



Prosody Changes and the Extent of its Impact on Memory Retention in Students

Kai Thurman





Question



To what extent do the changes in voice inflection (prosody) affect retention of information in students?





Why Question



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- Experience with ADHD
 - Clashes of Learning Style
 - Difficulties with memorization
 - Teacher Adaptation to Student Learning
- Increasing number of students in school
 - Unusual Learning Styles
- Lack of research in specific concentration
 - Prosody changes in retention of information in students



Hypothesis



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I hypothesize that there will be a positive relationship between prosody with more emphasis/stress on tonal changes, and the information that is retained by students.



Related Literature/Studies



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- Impact of Voice Pitch on Text Memory - Helfrich, Weidenbecher
 - Changes in prosody can ultimately affect how words are perceived, to the extent of changing definitions of words.
- Tone of voice guides word learning in informative referential contexts - Reinisch, Jesse, Nygaard
 - Tone of voice changes can give way to controlled learning, as nonsensical words can even take on meaning with proper prosody changes.



Research Design



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- **Qualitative experiment** - fill in the blank questions
- **Controls:** questionnaire, story, script, and debriefing (control group present, and a neutral recording with a text-to-speech program will be used, with male/female versions).
- **Independent variables:** grade level (5th, 8th, 12th), gender, recording played for any specific class (monotone, normal speaking, emphasized/stressed prosody change)
- **Dependent variable:** results of the questionnaire
- **Systematic random sampling** of about 150 students
- **Materials:** printer, paper, and ink, and computer with survey software may be needed. Spreadsheet software will also be used.
- **Limitations:** COVID-19 guidelines, sample size, lack of research, subjectivity of prosody changes/differences from person to person.



Procedure



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1. Create all survey materials - questionnaire, recordings, script, debrief, informed consent forms.
2. Choose five classes from each grade level (5th, 8th, 12th) based on availability and class size. Randomly choose four out of the five for each grade level.
3. Visit each class chosen, state the script, provide students with recording questionnaires, and give students 15 minutes to listen to one of three recordings and fill out the questionnaire, being sure to hand out informed consent forms a day before in order for them to participate.
4. Collect questionnaires and record data to see how primary-secondary school students are affected by prosody changes.



Data Collection



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- Subjects will be students from North Bay Haven Charter Academy in grades 5, 8, and 12.
- Permission from 15 teachers will be obtained.
- Four classes from each of the above grades will be selected to participate.
- 15 minutes needed of students' time in class.
- Staff do not need to participate or prepare for anything related to this study.



Preliminary Results



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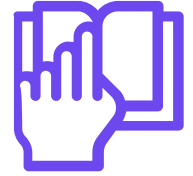


As of right now, I have gathered data and analyzed it, but not to the point of completion. This then is an overall view of how my project has gone thus far:

- Results are leaning more towards my original hypothesis of the inflected recording yielding more concise and correct results.
- In each grade level, either inflected or normal speech recordings took precedent in the amount of correct answers (Appendix D).
- Normal speech was not expected to have such a large presence in these tests.
- Inflection-heavy prosody in the tests have shown a positive correlation between higher-inflected prosody and the proportion of answers per grade of concrete guesses and “I don’t know” guesses (Appendix E).



Research Benefits



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- This study will contribute to the gap of knowledge regarding prosody and retention of information in students.
- Subjects will be able to learn about their learning styles and what teaching method fits the the best for them.
- Results can provide valuable information on the demographic of different learning styles within Bay District Schools, and allow for a change in curriculum to become more inclusive of different learning styles to take place.



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Questionnaire (Appendix: Entry A)



Appendix:

Entry A:

Example Questionnaire - on paper or online (Actual would look similar but would have more questions)

Grade: _____ Gender: M F Other (Please Specify)

What color was the hare's fur?

How long was the start/finish line (from one end of the stripe to the other)?

How many spots did the tortoise have on his shell?

Approximately how long was the race?

Why did the hare stop running? Please be specific.

What was the temperature outside on the day of the race?

Who won the race, and how far behind was the 2nd place competitor?

What did the winner enjoy after his victory against his opponent?

(All answers to the above questions will be in the recording, which is a take on the Tortoise and the Hare)



Consent Form (Appendix: Entry B)



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Entry B:

**Parent/Student Consent Form
AP Capstone Research
Researcher: Kai Thurman**

I am conducting a year-long research project in AP Research to receive AP credit. In this study, I am focusing on the effects on voice inflection changes (prosody) of a teacher or instructor affecting memory or retention of information in students. Those participating will be asked to fill out a questionnaire in which responses will remain confidential and anonymous. There are no risks involved in this study and the questionnaire will take place under teacher supervision, but participants may choose to withdraw from the study at any time.

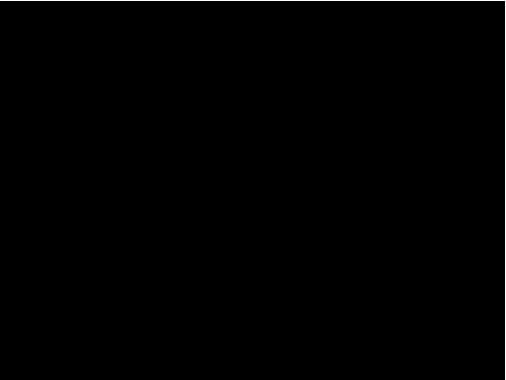
I understand that participation in this study and survey will not cause any physical or emotional harm. I give my consent and agree to participate as a volunteer in this study.

Student Signature: _____
Date: _____

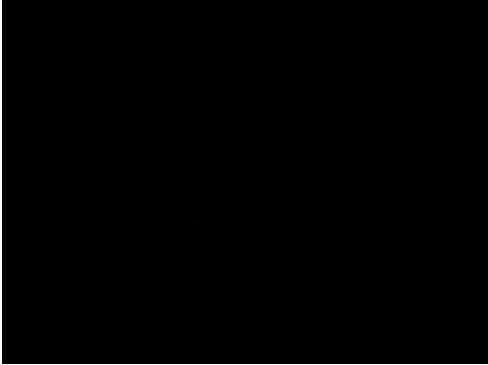
Parent Signature: _____
Date: _____

If you have any questions or concerns, please feel free to contact the researcher at (850) 630-7211 or xthurk@bayhaven.org, or the supervisor, Ms. Vaughn, at vaughnrl@bayhaven.org or (270) 871-4400.

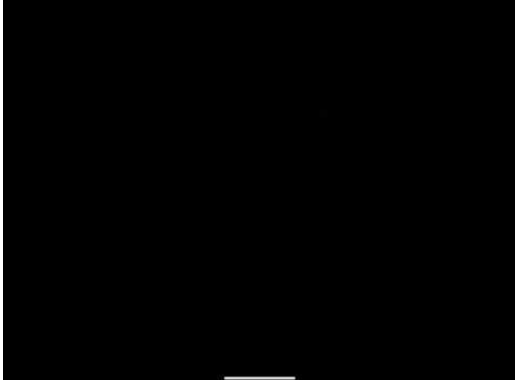
Recordings (Appendix: Entry C)



Monotone



Regular



Stressed Prosody



Control 1 - Male



Control 2 - Female



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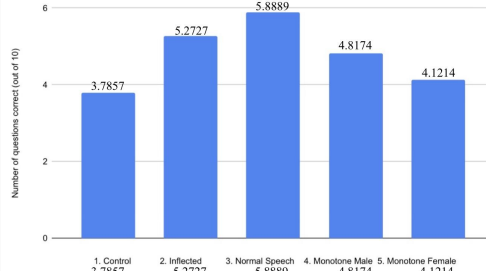
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Graphs for General Results Per Class (Appendix: Entry D)

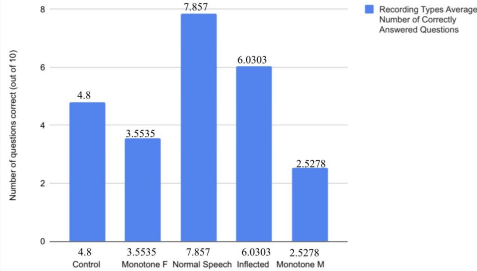


Recording Types Average Number of Correctly Answered Questions



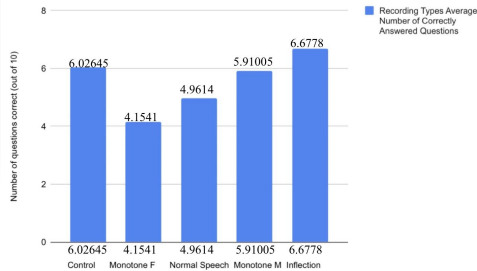
High School

Recording Types Average Number of Correctly Answered Questions



Middle School

Recording Types Average Number of Correctly Answered Questions



Elementary School



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Graphs for Proportions Per Randomly Selected Trial (Appendix: Entry E)



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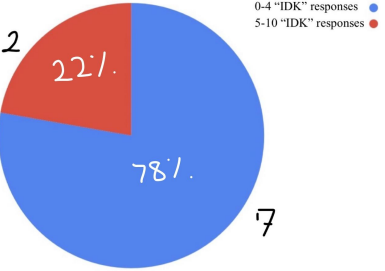
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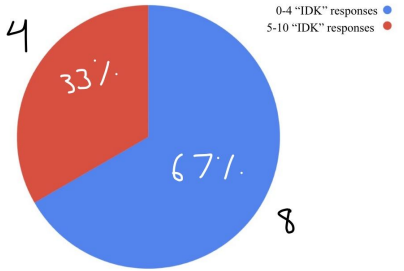


% of "I don't know" answers (Control) 9 participants in Control



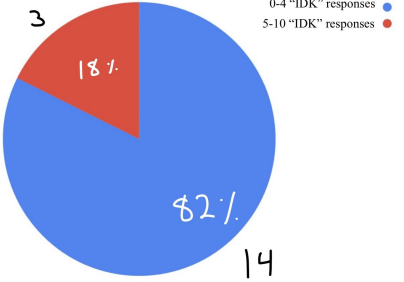
High School

% of "I don't know" answers (Monotone Female) 12 participants in Monotone Female



Middle School

% of "I don't know" answers (Inflected) 17 participants in Inflected



Elementary School



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Thank you!