School Curriculum and Standards Authority

Work Sample

Psychology | ATAR | Year 12

Performance associated with Grade C, representing satisfactory achievement

Assessment type

Investigation

Task title

Memory

Summary of task

Students were asked to design a reliable, valid and ethical study on memory. The task sheet set out the requirements for the task and included an abstract, introduction, method, proposed representation of results, discussion and evaluation of predicted results, conclusion and references.

The task was completed out of class over a two week period.

A grade is based on the student's **overall performance for the pair of units,** as judged by the teacher with reference to a set of pre-determined standards. These standards are defined by grade descriptions.

The Effect of Classical Music on Short Term Memory

Abstract

The experiment tested the hypothesis that participants who studied in silence would perform better on a short-term memory recall test than participants who studied whilst listening to classical music. The trials involved two groups of 20 participants (all university students) who were given a period of 60 seconds to study a list of 20 words, followed by a short break, and then 2 minutes to fill in as many terms as they could correctly recall as possible with the final results collected and aggregated by the researchers. The hope was to identify that the music made no significant difference or was even detrimental to the participants. This then would indicate a lack of correlation between short-term memory recall and the 'Mozart effect'.

– formulates a hypothesis

Introduction

There has been substantial research investigating the formation of memory and factors that influence it. Human memory can be defined using the multi-store model as proposed by Atkinson and Shiffrin (1968.) The three main components of memory according to this model are sensory, short-term, and long-term memory. Stimuli are dealt with by the sensory memory system. If attention is paid to them they are shifted to short-term memory. Information in short term memory will decay if it is interrupted. Maintenance rehearsal can be used effectively to maintain information in the short-term memory as well as increasing the likelihood of the information being transferred to long-term memory. Elaborative rehearsal involves linking new information in a meaningful way to information already stored in the long-term memory.

– discusses one psychological theory supported by a cited reference

In the past, multiple studies have investigated the links between music and short-term recall. A 1989 study by Salame and Bradley showed that a quiet room produced the best results during their experiments. Their first experiment showed that music disrupted short-term memory performance when compared with a quiet trial, and that vocal music was significantly more disruptive than instrumental music. Their second experiment used musically trained subjects and found that although vocal music was still significantly more disruptive, groups in the quiet and instrumental rooms performed quite evenly. Overall their results showed that a quiet room was more effective than one playing music, and that instrumental music was far less disruptive than vocal music when testing short-term memory. Another study done in the 2010's by Thompson et. al. found that, in the context of a modern high school learning environment, music had a minimal effect on short-term memory recall rather than the expected reduction. A 2012 study by Konantz investigated the effect of music on memorising a word list. This study investigated whether silence or music would have the more beneficial effect on short term memory recall as well as whether changing the variable between the memorising and testing phases affected recall. The results of the study suggested that the only variable which made a significant difference was the presence or absence of music in the memorising stage, with the students who did not listen to music during the memorising phase performing better on the tests. However, in 1993, Rauscher et. al. published a study whose results demonstrated a phenomenon known as 'the Mozart effect', where spatial reasoning abilities of students were increased for a short period of time following their listening to Mozart's piano sonatas.

– refers to relevant research, citing studies where the findings are included

The aim of the following study was to investigate the relationship between classical music and short-term memory recall to either support or disprove the link between improved recall and listening to classical music. It was hypothesised that the experimental group that listened to classical music would score lower than a group that studied in silence on a test requiring them to recall terms from a list of 20 words.

Method

Participants

The 40 participants chosen were all university students. They ranged between the ages of 18 and 25, and studied a variety of different majors from a variety of fields. The selection of participants was random but the gender balance ended up fairly even, with 23 female participants and 17 male.

Materials

Two classrooms were equipped with 30 desks and chairs. One room contained a sound system. The researchers used a stopwatch to time the participants. Each participant was given an A4 sheet of card with the 20 test words printed on it in a large font. The words were as follows, arranged in rows of 4 x 5:

Aileron	Rudder	Biplane	Afterburner	Taxi
Yaw	Stabiliser	Wing	Roll	Slats
Flaps	Pitch	Yoke	Turbine	Hangar
Cockpit	Fuselage	Propeller	Elevator	Winglet

The test sheets were A4 sheets of paper with 20 blank lines. Writing implements (blue pens) were given to the participants with the test sheets. Water was provided during the break.

Procedure

- The participants were randomly divided into two groups of twenty members each.
- Each group was settled into one of the two classrooms, where the purpose and procedure of the experiment was explained, they were permitted to ask further questions about the experiment, and they were given consent forms to fill out.
- The participants then each received a word sheet and were given 60 seconds to study it, timed by the researcher using a stopwatch. One group did their study in silence, while the other group was played *L'Orologio Degli Dei* by Giovanni Allevi.
- The word sheets were then taken back. The participants were given a 4 minute break, also timed by the researchers, during which they were instructed not to speak, but were permitted to request a drink of water from the researcher.
- The participants then received the test sheets of paper and were given 2 minutes (timed again by the researcher) to fill out as much of the sheet as possible. They were informed at the briefing that the order they recalled the terms in did not matter. The group who had studied in silence were tested in silence, and the group that had studied to music were played the same piece at the same volume during the test.
- After the two minutes ended the papers were collected and the participants were debriefed before they were dismissed.

The independent variable of the trial is the presence of music during the study period whilst the dependent variable is the number of words correctly recalled during the test period.

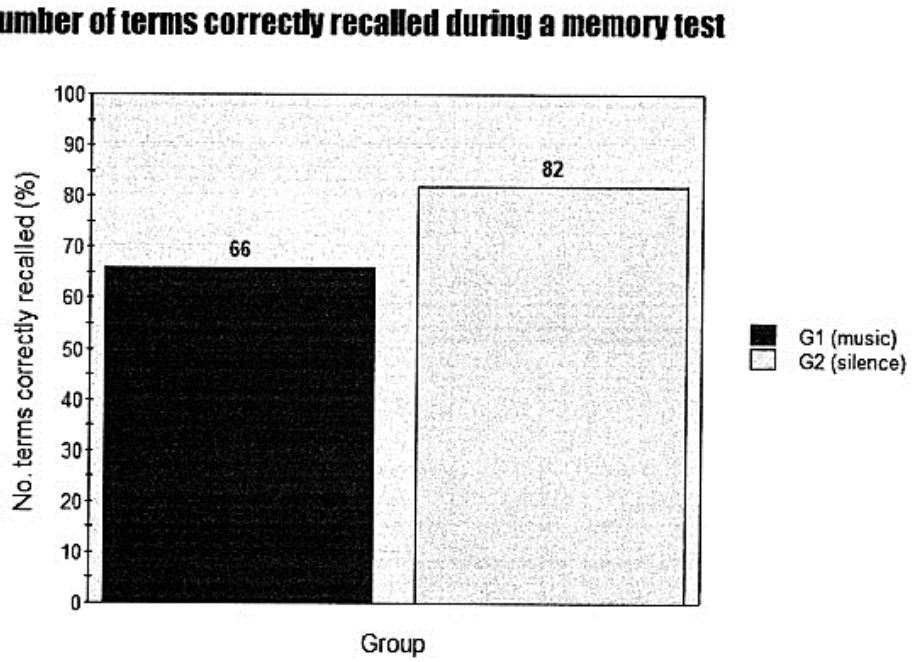
The procedure is ethically sound - nothing harmful is carried out at any point during the trials. Before the trials commence, the individuals are informed of the purpose and procedure of the experiment and permitted to make any further inquiries. Following this, written consent is obtained from the participants expressing they have a full understanding of the trial they are about to participate in.

The experiment is suitably valid as the method obtains results that are in line with what the hypothesis intends to measure. The aim is to investigate the link between the playing of classical music whilst studying and any increase or decrease upon short-term memory and recall. It is also quite reliable as the method is quite precise making it easy to accurately replicate the trials. To increase reliability, the number of trials may have been increased.

Results

	Mean # of terms recalled correctly	Mean % of terms recalled correctly
Group 1 (music)	13.2	66.00%
Group 2 (silence)	16.4	82.00%

– collects and processes simple data



The results as shown above demonstrate a clear difference in the performance of those students who had been listening to the music and those who did not.

Discussion

In the results, the difference between the scores of the two experimental groups was significant with a difference of 16% between the average score obtained during the trials. This indicates that the presence of classical music has a detrimental effect on short-term memory recall. Plausibly this could be put down to the music being a distraction from the mental task of memorising words. Further study is needed to explore the relationship between external stimuli and the capabilities of short-term memory. The results also called for examination and comparison between the findings of past research.

– states whether the results support the hypothesis

The 2010s study by Thompson et. al., however, indicated no significant differences were found when conducting a similar trial in a high school environment. The author of the journal suggested a link with personal listening devices (i.e. ipods and mp3 players) which could be examined in further study. A concept to be tested in future studies could be examining whether the use of personal listening devices reduces the detrimental effect of music on

memory recall which has been previously shown by other studies. The 2010s study suggested there was no significant difference between the experimental groups who had studied in silence and who had listened to music but further study would be needed to support this hypothesis.

The results of the experiment match up with similar findings such as those from studies conducted by by Konantz in 2012 and Salame & Bradley in 1989, which were previously discussed in the introduction. These results all suggest the presence of music is detrimental to short-term memory recall of words. However the results of the experiment are not in correspondence with the "Mozart Effect" , which is a phenomenon which has been documented previously in many studies such as those also mentioned in the introduction (Rauscher et. al., 1993.) Beyond the work of Rauscher et. al., some studies such as the one which was conducted by Rideout & Laubach in 1996 have successfully replicated the results of the original study and demonstrated or supported the existence of the 'Mozart Effect.' However, many more similar studies failed to replicate the results of the originaltrials. One such study (Steele, 1999) specifically followed a list of key procedural components as written by the authors of the original trials, yet failed to produce the same results.
One of the reasons identified for this significant variation in results has been traced to the specific skill or capability that was being measured by the experiment – i.e. spatial reasoning vs. short-term memory recall. The cognitive ability that was found to have been increased by the trials showing a successful effect was spatial reasoning, evidenced by the trials given to participants in many of the 'successful' studies that aimed to emulate the Mozart effect. Many of the participants in these trials undertook tasks such as solving a paper-folding and cutting task. This is clearly different to the word recall test employed in trials such as this experiment and other such as the study conducted by Konantz in 2012. These differences in results suggested the relationship between the two types of tasks to be distant enough that the 'Mozart effect' does not transfer to other types of mental tasks. Furthermore, as the original 1993 study in particular demonstrated, the positive effect of the classical music only lasted a short amount of time – 10-15 minutes as claimed by the researchers. As the entire experimental procedure above took less than 10 minutes, the length of the trials can be ruled out as the cause of the difference in results. This again is indicative that the hindrance provided by listening to the classical music was due to the 'Mozart effect' not extending to assisting in short-term memory recall.
A further study conducted in 1995 by Rauscher et. al., for example, was able to successfully replicate the original experiment's findings. As part of the journal, the author stipulates that many conditions are necessary in order to successfully replicate and demonstrate the 'Mozart Effect'. One of the authors' specified conditions or footnotes explicitly states that short-term memory is not enhanced as a result of their trials and the presence of classical music whilst studying. Thus the seemingly conflicting information presented by many sets of results from the trials (including the findings presented above) can be explained through their improper replication of the original Mozart effect trials. Whether the studies were or were not intended to test the Mozart effect is not of the utmost importance as the results themselves indicate the difference in performance of subjects under slightly varying conditions.

From this array of results many opportunities for further study are made present. Trials could be conducted to determine the specificity and breadth of the conditions required for the full 'Mozart effect' to take place upon participants. There could also be trials run to determine how best to apply this knowledge beyond an experimental context in order to aid students and other members of the general public.

The experiment above could also run repeated trials in order to demonstrate or increase the reliability of the trials and the results. It would be beneficial as the increased reliability would consequently provide more support for the hypothesis of the trials, which stated that

classical music was a hindrance rather than a help to participants who were attempting to better their focus on a short-term memory related word recall task. The validity of the experiment could be supported or increased by running many trials with slightly altered methods to investigate different aspects of the relationship between short-term memory and music as well as branching out to specific concepts such as the Mozart effect or turning attention to investigating the potential relationship between long-term memory and the presence of classical music whilst studying. Although the results are not strictly comparable to those of the above experiment, the knowledge or evidence gained from such trials could be put to use in demonstrating these relationships between the different areas of the human brain as it is a subject that has been and continues to be researched and tested extensively by scientists.

The results of the trial show that the earlier stated hypothesis was supported. The experimental group who listened to classical music during the testing period performed worse when it came to the short-term memory recall test than those participants who studied in a silent room by a significant amount, with the difference between the mean of the two groups being 16%.

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