

## The Impact of Music in Memory

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### Abstract

A lot of research has been done on the effects of music and sounds on performance in many areas of study. However, there have been mixed results about what kind of effects music can have. Musical pleasure was able to influence task performance, and the shape of this effect depended on group and individual factor (Gold B., et al. 2013). According to Fassbender (2012), music does have an effect on memory, music during a study or learning phase hindered memory but increased mood and sports performance. The objective of this experiment is to find if music can help memorize different tests like nonsense syllables, numbers and poems with rhyme. Students were from different faculties, N=74 (75% females) between age 17-22, participating in this experiment. Experiment had 4 different tests, self-created according to the experiment of nonsense syllables from (Ebbinghaus 1885). First test had 50 nonsense syllables to lead to the next phase of experiment. Students were separated in 3 groups with almost the same numbers of correct nonsense syllables from the first test. First group was taking the tests without music at all and in silent, second group was doing the test with lyrics music and the third group with relaxing music. All three groups had 5 minutes for each 3 different tests to memorize 50 other nonsense syllables (including 3 same syllables), 12 lines from poems and 50 different order of numbers, then to write down how much they memorized. The music was the same during memorizing phase and was repeated during writing phase with same volume and with headphones on. Result showed that there are significant differences memorizing lines from poems and the same syllables between students without music and them with music. T-test for each group also showed the significant differences between these two groups. Regression analyses explain 33% of variance factors for memorizing the lines and 50% of variance factors for memorizing the same syllables, groups have the most impact on regression. Conclusions of this research are that music affects memory negatively resulting that students are able to memorize better without music. This research also concludes that silent is a key factor to recognize the same nonsense syllables. When it comes to memorizing better keep the music down!

**Keywords:** Memory, music, memory tests, affect of music.

### Introduction

What we usually think of as "memory" in day-to-day usage is actually long-term memory, but there are also important short-term and sensory memory processes, which must be worked through before a long-term memory can be established. The different types of memory each have their own particular mode of operation, but they all cooperate in the process of memorization. Short term memory or working memory holds a small amount of information in

mind, readily state for a short period of time typically from 10 to 15 seconds, or sometimes up to a minute (Atkinson, R.C. & Shiffrin, R.M, 1971).

"Music is a play of tones, that is, of fixed, clearly defined quantities. Other sounds, glissandos, cries, noises, may occur as inserts; if they are numerous, the result is partly musical; if they predominate, it is no longer music in the proper sense of the word" (Wiora, W., 1963).

A lot of research has been done on the effects of music and sounds on performance in many areas of study. However, there have been mixed results about what kind of effects music can have. Musical pleasure was able to influence task performance, and the shape of this effect depended on group and individual factors (Gold B. et. al., 2013).

Martin, Wogalter and Forlano (1988) show that reading comprehension was impaired when current lyrical music was played. However, this seems to contradict the music and cognition literature, which proposes that listening to music that one likes increases cognitive performance (Hallam et. al., 2002; Saramo et al., 2008; Thompson et. al., 2001; Wallace, 1994).

Music led to a significant decline in performance overall, working-memory capacity moderated this effect in the reading-comprehension tasks. Individuals who are better able to control their attention may be protected from music-related distraction when completing certain kinds of academically relevant tasks (Christopher E., 2016).

According to Fassbender et al. (2012), music does have an effect on memory. This research found that music during a study or learning phase hindered memory but increased mood and sports performance.

Music benefits individuals in other way such is increasing older adult working memory performance because of listening to an excerpt of Vivaldi's "Four Season" (Mammarella et. al., 2007).

Accordingly, people primarily listen to music for emotion and mood regulation (Sloboda 2001; Saarikallio 2007). Prior research had shown that listening to music that people considered

pleasurable increased the release of dopamine in the brain, and dopamine is well known as a "feel good" neurotransmitter (Nadler et. al., 2010).

Can music direct reward-based decision making? Although the famous "Mozart effect" implies that music can temporarily influence cognitive performance (Rauscher et. al., 1993). Its functional relationship to reward processing has not yet been assessed.

Subsequent studies have revealed this phenomenon not to be caused the music of Mozart or other classical composers but by an increase in arousal and mood because of listening to preferred music (Nantais 1999; Perham 2012; Schellenberg 2005).

Carpenter (2012) did an experiment with older adults (age 63-85) to study the positive feelings and the impact in working memory among older adults. Participants completed a computer administered card task in which participants could win money if they chose from "gain" decks and lose money if they chose from "loss" decks. Participants in the positive-feeling condition also demonstrated improved working-memory capacity. This concludes that the effect of "good feeling" can have impact in working memory, even the complex decision making problems.

The Chinese University of Hong Kong use music as training method of memory. The results showed that children with music training demonstrated better verbal but not visual memory than did their counterparts without such training. When these children were followed up after a year, those who had begun or continued music training demonstrated significant verbal memory improvement. Students who discontinued the training did not show any improvement. Contrary to the differences in verbal memory between the groups, their changes in visual memory were not significantly different.

The objective of this experiment is to find if music can help memorize different tests like nonsense syllables, numbers and poems with rhyme. What's the impact of music in those different tests and if the impact of different music is the same.

**Hypothesis:**

H1: Lyrical music has negative impact on memory H2: Relaxing music increase memory

**Methodology**

**Sample**

Students were from different faculties, N=74 (75% females) between age 17-22, participating in this experiment, 57.8% of them have only one preferred kind of music and the most preferred music was RNB with 21.6%. According to them 54% listens music while studying.

**Instruments**

Experiment had 4 different tests, self-created. The first test had 50 nonsense syllables to lead to next phase, second test had 50 other nonsense syllables, third test had 50 different orders of numbers, fourth test had 12 lines of poems in different orders and all this tests were created according to the experiment of nonsense syllables (Ebbinghaus, 1885). This experiment had two different kind of music: Shattered Lyrics and Relaxing Music for Brain and Concentration (Melody).

**Procedure**

Before administrating the tests, was taken permission from faculties to use some of their classes. In first day participants did the first test (Test A). Participants were in the same class, they did test A, in silent, that had 50 nonsense syllables to lead to the next phase of experiment. After analyzing the test A in the other day of experiment students were separated in 3 groups with almost the same numbers of correct nonsense syllables from the test A. Then they had to do 3 different tests of memory in the same class, same time but in different part of the class. First group was taking the tests without music at all and in silent, second group was doing the test with lyrics music and the third group with relaxing music. All three groups had 5 minutes for each 3 different tests to memorize 50 other nonsense syllables(including 3 same syllables), 12 lines in different orders from poems and 50 different order of numbers, then to write down how much they memorized. The music was the same during memorizing phase and was repeated during writing phase with same volume and with headphones on.

**Results**

Results will present the main findings of the study by using the adequate concluding analyses to give an answer to the research hypothesis, and to give an explanation to the aim of the research.

Table 1. Anova: Results between 3 groups and 3 different tests

		Sum of Squares	df	Mean Square	F	Sig.
Tests of numbers	Between	18.834	2	9.417	0.505	p=.606
	Groups					
Tests of nonsense syllables	Between	9.58	2	4.79	0.276	p=.759
	Groups					
Same nonsense syllables	Between	9.589	2	4.795	6.703	p=.002**
	Groups					

M	SD	T-test	sig.
1.9130	.51461	4.132	p=.000**
1.0370	.89792	4.307	p=.000**
8.1304	2.30226	2.563	p=.014*
6.2593	2.78171	2.602	p=.012*

  

Tests of lines	Between Groups	51.851	2	25.926	4.5	p=.015*
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The results presented in table 1 show that there is a significant difference comparing three groups with each other and 3 tests used. There is a significant difference in nonsense syllables  $p=.002^{**}$  and in lines of poems  $p=.015^{*}$ . But there is not a difference in numbers and nonsense syllables.

Table 2. T-test: Results between group without music and lyrical music

		M	SD	T-test	sig.
Same nonsense syllables	Group without music	1.9130	.51461	4.132	p=.000**
	Group with lyrical music	1.0370	.89792	4.307	p=.000**
Test of lines	Group without music	8.1304	2.30226	2.563	p=.014*
	Group with lyrical music	6.2593	2.78171	2.602	p=.012*

T-test analysis in table 2 showed significant differences between group without music and lyrical music in same nonsense syllables and lines. The results in table 2, shows that group without music memorize more same nonsense syllables with  $M=1.91$  and  $SD=.51$  and group with lyrical music memorize less with  $M=1.03$  and  $SD=.89$ . Also table 2 shows that group

without music memorize more lines of poems with  $M=8.13$  and  $SD=2.30$  and group with lyrical music memorize less with  $M=6.25$  and  $SD=2.78$ .

Table 3. T-test: Results between group without music and relaxing music

		M	SD	T-test	sig.
Test of	Group without music	8.1304	2.30226	2.752	p=.009*
	Group with relaxing music	6.3913	1.97114	2.752	p=.009*

T-test analysis in table 3 showed significant differences between group without music and

relaxing music in lines. The results in table 3, shows that group without music memorize more lines with  $M=8.13$  and  $SD=2.30$  and group with relaxing music memorize less with  $M=6.39$  and  $SD=1.97$ .

Regression analyses explain 33% of variance factors for memorizing the lines and 50% of variance factors for memorizing the same syllables, groups have the most impact on regression. Regression analyses explain 33% of variance factors for memorizing the lines, groups with most impact  $\beta = -.318, p=.026^*$ , and 50% of variance factors for memorizing the same syllables, groups have the most impact  $\beta = -.456, p=.001^{**}$ .

Results also showed that there is not a significant difference between group with relaxing music and group with lyrical music.

## Discussion

Based on this research we have come to some results that support the lecture that music is a factor that has negative impact on memory. Our first hypothesis that lyrical music has negative impact on memory results to be approved because according to this experiment students that were doing the tests while listening to lyrical music had less correct lines that students without music at all but not significant differences in nonsense syllables or numbers.

The second hypothesis was refused because results shown that relaxing music has negative impact on memorizing lines while comparing the students that did the testes without music and them with relaxing music but not significant differences in nonsense syllables or numbers even

thought that current studies showed that relaxing music helps students to focus, but according to the experiment this focus while listening to music does not improve working memory.

There is a significant difference in same nonsense syllables. Students without music are more able to find the same nonsense syllables and remember them better than two groups with music.

It is important to mention that relaxing music and lyrical music does not have a significant impact difference in memory. The experiment also showed that it is not important the music you chose, it is important that music do not have a positive impact.

As Saarikallio (2007) said "People primarily use music for good mood and good feelings not as a tool for cognitive improvement".

## Conclusion and recommendation

Based on the results we conclude that trying to memorize lines without correct order while listening music is less effective than memorizing them without music, so it results that without the distraction of music students are more able to code and memorize different lines that have sense. According to results of this experiment is also conclude that music is a distraction to students, making them not to recognize the same nonsense syllables, even thought that results shown that at least one of three nonsense syllables was remembered by every student.

It is recommended that during different activities, music is a good tool to use because increase mood and the dopamine in brain but during reading, memorizing (numbers, lines and poems) better keep the music down. Even thought that people feel good about listening to music and read at the same time, actually the music is not a key factor especially to lines that have sense and focus. If it comes to memorizing better keep the music down!

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