

## SHORT TERM MEMORY AND THE ROLE OF BACKGROUND MUSIC

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### ABSTRACT

*To investigate the role of background music, 12 students of pre-intermediate level of Shokouh Language Institute, Bandar Abbas Branch, were chosen. 10 videos of a working memory task called n-back classified into 10 groups were prepared. The background music was administered alternatively during 10 sessions. The Participants had to check mark if they see the related turn back while their eyes were on the monitor and write the symbol X if it was not. The Friedman test results indicated that background music does not play any significant role on short term memory and recall among EFL students. Based on the results of this study, background music did not make any significant progress in the process of reminding the vocabulary through the word recalling of 3-back task, nor did it hinder performance. As considering their mental capacity, students of foreign language were confronted with new pleasing situation in which they could feel enjoyable learning.*

**KEYWORDS:** Short Term Memory, Background Music, Working Memory, Task

### INTRODUCTION

The concept of working memory proposes that some system stores information in the short-term memory. A common account of working memory capacity incorporates the notion of limited mental resources which are being shared between processing and storage components. Memory influences how to decide when a series of events end, and how these events are related. Therefore, in a kind of music that has communication as its goal; the structure of the music takes the structure of memory into consideration. It is the aim of this study to observe the effect of music on n-back task in which subjects are asked to monitor the identity or location of a series of stimuli to show when and if they are the same as the ones presented n trials previously.

Learning is dependent on the experiences and involves one to acquire new knowledge and skills. However, remembering and retaining what has been learned is vital if someone is

to use it again in the future. Filed (2003) defines working memory as a process of “holding information which is part of a current operation (e.g. linguistic input which we are processing) or it might be information retrieved from long term memory and held temporarily for present use” (p.109).

Atkinson and Shiffrin, (1968) stated that there are a number of structurally separated components through which information is being transferred. A subset of information in the sensory registers is selected for later procedure and is transferred into a short term store. The information in short term memory is considered fragile and decays in a short time, so rehearsal is necessary to keep it within the short-term memory and to transfer it to a sturdier store. One outstanding characteristic of working memory is that it is limited. Field (2003: 110-111) mentioned that when trying to memorize words, students would rely on some sort of voice in the head, meaning that they are rehearsing the words in their heads sub-vocally (without involving them actually using their voice). This process occurs whether they are memorizing spoken words or written words. The only difference is that the spoken words are already available in phonological form, while the written words are encoded phonologically so that students can rehearse them. According to Chastain (1988), experts had accepted two basic principles with regard to the left and right hemispheres of the brain.

“Although both function in concert to enhance the capacity of the other, they specialize in different types of mental activity. That is, the two hemispheres are asymmetrical rather than symmetrical. Thus, the total capability of the brain is enlarged and enhanced tremendously because the two hemispheres complement each other rather than duplicate functions of the other” (1988, p.27). Therefore, human brain consists of two hemispheres that are responsible for different learning activities. When language teachers emphasize the logistics of language, the left brain is called to act. When successfully giving students a deeply integrated program that needs the strengths of both left and right brain, learning accelerates. Although full awareness is important for learning, the process through the para-consciousness mind also occurs which means the subconscious mind never sleeps, therefore, all levels must be used to improve learning as well (e.g., Patel, Peretz, et al., 1998). Research throughout the years has demonstrated that playing music in the background can have positive effects on memory recall (Rauscher, Shaw & Ky, 1993). The effect of background music on emotions, behavior and mental tasks has been noted throughout history. This study suggests that there will be shared processing when music and language learning concurrently access. Baddeley and Hitch (1974) attempted to undertake some paradox by disrupting the operation of short-term memory. They asked normal subjects to hold sequences of digits while performing a range of tasks which were assumed to depend on working memory. The data indicated that there was definitely progressive impairment as the concurrent digit load was increased; however, the effect was far from surprising. In response, they proposed to divide the unitary short-term memory into three separable components, which all worked as part of a unified working memory system that served the function of facilitating the performance of a range of complex tasks. Cowan et al., (1992) claimed that there is no doubt that some of the effects in memorization occurs because long words take longer to recall and leads to more forgetting.

### ***Music and the Brain***

Richards (1993) claimed that music and rhythm create a link between the right brain's processing of music and the left brain's processing of verbal information. Music is so complex that it defies to be put in either hemisphere. Zatorre et al., (1992) showed that the emotional response to music is disassociated from both the perception of the music, and from other types of emotional responses. Therefore, when the brain processes music, this function extends over both hemispheric regions and blurs traditionally accepted divisions between them. N-back tasks are continuous-recognition measures that present stimulus sequences, such as letters or pictures. The design of the n-back task is that in all levels, subjects have to respond to all stimuli, therefore, the task requires a continuous monitoring and updating of information in working memory.

### **RESEARCH QUESTION AND RESARCH HYPOTHESIS**

Does background music play any significant role in a working memory task among EFL students?

Background music does not play any significant role in a working memory task among EFL students.

### **METHODOLOGY**

The purpose of this study was to examine the effect of background music on the short term memory during performance of a specific task as well as to ensure whether background music increases working memory or not.

#### ***Design of the Study***

The design carried out in this study was based on one group; quasi experimental design. There was only one group of participants and two treatments repeating one after the other. This research used time series design, a type of quasi-experimental design which means the measurements of the same variables were taken at different points in time. The dependent variable in this study was the performance of word recalling. The independent variable of this study was the treatment of instrumental music. Because the slow rhythm was expected to bring calmness to the students and lower their stresses, the pieces of music used in this research were relaxed piano and violin beats.

#### ***Participants***

To accomplish the objectives of this study, students of pre-intermediate level from Bandar Abbas branch of Shokouh Language Institute -Iran- were chosen. According to their course book "Four Corners" by Jack Richards, the participants were considered as pre-intermediate level.

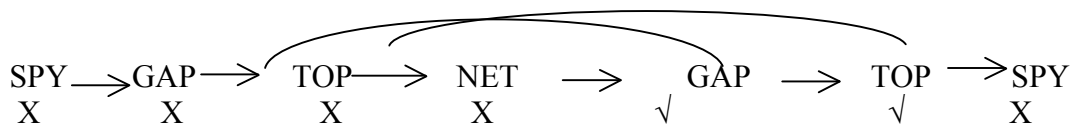
#### ***Instrumentation and material***

In this study, only one group was needed. There were two kinds of treatments which were applied to this group. The researcher made ten visual videos by using Power Point Software as the instrument and prepared them for the sessions. Five videos as the research materials were inserted with some pieces of instrumental background music. A laptop computer monitor was used for the

presentation of the videos of the task. For each session, 12 pieces of papers for 12 students were prepared with columns to divide sections of the results. Students were provided with some sheets for the particular sessions; treatment (Appendix A) and non-treatment (Appendix B) sessions.

### ***Procedure***

The task performances were applied at the end of the routine classes. Before starting the main ten performances of n-back task during the ten sessions, one session was assigned to get the students familiar with this working memory task by a sample video which was prepared and allocated by the researcher for practicing. The videos were presenting 3-back tasks. In the first session, the first group of videos was displayed. Video number one included 35 items of 3-letter words (including the repeated words). 10 words were chosen and devoted for each group of videos. 25 percent of the whole words in each video were repeated as n-backs. In the first session, each student was given one piece of paper with a column dividing the paper and tagged on the upper side '(first) session-3-back'. Holding a pen in their hands and eyes on the monitor, 12 participants were ready to start the task. The first video was displayed. Students were supposed to look at the monitor with 3-letter words passing one by one. Each word stopped for 1 second, and the time between appearing one word and the next word was 2.25 seconds. The time was scheduled in a way that students had the time to check on their papers whilst staying focused on the monitor. Students had to remind the repetition of the words from *three* turns back and write in the column the symbol  $\checkmark$  and X for the words which were not repeated of three turns back on the paper. In other words, students had to mark with either symbols for every single word anyways. For a better comprehension, look at the example below:



Therefore, at the end of the performance, they had n symbols for n words which had passed. The participants were all in the same group, but the treatment changed. There were two treatments: one was doing the tasks in one session with background music, and the other was doing the tasks without any background music. The selected music was some pieces of soft instrumental piano music, so that students would not get confused with the existence of lyrics. These two treatments were applied to the procedures every other session till the 10<sup>th</sup> session.

### ***Data Analysis***

In this study, descriptive statistic was used. Since all the analyses are based on non-parametric methods and the sample size is small, Friedman Test was applied which is a non-parametric statistical test equivalent to the parametric repeated measure ANOVA.

## **RESULTS AND DISCUSSION**

The findings are discussed into generating the result. The basic result with details of each session of the data collection is provided in table 1.

Table 1: Raw Data for the Study

1 <sup>st</sup> Session Without Background Music	Number of Correct Answers in the Task
Number of Students	3-Back
12	320
2 <sup>nd</sup> Session With Background Music	Number of Correct Answers in the Task
Number of Students	3-Back
7	186
3 <sup>rd</sup> Session Without Background Music	Number of Correct Answers in the Task
Number of Students	3-Back
8	208
4 <sup>th</sup> Session With Background Music	Number of Correct Answers in the Task
Number of Students	3-Back
8	216
5 <sup>th</sup> Session Without Background Music	Number of Correct Answers in the Task
Number of Students	3-Back
8	231
6 <sup>th</sup> Session With Background Music	Number of Correct Answers in the Task
Number of Students	3-Back
9	243
7 <sup>th</sup> Session Without Background Music	Number of Correct Answers in the Task
Number of Students	3-Back
9	260
8 <sup>th</sup> Session With Background Music	Number of Correct Answers in the Task
Number of Students	3-Back
12	315
9 <sup>th</sup> Session Without Background Music	Number of Correct Answers in the Task
Number of Students	3-Back
10 <sup>th</sup> Session With Background Music	Number of Correct Answers in the Task
Number of Students	3-Back
10	245

Due to the fact that subject mortality occurred during certain sessions, the researcher could not use the data for this section based on session by session sequence. Therefore, averages of the performance on three tasks were considered to get an initial picture of the results. Figure 1 illustrates the tasks average results with and without the presence of background music.

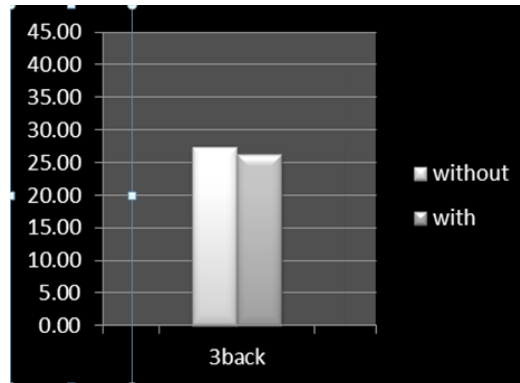


Figure 1: A Comparison of the Averages of Correct Answers for the Task

As figure 1 shows, it generally seems that the treatment and non-treatment average results are almost equal, and applying of the Friedman Test revealed that background music has no significant effect on correct answers of students. Therefore, the first hypothesis was supported; Background music does not play any significant role in a working memory task among EFL students.

## CONCLUSION

To approach the goal of this research which was scrutinizing the effect and role of background music on EFL students' short-term memory, 3-back task was applied with and without the treatment. It was concluded that based on the results, background music would not be an incentive element to progress through the word recalling, however, it would not impede the performance either. It means that almost no difference was found during the treatment and non-treatment sessions among the tasks. However, due to the new context in which the students were confronted, performing such tasks that was not common among Iranian students needed more time and energy.

## REFERENCES

- Atkinson, R. C., & Shiffrin, R. M. (1968). Human Memory: A proposed system and its control processes. In K. W. Spence & J. T. Spence (Eds.), *The psychology of learning and motivation* (Vol. 2, pp. 89–195). New York: Academic Press
- Baddeley, A. D., & Hitch, G. J. (1974). *Working Memory*. In G. A. Bower (Ed.), *Recent Advances in Learning and Motivation* (Vol. 8, pp. 47–90). New York: Academic Press. Retrieved from: <http://www.ncbi.nlm.nih.gov/pubmed/1736359>
- Bohlke, D., & Richard, C. J. (2012). *Four Corners*. (1<sup>st</sup> Ed). New York, NY. Cambridge University Press

- Chastain, K. (1988). *Developing Second Language Skills: Theory and Practice*. 3rd ed. Orlando. Harcourt Brace Jovanovich Inc.
- Cowan, N., Day, L., Saults, J. S., Keller, T. A., Johnson, T., & Flores, L. (1992). The Role of Verbal Output Time and the Effects of Word-Length on Immediate Memory. *Journal of Memory and Language*, 31,1-17. Available at : <http://websites.psychology.uwa.edu.au/labs/cogscience/Publications/Lewandowsky2007.pdf>
- Field, J. (2003). *Psycholinguistics: A Resource Book for Students*. British Library of Congress Cataloging in Publication Data. Section C
- Hornby, A. S., Cowie, A. P., & Lewis, J. W. (1974). *Oxford advanced learner's dictionary of current English*. London: Oxford University Press.
- Patel, A. D., Peretz, I., Tramo, M., & Labrecque, R. (1998). Processing prosodic and musical patterns: A neuropsychological investigation. *Brain and Language*, 61: 123-144. Retrieved from : [http://books.google.de/books?id=-L-tlIXA8WQC&pg=PA167&lpg=PA167&dq=book:+patel+peretz+1998&source=bl&ots=Uf-nvXUVKV&sig=nr7fS3VnzAVdsa0ZtZIszdUnUqQ&hl=en&sa=X&ei=9H4bU4iJJeyf7gae34GAAw&redir\\_esc=y#v=onepage&q=book%3A%20patel%20peretz%201998&f=false](http://books.google.de/books?id=-L-tlIXA8WQC&pg=PA167&lpg=PA167&dq=book:+patel+peretz+1998&source=bl&ots=Uf-nvXUVKV&sig=nr7fS3VnzAVdsa0ZtZIszdUnUqQ&hl=en&sa=X&ei=9H4bU4iJJeyf7gae34GAAw&redir_esc=y#v=onepage&q=book%3A%20patel%20peretz%201998&f=false)
- Richards, R.G. (1993). Music and rhythm in the classroom. In *Learn: Playful techniques to accelerated learning*, 109-113. (ERIC Document Reproduction Service No. ED379071). *Journal of International Education Research*. 3rd Quarter 2012. Vol 8. Retrieved From: <http://journals.cluteonline.com/index.php/JIER/article/viewFile/7111/7185>.
- Rauscher, F. H., Shaw, G. L., & K, K. N. (1993). *Music and spatial task performance*. *Nature* 365 (6447): 611. doi:10.1038/365611a0. PMID 8413624. edit
- Zatorre, R.J., Evans, A.C., Meyer, E., & Gjedde, A. (1992). Lateralization of phonetic and pitch processing in speech perception. *Science*, 256, 846-849. doi: 10.1126/science.1589767.[http:// books.google.de/books](http://books.google.de/books)