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Effect of Compact Disc Materials on Listeners’ Song Liking

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Honors committee members associated with this project are as follows: Kathleen Silva, Francisco Silva, and Thomas Gross.
The present study examined how a compact disc’s (CD) packaging (e.g., cover art, liner notes, band photos) influenced how much people liked songs they listened to. In Experiment 1, participants listened to 2 songs while examining the packaging material from the artist’s CD (Matching group) or from another artist’s CD (Mismatching group). A third group did not examine anything while listening to the songs (Music Only group). In general, the groups did not differ in their ratings of the songs they listened to. Experiment 2 tried to improve on Experiment 1 by using 2 CD packages that were modified to make them more similar in terms of complexity and appeal. Participants in the matching group liked some of the songs they listened to more than the participants in the other groups did. Overall, it remains unclear whether a CD’s packaging can influence how much someone likes a song. Suggestions for the controls that should be implemented in future research are discussed.

*Keywords:* music, song liking, CD, audiovisual, music preferences, familiarity, ecological validity, genre
Effect of Compact Disc Materials on Listener’s Song Liking

Within music psychology, extensive research has examined the factors influencing a listener’s preference for music. Critic reviews and informational essays about the musical artist are two such factors that have been identified (K. Silva & Silva, 2009), but there is a lack of research on the effect of interacting with physical materials associated with the music. This question is of increasing importance as the digital age has initiated the transition from compact disc (CD) to MP3, causing a shift in sales within the music industry (“The Nielsen Company”, 2012). The materials once included with a physical CD purchase such as band photos, lyrics, and album art are now less accessible to the listener. It is important to study whether there is a cost to losing these items and determining the most effective marketing for musicians (Dechsakda, 2012). Another interesting trend is the recent increase in the sale of vinyl albums, with each year seeing an exponential increase in a medium that was nearly extinct (“The Nielsen Company”, 2014). If listeners prefer to view physical CD materials while listening to music, the experience is lost in the digitalization of albums.

Studies have examined the effect of certain contextual information on song liking. Providing essays, critic reviews, and music videos results in people liking songs more than those who are not provided such contexts (Iwamiya, 1994; K. Silva & Silva, 2009). Liking for songs also increases with repeated listening because of the increased familiarity with the music (Peretz, Gaudreau, & Bonnel, 1998; Ward, Goodman, & Irwin, 2013). A study on CD appeal revealed that when participants received certain item-specific information about a CD in the form of song clips, they found those CDs more appealing than CDs they did not hear the song clips for, again demonstrating the role of familiarity on preference (Cooke, H. Sujan, Sujan, & Weitz, 2002).
Despite these findings, there have been no studies aimed at examining whether viewing CD materials will increase song liking.

Providing an informational context for music has consistently resulted in an increase in song liking. K. Silva and Silva’s (2009) study found that reading an essay about an artist before hearing their music increased song liking and hearing a disc jockey’s review of an album increased liking for those songs. A subsequent study revealed that reviews significantly increased listeners’ preference for songs across different musical genres (K. Silva & Silva, 2010). These experiments highlight the importance of the context in which a song is presented by revealing that the information listeners know about a song before they listen to it can affect their preference.

As previously researched, more ecologically valid listening environments had greater increases in participants’ song liking. Ecological validity refers to the ability of the testing environment to approximate a typical listening environment. Factors such as listening through headphones resulted in the highest average song liking (Szpunar, Schellenberg, & Pliner, 2004). Another study found that being alone while listening to music and listening by choice are aspects of ecologically valid listening environments that increase listeners’ song liking (North, D. Hargreaves, & Hargreaves, 2004). Thus, it is important to consider the validity of the testing environment when examining song liking.

Music videos have been used to examine how visual stimuli affect song liking. It is clear that providing music videos increases music sales, but the reason for this has not been examined (Aufderheide, 1986). In Iwamiya’s (1994) study, 9 Japanese acoustic design students were presented with degraded audio tracks while they simultaneously viewed music videos and rated the music on a set of qualities (cleanness, richness, etc.). The degraded music was rated as richer
when listeners were provided with a music video compared to those who did not have a visual stimulus (Iwamiya, 1994).

Music performance studies revealed that watching musicians affected listeners’ understanding of a song’s meaning. Although watching the performance led to a deeper understanding of the music, it was not clear whether seeing performances influenced the perception of music quality (Platz & Kopiez, 2012). Similar studies revealed that seeing instruments being played can influence perception of pitch and seeing performances has been shown to increase audience interest in the music (Saldaña & Rosenblum, 1993; Schutz, 2008). These studies reveal that visuals can have a significant effect on influencing perception and interest which may be an important factor in determining listeners’ music preferences.

Many previous studies included the influence of live or recorded visuals as well as essays and reviews of music, but did not examine the effect of interacting with materials and artwork from the band. CDs often come packaged with behind the scenes band photos, album art, or lyrics that provide information about the music being heard just as essays provide background information. These materials also make the listener familiar with the artist’s style, which may affect their preference for the music as a result of their increased familiarity in the same way that becoming familiar with an artist through reviews of their music caused listeners to like those songs more (K. Silva & Silva, 2009).

The following experiments were designed to test the effect of viewing CD materials on listeners’ song liking. Two genres of music (rock and country) were used to examine the generality of an effect of CD materials on song liking to different genres (K. Silva & Silva, 2010). Experiment 1a examined the effect using a rock band since rock is the most popular genre of music, while Experiment 1b utilized a country band as country is a different musical style, but
still among the top four most popular genres (“The Nielsen Company”, 2014). Past research has shown that hearing essays and critic reviews enhance song liking and item-specific information (e.g., song clips) can make CDs more appealing (Cooke et al., 2002; K. Silva & Silva, 2009). Based on such research, the present study predicted that participants who interacted with physical CD materials would like music associated with those materials more than participants who were given unrelated materials or no materials while listening to music.

**Experiment 1a**

This experiment was designed to test whether CD materials increased participants’ liking of two songs from the alternative-rock band Portugal The Man. Providing an informational context about a band in the form of critic reviews and essays has been shown to increase listeners’ liking of the music (K. Silva & Silva, 2009). This effect may be due to the increased familiarity with the artist, which suggests that providing information through the materials from the CD heard will increase liking for the music (North & Hargreaves, 1995).

**Method**

**Participants**

Psychology students ($N = 58$) between the ages of 18 and 25 from a liberal arts university in California volunteered for the study and received partial course credit. Of these participants, their favorite genres were alternative (22%) and rap/hip-hop (22%), followed by rock (19%), pop (17%), country (7%), electronica/dance (5%), folk (4%), and religious (2%) and soul (2%).

**Materials**

Participants listened to Portugal The Man’s album *In the Mountain in the Cloud* on CD (Portugal. The Man, 2011). This CD received favorable reviews and peaked at number 11 in the top alternative albums for that year (“Portugal. The Man Chart History”, 2014). Participants
listened to “So American” (3 min 37 s), and “Floating--Time Isn’t Working My Side” (3 min 36 s), which are the first two tracks on the CD. All songs were played off of their original CD and in the same order to make the listening situation more similar to a real-world equivalent (Demorest, 1995).

The album artist, John Gourley, is one of the band members and has discussed the importance of visual materials that accompany a CD to the music. Gourley creates their album art by following a color scheme and style that mimics the musical style of the album (Rupolo, 2013). Because the art style is similar to the music style, familiarity with the music may be increased when viewing these materials while listening to the songs, which may increase song liking. The original Portugal The Man CD materials were scanned to obtain the album art, track listings, and artist credits (see Appendix A). Twenty copies of the materials were printed onto 11 cm X 25.5 cm rectangles to approximate their original size and were adhered to plain cardstock to replicate the original cardboard form of the CD.

To determine whether an increase in liking for music was due to the album-specific materials or whether an effect could be found regardless of what was being viewed, Experiment 1a utilized CD materials from the band The Avett Brothers. Research has found that providing song clips from a CD can cause consumers to rate those CDs as more attractive than unfamiliar CDs (Cooke et al., 2002). Following this, the present study chose an unfamiliar CD as the control materials. The Avett Brothers materials were used to examine the contrast in song liking between those who viewed materials from the CD they heard (matching materials) and those who viewed materials from a different CD (mismatching materials). These materials were later used to test the generalizability of the effect of CD materials to a different genre (see Experiment 1b).
Each participant answered two parts of a questionnaire after hearing the songs. The liking of the songs was measured in addition to asking (a) how appealing the materials were, (b) the participant’s favorite genre of music, (c) the participant’s gender, and (d) whether they had heard the music before (see Appendix B). Because participants in the Music Only control group were not given materials, they were not asked to rate material appeal. Overall song liking was measured by having participants draw a vertical line through a horizontal line 180 mm in length with a negative sign (-) on the left and positive (+) sign on the right and the midpoint of the line being marked with the number zero. The distance from the point the vertical line crossed the horizontal line to the zero was measured and used as the participant’s song liking in subsequent analyses. A vertical line drawn 10 mm to the right of the zero would be +10 while a line drawn 10 mm to the left of the zero would be -10 (K. Silva & Silva, 2009). Participants also indicated their gender and were asked to evaluate the appeal of the CD materials on a scale ranging from -10 (very unappealing), through 0 (neutral), and to +10 (very appealing) with higher scores indicating a more positive preference for the materials. This measure was collected to determine subjects’ liking of the songs as a result of how they viewed the materials they saw (K. Silva & Silva, 2009).

Participants indicated their favorite genre of music from a set of 14 genres to provide more data that may have further explained song preference (Rentfrow & Gosling, 2003). They also indicated whether they would be likely to purchase the album on a scale from 1 (I would definitely not buy this album) to 9 (I would definitely buy this album) to determine the effect of CD materials on purchasing tendencies. If participants were likely to purchase more music as a result of viewing materials, it would provide information for musicians about effective ways to market their music (Goldberg, Chattopadhyay, Gorn, & Rosenblatt, 1993). Whether participants
had heard the artist before was asked to exclude individuals from the data analyses to control for the effects of previous exposure on song liking (North & Hargreaves, 1995; K. Silva & Silva, 2009). This resulted in participants being excluded from the data analyses leaving the total participants at $N = 58$ for this experiment. All analyses were conducted at the 0.05 significance level.

**Procedure**

A between-subjects design with three levels was used and participants were assigned to groups randomly. Participants in the Matching (experimental) group ($n = 21$) were given a copy of the materials included with the Portugal The Man CD and those in the Mismatching (information control) group ($n = 15$) were given the materials included with The Avett Brothers CD (see Experiment 1b). Both groups were instructed to examine materials while listening to the Portugal The Man songs. Participants in the Music Only (no material control) group ($n = 22$) listened to the same tracks as the other groups but were not given any materials.

Participants were tested in groups and listened to the songs through a speaker system in a quiet classroom (K. Silva & Silva, 2009). Due to limited availability, different rooms were used throughout the four-week time span of testing. Participants in each group listened to the songs in the same order and rated their liking for each song after it was played (K. Silva & Silva, 2009). After rating Song 2, participants in the Matching and Mismatching groups also rated the appeal of the materials.

**Results and Discussion**

The top graph of Figure 1 shows, on average, how much participants liked Song 1 (“So American”). The amount they liked the song did not differ between the three groups [One-way ANOVA: $F (2, 55) = 2.65, p = 0.08$]. The strength of the effect was measured through eta
squared which yielded a small effect size, $\eta^2 = 0.09$. Although the Matching group ($M = 33.57; SD = 31.28$) appeared to like the song more than those in the Mismatching group ($M = 23.33; SD = 29.48$) and the Music Only group ($M = 9.18; SD = 40.96$), these differences were not statistically significant.

The bottom graph of Figure 1 shows the average liking of Song 2 (“Floating--Time Isn’t Working My Side”). The differences in song liking between the groups was not statistically significant [One-way ANOVA: $F(2, 55) = 2.84, p = 0.07, \eta^2 = 0.09$]. Though not significant, those in the Matching group ($M = 28.43; SD = 29.72$), appeared to like the song more than those in the Mismatching group ($M = 19.07; SD = 31.15$) and the Music Only group ($M = 1.50; SD = 46.94$).

Figure 2 shows how appealing participants found the matching and mismatching CD materials. The results showed that the average material appeal did not differ when examining Portugal The Man materials ($M = 4.74; SD = 3.25$) or The Avett Brothers materials ($M = 5.10; SD = 3.40$) [Independent-samples, $t(34) = -0.32, p = 0.75$, two-tailed, $d = 0.11$].

Table 1 shows the average likelihood of purchasing music from the album. This analysis was conducted to reveal the effect of examining CD materials on participants’ purchasing tendencies, and showed that the likelihood of purchasing did not differ among the groups [One-way ANOVA: $F(2, 55) = 0.68, p = 0.51, \eta^2 = 0.02$].

The results regarding song liking were in the direction expected with liking increasing when participants saw the materials from the CD they heard. In line with K. Silva and Silva’s (2009) findings, the familiar context provided by the matching CD materials resulted in the highest average song liking, but a significant effect was not found. This could be due to the different testing conditions, including different rooms with different quality speaker systems,
different testing times, and different testing days. Given this variability in conjunction with the approaching $p$-values, it is possible that there may be a significant effect when testing environments are controlled.

It was expected that seeing materials from the CD heard would result in the highest song liking and subsequently the highest willingness to purchase music (Goldberg et al., 1993), but Experiment 1a found no difference in purchasing tendencies regardless of materials examined. However, participants noted on their data sheets that they never purchase music regardless of how much they liked it. Perhaps participants liked and wanted to hear more of the music, but they would seek out alternative ways to hear it. Billboard has linked recent declines in album sales to an increase in music streaming (Christman, 2014), so it may have been beneficial to ask for listening tendencies rather than purchasing.

Experiment 1a approached a significant effect of CD materials on song liking for those who listened to Portugal The Man, but it was important to determine whether these results were specific to the chosen music genre. Genre preference has been shown to influence song liking (Schafer & Sedlmeier, 2009), so Experiment 1a was replicated using a different genre to test the generalizability of the results.

**Experiment 1b**

Experiments 1a and 1b were performed simultaneously to determine whether providing album materials affects song liking ratings generally across musical genres (K. Silva and Silva’s, 2009). In Experiment 1b, the same testing procedures from Experiment 1a were used with music from the county-folk band, The Avett Brothers.
Method

Participants

Participants included undergraduate college students \((N = 54)\) who were recruited the same way as in Experiment 1a. Of these participants, their favorite genres were alternative (30%), followed by rap/hip-hop (28%), pop (17%), electronica/dance (9%) and rock (9%), country (6%), and religious (1%).

Materials

Participants listened to The Avett Brothers and heard “The Once and Future Carpenter” (4 min 52 s) and “Live and Die” (4 min 31 s) (The Avett Brothers, 2012). These are the first two songs on the folk album \textit{The Carpenter} released in 2012. Similarly to Portugal The Man, the album illustrator is one of the band members and matches the musical style of the album with the art style of the CD (Smith, 2013). As noted previously, this detail is important as an increase in liking is likely to result from an increase in familiarity with the music heard.

The Avett Brothers materials were scanned and 20 copies were printed onto 11.5 cm X 24 cm rectangles, folded in half, and stapled together to closely replicate the original CD insert (see Appendix C). An important note regarding the differences between the materials in Experiments 1a and 1b concerns the color and length. The original Portugal The Man materials did not include song lyrics and were colorful, whereas The Avett Brothers materials were longer due to the inclusion of lyrics, and were mostly neutral in color. Experiments 1a and 1b tested for effects using the original album materials, so these differences were left uncontrolled (Demorest, 1995).
Procedure

Experiment 1b replicated the design used in Experiment 1a. Participants in the Matching group \((n = 21)\) saw The Avett Brothers CD materials while those in the Mismatching group \((n = 17)\) saw the Portugal The Man CD materials. Both groups were instructed to examine the materials while listening to The Avett Brothers’ songs. Those in the Music Only group \((n = 16)\) listened to the same tracks as the other groups but were not given any materials. To help eliminate biased responses, 6 participants were excluded from the analyses because they recognized the artist, leaving 54 total participants to be analyzed. Experiment 1b followed the other procedures outlined in Experiment 1a.

Results and Discussion

The top graph of Figure 3 shows, on average, how much participants liked Song 1 (“The Once and Future Carpenter”). Song liking did not differ between the three groups [One-way ANOVA: \(F(2, 51) = 0.57, p = 0.57, \eta^2 = 0.02\)]. Though the Matching group liked the song most \((M = 24.00; SD = 20.88)\) when compared to the Mismatching group \((M = 15.29; SD = 45.93)\) and the Music Only group \((M = 11.13; SD = 44.34)\), these differences were not statistically significant.

The bottom graph of Figure 3 shows the average liking of Song 2 (“Live and Die”). Song liking differed significantly between the three groups [One-way ANOVA: \(F(2, 51) = 4.55, p = 0.02, \eta^2 = 0.15\)]. A Tukey’s HSD post-hoc test revealed that the Matching group \((M = 17.71; SD = 36.94)\) liked the song significantly more than the Music Only group \((M = -23.00; SD = 44.39.17) [p = 0.01]\). The Matching and Mismatching groups \((M = -0.06; SD = 46.16)\) did not rate the song differently \((p = 0.38)\), nor did the Music Only and the Mismatching groups \((p =
0.25). In sum, the Matching group liked the song significantly more than the Music only group, which was expected if interacting with CD materials affected song liking.

Figure 4 shows how appealing participants found the materials. The Avett Brothers matching materials \((M = 5.43; SD = 2.04)\) were rated as more appealing than the Portugal The Man mismatching materials \((M = 2.06; SD = 3.23)\) [Independent-samples, \(t(36) = 3.92, p = 0.00, \text{two-tailed}, d = 1.25\)], which was expected if item-specific information increases the appeal of a CD (Cooke et al., 2002).

Table 2 shows how likely participants would be to purchase the album. The likelihood of purchasing did not differ between those in the three groups [One-way ANOVA: \(F(2, 51) = 0.07, p = 0.93, \eta^2 = 0.00\)]. As with the results of Experiment 1a, these results may be due to the wording of the purchasing question, a point which is discussed further below.

Figure 5 shows, on average, the liking of the songs for all participants. A three-way mixed ANOVA examined the effect of song heard (Song 1 vs. Song 2), the type of materials viewed (matching materials vs. mismatching materials vs. music only), and the artist heard (Portugal The Man or The Avett Brothers) on participants’ ratings of song liking. There was a significant main effect of the song heard \([F(1, 106) = 9.92, p = 0.00]\). Participants rated Song 1 \((M = 19.63; SD = 36.45)\) higher than Song 2 \((M = 8.21; SD = 41.58)\). There was a significant main effect of the material type \([F(2, 106) = 6.70, p = 0.00]\). Song liking was higher for those who viewed matching materials rather than those who just heard the songs according to a Tukey’s HSD post-hoc test \((p = 0.00)\). There was no significant difference in song liking between those who viewed matching materials and mismatching materials \((p = 0.25)\), or those who viewed mismatching materials or just heard the music \((p = 0.19\); see Table 3 for a summary of group means). There was no significant interaction between the song heard and the type of
materials examined \(F(2, 106) = 1.46, p = 0.24\), between the song heard and the artist heard \(F(1, 106) = 2.79, p = 0.10\), or between the song heard, materials examined, and artist heard \(F(2, 106) = 0.97, p = 0.38\).

In examining the effect of CD materials on song liking, there was a significant effect for Song 2 by The Avett Brothers. Though there was no significant difference in liking for Song 1, the group means were in the same direction as for Song 2 with those who viewed materials from the CD they heard liking the song the most. Overall, the trend was found despite using different speaker systems that caused a difference in the quality of the music. It is possible that a reduction in such variability may result in a significant overall effect of CD materials on song liking.

There were differences between the material sets that may have influenced how appealing participants found the materials. The Portugal The Man materials were made on one piece of folded cardboard with album art and liner notes while The Avett Brothers materials consisted of a booklet with lyrics, band photos, and liner notes. Participants who listened to The Avett Brothers liked The Avett Brothers materials significantly more than the Portugal The Man materials in Experiment 1b. This suggests that the lengthier and more interactive materials from The Avett Brothers may produce more significant effects than the less detailed Portugal The Man materials, which is supported by research that found an increase in song quality ratings through exposure to complex visual stimuli such as music videos (Iwamiya, 1994). Based on this past research and the results from Experiments 1a and 1b, the Portugal The Man materials were modified in later experiments and made more complex. No pretests were run for Experiments 1a and 1b, so the modified materials were pretested before Experiment 2a to determine whether one of the material sets was more appealing than the other.
As with Experiment 1a, Experiment 1b found no significant effect of CD materials on participants’ tendencies to purchase music from the artist. Altering the wording of this question would better reflect the way people currently listen to music (Christman, 2014; “The Nielsen Company”, 2014). Determining the likelihood of participants to listen to more of the music rather than purchase it takes into consideration the rise in music streaming while still examining whether those with matching materials are more likely to seek out more from the artist.

Overall, examining Experiments 1a and 1b revealed limitations in the testing environments and materials that may have affected song liking ratings. Neither of the songs from Experiment 1a yielded a significant effect, but the data from both songs approached significance with the Matching groups having the highest average song liking. For Experiment 1b, there was no significant effect for liking of Song 1, but Song 2 revealed a significant effect. These differing results may be due to variability in the testing environments and materials. Because the Portugal The Man materials were rated as less appealing than The Avett Brothers materials in Experiment 1b, Experiment 2 aimed to make the materials more similar. The experiment also attempted to reduce variability by testing all subjects under the same conditions (e.g., same testing room, same speaker system). Other than these controls, Experiment 2 systematically replicated the testing procedures used in Experiments 1a and 1b.

**Experiment 2a**

Experiment 2a aimed to replicate Experiment 1 while controlling several factors. First, the significant effect found for CD appeal in Experiment 1b may be due to the more appealing nature of The Avett Brothers materials, so the Portugal The Man materials were modified to be more similar in length and complexity to The Avett Brothers materials. Secondly, to address the question about participants’ willingness to purchase music, the data sheets were modified to
reflect modern trends in music listening (Christman, 2014). The modified question asked how likely participants would be to listen to more music as opposed to purchase more music. Thirdly, to control for variability in the testing environments, the same room was utilized for all participants. This controlled for any differences in the presentation of the audio. Aside from these differences, the same procedures from Experiment 1 were replicated.

**Method**

**Participants**

Participants included undergraduate students ($N = 43$) who participated to receive credit for an introductory psychology course. Of these participants, they ranked their favorite genres as rap/hip-hop (33%), followed by rock/alternative (28%), pop (21%), country/folk/blue-grass (14%), and heavy metal (2%) and soul (2%).

**Materials**

**CD Materials.** The same Avett Brothers materials as in Experiments 1a and 1b were used while The Portugal The Man materials were modified to be more similar to The Avett Brothers materials (see Appendix D). Images of similar resolution quality as in The Avett Brothers materials were added (Wang, Bovik, Sheikh, Simoncelli, 2004). Like The Avett Brothers, the modified Portugal The Man materials were four double-sided pages folded in half and included the same number of pictures as well as included the lyrics to all of the songs. The pictures were from the artist who designed the original Portugal The Man materials and the colors were manipulated to match the color scheme of the album as a whole (“The Fantastic The”). The lyrics were accessed from an online database and efforts were made to match the text and color already used for the original materials (“Google Play”).
Stimulus Testing. Twenty-three undergraduate students participated in the stimulus testing. The presentation of the materials was counterbalanced so half of the participants saw the Portugal The Man materials first while the other half saw The Avett Brothers CD materials first. Participants were given 1 min to view each set before rating the materials’ appeal on the same scale used for Experiments 1a and 1b (K. Silva & Silva, 2009). The ratings of the Portugal The Man materials ($M = 2.81; SD = 3.50$) were similar to The Avett Brothers materials ($M = 4.10; SD = 3.65$) [Paired-samples, $t(20) = -1.21$, $p = 0.24$, $d = 0.36$].

Questionnaire. In modifying the genre preference question, the original 14 genres were grouped based on similarities in musical style to produce a final list of nine genres (“AllMusic”, 2014). Excluding participants whose genre preferences deviated from the artist heard has facilitated significant effects on song liking (K. Silva & Silva, 2009). Thus, participants in Experiments 2a and 2b were asked to rank their favorite genres from 1 to 9 to examine whether genre preference affects song liking ratings. Participants also indicated how likely they would be to listen to more music from the album on a scale from 1 (I would definitely listen to this album) to 9 (I would definitely not listen this album), with lower scores indicating a higher likelihood of listening to more music (Goldberg et al., 1993). Other than these modifications, the questionnaire used for Experiments 1a and 1b was replicated for Experiments 2a and 2b.

Procedure

Participants listened to the same songs (“So American” and “Floating--Times Isn’t Working My Side”) from Portugal The Man as used in Experiment 1a while viewing either modified Portugal The Man materials, The Avett Brothers materials, or no materials. The same procedure from Experiments 1a and 1b were followed using the newly modified album materials
and updated questionnaire. Similarly, the data were subjected to the same statistical analyses used in Experiments 1a and 1b.

**Results and Discussion**

The top graph of Figure 6 shows, on average, how much participants liked Song 1 (“So American”). The differences in liking between the three groups was not statistically significant [One-way ANOVA: $F(2, 40) = 1.58, p = 0.22, \eta^2 = 0.07$], though the order of the means was consistent with that of Experiment 1a showing that those who saw the matching materials from the Portugal The Man CD ($M = 29.86; SD = 40.75$) like the song most when compared to those who saw the mismatching materials from The Avett Brothers CD ($M = 4.50; SD = 36.10$) or just heard the music ($M = 8.80; SD = 43.89$).

The bottom graph of Figure 6 shows, on average, how much participants liked Song 2 (“Floating--Time Isn’t Working My Side”). The differences in song liking between the groups were statistically significant [One-way ANOVA: $F(2, 40) = 3.27, p = 0.048, \eta^2 = 0.14$]. A Fisher’s LSD post-hoc test revealed that those in the Matching group ($M = 32.00; SD = 39.60$) liked the song more than those in the Mismatching group ($M = -3.71; SD = 38.93$) [$p = 0.03$] and those in the Music Only group ($M = -1.93; SD = 46.23$) [$p = 0.04$]. There was no significant difference between the Mismatching and Music Only groups ($p = 0.91$).

Table 4 shows how likely participants would be to listen to more from the album. This was examined to determine whether CD materials would cause listeners to seek out more from the artist without having to spend money (Christman, 2014). The means suggested that those in the Matching group ($M = 3.93; SD = 2.73$) wanted to listen to the album more than those in the Mismatching group ($M = 4.50; SD = 1.70$) or the Music Only group ($M = 6.00; SD = 2.42$), but
the results only approached significance [One-way ANOVA: $F(2, 40) = 3.09$, $p = 0.06$, $\eta^2 = 0.13$].

As with Experiment 1a, analyses from Experiment 2a did not reach statistical significance for most measures. Although the liking for Song 1 was relatively far from significance ($p = 0.22$), the liking for Song 2 did reveal a significant effect ($p = 0.048$). Additionally, the results from Song 2 in Experiment 2a had a larger effect size ($\eta^2=0.14$), than Experiment 1a ($\eta^2=0.09$). However, Song 1 in Experiment 2a had a similar effect size ($\eta^2 = 0.07$) as in Experiment 1a ($\eta^2=0.09$).

There was no difference in people’s willingness to purchase more music from the artist they heard in Experiments 1a and 1b. Though the modified question about song listening tendencies did not produce a significant effect in Experiment 2a ($p = 0.06$, $\eta^2 = 0.13$), the results approached an effect more closely than in Experiment 1a ($p = 0.51$, $\eta^2 = 0.02$). Those who like the songs more are expected to listen to more from the artist (Goldberg et al., 1993), and the data from Experiment 2a approached a significant effect in the direction of this prediction as those in the Matching group liked the song the most and were most likely to listen to more from the album. However, a significant effect for listening tendencies was not found.

Overall, after attempting to reduce the within-subjects variability by using the same testing environment and similar materials, Experiment 2a revealed a significant effect for Song 2 and approached an effect for song listening. Because no significance was found for Experiment 1a, it suggests that when participants are tested in the same room and with more complex materials significant effects are more likely to be found. To examine the generalizability of results while employing these controls, the procedure was replicated using a different genre of music.
Experiment 2b

Experiment 2b replicated all aspects of Experiment 2a using The Avett Brothers’ songs rather than the Portugal The Man songs.

Method

Participants

Participants included undergraduate students ($N = 21$) who participated for introductory psychology course credit and ranked their favorite genres as country/folk/blue-grass (24%) and rock/alternative (24%), followed by pop (19%), electronica/dance (14%) and rap/hip-hop (14%), and classical (5%).

Materials

Experiment 2b used the first two songs from The Avett Brothers’ CD. Participants in the Matching group saw The Avett Brothers materials while those in the Mismatching group saw the Portugal The Man materials. The materials and data sheets used were identical to those in Experiment 2a.

Procedure

All participants were tested in the same room as in Experiment 2a. All songs were played at the same volume and participants received the same instructions as those in Experiment 2a.

Results and Discussion

The top graph of Figure 7 shows the average liking of Song 1 (The Once and Future Carpenter)$^3$. The difference in song liking between the groups was statistically significant [One-way ANOVA: $F (2, 18) = 4.38, p = 0.03, \eta^2 = 0.33$]. The Matching group liked the song significantly more than the Music Only group ($p = 0.02$). However, the Matching and
Mismatching groups did not rate the songs differently ($p = 0.26$), nor did the Mismatching and Music Only groups ($p = 0.48$).

The bottom graph of Figure 8 shows the average liking of Song 2 (Live and Die). The differences in song liking between the groups were statistically significant [One-way ANOVA: $F(2, 18) = 5.67, p = 0.01, \eta^2 = 0.39$]. The Matching group liked the song significantly more than the Music Only group ($p = 0.02$), but the Matching and Mismatching groups did not rate the songs differently ($p = 0.07$), nor did the Mismatching and Music Only groups ($p = 0.76$).

Table 5 shows how likely participants were to listen to more from the album. There was a statistically significant effect [One-way ANOVA: $F(2, 18) = 6.39, p = 0.01, \eta^2 = 0.42$]. The Matching group was more likely than the Music Only group to listen to more from the album ($p = 0.01$), but likelihood of listening to more from the album did not differ between the Matching and Mismatching groups ($p = 0.30$), or the Mismatching and Music Only groups ($p = 0.18$).

Figure 8 shows, on average, the liking of the songs for all participants. A three-way mixed ANOVA examined the effect of song heard (Song 1 vs. Song 2), the type of materials examined (matching materials vs. mismatching materials vs. music only), and the artist heard (Portugal The Man or The Avett Brothers) on participants’ ratings of song liking. There was a significant main effect of the song heard [$F(1, 59) = 5.37, p = 0.02$]. Participants rated Song 1 ($M = 14.43; SD = 43.21$) higher than Song 2 ($M = 5.94; SD = 45.07$). There was a significant main effect of the material type [$F(2, 59) = 9.34, p = 0.00$]. Those with matching materials liked the songs more than those with mismatching materials ($p = 0.00$), and those who heard the music only ($p = 0.00$), but there was no significant difference between those who viewed mismatching materials or heard the music only ($p = 1.00$; see Table 6 for a summary of group means).
was no significant interaction between the song heard and the type of materials examined \( [F (2, 59) = 0.62, p = 0.54] \), between the song heard and the artist heard \( [F (1, 59) = 2.90, p = 0.09] \), or between the song heard, the materials examined, and the artist heard \( [F (2, 59) = 0.06, p = 0.94] \).

The results from Experiment 2b produced more significant results with larger effect sizes for the effect of CD materials on song liking than were found in previous experiments. However, in Experiment 2a, the song liking results from Song 1 were far from significance, so the controls (e.g., same speaker systems, modified materials) did not consistently produce significant effects. However, participants’ responses to the question about listening to more from the album seemed to be a more accurate measure of music consumption tendencies than music purchasing. For those who heard The Avett Brothers, participants in the Matching group had the highest average song liking and were significantly more likely to listen to more from the artist, a result that yielded a large effect size \( (p = 0.01, \eta^2 = 0.42) \). The data from Experiment 2a did not reach statistical significance, but it did closely approached significance with a medium effect size \( (p = 0.06, \eta^2 = 0.13) \).

**General Discussion**

The present study aimed to examine the effect of viewing CD materials on song liking. In general, participants who saw materials from the CD they heard liked the songs more than those who saw materials from a different CD or just heard the music. These findings aligned with previous research that showed how learning certain information about an artist and developing a familiarity with them can increase liking (North & Hargreaves, 1995; Peretz et al., 1998; K. Silva & Silva, 2009; Ward et al., 2013).

Though the results of this study did not produce significant effects for every song tested, they do offer some support for the idea that familiarity with an artist causes a greater liking for
their music. This was supported by the results from the longer Avett Brothers materials and the modified Portugal The Man materials. In Experiment 1b, the longer and more informative Avett Brothers materials produced a significant effect for Song 2 ($p = 0.02$). Consistent with this, when the Portugal The Man materials were lengthened to include more pictures and lyrics, a significant effect with a larger effect size was found for Song 2 in Experiment 2a ($\eta^2 = 0.14$) than for the same song in Experiment 1a ($\eta^2 = 0.09$). This suggests that the length and information present in the materials may be an important variable for future research to consider.

Regarding which groups tended to differ in song liking ratings, the significant effects consistently arose between those who saw materials that matched the songs they heard and those who just listened to the music. Though the means were consistently higher for those who saw materials from the CD they heard rather than those with materials from a different CD, this was generally not statistically significant despite the prediction that the familiarity with the matching materials would increase song appeal over unfamiliar materials (North & Hargreaves, 1995). The reason for this may be explained by the nature of the materials used. Previous research found significant effects of providing reviews on song liking using a control stimulus that was entirely unrelated to the subject of the study, such as a report on brain biology (K. Silva & Silva, 2009), whereas the present study used CD materials from an unrelated artist. It would be helpful in future research to provide the information control group with a neutral stimulus rather than similar CD materials to determine the effect of matching album materials over arbitrary visual stimuli.

In Experiment 2a, the music purchasing question was changed to measure the likelihood that people would listen to more from the album. The song purchasing question revealed small effect sizes ($\eta^2 = 0.02, \eta^2 = 0.00$) whereas the song listening question produced larger effect sizes
(η² = 0.13, η² = 0.42). Those in Experiment 2b were more likely to listen to more music from the album if they saw the materials from the CD they heard. Although musicians directly benefit most from people purchasing their music, these results are meaningful since listening to songs over a streaming site can result in financial gains (e.g., payment for every stream of a song), especially as the trend toward streaming increases (Spotify, 2013; Christman, 2014).

Previous studies found that visual stimuli affected listeners’ liking and interest in certain music, just as those who viewed materials from a CD they heard were more likely to listen to more from the artist. These effects rely on the theory that visual information increases an audience’s emotional engagement, thereby producing greater interest in the music (Saldaña & Rosenblum, 1993; Schutz, 2008). Combining this with the idea that hearing song clips increases CD appeal over unfamiliar CDs (Cooke et al., 2002), viewing CD materials that match the music heard may increase interest in the music. As Experiment 2b found, the type of CD materials examined caused a significant effect on the listener’s desire to hear more from the album (p = 0.01, η² = 0.42), while Experiment 2a approached significance in this direction (p = 0.06, η² = 0.13). Musicians should consider this tendency in marketing their music; selling CDs with materials that complement the musical style and include more information might increase song liking and the desire to hear more of the music.

Despite efforts to increase ecological validity and reduce within-group variability, the present study contained limitations. Audio quality can influence subjective ratings of song liking (Iwamiya, 1994), and participants in Experiments 1a and 1b were tested in rooms with speaker systems of differing quality, while participants in Experiments 2a and 2b were tested with the same higher-quality speaker system. As a result, Experiments 2a and 2b produced three significant effects for song liking whereas Experiments 1a and 1b produced only one. Regarding
limitations of the experimental procedure, participants were tested in groups during the morning and afternoon, despite previous research suggesting that the average listener was alone when hearing music and more often listened to music in the evenings. Additionally, when participants listened in groups with strangers they tended to like music significantly less than when they heard music individually (North et al., 2004), which may explain the lack of significance seen in the present experiments. Realistically no study can control for all of these factors, but future studies may benefit from testing participants individually through headphones to control for certain aspects of sound quality and enhance the ecological validity of the results (Szpunar et al., 2004).

On a related note about ecological validity, the first two songs were played from the CDs to approximate a realistic listening experience. The results revealed more significant effects for Song 2 in the different experiments, which may be a result of the order in which the songs were played rather than the influence of the materials viewed. Future research may benefit from counterbalancing the order of the music to determine the effect of materials on song liking.

The lack of significant effects in some of the experiments may indicate that the preference for style and genre is stronger than the effect of materials (K. Silva & Silva, 2009; Schafer & Sedlmeier, 2009). Examining the distribution of genre preferences revealed that a higher percentage (24%) of those in Experiment 2b liked country music than any of the other tested groups. As past research has shown, preference for a musical style is a predictor of song preference (Schafer & Sedlmeier, 2009). In K. Silva and Silva’s (2009) study, significance was found when participants whose music preferences deviated from the target genre were eliminated. Because the present study used such a limited sample, participants were included in the analyses despite their personal genre preferences, possibly contributing to the lack of
CD MATERIALS AND SONG LIKING

statistical significance. Future studies may benefit from pre-screening individuals for genre preferences and including only those whose preferences match the music being heard.

The results from the present study aimed to determine whether there was a loss in moving from physical CD materials to digital downloading and streaming of music. Partial basis for this idea came from the recent increases in vinyl sales and the idea that interacting with physical materials may increase song liking (North & Hargreaves, 1995; “The Nielsen Company”, 2014). Although moderate effects were found, it is unclear from the present study whether such an effect is lost in a digital purchase. Digital albums are downloaded straight to the purchaser’s computer, allowing them to view accompanying images while listening to the music (iTunes, 2015). These digital images should be compared to the physical CD materials to examine whether there is a difference in song liking between these two mediums. Examinations between virtual and tangible games and internet purchasing and in-store purchasing tendencies reveal a recent trend toward preferring the virtual situations (Kukar-Kinney, Ridgway, & Monroe, 2009; Soute, Kaptein & Markopoulos, 2009). The present study found that those who viewed physical materials from the CD they heard liked the music more than those who just heard the music. To determine whether this effect is lost in the transition to digital music, digital materials should be compared to physical materials to make clearer whether the decline of physical CDs results in the loss of a significant effect on listeners’ song liking.
References


Footnotes

1 For Experiment 1a, 8 participants were excluded due to an unusual variance. These subjects were in a vastly different seating position, so it was decided that these data should not be included in the final analyses. Seventeen other subjects were also excluded from the data analyses due to a computer error which caused the wrong tracks to play.

2 Because participants were excluded if they recognized the artist they heard, 9 participants were not included in the final analysis resulting in this sample size.

3 Due to the small sample size, a Kruskal-Wallis analysis of variance was conducted for both songs in Experiment 2b. The results from Song 1 yielded a significant effect ($p = 0.02$), as did the results from Song 2 ($p = 0.01$).
Table 1

_Average Likelihood of Purchasing for those who Heard Portugal The Man_

<table>
<thead>
<tr>
<th>Type of Materials</th>
<th>n</th>
<th>M (SD)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Matching</td>
<td>21</td>
<td>4.05(2.16)</td>
</tr>
<tr>
<td>Mismatching</td>
<td>15</td>
<td>3.53(2.20)</td>
</tr>
<tr>
<td>Music Only</td>
<td>22</td>
<td>3.27(2.25)</td>
</tr>
</tbody>
</table>

_Score. Higher scores here indicate a higher likelihood of purchasing the album._
Table 2

*Average Likelihood of Purchasing for those who Heard The Avett Brothers*

<table>
<thead>
<tr>
<th>Type of Materials</th>
<th>n</th>
<th>Likelihood of Purchasing</th>
</tr>
</thead>
<tbody>
<tr>
<td>Matching</td>
<td>21</td>
<td>3.10(1.61)</td>
</tr>
<tr>
<td>Mismatching</td>
<td>17</td>
<td>3.24(1.64)</td>
</tr>
<tr>
<td>Music Only</td>
<td>16</td>
<td>3.00(2.13)</td>
</tr>
</tbody>
</table>

*Note.* Higher scores here indicate a higher likelihood of purchasing the album.
Table 3

Average Ratings of Song Liking for Different Artists Depending on Type of Materials Given

<table>
<thead>
<tr>
<th>Material Group</th>
<th>Portugal The Man (Song 1)</th>
<th>Portugal The Man (Song 2)</th>
<th>The Avett Brothers (Song 1)</th>
<th>The Avett Brothers (Song 2)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Matching</td>
<td>33.57 (31.28)</td>
<td>28.43 (29.72)</td>
<td>24.00 (20.88)</td>
<td>17.71 (36.94)</td>
</tr>
<tr>
<td>Mismatching</td>
<td>23.33 (29.48)</td>
<td>19.07 (31.15)</td>
<td>15.29 (45.93)</td>
<td>-0.06 (36.94)</td>
</tr>
<tr>
<td>Music Only</td>
<td>9.18 (40.96)</td>
<td>1.50 (46.95)</td>
<td>11.13 (44.34)</td>
<td>-23.00 (39.17)</td>
</tr>
</tbody>
</table>
Table 4

*Average Likelihood of Listening to More Music for those who Heard Portugal The Man*

<table>
<thead>
<tr>
<th>Material Group</th>
<th>n</th>
<th>M (SD)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Matching</td>
<td>14</td>
<td>3.93(2.73)</td>
</tr>
<tr>
<td>Mismatching</td>
<td>14</td>
<td>4.50(2.44)</td>
</tr>
<tr>
<td>Music Only</td>
<td>15</td>
<td>6.00(2.42)</td>
</tr>
</tbody>
</table>

*Note.* Lower scores here indicate a higher likelihood of listening to more music from the album.
Table 5

Average Likelihood of Listening to More Music for those who Heard The Avett Brothers

<table>
<thead>
<tr>
<th>Material Group</th>
<th>n</th>
<th>Likelihood of Listening M (SD)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Matching</td>
<td>9</td>
<td>3.56(2.13)</td>
</tr>
<tr>
<td>Mismatching</td>
<td>6</td>
<td>5.17(2.32)</td>
</tr>
<tr>
<td>Music Only</td>
<td>6</td>
<td>7.33(1.37)</td>
</tr>
</tbody>
</table>

*Note.* Lower scores indicate a higher likelihood of listening to more music from the album.
Table 6

*Average Ratings of Song liking for Different Artists Depending on Type of Materials Given*

<table>
<thead>
<tr>
<th>Material Group</th>
<th>Portugal The Man</th>
<th>The Avett Brothers</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Song 1</td>
<td>Song 2</td>
</tr>
<tr>
<td>Matching</td>
<td>29.86(40.75)</td>
<td>32.00(39.60)</td>
</tr>
<tr>
<td>Mismatching</td>
<td>1.13(37.15)</td>
<td>-6.47(39.00)</td>
</tr>
<tr>
<td>Music Only</td>
<td>8.80(43.89)</td>
<td>4.80(40.23)</td>
</tr>
</tbody>
</table>
Figure 1. How much participants liked Song 1 (top) and Song 2 (bottom) by Portugal The Man. Those in the Matching group listened to the songs while viewing the materials from the CD they were listening to. Those in the Mismatching group listened to the songs while viewing the CD materials from another artist. Those in the Music Only group listened to the songs without viewing any materials. The error bars indicate the standard deviations of the groups.
Figure 2. How appealing participants in the Matching group found the Portugal The Man materials and how appealing participants in the Mismatching group found The Avett Brothers materials while they listened to Portugal The Man songs.
Figure 3. How much participants in the Matching, Mismatching, and Music Only groups liked Song 1 (top) and Song 2 (bottom) by The Avett Brothers. The error bars indicate the standard deviations of the groups.
Figure 4. How appealing participants in the Matching group found the Portugal The Man materials and how appealing participants in the Mismatching group found The Avett Brothers materials while they listened to The Avett Brothers songs.
Figure 5. How much participants liked all songs based on the type of materials given, the artist heard, and whether the first or second song was heard.
Figure 6. How much participants in the Matching, Mismatching, and Music Only groups liked Song 1 (top) and Song 2 (bottom) by Portugal The Man. The error bars indicate the standard deviations of the groups. Those in the Matching group examined the modified materials for Portugal The Man.
Figure 7. How much participants in the Matching, Mismatching, and Music Only groups liked Song 1 (top) and Song 2 (bottom) by the Avett Brothers. The error bars indicate the standard deviations of the groups.
Figure 8. How much participants liked all songs based on the type of materials given, the artist heard, and whether the first or second song was heard.
Appendix A
Appendix B

1. Please rate the song by drawing a vertical line on the line below in the spot that best indicates your liking of Song 1.

- ____________________________________________________ 0 ____________________________________________________ +

2. Please rate the song by drawing a vertical line on the line below in the spot that best indicates your liking of Song 2.

- ____________________________________________________ 0 ____________________________________________________ +

3. Rate the appeal of the booklet on a scale with -10=Very unappealing, +10=Very appealing, and 0=neutral:

<table>
<thead>
<tr>
<th>Very unappealing</th>
<th>Neutral</th>
<th>Very appealing</th>
</tr>
</thead>
<tbody>
<tr>
<td>-10  -9  -8  -7  -6  -5  -4  -3  -2  -1  0  +1  +2  +3  +4  +5  +6  +7  +8  +9  +10</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

4. Please indicate your favorite genre of music (choose one):

Blues _____  Jazz _____  Classical _____  Folk _____  Rock _____  Alternative _____  Heavy metal _____  Country _____  Sound tracks _____  Religious _____  Pop _____  Rap/hip-hop _____  Soul/funk _____  Electronica/dance _____

5. How likely would you be to purchase this album?

I would definitely not buy this album (1)                                     I would definitely buy this album (9)

1               2               3               4               5               6               7               8               9

6. Did you recognize either of these songs or the artist? (circle one): Y     N

7. Please indicate your gender:   M ___  F ___    Prefer not to answer: ___
Appendix C
Appendix E

1. Please rate the song by drawing a vertical line on the line below in the spot that best indicates your liking of Song 1.

   - ____________________________________________________ 0 ____________________________________________________ +

2. Please rate the song by drawing a vertical line on the line below in the spot that best indicates your liking of Song 2.

   - ____________________________________________________ 0 ____________________________________________________ +

3. Rate the appeal of the booklet on a scale with -10=Very unappealing, +10=Very appealing, and 0=neutral:

   Very unappealing          Neutral          Very appealing
   -10  -9  -8  -7  -6  -5  -4  -3  -2  -1  0  +1  +2  +3  +4  +5  +6  +7  +8  +9  +10

4. Please rank the genres from your favorite (1) to least favorite (9):
CD MATERIALS AND SONG LIKING

Classical/Instrumental  ____  Rock/Alternative  ____  Heavy metal  ____  Country/Folk/Blue-Grass  ____
Pop  ____  Rap/Hip-Hop  ____  Soul/Funk/R&B  ____  Electronica/Dance  ____  Jazz  ____

5. How likely would you be to listen to more songs from this album?

   I would definitely listen to this album (1)                     I would definitely not listen to this album (9)
   1               2               3               4               5               6               7               8               9

6. Did you recognize either of these songs or the artist? (circle one): Y     N

7. Please indicate your gender:   M ___  F ___   Prefer not to answer ___