

Investigating The Impact of Dialect On Short-Term Memory: A Pilot Study

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Abstract

This paper summarizes and discusses the findings of a university based study following the impact of dialect on one's ability to recall information in both familiar and unfamiliar dialects. According to current research, experience plays a part in one's ability to encode and retrieve information in unfamiliar dialects efficiently. Adults who self-identified as native speakers of English were recruited to participate in the study. Individuals listened to two short passages in either unfamiliar or familiar dialect and were then prompted to answer questions immediately after. Short-Term Memory recall tasks were implemented in the form of fill in the blank and summary questions. In addition to this, participants were asked to rate their confidence when answering both sets of questions. Results of the study, through qualitative data provide supportive evidence regarding the correlation between task complexity and processing demands.

Key words: Communication Disorders, Dialect, Short-Term Memory, Passage Recall Tasks, Processing Demand.

Introduction

Everyday we are tasked with holding onto a finite amount of information. Whether we are asked to respond to a colleague's email or to pick up milk on our way home from work. Those who are organized may write this information down, while others may be confident that they will be able to recall the information later. Nevertheless, this is a process that is occurring subconsciously until we suddenly forget what it was we were told to remember. Some may blame their poor memory, while others may blame the person who gave them the instructions in the first place.

This study is focusing on the cognitive function of short-term memory. Short-term memory is, "...often considered passive and dedicated to item memorization," (Mathy, Chekaf, & Cowan, 2018). However, for the purposes of this experiment, it is being brought to the forefront to determine what impacts this encoding process. In addition to this, this study is hoping to observe what happens when there is an interference with this intake of information. According to Saul Mcleod, "Short-term memory (STM) is the second stage of the multi-store memory model proposed by the Atkinson-Shiffrin. The duration of STM seems to be between 15 and 30 seconds, and the capacity about 7 items..." (Mcleod, 2009). Short-term memory is a stage of memory that is short and can only hold onto a few items. Due to this fact, it is also important to test what happens when this stage is being altered in an unusual way. This is the rationale as to why passages were chosen as stimuli.

For the purpose of this study, individuals will also be taking part in measures of immediate recall. After listening to both passages, participants will be asked to give a short summary of the passage they just heard, as well as answer fill-in the blank questions. In this way,

immediate verbal recall as well as immediate written recall are being measured. According to AlleyDog, an online psychology glossary, "...It is a neuropsychological test instrument ... In this test the subject is given material to memorize, usually a list of words. Immediately after the list was removed, the subject is asked to remember the items on the list. The test is scored by the number of items remembered," (AlleyDog, n.d.). In order to test immediate recall in this experiment, a standardized version of the Wechsler Memory Scale Revised Edition was modified.

Phonology is also a major cornerstone of this study. Phonology is the, "study of the speech sound (i.e., phoneme) system of a language, including the rules for combining and using phonemes." (ASHA, n.d.). For this experiment, each dialect the individuals will be hearing will have its own unique phonemes. In addition, the Primary Investigator was attempting to manipulate the phonemes the participants are encountering to be familiar and unfamiliar. This will result in the participant's phonological processing ability and awareness being tested. According to previous research, Phonological awareness is, "the ability to hear and manipulate the sounds in spoken words and the understanding that spoken words and syllables are made up of sequences of speech sounds," (Yopp, 1992). Further, it requires the individual to recognize each sound, encode it, and then derive understanding or meaning. Typically, phonological awareness is mentioned when topics of literacy are being discussed. For this experiment, because passages are being used and there is an element of comprehension, it was crucial to touch upon this topic.

For this study it is necessary to express what it means when dialect is being used. Dialect is often interchanged with the word accent or speech variety. As expressed by Wolfram, “Languages are invariably manifested through their dialects, and to speak a language is to speak some dialect of that language ... the term dialect is defined as a neutral label to refer to any variety of a language which is shared by a group of speakers,” (Wolfram, 1991). However, for the purposes of this study, dialect is the word that will be used to describe the different speech variations heard on the recordings. A dialect is familiar when it encompasses the speech patterns or phonemes someone associates as being the most recognizable. This can be due to living in a particular geographical location or the types of phonemes a person was immersed with as they developed language. An unfamiliar dialect is the opposite. A dialect is unfamiliar when the phonemes are not recognizable to the listener. Of course, it is possible for unfamiliar dialects to become familiar. For this experiment, the unfamiliar dialect will always be spoken by the Arkansas native. While the familiar dialect will change depending on the location the subjects note as where they either grew up or live currently.

Confidence is the last piece of this study that must be addressed. Although it’s role is to act as qualitative evidence, it is still necessary that we operationalize this definition for the study. According to previous research, confidence ratings are used throughout metacognitive research to assess metacognitive monitoring. “While, confidence ratings have been utilised to provide valuable insights into metacognitive processes, they have typically been elicited with little consideration as to their effect on the underlying cognitive process,” (Double & Birney, 2019). Similar to how it was used in previous research, the confidence ratings will be

used at the end of each passage's line of questions to try to explain why individuals performed the way they did.

The purpose of this university based study is to find supporting evidence to address a question regarding short-term memory. That question being does dialect have an impact on short-term memory? The prediction is that an individual responding to recall questions will perform better when passages are played in a familiar dialect as compared to an unfamiliar dialect. Previous research has focused on non-word repetition, word lists, and short sentence recall (Berman, Jonides, & Lewis, 2009, Treisman & Tuxworth, 1973). However, it was rare to find a recorded passage being utilized in this type of short-term memory testing. Passages are often used when the focus of the experiment is to determine something about literacy (Carlisle, 1999, Zabucky & Ratner, 1992). Recordings of passages are used for students with learning disabilities to guide them in reading a story, comprehending the information within it, and then expressing their knowledge on a topic.

Special attention must also be paid to outcomes of studies regarding memory when individuals were tasked with remembering different categories of information. According to research by Treisman and Tuxworth, "when subjects are asked to monitor sentences for targets defined at different levels, their subsequent recall shows an interaction between recall delay and types of target (phonemic or semantic anomaly)," in addition, there is selective interference when phoneme monitoring is involved (Tresiman & Tuxowrth, 1973). For this reason, it is expected that individuals who choose to focus on the phonemes of the unfamiliar dialect will perform worse than when they are hearing the familiar dialect. This is because when listening to the familiar dialect they will pay less attention to the phonetic features of the speaker, and

instead will give all of their attention to the content of what is being said because it is natural for them to hear a specific dialect with all of its unique features.

Methods/Materials

Sample Recruitment was carried out in two modalities. The first was an email sent by the Honors Program Secretary to members of the SUNY New Paltz Honors Program. The second was in class recruitment carried out by the Primary Investigator. The Primary Investigator asked for permission from four separate professors to read aloud a recruitment statement in front of the class. For both methods, individuals were only provided with information regarding what was expected of them, what criteria was being used to determine their eligibility for the study, and information regarding where and when the experiment would take place.

The sample population was screened for eligibility in numerous ways due to the impact their individual variables could have on data. First, recruitment materials included a short explanation of criteria that needed to be met in order to participate in the study. This was meant to act as a primary filter for participants. Second, when participants arrived to complete the experiment they first were required to fill out a demographic questionnaire. To participate in the study individuals needed to be at least eighteen years old, not have used or had been currently using the campus disability resource center, or have received or had been currently receiving speech, language, or audiological services. Aside from this, the questionnaire asked participants what their native language was. If a participant answered that their native language was not English they were deemed ineligible for the study. If participants were deemed ineligible to

participate after completing the questionnaire, this was noted and their data was not used. In addition, each question included prefer not to answer option.

As mentioned previously, individuals were excluded from the study to avoid individual variables from affecting data. It was imperative that individuals who participated were over eighteen to ensure they were legally allowed to consent to being a part of the study. Apart from this, in order for the experiment to be completed efficiently, it required an individual to be in a later stage of development cognitively. In addition, information regarding a participant's medical background was asked to ensure the experiment could be completed independently without assistance. Because the experiment required an individual to listen to passages and recall content, it was imperative that they were able to complete these tasks efficiently. Further, non-English speakers were excluded because their language experiences may have skewed results. Also, both passages and all questions are presented in English. If an individual was not proficient in English, it could have led to unwanted frustration and errors attributing to translation and not short-term memory.

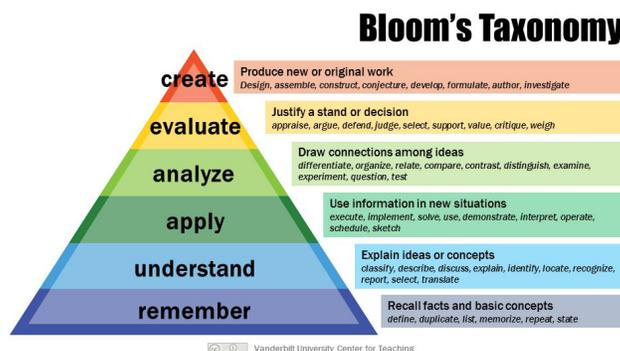
Materials This study used two standardized passages chosen based on their similar sentence structure, length, vocabulary, and content. The two passages used were called "Comma Gets a Cure" and "The Grandfather Passage". In addition, these passages are commonly used in testing an individual's fluency, vocal quality, rate of speech, and suprasegmentals of speech. Meaning, they are not meant to make sense or have a cohesive narrative. The passages were recorded in various dialects by SUNY New Paltz Students and a faculty member to represent both familiar and unfamiliar dialects. In regards to familiar dialects, a resident of Long Island, Queens, and the Hudson Valley were asked to read and record both passages. While the unfamiliar versions of the

passages were recorded by a native of Arkansas. The passages were all recorded by females to ensure data would not be impacted due to the sex of the recorded.

Cued recall materials. Aside from eligibility and recruitment materials stated previously, other materials utilized in the experiment involve the questions asked to participants. The first set of questions are fill-in the blank. These questions provide the participant with the context and content of the sentence. There are five in total for both passages and for each, one to two words are missing and participants were instructed to complete them with information from the passage. Participants received points if the answer was fully complete and correct. Fill-in the blank questions used in the experiment for both passages are in appendix A.

These questions were constructed according to the principles of Bloom’s Taxonomy Revised Edition. Bloom’s Taxonomy is an educational tool created in 1956 by Bloom et al. As mentioned by Huitt it is, “The major idea of the taxonomy is that what educators want students to know (encompassed in statements of educational objectives) can be arranged in a hierarchy from less to more complex. The levels are understood to be successive, so that one level must be mastered before the next level can be reached,” (Huitt, 2011). A diagram of Bloom’s Taxonomy is pictured below from the Vanderbilt University’s website.

Figure 1



(Vanderbilt University, 2019)

Free recall materials. The second type of question focused on free recall, or the participants relaying as much information as they could from beginning to end from the passage. The materials required for this included a score sheet that the Primary Investigator filled in as the individual provided important details regarding content from the passages. The score sheet was a modified version of the Wechsler Memory Scale Revised Edition or WMS-R. The WMS-R is, “The Wechsler Memory Scale – IV (WMS-IV) is the latest (2009) revision of a widely used clinical instrument designed to assess domains of memory, including short-term, long-term (declarative), and working memory,” (Kreutzer, DeLuca, Caplan, 2011). The score sheet includes forty-four specific story details and twelve general story details. Participants received a point for each detail they recalled during their retelling of the story. An example of the modified summary sheet can be found in appendix B.

Verbal response questions are where the participants are asked a question to reflect on their performance. These questions took the form of a likert score, where the individuals involved in the experiment rated their confidence on a scale of 1 to 5. 1 being not confident at all to 5 being very confident. After this, they then had a second question where they needed to explain their reasoning for their rating. These questions can be found in Appendix A.

These questions were asked for data purposes. As mentioned previously, the cued recall questions were created according to Bloom’s Taxonomy. These questions were meant to encourage a higher level of cognition and help provide the context and content of the story so that they could recall specific story details. Responses provided information regarding impact dialect has on recalling different parts of speech. While the free recall question where participants were asked to relay all information from beginning to end that they could remember

was crafted from the Wechsler Memory Scale Revised Edition. The WMS-R was modified so that it would be appropriate to measure recalled information from the passages used for the experiment. This type of question was meant to provide information about the types of information a participant could recall when presented with the passages in both dialects. An example of the free recall portion of the experiment can be found in Appendix B. The verbal response questions were created to assess an individual's confidence when completing all experimental tasks. They were presented as likert scores so that their impressions about their performance could be quantifiable and specific. The second verbal response question was formatted so that participants could qualify their responses and provide statements about their experience. All data collection materials were meant to appear simple and not intimidating so that individuals would answer them without fear of making a mistake.

Procedure Individuals participated in the study for one session lasting no longer than twenty minutes. During the experiment, participants were first asked to answer questions on a demographic questionnaire. After this was completed, the individual then listened to their first passage, which was either "Comma Gets a Cure" or the "Grandfather Passage", which may have been in a familiar or unfamiliar dialect. Counterbalancing measures were put into place for their second passage. If an individual listened to "Comma Gets a Cure" in the familiar dialect, they then heard the "Grandfather Passage" in an unfamiliar dialect. After each passage had been presented they then answered the questions. The order in which they were presented remained the same regardless of which type of passage they heard. First they would complete the free recall summary section, then the cued recall portion, and then end with the verbal response questions. All participants were given a short break between each listening passage. Each

recording was only played once. During the experimental process the Primary Investigator presented all of the stimuli and collected data as the participants were answering the questions provided to them.

Results

After all data was collected, information was input into excel where statistics were computed. The mean and standard deviation were calculated due to being required to compare performance results of both groups. Further, unpaired and paired t-tests were completed to find p-values for each grouping. Chi-square was used for the nominal data to determine the significance of likert score responses.

Demographic Information The population sampled for this experiment were undergraduate students attending SUNY New Paltz. There were approximately 16 individuals who participated in this study. Participants were at least eighteen years of age and included 8 males (50%) and 8 females (50%). The study included one freshman (6.3%), six sophomores (37.5%), three juniors (18.8%), and six seniors (37.5%). All individuals were native speakers of English, did not receive speech, language, or audiological services, and did not utilize the campus disability resources. Further, all subjects were current residents of New York State. However, four participants answered that they were not born in New York. Two were born in Florida (12.5%), one was born in Wisconsin (6.3%), and one was born in Connecticut (6.3%). Other demographic information can be found in table 1. Information is displayed on pie charts in tables 2, 3, and 4.

Table 1

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Participant	Gender	Academic Level	State Born In	City Born In
1901	2	2	1	5
1902	1	2	1	6
1903	1	2	2	7
1906	1	2	2	4
1909	2	3	1	9
1910	1	4	1	1
1911	1	4	1	2
1912	1	4	1	2
1913	1	4	1	10
1914	1	4	1	14
1915	2	3	4	11
1916	2	2	1	16
1917	2	2	1	17
1918	2	1	1	1
1920	2	4	1	13
1921	2	3	5	18

Table 2 Academic Levels of Participants

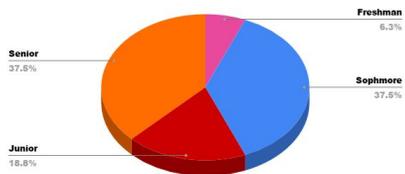


Table 3 Genders of Participants

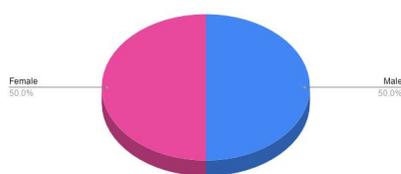
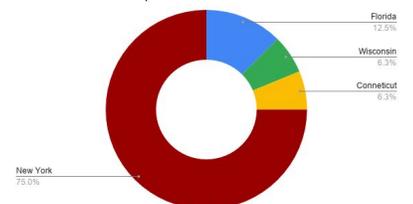


Table 4 States Participants Were Born In



Summary All Items After each passage was completed all participants were asked to provide a verbal summary of what they had just heard with as many specific details as they could recall.

Participants were awarded a point for each specific and general detail they recounted from the story. In total they could receive sixty-six points. Forty-four points for the specific and twelve for general details. Table 5 details the descriptive statistics for the totals for all sixty-six items for all four types of passages. Table 6 expresses the p-values for all comparisons of the total stories. The result for total familiar Comma (M=13.25; SD= 7.1195) and unfamiliar Comma (M=14; SD= 3.7417) is $t(14) = .2467$, $p = .8087$. The result for the total familiar (M=11.125; SD= 3.8222) and unfamiliar grandfather (M=13.375; SD= 8.0146) was $t(14) = .6704$, $p = .5135$. The result of the familiar grandfather (M= 11.125; SD= 3.8222) and familiar Comma (M= 13.25; SD= 7.1195) is $t(14) = .6958$, $p = .4980$. The result of unfamiliar Comma (M= 14; SD= 3.7417) and unfamiliar grandfather (M= 13.375; SD= 8.0146) was $t(14) = .1870$, $p = .8544$. According to these p-values there is no significant evidence regarding if dialect has an impact on short-term memory in regards to these types of questions.

Table 5

Statistic	Familiar Comma	Unfamiliar Comma	Familiar Grandfather	Unfamiliar Grandfather
Mean:	13.25	14	11.125	13.375
Standard Deviation	7.1195	3.7417	3.8222	8.0146

Table 6

Statistic	Familiar vs. Unfamiliar Comma	Familiar Vs. Unfamiliar Grandpa	Familiar Grandpa Vs Familiar Comma	Unfamiliar Comma Vs. Unfamiliar Grandfather
P-Value	.8087	.5135	.4980	.8544

Summary Familiar General and Specific Table 7 displays the descriptive statistics for the familiar responses for the summaries. As for all parts of the experiment, eight individuals answered familiar Comma while eight participants responded to familiar grandfather. Table 8 displays the p-values. The result of familiar Comma specific ($M= 7.75$; $SD= 5.1755$) and familiar grandfather specific ($M= 7.375$; $SD= 3.7393$) was $t(14) = .3462$, $p= .8704$. While the result for Familiar Comma general and familiar grandfather general was $t(14) = .100$, $p= .8381$. According to these p-values there is no significant evidence regarding if dialect has an impact on short-term memory in regards to these types of questions.

Table 7

Statistic	Familiar Comma Specific	Familiar Comma General	Familiar Grandfather Specific	Familiar Grandfather General
Mean:	7.75	5.125	7.375	9.5
Standard Deviation	5.1755	2.9970	3.7393	1.5979

Table 8

Statistic	Familiar Comma Specific Vs. Familiar Grandfather Specific	Familiar Comma General Vs. Familiar Grandfather General
P-Value	.8704	.8381

Summary Unfamiliar Specific and General Total The descriptive statistics displayed in table 9 express the unfamiliar specific and general responses for both stories. Table 10 displays the p-values. The result for unfamiliar Comma ($M= 8.625$; $SD= 3.37797$) and unfamiliar grandfather specific ($M= 7.25$; $SD= 5.7508$) was $t(14) = .5231$, $p= .5691$. While the result for unfamiliar

Comma ($M=5.375$; $SD=2.2648$) and Grandfather general ($M=6$; $SD= 3.1168$) was $t(14) = .4588$, $p=.6533$. According to these p-values there is no significant evidence regarding if dialect has an impact on short-term memory in regards to these types of questions.

Table 9

Statistic	Unfamiliar Comma Specific	Unfamiliar Comma General	Unfamiliar Grandfather Specific	Unfamiliar Grandfather General
Mean:	8.625	5.375	7.25	6
Standard Deviation	3.37797	2.2648	5.7508	3.1168

Table 10

Statistic	Unfamiliar Comma Specific Vs. Unfamiliar Grandfather Specific	Unfamiliar Comma General Vs. Unfamiliar Grandfather General
P-Value	.5691	.6533

Summary Specific and General Total Table 11 displays the descriptive statistics for the total unfamiliar and familiar general as well as the total unfamiliar and familiar specific responses.

While table 12 details the p-values. The result for the unfamiliar specific total ($M= 7.9375$; $SD= 4.6111$) and the familiar specific total ($M=7.5625$; $SD= 4.3661$) was $t(15) = .2011$ $p = .7275$.

While the result for the unfamiliar ($M= 5.6875$; $SD= 2.6513$) and the familiar general total ($M= 5.25$; $SD= 2.3238$) was $t(15) = .2011$ $p = .6086$. According to these p-values there is no significant evidence regarding if dialect has an impact on short-term memory in regards to these types of questions.

Table 11

Statistic	Unfamiliar Specific Total	Unfamiliar General Total	Familiar Specific Total	Familiar General Total
Mean:	7.9375	5.6875	7.5625	5.25
Standard Deviation:	4.6111	2.6513	4.3661	2.3238

Table 12

Statistic	Unfamiliar Specific Total Vs. Familiar Specific Total	Unfamiliar General Total Vs. Familiar General Total
P-Value	.7275	.6086

Significant result. One pairing was found to scientifically significant. This was the comparison between the familiar Comma specific (M= 7.75; SD= 5.1755) and the unfamiliar Comma specific (M=8.625; SD= 3.7797) groups. The result was $t(14) 2.1992, p = .0458$. These results are considered to be qualitatively significant and not quantitatively significant. Likert scores as well as participant feedback on the two passages were required to support conclusions made from this data. Information regarding descriptive statistics can be found in table 13, and the p-value details can be found in table 14.

Table 13

Statistic	Familiar Comma Specific	Unfamiliar Comma Specific
Mean:	7.75	8.625
Standard Deviation	5.1755	3.37797

Table 14

Statistic	Familiar Comma Specific Vs. Unfamiliar Comma Specific
P-Value	.0458

Fill-In The Blank After each passage was concluded, following the summary section of the experiment, participants were asked to complete a fill-in the blank worksheet. Each sheet included three questions with five blanks in total. In order to receive one point the answer needed to be fully complete and correct. Each type of story configuration was answered by eight participants. In other words, eight individuals answered familiar Comma, unfamiliar Comma, unfamiliar grandfather, and familiar grandfather. Table 15 details the descriptive statistics that were calculated for all passages.

While Table 16 presents the p-values that were found for all comparisons of the passage results. The result of unfamiliar Comma (M= 1.875; SD= .354) and familiar Comma (M=1.625; SD= .518) was $t(14) = .45, p = .6616$. The result of unfamiliar grandfather (M=1.75; SD= .866) and familiar grandfather (M=1.75; SD=.707) was $t(14) = .32, p=.7513$. While the result of unfamiliar Comma (M=1.875; SD= .354) and unfamiliar grandfather (M= 1.75; SD= .866) was $t(14) = .37, p= .7166$. The result of familiar Comma (M= 1.625; SD= .518) and familiar grandfather (M=1.75; SD= .707) was $t(14) = .40, p= .6927$. The result of the total familiar (M=1.6875; SD=.60208) and unfamiliar (M=1.8125; SD=.6551) fill-in the blank was $t(15)= .8076, p=.4320$. According to these p-values there is no significant evidence regarding if dialect has an impact on short-term memory in regards to these types of questions. Tables 17, 18, 19, 20, and 21 present the data in the previous tables in a more visual format.

Table 15

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Statistic	Familiar Comma	Unfamiliar Comma	Familiar Grandfather	Unfamiliar Grandfather
Mean:	1.625	1.875	1.75	1.75
Standard Deviation	.518	.354	.707	.886

Table 16

Statistic	Familiar vs. Unfamiliar Grandpa	Familiar Vs. Unfamiliar Comma	Familiar Comma Vs. Familiar Grandfather	Unfamiliar Comma Vs. Unfamiliar Grandfather	Total Familiar Vs. Total Unfamiliar
P-Value	.7513	.6616	.6927	.7166	.4320

Table 17 Familiar Grandpa and Familiar Comma

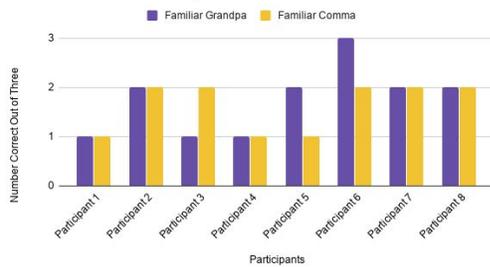


Table 18 Unfamiliar Grandpa and Unfamiliar Comma

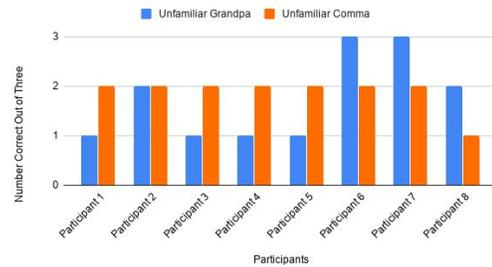


Table 19 Familiar Grandpa and Familiar Comma

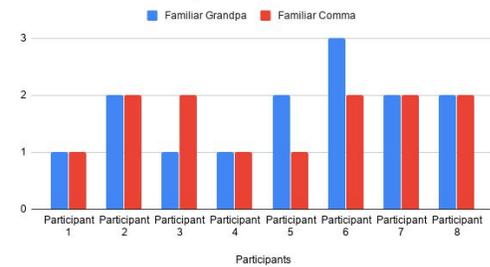


Table 20 Unfamiliar Grandpa and Unfamiliar Comma

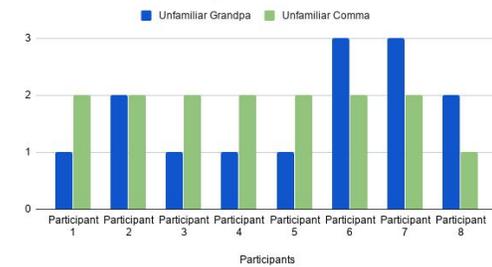
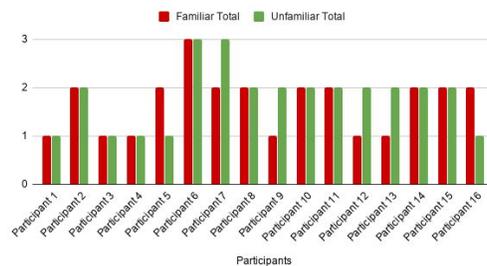


Table 21 Familiar Total and Unfamiliar Total



Likert Scores After completing the fill-in the blank and the summary portions of the experiment, individuals were asked to subjectively rate their confidence when answering the questions overall. The scale was 1 to 5. 1 being not confident at all to 5 being very confident. This data was meant to act as qualitative supporting evidence if quantitative significance was found in other areas. Chi-Square was used to compare the means of these results due to them being nominal in nature. Further mean, standard deviation, and mode were also calculated this can be seen in table 21. While the p-values for the comparisons between passages is displayed in table 22. The result for the chi-square were $X^2(21, 8) = 6.80, p = .999$. According to this p-values there is no significant evidence regarding if dialect has an impact on short-term memory in regards to these types of questions. In addition, there is no evidence as to the significance of the low confidence ratings.

Table 21

Statistic	Unfamiliar Grandfather	Familiar Grandfather	Familiar Comma	Unfamiliar Comma
Mean	2.89	3.11	3.33	3
Mode	2	3	3	2
Standard Deviation	1.453	.601	.866	1.12

Table 22

Statistic	All Stories Compared
P-value	.999

Discussion

As data was being collected from participants, a new hypothesis arose. Does dialect have different effects on short-term memory depending on varying demand conditions? The result of the likert scores, participant comments, and the one significant statistic in regards to “Comma Gets a Cure”, presents a trend that dialect may have an impact on the processing demand of individuals when they are completing a more complex task qualitatively. According to previous research, every individual has their own capacity in regards to processing demands. Further, this capacity depends on the amount of attention and connection the individual is making to the stimuli (Mathy, Chekaf, & Cowan, 2018, chiaravalloti et. al, 2003). According to another study, complex tasks do not allow for time to “chunk” information, while simple tasks do. In addition, tasks that include homogenous material as opposed to heterogenous also reduce the processing demand of stimuli (Mathy, Chekaf, & Cowan, 2018). In regards to both stories, both are not standardized for someone to understand and derive meaning from them. Further, “Comma Gets a Cure” included more information such as names, places, feelings, and events as opposed to “The Grandfather Passage” that focused only on one character and their life. For this reason, the feedback and results found for the unfamiliar and familiar “Comma Gets a Cure” is qualitatively significant in this case.

Although the data was quantitatively insignificant the outcome data for the experiment can still be considered to have real world implications. If data was found to be significant what would that say about our interactions with others that are different from us? Would that mean if

we were talking to individuals with unfamiliar dialects we would be unable to remember much of what they told us at all? If that were the case, it would have an impact on economics, world politics, and even our interactions on a community level. Further, it would create a need for research to find solutions so that we could improve our memory. The fact that there is no need for such things in regards to dialect may express the idea that perhaps there is no impact on the short-term memory level, but maybe in regards to other types of memory such as long term or phonological memory.

Unfortunately every experiment experiences limitations in one way or another. This study was no different. However, it must be addressed that these limitations may have had a major impact on the outcome of data. Due to unforeseen weather conditions and time constraints, the sample size for the experiment was smaller than anticipated. The Primary Investigator only had the opportunity to recruit for one day through email and in two classes. This was less than the week that was planned. In addition to this, the length of the experiment was three days instead of five, which limited the amount of opportunities individuals had to participate.

Another limiting factor was that there was little to no diversity amongst participants. A majority of subjects came from a similar geographical location, Long Island, and therefore it is uncertain if the population's socioeconomic status was an extraneous variable that had an impact on results. According to Newsday, a Long Island Newspaper, Long Island has the highest graduation rate in New York state at 90%, 60% of students are planning on pursuing higher education, and it has the fewest buildings that are considered to be "unsatisfactory", (n.d., 2017).

Similarly, all participants included in the study were typically developing, native English speakers. The outcome of the experiment could have been different if individuals with speech,

language, audiological, and learning difficulties were eligible to participate in the study. In addition, it is uncertain if bilingual subjects may have performed the same as their monolingual counterparts. According to researchers such as Bialystok, it has been concluded that monolinguals and bilinguals perform equally as well when completing tasks focused on short-term memory (Bialystok, 2009). This is something to heavily consider in regards to future research.

Lastly, this experiment focused only on college aged individuals. Perhaps, if this experiment was done with the older population, dialect may have a more pronounced impact on short-term memory. According to statistics, “about 40% of people aged 65 or older have age associated memory impairment—in the United States, about 16 million people. Only about 1% of them will progress to dementia each year,” (Small, 2002). Especially now, with funding going to research regarding dementia and alzheimers, perhaps the results of the experiment could support findings regarding those diseases or the aging mind overall.

Aside from limitations due to the sample, availability of experimental materials posed some restrictions on the outcome of the experiment. When constructing the materials that would be used to evaluate the participants, there were no previous studies found that utilized passages. For this reason, the Primary Investigator searched for passages that were already standardized. “Comma Gets a Cure” and “The Grandfather Passage” are meant to test an individual’s prosody. For this reason, the stories are both nonsensical, have awkward phrasing, and do not allow for someone to make personal connections to the story. Further, because of the length and complexity of both stories, they needed to be further modified. This led to the passages no longer being standardized. For this reason, it is uncertain if the experimental outcomes could have been

due to the passages or the performance of the individuals. Apart from this, the short answer questions were created from scratch. Although based loosely on Bloom's Taxonomy Revised, which provides ways to ask questions that target specific knowledge, there was no information that would express if the materials were valid, standardized, or appropriate.

Another limitation of the experiment were the quality and quantity of the recordings. Due to time constraints and needing to use modified passages, the Primary Investigator was unable to utilize a database that had the recordings in a lab setting. Meaning, outside of the sample for the experiment, individuals needed to be recruited to record the passages. For this reason, the amount of recordings were subject to the different dialects of those who volunteered to record. Further, due to being a student run study, lab quality recordings were unable to be obtained. This led to low quality materials with few variations. In addition to this, it is possible that the dialects of the individuals were not distinct enough to present the diverse speech sounds required to be familiar or unfamiliar. Leading to all recordings sounding alike or all familiar regardless of where the speaker was from.

The demographic questionnaire was also a limiting factor for the experiment. Because there was little background information, it was difficult to determine eligibility of subjects. For this reason, creating a demographic questionnaire that would screen subjects, but also act as appropriate supporting evidence was difficult. Questions focused on where the participants were born, raised, and currently reside. However, as analysis began it was apparent questions regarding specific experience with language were lacking. In addition to this, there was no data taken having to do with personal experiences with memory. Such as how often they forget

things, how they organize their thoughts, and how confident they are in their own memory prior to listening to the passages.

A major implication when running any experiment is the fact that it will inspire individuals to further research the subject to either replicate the results that were found or find their own data. One thing future clinicians can focus on is the impact of multiple types of memory. Although there was no significant link between dialect and short-term memory found as a result of the study, perhaps the fact that there are a lot of opportunities for future research are what make this experiment significant. Even if the results are still insignificant pioneers are imperative for the furthering of our knowledge not just about the brain, but the role language plays when it comes to memory.

Future studies should choose contrasting familiar and unfamiliar dialects based on phonemic features. For example, they should test /r/+ against /r/- dialects. This may have an impact on how an individual may store and recall information. Especially, if they are hearing features that are unfamiliar to them. The dialects used for the experiment were United States based. Meaning, although they were from geographically different locations, the North and the South, they still shared a lot of the same features due to all being based on dialects of United States English.

Future research should also consider having a larger and more diverse sample size. For instance, the study should focus on individuals throughout the lifespan. Perhaps the results would be significant for the geriatric populations as opposed to the young adult participants. Further, individuals from multiple socioeconomic backgrounds should also be considered for future studies. According to some researchers, experience with language plays a role in one's

phonological awareness (Morales, 2013). This is because, perhaps an individual's background in education as well as diversity of those they interacted with as they developed may have an impact on their phonological awareness and therefore short-term memory in regards to dialect.

Lastly, future research should look to differentiate the types of ways they assess the recall of participants. According to Gardiner, who theorized that we have multiple intelligences, perhaps by presenting questions in multiple formats, we may be able to see the thought processes as well as maximize someone's potential when answering questions (Herndon, 2018). Previous studies into short-term memory recall utilized word lists, nonword repetition, sentence recall, and sometimes multiple choice (Berman, Jonides, & Lewis, 2009, Treisman & Tuxworth, 1973). However, if participants were able to write responses, select answers from a set of visual images, or create their own images, it may affect the outcome of data. According to previous research, "encoding of pictures resulted in greater activity of bilateral visual and medial temporal cortices, compared with encoding words, whereas encoding of words was associated with increased activity in prefrontal and temporoparietal regions related to language function," (Cheryl et. al, 1998). As such, this may again lead to data regarding the effect of dialect on short-term memory to be different from the outcomes of the study. For this reason, it is important for future researchers to be open to using multiple materials and modalities in regards to presenting stimuli for participants.

Conclusion

This paper summarizes and discusses the findings of a university based study following the impact of dialect on one's ability to recall information in both familiar and unfamiliar dialects. According to current research, experience plays a part in one's ability to encode and

retrieve information in unfamiliar dialects efficiently. Adults who self-identified as native speakers of English were recruited to participate in the study. Individuals listened to two short passages in either unfamiliar or familiar dialect and were then prompted to answer questions immediately after. Short-Term Memory recall tasks were implemented in the form of fill in the blank and summary questions. In addition to this, participants were asked to rate their confidence when answering both sets of questions. Results of the study, through qualitative data provide supportive evidence regarding the correlation between task complexity and processing demands.

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Appendix A

Comma Gets a Cure

Directions: Read each question below carefully and fill in the blank(s) with information from the passage you just heard. Answers may be more than one word.

1. “she was very happy to start a new job at a superb private practice in _____ near the Duke Street Tower”

2. “The letter implied that the animal could be suffering from a rare form of foot and mouth disease, which was surprising, because normally you would only expect to see it in a ‘ _____ ’ or a ‘ _____ ’...”

3. “The goose's owner, Mary Harrison, kept calling, ‘ _____ , _____ ,’ which Sarah thought was an odd choice for a name.”

1. How confident did you feel when answering these questions? Circle your answer.
(From a scale of 1 to 5. 1 being not very confident to 5 being very confident.)

1 2 3 4 5

2. In a short statement (1-2 sentences), explain your reasoning for your answer to number one.

Appendix B

Comma Gets a Cure

Directions to be given to participants: For this activity summarize the passage you just heard from beginning to end. Provide as many specific details as you can. You are not being timed so there is no need to rush. Do not worry if you cannot remember all of the details, just do your best. Are you ready to proceed?

S1: Comma Gets a Cure				
Story	Points (0/1) Synonyms or Complete Ideas	Points (0/1) General Themes or Ideas	Synonyms (1 point)	No points
Sarah			Sarah	Other Name
Perry			Perry	Other Surname
GENERAL THEME			INDICATION THAT CHARACTER WAS FEMALE	
Worked			Worked, was employed	
Was a Veterinary Nurse			Vet, Animal Nurse, Veterinarian	Any other job (Doctor, Nurse)
Who had been working daily at an old zoo			zoo	Any other location
In a deserted district of the territory			District, District in a territory	Other place, town, city
GENERAL			INDICATION	

THEME			ABOUT CHARACTERS FEELINGS ABOUT NEW JOB	
So she was happy to start a new job			Happy	Sad, angry, frustrated, upset, joyful, Excited
At a superb private practice			Private Practice	
In north square near Duke Street Tower			North square near duke street tower	Anywhere else
GENERAL THEME			INDICATION THAT CHARACTER LIKED THE NEW AREA BETTER	
That area was much nearer for her			Nearer, closer	Other distance measure
And more to her liking			More to her liking	Other feeling
When she got there, there was a woman			Woman	Man, child
With a goose waiting for her			Goose	Other bird or animal
GENERAL THEME			INDICATION THAT THE CHARACTER WAS GIVEN SOMETHING	
The woman gave Sarah				

A letter			letter or note	Any other object or not
From the vet			Vet	Any other type of doctor or profession
GENERAL THEME			THE INDICATION THAT THE LETTER IMPLIED SOMETHING	
The letter implied			Implied, said	Anything else
GENERAL THEME			INDICATION THAT THE LETTER IS REFERRING TO THE GOOSE	
That the animal			Animal, goose	Anything else
GENERAL THEME			INDICATION THAT THE ANIMAL/GOOSE WAS IN PAIN OR SUFFERING	
Could be suffering			Suffering, has	Anything else
From a rare form			Rare, unique, unusual	common
Of foot and mouth disease			Foot and mouth disease	Any other type of disease or ailment, sickness
GENERAL THEME			INDICATION THAT IT IS SURPRISING	

			BECAUSE THIS TYPE OF ANIMAL DOES NOT GET FOOT AND MOUTH DISEASE	
Which was surprising			surprising	Any other adjective
Because normally you would only expect to see it in			Normally, usually would expect	
A dog			dog	Any other animal
Or a goat			goat	Any other animal
GENERAL THEME			INDICATION THAT EVENT DID NOT TAKE LONG OR HAPPENED IMMEDIATELY	
Before long			Before long, soon after	Any other indicator of time
That itchy goose			Itchy goose	Any other adjective or any other animal
GENERAL THEME			INDICATION THAT THE GOOSE/ANIMAL WAS WALKING AROUND OR DOING SOMETHING	

Began to strut			Strut, walk	Run, any other type of action
Around the office			Office	Building, area, room
Like a lunatic			lunatic , crazy	Any other adjective
Which made an unsanitary mess			Mess, unsafe, dirty	Clean, no mess
GENERAL THEME			INDICATION THAT THE GOOSE'S OWNER WAS SAYING ITS NAME	
The goose's owner			The goose's owner	Any other person
Mary			Mary	
Harrison			Harrison	
Kept calling			Calling, yelling	Any other verb
Comma, Comma			Comma	Any other name
GENERAL THEME			INDICATION ABOUT MAIN CHARACTER'S THOUGHTS	
Which Sarah			Sarah	Any other character
Thought was an odd			Odd, Weird	Any other adjective
Choice			choice	Any other verb
For a name			Name	Anything else
Point total:	Max= 41	Max = 12	In case of repetition of	

			these words, only give 1 point.	
--	--	--	--	--