Effects of Music on Reading Comprehension: Genres of Music vs. Lyrical and Non Lyrical

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Declaration

I declare that this submission is my own work. Where I have read, consulted and used the work of others I have acknowledged this in the text.

Word Count: 4720

Signed: ____________________________  Date: _______________
Acknowledgments

First and foremost I would like to thank my project supervisor Dr. John Greaney, for his guidance, continuous feedback and suggestions throughout the year, and also for being so accommodating with his time and willing to help. Without his help, completing this project would have been near impossible.

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Last, but most importantly, I would like to thank my Mum, who has continuously offered me encouragement and support, and motivated me throughout the years with her phone calls and texts during the week. And so it is to my Mum that I dedicate this piece of work.
# Table of Contents

Abstract 6

1. Introduction 7

1.1 Music and Learning 7

1.2 Background Noise 8

1.3 Music and Lyrics 9

1.4 Music and Reading Comprehension 10

2. Methodology 12

2.1 Design 12

2.2 Participants 12

2.3 Materials 12

2.4 Procedure 14

3. Results 16

3.1 Inferential Statistics 16

3.2 Descriptive statistics H1 17

3.3 Descriptive statistics H2 18

3.4 Descriptive statistics H3 18

4. Discussion 21

4.1 Interpretation of Results 21

4.2 Theoretical and practical implications 21

4.3 Strengths and limitations of study 22

4.4 Suggestions for future research 22

4.5 Conclusion 23

5. References 24

6. Appendices 27
## Table of figures

<table>
<thead>
<tr>
<th>Figure</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Figure 1</td>
<td>17</td>
</tr>
<tr>
<td>Table 1</td>
<td>16</td>
</tr>
<tr>
<td>Figure 2</td>
<td>19</td>
</tr>
<tr>
<td>Table 2</td>
<td>20</td>
</tr>
<tr>
<td>Figure 3</td>
<td>20</td>
</tr>
</tbody>
</table>
Abstract
This study investigated the effects which two different genres of music (classical music and jazz music) and music with and without the presence of lyrics, had on the reading comprehension test scores of third level students. Previous research in the area has shown mixed results on how music can interfere with the completion of a cognitive task such as reading comprehension. A reading comprehension test was administered to 50 third level students in five different conditions, no music, a classical music, a lyrical classical music, a jazz music and a lyrical jazz music condition. Students were also asked to complete a STOMP (Short Test of Musical Preference) and a survey questionnaire for get an understanding for the type of music listened to while studying and students preference for listening to music while studying. The results of the study showed that there was no significant difference in the reading comprehension test scores of students in a music environment and those in a non-music environment.
1. Introduction

A number of studies on the effects of background music on reading comprehension have been completed in recent years by psychology researchers. These studies have been conducted as a result of differences in scores on national achievement tests, which indicated students in recent years did not perform significantly better than did student in past decades (Schneider, 2007). However, there are mixed results on how the use of music interferes with the completion of a cognitive task such as reading comprehension. In general, students have perceived a decrease in performance on learning assignments in the presence of background media, but an increase of performance on paper and pencil assignments (Beentjes, Koolstra, & van der Voort, 1996). This study aims to contribute to recent findings by Anderson and Fuller (2010) to find the effects which different genres of music (classical music and jazz music), and lyrical and non-lyrical music have on the reading comprehension test scores among 50 third level students.

1.1 Music and Learning

Music listening and music learning can lead to short-term and long term cognitive benefits (Schellenberg, 2005). Research conducted by Salame and Baddeley (1989) have also looked at the effects of music on short-term memory (STM). Participants were asked to recall a number sequence while listening to vocal or instrumental music. The results of the study showed that participants in the instrumental music condition were able to recall numbers more accurately than participants in the vocal music condition. The participants found the words in the vocal music condition distracting, however, participants didn't find the instrumental music distracting. A number of studies have been conducted to investigate the relationship between music and learning. Leng and Shaw's (1991) Mozart Effect study examined if music training in young children would act as an exercise for higher brain function, more precisely, spatial temporal reasoning. The results of this study, showed a long term enhancement in spatial temporal reasoning. From the results of the previous study, Rauscher and Shaw's (1998), examined the idea that if music were to have a long term effect on spatial temporal reasoning, then maybe listening to music might have a short term enhancement. The study was conducted on college students, whereby the students listened to the first 10 minutes of Mozart Sonata for Two Pianos in D Major (K.448). The result of the study showed that those who
listened to Mozart Sonata for Two Pianos in D Major (K.448) scored significantly higher on a spatial temporal reasoning task than after listening to other genres of music.

Research by Schellenberg (2004) examined the use of music lessons to increase general intelligence. The study used two types of music lessons (piano and voice) and two control groups (drama lessons and no lessons). Participants were assigned to one of four groups and administered the Wechsler Intelligence Scale for Children Third Edition (WISC-III) before and after their group condition. Results of the study found that the combined music groups had an improvement in IQ when compared with those in the drama and no lessons group.

A number of studies tend to focus on the detrimental effects which music can have on cognitive task, however research conducted by Savage (2001), has found that listening comprehension and reading comprehension involve similar cognitive processes, suggesting they are not competing stimuli, which indicates that music could be used to further enhance educational tasks.

### 1.2 Background Noise

Oswald, Tremblay, and Jones (2000) examined the disruption in comprehension scores by the meaning of irrelevant sound, by using meaningful and meaningless speech. The study found that both meaningful and meaningless irrelevant material disrupted the reading comprehension task, however there was a greater disruption caused by meaningful irrelevant speech. Until there is further investigation into comprehension and cognitive task, the findings of the study suggest that silence appears to be the optimal working environment.

Dobbs, Furnham and McClelland (2011) conducted a study to examine if background noise would be as distracting as music on the cognitive test performance of introverts and extroverts. One hundred and eighteen female secondary school students participated in the study to undergo three cognitive tests, in the presence of music, noise and silence. The results of the study found that introverts performed worse on cognitive tasks than extroverts in the presence of music and noise, however in a silent environment, the performance of introverts and extroverts was the same.
Research conducted by Banbury and Berry (1998) examined the effects of office noise (with and without speech) on recall memory and mental arithmetic. The results of the study found that during mental arithmetic and recall, the task performance of participants significantly declined in the presence of background office noise compared to silence conditions. Similarly, Broadbent (1958) examined the effects which noise has on complex mental tasks. The findings of the study showed that noise conditions, in comparison to silent conditions, deteriorated the performance of participants over time.

1.3 Music and Lyrics

Besson at al (1998) conducted a study to address whether people listening to a song treat the linguistics and musical components separately, or do they integrate them with one single percept. The study involved recording event related potentials (ERP’s) of participants. Musicians were asked to listen to excerpts from operas sung a cappella (solo singing without instrumental sound) and excerpts of music, where the participants were asked to pay equal attention to the language and the music in order to find semantic and harmonic clashes. The results of the study showed evidence of the music and lyrics independent on-line processing when the semantic and harmonic features are taken into account. As is the case for so many other cognitive skills, the exquisite unity of vocal music emerges from the concerted activity of separate processors (Risset, 1991). Pool, van der Voort, Beentjes, and Koolstra (2000) conducted a study which found that a Dutch-speaking television program inhibited eighth grade students' performance on a written task. However English-speaking music videos did not cause distraction among the students. This could suggest that the use of lyrics, in a foreign language within a song, could increase the complexity of the music, causing further detrimental effects to a cognitive task.

The musical complexity theory mentioned by Furnham and Strbac (2002) states that although music has led to increased test scores, increased complexity within music will lead to a decrease in test scores among participant test scores, in comparison to less complex music. Research by Furnham & Bradley (1997) has been conducted on complexity contained music without lyrics. Although lyrics can add to the complexity within music, which in turn can add to the information load to be processed by the brain, a study by Banbury and Berry (1998)
found that background noise combined with words had a detrimental effect on memory, whereas background noise without words did not have any notable effects.

1.4 Music and Reading Comprehension

Recent research has found that although students are aware of the negative effects listening to music can have on studying, students continue to listen to music while studying. Hallum & Kotosopoulou (2010) conducted research to explore whether students were aware of the impact which music has on their studying. In particular, the research was in relation to homework, where students have control over the playing of music. The study also explored cultural (USA, UK, Greece and Japan) and age (12yrs, 16 – 18yrs and 20yrs) differences among students who reported using music while studying, along with their perceptions of the effects of listening to music while studying. The study used a five point rating scale questionnaire. This questionnaire was used to explore the listening habits of the students while undergoing different types of studying, the listening habits of students in different cultures, their understandings of the effects which music can have on studying, the factors affecting whether music was listened to and characteristics and types of music listened to. The findings of the study suggest that the students are aware that their performance on some tasks will be impaired if listening to music while studying, namely those whereby the cognitive processes involved are shared with those involved with the processes of listening to music.

Anderson and Fuller (2010), reported on the effects of music on reading comprehension of high school students. The study examined 334 7th and 8th grade students under two conditions, namely a non-music environment and music (alternative music) environment. The participants were administered the reading comprehension subtest of the Gates-MacGinitie Reading Test, 4th edition (MacGintie, MacGintie, Maria, & Dryer, 2000). Following the music portion of the test, the participants were also asked to complete a survey to assess any preference for or against listening to music while studying. The results of Anderson & Fuller’s (2010) study found that the performance of the participants declined significantly when listening to music. Despite some participants having a stronger preference for listening to music while studying, there was a negative effect on comprehension for participants, despite students claiming they can study effectively while listening to music (Patton, Stinard, & Routh, 1983). However, research by Etaugh and Michaels (1975) found that college students, who
regularly listened to music while carrying out a study task, improved on the reading comprehension test in the presence of music.

Anderson and Fuller’s (2010) study allows for further investigation into the effects of music on reading comprehension to distinguish the differential effects which different genres of music could have on reading comprehension performance. Therefore, this study will examine the differences in reading comprehension scores, with the presence of lyrical and non-lyrical music in two different genres of music (classical music and jazz music). More specifically, the aim of the study is to examine the differences in reading comprehension test scores of third level students in five different musical conditions, no music, a lyrical classical music, a non-lyrical classical music, a lyrical jazz music and a non-lyrical jazz music condition.
2. Methodology

2.1 Design

This study employed a fixed survey-based design. The dependent variable being the reading comprehension tests scores and the independent variable being the music used in the study (no music, lyrical classical music, classical instrumental music, lyrical jazz music and instrumental jazz music)

2.2 Participants

The data for this study was obtained from 50 student participants from third level education. The genders in the study were represented as 18 males and 32 females. The participants were divided into five groups, (ten participants per condition), no music, a lyrical classical music, classical instrumental music, lyrical jazz music and instrumental jazz music condition. Convenience sampling was employed to recruit the participants.

2.3 Materials

The participants were administered a consent form, which provided information on the study, ensured the participants were aware of the procedures involved, informed participants the study was voluntary, outlined the confidentiality of the information which the participants were providing and provided contact information if the participants had any further questions on the study. Participants were required to tick the boxes of the consent form to agree to participate in the study.

The Brief Mood Introspection Scale (BMIS), developed by Mayer & Gaschke (1988), is a mood adjective scale with an item sample of 16 adjectives, 2 selected from each of eight mood states: (a) happy (happy, lively), (b) loving (loving, caring), (c) calm (calm, content), (d) energetic (energetic, active), (e) fearful/anxious (jittery, nervous), (f) angry (grumpy, fed up), (g) tired (tired, drowsy) and (h) sad (gloomy, sad) The BMIS is used to measure pleasant–unpleasant mood using a four point version of the Meddis response scale for each adjective (XX, X, V, VV).
The reading comprehension test (retrieved from www.englishforeveryone.org, a website which provides reading comprehension worksheets for students), was administered to the participants to measure the participants ability to acquire and process new information in the different environments. This measure consists of an approximately seven hundred and fifty six word reading comprehension, followed by fifteen multiple choice (four choices per item) questions based on the reading comprehension. The reading comprehension test took ten minutes to complete.

The music was played from an IPod docking station at a comfortable volume for the participants from high quality speakers. The pieces of music used as background music for the reading comprehension tests included; Jazz music: Body and Soul by Jazz Artist Guild and Body and Soul by Billie Holiday and Classical Music; Mozart’s aria for soprano and strings “Conservati fedele” in A major, KV 23, Andante grazioso and Mozart’s Piano Concerto No.23 In A Major, K 488 Adagio.

A STOMPR (Short Test of Musical Preference Revised) developed by Rentfrow & Gosling (2003), was used to assess the preferences of music listened to while studying. The STOMPR test has a 7 point rating (1 = dislike strongly to 7 = like strongly) of 23 items (music genres). The 23 items are then scored into the four groups as follows; reflective and complex (bluegrass, blues, classical, folk, international/foreign, jazz, new age and opera), intense and rebellious (alternative, heavy metal, punk and rock), upbeat and conventional (country, gospel, oldies, pop, religious and soundtrack/theme songs) and energetic and rhythmic music (dance/electronica, funk, rap/hip-hop, reggae and soul/R&B.

A short survey questionnaire, using a five point rating scale, where 1 = Never, 2 = Rarely, 3 = Occasionally, 4 = Frequently and 5 = Always, developed by Hallum & Kotosopoulou (2010), was used to recognise study habits of the participants and their preference of music playing while completing tasks such as studying, revising, writing, memorising, reading, coursework, editing, problem solving, developing ideas, thinking, studying favourite subject, studying least favourite subject and studying a foreign language.

A debriefing form was distributed to the participants, providing further information about the present study, the contact information of the researcher if participants had further questions and to thank the participants for their participation.
2.4 Procedure

The participants entered the room, which was designated for the study, in groups of five to ten. Each participant was made aware of the aims of the study. The participants were fully briefed before the study commenced and debriefed once their participation in the study was complete. The participants were assured they were free to withdraw from the study at any point and any data they may have answered would be destroyed. All participants were made aware of the anonymity and confidentiality of the data which they provided during the study, and that the researcher would take extra precaution to ensure there was be no psychological distress caused to the participant due to their participation in this study. The consent form was then distributed to the participant and consent was obtained from each participant before taking part in the study.

Once the consent forms were collected, the participants were administered the Brief Mood Introspection Scale (BMIS) to record the participants overall mood before the reading comprehension task commenced.

Once the BMIS was completed, the participants were administered the reading comprehension test while in a non-music environment, and the other groups in the music environments. Once the comprehension has been read, the participants were asked to answer the multiple choice questions based on the comprehension. The reading comprehension test section of the study was completed in ten minutes. The same procedure was taken for all the music groups. During the music groups, the music was played in the background via an IPod docking station, over the duration of the reading comprehension test task.

Once the reading comprehension test section of the study was completed, the BMIS was then administered a second time to show if the music played had an effect on the participants overall mood.

Having completed the second BMIS, the participant were asked to complete a STOMPR (Short Test of Music Preference Revised) which distinguished the participant’s preference of music while studying. Finally, a short survey based questionnaire to distinguish the participant’s preference on the use of music while completing study tasks such as reading comprehensions was administered. Once the participants completed the tasks, the researcher then collect the materials and a full debriefing was completed. The researchers contact details were made
available to each of the participants to answer any further questions about the study or offer advice if needed after the participation in the study. Finally, the researcher thanked the participants for taking part in the study.
3. Results

3.1 Descriptive statistics:

To answer the research question of the study: if there be a difference in the reading comprehension scores of third level students using different musical environments (non-music, lyrical classical music, classical music, lyrical jazz music and non-lyrical jazz music) as distracters, fifty third level participants (N=50) were divided into five groups (group 1: no music control group; group 2: classical music; group 3: jazz music; group 4: lyrical jazz music and group 5: lyrical classical music) and administered a reading comprehension test. The means and standard deviation of the reading comprehension test scores are shown in Table 1.

Table 1: Reading comprehension test scores among the five groups

<table>
<thead>
<tr>
<th>Group</th>
<th>Presence of music genre</th>
<th>Presence of lyrics</th>
<th>Mean</th>
<th>Std. Deviation</th>
<th>N</th>
</tr>
</thead>
<tbody>
<tr>
<td>Group 1 (control)</td>
<td>No</td>
<td>No</td>
<td>5.80</td>
<td>2.66</td>
<td>10</td>
</tr>
<tr>
<td>Group 2 (classical)</td>
<td>Yes</td>
<td>No</td>
<td>6.30</td>
<td>2.45</td>
<td>10</td>
</tr>
<tr>
<td>Group 3 (jazz)</td>
<td>Yes</td>
<td>No</td>
<td>6.30</td>
<td>2.06</td>
<td>10</td>
</tr>
<tr>
<td>Group 4 (jazz)</td>
<td>Yes</td>
<td>Yes</td>
<td>6.00</td>
<td>2.54</td>
<td>10</td>
</tr>
<tr>
<td>Group 5 (classical)</td>
<td>Yes</td>
<td>Yes</td>
<td>5.80</td>
<td>1.40</td>
<td>10</td>
</tr>
</tbody>
</table>
### 3.2 Inferential statistics: H1

The first hypotheses, there will be a significant difference in reading test scores between the participants in a non-music environment and those in a music environment, was tested by conducting a one-way between-groups analysis of variance (ANOVA). The ANOVA was conducted to compare the mean scores of the reading comprehension across the five groups. There was no statistically significant difference at the \( p > .05 \) level in reading comprehension test scores for the five groups: \( F(4, 45) = .23, p = .92 \). Thus the first hypotheses, there will be a significant difference in reading test scores between the participants in a non-music environment and those in a music environment, was not supported. Although there was no statistical significance, there were some trends in mean scores between groups. A Post-hoc comparisons using the Tukey HSD test indicated that the mean scores of the reading comprehension test scores did not differ significantly: group 1 (M=5.80, SD = 2.66), group 2 (M=6.30, SD = 2.45), group 3 (M=6.30, SD = 2.06), group 4 (M=6.00, SD = 2.54) and group 5 (M=5.80, SD=1.40). Figure 1 shows the reading comprehension test scores among the five groups.

![Figure 1: Reading comprehension test scores across the five groups.](image-url)
3.3 Inferential statistics: H2

To test the second hypothesis; there will be a difference in reading comprehension test scores using different genres of music (classical and jazz music), a one-way analysis of variance was also used.

The participants were divided into two groups, group 1: classical music and group 2: Jazz music. There was no statistically significant difference at the p > .05 level in reading comprehension test scores for the two music genre groups: F (1, 36) = .21, p = .88.

Post-hoc comparisons using the Tukey HSD test indicated that the mean scores for the music genre groups, classical music (M = 6.30, SD = 2.45) and jazz music (M= 6.30, SD = 2.06) were not significantly different, and the mean difference between the two groups (M = .00).

3.4 Inferential statistics: H3

The third hypotheses, there will be a difference in reading test scores between participants in a non-lyrical music environment and those in a lyrical music environment, was also not supported by the results. A two-way between groups analysis of variance was conducted to explore the impact which the presence of lyrics in music, in two genres of music, has on reading comprehension scores. Participants were divided into four groups according to genre and the presence of lyrics (group 1: classical music; Group 2: Jazz music; Group 3: classical music with lyrics; and Group 4: Jazz music with lyrics). The interaction effect between genres and lyrical groups was not statistically significant, F (1, 36) = 0.21, p = .884. There was not a statistically significant effect for genres of music on reading comprehension test scores, although there was a trend of those in a lyrical music environment scoring lower than those in a non-lyrical music environment, F(1, 36) = 0.343, p = .562.

Although figure 2 shows the results trended towards higher reading comprehension test scores in non-lyrical music conditions (M = 6.30) than the lyrical conditions (M = 6.15), there was not a significant difference. Using a post-hoc comparisons, using the Tukey HSD test indicated the mean different between non-lyrical classical music and lyrical classical music was M =.500, and the difference between non-lyrical jazz music and lyrical jazz music was
M = .200, therefore, there was not a significant difference in reading comprehension test scores in a lyrical and non-lyrical environment.

Figure 2: Difference in reading comprehension test scores among participants in musical conditions with and without the presence of lyrics.

Figure 3 summarises the means for all participants regarding their responses (1 = Never, 2 = Rarely, 3 = Occasionally, 4 = Frequently and 5 = Always) to statements about playing music while completing study tasks such as reading, writing and problem solving. Listening to music while thinking scores the highest on the survey (M = 3.3). Other tasks such as editing, writing and developing ideas also scored high, while tasks such as memorizing and reading scored lower, with studying a foreign language scoring the lowest (1.56).
Table 3 summarises the mean scores for the STOMPR (Short Test of Music Preference Revised) test. The results of the test show that participants prefer the use of reflective and complex music (which included jazz and classical music), while the use of intense and rebellious music is least preferred among participants.

Table 2: Overall mean scores for types of music preferred for studying

<table>
<thead>
<tr>
<th>Type of music</th>
<th>Mean scores</th>
</tr>
</thead>
<tbody>
<tr>
<td>Reflective &amp; complex</td>
<td>29.28</td>
</tr>
<tr>
<td>Intense &amp; rebellious</td>
<td>17.78</td>
</tr>
<tr>
<td>Upbeat &amp; conventional</td>
<td>21.16</td>
</tr>
<tr>
<td>Energetic &amp; rhythmic</td>
<td>19.78</td>
</tr>
</tbody>
</table>
4. Discussion

4.1 Interpretation of Results

In the present study, reading comprehension tests were administered to fifty third level students in five different musical environments. The results of the study did not support the assumption that there was a difference in reading comprehension test scores among third level students using different musical environments (no music, jazz music, classical music, lyrical jazz music and lyrical classical music) as distracters. The reading comprehension scores did not decline significantly when participants were listening to music compared with participants in a quiet setting. Therefore the first hypotheses, there will be a significant difference in reading test scores between the participants in a non-music environment and those in a music environment, was not supported.

The second hypotheses, there will be a difference in reading test scores using different genres (classical and jazz) of music, was also not supported. Table shows there was no significant difference in reading comprehension test scores among participants in a classical music or jazz music environment.

The third hypotheses, there will be a difference in reading test scores between participants in a non-lyrical music environment and those in lyrical music environment, was also not supported, although there were trends in reading comprehension test scores of participants in a lyrical music environment scoring higher than those in a non-lyrical music environment.

4.2 Theoretical and Practical Implications

Although the study did not support this assumption, existing research has found inconclusive results on the topic of music interfering with study habits of students. Anderson & Fuller’s (2010) study, to examine the effects of lyrical music on learning in 334 adolescents, found that studying while listening to music detracts from the reading performance of adolescents. However the current study did not support these findings. Although many previous studies indicate music as having a detrimental effect on cognitive ability, other studies have had positive effect. Schellenberg, (2005) found evidence showing that music listening and learning enhances cognitive function, while Beemtjes et al (1996) found that students’ performance decreased on learning assignments in the presence of background music and media.
The results of the survey of participants study habits, shown in Figure 3, did however support the results of previous research conducted by Patton et al (1983). This study found that the majority of students chose quiet settings to complete tasks such as reading, whereas student would complete maths and written tasks in the presence of media.

4.3 Strengths and limitations of the Research

The use of different genres of music to distinguish the differential effects of the genres is a key strength of this research. As the previous research by Hallum & Kotosopoulou (2010) found that although students aware of the negative effects listening to music can have on studying, they continue to listen to music while studying. Therefore it is import to find which genre of music is least detrimental to cognitive tasks.

Limitations to the study may include the reading ability of the students. As the reading ability of the participants was not assessed before the reading comprehension test was distributed, this may have influenced participants reading comprehension test scores. Other limitations may include environmental factors such as the volume of the music, other background noise, or possible distraction by other participants taking part in the study. The sample size used for the study was also a limitation of the current study and therefore a larger sample size may have produced a more significant result.

4.4 Suggestions for Future Research

Further study is needed to determine if the effects of other genres of music (e.g. pop, rock, alternative, etc.) has a greater or less detrimental effect on reading comprehension test scores than the genres used for this study.

Research by Etaugh and Ptasnik (1982) found whether the presence of preferred music had an effect on the reading comprehension scores of students. Results of the study found that those who didn't regularly study in the presence of background music displayed a greater level of comprehension, while those who regularly studied in the presence of background music performed better in the music conditions.
As the music used for this study was not deliberately chosen to reflect popular genres among the participants, i.e. music the students would listen to independently, further research could investigate whether a more popular genre of music would have an effect on the reading comprehension test scores of the participants. The use of a meaningful reading comprehension test may have a significant result compared to a meaningless reading comprehension. As the reading comprehension was not a meaningful text, future research could investigate if a meaningful text, such as student health information, would produce a more significant result. As the study only focuses on reading comprehension test scores, further investigation could look at the effects of music on other tasks such as problem solving. Research by Wolfe (1983) examined the effects of loudness of background music while completing maths problems and questionnaires and found that participants completing the task with background music at a volume of 80 – 90dB, perceived the loudness to be distracting. Therefore, future investigation of the level of volume by which the music was played should be taken into account. Finally, the time period for which the study was completed should be taken into consideration for further investigation, to find what effects, if any, music has on reading comprehension over longer or shorter time spans.

4.5 Conclusion

In conclusion, the association between music and intellectual performance among third level students is a topic which is in need of further investigation. This study focuses specifically on reading comprehension test scores, therefore other studies could focus on study tasks whereby students listen to music more frequently while undergoing (figure 3) such as thinking, developing ideas and written tasks. Each of these tasks involves different cognitive processes, which may have an impact on the effect which music can have on these particular types of learning.

Although there was no significant difference in test scores, trends among the group results suggest that the addition of lyrics to music will increase the complexity of the music, which may have cause further detrimental effects on cognitive processes involved in completing a reading comprehension test. A number of other factors need to be taken into consideration in order to get a full understanding of what aspects, i.e. tempo, lyrics or structure, within music will cause further detrimental effects on the study tasks of students.
References


Appendix A

Effect of Music on Reading Comprehension: Genres of Music vs. Lyrical and non-Lyrical Music: Participant Consent Form

About the researcher:
My name is Sarah Mac Sweeney. I am a fourth year Applied Psychology student in the Institute of Art, Design and Technology. The following study is being carried out as part of my final year thesis. This study has been reviewed by The Department of Learning Sciences Ethics Committee (DLSEC).

Purpose of the study:
The aim of the study is to examine the differences of third level students reading comprehension scores in five different musical conditions, a no music environment, a lyrical classical music environment and a non-lyrical classical music environment, lyrical alternative music environment and a non-lyrical alternative music environment.

Procedure:
If you consent to participation in the study you will be asked to do the following:

1. Complete a brief mood scale
2. Read through the reading comprehension once and answer the questions which follow in the given environment
3. Once you have completed the reading comprehension task, you will be asked to retake the mood scale, a short survey, and complete the STOMP test (Short test of music preference).

The total time of the study will take 20 minutes.

Confidentiality:
Participants are free to withdraw from the study at any point, and any data given will be destroyed. Any information given by the participant will remain anonymous, will remain confidential among the researchers and will be destroyed once the research is completed.

Contact and questions:
If you have any concerns about any aspect of this study, please contact:
Researcher: Sarah Mac Sweeney Supervisor: Dr. John Greaney
E-mail: Sarahmactea@live.ie John.greaney@iadt.ie
Please tick box

1. I confirm that I am over 18 years of age □

2. I agree to take part in this study □

3. I confirm that I have read and understood the information sheet for the above study and have had the opportunity to ask questions □

4. I understand that my participation is voluntary and that I am free to withdraw at any time. □

5. I understand that data collected about me during this study will remain anonymous before it is submitted for publication. □

Please tick if you are:

Male □  or  Female □

___________________  __________________
Participant No.        Date

Thank you for your participation
Appendix B

Brief Mood Introspection Scale (BMIS)

By John D. Mayer

____________________________________________________

INSTRUCTIONS: Circle the response on the scale below that indicates how well each adjective or phrase describes your present mood.

(Definitely do not feel)  (Do not feel)   (Slightly feel)   (Definitely feel)
XX                         X              V                VV

___________________________________________________________________________

Lively   XX X  V VV     Drowsy  XX X V VV
Happy   XX X V VV     Grouchy  XX X V VV
Sad     XX X V VV     Peppy   XX X V VV
Tired   XX X V VV       Nervous  XX X V VV
Caring  XX X V VV      Calm   XX X V VV
Content   XX X V VV     Loving  XX X V VV
Gloomy  XX X V VV      Fed up  XX X V VV
Jittery   XX X V VV       Active  XX X V VV

___________________________________________________________________________

Overall, my mood is:

Very                                                                      Very
Unpleasant                                                                Pleasant
-10 –9 –8 –7 –6 –5 –4 –3 –2 –1 0 1 2 3 4 5 6 7 8 9 10
Appendix C

HUBBLE

The 32,000-word novella The Time Machine by H.G. Wells, published in 1895, is generally credited with popularizing the idea of time travel by means of a time machine, a vehicle which takes the occupant backward or forward in time. Dozens of sequels and adaptations over the years have further promoted the notion. Indeed, Albert Einstein’s Theory of Special Relativity lays the foundation for the possibility of time travel. So far, no one has demonstrated the ability to travel in time. However, time machines have been constructed, and they do allow glimpses into the past.

The most efficacious time machine currently in existence is the Hubble Telescope, named after the American astronomer Edwin P. Hubble. Its capability to locate distant astronomical targets and lock in on them, permitting their faint light to aggregate on its detectors, allows it to peer far into the past. Light travels 186,000 miles per second. The Hubble Telescope has looked back in time at 10,000 galaxies whose light left them billions of years ago. Therefore, utilizing the telescope as time machine, astronomers are able to contemplate galaxies as they were eons ago.

Although the telescope was launched into space in 1990, its inception was almost a half-century earlier as astronomer Lyman Spitzer, Jr. mulled over the possibility of a large space telescope in a 1946 report, “Astronomical Advantages of an Extra-Terrestrial Observatory.” Because the earth is bathed in its constantly churning atmosphere, earth-based telescopes cannot penetrate deep space; the atmosphere distorts the view. Telescopes were constructed on mountains, but there was still no way to wholly escape the effects of the layers of gases enveloping the earth.

During the 1960s, the Space Race between the then-Soviet Union and the United States was accelerating. The National Aeronautics and Space Administration (NASA) was established. Funds for space endeavours were abundant, and plans for a large space telescope, by then designated the LST, were underway. The designs called for a 2.4-meter primary telescope mirror which could be transported into space by one of NASA’s rockets. According to National Geographic’s Imaging Space and Time, the resolving power of the deep space telescope would be “equivalent to being able to distinguish the left and right headlights of a car in California seen from New York, or features less than 1/30,000th the size of the full moon. This was at least a tenfold increase over the atmospheric limit.”

One of the primary challenges involved in successfully transporting the telescope into space was protecting the mirror from the jarring vibrations that occur during launch. It was crucial that the mirror be able to withstand the shuttle’s vicissitudes as well as the volatile atmospheric conditions found in space. If not, the precise shape of the mirror could be compromised, and its imaging capability significantly weakened.

After the telescope had been launched, astronomers subsequently realized that the
primary mirror had not been ground correctly. A lens in the test instrument was about one millimetre askew, which is large by optical standards. In 1993, space–walking astronauts installed corrective lenses which improved the eyesight of the Hubble. In 2009, the corrective lenses themselves were replaced with a supersensitive spectrograph with built–in corrective lenses. The new spectrograph is expected to provide insight into the origins of stars and galaxies.

The successor to Hubble, the James Webb Space Telescope, is expected to be launched in 2014. It will observe only in infrared, so it will complement the Hubble Telescope, which observes in the visible and ultraviolet light ranges.

Hubble currently has the capability to view galaxies that were formed 13.7 billion years ago, long before humans existed, in an area called the Hubble Ultra Deep Field. Astronomers aspire to see beyond the Hubble Ultra Deep Field to a time that is devoid of galaxies, a time before galaxies had formed. If H.G. Wells was onto something in his novella, that time may be close at hand. As one of the characters in the popular work asked, “If Time is really only a fourth dimension of Space, why is it, and why has it always been, regarded as something different? And why cannot we move in Time as we move about in the other dimensions of Space?”

Less than a decade after Wells’ novella, Einstein’s Special Theory Relativity seemed to concur with Wells’ character by proposing that travelling through space at the speed of light would alter time by causing it to dilate, raising the possibility of not merely glimpsing the past, but perhaps travelling to it.
Please answer the following questions based on the previous reading.

1. The 32,000 word novella ‘The Time Machine’ was by:
   a) Albert Einstein
   b) H. G Wells
   c) Edwin P. Hubble
   d) Lyman Spitzer

2. ‘The Time Machine’ was published in:
   a. 1993
   b. 1860
   c. 1990
   d. 1895

3. According to the passage, who lay the foundations for the possibility of time travel?
   a. H.G. Wells
   b. Albert Einstein
   c. Edwin P. Hubble
   d. Lyman Spitzer

4. Who had the idea for the Hubble Telescope?
   a. H.G. Wells
   b. Albert Einstein
   c. Lyman Spitzer, Jr.
   d. Edwin P. Hubble

5. According to the passage, which of the following statements is/are true of the Hubble Telescope?
   a) It is unable to observe light on the infrared part of the spectrum.
   b) It will be replaced by the James Webb Space Telescope.
   c) It was initially constructed in 1946, but not launched until 1990.
6. The Hubble Telescope has the capability to view galaxies that were formed:
   a. 13.8 billion years ago
   b. 13.7 million years ago
   c. 18.7 million years ago
   d. 17.8 billion years ago

7. The James Webb Space Telescope will become the successor to Hubble in:
   a. 2012
   b. 2020
   c. 2014
   d. 2015

8. According to the passage, when was the telescope launched into space:
   a. 1990
   b. 1980
   c. 1993
   d. 1983

9. Hubble can view galaxies in an area called:
   a. Hubble Space Field
   b. Deep Space field
   c. Hubble Field
   d. Hubble Ultra Deep Field

10. How many galaxies had the Hubble telescope looked back on?
    a. 5,000
    b. 10,000
    c. 100,000
    d. 1 million

11. According to the passage, light travels:
    a. 190,000 miles per second
    b. 180,000 miles per second
    c. 186,000 miles per second
    d. 179,000 miles per second
12. Which of the following was a challenge involved in transporting the telescope into space:
   a. Protecting the lens
   b. How it would be transported
   c. Too big to be transported
   d. Protecting the mirror

13. Once the telescope had been launched, astronomers realised
   a. It wasn’t big enough
   b. The telescope was placed incorrectly
   c. It didn’t survive the transport
   d. The lens was askew

14. The passage mentions:
   a. Einstein’s Theory of General Relativity
   b. Einstein’s Theory of Astronomy
   c. Einstein’s theory of Special Relativity
   d. Einstein’s Theory of Space Dimensions

15. What size was the primary telescope which was transported into space?
   a. 2.4 meter
   b. 4.2 meter
   c. 4.0 meter
   d. 2.0 meter
Appendix D

Questionnaire of Musical Preference for Studying

Using the five point rating scale where:

5 “Always”, 4 “frequently”, 3 “Occasionally”, 2 “rarely” and 1 “Never”,

Please answer the following.

**I listen to music while:**

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<tr>
<th></th>
<th>Never</th>
<th>Rarely</th>
<th>Occasionally</th>
<th>Frequently</th>
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<td>Studying</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>Revising for exams</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
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<td>Writing</td>
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<td>2</td>
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<tr>
<td>Reading</td>
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<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
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<tr>
<td>Doing course work</td>
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<td>2</td>
<td>3</td>
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<td>5</td>
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<td>5</td>
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<td>3</td>
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<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
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</tbody>
</table>
Appendix E

STOMP-Revised

Please indicate your basic preference for listening to each of the following genres while studying using the scale provided.

1-----------------2-----------------3-----------------4-----------------5-----------------6-----------------7
Dislike          Dislike      Dislike a       Neither like          Like a Like                 Like
Strongly          Moderately         Little        nor dislike           Little         Moderately
Strongly

1. ___ Alternative
2. ___ Bluegrass
3. ___ Blues
4. ___ Classical
5. ___ Country
6. ___ Dance/Electronica
7. ___ Folk
8. ___ Funk
9. ___ Gospel
10. ___ Heavy Metal
11. ___ International/Foreign
12. ___ Jazz
13. ___ New Age
14. ___ Oldies
15. ___ Opera
16. ___ Pop
17. ___ Punk
18. ___ Rap/hip-hop
19. ___ Reggae
20. ___ Religious
21. ___ Rock
22. ___ Soul/R&B
23. ___ Soundtracks/theme song
Appendix F

SPSS Output

Means and standard deviation of reading comprehension test scores.

Descriptive Statistics

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<th>Lyrics</th>
<th>Genre</th>
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<th>Std. Deviation</th>
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<td></td>
<td>Jazz</td>
<td>6.30</td>
<td>2.058</td>
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<td>Total</td>
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ANOVA

test score

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<th>F</th>
<th>Sig</th>
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<td>Total</td>
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Post-hoc test: Multiple comparisons of reading comprehension test scores among five groups.

Multiple Comparisons

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<th>(I) group</th>
<th>(J) group</th>
<th>Mean Difference (I-J)</th>
<th>Std. Error</th>
<th>Sig.</th>
<th>95% Confidence Interval</th>
<th>Lower Bound</th>
<th>Upper Bound</th>
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<td>1.034</td>
<td>.995</td>
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