



## Proposal for Senior Honors Thesis

**HONS 497 Senior Honors Thesis      Credits: 2**

Directions: Please return signed proposal to the Honors Office **at least one week prior to your scheduled meeting with the Honors Council**. This proposal must be accepted by Honors Council the semester before presentation.

Student's Name: Cameron Mayer

Primary Advisor: Dr. D'Jaris Coles-White

Thesis Title: The Impact of Technology on the Developing Visual and/or Auditory Memory in Children Age Four to Ten.

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Expected date of Graduation: 2023

- I. Provide goals and brief description of your project or research.
  - a. Research questions
    - i. Is there a relationship between the use of technology in children ages 4-10 and their visual and auditory memory skills?
    - ii. How does a child's visual memory compare to their auditory memory at ages 4-10?
  - b. Hypothesis
    - i. If the child spends more time on technology devices than on non-technology tasks, then the child will have increased visual memory skills as well as decreased auditory memory skills.
  - c. Research goals
    - i. Collect a measurable level of visual memory in children.
    - ii. Collect a measurable level of auditory memory in children.
    - iii. Collect a measurable amount of time children spend doing various activities, including those that involve technology, through an examiner-given questionnaire.
    - iv. Compare data to see if there is a relationship between time spent on technology and visual and auditory memory skills.
    - v. Analyze data to see how visual and auditory memory skills compare at ages 4-10.
  - d. Key terms defined
    - i. "Visual memory is the ability to remember or recall information such as activities, pictures or words that have been viewed in the past" (Gonzalez, Visual Memory: Definition & Skills).
    - ii. "Auditory memory involves being able to take in information that is presented orally, to process that information, store it in one's mind and then recall what one has heard" (Edublox, Auditory Memory: Definition, Importance, Test, Overcoming Deficits).
    - iii. A simple analysis of variance (or ANOVA) is used when you have more than two levels of the same variable and want to compare these groups together (Salkind, Statistics for People who (Think They) Hate Statistics).
  - e. Research assistants
    - i. My project will include two assistants: Megan Napod and Emily Dabney.
    - ii. It was recommended by the IRB Office that I include another individual during data collection to ensure the safety of the students.

- iii. Megan Napod will assist me for the Michigan schools and Emily Dabney will assist me with the Maryland schools.
  - f. Survey competency information
    - i. Dr. Coles-White, who is my primary advisor, is highly proficient in statistical analysis using SPSS as a result of conducting and being a part of various research projects.
    - ii. I have taken Elementary Statistics (STAT 285).
    - iii. The questions for my survey were crafted in a way that will be informative to our data collect, yet noninvasive to parental rules within the home.
    - iv. Under the advice of Dr. Coles-White I sought guidance from Mrs. Laura Carroll from the Office of Institutional Effectiveness to transfer my questionnaire from paper to digital form.
    - v. My questionnaire will provide the desired data by asking questions that will specify the child's general background information, the amount of time spent on various activities (Options: never, sometimes, most/everyday), what age the child began doing these activities, whether the child has a time limit or not for each activity, and if so what the time limit is. In this manner, a measurable amount of time that the child spends on technology activities will be acquired.
    - vi. Auditory and visual memory will each be compared separately with the amount of time spent on technology. The results will be analyzed in SPSS. If the research volunteers are competent to collect data or if Dr. Coles-White wants to collect data, an inter-rater reliability test will be conducted between all of the testers.
    - vii. The questionnaire will be provided with this document.
  - g. Background of project
    - i. The development of and access to technology has exponentially increased over the past ten years. With this rise in the technology industry, the research community has begun to evaluate the impact of device usage on the development of children. The research study *Media and Young Minds* found that, "for children younger than 2 years, evidence for benefits of media is still limited, adult interaction with the child during media use is crucial, and there continues to be evidence of harm from excessive digital media use..." (Radesky & Christakis, 2016). Another study discovered that, "technology use at bedtime is associated with not only decreased quantity of sleep but also with decreased quality of sleep and an increase in average BMI [body mass index]" (Fuller et al., 2017). A third study looked at the opinions of parents concerning this issue: "some parents have embraced the new medium as a way for their 0–3s to develop skills and competencies further. For others, however, touch screens represent a threat to cherished ideals around childhood innocence and children's physical, social and emotional well-being" (O'Connor & Fotakopoulou, 2016). As stated by these research studies, there is a legitimate concern regarding children and their use of technology. Unfortunately, the amount of research investigating this topic is extremely limited, especially in the case of technology's impact during different childhood developmental stages (Lee, Joan. 2016). In addition, there is no available research concerning technology's effect on the auditory or visual memory in children. Therefore, in response to the need for research in both of these areas, my project will be examining the effect of technology on the auditory and visual memory in children ages 4-10.
    - ii. My research advisor, Dr. Coles-White, is an accomplished Speech-Language Pathologist who has conducted and been a part of multiple research studies. Her area of focus is language. Auditory and visual memory is highly synonymous with language skills and comprehension. My hypothesis suggests that with an increase in technology use, the child will experience increased visual memory skills but decreased auditory skills. Thus, with an increase of technology use, the child may be experiencing difficulty or delays in their language development.
  - h. Description of project
    - i. My project consists of an auditory memory test, a visual memory test, and a questionnaire to be completed by the child.
    - ii. Description of the visual memory test.

1. This visual memory test will include a binder with pages of incrementally increasing pictures. The child will be asked to look at a page with one picture. Then, they will be shown a new page with the same picture and a new picture. The child will then be asked to point to the picture that they previously saw. Accordingly, the child will then view two pictures that they have to remember by pointing to them out of a field of four pictures. Likewise, the test will continue until the child is not able to answer 50% or more correctly or they reach the end of the test, which will be 10 images out of a field of 20.
2. The practice trials will be provided with this document
- iii. Description of the auditory memory test.
  1. The auditory memory test will be conducted in the same incrementally increasing manner as the visual test. The child will be asked to repeat one word back to the researcher. Then, they will be asked to repeat two words back to the researcher and so on. The test will continue until the child cannot answer 50% or more correctly or they reach the end of the test, which will be 10 words that must be repeated back to the researcher.
  2. The list of words that will be used will be provided with this document

II. Outline your methodology. Please be specific. How does this achieve your goals and how reliable is it?

- a. Institutional consent forms will be collected from schools that have agreed to work with me.
- b. Parent consent forms will be collected and only children who have permission will be included in the study.
- c. Participants will be asked a series of questions concerning what activities they do outside of school. These responses will be quantified for statistical purposes.
- d. The child will be asked to complete two tests—an auditory memory test and a visual memory test. In these tests, participants will be asked to do tasks that are adapted from and expanded upon from the subtests that are part of the Preschool Language Scales Fifth Edition (PLS-5). This standardized test is designed to examine preschooler's auditory comprehension ability and is used for identifying children who may need additional testing in their speech and language abilities. (Zimmerman, 2011). Through evidence-based investigation, the PLS-5 has been proven to be both reliable and valid. From this test, I used the concept of a flipbook, an incrementally increasing number of pictures facing the client, and pointing to the desired picture to be recorded as a response in my project.
- e. The visual memory test is validated through the work of Lauren Cole who created an identical test to the one I am using (Cole, 2017). She is an accomplished researcher and the company that the game was published through is a part of the University College London Institute of Education EDUCATE Program. The data collected from this test will be correlated with the auditory memory game scores and the amount of time spent on technology separately.
- f. The auditory memory test is validated by the efforts of Casalini et al. (2007) who conducted a study using repetition of real word strings in their procedures. The data collected from this test will be correlated with the visual memory scores and the amount of time spent on technology separately.
- g. The correlation of the auditory and visual memory test scores will be used to compare the auditory skill level with the visual skill level of children ages 4-10.
- h. Both tests are reliable based on their adherence to using closed-ended questions and answers. It is easier to assess closed-ended than open-ended questions. It is also better to use closed-ended questions when you are comparing different categorizes of your results (Farrell, 2016).
- i. The questionnaire that the researcher will be completing with the child will indicate what areas the child spends most of their time. The questionnaire includes inquiries about both technological and non-technological activities. The data collected concerning the child's time spent on technology activities will be compared with both visual and auditory memory game scores separately. Tantamount to my hypothesis, I will expect to see that with an increase in technology use, the child will experience an increase in visual memory and a decrease in auditory memory.
- j. The outcomes from these three data collection categories (auditory game scores, visual game scores, and time spent on technology) will be analyzed using SPSS (Statistical Package for Social Sciences) to determine if there is

- a relationship between the categorical variables and to determine if there is a difference between participants based on age.
- k. A Pearson Product Moment Correlation Coefficient will be run to determine if there is a relationship between the categorical variables and an ANOVA will be conducted to determine if there is a difference between participants based on age.
  - l. Each test and the questionnaire will be completed only once with each student.
- III. Explain in what sense your project is original, unique, or beyond normal senior expectations. How does it relate to current knowledge in the discipline?
- a. This project is a continuation of a pilot study that was conducted by another student. The procedures for this project have remained the same. However, a new visual game and a new auditory game have been created. The visual game is now on pages in a binder compared to a deck of cards that were previously used. The cards had two pitfalls: they were difficult to sort and they had the object's name on them. It was especially important to have unlabeled pictures since we increased the age range to include older children. For the auditory game, I created a new list of words to make the test unique to me. Additionally, I created scoring sheets for both games. The questionnaire has been expanded to include more informational questions pertaining to the study and will be given to the child instead of the parents. It was recommended that the questionnaire be given to the students instead of the parents because it was discovered that parents were not truthful in their responses. In my study, the questionnaire was created using the software Class Climate, which will enable easy analysis of the results in SPSS. Lastly, my project will include multiple schools with a potential for the involvement of more than 100 students compared to the 12 children that participated in the previous study. This project demands a diligent review of research literature and attention to detail, as well as interpersonal communication skills with the addition of multiple schools to the study.
  - b. This project will be catering to the absence of research concerning technology's impact on visual and auditory memory in children. The data provided by this project may potentially be used to create normative data for how auditory and visual memory compare during this age range. This will be beneficial to the understanding of childhood development and could possibly provide guidance as to what areas Speech Pathologists could focus on to help children succeed in both the classroom and everyday life.
- IV. Include a substantive annotated bibliography of similar or related work.
- a. My annotated bibliography will be provided with this document
- V. Provide a statement of progress to date and list the research methods coursework completed.
- a. Took HONS 398 Fall Semester of 2019.
  - b. Created the Visual and Auditory memory games.
  - c. Created the Parent Consent Form and Child Acknowledgement Form.
  - d. Began communicating with potential schools to partner with.
  - e. Received an Institutional Consent Form from Spencerville Adventist Academy November 13, 2019.
  - f. Submitted to the IRB office November 17, 2019.
  - g. The IRB office approved my project pending 4 modifications December 10, 2019.
  - h. Resubmitted to the IRB with completed modifications January 9, 2020.
  - i. Converted the questionnaire to electronic form using Class Climate January 24, 2020.
  - j. Received IRB approval on January 28 under the Full category
  - k. Received an Institutional Consent Form from Ruth Murdoch Elementary February 13, 2020.
  - l. Received an Institutional Consent Form from Village SDA School February 20, 2020.
  - m. Received an Institutional Consent Form from Atholton Adventist Academy February 25, 2020.
  - n. Began and finished collecting data at Village SDA School March 9-13, 2020.

**Department Chair Approval**

- This student's performance in his/her major field is acceptable.
- He/she has completed the requisite research methods coursework for the research to be pursued.
- I understand that he/she plans to graduate with Honors.

\_\_\_\_\_  
Department Chair (signature)

**Research Advisor Approval**

**I have read and support this proposal:**

\_\_\_\_\_  
Primary Advisor (signature)

If human subjects or if live vertebrate animals are involved, evidence of approval from the Institutional Review Board or an Animal Use Committee is needed through the campus scholarly research offices (Ext. 6361).