The Effect of Background Music on Academic Performance

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Abstract:

Many people claim that music has a significant effect on behavior and development. Only limited research has been conducted to verify the effect of music on academic performance. We studied the effects of background music on performance of students from Biostatistics class and Computer Information Technology (CIT) class. Among total of 40 students, 20 from Biostatistics class and 20 from CIT class were used for research. Quizzes were given to both classes with music and without music. An ANOVA test was done to analyze the results. In both classes, music had no effect either positively or negatively. Music did not show any effect in our research does not mean that music can be played in class. More research is needed to understand the effects of music on academic performance. Grouping students based on their choice of music and increasing the number of students might help to understand the relation of music on academic performance.
Introduction:

Interest in the effects of music has gone up in recent years. Music has been important in human societies for centuries but the social effects of music are not well understood. Recent studies show that music can influence psychological (Lin et al., 2009), behavioral (Hallam and Price, 1998), cognitive (Furnham et al., 1999) and emotional (Cevasco, 2008) functions. The effects of music have been of interest to various groups including therapist and psychologist. Psychologists have hypothesized that music could be used to treat people with psychological problems. Music therefore has played an important role in human society. Music has not only been limited in treating psychological problem but also been used to see its relation on various performances. Music has been used to enhance sports performance (Brooks, 2010), improvement in behavior and academic performance (Hallam & Price, 1998), etc. This research project focuses on the effect of music on the academic performances of college students.

Music is most commonly accessible through sources of entertainment such as television, YouTube, Pandora, Spotify, CDs and FM radios. Background music is frequently played in public places like hospitals, stores, transportation centers, playgrounds, and also in official ceremonies. The music has been a part of human society. It has therefore become a subject of interest to study effects of music in our daily life. For example, Oldham et al. (1995) showed that workers listening to music with stereo headsets significantly improved their assigned work compared to workers not listening to music.
Music is also popular among the young generations, especially among college students. Several surveys were conducted to know the effects of music on students. Listening to music is still preferred while doing homework and reading (North et al., 2000). Most people believe that watching television and listening to music distracts students. We have stereotypical sense that listening to music decreases the overall academic performance of students. However, Patton et al., (1983) concluded that radio was considered beneficial to students while visual TV was taken as moderate distractor. Television is taken as modern distractor because it has both visual and audio on it.

We are intrigued to study the relation of music and their academic performance during college years. Our study focusses on playing classical music. Classical music is considered as mood calming and soothing (Giles, 991) and therefore may motivate students towards their assigned work. We believe that classical music without vocals minimizes the chances of possible distraction. Thus, we hypothesized that music has affected academic performance. We predicted that a soothing classical song played during a quiz will result in higher quiz scores than for a quiz taken with no background.

**Materials**

A classical song by Johann Sebastian Bach no. 5 in D major III Allegro was chosen as it was perceived as soothing and mood calming Classical music was chosen because Giles (1991) has shown that classical music is considered as the mood calming and soothing. This classical music was played using a good sound quality music system in our class, to a group of 24 students. Students were assessed using five questions with difficulty ranging from easy to hard. The questions tested were related to topics that we had studied in class. Similarly, another group
of 20 students from CIT class were assessed using a quiz related to CIT class. Each quiz had 5 questions, each worth 1 point (Appendix I). The same classical background music was used in both classes.

*Design:*

Two trials were completed in both classes. Each class took two 5-question quizzes (A and B). During the first trial half the class had quiz A and half had quiz B in alternate fashion so that students sitting next to each other got different quizzes. A second trial was conducted with music. This time the students getting Set A now got Set B and vice versa. The questions in those two quizzes were different and the difficulty range was similar to the first quiz. Other outside factors such as time factors, volume and other distraction factors such as discussion among students were standardized as much as possible.

Multiple choice questions were given to test student’s performance. The academic performance of students was determined by comparing average scores between the quizzes with and without playing background music. Data were analyzed with using two-way ANOVA on SPSS.

*Results:*

The research showed that the average score without music in Biostat class was found to be 2.77 (SD 1.07) and the average with music was found to be 2.95 (SD 0.89). Similarly, in CIT class, the mean without music was found to be 3.56 (SD 0.92) and that with music was 3.56 (SD 1.04). Overall in Biostats class there was slight positive effect of background music in the quiz
performance for both quizzes. The results of the research are summarized by the Figure 1 and Figure 2 below.

In CIT class, ANOVA test (Appendix I) revealed that there is no significant difference between groups ($F_{set}=.213$, df =1,32 and p=.648 and $F_{music}=.017$, df=1,32 and p=.896). Similarly, in Biostat class, there is no significant difference between the groups ($F_{set}=.426$, df=1, 40 and p=.518 and $F_{music}=.998$, df=1, 40 p-value=.324). The plot between the mean score obtained in Quiz A and Quiz B with/without music in CIT class (Figure 1) are exactly same indicating that their mean score is same. Also, the SEM error bar overlaps each other (graph 1) which suggests that there is no significant difference between those two results. Similarly, the plot between the mean score obtained from Quiz A and Quiz B with music and without music shows a slight increase in average value (graph 2). The SEM error bars overlap each other (graph 2) which suggests that the differences between the two results are not statistically significant.

![Figure 1](image1.png)  
**Figure 1:** Results showing the error bar at CIT class

![Figure 2](image2.png)  
**Figure 2:** Results showing the error bar at Biostat class
**Discussion:**

The result showed that the introduction of background music has no significant effect on quiz performance. Even though there was slight positive effect the differences were not significant. The analysis also showed that there was no negative effect of music in the quiz performance of the students either. Further research with increased sample will be needed to better understand the effect of music on quiz performances. Similarly, since different students might have different choice preferences of music, variation in music type i.e. classical, instrumental, etc. can be done to further analyze the effect of music. Nevertheless, introduction of background music did not show any negative effect on quiz performances. Our experiment did not show any statistical significance of background music in quiz performance which is supported by the studies carried out by Wolfe (1983) and LaBach (1960) reporting that students' self-reports of background music interference had no effect on their performance.

The introduction of background music might have caused some distraction to some of the students. The study of the individual scores showed variation (up and down) with or without music. However the average score was not change significantly which tells us that music did not cause significant distraction. Also, the music that we chose for our research experiment might not have been pleasing to all the students which therefore might have interfered with the possible results. In our research, students were not told that they were being a part of research. However, playing background music and giving quizzes at the same time might have given them some hints that they were being part of the research. Therefore there might be possible interference in
the expected results. In CIT class, some of the students felt distracted when music was played. We had no control measure to minimize possible discussion between students which might have changed the possible outcomes.
References


Appendix I- Statistical Data from ANOVA test

Biostat

**Tests of Between-Subjects Effects**

<table>
<thead>
<tr>
<th>Source</th>
<th>Type III Sum of Squares</th>
<th>df</th>
<th>Mean Square</th>
<th>F</th>
<th>Sig.</th>
</tr>
</thead>
<tbody>
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<td>90.535</td>
<td>90.854</td>
<td>.000</td>
</tr>
<tr>
<td>Music</td>
<td>.995</td>
<td>1</td>
<td>.995</td>
<td>.998</td>
<td>.324</td>
</tr>
<tr>
<td>Set</td>
<td>.424</td>
<td>1</td>
<td>.424</td>
<td>.426</td>
<td>.518</td>
</tr>
<tr>
<td>Music * Set</td>
<td>.005</td>
<td>1</td>
<td>.005</td>
<td>.005</td>
<td>.946</td>
</tr>
<tr>
<td>Error</td>
<td>39.859</td>
<td>40</td>
<td>.996</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>402.000</strong></td>
<td>44</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

a. R Squared = .901 (Adjusted R Squared = .891)

For cit class:

**Tests of Between-Subjects Effects**

<table>
<thead>
<tr>
<th>Source</th>
<th>Type III Sum of Squares</th>
<th>df</th>
<th>Mean Square</th>
<th>F</th>
<th>Sig.</th>
</tr>
</thead>
<tbody>
<tr>
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<td>113.864</td>
<td>111.959</td>
<td>.000</td>
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<tr>
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<td>.216</td>
<td>.213</td>
<td>.648</td>
</tr>
<tr>
<td>Music</td>
<td>.018</td>
<td>1</td>
<td>.018</td>
<td>.017</td>
<td>.896</td>
</tr>
<tr>
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<td>1</td>
<td>.089</td>
<td>.088</td>
<td>.769</td>
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<tr>
<td>Error</td>
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<td>32</td>
<td>1.017</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>488.000</strong></td>
<td>36</td>
<td></td>
<td></td>
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</tr>
</tbody>
</table>

a. R Squared = .933 (Adjusted R Squared = .925)
Appendix II – Questions used to quiz students

For CIT Class

1.) What is making Web Standards?
   a. The World Wide Consortium
   b. Microsoft
   c. Google
   d. Mozilla

2.) Choose the correct HTML tag for the largest heading.
   a. <head>
   b. <heading>
   c. <h1>
   d. <h6>

3.) What is the general syntax for inline image?
   a. Src=img
   b. Src=image
   c. Img=file
   d. Img src=file

4.) There are _____basic colors recognized by all version of HTML
   a. 16
   b. 8
   c. 256
   d. 20

5.) An html _______takes text in one format and change it to HTML code.
For Biostat

1.) In one-way ANOVA, different levels of the factors are called

   a. Treatments
   b. Variables
   c. Responses

2.) When comparing three treatments in a one-way ANOVA, the null hypothesis would be: all three treatments have the same effect on the mean response. In words, how would you interpret the alternate hypothesis \( \text{Ha} \)?

   a. At least two treatments are different from each other in terms of their effects on the mean response.
   b. All three treatments have different effects on the mean response
   c. Exactly two of the three treatments have the same effect on the mean response.
   d. Any or all of the above

3.) In ANOVA, which of the following is directly influenced by the size of the sample variances?

   a. SS between
   b. SS within
   c. SS total
   d. All three SS values are influenced
4.) Answer the following questions based on this table.

<table>
<thead>
<tr>
<th></th>
<th>Sum of Squares</th>
<th>df</th>
<th>Mean Square</th>
<th>F</th>
<th>Sig.</th>
</tr>
</thead>
<tbody>
<tr>
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<td>3</td>
<td>54.000</td>
<td>10.452</td>
<td>.001</td>
</tr>
<tr>
<td>Within Groups</td>
<td>62.000</td>
<td>12</td>
<td>5.167</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>224.000</td>
<td>15</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

a. How many data points are there in this data set?
   A. 30   B. 27   C. 16   D. 5   E. 12   F. 3

b. Do we accept or reject the null hypothesis?
   A. Accept   B. Reject   C. neither   D. not enough information is provided