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Music While You Work: The Effects of Background Music on Test Performance amongst Extroverts and Introverts.

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Abstract

The effect of background music amongst Extroverts and Introverts on test performance was explored via two short comprehension and problem solving tests. The participants consisted 25 Extroverts and 25 Introverts (of both genders) and completed both tests; one in silence and the other in the presence of music. The results from the factorial ANOVA supported the hypothesis as put forward by the researcher in that Extroverts performed significantly better during the completion of the test in presence of music, but poorer in silence, compared to the Introverts who performed better in silence than in the presence of music. This research is performed to examine claims and theories from past research. It is hoped that the result from this study are taken on board and employed in an educational setting.

Keywords: *Personality, Extrovert, Introvert, Studying, Background Music, Test Performance,*

Introduction

Music is more evident in the day to day activities of everyday life than it has ever been (Dobbs, Furnham & McClelland, 2011). As a result of this growing increase in the wide uses of background music; for example, in the workplace or supermarkets, has led to an increased amount of research into the effects of background music (Dobbs et al., 2011). It is important for educational researchers to question whether the use of background music will stimulate learning and performance in the classroom. It has been said that the use of music as a primary stimulus, elevates the mood and emotions of an individual (Kaufmann, 1985). These physiological changes that have been known to have a positive effect on both the sympathetic and parasympathetic nervous system have then been evidenced to alter behavioural characteristics in which it has increased work performance (Myskja & Lindbaek, 2000).

Research by Taylor and Rowe (2012) was conducted to determine if playing Mozart in the background during trigonometry tests would enhance the performance of 69 students compared to completing the test in silence. The authors found that those who completed the test with the aid of Mozart performed considerably better than those who completed the tests in silence. It is felt that a better study would examine the effects of Mozart on performance on a variety of test subjects rather than several tests in one topic area. It is suggested that Taylor and Rowe could have enhanced the results of their study if they had included a test which involved elements of comprehension and other literary techniques. A further cross cultural pilot study carried out by Shish, Huang and Chiang (2009) to investigate the correlation between work concentration levels and the use of background music and also to explore the influence of background music on participants' attention test scores. In this study, 32 voluntary college students completed a task which consisted of a ten minute test used in occupational therapy within China called the Chu's attention test.

Results revealed that those that who listened to music beforehand, scored higher on the attention test compared to those that completed the test in silence. This study shows that background music can have a potential to influence worker concentration (Smith & Curnow, 1966) and therefore test performance. Those who worked in silence performed worse due to them being open to environmental distraction. Research has shown that the use of background music in the work place can help to centre the mind and bring focus to the task in hand (Smith & Curnow, 1966).

To further support the idea that background music can be advantageous in completing tasks, Doyle and Furnham (2011) examined the distracting effects of music on creative and non-creative individuals using comprehension tasks in two conditions; silence and in the presence of music. Creative individuals performed better in the presence of music, compared to non-creative individuals, who appeared to struggle in the presence in music. The researchers chose the music genre and the duration during the task as employees may not have the option to choose the type of music in the work place. However, what could be said for this research, to suggest improvement for the study, would be to investigate the various types of music individuals prefer as a study conducted by Oldham, Cummings, Michael, Scmidthe and Zhanet, (1995) found that different music genres are more likely to have a positive effect on individuals who enjoy that particular genre.

Background music is also used in open plan offices in order to boost office morale and also to increase worker productivity whilst also masking background speech, which is considered to be distractive and invasive of the privacy of others (Schlittmeier & Hellbruck, 2009). Research has since shown that office noise such as telephone conversations and typing impairs the cognitive performance of workers, which in turn leads them to lose focus (Martin, 2008). With this in mind, it relates to why students who study in the library with music quietly in the background via headphones, in order to block out generic dialogue of their peers and able them to focus solely on their work.

The Extrovert-Introvert continuum was first introduced by Carl Jung, and later, further developed by Hans Eysenck, who considered that there were two dimensions to personality which accounted for the various traits displayed by individuals, the two dimensions were Extroversion and Introversion (Eysenck & Eysenck, 1963). Extroverted individuals were known to be sociable characters in comparison to introverted beings that were seen to be more sociably reserved (Oliver, 1930). Studies examining the extrovert-introvert continuum have found it to be supported by the claims as made by both Jung and Eysenck. Such claims include the various personality traits produced by extroverts and introverts, respectively and also the arousal levels and conditions in which extroverts and introverts work best (Eysenck & Eysenck, 1963). The extrovert-introvert field has been studied alongside learning style, in accordance with students learning in specific conditions which are to enhance their learning ability and information retention (Erton, 2010), self-esteem, in terms of confidence increasing/decreasing when learning a foreign language depending on the personality type of

the individual (Sidek, 2011), and also personality in relation to the traits displayed and how they suggest which studying environment is suited for extroverts and which is suited for introverts (Marashi & Dibah, 2013).

The effect of music played in the background has been of interest to social and cognitive psychologists for many years. For example, Dobbs et al. (2011) carried out research amongst extroverts and introverts to examine whether the cognitive test performances would be affected by the presence of music. It was found that from this that introverts performed significantly poorer in all three cognitive tasks, compared to those in the extrovert group. The way in which Dobbs et al. (2011) used a specific cognitive test in the study, is felt to have increased the difficulty of the task, due to the increased concentration from participants, which would then in turn mimic the complexity of an exam like situation.

The influence of music in the background in an educational setting was first researched by Furnham and Allass (1999) who conducted a study involving 24 introverts and 24 extroverts. This study intended to investigate whether faster paced music had a greater effect on performance than slower music. It was found that extroverts performed significantly better in the presence of complex (faster paced) music but performed considerably worse in the presence of simple (slower paced) music. Critically, Furnham and Allass (1999) were able to show that extroverts perform better in environments which are mentally stimulating, hence the faster, more upbeat tempo in the music, compared to that of introverts, who perform considerably better in environments away from stimulating situations, hence the slower pace in music. To further the topic regarding increasing productivity, there has been research into how music can enhance motivation in everyday situations (Martin, 2008). What was found was that the use of music increased the motivation and productivity of daily activities in personnel staff completing everyday activities. Similarly, Schlittmeier and Hellbruck (2009) also found that the use of background music improved office morale and worker productivity.

Eysenck (1981) posited that whether it is noise or background music, it has the potential to increase levels of arousal in the brain, and that it would have a negative impact on introverts, as the stimulating environment would cause them to over exceed their optimum working levels. Furnham and Bradley (1997) carried out research to investigate Eysenck's prediction, amongst extroverts and introverts and found that introverts were adversely affected by background music when completing a memory recall task. It was found that those who preferred to work in the presence of music found it had relaxing qualities (Oldham et al.,

1995), and that it enabled the individual to centre themselves and focus their concentration on the task in hand. Eysenck (1990) suggested that extroverts have a lower arousal level, compared to the introverts, which causes them to seek out a greater stimulation source in order to increase their arousal. Introverts have a naturally high arousal level, this causes them to avoid over stimulating situations and activities, so they tend to work in quiet environments and partake in less stimulating activities. This claim supports the earlier study, by Furnham and Allas (1999), who found that the complexity of the music provided stimulating and none stimulating environments

Following from this, Dobbs et al's, (2010) proposed that music would have an effect on performance dependant on the personality of the individual. Eysenck's (1981) theory of personality projected that on tasks of reasonable difficulty, introverts will perform better in non-stimulating conditions and less well under more intense and simulating situations. This is to a certain extent, a common stereotype as it is expected by society that those who are referred to as reserved and unsociable would be able to carry out tasks in conditions which are mirrored to their personality (Dobbs et al., 2010). Smith (1961) noted that creating complex test conditions can challenge the cognition of the brain. Furnham and Bradley (1997) suggested that music containing lyrics was more likely to have a significant effect on test performance due to it increasing the complexity of the testing condition. Furthermore it can be said that those who prefer to work in the presence of music would select music which contained lyrics, to which they may use to aid them in defining a rhythm, consequently increasing performance (Bloor, 2009).

As a result, the aim of this quantitative research study will explore the effect of background music on test performance upon extroverts and introverts. It was predicted that extroverts would perform significantly worse in the condition without music compared to the introverts. It was further predicted that extroverts will perform significantly better in the presence of music compared to introverts.

Method

Design

The design for this study was a 2x (2) mixed subjects. Using a mix of comprehension and logic based tasks to examine the effects of background music on test performance amongst

extroverts and introverts. All participants took part in both conditions (in silence and in the presence of music).

Participants

The participants used for this study consisted of 50 students (50% male and 50% female), who were studying at the University of Cumbria, between the ages of 18 and 25. The pre-test revealed that in the sample of 50 students, there were 23 introverts and 27 extroverts.

Materials

Prior to the start of the test, all participants were provided with relevant information regarding the intention of the investigation in the form of an information sheet. This supplied the participants with detailed information regarding participants' aptitude to effectively partake in the study. The participants were presented with a consent form in which they were informed of their right to withdraw at any given point. A debrief form was distributed at the end of the study. Next, participants were given a personality questionnaire. The questionnaire, an 81 item questionnaire which took ten minutes to complete in order for the researcher to understand which participants scored as extroverts and who scored as introverts. Test one was administered and was to be taken in silence. Test two was to be taken in the presence of music. The questionnaire was split into two sections; social scenarios and personal assessment. The scale for the social scenarios section had a Cronbach's α of .23 which is considered unacceptable. The scale for the personal assessment section had a Cronbach's α of .66 which is considered minimally acceptable.

Procedure

Ethical clearance was granted prior to the start of the study. Potential participants were invited to take part via means of email. The questionnaire, an information sheet and consent forms were also distributed. Following the signing of the consent form, the researcher informed the participants that their identity would remain anonymous and once any questions were answered, test one was administered. Participants were told that they were to complete the test in silence and that they had 15 minutes. After the first 15 minutes, participants were asked to place test one face down in front of them. Test two was then administered. Again, participants were informed that they had another 15 minutes to complete the test, and that for the duration there would be music playing in the background.

Results

Once the data was collected, the answers were then marked and presented as raw data. Displayed in table one are the mean and standard deviations of those who scored as extroverts/introverts and their test scores in both silence and in the presence of music.

Table 1:

Summary of descriptive statistics

	Personality	Mean	Standard Deviation
Silence	Extroverts	11.41	1.65
	Introverts	13.00	1.68
Music	Extroverts	13.56	2.10
	Introverts	10.04	2.12

To analyse the data, a 2 x (2) mixed factorial ANOVA was performed. It was found that the first main effect which was test conditions was not significant, ($F(1,48) = 2.31, p = .135, \eta^2 = .05$). This suggests the different conditions that were employed (silence and with music) had no effect on test performance. Furthermore the second main effect which, in this instance was personality, was also found to be not significant, ($F(1,48) = 4.19, p = .05, \eta^2 = .08$). This further implies that personality did not harbour an effect on test performance. However, the interaction of test conditions with personality was found to be significant, ($F(1,48) = 92.27, p < .001, \eta^2 = .66$).

The graph below shows the significant interaction of test conditions with personality (extroverts and introverts). What the interaction graph illustrates is that introverts performed considerably well during test one, which was completed in silence, compared to test two, which was in the presence of music, they performed noticeably poorer. Likewise with the

extroverts, the graph also illustrates that the extroverts performed substantially better in test two, in the presence of music, than in silence.

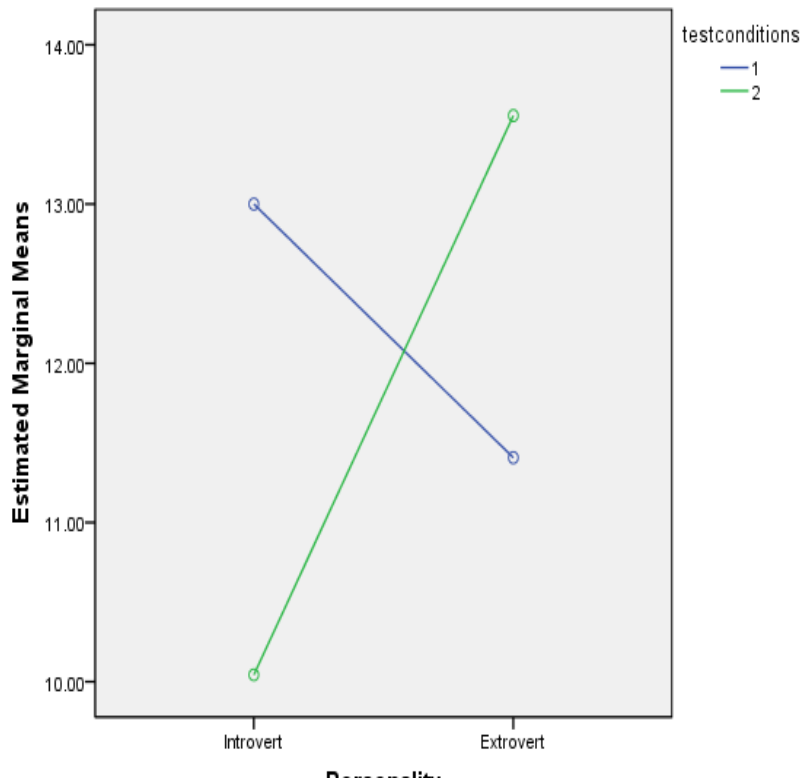


Fig 1: A graph to show the interaction between personality and test conditions

Further to this, to investigate the interaction further, a one tailed paired samples t-test revealed that introverts scored significantly higher in silence ($M = 13.00$) compared to that of the presence of music ($M = 10.04$; $t(22) = 8.01$, $p < .001$). A second paired samples t-test also revealed that extroverts scored significantly higher in the presence music ($M = 13.56$) compared to as silence ($M = 11.41$; $t(26) = -5.71$, $p < .001$). Overall from both the factorial ANOVA and the paired samples t-test, the results support the hypothesis in that the extroverts would perform better in the presence of music and that introverts would perform better in silence.

Discussion

The aim of this study was to investigate whether background music had an effect on test performance amongst extroverts and introverts. The results support the hypothesis which was posited, that introverts would perform better in silence than in the presence of music. It also supported both the hypothesis that extroverts would perform better in the presence of

music than in silence, and that introverts would perform better in silence than in the existence of music

These results support those of Eysenck (1990) who suggested that extroverts have a higher arousal level than introverts. The results from this study support this claim as the first test was completed in a lowly stimulating environment, which benefitted the introverts in this study as they were able to reach their optimum functioning level with ease. However, this could not be said for the extroverts as they require and prefer highly arousing and stimulating environments to work in, in order to reach their optimum functioning level, hence why they performed poorly in test one but they performed reasonably better in test two in the presence of music, where their ideal functioning levels were reached. Furthermore, Eysenck (1990) stated in his personality inventory that the characteristics of an extrovert and introvert are mirrored in their ideal studying environments. As introverts are characteristically quiet they more often than not, look for and favour a quieter working environment, hence why they performed better in silence than in the presence of background music. Likewise with extroverts who are talkative, favour the more social and stimulating environment, therefore performing better in the presence of background music.

The idea of mirrored characteristics, as theorised by Eysenck (1990), in working environments is a suggestion as to the reason why extroverts work better in a louder more stimulating environment. To further this idea regarding the social and stimulating environment, the use of lyrical music during the completion of test two can also help to mirror that of a social environment due to vocals mimicking a social event, therefore increasing the scores on test two for extroverts and decreasing introverts' scores on this test.

The current investigation further supports the research carried out by Doyle and Furnham (2011), who predicted an interaction of a musical distraction would have a negative effect on the performance on non-creative individuals and it would have a positive effect on creative individuals. The current study supports this as music did have a positive effect on extroverts and a negative effect on introverts. However, it cannot be fully related to the current study, as it cannot be said that extroverts are the creative individuals and introverts are non-creative as it can be classed as stereotypical judgement, as the most introverted individual may be exceptionally creative as spending time alone leaves time for own thoughts and imagination to protrude. Furthermore, in the current investigation, the researcher acknowledged the limitations of the study by Doyle and Furnham (2011) and used them to

strengthen the present study by combining the use of comprehension and problem solving question styles in order to attain a more complex test condition, therefore achieving more significant results, which were in line with the predictions made.

These results could be applied in an educational setting as it has been confirmed and supported by research that the traits of individuals can be mirrored in optimum working conditions. This study can be beneficial to those who struggle to study in complete silence during studying times as it has been found by Fox and Embrey (1972) that in order to sustain the maximum arousal for task completion it is beneficial to have a musical distraction when arousal has peaked when performing repetitive tasks therefore implying that background music should be allowed during studying times in order to boost energy levels and brain arousal and decrease level of fatigue (Doyle & Furnham, 2011).

That said, a probable limitation of this study could be the music choice. It is felt that the researcher should have asked the preference of music genres of the participants, as the music choice was chosen by the researcher, which may have therefore influenced the results obtained. It is felt that the genre of music may have an effect on test performance, therefore implying that should participant preference be taken into account, then the results may have demonstrated a greater effect. However, should music preference be taken into account in future studies, it should be noted that each participant may have various differences opinions on music preference, therefore creating more complex test conditions which may hinder the validity of the study and results obtained.

Moreover, it is felt that a further methodological limitation of this study is the internal reliability test, which found that the scale for the scenarios section of the questionnaire was considered unacceptable due to having a low alpha level. What could be suggested from this result is that scenarios may not be able to be rated upon a scale and that this scale may be deemed not suitable for the questions used. However the scale for the personal assessment had a higher alpha level indicating that the scale was mildly acceptable, suggesting that the scale was suitable for the questions and that personal assessment is a topic that can be accurately measured.

Overall, this paper has investigated the effect of background music on test performance amongst extroverts and introverts. It was shown that the aims and hypothesis of this study were met, which confirmed that extroverts performed better in the presence of music than in silence, and that introverts performed better in silence than in the presence of

music. The aim of the research was to suggest possible explanations as to why extroverts and introverts perform best in specific conditions. It was suggested that the reasoning behind it, is that the traits as displayed by extroverts, as talkative and social beings, and introverts as quiet and reserved beings, were then emulated in their ideal working conditions. The findings from this study have supported and confirmed the questions raised by past researchers regarding extroverts and introverts and their ideal working environment. Past and present research have investigated the performance of extroverts and introverts in various working conditions with a variety of music genres, and it has been shown numerous times that extroverts can perform adequately better in the presence of music than in silence and also that introverts seem to struggle in the presence of the background music. These findings suggest several courses of action for that of educationists and psychologists, in that it should be encouraged to have music on in the background during the completion of homework and coursework in order to benefit those who are classed as extroverts and introverts, in order to enhance learning and information retention, by school advisors, staff and thereafter parents. It is considered important that parents are notified and the results and conclusions of this study and previous research are explained to them in order for them to fully understand and support their child, during the completion of homework related tasks.

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