

## Effect of Music Genre on Memory

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### Abstract

Effects of music on memory retention are quite powerful, certain types of music genre are known to activate the left and right parts of the brain, which maximizes learning and aids retention. The psychological processes of encoding, storage and retrieval are referred to as memory. This study is aimed at finding out the effect of Music style (Genre) on memory. Sixty four participants were randomly assigned into four different music (Treatment) conditions, namely; Classical music genre, Country music genre, Rhythm and Blues music genres and Reggae music. In each group, participants studied a comprehension passage for ten (10) minutes while listening to music through earphone device, after which they filled out a questionnaire adapted from the passage they studied in order to test their memories. Three hypotheses guided the study. There was a significant effect of music genre on memory:  $F(3.60) = 7.07$ ,  $P \leq 0.05$  when the ANOVA test was performed on the data, the group that were randomly assigned to Classical genre did better in the recall process. However, Gender and Age were not found to be a determinant factor from the analysis;  $F(3.57) = 0.51$  and  $F(2.61) = 1.68$  respectively. Further research may explain why the results of this experiment contrast some of the published research on the effects of music on memory. The study recommends that the retrieval (recall) can be done the next day and more music genre should be used.

**Keywords:** *Effect, Music genre, Memory*

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## **Background to the Study**

Listening to music is a common pastime amongst many people, more so for students and younger people who listen to music while they are studying. This raises the question, does listening to music aid your memory and if so, what genre is the most effective. It has been tested that music is a pleasurable experience which increases dopamine levels in the brain can help the brain respond to reward based incentives and this could help the brain remember and recollect information (Jacob, 2014).

Memory is vital to one's life. Without it, no development, improvements, or achievements can occur as there is no way to access prior events. Memory refers to the way that one stores information, and later recalls it. The process of memory occurs in three main steps: encoding, storage, and retrieval (Izzy, 2013). In order for one to store a memory of information or experiences, the brain must first encode it. Information entering the memory system from external inputs can be recorded in three main ways: visual, acoustic, and semantic (Izzy, 2013).

The effect of music on memory retention are quit powerful. Certain types (genre) of music are known to activate the left and right parts of the brain, which maximizes learning and aids retention. Knowing which genre of music to listen to while learning, studying or preparing for a test can help you improve your retention of the information and gain more success in test results. Music communicates different types of messages through the combination of lyrics and sound (Sellnow and Sellnow, 2001).

The idea of music as communication reaches the likes of audio production students, who are taught the concept of musical underscoring, or adding music to “enhance information or emotional content” in a wide variety of ways from establishing a specific locale to intensifying action (Kagan, 2001). In this realm, music becomes a key instrument in augmenting or punctuating a given message.

Music genre also known as music style is a conventional category that identifies pieces of music as belonging to a shared tradition or set of conventions (Samson, 2012). Music can be divided into different genres in several ways. The artistic nature of music means that these classifications are often arbitrary and controversial, and some genre may overlap (Green and Douglas, 1965). Memory like learning, is hypothetical construct denoting three distinguishable but interrelated processes

### **1. Memory Encoding**

When information comes into our memory system (from sensory input), it needs to be changed into a form that the system can cope with, so that it can be stored. Think of this as similar to changing your money into a different currency when you travel from one country to another. For example, a word which is seen (in a book) may be stored if it is changed (encoded) into a sound or a meaning (i.e. semantic processing).

## 2. Memory Storage

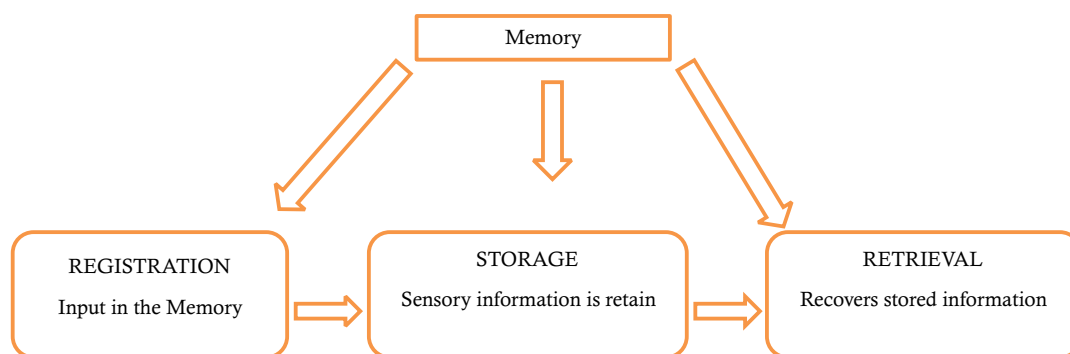
This concerns the nature of memory stores, i.e., where the information is stored, how long the memory lasts for (duration), how much can be stored at any time (capacity) and what kind of information is held. The way we store information affects the way we retrieve it. There has been a significant amount of research regarding the differences between Short Term Memory (STM) and Long Term Memory (LTM).

Most adults can store between 5 and 9 items in their short-term memory. Miller (1956) put this idea forward and he called it the magic number 7. He thought that short-term memory capacity was 7 (plus or minus 2) items because it only had a certain number of “slots” in which items could be stored.

### Memory Retrieval

This refers to getting information out storage. If we can't remember something, it may be because we are unable to retrieve it. When we are asked to retrieve something from memory, the differences between STM and LTM become very clear.

STM is stored and retrieved sequentially. For example, if a group of participants are given a list of words to remember, and then asked to recall the fourth word on the list, participants go through the list in the order they heard it in order to retrieve the information. LTM is stored and retrieved by association. This is why you can remember what you went upstairs for if you go back to the room where you first thought about it. Organizing information can help aid retrieval. You can organize information in sequences (such as alphabetically, by size or by time). Imagine a patient being discharged from hospital whose treatment involved taking various pills at various times, changing their dressing and doing exercises. If the doctor gives these instructions in the order which they must be carried out throughout the day (i.e., in the sequence of time), this will help the patient remember them.



**Source:** Gross Psychology, pg. 257

However, Miller didn't specify the amount of information that can be held in each slot. Indeed, if we can “chunk” information together we can store a lot more information in our short-term memory. In contrast, the capacity of LTM is thought to be unlimited. Information

can only be stored for a brief duration in STM (0-30 seconds), but LTM can last a lifetime. The challenging question is; “does the type of music played during memorization and recollection or a simple cognitive task have a significant effect on students' ability to memorize and retain simple previously learnt information?”

Most of the research conducted earlier on this are, participants were subjected to all treatment conditions (within group design), and numbers of participants are relatively few for effective generalization which may lead to fatigue in brain and may affect their findings. Also no research of this nature has been conducted in this part of the world in order to ascertain generality of the outcome. There is need for further research in the area in order to reverse the missing problems identified from other similar research, especially a change in the design (now using a between group), and also carrying the study in this part of the world (Nigeria in particular).

Many areas of the brain are used to process information. However, the hippocampus is the section that transfers information into long-term memory. This type of memory contains all of the presorted important information in a relatively permanent and limitless storage. Long-term memory also organizes information for easy recovery (Coon, 1997). The memory is a mental system that receives, stores, organizes, alters and recovers information from sensory input. Sensory memory, short-term memory and long-term memory are the three basic types. Information first enters sensory memory, which holds an exact copy of the data for a few seconds.

Another name for short-term memory is working memory, which describes the thinking and problem solving aspects. Short-term memory, according to a psychologist George Miller, can hold a magic numbers of seven (plus or minus two) bits of information. Bits are units of information such as numbers, phrases or words. Information is held in short-term memory by two types of rehearsal. Maintenance rehearsal refers to silently repeating or mentally reviewing information. Elaborative rehearsal connects the new information with existing information (Coon, 1997).

Much 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. Music has been associated with better memory and situations in which people learn something that are repeated in the test phase are better remembered. This can have implications in the real world because it can be helpful or it can hinder study habits. This is very useful for high school and university students. According to an article by Fassbender, Richards, Bilgin, Ihompson and Heiden, (2012), music does have an effect on memory. This research found that music during a study or learning phase hindered memory at a test phase but increased mood and sports performance. Research by Mann (2008) indicates that sound in the environment, and not necessarily music, enhances learning.

Fassbender, Richards, Bilgin, Ihompson and Heiden, (2012) presented a virtual history lesson to students under different environmental conditions. These conditions consisted of either background music, or no background music, along with either a 3 monitor display system or an immersive reality center.

The results found that memory for the history lesson was better for the 3 monitor display system with no background music and for the immersive reality center with background music. The concept of context dependent memory is also a major factor in these studies because many studies have shown that it does matter that conditions in study and test are the same.

It especially comes into play in a study by Balch, Bowman and Mohler, (1992). Context dependent memory is the notion that the something that is learned or studied in particular conditions will be remembered best if those particular conditions are repeated during the testing phase. McGeoch (1932) stated as cited in Balch, Bowman and Mohler, (1992) as part of his hypothesis that if the contexts are different during study and test, the subject is not only likely to not remember, but to actively forget some things that were studied and learned.

As stated by Balch, Bowman and Mohler, (1992), context not only can depend on music and background noise or stimuli but on the certain smells, the time of day, alcohol or drug states, and the mood in which one is in at the time of encoding. In the experiment performed by Balch, Bowman and Mohler, (1992), results showed the highest number of words recalled was the group in which the same cue was played during the study phase and during the test phase not only displaying evidence of context dependency but that "this procedure revealed that context dependency was significant" (Balch, Bowman and Mohler, 1992). Context dependency is important and relevant to this type of research because if the context is important, people may hinder their own learning by listening to music while studying and not while taking the test or vice versa.

The outcome of Smith and Morris (1997) showed that the participants' preferred type of music caused them to perform the worst on the test and that no music produced the best result. Participants exposed to less stimulating music did better than those exposed to higher stimulating music, but worse than those exposed to non-music condition.

Tucker and Bushman (1991), reported that Rock and Roll music decreased the students' performance on the mathematical and verbal part of the test conducted. However, it did not affect their performance on the reading comprehension part of the test.

Banbury, Macken, Tremblay and Jones, (2001), concluded in their review that irrelevant sound have a severe negative effect on memory most especially, short-term memory. Similar to this is the report of Susan (2001), that irrelevant noise is distracting in educational settings. This study is not disputing this fact but trying to add meaning to the sound. To see if relevant sound can enhance memory.

Three hypotheses guided the study which is;

1. The classical genre is most effective out of all the four genres in aiding information retention, while Rhythm and Blues (R&B) is the least effective.
2. There will be significant difference between age grades in terms of information retention.
3. There will be a significant difference between males and females in information retention.

## **Method**

This study adopted an experimental method with a non-repeated measures design (U-RMD) that is, a between group design. We had four treatment conditions and the participants were randomly assigned into one of the treatment conditions by picking numbers squeezed in pieces of papers, any number a participant picked automatically made him/her a member to the group regardless of their gender and age.

## **Participants**

A total of sixty four (64) participants ranged in age from 15 to 35 years were used for this study. All participants were students of the College of Education, Akwanga, Department of educational foundations. There were 28 females and 33 males.

## **Instruments**

The instruments used for this study were:

- i. Comprehension passage: is the instrument participants studied while listening to music. In other words it sets to measure the level of compatibility of music and memory.
- ii. Questionnaires: contains the same comprehension passage, but with some missing words to be recalled by participants. In other words the instrument measured memory.
- iii. Stop watch: was used to keep record of time originally set for the experiment.
- iv. Sixteen (16) mp3 player: was used to play music as they (Participants) were studying the comprehension passage.

## **Procedure**

The experiment was conducted in four sections. That is, four participants from each of the experimental group making a total of sixteen (16) participants per session. After reading the open scripted instructions, participants were given the comprehension passage but covered so that they could not study it until the stipulated time for the experiment. While the music was played, participants were asked to uncover the passage and commence reading immediately. After ten minutes, they were asked to stop reading the passage and were given two minutes to rest in a very silent condition, during this time participants were given the set of recall questionnaire (RQ) developed from the passage to respond to silently. While the recall process is on, the next group of sixteen participants are on with their experiment because the time stipulated for recall is the same with the time for reading the passage. After ten minutes the recall questionnaire was retrieved and the closing statement (Scripted) were read to their hearing and were asked to leave the laboratory. This continued until the fourth set of sixteen participants.

The ethical consideration was taken care of, as the anonymity of participants was highly observed, because personal information about them was kept confidential. Generally the nature of the experiment was such that involves no risk.

## Results

The statistics employed for this study are both descriptive and inferential statistics through SPSS statistical package version 17. Analysis of variance (ANOVA) was used to test the three hypotheses.

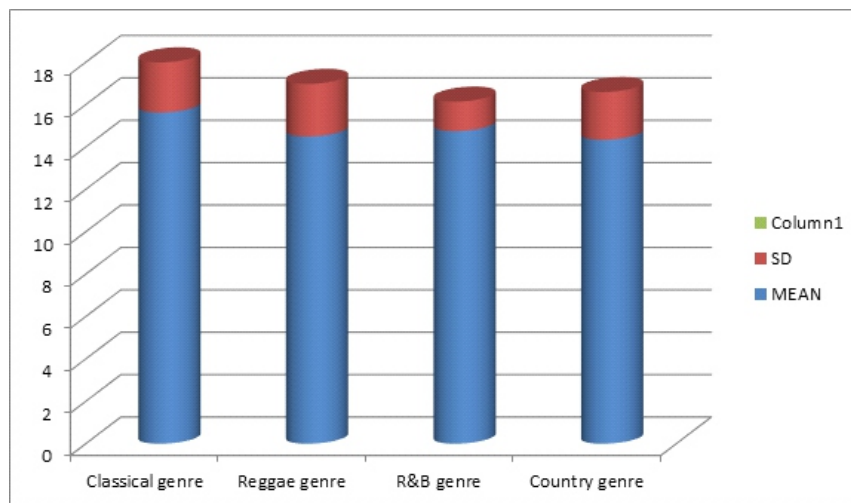
**Ho1:** The classical genre is most effective out of all the four genres in aiding information retention, while Rhythm and Blues (R&B) is the least effective.

**Table 1: Mean and standard deviation for the music genres**

Variable	N	$\pi$	SD
Classical genre	16	15.63	2.363
Reggae genre	16	14.50	2.477
Rhythm and blues	16	14.75	1.390
Country genre	16	12.50	1.461
Total	64	14.34	2.255

Table 1 showed that classical genre (N= 16,  $\pi$  = 15.63; SD = 2.363) is higher and the country genre (12.50, 1.461) is lower.

**Figure 2** for graphical mean differences of music genre.



**Table 2: Summary table for ANOVA on the effect of types of music on memory**

Source	SS	df	$U_s$	F	P – Value
Between group	83.688	3	27.896	7.070	0.05
Within group	236.750	60	3.946		
Total	320.438	63			

$F(3,60) = 7.07 \leq 0.05$  Critical Value = 2.76.

The result as shown in table 2, indicates that there is a statistically significant difference between the four types of music on memory  $F(3,60) = 7.07$ ,  $P < 0.05$ , Therefore, the first hypotheses is accepted at a confidence interval of 95%.

**Ho2:** There will be significant difference between age grades in terms of information retention.

**Table 3: Mean and Standard Deviation for age**

Variable	N	$\pi$	SD
15 – 19	18	14.22	2.713
20 – 24	33	14.33	2.087
25 – 29	6	14.50	1.871
30 >	4	15.75	2.500
Total	61	14.41	2.268

**Table 4: Summary table for ANOVA on the differences between age in information retention.**

Source	SS	Df	$U_s$	F	P – Value
Between group	8.060	3	2.687	0.509	0.05
Within group	300.694	57	5.275		
Total	308.754	60			

The mean according to age indicated that the older people had the higher mean than the younger people. However, further statistic using one way ANOVA indicated that there is no statistically significant difference between the young old:  $F(3,57) = 0.509$ ,  $P \geq 0.05$  NS Critical value = 2.78 revealed a significant result at a confidence interval of 95%. Therefore, it implies that we failed to reject the null hypotheses.

**Ho3:** There will be a significant difference between males and females in information retention.

**Table 5: Mean and Standard Deviation for Gender**

Variable	N	$\pi$	SD
Male	33	14.76	2.359
Female	28	14.04	2.009
Missing	3	12.67	2.887
Total	64	14.34	2.255

**Table 6: Summary table for ANOVA on the differences between gender in information retention.**

Source	SS	Df	$U_s$	F	P – Value
Between group	16.746	2	8.373	1.682	0.05
Within group	303.692	61	4.979		
Total	320.438	63			

**Source:** Author's field work, 2014

The mean of people's performance in the different treatment conditions according to gender distribution indicated that the males had the higher mean than the females. However, further



statistics using one way ANOVA indicated that there is no statistically significance difference between gender:  $F(2,61) = 1.682$ ,  $P \geq 0.05$  NS Critical value = 3.12 revealed an insignificant result at a confidence interval of 95%. It implies that the alternative hypotheses will be rejected and the null hypotheses accepted.

### **Summary**

The findings of this research are summarized as follows:

1. The Classical genre is the most effective in information retention, while the Country genre is the least effective in information retention (memory) instead of rhythm and blues as hypothesized.
2. There is no statistically significant difference between ages in terms of information retention.
3. There is no statistically significant difference between males and females in terms of information retention.

### **Discussion**

The results show that the first hypotheses was partly retained for the tests conducted. The result supports the hypotheses in the sense that the classical genre is most effective in aiding information retention, but did not support the fact that Rhythm and Blues genre will perform worst in terms of information retention, instead country music genre had the worst performance in aiding memory. This could be as a result of the participant's unfamiliarity with the music pattern. Which is in line with the outcome of Banbury, Macken, Tremblay and Jones, (2001), who concluded that irrelevant sounds have a severe negative effect on memory, especially short-term memory. The finding contradicted those of Smith and Morris (1977) which showed that the participants' preferred type of music caused them to perform the worst on the test and that no music condition produced the best result.

The second hypotheses show that there is no statistically significant difference between young and old in terms of information retention, therefore, we failed to reject the null hypotheses. From the literature, there has not been a situation where by differential effect between ages grades on the subject matter were adequately researched upon. Also the third hypotheses revealed a statistically non-significant difference between genders in term of information retention, therefore, the hypotheses stated was rejected as well.

### **Conclusion**

The results show that the first hypotheses should be partly retained for the tests conducted. The result support the hypotheses in the sense that the Classical genre is most effective in aiding information retention, but did not support the fact that Rhythm and Blues genre will perform worst in information retention, instead country music did badly in the experiment, this could be as a result of the participants' unfamiliarity with the music pattern.

### **Recommendation**

An elaboration on this experiment would be to test the participants using more genres of music to better identify which genre affects student's abilities to memorize and recall words.

Students could also be given a series of tasks to perform, such as math and visual puzzles, to test which types of tasks music affects the most. Also, the recollection part of the experiment could be done the following day, to increase the ecological validity of the experiment.

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### **Appendix 1: Participants' Consent and Debriefing Form**

Dear Participant,

I am investigating into issues concerning the use of music in Nigeria.

In this study we will ask you to listen to a particular music while reading a passage after which you will be asked to respond to some recall question from what you have read. All information you provide will remain confidential and will not be associated with your name. If for any reason during this study you do not feel comfortable, you may leave the laboratory. Your participation in this study will require approximately 40 minutes. When this study is completed you will be provided with the results of the experiment if you request them, and you are free to ask any question(s).

Please indicate with your signature on the space below that you understand your right and agree to participate in the experiment.

Your participation is solicited, yet strictly voluntary.

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Signature of Participant

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Experimenter

### **Appendix ii: Comprehension**

#### **SOCIALIZATION**

Human beings are born without personal, social or cultural competence to function in the world. People need to learn how to live in their communities. 'socialization' refers to the processes through which human beings learn what is expected of them and how to function within particular groups. It involves the acquisition of habits, repertoires, skills, norms, values, understanding and symbols that enable a person to adopt roles as daughters, sons, fathers, mothers, workers, friends and citizens. Through socialization people learn what it means to be a member of a particular ethnic group, social class, and gender. Socialization often involves a combination of learning centered around family and peers and learning from institutions such as schools and media. Socialization is not a passive process. People actively engage in their socialization and increasingly come to be socialized into a number of communities, with varying degrees of success. During the 1920s and 1930s socialization emerged as a core interest for Charles Cooley, George Mead and other psychologist associated with the Chicago School (Clausen, 1968).

More recently, the term 'socialization' has been used to capture how people can move beyond their socialized patterns of being in a particular group and become socialized into a new community by adopting new patterns of being (Berry, Poortinga, Seggall & Dasen, 2002). Resocialization can occur throughout a person's life.

**Source:** Social Psychology and Everyday life. (pg. 25)

### **Appendix iii: A recall questionnaire from the Comprehension**

#### **Section A:**

Participants' Personal Inventory Form (PPIF)

Instruction: Supply the answers to the blank spaces and tick (✓) in the appropriate places.

1. Age: 15–19 [ ], 20–24 [ ], 25–29 [ ], 30 & above [ ]
2. Sex: Male [ ], Female [ ]
3. Music Preference: Reggae [ ], Classical [ ], R&B [ ], Country [ ]
4. Experimental group: One [ ], Two [ ], Three [ ], Four [ ]

#### **Section B**

Read the items of the instrument carefully and fill in the blank space as it was in the comprehension passage you read a few minutes ago.

#### **Socialization**

Human beings are born without personal, social or \_\_\_\_\_ competence to function in the world. People need to learn how to live in their communities. '\_\_\_\_\_' refers to the processes through which human beings learn what is expected of them and how to function within particular \_\_\_\_\_. It involves the acquisition of habits, repertoires, skills, norms, values, understanding and \_\_\_\_\_ that enable a person to adopt roles as daughters, sons, fathers, mothers, workers, \_\_\_\_\_ and citizens. Through \_\_\_\_\_ people learn what it means to be a member of a particular ethnic group, social class, and gender. Socialization often involves a combination of learning centered around family and peers and learning from \_\_\_\_\_ such as schools and media. Socialization is not a passive process. People actively engage in their socialization and increasingly come to be socialized into a number of \_\_\_\_\_, with varying degrees of success. During the 1920s and 1930s socialization emerged as a core interest for Charice Cooley, George Mead and other psychologist associated with the Chicago School (Clausen, 1968).

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