

The Effects of Three Different Background Music between Vocal, Instrumental and Silent on Verbal and Spatial Task Performance in Learning

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DOI : 10.23917/varidika.v31vi2i.10224

Submission

Track:

Received:

1 July 2019

Final Revision:

1 October 2019

Available online:

27 December 2019

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ABSTRACT

The objective of this study is to investigate the effect of three different backgrounds of music vocal, instrumental and silent on the verbal and spatial task performance in learning. The samples from Master students of Education in University Putra Malaysia which consisted of 36 students from Faculty of Educational Studies. This experimental research design to test hypothesis the effect of three different backgrounds of music vocal, instrumental and silent on the verbal and spatial task performance in learning. Data was analyse using IBM Statistics where this study used independent sample T-test and two-way analysis variance (ANOVA). The T-test result of analysis show there is differences between vocal condition ($t = 1.101$, $p = 0.172$), instrumental condition ($t = 2.06$, $p = 0.018$), and silent condition difference ($t = 2.712$, $p = 0.022$) on the verbal and spatial task in learning. Two-way ANOVA Task-Music group Greenhouse-Geisser was reported in the significant level ($p < 0.05$).

Keywords: background music, vocal condition, instrumental condition, silent condition, verbal task performance, spatial task performance, and learning.

INTRODUCTION

The advancement of technology, portable audio devices has led people to tend to listen to music more often music is important in the life of someone in doing activities such as working, driving, cooking and learning. Neurological studies show that human brains are born with music (Demorest & Morrison, 2000). According to Mammarella, Fairfield and Cornoldi (2007), they considered white noise as a unique type of sound. It is because it consists each of the frequency outside the range of the human hearing and has been used in relaxation technique. According to Dalton and Behm (2007), music background consists a rhythm, melody and harmony sound that has been reported annoying because the sound is known as auditory signals unwanted or interference on human performance.

The different background of music can affect a person's cognitive performance in doing the task. In early 1990, Rausher, Shaw and Ky (1993) study about the effects of Mozart' music show that the music can enhance spatial task performance in silence condition. According to Perham and Vizard (2011) in his study shows that music can affect cognitive tasks such as reading comprehension with music because of the presence of simultaneous conflicts in semantic information processing task focus and sound irrelevant. Not only that, according to Perham and Vizard (2011) in his study show background music can affect learning, memory and working memory. Studies by Alley & Greene (2008); Cassidy & MacDonald (2007); Avila, Furnham, & McClelland, (2011); Jancke&Sandmann (2010)also show background music can affect learning, memory and working memory and attention to the task of monitoring the cognitive.

In learning students have a tendency going better in reduce stress, be quiet, be happily and more creative in the existence of a suitable background music in their learning(Chie, Qiu Ting, Karthigeyan & Kartpagam, 2009). This study showed that the performance can be improved by the use of an effective music and not to stimulate them. According to Kotsopoulou and Hallam (2004), many students tend to listen to music while studying. In a study conducted by Oldham, Cummings, Mischel, Schmidthe and Zhan (1995) and same reported by Furnham & Bradley (1997) shows people prefer to do their work with music as the situation calm and have a major impact on work performance, assessment of fatigue and satisfaction in an organisation. However, according to Perham and Vizard (2011) showed that listening to music while working disturb them because they think like listening to someone speak. In addition, hearing music also helped generate a strong feeling of knowing regarding the past.

According to Alley and Greene (2008), amodel of working memory (WM-Working Memory) developed by Baddeley and Hitch (1974) was an attempt to mimic the processes employed in short-term memory (STM) to long-term memory (LTM) can be. Where there are active memories as opposed to inactive memory. Active memory (active memory) is not only referred to the processing of events that are happening but also activities and calculations based on information derived from long-term memory.

RESEARCH METHOD

2.1 *Participants*

Participants in this study were 36 postgraduate educational studies students, 3 is male and 35 is female from a public research university in Malaysia.

2.2 *Instruments*

In this experiment, verbal and spatial has been used to collect data. As for verbal tasks, the participant was given Reading Comprehension Task, Word Memory Task, and Similarities Task, and for the spatial task, the set of Mental Rotation Task, Paper Folding Task, and Object Location Task were given. Word Memory Task and Object Location where presented using Microsoft PowerPoint in ten seconds. The instrumental music (piano) by from Fabrizio Caligaris – “*Somewhere over the Rainbow*” and vocal music use by Mike Tomkins– “*We are Young*”.

2.3 *Procedures*

The participants were randomly given a set of the test provided, whether it is spatial task set and verbal task set, which need to be completed. Before the experiment, the participant received a consent form which needs to be confirmed as their participation in this study. There was a brief on the study as they volunteer to participate and the well explained on how the study was conducted and particular task that needs to complete the experiment.

2.4 Pilot Test

A pilot test as to ensure the validity and reliability of the study were carried out among six participants. The pilot test was conduct similarly with the real methods and receives the same set of the task with certain music condition.

2.5 Data analysis procedure

The computation of collected data used the Statistical Package for Social Science (SPSS). The inferential statistics that computer in this experimental study using independent sample T-test to compare the mean between groups and Two-Way Analysis of Variance (ANOVA) has used to compare three or more group in this study.

RESULTS & DISCUSSION

The discussion is written to interpret and describe the significance of your findings in light of what was already known about the issues being investigated, and to explain any new understanding or insights about the problem after you have taken the findings into consideration. It should connect to the introduction by way of the research questions or hypotheses you posed and the literature you reviewed, but it does not simply repeat or rearrange the introduction; this section should always explain how your study has moved the reader's understanding of the research problem forward from where you left them at the end of the introduction.

3.1 Verbal and spatial task performance under instrumental music condition

Table 1 shows the result of verbal and spatial task performance under instrumental condition. Hypothesis 1 shows that there is no significant difference between the verbal and spatial task performance under instrumental music condition. The hypothesis is rejected. The results show the task performance under instrumental music condition between verbal and spatial are statistically difference ($t = 2.06$, $p = 0.018$), which spatial task performance is better than verbal task performance under instrumental music condition.

Table 1:T-Test Results of Verbal and Spatial Task Performance under Instrumental Condition

	Task	n	Mean	Std. Deviation	t-stats	p-value
Instrumental	Verbal	6	51.1900	2.91489	2.06	0.018

	Spatial	6	62.7483	13.36864
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Note: $p < 0.05$

3.2 Verbal and spatial task performance under vocal music condition

Table 2 shows the result of verbal and spatial task performance under vocal condition. Hypothesis 2 shows that there is no significant difference between verbal and spatial task performance under vocal music condition. The hypothesis is accepted. The results show the task performance under vocal music condition between verbal and spatial are no statistically difference ($t = 1.101$, $p = 0.172$), which spatial task performance just slightly higher than verbal task performance under vocal music condition. The results indicate that vocal music conditions do not impact on verbal or spatial task performance.

Table 2: T-Test Results of Verbal and Spatial Task Performance under Vocal Condition

	Task	n	Mean	Std. Deviation	t-stats	p-value
Vocal	Verbal	6	48.2150	6.67886	1.101	0.172
	Spatial	6	53.9183	10.79072		

Note: $p < 0.05$

3.3 Verbal and spatial task performance under silence condition.

Table 3 shows the result of verbal and spatial task performance under silent condition. Hypothesis 3 shows that there is no significant difference between verbal and spatial task performance under silent condition. The hypothesis is rejected. The results show the task performance under silent condition between verbal and spatial are statistically difference ($t = 2.712$, $p = 0.022$), which spatial task performance is better than verbal task performance under instrumental music condition.

Table 3: T-Test Result of Verbal and Spatial Task Performance under Silent Condition

	Task	n	Mean	Std. Deviation	t-stats	p-value
Silent	Verbal	6	48.8100	6.67886	2.712	0.022
	Spatial	6	59.8017	8.03483		

Note: $p < 0.05$

3.4 Analysis of Two-Way repeated ANOVA

The final data analysis is using Two-Way Repeated ANOVA to find is there any significant difference between this study groups means as determined by two-way ANOVA. In this study the significant level ($p < 0.05$) was reported for Task Group and Music group for item Music (within the group). As ANOVA results, there is the difference between this study groups

means but only music group was reported to the significant level ($p < 0.05$). Therefore, there is a significant effect of the music background at the $p < 0.05$ level in the 3-Music condition.

Table 4: Two-way ANOVA

Source		Type III Sum Of Squares	Df	Mean Square	F	Sig.
Task (Within Group)	Sphericity Assumed	209.7	2	104.85	1.179	0.347
	Greenhouse-Geisser	209.7	1.501	139.673	1.179	0.341
	Huynh-Feldt	209.7	2	104.85	1.179	0.347
	Lower-Bound	209.7	1	209.7	1.179	0.327
Task (Between Group)	Sphericity Assumed	889.642	10	88.964		
	Greenhouse-Geisser	889.642	7.507	118.511		
	Huynh-Feldt	889.642	10	88.964		
	Lower-Bound	889.642	5	177.928		
Music (Within Group)	Sphericity Assumed	798.251	1	798.251	17.281	0.009
	Greenhouse-Geisser	798.251	1	798.251	17.281	0.009
	Huynh-Feldt	798.251	1	798.251	17.281	0.009
	Lower-Bound	798.251	1	798.251	17.281	0.009
Music (Between Group)	Sphericity Assumed	230.956	5	46.191		
	Greenhouse-Geisser	230.956	5	46.191		
	Huynh-Feldt	230.956	5	46.191		
	Lower-Bound	230.956	5	46.191		
Task * Music (Whit In Group)	Sphericity Assumed	62.569	2	31.284	0.333	0.724
	Greenhouse-Geisser	62.569	1.77	35.351	0.333	0.7
	Huynh-Feldt	62.569	2	31.284	0.333	0.724
	Lower-Bound	62.569	1	62.569	0.333	0.589
(Task*Music) (Between Group)	Sphericity Assumed	938.504	10	93.85		
	Greenhouse-Geisser	938.504	8.85	106.051		
	Huynh-Feldt	938.504	10	93.85		
	Lower-Bound	938.504	5	187.701		

Note: $p < 0.05$

4. Discussion

As conclusion according to the results of this study that was reported, there are significant differences between verbal and spatial task performance under instrumental music condition while this study claims that there is no significant difference between verbal and spatial task performance under vocal music condition. This research result is same from the previous study where there is no significant difference between verbal and spatial task performance under vocal music condition. The study conducted by Alley and Greene (2008) on using 4 digit task with different background auditory stimuli such as instrumental music; the irrelevant speech; and the silence part. The digit task showed the better result in silence condition rather than speech condition. Alley and Greens (2008) study also contributed the difference among vocal music and speech music condition. The vocal music condition has the little distracting rather than speech condition. The results of this study did not show the significant difference between the experimental groups that were examined in the same condition.

Personality type also is one of the variables that affect on individual task performance. Avila, Furnham and McClelland (2011) mentioned introverts (low extroversion) and extroverts (high extroversion) are different in individual's cortical arousal levels which are known as performing the great potential without distractions. In detail, extroverts related to higher arousal threshold level tend to seek arousal or stimulating situations. Therefore, Campbell & Hawley (1982) predicted detrimental effects of music on task performance. In this case, when music had been introduced, extravert's personality type may show the better performance rather than introverts. In the year 1997, Furnham & Bradley (1997) study on radio distraction level and radio extracts on recall memory and reading tasks (comprehension) in 10-Extravert and 10-Introvert individuals. The results of this experiment showed a significant difference between the extrovert and introvert group. Extravert performance was much better in memory recall task. As general the introverts showed the weak performance in another task as well.

Besides, studies also find that there is a significant difference between verbal and spatial task performance under silent condition. Finally, this study reported the difference between means of music conditions in spatial task performance among respondents. The overall results show instrumental music condition is better for both verbal and spatial task performance. The previous study by Furnham & Bradley (1997) shows one of the factor effects on the result obtain is the different type of background music. In addition O'Hare (2011) and Furnham & Bradley (1997) mentioned about the positive effect of instrument music on memory recalled which is showed that vocal condition is in the line with poor performance. However, the results of Kotsopoulou & Hallam (2004) mentioned, a study on the music condition did not show any effect on memory and recalled task.

This study contributed that may background music can affect on learning, memory and working memory. The music condition may reduce stress, tend respondents to be quiet and make them happier and more confidence. In addition, these conditions may make them show better performance. This study results are similar to the previous study (Perham & Vizard, 2011; Avila, Furnham & McClelland, 2011; Cassidy & MacDonald, 2007; Alley & Greene, 2008) results for instrumental music conditions and vocal music condition. These findings provide valuable alternatives for the students especially, to achieve more or less in completing their task.

CONCLUSION

The study conducted randomly towards the students without considering their strength in verbal or spatial intelligence. Additionally, this study only focused on three background music; silent, instrumental and vocal. It is also possible that each individual may have their personal preferences music.

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