The Effects of Musical Distraction on Cognitive Task Performance

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Abstract

This study investigated the effects of musical distraction on cognitive task performance. Participants included 15 women and 8 men, ranging in ages from 18 to 45 years old. These students from a psychology class were exposed to 2 different conditions, being silence and punk rock music, while completing an anagram test. The results were contrary to what was hypothesized, there was no difference in performance between the group solving the task with silence, or with the musical distraction. This study offers support to previous research indicating that musical distraction had no effect on performance in other academic areas.
The Effects of Musical Distraction on Cognitive Task Performance

Musical distraction is a very common occurrence on an every day basis; we experience it mainly because of the frequent appearance of background music in the modern world. Most office buildings, businesses, even elevators play background music constantly during our daily activities. Based on observation, for the most part, public crowded areas choose classical music, but some businesses and office buildings give their employees the choice of the music they want to listen to while they are working on cognitive tasks. The effect of background music depends on the person listening to it and on the activity that the listener is working on (Manthei & Kelly, 1993). Employees have frequently argued that choosing the music they want to listen to makes them more efficient and productive while working (Schoenhals, 2004). In studies conducted to learn about the effects of musical distraction on cognitive task performance results have supported the idea of music improving performance (Graziano, 1999), but there has also been research contradicting those findings (Henderson, Crews & Barlow, as cited in Manthei & Kelly, 1993) where music distracted participants on a paragraph comprehension test.

Research involving noise as a distraction factor has illustrated the same mixed results as studies concerning background music. Murphy, Craik, Li, and Schneider (2000) examined the effects of background noise, instead of music, in short-term memory performance. Murphy et al. (2000) found that older adults in a quiet area performed the same as younger adults in an environment with noise, and younger adults in a noisy setting performed poorly compared to those in a quiet location. In contrast, Pool (2002), observed the distraction effects of background television on homework performance, where she found that television-induced distraction did not make any significant difference on students working on an easy homework assignment.
Several studies have focused on the different effects of various music types or noise on performance (Manthei & Kelly, 1993; Graziano, 1999; Murphy et al., 2000). The present study considers the effects of one music type, and no music at all, on cognitive task performance. By reducing the music types to only one kind of music, more consistent results can be found that can lead to better understanding of the effects of musical distraction. Another investigation (Wright & Adams, 1999) showed that visual distraction can have a statistical significance on cognitive processes. Special attention will be given to the current experiment to reduce the maximum amount of visual disruption in order to avoid the existence of a confounding variable.

The purpose of this study is to investigate the effects that musical distraction can have on a cognitive task performance, in comparison to carrying out a cognitive task in a quiet atmosphere. It is predicted that there will be a significant difference between the task performed in a quiet area and the one executed with the musical distraction in the background.

Method

Participants

Twenty three students from Orange Coast College’s Psychology Research Methods class took part in this experiment. Fifteen were women, and eight men. The participants ranged in age from 18 to 45, with a mean of 27 years. They were all given extra credit in return for their voluntary participation.

Materials

Two tests were used to measure cognitive task performance. Each one consisted of nine everyday vocabulary anagrams, which were randomly selected from an online website. The song used was “In My Dreams” (With Broken Wings, 2005). The music was downloaded from
LimeWire, a popular file sharing Gnutella client for Windows. In order to make sure that the participants would not be familiar with the music, the music files downloaded had as part of their title the word “unedited”.

**Design**

The experiment was conducted as a Repeated Measures Design, since each participant was tested under both conditions. The independent variable was musical distraction with two levels, heavy-metal music, and no music. The dependent variable was the cognitive performance, measured with the amount of correct anagrams solved. As a control procedure, the participants were tested under total silence after being tested with the musical distraction.

**Procedure**

Participants were given informed consent forms while the researcher was giving instructions on how to fill out the information. The participants were asked to solve two tests with nine different anagrams. During the first test there was only silence, and throughout the second test punk-rock music was played. The experiment was performed during the students’ class period. A portable stereo played the unedited songs at a considerably high volume. Having the participants solve the anagram test while the music was playing served as the experimental condition, while the silence was the controlled condition. Participants were given a package with the two tests and a survey, and were directed not to talk while working on them. The researcher stated that they would have four minutes to work on each test, and that the purpose of the music was to measure their anxiety while working on a cognitive task. After the participants finished with the tests, they were instructed to fill out the survey which had questions about the difficulty of the tasks and the amount of anxiety experimented while working on both tasks. The
researchers then had a debriefing session with the participants, were it was explained that the study was meant to see the effects of musical distraction on cognitive task performance. Finally, the participants received a debriefing form which contained the instructions to obtain the results of the experiment.

Results

It was predicted that there would be a significant difference between the task performed with silence and the task carried out with the musical distraction in the background. However, the results did not support this hypothesis. The amount of anagrams solved were, on average, equivalent in both conditions being punk rock music, and no music ($M = 4.52, SD = 2.09; M = 5.00, SD = 1.54$, respectively). The effects of musical distraction were analyzed using a within-subjects t-test design with an alpha level of .05. Figure 1 displays the results which demonstrate that the effect of punk rock music was not significant, $t(22) = 1.23, p > .05$, and Table 1 presents the means and standard deviations under both conditions. The results suggest that there is no difference when performing a cognitive task with, or without musical distraction.

Discussion

The results of this study revealed that there is no significant difference between conducting a cognitive task performance with musical distraction, or without musical distraction. The results do not support the original hypothesis; which stated that there would be a difference in performance when a cognitive task was conducted with musical distraction instead of silence. However, the conditions by which the experiment was performed may have contributed to the lack of support for the hypothesis.
This experiment suggests that it is not relevant, for example, for an employee to work while listening to music. This finding supports the study conducted by Manthei and Kelly (1993) reporting that there was no effect on student’s math test scores caused by background music; as well as the findings of Pool (2002), where television distraction made no significant difference on students working in a homework assignment. Nevertheless, there is still theoretical background which supports the idea of music facilitating performance (Graziano, 1999), or impeding it (Henderson, Crews & Barlow, as cited in Manthei & Kelly, 1993), both findings have been random.

For a better understanding of past contradictions, it is important for future studies to work with larger samples. The current study tested a convenience sample consisting of psychology students, which based on the survey’s answers, tended to enjoy the music that was chosen as a distraction; this, as well as the practice effect on the second test may have affected the obtained data. Since musical distraction is such a common occurrence, further research on this topic is suggested. This research should choose a large, random sample that takes into consideration participants’ preference of music and a design that would counterbalance both conditions.
References


Table 1

*Mean and Standard Deviation of Group Solving Task With and Without Music*

<table>
<thead>
<tr>
<th></th>
<th>Without Music</th>
<th>With Music</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean</td>
<td>4.52</td>
<td>5.00</td>
</tr>
<tr>
<td>Standard Deviation</td>
<td>2.09</td>
<td>1.54</td>
</tr>
</tbody>
</table>
Figure Caption

*Figure 1.* Mean number of anagrams solved as a function of the condition (without music, with music).
Number of Anagrams Solved

<table>
<thead>
<tr>
<th>Conditions</th>
<th>Without Music</th>
<th>With Music</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of Anagrams Solved</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>4</td>
<td>5</td>
</tr>
</tbody>
</table>

The chart shows that participants solved 4 anagrams without music and 5 anagrams with music.