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Classical Recall: Analysis of the “Mozart Effect” On Basic Mental Tasks

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Researchers conducted a study based on the theory of the Mozart Effect to determine how well students at Lindenwood University performed on cognitive tasks when certain variables were manipulated. There were a total of twelve different conditions, in which the order of tasks, music, and hypothesis instructions were varied. It was concluded that no significant difference was found between any of the assigned conditions. Further research needs to be performed to determine if other variables would be better predictors of cognitive achievement, instead of the presence of classical music and priming participants with different hypotheses. If the Mozart Effect is to be researched in the same fashion, perhaps it would be beneficial to vary the type of music.

In 1993, Rauscher and Shaw, explained a phenomenon known as the Mozart effect. According to their 1993 study, listening to Mozart sonatas while performing mental tasks improves a person's functioning on spatial tasks (Rauscher, 2006). Shortly after, other psychologists came forward and made lofty claims about other possibilities such as long-term mental benefits in infants and children that listen to Mozart or other classical music.

Pop culture has since latched on to this idea, and we now have albums marketed towards infants, which claim to make the children more successful and intelligent (Mckelvie & Low, 2002). Even worse, the media has twisted the actual findings into claims that simply listening to Mozart's music will make you gradually smarter (Cassity, Henley, & Markley, 2007). While these claims may be rooted in truth, there has been very little evidence to prove that this "Mozart effect" is something that scientists can be certain of improving or

enhancing mental tasks. Many psychologists have attempted to replicate this study, in a variety of different ways, but results so far have been very inconclusive.

Many critics have spoken out against the popular Mozart effect, and stated that these results were due to pre-existing differences in groups from the 1993 study by Rauscher (2006). Also, we do not know if these improvements in functioning are simply due to changes in arousal that could be brought on by any type of music, or if there is something specific about a Mozart sonata (Rauscher 2006). If this improvement in functioning because of listening to certain types of music is found to be true, the possibilities for improvement of society could be tremendous. If we were to saturate our culture with classical music, or begin having our children listen to Mozart during study times, mental capabilities and focus could dramatically improve over long periods of time. A great deal of the research concerning this topic was conducted using rats as participants, which raises some questions about possible generalizations to the human population. Actual data concerning humans and specifically children are sparse (Crncec, Wilson, & Prior, 2006). Many of the original studies have also been criticized for poor research designs.

The purpose for this study was to further the research about the Mozart effect in an unbiased manner, with the hope of eventually deciphering whether this phenomenon is due to chance or some other factor. A classical piece of music was used for this study, but not a Mozart sonata. Some of the research suggests that any music that is of a moderate to upbeat tempo will result in improved functioning (Husain, G., et al. 2002). The selected piece, *Doce de Coco* by Yo-Yo Ma, would be considered about a medium tempo.

Coming into this experiment, our research hypothesis was that participants would perform better on the given mental tasks if music was presented. However, regardless of the

results, this study serves the purpose of advancing the research in this area, and provides more data that can be built upon.

Method

Participants

Eighty-one Lindenwood undergraduate students were recruited through the Human Subject Pool and various psychology classes. Students from the Human Subject Pool were enrolled in entry level psychology, sociology, and anthropology courses. As compensation for their involvement, students received extra credit in their entry level courses. Students who chose not to participate in an experiment were given the option to write a paper for extra credit. After analyzing our data, 70.4% of the participants were women that participated in the experiment and 29.6% of the participants were men. About 80% of the students spoke English as their first language and 19.8% of the students that performed the experiment spoke another language as their first language. Forty percent of the participants were freshman, 29.6% of the participants were sophomore, 17.3% of the participants were junior, and 12.3% of the students were seniors. The youngest participant was 18 and the oldest participant was 46 years of age. Country music was the most preferred genre with 22.2% of the participants choosing it. The least favorite music was Blues with 3.7% of the students choosing this as their music preference.

Materials

Participants were asked to fill out a questionnaire consisting of seven questions. The questionnaire, (see Appendix B) was made to determine gender, if English was their first language, age, music preference, if music is listened to while studying, and questions regarding their history of engaging in the types of cognitive tasks they did in the experiment.

These tasks were consistent for everyone and included anagrams (unscrambling words) and mazes (see Appendices C-F). We primed the participants with certain hypotheses based on a counterbalanced design. A third of the participants were told that classical music was shown to help cognitive tasks, a third were told that it doesn't help and the final third was given no priming hypothesis regarding the effectiveness of music. Two separate forms were used, each involving the completion of five anagrams and a maze. Most of these tasks were developed by the researchers specifically for this study, and the mazes were gathered through a random maze generator published on the internet. Five chairs, a room in the Psychology Lab in Young Hall at Lindenwood University, a computer with speakers to play Yo-Yo Ma's *Doce de Coco*, a clock, a large conference table, pencils, and paper were used for administering the experiments. Also, there was an informed consent form, and a feedback letter that was issued to participants.

Procedure

In this design, after the participants walked into the room, we asked them to read and fill out the sign in sheet, informed consents, participant's receipt and questionnaire. The participants were then assigned to a specific task set to complete. Participants were asked to participate in two rounds of examinations, each round consisting of five anagrams and one maze; for each round, participants where allotted three minutes to complete the tasks. There were a total of twelve different conditions, in which the order of forms, music, and hypothesis instructions were varied (see Appendix A).

Each participant was given a specific combination of forms A and B, and to control any order effects, all combinations were used equally. With regard to our varying instructions, some participants were told that our hypothesis was that classical musical helps

mental functioning, others were told we believe it does not help and a third group were given no instructions regarding our hypothesis. Participants in all groups were timed and the time was recorded if the participant finished all of the given tasks before the three minutes were up. Following the experiment, participants were debriefed on the experiment, and given our feedback letter.

Results

A 3x2 mixed factorial analysis of variance (ANOVA) was used to analyze each variable. Some t-tests were also used to analyze various descriptive statistics. It was found that there was no significance in the ability of each participant performing their tasks accordingly with the two stimuli (classical music, hypothesis instructions). We found no significance or support for our hypothesis in any of the conditions that would suggest that the hypothesis given or presence of music affects performance in completing mental tasks. In order to determine whether people scored higher with music or without music, we analyzed the data to reveal that it was not statistically significant, $t_{(81)} = .083$, $p > .05$. We then conducted an analysis of how significant our hypothesis instructions were, after which we found no significance, $F(2, 78) = .120$, $p>.05$. Lastly we analyzed the interaction between instruction and presence of music, in which we found no significance, $F(2, 78) = .182$, $p > .05$. In an analysis of task sets and music presentations, there seem to be no correlation between task set and music presentation whatsoever.

Discussion

Although our data did not confirm our original hypothesis that classical music would improve participants' scores on mental tasks, the study did line up with a great deal of previous research. It seems that psychologists are becoming increasingly adamant that the

data are not backing up the claims of the Mozart effect enthusiasts. Only occasionally does a study come along which supports a "Mozart effect," which leads us to believe there may be some other variables contributing to previous results. To be taken seriously, these results would need to be far more consistent.

While our study did add to the body of work on this topic, we would like to have learned a little more from our efforts. Because we tested participants on the anagrams and mazes during the same trial, we could not measure the effects that the music had on the maze task or anagrams independently of the other. In a future study, we would definitely keep these tasks separate with a different time frame, so that the differences could be measured easily.

During this study we also expected to find better scores in groups that knew our hypothesis was that music would help on mental tasks. We told certain people that our hypothesis was that music helps on mental tasks, told others that our hypothesis was that music did not help on mental tasks, and others were not informed of our hypothesis. Interestingly, all three of these groups scored almost identically, which indicates that the participants were not affected by our instructions.

There is still a great deal of room for more studies of this type. The results have been inconclusive to this point, and researchers could also look at a wide variety of combinations between different mental or spatial tasks paired with different types of music or other activities. The most important thing to note from this study is that the Mozart effect is far more popular than it should be, based on the limited amount of research which confirms that it is real.

After a conference with our professor, new light has been shed on our experiment. It has been brought to our attention that the design of our experiment was in fact, faulty. The majority of cases in our design were laden with confounding variables. Many participants were subjected to the same form of anagrams and mazes twice. While this helped the argument for the practice effect, it greatly cut down the number of valid trials we had to analyze the benefits of music on cognitive tasks. We re-analyzed our data, yet we still found no significance.

Our dependent variable has also been scrutinized for failing to represent the true ability of our participants. In our design, we capped the time limit for each round of tasks at three minutes. However, in previous discussions with our professor and group members, we agreed that three minutes should have been ample time to complete these tasks. In future studies, it may be more beneficial to base the dependent variable on the number of correct responses, rather than a timed completion.

References

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Appendix A

1A) P told that classical music helps - do tasks A with music - do tasks B without music

1B) P told that classical music helps - do tasks B with music - do tasks A without music

2A) P told that classical music helps - do tasks A without music - do tasks B with music

2B) P told that classical music helps - do tasks B without music - do tasks A with music

3A) P told that classical music does not help - tasks A with music - tasks A without music

3B) P told that classical music does not help - tasks B with music - tasks B without music

4A) P told that classical music does not help - tasks A without music - tasks A with music

4B) P told that classical music does not help - tasks B without music - tasks B with music

5A) P not told hypothesis - tasks A with music – do tasks A without music

5B) P not told hypothesis - tasks B with music - do tasks B without music

6A) P not told hypothesis - tasks A without music - do tasks A with music

6B) P not told hypothesis - tasks B without music - do tasks B with music

Appendix B

Screening Questionnaire

1. Is English your first language? Yes_____ No_____

2. Are you female or male? Male_____ Female_____

3. What year are you in school?

   Freshman_____ Sophomore_____ Junior_____ Senior_____

4. How old are you?

5. What is your favorite type of music?

Classical_____ Blues_____ R&B_____ Rap_____Country_____Other_____

6. Do you listen to music while you study? Yes_____ No_____

7. Which of the following mental tasks do you engage in? Check all that apply:

   Anagrams _____

   Mazes _____

   On average, how many times a month do you engage in each task?

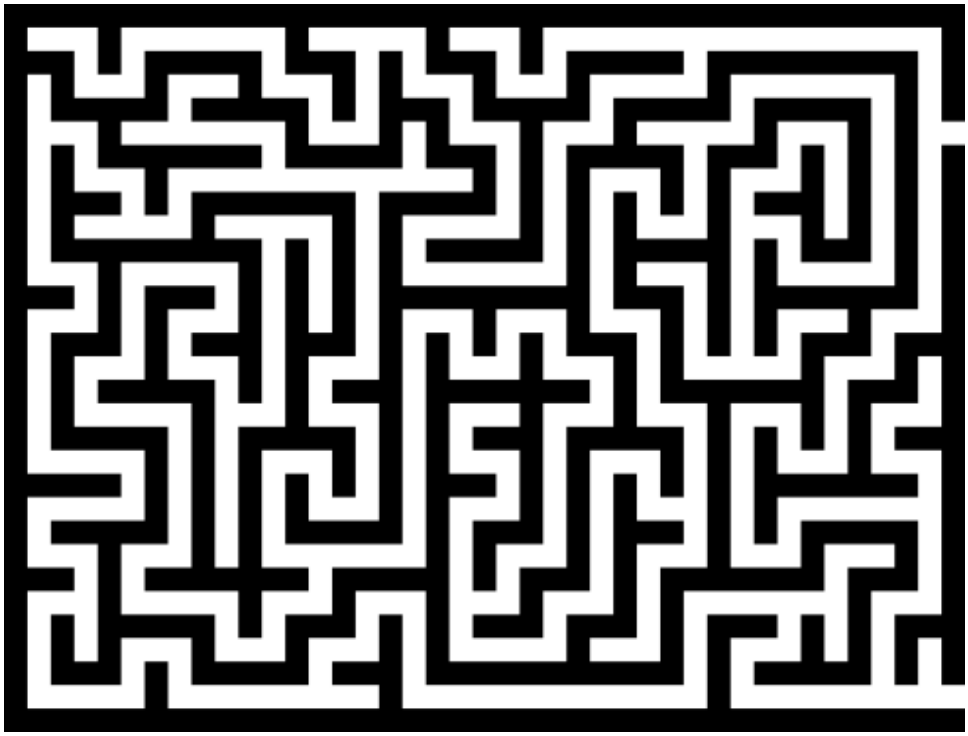
   (Please write your answer in the space next to each task)

Appendix C

Form A.
Anagrams

1. Pleoep
2. Njpaa
3. Richa
4. rwelfo
5. Cabkl

Maze



Appendix D

Form A. Anagram Answers

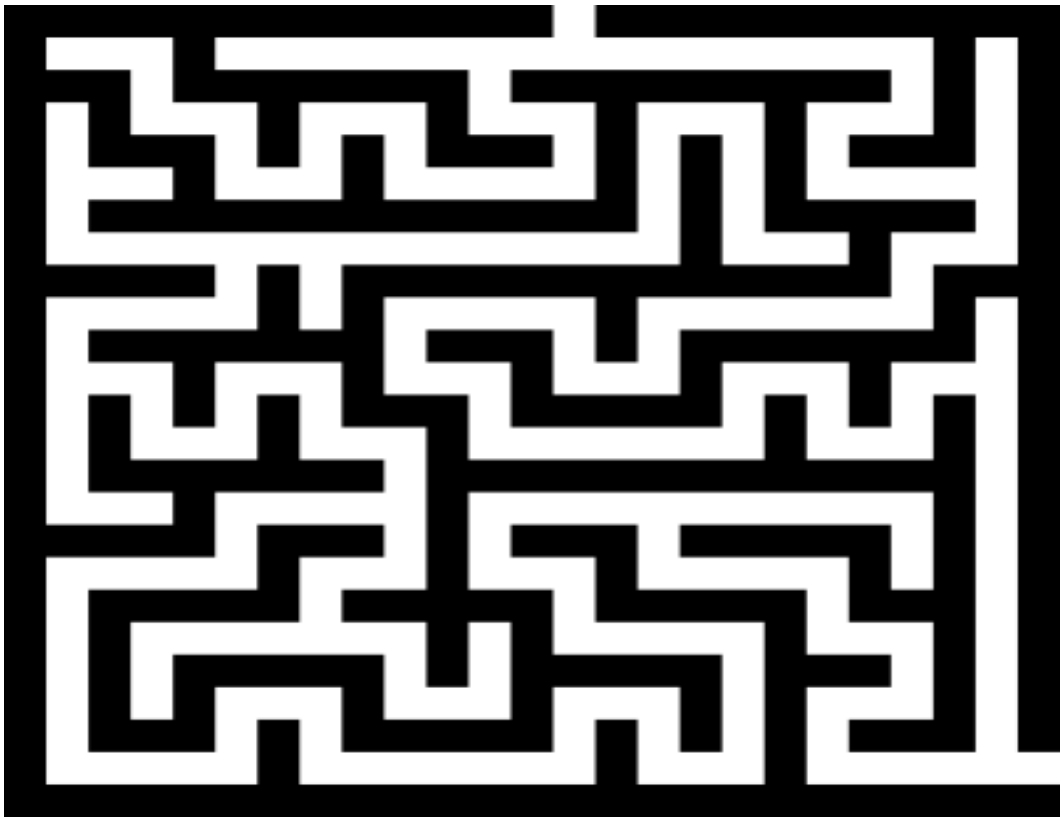
1. People
2. Japan
3. Chair
4. Flower
5. Black

Appendix E

Form B.

1. Tirnse
2. Lifna
3. Hisd
4. Tcrou
5. Aetng

Start



Finish

Appendix F

Form B. Anagram Answers

1. Insert
2. Final
3. Dish
4. Court
5. Agent

Appendix G

Informed Consent Form

I, _____ (print name), understand that I will be taking part in a research project that requires me to complete a short exercise that may require me to participate in a set of anagrams, and mazes while listening to classical music and to participate in a brief experiment that involves timing the experiment. I understand that I should be able to complete this project within 3 minutes. I am aware that my participation in this study is strictly voluntary and that I may choose to withdraw from the study at any time without any penalty or prejudice. I understand that to the best of my knowledge, I will not suffer any adverse effects from engaging in these types of tasks that were mentioned above. I should not incur any penalty or prejudice because I cannot complete the study. I understand that the information obtained from my responses will be analyzed only as part of aggregate data and that all identifying information will be absent from the data in order to ensure anonymity. I am also aware that my responses will be kept confidential and that data obtained from this study will only be available for research and educational purposes. I understand that any questions I may have regarding this study shall be answered by the researcher(s) involved to my satisfaction. Finally, I verify that I am at least 18 years of age and am legally able to give consent or that I am under the age of 18 but have on file with the HSP office, a completed parental consent form that allows me to give consent as a minor.

_____ Date: _____

(Signature of participant)

_____ Date: _____

(Signature of researcher obtaining consent)

Student Researchers' Names and Numbers:

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Appendix H

Feedback Letter

Thank you for participating in our study. The study was used in order to understand if classical music would enhance people's concentration in completion of mental tasks. We hypothesized that classical music will help participants accomplish their assigned tasks at a more efficient rate than the participants that were not given music during their experiment. Please note that we are not interested in your individual results; rather, we are only interested in the results of a large group of consumers, of which you are now a part of. No identifying information about you will be associated with any of the findings.

If you have any questions or concerns regarding any portion of this study, please do not hesitate to bring them up now or in the future. Our contact information is found at the bottom of this letter. If you are interested in obtaining a summary of the findings of this study at a later date, please contact us and we will make it available to you at the completion of this project.

Thank you again for your valuable contribution to this study.

Sincerely,

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