



IMPACT OF TWO DIFFERENT GENRES OF MUSIC ON RESPONSIVENESS TO VISUAL STIMULI AND OTHER BRAIN PROCESSES

Parijat Lanke*

Abstract: *Purpose of the study is to find out the difference in the level of response to stimuli by a persons' occipital and temporal lobe brain regions while doing a task and listening to music at the same time. Two different genres of music have been selected as Jazz and Metal. 30 students were selected as test subjects and were made to read a comprehension and work on given tasks in 3 different environments, in silence(as control), while listening to jazz music and then hearing a metal song. Results are close to expectation. Time taken by the test subjects to read the comprehension while listening to jazz was much less than reading it while hearing the metallic song and the subjects were also unable to perform the activities they were assigned, correctly and in time when listening to louder sound of the metal song. These results signal that the cognitive process of reading or writing may get affected while the temporal lobe is busy in processing auditory stimuli. The major contribution of the study would be to cognitive psychology. The occipital lobe of cortex that helps us process visuals cannot function to its full efficiency if the temporal lobe is busy in processing rhythm and melody. The study holds a value for the person in any age group as reading and listening to music is a hobby that a person follows from teenage to old age. This may also prove important for the organizations such as restaurants and bars where employees have to work in such an environment.*

Keywords: Jazz, Metal, Genres, Response, Occipital lobe, Temporal lobe.

*Department of Management Studies, Maulana Azad National Institute of Technology



Human brain is one of the most beautiful and complex system, processing millions of functions at a time. Brain has been fascinating many researchers and scientists in the field of psychology and psychiatry since times. In human brain, Music is considered as the most powerful source of auditory stimuli (Sacks O., 2006). Music generates emotions and feeling and could manipulate good or bad moods. Music listening activates a wide spread bilateral network of brain regions related to attention, semantic processing, memory, motor functions and emotional processing (Teppo Sarkamo et al., 2008). Various regions of the brain have been identified which process music and other visual stimuli and on a major scale it has been considered as occipital lobe is the visual processing centre of brain while temporal lobe is a key to high level auditory stimuli processing, Both the lobes are considered as major parts of the four lobe regions of brain. Listening to music is a complex process as it induces a sequence of emotional and cognitive components with distinct neural substrates. (Peretz and Zatore, 2005). It has also been found that music has a impact on alleviating anxiety, depression and pain during somatic injuries. (Cassileth et al., 2003; Cepeda et al., 2006; Siedliecki and Good, 2006). When music excerpts are compared to noise, it was suggested that both cognitive and language processes were recruited in general responses to music (Flores-Gutiérrez EO, Díaz JL, Barrios FA, Favila-Humara R, Guevara MA, del Río-Portilla Y, Corsi-Cabrera M., 2007). Music interventions have also been used to reduce anxiety and distress and physiological functioning for people with coronary heart disease. (Bradt. J. Dileo C, Potvin N, 2013).

Although a lot of studies have proven the benefits of music on the human brain and body but few have contradicted it. Some research show that a normal human is subjected to hear music while reading a book or studying for an exam scores lower grades than the ones' who study in silence. This difference in the grades was attributed to low level of concentration due to the simultaneous language and auditory as well as a visual processing taking place inside the brain. Listening to real music, especially if it contains lyrics, activates brain bilaterally, whereas listening to pure verbal material, which activates primarily the left hemisphere (Zattore et al., 2002; Tervaniemi and hugdahl, 2003). However, the knowledge about the effect of listening to two different genres of music, one at a time, along with reading or doing a task is very limited. So the purpose of the research was to determine the differences in response timing to the visual and task works while the subject are made to



listen to music simultaneously. The null hypothesis would suggest that there shall not be any difference in the response to these processes while hearing two different music genres, as all may be considered equivalent to noise for the brain. Since the brain areas involved in music and visual processing are primarily the temporal and occipital lobes respectively, so it could also be perceived that the research in question would not affect the functioning of these two lobes neither any other response processing parts of the brain during the study.

METHODOLOGY

Subjects (N=30) were selected. N of 30 respondents has been considered as a reasonable starting point for deciding the qualitative sample size that can reveal the full range (or nearly the full range) of potentially important results. An N of 30 reduces the probability of missing a result with a 10 percent-incidence to less than 5 percent, as there could be a lot of variation and the population size is so large that all of the population space cannot be included. In such maximum variation cases it is customary to choose no more than 30 samples. Following inclusion criteria was used: (1) Knowledge of English as language for reading and writing. (2) No prior neurological or psychiatric disease. (3) No hearing deficit. (4) Ability to do simple arithmetic calculations. (5) Able to co-operate. The subjects were assigned to read a comprehension and were made to hear to the jazz music (Careless whisper, Kenny G) and a metal song (The trooper, Iron Maiden), one at a time. The same songs were played when subjects were asked to do certain simple task of calculating coins and notes cumulating to a certain amount & the time for completion was again noted for both of the activities respectively. Time has been considered as the parameter because responsiveness was to be measured and it is benchmarked by time. Time take to complete or read something tells us the level of engagement of the person into the task, keeping other factors mostly constant.

All the subjects completed the tasks assigned and gave varying values of response timings. A control (doing both the tasks in silence) was set in order to compare the timings for both the experiments with control and also between the two experiments and these timings have been tabulated. The data so obtained has been analyzed using mean, standard deviation & t-tests. Difference in timing between jazz and metal, control and jazz and control and metal was tabulated and analyzed individually.



RESULT

All the findings have been tabulated along with the test results. Control for the Experiment was taken as,8 minutes for Reading comprehension and 12 minutes for task completion. Student t test was applied on the observed value of N=30 observations and the p value significance was inferred.

Table 1: Observed data from the experiment conducted

S. No.	JAZZ		METAL	
	Reading comprehension(min.)	Task completion(min.)	Reading comprehension(min.)	Task completion(min.)
1	12	14	14	19
2	11	16	14.8	21
3	13	15.2	15.7	20.4
4	12	13	16	17
5	10.9	14.1	15.8	18.5
6	10.5	15.2	13.9	19.3
7	12	14.9	15.2	18.2
8	14	15.6	17	17
9	11.2	14	18.3	19.4
10	9	16.2	18.2	23
11	10	17.3	15.3	22.4
12	10.5	14.2	16	18.7
13	11	13	14.7	16.9
14	13	15	14.8	19.4
15	12.5	13.4	12.8	20.4
16	13	14.5	14.5	16.8
17	12	13.4	15.6	17
18	10.7	15	17	18.7
19	10.4	17	18.2	22.7
20	11	18.3	11.6	23.2
21	11.7	16.4	13.6	18
22	12.8	13.9	14.3	16.2
23	14.9	16.5	18	20.3
24	13.5	12.3	16.3	16.5
25	12.7	14.8	14.9	17.3
26	11.3	13	15.6	18.8
27	9	12	14	15
28	10	15	15	19
29	12	16.3	16	21
30	15.3	18.9	19.4	20.2

Table 2: Mean & Standard Deviation

Particulars	JAZZ		METAL	
	Reading Comprehension(minutes)	Task Comprehension (minutes)	Reading Comprehension(minutes)	Task Completion(minutes)
Mean	11.763333	14.94667	15.55	19.043333
S.D.	1.5361132	1.686198	1.74014466	2.1224065



Table 3: Statistical Analysis of Jazz & Metal

particulars	Mean±s.d. (jazz)		Mean±s.d. (metal)	t test value	p value	Inference
R.C.	11.763333±1.5361132		15.55±1.74014466	8.9362	p<0.001	Highly Significant
T.C.	14.94667±1.686198		19.04333±2.122406	8.2776	p<0.001	Highly Significant

Table 4: Statistical Analysis of control & Jazz

Particulars	mean±s.d.(control)		mean±s.d. (jazz)	t test Value	p value	Inference
R.C.	8±0		11.763333±1.5361132	13.4187	p<0.001	Highly Significant
T.C.	12±0		14.94667±1.686198	9.5716	p<0.001	Highly Significant

Table 5: Statistical Analysis of control & Metal

Particulars	mean±s.d.(control)		mean±s.d.(metal)	t test value	p value	Inference
R.C.	8±0		15.55±1.74014466	23.7641	p<0.001	Highly Significant
T.C.	12±0		19.04333±2.122406	18.1765	p<0.001	Highly Significant

(Note: S.D. – Standard deviation, R.C. – Reading comprehension, T.C. – Task Completion)

DISCUSSION

The novel main finding of the study is that listening to soft music such as jazz while doing a task is not of much difference than doing it in silence and person is habitual of listening to music can switch over to the soft genres of music to help him complete the work on time and with efficiency. The results also show that listening to metal or a hard music cause more time consumption while reading comprehension and completing the task and the difference between the control values and metal song timing values is very high which shows a larger deviation of concentration level. Moreover, it could also be otherwise said after analyzing the results that the occipital lobe which is the visual processing centre of the mammalian brain has lower control over the brain than the temporal lobe which is the region where auditory and other high value stimuli to act and respond when both of them are engaged simultaneously to perform their respective jobs. This could be attributed to the very nature of music to have a strong connection with both attention and memory system of the brain. Music is also closely related to emotion and arousals. The t test values for the collected data came out to be highly significant which signals that the hypothesis suggested is a null hypothesis and the results so obtained reject it establishing the fact that these two different



genres of music have different impacts on the responsiveness of brain and that the soft music (Jazz) is more equivalent to silence as the values are closer to control but the loud music (Metal) cause a total distraction of the subjects from the task in hand losing their time and efficiency.

Summarizing the study, I would like to mention that different genres of music do have a differing impact on the response time of the brain and a lower level of concentration on the task, so the persons with a habit of listening to music while doing any task either it be reading or writing or any other task such as counting something etc, should switch their choice of music to soft while doing it simultaneously. The study will also prove beneficial for the organizations where music is played throughout the working hours, such as restaurants and bars, will be recommended to play a softer music such as jazz so that the employees as well as visitors will be able to get more out of the work they are onto. Mostly the habit of listening to music has been found in teenagers and according to WHO reports, 40 people under the age of 25 die in road accidents every hour which may be caused due to over speeding or lack of concentration and many other such unfortunate factors. It has also been observed that teenagers have a habit of listening to loud music in their cars, & then they tend to drive fast which may lead to unfortunate events or accidents so with the significance of the results of this study, It may also be suggested to listen to a soft music while driving which helps to keep the mind of the driver concentrated and calm. Thus lastly it could be stated that,

“Never quit Music, Its beautiful; Try & change the way you hear it”

REFERENCES

1. Bradt J, Dileo C, Potvin N. Music for stress and anxiety reduction in coronary heart disease patients. *Cochrane Database of systematic Reviews* 2013, Issue 12.
2. Cassileth BR, Vickers AJ, Magill LA, Music therapy for mood disturbance during hospitalization for autologous stem cell transplantation: a randomized controlled trial. *Cancer* 2003; 98:2723-9.
3. Cepeda MS, Carr DB, Lau J, Alvarez H, Music for pain relief, *Cochrane database system Reviews* 2006:004843
4. Enrique O. flores-Gutierrez, Jose Louis Diaz, Fernando A. barrios, Rafael Favila-Humara, Miquel Angel Guevara, Yolanda del Rio-portilla, Maria Corsi-Cabrera.



- Metabolic and Electric brain patterns during pleasant and unpleasant emotions induced by music masterpieces. *International Journal of Psychophysiology* Volume 26, Issue 1, July 2007.
5. Peretz I, Zatorre RJ. Brain organization for music processing. *Annual review of Psychology* 2005; 56:89-114.
 6. Sacks O. The power of music. *Brain* 2006;129:2528-32.
 7. Siedliecki SL, Good M. Effect of music on power, pain, depression and disability. *Journal of Advanced Nursing* 2006; 54:553-62.
 8. Teppo Sarkamo, Mari Tervaniemi, Sari Laitinen, Anita Forsblom, Seppo Soinila, Mikko Mikkonen, Taina Autti, Heli M. Silvennoinen, Jaakko Erkkila, Matti Laine, Isabelle Peretz, Marja Hietanen. Music listening enhances cognitive recovery and mood after middle cerebral artery stroke. *Brain-A journal of neurology*, feb. 2008; 866-876.
 9. Tervaniemi M, Hugdahl K. Lateralization of auditory-cortex functions. *Brain Res Review* 2003;43:231-46.
 10. Zattore RJ, Belin P, Penhune VB. Structure and function of auditory cortex: music and speech. *Trends cognitive science* 2002;6:37-46.
 11. Global status report on road safety: time for action. Geneva, World Health Organization, 2009.