The Effect of Auditory Distraction on Memory

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**Abstract**

This study will test whether music has an effect on memory recall tasks. Participants will be assigned to a group with music or no music. Participants in both conditions will study a list of 10 words for one minute and immediately after, will have 25 seconds to write down the words they were able to remember. I hypothesize that the group of participants with no music will be able to remember more words and that the data will support past research.

*Keywords:* memory, distraction, audition

**The Effect of Auditory Distraction on Memory**

The concept of auditory distraction is when a sound that is irrelevant disrupts the behavior of an assigned task (Hughes, Vachon, & Jones, 2007). It has been well researched and is now widely known that this type of distraction hinders serial recall of visual material. According to the changing state effect, the distraction is caused by the differences in the sound. Hughes et al (2007) noted that even the smallest amount of background noise cause a difference in recall, even with the participants being warned to ignore the noise Steady state speech or speech that has a repeated tone has little to no effect, but if the sound is a succession of varying tones, there will be a greater effect (Jones & Macken, 1993). Jones and Macken demonstrated this in their first experiment. They tested 24 males and females who were given headphones that played consonants for 700 milliseconds and then played nothing for 300 milliseconds. There was a ten second delay where the researchers assumed the participants would be rehearsing the sequence of the consonants then the participants were prompted to enter what they had remembered on a keypad. The researches told the participants to ignore any sound that was heard and reassured them that they would not be tested on it (Jones & Macken, 1993). The results of their post hoc tests showed that only the difference in the quiet condition and the 4 tone condition was significant, meaning that the disruption of recall is only important when there is a changing state condition. The results of this experiment also showed that recall is lessened even when the sounds are nonspeech (Jones & Macken, 1993).

 Another experiment tested recall by having the participant wear headphones with two different messages being played in each ear. The researcher asked the participant to ignore one message and to repeat the other message word for word (Jones, 1999). Jones and Macken also experimented with the number of voices and the location of the voices. They found that the participant performed no differently with one voice versus two voices, but when there was a constant babble of six voices, the participants’ errors decreased significantly, presumably because the six voices blended together to make a steady babble. They also found that when the six voices came from separate locations, rather than one, the disruptions of recall increased significantly (Jones & Macken, 1995). Their results can be summarized as meaning that irrelevant speech will have less effect in places like large offices, but will have greater effects in areas with better acoustics that help differentiate between different voices (Jones & Macken, 1995). LeCompte (1995) conducted an experiment similar to Jones and Macken’s. He found that recall is significantly decreased when a sound is repeated, like “*be be be*.” A comparable, but not as significant effect was found when the background noise was just a continuous sound, like “*beeeeee.*” Sorqvist (2010) also noted that even though his results support this past research, his results could be interpreted differently. He claims that people with higher working memory capacities are able to control their attention switch, as long as the sound is like “*beeeeee*.”

In the experiment that follows, I will test the hypothesis that vocal music disrupts recall significantly more than non vocal music. I expect that the results will support the hypothesis.

**Method**

**Participants**

The participants will be 20 male and female, traditionally aged college students. The participants will be picked from a small liberal art university and will be participating as a method of fulfilling course requirements. All participants will be treated ethically (see Appendix A).

**Materials and Procedure**

The participants will be in a typical lecture classroom, with tables will be spaced evenly apart, and the participants will sit anywhere they choose. The participants will use the available lighting in the room and will use their own writing utensils. They will have a list of ten words (see Appendix B) to memorize while a song is played in the background.

Each trial will begin with the participants choosing his or her seat, anywhere in the room. I will hand out the sheets of paper with the list or words face down on the table. When I say to begin, the participant will turn over the piece of paper and study the words for thirty seconds. Then, the participant will turn the sheet of paper over and write down the words he or she remembers. The paper will be collected and the participant may leave.

**Proposed Results**

The results will be analyzed with a between subjects independent *t*-test because it is a between subjects design with one independent variable. I think the test will show a significant difference in the number of words the group with no music is able to remember compared to the group with music (see Figure 1).

**Proposed Discussion**

I think the results of the analyses with support my hypotheses and previous research. Confounding variables could include instrumentation and demand characteristics. If the paper with the word list is thin, the participant could see through it and would be able to see the words. Because music is not generally played during memory tasks, the participant could realize this and go out of their way to memorize the words. For future research, it could be tested to see if the results depend on when the music is started, the volume of the music, or the location of the participant in proximity to the music.

References

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Sorqvist, P. (2010). High working memory capacity attenuates the deviation effect but not the changing-state effect: Further support for the duplex-mechanism account of auditory distraction*.* *Memory & Cognition*, *38*(5), 651-658. doi:10.3758/MC.38.5.651

*Figure 1.*Predicted number of words remembered

Appendix A

IRB forms

**LONGWOOD UNIVERSITY**
**Institutional Review Board**
**Committee Action Form**

(To Be Completed By Researcher)

Proposal Title: The Effects of Auditory Distraction on Memory

Principal
Investigator: Caitlin Toliver

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(For IRB Use Only)

[  ]  Meets the criteria for making research exempt from obtaining written informed consent and Committee review.

[  ]  Approved by the Longwood University Institutional Review Board.

[  ]  Approved with revisions by the Longwood University Institutional Review Board.

[  ]  Rejected by the Longwood University Institutional Review Board.

Date:\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Signature of IRB (circle one) Member/Chair:\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Comments:

**Longwood University Institutional Review Board**
**Research Proposal Submission Form**

**I. Proposal**

All Longwood University administration, faculty, and students conducting investigations involving human subjects, and all other researchers conducting investigations involving human subjects at Longwood University, must submit a research proposal to be reviewed and approved by the Human Subject Research Review Committee prior to the commencement of research.  Research involving children should conform to the ethical standards found at <http://www.srcd.org/ethicalstandards.html>. **Some types of human subjects research are exempt from the provisions of state and federal law, however, even research exempt from these provisions must be reviewed by the committee to determine that they are indeed exempt.**  Research proposals submitted to the committee must follow the protocols contained in this form and include the following information.  *Check those that are included*.

[ ]  A description of the research, including:

1) A Title,
2) The purpose of the research, and
3) The methods or procedures to be employed including descriptions of:
    a) The human subjects and the criteria for including them in the research,
    b) What is to be done with or to them,
    c) Any possible risks, stress, or requests for information subjects might consider personal or sensitive, or which may be illegal, and whether or not the only risk to the subjects is the harm resulting from a breach of confidentiality,
    d) the steps that will be taken to ensure the anonymity and confidentiality of the subjects,
    e) the permissions from other institutions, if required, that will be obtained.

[ ]  A signed, completed copy of this submission form.

In addition, the research proposal may have to include the following documents.  *Check those that are included*.

[ ] A copy of the test, survey, or questionnaire, if employed, and if it is not a standardized professional diagnostic tool otherwise specified in the proposal.

[  ]   A copy of the written statement explaining the research indicating that participation is voluntary, if required. (See III. A. below.)

[ ]  A copy of what will be said to subjects before and after the research is conducted, if the methodology requires that the subjects be misled in any way.  (See III. B.)

[ ] A copy of the informed consent statement that will be used, if required.  (See Sec. IV. below.)  A model informed consent statement can be found at the end of this form.

 **II. Exemptions**

If your research falls into any of the categories of research below, it is exempt from the requirement of obtaining written informed consent and being reviewed by the entire Committee, and only 1 copy of the proposal need be submitted. All others must submit 3 copies of their proposal. If your project conforms to any of the following descriptions, check those which apply:

[ ] Research or student learning outcomes assessments conducted in educational settings involving regular or special education instructional strategies, the effectiveness of or the comparison among instructional techniques, curricula, or classroom management methods, or the use of educational tests, whether cognitive, diagnostic, aptitude, or achievement, if the data from such tests are recorded in a manner so that subjects cannot be identified, directly or through identifiers linked to the subjects.

[ ] Research involving survey or interview procedures unless responses are recorded in such a manner that the subjects can be identified, directly or through identifiers linked to the subjects, and either (i) the subject's responses, if they became known outside the research, could reasonably place the subject at risk of criminal or civil liability or be damaging to the subject's financial standing or employability or (ii) the research deals with sensitive aspects of the subject's own behavior, such as sexual behavior, drug or alcohol use, or illegal conduct.

[ ] Research involving survey or interview procedures, when the respondents are elected or appointed public officials or candidates for public office.

[ ] Research involving solely the observation of public behavior, including observation by participants, unless observations are recorded in such a manner that the subjects can be identified, directly or through identifiers linked to the subjects, and either (i) the subject's responses, if they became known outside the research, could reasonably place the subject at risk of criminal or civil liability or be damaging to the subject's financial standing or employability or (ii) the research deals with sensitive aspects of the subject's own behavior, such as sexual behavior, drug or alcohol use, or illegal conduct.

[ ] Research involving the collection or study of existing data, documents, records, pathological specimens, or diagnostic specimens, if these sources are publicly available or if the information is recorded by the investigator in a manner so that subjects cannot be identified, directly or through identifiers linked to the subjects.

**III. Special Types of Research**

A. In addition to the above types of research that are exempt from the requirement to obtain written informed consent and full committee review, the committee may waive the requirement that the investigator obtain written informed consent for some or all subjects for the following type of research. If your research conforms to the following description, indicate by checking.

[ ] Research in which the only record linking the subject and the research would be the consent document, and the principal risk would be potential harm resulting from a breach of confidentiality.

In the forgoing type of research, the committee may require the investigator to provide the subjects with a written statement explaining the research and indicating that their participation is voluntary. In addition, each subject shall be asked whether s/he wants documentation linking him or her to the research, and the subject’s wishes shall govern. In the case that the subject agrees to be identified in the research, her or his written permission to do so shall be obtained by the researcher.

B. Some research methodologies may require that the subjects be initially misled regarding the purpose of the research, and so require that the consent procedure omit or alter some or all of the basic elements of informed consent, or waive the requirement to obtain informed consent. If your research conforms to the following description, indicate by checking.

[ ] Research involves no more than "minimal risk" or risk of harm not greater than those ordinarily encountered in daily life or during the performance of routine physical or psychological examinations or tests, research could not practicably be performed without the omission, alteration or waiver, and the omission, alteration or waiver will not adversely affect the rights and welfare of the subjects.

Inthe forgoing type of research, the committee requires the researcher to provide the subjects with an adequate post-investigative explanation of the purpose and methods of the research, or explanatory debriefing procedure to be undertaken immediately after the conclusion of each subject's participation. The committee requires investigators undertaking this sort of research to furnish the committee with copies of the information that will be supplied to the subject before and after the investigation.

**IV. Written Informed Consent**

    Research engaged in all other types of research must obtain written informed consent from the research subjects. Informed consent means the knowing and voluntary agreement, without undue inducement or any element of force, fraud, deceit, duress, or other form of constraint or coercion, of a person who is capable of exercising free power of choice.

    The basic elements of information necessary to such consent are:

 1. A reasonable and comprehensible explanation to the person of the proposed procedures of protocols to be followed, their purposes, including descriptions of any attendant discomforts, and risks and benefits reasonably to be expected;

 2. A disclosure of any appropriate alternative procedures or therapies that might be advantageous for the person;

 3. An instruction that the person may withdraw his consent and discontinue participation in the human research at any time without prejudice to her or him;

 4. An explanation of any costs or compensation which may accrue to the person and, if applicable, the availability of third party reimbursement for the proposed procedures or protocols; and

 5. An offer to answer and answers to any inquiries by the person concerning the procedures and protocols.

    Informed consent must be obtained in the following manners for the following types of human subjects: (a) competent, then it shall be subscribed to in writing by the person and witnessed; (b) not competent at the time consent is required, then it shall be subscribed to in writing by the person’s legally authorized representative and witnessed; or (c) a minor otherwise capable of rendering informed consent, then it shall be subscribed to in writing by both the minor and her or his legally authorized representative.
    Legally authorized representative means (a) the parent or parents having custody of a prospective subject, (b) the legal guardian of a prospective subject, or (c) any person or judicial or other body authorized by law or regulation to consent on behalf of a prospective subject to such subject’s participation in the particular human research.
    Any person authorized by law or regulation to consent on behalf of a prospective subject to such subject’s participation in the particular human research shall include an attorney in fact appointed under a durable power of attorney, to the extent the power grants the authority to make such a decision. The attorney in fact shall not be employed by the person, institution, or agency conducting the human research. No official or employee of the institution or agency conducting or authorizing the research shall be qualified to act as a legally authorized representative.
    A legally authorized representative may not consent to nontherapeutic research, or research in which there is no reasonable expectation of direct benefit to the physical or mental condition of the human subject, unless it is determined by the human subject research review committee that such research will present no more than a minor increase over minimal risk to the human subject.
    Notwithstanding consent by a legally authorized representative, no person who is otherwise capable of rendering informed consent shall be forced to participate in any human research.
    In the case of persons suffering from organic brain diseases causing progressive deterioration of cognition for which there is no known cure or medically accepted treatment, the implementation of experimental courses of therapeutic treatment to which a legally authorized representative has given informed consent shall not constitute the use of force.
    No informed consent form shall include any language through which the person who is to be the human subject waives or appears to waive any of her or his legal rights, including any release of any individual, institution, or agency or any agents thereof from liability for negligence.
    Human subject research investigators are responsible for obtaining written informed consent from research subjects in accordance with these specifications, and for obtaining permissions from any other institutions that may be involved in informed consent statement which conforms to these specifications.

    The Longwood University Institutional Review Board must be informed of any violation or alteration of the research protocol.  Continuing research projects must be re-approved annually.

    The undersigned researcher(s) indicate that the information provided to the committee is accurate and true to the best knowledge of the researcher(s), and that the researcher(s) have conformed to the above guidelines to the best abilities of the researcher(s).

Date: 4/18/14  Signed (legibly): Caitlin D. Toliver

Date: \_\_\_\_\_\_\_\_\_\_\_\_\_\_  Signed (legibly):\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

If this research is being completed in partial fulfillment of a Masters degree, the thesis committee must approve of your project prior to submission of these forms. The signature(s) of your committee chair/advisor on the appropriate form constitutes acknowledgement of this prior approval by your committee.

Please indicate the address where you would like the approval form sent (along with phone # and/or e-mail address):

caitlin.toliver@live.longwood.edu

Further information of the status of proposals may be found at the following:

          Dr. Eric Laws, Department of Psychology; Phone:  (434)395-2841; e-mail:  lawsel@longwood.edu

<!doctype html public "-//w3c//dtd html 4.0 transitional//en">

**DESCRIPTION OF RESEARCH**

Title of Research: **The Effects of Auditory Distraction on Memory**

1. Purpose of Research: The goal of this research is to see how much noise actually affects memory. The research is being conducted as a between subjects design, under the supervision of Dr. Laws.
2. Methods and Procedures:
3. Participants: Participants will be Longwood University students who agree to voluntarily participate in the research. The purpose of the research will be explained to the students and they will be asked to participate with the provision that they are free to withdraw at any time without penalty.
4. Procedures: The participants will be asked to memorize a set of words, while in a room with music or no music. After ten seconds of viewing the words, the participant will be given 20 seconds to write down the words he or she was able to remember.
5. Possible Risks: It is anticipated that participants will be at no physical, psychological, or emotional risk at any time during the research. Nor is it anticipated that participation in the research will place the participants at any risk of criminal or civil liability, or damage the participants' financial standing or employability.
6. Assurance of Anonymity and Confidentiality: Participants will be informed of the voluntary and confidential nature of the research via instructions on the data collection instrument. Participants will also be instructed not to put their name or any identifying information on the instrument. When collecting data from participants, the researcher will immediately place the data in a large envelope, and will not examine any of the data until all data have been collected. Once collected, the raw data will only be accessible to Caitlin Toliver and Dr. Laws. In the event that any information provided by a participant should become known outside the research, it is unlikely that any harm would come to the participant.

**Longwood University**
**Consent for Participation in Social and Behavioral Research**

I consent to participate in the research project entitled:

**The Effects of Auditory Distraction on Memory**

being conducted in the Department of **Psychology** by

**Caitlin Toliver**

* I understand that my participation in this research is voluntary, and that I am free to withdraw my consent at any time and to discontinue participation in this project without penalty.
* I acknowledge that the general purpose of this study, the procedures to be followed, and the expected duration of my participation have been explained to me.
* I acknowledge that I have the opportunity to obtain information regarding this research project, and that any questions I have will be answered to my full satisfaction.
* I understand that no information will be presented which will identify me as the subject of this study unless I give my permission in writing.
* I acknowledge that I have read and fully understand this consent form. I sign it freely and voluntarily.  A copy of this form will be given to me.

Name (Print): \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Date: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_        Signed: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

I understand that if I have concerns or complaints about my treatment in this study, I am encouraged to contact the Office of Academic Affairs at Longwood University at (434) 395-2010.

Appendix B

Questionnaire to be used in the Research

FRONT

Please memorize the following words:

Cat

Water

Blueberry

May

Tea

Bag

Nail

Blank

Spray

Jazz

BACK

Please write down the words you remember

Were you able to concentrate?