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A Comparison of Comprehension Accuracy and Rate: Repeated Readings and Listening While Reading

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I am submitting herewith a dissertation written by Megan Amber Schall entitled "A Comparison of Comprehension Accuracy and Rate: Repeated Readings and Listening While Reading." I have examined the final electronic copy of this dissertation for form and content and recommend that it be accepted in partial fulfillment of the requirements for the degree of Doctor of Philosophy, with a major in School Psychology.

Christopher Skinner, Major Professor

We have read this dissertation and recommend its acceptance:

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A Comparison of Comprehension Accuracy and Rate: Repeated
Readings and Listening While Reading

A Dissertation Presented for the
Doctor of Philosophy
Degree
The University of Tennessee, Knoxville

Megan Amber Schall
August 2016

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Abstract

There is a need for effective and efficient reading interventions in American schools. Two empirically supported reading interventions are Repeated Readings and Listening While Reading. Previous researchers have evaluated the effects of these interventions individually on reading fluency and comprehension, and in comparison on students' reading fluency. This is the first study to compare the relative effectiveness of each intervention on students' comprehension, which is the typical purpose of reading. The current study extends previous research by considering the instructional time required to complete each intervention, and converting students' comprehension accuracy scores into a comprehension rate measure. Additionally, students read two passages for each reading condition, one slightly below an instructional level and one at a frustrational level, to determine if an interaction exists between passage difficulty and intervention condition. Results revealed no main effect for reading condition on students' comprehension accuracy scores. However, analysis of comprehension rate scores revealed a significant main effect for reading condition as well as a significant interaction effect between reading condition and passage difficulty. Listening While Reading resulted in significantly greater comprehension per minute of instructional time than Repeated Reading or the control condition. While both interventions appeared equally effective when examining overall comprehension of a passage, results suggest that Listening While Reading is a significantly more efficient intervention for targeting

comprehension. This was found across both levels of passage difficulty. Implications for measurement, intervention selection, and academic accommodations are discussed.

Keywords: Repeated Reading, Listening While Reading, Comprehension
Accuracy, Comprehension Rate

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Chapter 1

Introduction and Literature Review

There is a need for effective reading instruction and remediation in American schools, for both majority and minority students. In 2011, in a nationwide sample of 4th-grade students, only 34% of students were at, or above, the proficient level in reading, with a large gap between the performance of Caucasian students and African American, American Indian, and Hispanic students (National Center for Education Statistics, 2011). The National Reading Panel (National Institute of Child Health and Human Development, 2000) reviewed reading studies and identified phonemic awareness, phonics, oral reading fluency, vocabulary, and comprehension as core components of effective reading instruction. Consequently, there has been an increased focus on interventions designed to improve students' oral reading fluency and comprehension. While a variety of interventions, and strategies and procedures have been used to enhance oral reading fluency and comprehension, two simple and empirically supported interventions are Repeated Reading and Listening While Reading.

Repeated Reading

Repeated Reading is an empirically validated intervention in which students read the same passage multiple times. Dahl (1974) applied Repeated Readings with a sample of 32 poor readers in the 2nd-grade. Students either used context to decode a text, read the text repeatedly, or studied flash cards pertaining to the text. Dahl found that both using context and Repeated Readings improved the students' reading skills.

Samuels (1979) provided the first comprehensive description of the method of Repeated Reading. He viewed Repeated Reading as an extension of his research on information processing and working memory (LaBerge & Samuels, 1974; Samuels, 1979). According to his automaticity theory, fluent readers who are able to decode text automatically are consequently able to allocate more cognitive resources to comprehending text. Repeated Reading simultaneously reduces errors in word recognition and increases reading speed thus freeing attention for comprehension. Samuels found that these improvements occurred for the given passage as well as new passages. His work emphasized the importance of fluency in reading comprehension.

Subsequent researchers investigated causes for the success of Repeated Reading interventions. In addition to reducing the cognitive burden by increasing decoding speed, Fleischer, Jenkins, and Pany (1979) suggested that the Repeated Reading procedure might positively affect comprehension by helping readers to “chunk” information, and familiarizing them with vocabulary and syntax. Schreiber (1980) sought an explanation for the generalization of fluency improvements as a consequence of Repeated Readings that was found by Samuels (1979). Schreiber suggested that young readers rely more heavily on phonetic properties to comprehend text compared to proficient readers. The punctuation cues provided in the English language do not divide written sentences into phrases as clearly as pronunciation cues do in spoken sentences. Through Repeated Readings, students learn prosody and expression that is not evident in written letters and punctuation which then leads to fluency.

Repeated Reading has been successfully employed with elementary-aged students (O'Shea, Sindelar & O'Shea, 1985; Therrien, Kirk, & Woods-Groves, 2012; Savaiano & Hatton, 2013) and secondary students (Freeland, Skinner, Jackson, McDaniel, & Smith, 2000; Hawkins, Hale, Sheeley, & Ling, 2011). In a sample of 30 third grade students, students were instructed to read a passage one, three, or seven times. Fluency and comprehension scores increased as a function of increased reading repetitions, so that students who read a passage seven times had the highest overall scores (O'Shea et al., 1985). In a similar study, seven students with disabilities were asked to repeatedly read a series of science passages until they reached a predetermined fluency criterion (Kostewicz & Kubina, 2011). Using a Repeated Reading intervention, students were able to reach the fluency criterion on four consecutive passages and demonstrated increases in words correct per minute (WCPM), decreases in error, and improvements in oral retelling. Students' maintenance scores were higher than baseline scores suggesting reading transfer. Savaiano and Hatton (2013) extended research with Repeated Reading to students with visual impairments. Using a single-subject, changing criterion design, a Repeated Reading intervention improved oral reading rate for two out of three students and comprehension scores for all three participants.

Repeated Reading has been equally effective with older students who are performing below grade level in reading. Freeland et al. (2000) studied the effects of Repeated Reading on three secondary students' comprehension. Participants had been previously diagnosed with a specific learning disability in reading. Compared to a single

silent reading, completing aloud Repeated Readings increased students' factual comprehension levels and factual comprehension rates, but did not have a significant difference on their inferential comprehension performance. Hawkins et al. (2011) combined Repeated Reading with a vocabulary previewing intervention with 6 high-school students who were reading below grade level and found that both interventions increased students' fluency and comprehension compared to no intervention, with a combination of Repeated Reading and vocabulary resulting in the greatest reading gains.

While studies generally support the effectiveness of Repeated Reading, the results from meta-analyses are mixed. In one meta-analysis, Therrien (2004) reported that Repeated Reading is an effective intervention to improve fluency and comprehension for general education students as well as students with learning disabilities. Its effects occur on the given passage and generalize to new passages. Conversely, implementing a higher standard for inclusion, O'Keeffe, Slocum, Burlingame, Snyder, and Bundock (2012) reviewed narrative literature reviews and meta-analyses and determined that there is not enough high quality research to consider Repeated Reading an empirically validated treatment.

Listening While Reading

To implement a Listening While Reading intervention, a previewer (e.g., the teacher or a more advanced student) reads a passage to the student while they follow along, often using their finger, prior to instruction or testing. This method of reading instruction does not require extensive training for the previewer, functions with

individuals, small groups, or class-wide (Begeny & Silber, 2006; O'Donnell, Weber, McLaughlin, 2003; Rasinski, 1990), is effective for students of various ages (Hawkins, Musti-Rao, Hale, McGuire, Hailley, 2010; Salend & Nowak, 1988; Skinner et al., 1993), and for students learning English as a second language (O'Donnell, Weber, & McLaughlin, 2003). As the previewer models fluent reading, the student is free to dedicate more cognitive resources to comprehending the text (LaBerge & Samuels, 1974). This is one possible explanation for the intervention's past effectiveness.

Listening While Reading has received empirical support from numerous researchers for use with elementary-aged students with learning disabilities (Lionetti & Cole, 2004; Rose & Beattie, 1986; Salend & Nowak, 1988). In a comparison of reading along to a teacher's reading of a passage versus reading along to a taped recording of the story, Rose and Beattie (1986) found that four elementary-aged boys with learning disabilities had higher words correct per minute scores reading the same passage following the teacher procedure compared to the taped procedure. However, both previewing procedures improved the participants' scores compared to no previewing, and neither procedure significantly differed in reducing error rates. In a study with 25 middle-school remedial readers, Schmitt, Hale, McCallum, and Mauck (2011) found that having students complete a Listening While Reading task using text-to-speech assistive technology did not result in significantly different comprehension scores compared to a silent reading control condition. These studies suggest that having another individual,

rather than a recording, act as the previewer maximizes students' opportunity for greater fluency gains.

In a similar study, three elementary-aged students diagnosed with a learning disability completed a Listening While Reading intervention as a peer read to them (Salend & Nowak, 1988). To assess its effects on their reading accuracy, participants subsequently read the same passage to their teacher who noted their errors as they read. In all students, peer previewing resulted in decreased oral reading errors. To assess whether the previewer's reading speed affected students' subsequent fluency and comprehension, four 4th- and 5th-grade students reading below grade level followed along as a previewer read a passage at either a slow or a fast rate (Lionetti & Cole, 2004). Both rates of reading significantly increased participants' WCPM and participants maintained high accuracy scores. There was no significant effect on comprehension scores as a result of either rate of previewing.

In addition to being an effective intervention for students with learning disabilities in reading, Listening While Reading has also received empirical support with general education students (Hawkins, Musti-Rao, Hale, McGuire, & Hailley, 2010). Twenty-one fourth grade students in general education increased their comprehension and vocabulary scores after completing a Listening While Reading task. This study demonstrates the positive effects that reading interventions might have on elementary-aged students who are reading at their grade level.

Research has demonstrated the positive effects of Listening While Reading with upper grade-level students, as well (Skinner et al., 1993; Skinner, Robinson, Adamson, Atchison, & Woodward, 1998). Skinner et al. (1993) compared fast- and slow-rate previewing on the reading performance of 12 junior and senior high school students with diagnosed learning disabilities. Similar to Lionetti and Cole (2004), Skinner et al. found that both rates of previewing increased students' WCPM scores compared to their baseline oral reading rates. However, they also found that students made more errors per minute after the fast-rate previewing, suggesting that having students follow along at a pace that is higher than their current reading rate might not benefit them as much as reading at a pace that more closely matches their silent reading rate.

In a subsequent study, Skinner et al. (1998) compared student-rate Listening While Reading to fast-rate Listening While Reading on students' comprehension. Secondary students with learning disabilities completed the reading procedures and answered five factual and five inferential questions. The student-rate listening condition led to lower inferential accuracy than both the fast-rate condition and the silent reading control condition. Cumulatively, these studies suggest that reading a passage at a fast rate to a student might improve their overall comprehension of the material at the expense of their ability to decode individual words. These results are consistent with cognitive theories of information processing (LaBerge & Samuels, 1974; Samuels, 1979).

Comparison Studies of Repeated Reading and Listening While Reading

Researchers have compared the effects of Repeated Reading and Listening While Reading on fluency, comprehension and vocabulary knowledge. In one of the first studies comparing the relative effectiveness of Repeated Reading and Listening While Reading, 20 3rd-grade students completed two treatment cycles in which they repeatedly read and repeatedly listened to two passages (Raskinski, 1990). Each treatment cycle lasted four days. On the first day, participants completed pretesting in which they orally read a passage as an experimenter recorded their reading speed and accuracy. On the second and third days, students were assigned to pairs to complete the intervention. One student orally read a passage aloud in the presence of the teacher as the other student followed along using a copy of the passage. On the fourth day, participants were post-tested using the same procedures implemented during pretesting. Before beginning the second treatment cycle, the student pairs switched their roles so that those who had repeatedly read the passage became the listeners and those that repeatedly listened to the passage became the readers. A new passage was used for the second cycle of treatment.

Rasinski (1990) was interested in measuring the effects of these interventions on students' oral reading fluency. Results indicated that both treatments were effective at promoting students' reading speed and reading accuracy from pre-test to post-test. There were no significant differences between treatments for reading speed or reading accuracy, nor any interactions between treatment and pre- and post-test gain scores. Therefore, Rasinski suggests that both Repeated Reading and Listening While Reading are

supported methods at increasing elementary students' reading fluency, with neither treatment superior to the other.

Webb and Chang (2012) investigated the effects of each intervention on English language learners' vocabulary knowledge. They found that both Repeated Reading and Listening While Reading improved the vocabulary scores of teenage students learning English as a foreign language, with Listening While Reading leading to significantly greater vocabulary knowledge. Silber and Martens (2010) looked at the effectiveness of combining both interventions compared to training students on key words using multiple exemplars. In order to incorporate both treatments, experimenters read the passage aloud to students as they followed along with their finger, and then students read the passage chorally three times. Students then answered comprehension questions. Both the multiple exemplar and the combined Listening While Reading/Repeated Reading conditions improved students comprehension scores compared to a control group; however, multiple exemplar training resulted in significantly larger learning rates so that students in that condition experienced greater fluency increases per minute of instruction.

Other researchers compared the effects of these interventions as components in larger reading packages (Begeny & Silber, 2006; Tingstrom, Edwards, & Olmi, 1995). In one study, three African American males reading below grade level alternated between a Reading to Read intervention designed to increase oral reading fluency and a Listening While Reading intervention (Tingstrom, Edwards & Olmi, 1995). Reading to Read includes a Repeated Reading component with additions such as charting student progress.

The Listening While Reading condition resulted in greater WCPM scores and lower error scores for two of the three students. Begeny and Silber (2006) examined the effects of four group-based reading packages that contained two or more of the following: Repeated Reading, Listening While Reading, and practicing vocabulary words in isolation. Combining the three components yielded the highest fluency gains, with inconsistent maintenance scores. Neither study examined the effects of the treatments on students' comprehension gains.

In a series of studies, Rose and colleagues compared the effectiveness of oral previewing (Listening While Reading) and silent previewing (silent Repeated Reading) (Rose 1984a; Rose 1984b; Rose 1984c; Rose & Beattie, 1986; Rose & Sherry, 1984). In the oral previewing condition, an experimenter read a passage aloud as the student followed along prior to assessment. In the silent previewing condition, students read the passage silently before assessment. This method was replicated with elementary males with behavioral disorders, elementary students diagnosed with mental retardation, elementary students with learning disabilities, and junior-high students with learning disabilities. In each study, both prepractice procedures improved students' WCPM scores during assessment compared to no prepractice, with oral previewing (Listening While Reading) yielding higher WCPM scores than silent previewing (silent Repeated Reading).

Dowhower (1987) implemented a time-series design to compare the relative effectiveness of the interventions on 2nd-grade students' WCPM, accuracy, and

comprehension. Participants had average decoding abilities, but below average reading rates. The Listening While Reading condition was completed through the use of a tape recorder and students were permitted to transition from the Listening While Reading condition to the independent RR condition when they felt they were able to read without assistance. Therefore, the two conditions were confounded in the results. Students' WCPM, accuracy, and comprehension on five factual questions improved under both conditions. However, Dowhower found that Listening While Reading with a tape recorder yielded the best results for slow readers (<45 WCPM) while Repeated Reading produced better results for faster readers. The positive results generalized to unpracticed, similar passages.

In a study of four elementary-aged males, Daly and Martens (1994) compared the effectiveness of listening passage preview (Listening While Reading), subject passage preview (Repeated Reading) and taped words on students' ability to accurately and quickly read word lists and passages. In addition to measuring students' fluency, Daly and Martens also measured reading accuracy. The Listening While Reading condition resulted in higher accuracy and fluency scores than Repeated Reading or taped words.

Repeated Reading and Listening While Reading were also demonstrated to be effective for adult learners with low reading abilities (Winn, Skinner, Oliver, Hale, & Ziegler, 2006). Six men and women reading at 4th- and 5th-grade reading levels completed a repeated measures design with three conditions: Listening While Reading, Repeated Reading, and a control condition. Participants read three passages for each condition. In

the Repeated Reading condition, participants read a passage silently once and then read it aloud a second time as an experimenter recorded their errors and seconds to finish. In the Listening While Reading condition, participants listened as an experimenter read the story aloud to them and then read it aloud as the experimenter recorded errors and seconds to finish. In the control conditions, participants read a passage aloud a single time to the experimenter. Repeated Reading and Listening While Reading both yielded significantly higher WCPM scores than the control condition, with no significant differences between the two interventions. These results suggest that both interventions are effective at increasing fluency in adult learners with reading skill deficits.

Purpose of the Study

The purpose of this study was to extend research comparing Repeated Reading and Listening While Reading in three ways. First, rather than examining their relative impact on reading fluency, we sought to determine which intervention enhanced comprehension scores. Second, we included a measure of the time taken to complete each intervention to calculate comprehension rates for each treatment (% comprehension questions correct per minute of instruction). Third, students were assessed on easy and hard passages for each treatment to assess differential effectiveness as a function of passage difficulty. The applied significance of these modifications will be discussed below.

Comprehension accuracy. While researchers have examined the independent impact of both Repeated Reading (Dahl, 1974; Hawkins et al, 2011; O'Shea et al., 1985;

Savaiano & Hatton, 2013; Therrien, 2004) and Listening While Reading (Hawkins, et al., 2010; Lionetti & Cole, 2004; O'Donnell, Weber, & McLaughlin, 2003; Schmitt et al., 2011; Skinner et al., 1998) on comprehension, there is little research on their relative effectiveness on promoting factual and inferential passage comprehension. The majority of the comparison studies have investigated reading fluency as the outcome measure, with the exception of Dowhower (1987) who included students' performance on five factual recall comprehension questions as a dependent variable. However, participants in this study were not assessed on their inferential comprehension of passages, and the two treatments were confounded in the time series design. In this study, we examined how Repeated Reading and Listening While Reading differentially promote students' literal and inferential passage comprehension.

Comprehension rate. Recent research has suggested the importance of considering learning rate in addition to learning outcomes (Joseph & Nist, 2006; Nist & Joseph, 2008; Skinner, 2008). When examining learning per unit of instructional time, the results might appear different than when examining overall learning outcomes. For example, Joseph and Nist (2006) found that when looking at overall word reading accuracy after three interventions, the treatments appeared nearly indistinguishable; however, graphing results with the number of sessions on the horizontal axis demonstrated a clear superiority of one intervention at promoting word learning rate. Other researchers have investigated intervention effectiveness vs. efficiency in areas of spelling (Cates et al., 2003), flashcard learning (Joseph, Eveleigh, Konrad, Neef, &

Volpe, 2012; Skinner, Belfiore, & Watson, 2002), oral and written retelling to promote comprehension (Schisler, Joseph, Konrad, & Alber-Morgan, 2010), and Repeated Reading versus multiple exemplar training (Silber & Martens, 2010).

Researchers have not examined comprehension following Repeated Reading or Listening While Reading divided by cumulative instructional time. In comparing interventions to see which causes the largest increases in learning, it is important to account for instructional time. Otherwise, we might recommend interventions that cause slightly more learning (i.e., comprehension) but retard learning rates (i.e., comprehension rate) because of the additional instructional time (Skinner, 2008). In this study, we looked at the overall comprehension as a result of both interventions, as well as the rate of comprehension caused by Repeated Readings and Listening While Reading. Specifically, the impact of Listening While Reading and Repeated Reading on students' comprehension will be calculated by dividing the percentage of comprehension questions answered correctly by the time spent on each respective intervention.

Passage difficulty. In this study, participants completed Repeated Reading and Listening While Reading treatments for one easy and one hard passage. A common accommodation for students who are unable to read a text is to have an adult or peer read the text aloud to the student (i.e., Listening While Reading). Therefore, there are important applied implications for how well students respond to each reading intervention when material varies in difficulty. In one study, Dowhower (1987) found that Listening While Reading was more effective for students reading at <45 WCPM

while Repeated Reading was more effective for faster readers. One hypothesis is that Listening While Reading might yield higher comprehension scores when material is too hard for students to read independently and Repeated Reading might result in greater comprehension when material is at a student's grade level, resulting in an interaction effect between treatment type and passage difficulty.

Chapter 2 Materials and Method

Participants and Setting

Prior to recruiting participants, a power analysis based on the meta-analysis published by Therrien (2004) was conducted. The results suggested that a sample of 40 students would be sufficiently large to provide greater than 90% power to detect significant differences. Participants included 49 second-grade students in a rural elementary school in the Southeastern United States. The sample included 20 males and 29 females, and was predominantly Caucasian and Hispanic (46.9% Caucasian; 46.9% Hispanic; 3.0% African American). The school provides free or reduced-price lunch to approximately 89% of its students. Participants completed procedures on two days in the fall semester. All procedures were conducted with experimenters in a quiet hallway.

Materials and Measures

Six passages taken from the 2008-2009 Texas Primary Reading Institute (TPRI) Development Study (Texas Education Agency, 2010) were used in this study (see Appendix). Three passages were taken from the second-grade sample (e.g. easy passages) and three passages were taken from the third-grade sample (e.g., hard passages). Second grade students read passages at an average of 156 s with an average standard deviation of 76 s; their average comprehension accuracy score was 76%. 3rd-grade students read passages at an average of 150 s with an average standard deviation of 71 s; their average comprehension score was 73. Factual and inferential open-ended questions are provided for each passage. Experimenters read the questions aloud to the participants and recorded

their responses. Questions were scored using a rubric that included possible correct answers.

School psychology Ph.D. students administered the passages to students individually. All students had previous experience administering and scoring brief reading passages. Each experimenter received additional training prior to beginning the study to clarify the standards for errors. During testing, experimenters audio recorded each student to obtain inter-scorer agreement estimates.

Procedures

Each participant read six passages, one easy passage and one hard passage for each of three reading conditions: Listening While Reading (LWR), Repeated Reading (RR), and control. The order in which the reading conditions and passage difficulty within conditions were presented was randomly assigned to participants. Additionally, each passage was used an equal number of times across reading conditions. For example, 1/3 of students read easy passage X under the LWR condition, 1/3 of students read easy passage X under the RR condition, and the remaining 1/3 of students read easy passage X under the control condition.

Experimenters administered the assessment procedures to students individually. The procedures for each reading condition are displayed in Table 1. In the control condition, experimenters read the following standard instructions to students:

When I say ‘begin,’ start reading this passage aloud. Read across the page. Try to read each word. If you come to a word you don’t know I’ll tell it to you. Be sure

to do your best reading. After you finish you will answer questions on what you just read. Do you have any questions? Begin. (Shinn & Shinn, 2002, p.18)

When the student began to read, the experimenter started a stopwatch and recorded errors as the student read the passage. After completing the passage, the experimenter recorded the total seconds required to read the passage, then immediately administered the comprehension questions for the passage. This procedure was replicated for both the easy and hard passage conditions.

In the Listening While Reading (LWR) condition, the experimenter read an easy and a hard passage aloud to the student as they followed along with their finger. The following instructions were read to students prior to beginning this reading condition:

I am going to read this passage aloud. Follow along with your finger. Be sure to pay attention because when I am finished you will answer questions. Do you have any questions?

Before beginning to read the passage aloud, the experimenter began a stopwatch to record how many seconds they spent reading the passage. Immediately following each passage, the experimenter orally administered the comprehension questions corresponding to that passage. This procedure was replicated for both the easy and hard passage conditions.

In the Repeated Reading (RR) condition, the experimenter read the following instructions modified from the control passage instructions:

When I say 'begin,' start reading this passage aloud. Read across the page. Try to read each word. If you come to a word you don't know I'll tell it to you. Be sure

to do your best reading. When you finish you are going to read this passage one more time and answer questions on what you just read. Do you have any questions? Begin.

Experimenters recorded errors and seconds to read the passage for each Repeated Reading. Following the second reading, the experimenter administered the comprehension questions. The same procedures were followed for the passage of alternate difficulty.

Each passage included questions that covered three different subtypes of comprehension. Category one questions were called “Right There” questions. Answers to category one questions were found within a single sentence in the story, used language that closely matched the language in the story, and did not require any background knowledge. Category two questions were named “Think and Search” questions. Similar to category one questions, the answers to category two questions were located directly in the text and required no background knowledge. However, in order to answer these questions students were required to connect information from multiple sentences. The third category of questions, “Author and You”, required students to infer answers drawing on information from different parts of the story.

Analysis

A two-by-three repeated measures within-subjects ANOVA was used to test for significant differences in students' comprehension scores across passage difficulty and reading conditions. The first factor, passage difficulty, had two levels (easy or hard) and the second factor, reading condition, had three levels (Listening While Reading, Repeated Reading, and control). To test for differences in rates of comprehension, a new variable was created by dividing the percentage of comprehension questions answered correctly by the seconds to complete the intervention, and multiplying that number by 60. This variable, named comprehension rate, represents students' comprehension per minute of instructional time. The same two-by-three within-subjects ANOVA was completed with comprehension rate as the dependent variable.

Inter-scorer Agreement

To obtain an estimate of inter-scorer agreement on participants' reading speeds and comprehension accuracy, two experimenters collectively listened to approximately 20% of the audio recordings of participants' readings to independently score their seconds spent reading and comprehension accuracy. The ratings for seconds spent reading were considered consistent across raters if both times were within plus or minus three seconds of each other. Pearson product-moment correlations between the original experimenter and second experimenter's scores were obtained for these cases. The correlation between the two raters for time spent reading was 1.00. The correlation between the two raters for comprehension accuracy was .99. While assessing students,

experimenters followed typed instructions and collected procedural integrity data by following a series of steps using a procedural integrity form (see Appendix). Experimenters accurately completed 100% of the intervention and assessment procedures.

Chapter 3

Results

Before conducting analyses, researchers screened data for missing data points and outliers resulting in the exclusion of one case from analyses. This case was excluded due to missing data from one story and extreme scores on remaining data points. The remaining 48 cases were included in all analyses.

Average Oral Reading Fluency

To determine if the passages designated as easy and hard were at participants' instructional and frustrational levels, respectively, researchers calculated the mean words correct per minute (WCPM) scores for each passage under the control condition (see Table 2). The first three passages, Spring Break, Skate Board, and Rosa's New Friend, were designated as easy passages. Students' scores ranged from 71.82 WCPM on Spring Break to 85.60 WCPM on Rosa's New Friend. According to Hasbrouck and Tindal (1992), these scores fall slightly below the instructional level for 2nd-grade students assessed in the winter (see Table 3). The final three passages, Storm Chasers, Tornado, and Chinchillas, were designated as hard passages. Students' scores ranged from 53.98 WCPM on Storm Chasers to 58.29 WCPM on Tornado. These scores fall below the instructional level, and therefore are considered to be at participants' frustrational level (Hasbrouck & Tindal, 1992).

Descriptive Statistics

Descriptive statistics were calculated for participants' reading speed (i.e., seconds to read a passage), reading comprehension accuracy (i.e., percentage of comprehension

questions answered accurately), and reading comprehension rate (i.e., a students' comprehension accuracy divided by the seconds to complete the intervention condition and multiplied by 60) for each individual story, as well as for each combination of passage difficulty and intervention condition. Tables 4 through 6 display reading speed, comprehension accuracy, and comprehension rate score distributions, respectively, for each of the six stories included in the study.

When interpreting reading speed (see Table 4), it is important to note that the easy passages, in addition to having more basic vocabulary, were also shorter in length and therefore required less time to read than hard passages. Among the easy passages, Rosa's New Friend ($M = 168.67$) had the fastest mean reading speed (i.e., the fewest seconds to read the passage), followed by Spring Break ($M = 207.86$) and Skateboard ($M = 219.68$), respectively. Among the hard passages, Chinchillas ($M = 280.83$) had the fastest mean reading speed followed by Storm Chasers ($M = 306.64$) and Tornado ($M = 311.00$), respectively.

Table 5 displays students' reading comprehension accuracy scores by story under the control condition. As expected, the mean accuracy scores were higher for easy passages than hard passages, with Rosa's New Friend yielding the highest overall comprehension accuracy scores ($M = 86.67$) and Storm Chasers yielding the lowest overall scores ($M = 39.68$). The maximum score for each of the easy stories was 100%, meaning that at least one student was able to correctly answer all of the comprehension questions for each easy story. No student scored 100% on any of the difficult passages.

Participants' reading comprehension rate score distributions are found in Table 6. These scores represent the percentage of the passage comprehended per minute of instructional time, so that a score of 50.00 suggests that the student comprehended 50% of the passage per minute of instruction. Among the easy stories, Rosa's New Friend had the largest mean comprehension rate score ($M = 41.07$) followed by Spring Break ($M = 38.62$) and Skateboard ($M = 27.81$), respectively. Among the hard stories, Chinchillas had the highest mean comprehension rate score ($M = 19.83$) followed by Storm Chasers ($M = 16.09$) and Tornado ($M = 14.65$), respectively.

Table 7 displays students' reading speeds in seconds for each of the six combinations of passage difficulty and intervention condition. As expected, Listening While Reading had the fastest mean reading speeds, followed by the control condition and the Repeated Reading condition, respectively. The easy passages for each reading condition also yielded faster reading speeds than the hard passages. The Repeated Reading and control conditions were positively skewed. The Listening While Reading conditions were almost symmetrical suggesting that reading speed was consistent across the five researchers who read these passages.

Participants' reading comprehension accuracy by passage difficulty and intervention condition are shown in Table 8. With the exception of the easy control condition, all score distributions are relatively symmetric. Comprehension accuracy scores in the easy control condition were slightly skewed left. Participants' mean

comprehension accuracy scores were highest under the easy passage Repeated Reading condition ($M = 80.32$) and lowest under the hard control condition ($M = 46.06$).

Similarly, reading comprehension rate scores by passage difficulty and intervention condition were relatively symmetric, with the exception of the difficult Repeated Reading condition (see Table 9). Comprehension rate scores were slightly skewed to the right under the difficult Repeated Reading condition. The easy Listening While Reading condition yielded the highest comprehension scores per minute of instructional time ($M = 62.36$) while the hard Repeated Reading condition yielded the smallest comprehension rate scores ($M = 6.05$).

Comprehension Accuracy

A repeated measures ANOVA was used to test for the effects of passage difficulty and intervention type on students' comprehension accuracy (see Figure 1). Mauchly's Test of Sphericity indicated that the assumption of sphericity had not been violated for intervention, $X^2(2) = 2.75, p = .25$, or the interaction between passage difficulty and intervention, $X^2(2) = 0.85, p = .66$.

Results revealed a main effect of passage difficulty so that students' reading comprehension accuracy (i.e., the percentage of comprehension questions answered correctly) was significantly higher on easy passages compared to hard passages, $F(1,47) = 264.29, p = .00$ (see Figure 2). On average, students scored 29% higher on easy passages than on hard passages. However, there was not a significant main effect in reading comprehension accuracy across different intervention conditions, $F(2,94) = 2.50$,

$p = .09$. This suggests that Repeated Reading, Listening While Reading, and the control condition did not differentially impact students' ability to comprehend a passage.

Similarly, we did not find a statistically significant interaction effect between passage difficulty and intervention type, $F(2,94) = .46, p = .64$.

Comprehension Rate

A second repeated measures ANOVA was completed to test for the effects of passage difficulty and intervention type on students' comprehension per minute of instructional time, which was labeled as their comprehension rate (see Figure 3).

Mauchly's Test of Sphericity indicated that the assumption of sphericity was violated for both intervention condition, $X^2(2) = 16.83, p = .00$, and the interaction between passage difficulty and intervention condition, $X^2(2) = 26.50, p = .00$. Consequently, Greenhouse-Geisser corrections were used when interpreting data.

As expected, we found a main effect of passage difficulty, with significantly higher comprehension rate scores on easy passages compared to hard passages, $F(1,47) = 500.69, p = .00$ (see Figure 4). On average, students' comprehension rate score per minute of instructional time was 18.98 % higher on easy passages compared to difficult passages. Significant simple main effects were found for each reading condition, as well (see Table 10). Repeated Reading scores were significantly higher on the easy passage condition ($M = 16.08$) compared to the hard passage condition ($M = 7.08$), $F(1,47) = 144.59, p = .00$. Similarly, Listening While Reading scores were significantly higher on easy passages ($M = 62.36$) than on hard passages ($M = 31.68$), $F(1,47) = 143.49, p = .00$.

Control condition comprehension rate scores were also significantly higher on easy passages ($M = 29.06$) than on difficult passages ($M = 11.81$), $F(1,47) = 136.63$, $p = .00$.

As seen in Figure 5, a main effect of intervention condition on comprehension rate scores were found, as well, $F(2,72) = 258.11$, $p = .00$. Bonferonni post hoc tests showed that Listening While Reading resulted in significantly larger comprehension rate scores than either the Repeated Reading or control conditions. The control condition, in which students read a passage a single time, produced significantly larger comprehension rate scores than the Repeated Reading condition. Repeated Reading produced the smallest comprehension rate scores for both easy and hard passages. Simple main effects were found between each reading condition within both easy, $F(2,46) = 198.97$, $p = .00$, and hard, $F(2,46) = 65.26$, $p = .00$, passages (see Table 11). Within easy passages, Listening While Reading ($M = 62.36$) led to significantly higher reading comprehension rate scores than either the control condition ($M = 29.06$) or the Repeated Reading condition ($M = 16.08$). Comprehension rate scores were also significantly higher as a result of the control condition ($M = 29.06$) compared to the Repeated Reading condition ($M = 16.08$). The same pattern of simple main effects was found when comparing reading condition scores on the hard passages. Listening While Reading ($M = 31.68$) yielded significantly higher comprehension rate scores than either the control ($M = 11.81$) or the Repeated Reading conditions ($M = 7.08$), and the control yielded significantly higher scores than the Repeated Reading procedure.

A significant interaction was found between passage difficulty and intervention type, $F(1,65) = 33.55, p = .00$ (see Figure 2). To examine further the nature of the interaction, we completed interaction contrasts for each level of reading condition (see Table 12). Significant interactions were found between Listening While Reading and Repeated Reading, $F(1,47) = 62.19, p = .00$, Listening While Reading and control, $F(1,47) = 16.39, p = .00$, and Repeated Reading and control, $F(1,47) = 23.86, p = .00$.

Chapter 4 Discussion

In this study, we extended the current research comparing two empirically-validated reading interventions, Repeated Reading (Dahl, 1974; Freeland et al., 2000; Hawkins et al., 2011; O'Shea, Sindelar & O'Shea, 1985; Therrien, Kirk, & Woods-Groves, 2012; Savaiano & Hatton, 2013), and Listening While Reading (Hawkins, Musti-Rao, Hale, McGuire, Hailley, 2010; Salend & Nowak, 1988; Skinner et al., 1993). While previous researchers have compared each reading intervention's relative effectiveness at improving students' reading fluency (Begeny & Silber, 2006; Rose 1984a; Rose 1984b; Rose 1984c; Rose & Beattie, 1986; Rose & Sherry, 1984; Tingstrom, Edwards, & Olmi, 1995), in this study we sought to determine which intervention better enhanced students' reading comprehension.

In addition to measuring students' overall comprehension accuracy as a result of each intervention, we also included a measure of the time required to complete each condition, thus allowing us to calculate a measure of comprehension rate (i.e., % of comprehension questions answered correctly per minute of instructional time). We sought to determine whether the interventions were both effective and efficient. Using a within-subjects design, students were assessed twice per reading condition, once using an easy passage and once using a difficult passage. This allowed us to examine differential effectiveness of each reading intervention as a function of passage difficulty. In this chapter, the applied and theoretical implications of the comprehension accuracy results, the comprehension rate results, and a comparison of the two measures will be discussed.

Comprehension Accuracy

Instruction to early readers focuses on developing skills such as phonemic awareness and phonics. However, the ultimate goal of reading instruction is to develop the skills necessary to comprehend a text. The National Reading Panel includes comprehension as one of the core components of effective reading instruction (National Institute of Child Health and Human Development, 2000). While researchers have theorized a connection between reading fluency and reading comprehension (LaBerge & Samuels, 1974; Samuels, 1979), it is important to include explicit measures of reading comprehension as dependent variables when assessing reading interventions (Skinner et al., 1998).

In this study, we assessed students' comprehension accuracy following each individual passage by asking students to answer between seven to nine open-ended questions. Each passage included two or three questions for each of the three categories of comprehension assessment. Category one questions, or "Right There" questions, assessed students' ability to identify information provided in a single sentence in the story that required no background knowledge on the text's topic. Category two questions, "Think and Search", similarly required no background knowledge and could be found directly in the text. However, these questions required students to combine information from more than one sentence in the story. Lastly, "Author and You" category three questions assessed participants' skills at inferring information based on multiple parts of the story. Students' cumulative answers to questions in each category formed their single

comprehension accuracy score. This score was transformed into a percentage score by dividing the number of comprehension questions answered correctly by the total number of comprehension questions for the passage, and multiplying the number by 60.

Main effect of passage difficulty. Analyses revealed a statistically significant main effect of passage difficulty on students' comprehension accuracy (see Figure 1). As expected, students comprehended more after reading a story that was at their current grade-level (i.e., an easy passage) compared to a story that was written at a 3rd-grade reading level (i.e., a hard passage). This finding was consistent across each reading condition (i.e., Repeated Reading, Listening While Reading, and the control condition). The passages used in the current study were taken from previous research (Texas Education Agency, 2010). Results from previous studies using these passages guided our estimates of how difficult each passage would be for students in second grade. Analysis of students' WCPM confirmed that the hard passages were at students' frustrational level, on average, and that easy passages were at students' instructional level, on average. This finding might enhance inferences made regarding the impact of passage difficulty on comprehension.

Main effect of reading condition. Analyses did not reveal a significant main effect of reading condition on comprehension accuracy scores. The similarity in comprehension accuracy scores between the Repeated Reading and control conditions is inconsistent with previous researchers who found Repeated Reading to improve students' comprehension. Freeland et al. (2000) found that Repeated Reading resulted in

significantly higher factual comprehension levels and factual comprehension rates than a single reading; however, they did not find a significant difference in students' performance on inferential comprehension questions. The disparate results might be attributable to the inclusion of inferential comprehension questions in the current comprehension accuracy measure. Additionally, Freeland et al. only factored the reading speed of the second repeated reading into their reading comprehension rate score, whereas the current study included the combined reading speed of both readings. Similarly, Hawkins et al. (2011) and Savaiano and Hatton (2013) found that Repeated Reading improved oral reading fluency and comprehension over a similar control condition. However, both research teams used single-subject research designs which does not allow for tests of statistical significance. Mean Repeated Reading scores in the current study were higher than mean control condition scores; however, they did not reach a level of statistical significance. The difference in research design might contribute to the disparate findings. Additionally, Savaiano and Hatton measured comprehension using an oral retelling measure rather than responding to comprehension questions which might have led to different results.

O'Shea et al. (1985) also found that Repeated Reading led to greater comprehension using an oral retelling procedure. Three Repeated Readings led to statistically greater oral retelling scores than a single reading, and seven Repeated Readings led to statistically greater comprehension scores than either three or one reading of a passage. The single reading condition in the O'Shea et al. study is similar to the

control condition in the current study; therefore, it is surprising that the significant difference between one and three readings found by O'Shea et al. was not replicated in the difference between one and two readings in the current study. However, as mentioned previously, the different comprehension measures used by O'Shea et al. and in the current study likely contribute to the incongruent results.

The statistically similar comprehension accuracy scores between the Repeated Reading and control conditions have implications for how educators respond to students who have difficulty comprehending a text. It is common practice to ask a student to reread material either aloud or silently in order to understand it better. However, these results imply that a second reading does not contribute significantly to a students' understanding. Therefore, instead of asking a student to reread material educators could use other comprehension strategies such as using outlines, taking notes, summarizing, or preteaching vocabulary (Daly III, Neugebauer, Chafouleas, & Skinner, 2015).

Similar to Repeated Reading, the Listening While Reading condition did not differ significantly from the control condition. This finding is consistent with Skinner et al. (1998) and Lionetti and Cole (2001) who found that Listening While Reading did not result in a significant main effect on comprehension scores compared to a control condition. However, these results are inconsistent with Hawkins et al. (2010) who found that a class wide Listening While Reading procedure led to better comprehension and vocabulary scores than a silent reading control condition.

The lack of a significant difference between either intervention condition and the control condition is also surprising given the relationship between oral reading fluency and comprehension (LaBerge & Samuels, 1974; Samuels, 1979). Numerous researchers have found both Listening While Reading (Lionetti & Cole, 2004) and Repeated Reading (Kostewicz & Kubina, 2011; O'Shea et al., 1985) to be effective interventions for increasing participants' reading fluency. Winn et al. (2006) found that both Listening While Reading and Repeated Reading resulted in greater WCPM scores compared to a control condition. Rasinski (1990) also found that both interventions increased elementary students' reading fluency, with neither treatment producing significantly superior results to the other. This study provides evidence that just because two constructs are correlated does not mean that an intervention that is effective at increasing one (e.g., oral reading fluency) will necessarily increase the other (e.g., reading comprehension).

In addition to not finding a significant difference between the interventions and control conditions, we also did not find a significant difference between the two intervention conditions. The lack of a significant difference between Repeated Reading and Listening While Reading is contrary to previous researchers who found differential effects of each intervention on other reading-related outcome variables. For example, Webb and Chang, (2012) found that a Listening While Reading procedure produced greater gains in vocabulary knowledge in English Language Learners than a Repeated Reading procedure. Other researchers examining each reading condition's impact on

reading fluency consistently have found Listening While Reading to be superior. Daly and Martens (1994) found that Listening While Reading resulted in greater fluency and reading accuracy scores than a Repeated Reading condition. Tingstrom, Edwards and Olmi (1995) found that Listening While Reading produced greater WCPM scores and fewer reading errors in three African American males reading below grade level. In a series of studies comparing oral previewing (Listening While Reading) and silent previewing (silent Repeated Reading), Rose and his colleagues (Rose 1984a; Rose 1984b; Rose 1984c; Rose & Beattie, 1986; Rose & Sherry, 1984) found that Listening While Reading yielded higher WCPM scores than Repeated Reading in elementary males with behavioral disorders, elementary students diagnosed with mental retardation, elementary students with learning disabilities, and junior-high students with learning disabilities.

This discrepancy between past results comparing Listening While Reading and Repeated Reading and the results from the current study suggests that while Listening While Reading might be better at enhancing students' reading fluency and vocabulary knowledge, it does not differentially enhance students' comprehension scores. This provides additional support that interventions which enhance one reading construct do not necessarily enhance correlated reading constructs. However, there might be reasons to suggest the use of Listening While Reading over Repeated Reading which will be discussed later in this chapter.

Interaction effect between passage difficulty and reading condition. Our analysis of comprehension accuracy did not reveal a significant interaction between passage difficulty and intervention condition. Based on the findings of Dowhower (1987) that Listening While Reading was more effective for students reading below 45 WCPM and that Repeated Reading was more effective for faster readers, we hypothesized that Listening While Reading would produce greater reading comprehension scores when material was difficult for students to read independently and Repeated Reading would produce greater scores when material was at an instructional level, resulting in an interaction effect between the type of reading intervention and the difficulty of the passage.

While the current data from the analysis of comprehension accuracy was in the direction that we anticipated, it did not reach a level of statistical significance. The mean Listening While Reading score was higher than the control score in the hard passage condition, and lower than the control score in the easy passage condition. However, the mean differences were far too small to make any conclusive statements. It is possible that a greater difference in passage difficulty would differentiate participants' comprehension to a level of significance. It is also important to note that Dowhower (1987) assessed participants using five factual recall questions and a time series design that allowed students to move between interventions per their choice. In this study, we added inferential comprehension questions and used a within-subjects repeated measures design. The design differences might contribute to the disparate results.

General Limitations and Future Research

Several limitations existed in the current study that could be examined in future research. First, the within-subjects design of the study allowed for a smaller sample size. However, a larger sample size in future studies would allow for greater statistical power. It is possible that with a larger sample size, the pattern of results in the comprehension accuracy analyses would have reached a level of significance. Additionally, the participants included in this study came from a low socioeconomic, rural school and were predominantly Hispanic or Caucasian. These demographic characteristics limit the external validity of our results. Future researchers should replicate the study design using a more varied sample, economically, racially, and linguistically. Future researchers should also examine similar questions across different grade levels, as most students acquire more advanced self-regulated comprehension strategies as they progress through school.

A second limitation is that data were only collected from a single passage for each of the six reading condition and passage difficulty combinations. Therefore, we are unable to make inferences about students' comprehension skills or comprehension gains over time. It is possible that students might become better at comprehending text from Repeated Readings over time, but that the research design of the current study was unable to detect such behavior. Future researchers should examine similar research questions using multiple passages over time.

Finally, caution should be used when generalizing results to a classroom setting because the response contingencies are different. In a classroom, there are consequences for comprehending material; however, participants in the study were aware that there were not consequences for their performance on the study passages. Future researchers should examine the effect of providing incentives for comprehension on student performance. Students' behavioral indications suggested that Repeated Reading was an undesirable intervention. However, it is possible that adding an incentive might reduce their aversion to the Repeated Reading intervention and allow it become more effective.

Comprehension Rate

Researchers have suggested the importance of considering measures of learning rate when assessing instructional strategies (Joseph & Nist, 2006; Nist & Joseph, 2008; Skinner, 2008). Outcome measures might appear different when examining rate of improvement versus overall improvement (Joseph & Nist, 2006). Considering instructional time allows researchers to provide teachers and educators with interventions that are not only effective, but efficient at increasing students' academic skills in the limited time that is available. Otherwise, we might support interventions that increase learning (i.e., comprehension), but ultimately retard students' rate of learning (i.e., comprehension rate) due to the added instructional time (Skinner, 2008).

Researchers have compared intervention effectiveness and efficiency looking at spelling (Cates et al., 2003), sight-word learning (Joseph, Eveleigh, Konrad, Neef, & Volpe, 2012; Skinner, Belfiore, & Watson, 2002), oral and written retelling to promote

comprehension (Schisler, Joseph, Konrad, & Alber-Morgan, 2010), and Repeated Reading versus multiple exemplar training (Silber & Martens, 2010). However, researchers have not examined the rate of comprehension learning as a result of Repeated Reading compared to Listening While Reading. In this study, we examined the rate of learning caused by the Repeated Reading, Listening While Reading, and control conditions. In addition to analyzing the effectiveness of each reading condition at enhancing participants' overall comprehension accuracy, we also sought to determine the efficiency of each intervention by creating a reading comprehension rate variable. This variable was calculated by dividing a participant's reading accuracy score (i.e., the percentage of comprehension questions answered correctly) by the seconds required to complete the reading intervention for the corresponding passage and multiplying the number by 60.

Main effect of passage difficulty. We found a significant main effect of passage difficulty on participants' reading comprehension rate scores. Participants' comprehension rates were significantly higher on easy passages compared to hard passages, meaning students were able to comprehend more of the easy passages per minute of instructional time than they were able to comprehend of the difficult passages per minute of instructional time. This effect was seen across the Repeated Reading, Listening While Reading, and control conditions. As expected, this suggests that students comprehend texts at a faster rate when the material is easy for them than when the material is above their current reading level, regardless of the instructional strategy that is

employed. Additionally, the harder passages required longer for both students and examiners to read, thus decreasing the overall rate of learning on those passages. This result is consistent with the results from the comprehension accuracy analysis.

Main effect of reading condition. We also found a significant main effect of reading condition on comprehension rate scores. Listening While Reading yielded the largest comprehension learning rate scores for both easy and hard passage conditions. In other words, students comprehended more of the passage per minute of instruction under the Listening While Reading condition compared to other reading conditions. Since the experimenters read the passage to the student to complete this intervention, the overall instructional time was much faster than the time required to complete the Repeated Reading and control conditions. Because no main effect of reading condition was found in the comprehension accuracy analysis, these results can be attributed to the efficiency of the intervention. This is consistent with research completed by Hale et al. (2005) who found that while Listening While Reading did not result in comprehension accuracy levels significantly higher than a silent reading control condition, it did result in higher rates of comprehension than the control condition.

The significantly greater comprehension rate scores of Listening While Reading across both easy and hard passages provide support for using this strategy as a classwide accommodation procedure. A typical classroom contains some students who encounter the material at an instructional level, and other students who encounter the same material at a frustrational level. These results suggest that having the teacher read a text aloud to

the class will improve the comprehension rate for students in either category. This suggestion is supported by Hawkins et al. (2010) who found Listening While Reading to be an effective classwide intervention for improving comprehension and vocabulary knowledge. For example, a teacher could read a passage aloud that contained a high frequency of difficult content-specific vocabulary, such as a science or history passage, to provide the students with a basic understanding of the topic prior to beginning small group activities or other assignments.

Passages read using the Repeated Reading condition resulted in significantly smaller comprehension rate scores for both easy and hard passages than either the control or the Listening While Reading conditions. In the Repeated Reading condition, students read the story aloud to an experimenter twice before answering questions. This reading intervention required the longest time to complete and therefore appeared to retard the students' rate of comprehension. In the comprehension accuracy analysis, students produced the highest scores following the Repeated Reading condition, although not at a statistically significant level. However, when considering the time required to complete the intervention, Repeated Reading transitioned from the "best" intervention to the worst intervention. This study showed that Repeated Readings did not significantly improve comprehension above the control; furthermore, it is an inefficient intervention as it hinders students' rates of comprehension. As mentioned previously, an applied application of this finding is the way educators respond to students who do not comprehend a passage. The significantly slower rate of comprehension as a result of

Repeated Readings suggests that different comprehension strategies might be a better use of a teacher's time with a student. Having a student read a passage for a second time will neither improve their comprehension of the passage nor make the best use of the available time.

It is important to note that these results are inconsistent with Freeland et al. (2000) who found Repeated Reading to improve factual comprehension levels and factual comprehension rates. However, Freeland et al. only factored the reading speed of the second repeated into their reading comprehension rate score, whereas the current study included the combined reading speed of both readings. Furthermore, as previously mentioned, Freeland et al. did not find a significant difference on inferential questions, the inclusion of which might have decreased the overall comprehension level and rate scores for participants in the current study.

Interaction effect between passage difficulty and reading condition. A significant interaction was found between the difficulty of the passage and the reading conditions (see Figure 2). This interaction is seen in the range of scores between each intervention in the easy passage versus difficult passage conditions. The range of comprehension rate scores is larger in the easy passage condition than in the hard passage condition. This suggests that the difference in the efficiency of each respective reading intervention was greater on passages that are at an easy reading level for the student. Conversely, the difference in the efficiency of the three reading conditions was not as large on passages

that were slightly above the student's grade-level, although the difference between each score still reached a level of statistical significance.

We expected Listening While Reading to be a stronger intervention on hard passages than on easy passages. Since the content in the difficult passages was still more advanced, we expected the average comprehension score to be lower even under the Listening While Reading Condition. However, we expected the change in Listening While Reading comprehension rate scores from easy passages to hard passages to be the smallest change since participants would not be burdened by decoding phonetically advanced words. However, these results show that the difference between scores on easy and hard passages was the greatest for the Listening While Reading condition, suggesting it was a strong intervention for promoting a high rate of comprehension on easy passages, too.

Similarly, we expected Repeated Reading to be a stronger intervention on easy passages than on hard passages due to the more advanced vocabulary contained in the hard passages. We also expected the change in scores to be intensified by the additional time it required students to read a longer passage twice. Therefore, we expected a greater difference in scores for this condition between easy and hard passages. However, we found that the difference in comprehension rate scores was the smallest under the Repeated Reading condition. This suggests that Repeated Readings produced the most similar results between instructional and frustrational passage compared to the control and Listening While Reading conditions.

Limitations and future research. Since the Repeated Reading condition produced the slowest reading comprehension rate scores, future researchers should investigate variations of this intervention that might result in higher comprehension levels and rates. For example, instead of having students read a passage twice before asking questions, comprehension scores might improve if students read a passage, preview the comprehension questions, then read the passage for a second time.

The high comprehension rate scores produced by the Listening While Reading condition in this study are largely attributable to the reading speed of the examiners. The difference in instructional time would decrease if another peer were to read the passage aloud, thus decreasing the comprehension rate score. Future researchers should examine the effectiveness and efficiency of Listening While Reading on students' comprehension when another peer is reading the story aloud.

Comprehension Accuracy vs. Comprehension Learning Rate

The effects of Repeated Reading and Listening While Reading on students' comprehension accuracy and comprehension rate when presented with grade-level and above grade-level passages were evaluated and compared. Comparing results from both accuracy and rate analyses allows us to answer these questions from a cumulative perspective which has both theoretical and applied implications.

Implications for measurement. The main effect of passage difficulty was consistent across both means of assessing the reading conditions (i.e., comprehension accuracy and comprehension rate), with higher scores on easy passages than on hard

passages. Results differed when looking at the main effect of reading intervention condition. When analyzing students' comprehension accuracy without considering the time required for them to complete the intervention, we did not find significant differences between the three treatment conditions. This suggested that Repeated Reading, Listening While Reading, and reading a passage aloud a single time were similarly effective at promoting students' comprehension. Based on these results, no single intervention should be recommended over another for the purposes of improving students' comprehension of a given text. Conversely, when considering instructional time by analyzing participants' comprehension rate, a main effect was found between reading conditions. The Listening While Reading condition produced significantly greater comprehension learning per minute of instructional time compared to the Repeated Reading and control conditions.

There are important implications for measurement that should be taken from this study. Previous researchers have noted that results might change when the scale changes (Skinner et al., 2002; Skinner et al., 2009). The results from this study support the researchers who found that analyzing an intervention's effectiveness versus efficiency can yield disparate results. When analyzing the relative effectiveness of each intervention (i.e., comprehension accuracy), we did not find a significant difference between either intervention compared to the control condition. However, when we analyzed the relative efficiency of each intervention (i.e., comprehension rate), we found a significant difference between each reading condition compared to each other, as well as to the

control condition. These results demonstrate the importance of including measures of instructional time when considering the value of academic interventions. No recommendations could be made based on the accuracy data since the reading conditions appeared equally effective. Based on that data alone, we would suggest that educators select either intervention based on personal preference. However, when accounting for instructional time, we would recommend Listening While Reading over Repeated Readings.

Implications for selecting interventions. Learning is a function of time and behavior. The behavior variable in this study was the two reading conditions and the control condition, all of which produced similar results. However, the time variable in this study, the seconds required to complete each reading condition, varied as a function of the behavior and resulted in disparate results. Students with learning disorders actually have learning rate disorders. That is to say, they are still able to learn information; however, their learning occurs at a rate that is significantly slower than their peers. As discussed previously, we want to select interventions that yield the greatest learning rates so that these students can learn at a pace that will hopefully allow their content knowledge to catch up to their peers. In this study we found that interventions that caused the same amount of learning (i.e., comprehension) caused different learning rates (i.e., comprehension rate). While the differences in accuracy scores were negligible across conditions, Listening While Reading produced significantly greater comprehension rate scores than the control and the Repeated Reading conditions. Therefore, it is

recommended that teachers and educators select a Listening While Reading intervention over a Repeated Reading intervention when the goal is reading comprehension.

General limitations and future research It is important not to draw conclusions that are too general from the comprehension rate results. While Repeated Readings did not enhance students' reading comprehension rate, it is still a valuable intervention for other purposes. For example, the results of this study do not discount the benefits of Repeated Reading as a fluency intervention (Kostewicz & Kubina, 2011; O'Shea et al., 1985; Rasinski, 1990; Winn et al., 2006). The current findings emphasize the value of considering the purpose of instruction when selecting an intervention. Future researchers should continue to evaluate the effectiveness and efficiency of commonly used interventions on specific reading targets (e.g., decoding, fluency, comprehension).

Given the difference in results as a function of the measure used, it is recommended that future researchers replicate the O'Shea et al. (1985) study examining comprehension rate. It is possible that the single reading or the three reading condition would result in the greatest comprehension rate score even though the seven reading condition yielded the highest comprehension oral retell score. If so, that would differentially inform intervention selection.

Exploratory Analysis

Two exploratory analyses were completed on the data set that were not planned prior to data collection. The first analysis examined the effect of each independent variable on the two primary races included in the study sample. The second analysis

examined the correlation between the difference in speed and comprehension accuracy under the control and Listening While Reading conditions.

Exploratory analysis I: Race. The participants included in this study were divided approximately evenly between Caucasian ($n=23$) and Hispanic ($n=22$) students. Three African American students also participated in the study. Although this equal division between two primary races was not anticipated, it allowed us to complete several exploratory statistical analyses to compare performance across Hispanic and Caucasian students. A repeated-measures ANOVA looking at comprehension accuracy showed a consistent pattern of results for both Hispanic (see Figure 6) and Caucasian (see Figure 7) students as those seen in the analysis of the entire sample. A significant main effect of passage difficulty on comprehension accuracy showed that both Caucasian and Hispanic students performed significantly better on questions following easy passages than on questions following hard passages. However, there was a significant difference in the accuracy scores across easy and hard passages between both races. On easy passages, Caucasian students ($M = 82.13$, $SD = 11.37$) scored significantly higher on the measure of comprehension than did Hispanic students ($M = 73.23$, $SD = 13.47$); $t(43)=2.40$, $p=.02$. Similarly, on hard passages Caucasian students ($M = 55.57$, $SD = 20.84$) scored significantly higher on the measure of comprehension than did Hispanic students ($M = 39.77$, $SD = 15.96$); $t(43)=2.85$, $p < .01$. Similar to the primary results analyzing all cases, neither a main effect for intervention condition nor an interaction effect between passage difficulty and intervention condition was found for either race.

A second repeated-measures ANOVA was completed for each racial group using comprehension rate as the dependent variable. The pattern of results was consistent between the full sample and the Hispanic (see Figure 8) and Caucasian (see Figure 9) samples. For both Hispanic and Caucasian students, the easy passages resulted in greater rates of comprehension compared to the hard passages. Additionally, a main effect was found for intervention type with Listening While Reading producing significantly larger rates of comprehension than Repeated Reading and the control condition. Across both races, the control condition produced significantly larger rates of comprehension learning than Repeated Reading as seen in the full sample analysis.

These results indicate that the Caucasian students in the sample comprehended significantly more text than their Hispanic peers. This is to be expected as many of the Hispanic students were currently enrolled in ELL classes. However, the pattern of responding as a function of passage difficulty and intervention type was consistent across both races, suggesting these interventions produce similar results across varying levels of reading achievement and race, and supports the external validity of our findings.

Exploratory analysis II: Experimenter-student reading speed. In order to determine if a relationship existed between the difference in student (i.e., control) and researcher (i.e., Listening While Reading) reading speeds and the difference in comprehension accuracy scores on the corresponding passages, two new variables were created. The first variable, a difference score for reading speed, was computed by subtracting the average reading speed on Listening While Reading passages from the

average reading speed on control passages. The second variable, a difference score for comprehension accuracy, was similarly computed by subtracting the average comprehension accuracy score on Listening While Reading passages from the average comprehension accuracy score on control passages.

The reading speed difference score ($M = 169.31$, $SD = 119.31$) did not correlate significantly with the comprehension accuracy difference score ($M = .97$, $SD = 13.42$), $r(48) = -.20$, $p = .18$ (see Table 13). The negative direction of the correlation suggests that as students independent reading speed approached the experimenters' reading speed, their comprehension gains from Listening While Reading relative to independent reading increased. While this result is consistent with others who manipulated experimenters' reading speed during Listening While Reading (Skinner, Logan, Robinson, & Robinson, 1997), there are two reasons why this result should be interpreted with caution. First, the strength of the correlation did not reach a level of statistical significance. Second, because experimenters' reading speed was not manipulated, any relationship among these variables may be attributed to more rapid readers also having stronger overall reading skills (Schall, Ciancio, McCullough, & Skinner, 2013) and reading comprehension skills (Schall et al., under review).

Conclusion

This study was the first to compare the relative effectiveness and efficiency of Repeated Reading and Listening While Reading interventions on students' comprehension. It was also the first to include the variable of passage difficulty. We

found little evidence that either intervention enhanced comprehension above the control condition; however, we did find that Listening While Reading significantly enhanced comprehension rate. Given that the purpose of almost all reading is comprehension, we recommend that researchers continue to investigate the effects of reading interventions on comprehension and comprehension rate, as we are often finding differences.

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Appendices

Table 1

Six reading conditions completed by each participant

Control	LWR	RR
Read <i>Easy</i> passage & Answer Questions	Follow along with finger <i>Hard</i> passage & Answer Questions	Read aloud to Experimenter <i>Easy</i> passage Read <i>easy</i> passage & Answer Questions
Read <i>Hard</i> passage & Answer Questions	Follow along with finger <i>Easy</i> passage & Answer Questions	Read aloud to Experimenter <i>Hard</i> passage Read <i>hard</i> passage & Answer Questions

Note: LWR = Listening While Reading intervention; RR = Repeated Reading intervention

Table 2

Participants' Words Correct Per Minute scores for each passage under the control condition

Story	Mean	Standard Deviation
Spring Break	71.82	36.93
Skate Board	72.43	30.23
Rosa's New Friend	85.60	32.25
Storm Chasers	53.98	24.33
Tornado	58.29	29.36
Chinchillas	54.64	24.38

Table 3

Second grade students' average fluency rates

	Fall	Winter	Spring
Hasbrouck & Tindal (1992)	53-82	78-106	94-124
Marston & Magnusson (1988)	51	73	82

Table 4

Descriptive statistics for participants' reading speed in seconds by story under the control condition

Story	Minimum	Maximum	Mean	Std. Deviation
Spring Break	84	475	207.86	123.57
Skateboard	104	632	219.68	117.19
Rosa's New Friend	80	324	168.67	63.38
Storm Chasers	145	574	306.64	123.48
Tornado	130	682	311.00	149.64
Chinchillas	141	674	280.83	156.21

Table 5

Descriptive statistics for participants' reading comprehension accuracy (% correct) by story under the control condition

Story	Minimum	Maximum	Mean	Std. Deviation
Spring Break	11.11	100.00	76.19	21.73
Skateboard	33.33	100.00	71.35	19.71
Rosa's New Friend	66.67	100.00	86.67	13.41
Storm Chasers	00.00	88.89	39.68	28.15
Tornado	25.00	75.00	46.02	15.62
Chinchillas	14.29	85.71	53.57	27.33

Table 6

Descriptive statistics for participants' reading comprehension rate per minute of instructional time by story (% correct per minute of instruction)

Story	Minimum	Maximum	Mean	Std. Deviation
Spring Break	1.40	100.00	38.62	24.25
Skateboard	3.58	89.55	27.81	20.38
Rosa's New Friend	5.60	92.31	41.07	25.35
Storm Chasers	0.00	85.71	16.09	18.51
Tornado	0.47	45.45	14.65	10.65
Chinchillas	2.14	66.79	19.83	17.21

Table 7

Descriptive statistics for participants' reading speed in seconds for each passage difficulty and intervention condition

Condition	Minimum	Maximum	Mean	Std. Deviation	Skewness	Kurtosis
RR_Easy	158	1116	375.10	208.59	1.99	4.02
RR_Hard	219	1580	575.42	276.94	1.57	3.23
LWR_Easy	60	89	71.83	7.27	0.17	-0.63
LWR_Hard	68	113	92.06	11.02	-0.18	-0.64
C_Easy	80	632	200.29	105.68	2.16	5.89
C_Hard	130	682	302.19	141.75	1.27	1.26

Note: LWR = Listening While Reading intervention; RR = Repeated Reading intervention; C = Control

Table 8

Descriptive statistics for participants' reading comprehension accuracy (% correct) for each passage difficulty and intervention condition

Condition	Minimum	Maximum	Mean	Std. Deviation	Skewness	Kurtosis
RR_Easy	44.44	100.00	80.32	15.92	-0.51	-0.66
RR_Hard	00.00	100.00	50.64	24.80	0.23	-0.11
LWR_Easy	22.22	100.00	74.31	19.74	-0.86	0.53
LWR_Hard	11.11	100.00	47.36	23.80	0.44	-0.63
C_Easy	11.11	100.00	77.55	19.38	-1.15	1.85
C_Hard	00.00	88.89	46.06	23.01	-0.08	-0.85

Note: LWR = Listening While Reading intervention; RR = Repeated Reading intervention; C = Control

Table 9

Descriptive statistics for participants' reading comprehension learning rate per minute of instructional time for each passage difficulty and intervention condition

Condition	Minimum	Maximum	Mean	Std. Deviation	Skewness	Kurtosis
RR_Easy	3.58	35.29	16.08	8.10	0.71	-0.16
RR_Hard	0.00	27.40	7.08	6.05	1.86	3.44
LWR_Easy	19.61	100.00	62.36	16.95	-0.52	0.79
LWR_Hard	6.17	85.71	31.68	17.40	0.89	0.81
C_Easy	1.40	71.43	29.06	15.19	0.80	0.79
C_Hard	0.00	36.78	11.81	8.91	0.97	0.16

Note: LWR = Listening While Reading intervention; RR = Repeated Reading intervention; C = Control

Table 10

Pairwise Comparisons of differences in comprehension rate scores between each reading condition within both levels of passage difficulty

Condition	Passage Difficulty	Mean Score	F Statistic	p-value
Repeated Reading	Easy	16.08	144.59	.000
	Hard	7.08		
Listening While Reading	Easy	62.36	143.49	.000
	Hard	31.68		
Control	Easy	29.06	136.63	.000
	Hard	11.81		

Table 11

Pairwise Comparisons of differences in comprehension rate scores between each passage difficulty within all levels of reading condition

Passage Difficulty	Condition 1	Condition 2	Mean Difference	F Statistic	p-value
Easy	Repeated Reading	Listening While Reading	-46.28	198.97	.000
	Repeated Reading	Control	-12.99		
	Listening While Reading	Control	33.30		
Hard	Repeated Reading	Listening While Reading	-24.60	65.26	.000
	Repeated Reading	Control	-4.73		
	Listening While Reading	Control	19.87		

Table 12

<i>Interaction contrasts between reading conditions' reading comprehension rate scores</i>			
Condition 1	Condition 2	<i>F</i> Statistic	<i>p</i> -value
Listening While Reading	Control	16.39	.000
Listening While Reading	Repeated Reading	62.19	.000
Control	Repeated Reading	23.86	.000

Table 13

Correlation in difference scores between control and Listening While Reading reading speed and comprehension accuracy

	Mean	Standard Deviation	Pearson Correlation	<i>p</i> -value
Reading Speed Difference Score	169.31	119.31		
Comprehension Accuracy Difference Score	.97	13.42	-0.20	.176

Note: Difference score computed by subtracting LWR scores from control scores

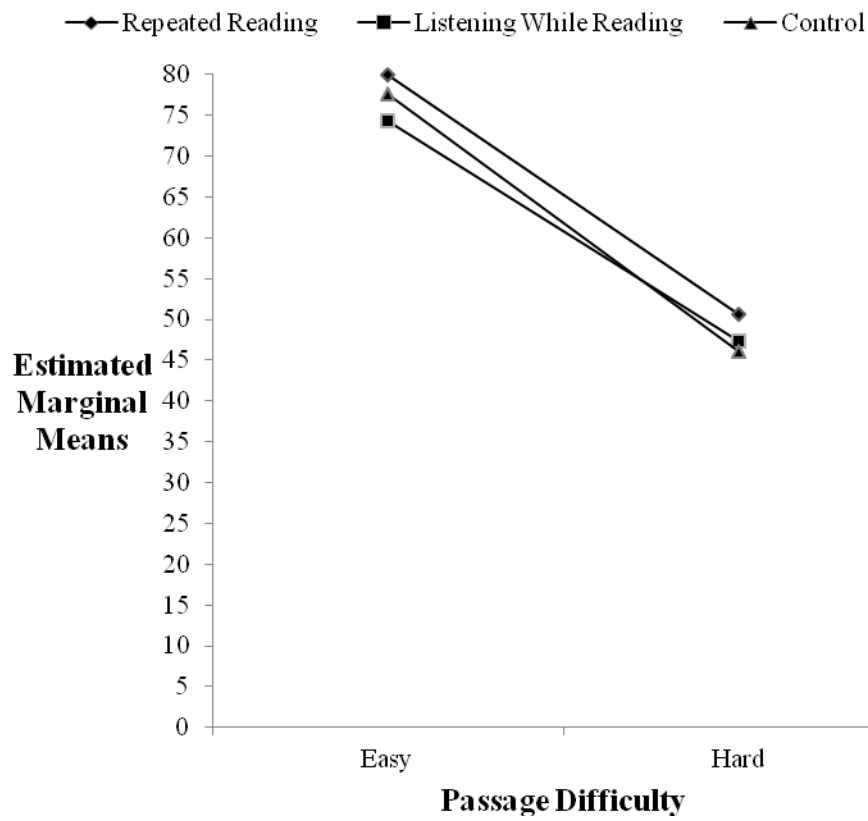


Figure 1. Participants' reading comprehension accuracy scores across two levels of passage difficulty and three levels of reading intervention conditions.

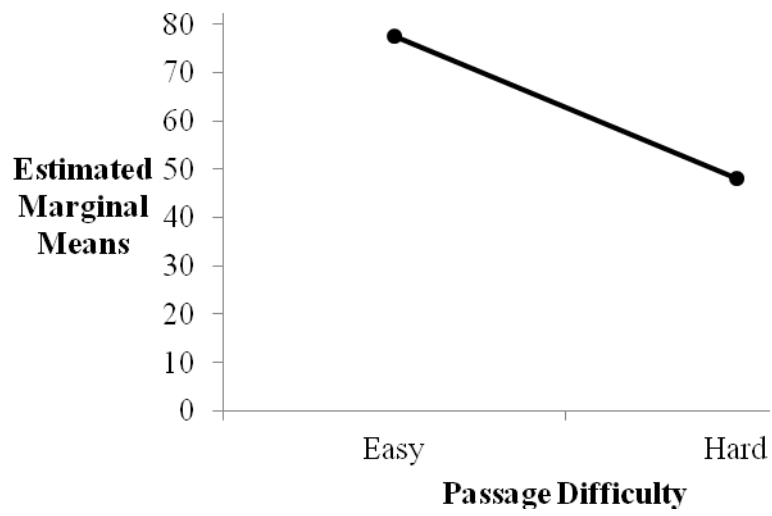


Figure 2. Main effect of passage difficulty in reading accuracy scores.

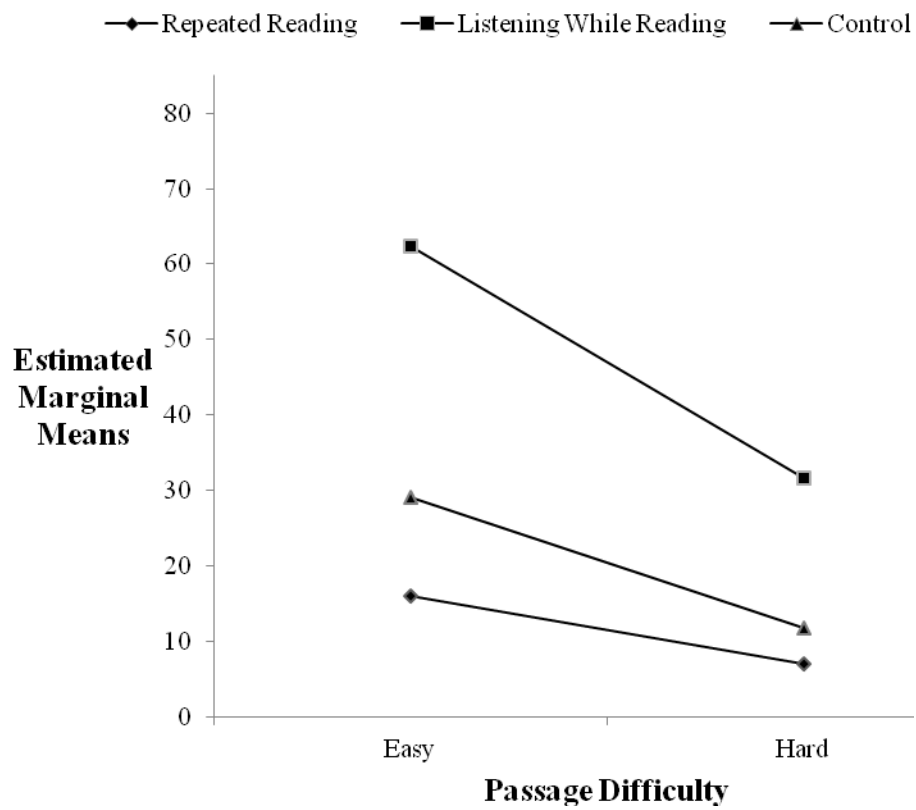


Figure 3. Participants' reading comprehension rate scores across two levels of passage difficulty and three levels of reading intervention conditions.

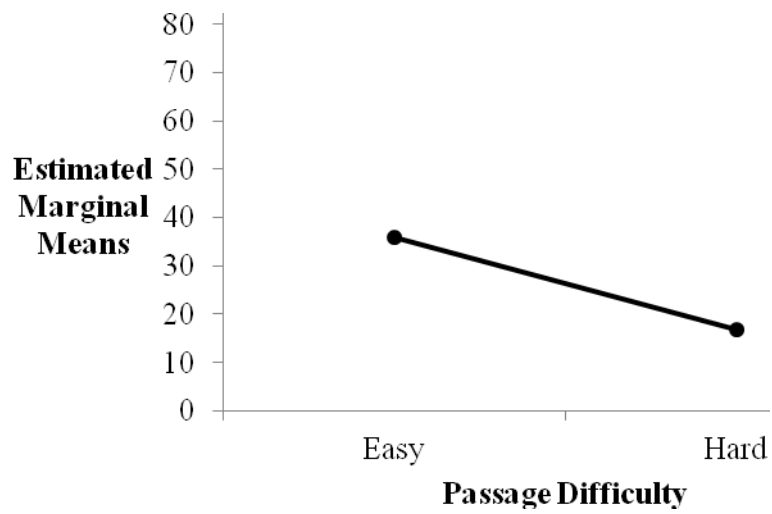


Figure 4. Main effect of passage difficulty in reading comprehension rate scores.

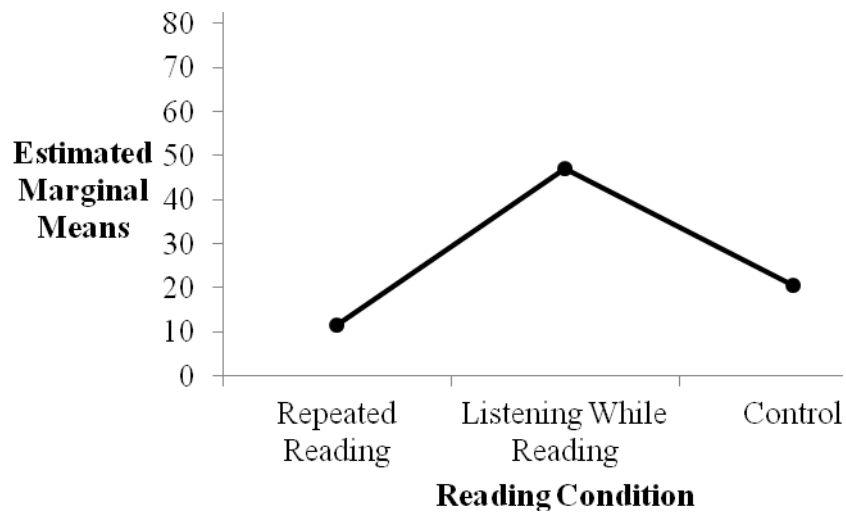


Figure 5. Main effect of reading condition in reading comprehension rate scores.

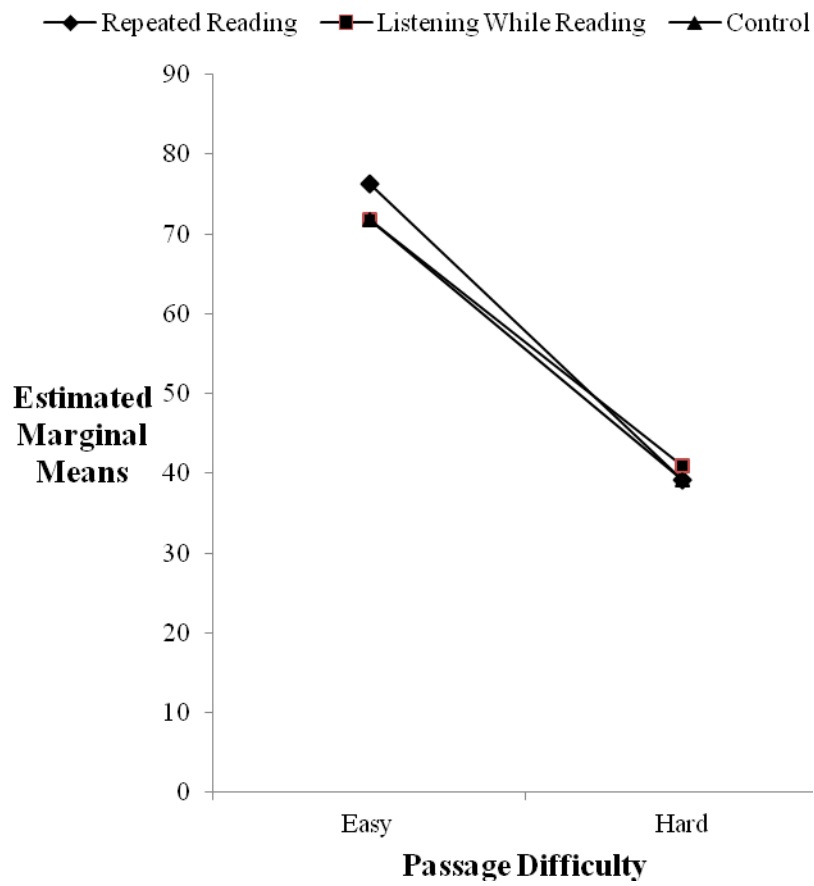


Figure 6. Hispanic participants' reading accuracy scores across two levels of passage difficulty and three levels of reading intervention conditions.

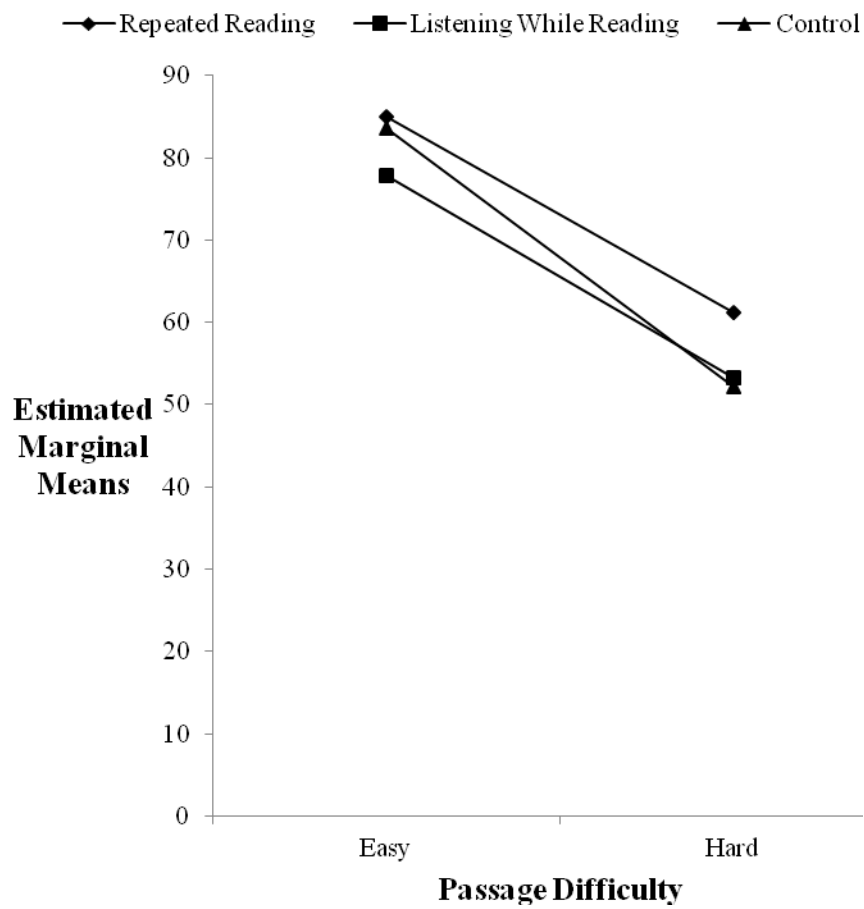


Figure 7. Caucasian participants' reading accuracy scores across two levels of passage difficulty and three levels of reading intervention conditions.

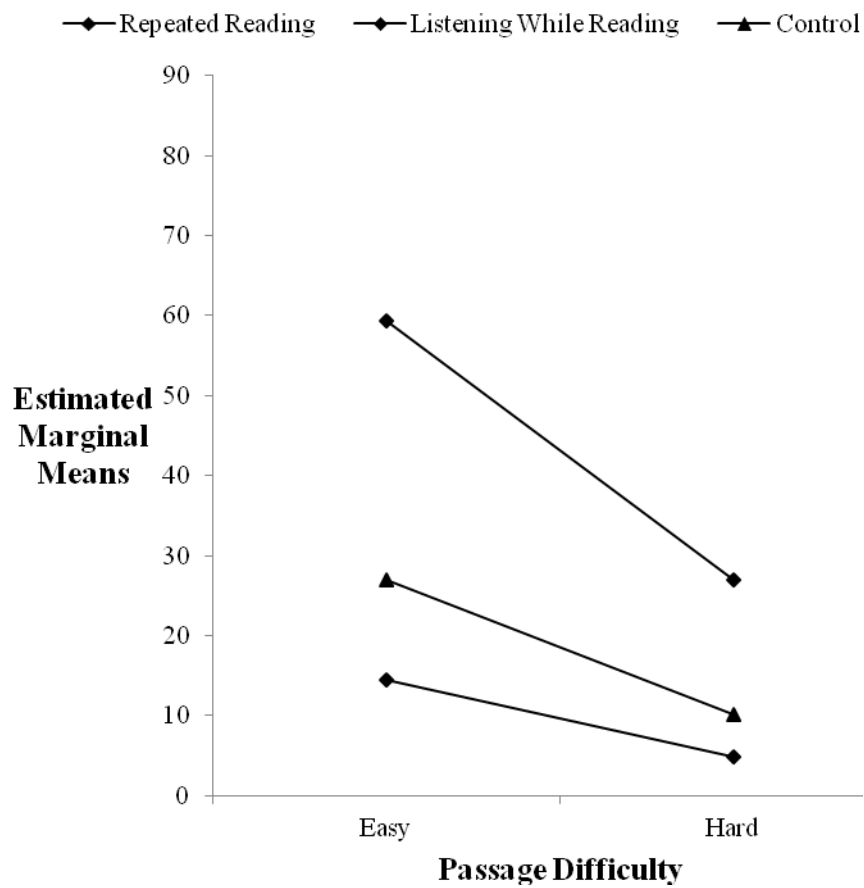


Figure 8. Hispanic participants' reading comprehension rate scores across two levels of passage difficulty and three levels of reading intervention conditions.

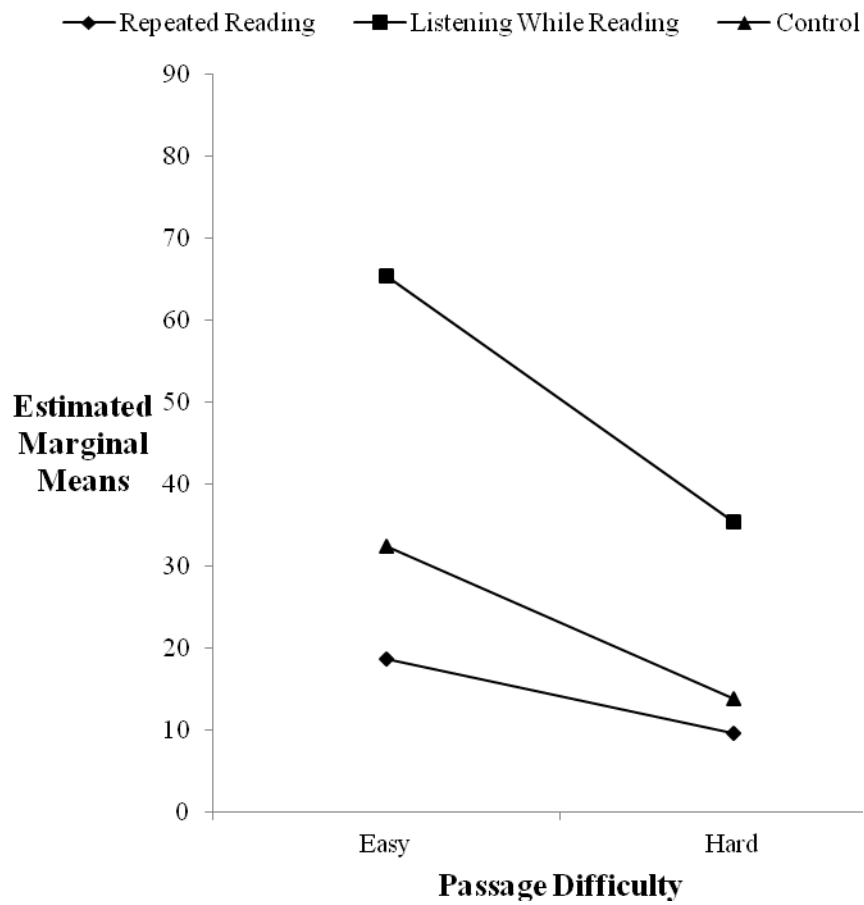


Figure 9. Caucasian participants' reading comprehension rate scores across two levels of passage difficulty and three levels of reading intervention conditions.

Instructions

Control

1. When I say 'begin,' start reading this passage aloud. Read across the page. Try to read each word. If you come to a word you don't know I'll tell it to you. Be sure to do your best reading. After you finish you will answer questions on what you just read. Do you have any questions? Begin.
2. Start the stopwatch when they begin reading.
3. Record errors as the student reads the passage. When they finish, record the total seconds it took them to read the entire passage.
4. Administer comprehension questions for the passage.

Repeated Reading

1. When I say 'begin,' start reading this passage aloud. Read across the page. Try to read each word. If you come to a word you don't know I'll tell it to you. Be sure to do your best reading. When you finish you are going to read this passage one more time and answer questions on what you just read. Do you have any questions? Begin.
2. Start the stopwatch when they begin reading.
3. Record errors as the student reads the passage. When they finish, stop the stopwatch and record the total seconds it took them to read the entire passage.
4. Prompt students to read the passage a second time. Repeat steps 2 and 3.
5. Administer comprehension questions for the passage.

Listening While Reading

1. I am going to read this passage aloud. Follow along with your finger. Be sure to pay attention because when I am finished you will answer questions. Do you have any questions?
2. Start the stopwatch before you begin reading. When you finish, record the total seconds it took you to read the entire passage.
3. Administer comprehension questions for the passage.

Procedural Integrity Checklist

1. Complete Demographic Page. Match the student's name with the appropriate ID from the list.
2. Hand student the appropriate passage according to the order of *your* packet.
3. Read the instructions corresponding to the sticker color on your packet.
4. Repeat steps 2 and 3 for the first 3 stories in your packet on day 1.
5. Repeat steps 2 and 3 for the last 3 stories in your packet on day 2.

Grade 2 Easy Narrative

Rosa's New Friend (221 words)

In the summer, Rosa's family moved to Texas. Rosa was sad. She left all of her friends behind and she did not know how she would find new ones. Rosa looked out the window to see if there were any children playing outside, but she did not see anyone. It was so hot that all the kids stayed inside.

One day, Rosa's mom said, "Let's go to the park. I hear there is water to play in. You can run through the spray and there are buckets that dump water on your head."

Rosa went with her mom to the park. When they got there, Rosa's mom told her to go play. Rosa saw lots of kids running and splashing in the water. They were smiling and having a great time. Rosa sat on a bench. The sun was beating down on Rosa's head. She felt hot, but she did not go play.

A girl Rosa's age ran past and splashed Rosa.

"I'm sorry!" said the girl. "Hey, you're new here. What's your name?"

"Rosa."

"I'm Cara. Come on, let's go play in the water," said the girl.

Rosa followed Cara out into the water. They ran, splashed, and giggled. At the end of the afternoon, Rosa and Cara made a plan. They would meet at the park the next day.

Grade 2 Easy Narrative - Rosa's New Friend

CATEGORY 1

1. Where did Rosa's family move to? (*Texas.*)
2. Where did Rosa and her mom go? (*The park.*)
3. What was the name of Rosa's new friend? (*Cara.*)

CATEGORY 2

4. At the beginning of the story, why was Rosa sad? (*She left her friends behind. She didn't know how she would make new friends.*)
5. What did mom say they could do at the park? (*Play in the water. Run in the spray. Get water dumped on your head.*)
6. What plan did Rosa and Cara make at the end of the afternoon? (*To meet at the park the next day.*)

CATEGORY 3

7. When Rosa first got to the park, why didn't she go and play? (*She was shy. She didn't know anyone. She didn't have any friends. She had just moved so she didn't know the kids.*)
8. How did Cara know that Rosa was new? (*Cara had never seen Rosa there before. Cara didn't recognize Rosa.*)
9. How do you know that Rosa and Cara became friends? (*They played together. They made plans to meet up the next day.*)

Grade 2 Medium Expository

Skateboard! (234 words)

If you want to get somewhere, a skateboard is a fun way to go. You can ride a skateboard faster than you can walk. A skateboard can travel on flat ground like a sidewalk, but is not good for traveling on grass.

Skateboards have four wheels made of plastic. They also have a flat board to stand on. It is called the deck. The deck feels like sandpaper which keeps your feet from slipping. On the bottom, the deck can be painted with colorful artwork.

If you would like to do tricks, first you need to learn how to ride. When you skate, you should wear a helmet, knee pads and wrist guards. Stand on the board with your feet to the side. Most riders put their left foot to the front. They use the right foot to push off the ground. A few skaters put their right foot to the front of the board. This is called riding with a goofy foot.

If you want to do tricks, a skate park is a good place to go. A skate park has ramps that you can skate down. Some skaters at the park practice jumping in the air and flipping their boards. Others ride their boards as they slide across a rail. It takes a lot of practice to be a good skater, but once you learn, it can be a lot of fun.

Grade 2 Medium Expository - Skateboarding!

CATEGORY 1

1. What are the skateboard wheels made out of? (*Plastic.*)
2. Why does the deck feel like sandpaper? (*To keep your feet from slipping.*)
3. What should you wear when you skate? (*Helmet. Knee pads. Wrist guards.*)
4. Where is a good place to do tricks? (*The skate park.*)

CATEGORY 2

5. What part of the board do you stand on? (*The deck. A flat board.*)
6. How do most riders use their feet on the skateboard? (*Left foot on the front of the board. Feet to the side. The right foot pushes off the ground.*)

CATEGORY 3

7. Why isn't a skateboard good for traveling on grass? (*The wheels would not roll well on grass, grass is not flat, grass is bumpy.*)
8. Why should a skateboarder wear a helmet, knee pads, and wrist guards? (*To keep them safe, in case they fall, so they won't get hurt*)
9. Why is a skate park a good place to do tricks? (*It has ramps and rails . Other skaters are there. It is a place where you can practice. You can learn from the others who are there. There's space. It is made for skateboarding.*)

Grade 2 Medium Narrative

Spring Break (207 words)

For spring break, Adam and his family were going to visit his grandparents. Just two days before the vacation, he fell off his bike. Crack! Adam had never felt such a pain.

Adam's mother took him to the hospital. He had to have X-rays and get a shot. After the X-ray, the doctor told Adam his leg was broken. Adam would have to spend a day in the hospital.

The doctor put a cast on Adam's leg and said Adam would have to wear it for five weeks. Adam would also have to learn to walk with crutches.

The crutches were easy to use, and Adam's friends came to visit him. The shot helped the pain go away, but Adam still felt bad. He thought spring break was ruined. The doctor wanted Adam to stay home and rest for a few days. That meant he would not get to see his grandparents. Adam's parents told him they would go see his grandparents when his cast came off. This made Adam feel better.

The next day, Adam heard a knock at the door. His mom went to open it. Adam looked up and saw his grandparents smiling at him. It would be a great spring break after all.

Grade 2 Medium Narrative - Spring Break

CATEGORY 1

1. Who was Adam's family planning to visit on spring break? (*They were going to visit his grandparents.*)
2. What did the doctor put on Adam's leg? (A cast)
3. How long was Adam supposed to wear a cast? (*5 weeks.*)

CATEGORY 2

4. What was Adam doing when he broke his leg? (*Riding his bike.*)
5. Why did Adam get a shot? (*To stop his leg from hurting.*)
6. Why would Adam have to learn to walk on crutches? (*His leg would be in a cast.*)
7. What did his parents say that made Adam feel better? (*His parents told him they would go to see his grandparents when his cast came off.*)

CATEGORY 3

8. Why did Adam think spring break was ruined (*Instead of going to his grandparents, he spent a day in the hospital. He had a cast put on his leg. He couldn't go on a trip.*)
9. Why did Adam think it would be a great vacation after all? (*Adam got to see his grandparents after all.)*

Grade 3 Hard Expository

Tornadoes (268 words)

One of the most powerful forces of nature is the tornado. A tornado is a swirling column of air that starts at a cloud in the sky and ends at the ground. The winds of a tornado can blow from 40 miles per hour up to more than 300 miles per hour. A tornado may stay on the ground for a very short distance or for many miles. The strength of a tornado can rip apart a large house, destroy a small bridge or pick up a car or truck.

Tornadoes can be found all over the world, but most of them occur in the United States. If we imagine a tornado, usually we picture a dark cloud in the air with the v-like shape of a funnel. The winds of a tornado are actually invisible. What can be seen is the water vapor and debris that are carried by the tornado's strong winds. Sometimes tornadoes are called "funnel clouds." Officially, though, a funnel cloud in the sky becomes a tornado when its strong winds touch the ground.

Tornadoes can be very dangerous for people. If people know there might be a tornado, there are things they can do to protect themselves. Scientists have gotten much better at knowing when a tornado may be coming. Usually they can give people warning before a tornado strikes. When there is a tornado warning, a basement or a first-floor room with no windows is the safest place for people to go. Here they can usually wait for the storm to pass without being hurt by broken glass or other flying objects.

Grade 3 Hard Expository - Tornadoes

CATEGORY 1

1. Where do most tornadoes occur? (*The United States.*)
2. When does a funnel cloud in the sky become a tornado? (*When it touches the ground. When its wind touches the ground.*)
3. Where is the safest place for a person to go when there is a tornado warning? (*A basement. A first floor room with no windows.*)

CATEGORY 2

4. Why are tornadoes sometimes called funnel clouds? (*Because they have the shape of a funnel. Because they look like a funnel.*)
5. The story says the winds of a tornado are invisible, but when you look at a tornado what can you see? (*Water vapor. Debris. Water and debris that the wind is blowing.*)

CATEGORY 3

6. What is at the top of a tornado? (*A cloud.*)
7. What kinds of damage can a tornado cause? (*Rip apart a house. Destroy a bridge. Pick up a car or truck.*)
8. Why can tornadoes be dangerous for people? (*Their house can be destroyed. The might be hit with broken glass or flying objects. They might be blown down or picked up by wind.*)

Grade 3 Medium Expository

Chinchillas (231 words)

Chinchillas are small rodents native to South America. Many people think that chinchillas are cute. They have fur that is thick and soft. It protects them from the harsh outdoor environment and keeps them warm. In addition to their soft fur, chinchillas have large eyes and bushy tails. When fully grown, they are about 12 inches long. Chinchillas usually weigh somewhere between one to three pounds. Their hind legs are strong, and this makes them good jumpers. Some people say chinchillas remind them of rabbits. Chinchillas have a lifespan of about 15 years. Some live even longer than that.

Chinchillas are sometimes kept by people as pets. In a natural setting, chinchillas eat grass, fruit, leaves, and bark. However, a pet chinchilla can eat many types of food. The most common foods for pet chinchillas are the special pellets that are found in pet stores. Chinchillas also enjoy dry hay. As treats, they like small pieces of apples, carrots, raisins, corn or bread.

You might be surprised to know that chinchillas take dust baths to help take care of their fur. For chinchillas kept as pets in cages, special sand is sold at pet stores. You simply fill a large bowl with the sand and let them roll in it. Not only does the sand help their coats stay healthy and shiny, but the dust bath also makes them feel relaxed.

Grade 3 Medium Expository - Chinchillas

CATEGORY 1

1. How big are chinchillas when they are fully grown? (*About 12 inches long.*)
2. What makes chinchillas good jumpers? (*Their strong hind legs. Their strong legs.*)
3. In a natural setting, what do chinchillas eat? (*Grass, fruit, leaves and bark.*)

CATEGORY 2

4. Why do chinchillas remind some people of rabbits? (*They are good jumpers. The way they walk is similar to a hop.*)
5. How does taking dust baths help chinchillas? (*It helps their coats stay healthy and shiny. Makes them feel relaxed.*)

CATEGORY 3

6. What are some reasons people think chinchillas are cute? (*They have thick and soft fur. They have large eyes and bushy tails. They are small.*)
7. Why might you be surprised to know that chinchillas take dust baths to help take care of their fur? (*Dust is dirty. Usually animals take baths with water, not dust.*)

Grade 3 Hard Expository

Storm Chasers (263 words)

Most people hide from tornadoes and lightning. Storm chasers, however, want to find storms. Using cell phones and weather radios, they try to figure out when and where a major storm will hit. When a storm is coming, they jump in the car and drive right into the heart of the storm.

There are two main reasons people chase storms. The first reason is to understand storms better. Scientists who study weather want to learn more about storms so they can better predict them. This will allow them to warn more people when weather might be dangerous.

The second reason people chase storms is for excitement. These people love to experience wild weather. Many like to take pictures of tornadoes and lightning. They can sell these pictures to magazines or the internet.

No matter the reason for chasing storms, there are certain safety rules every chaser should follow. For example, a chaser should never chase alone. Driving while looking for storms can be dangerous. One person might drive while another looks for storms. A second rule is to always have an escape route. If the storm makes an unexpected turn, the chasers have to be ready to flee. Finally, safe storm chasers must always be alert. They must look around constantly because a storm can change its path at any moment.

Some storm chasers, however, don't follow the safety rules. These dangerous chasers are called "yahoos." If you know what you're doing, storm chasing can be interesting and safe. For those who don't follow the rules, storm chasing can be a deadly thrill.

Grade 3 Hard Expository - Storm Chasers

CATEGORY 1

1. What do the chasers use to figure out where a storm will hit? (*Cell phones. Weather radios.*)
2. Where can people sell pictures of tornadoes and lightning? (*To magazines. The internet*)
3. What are Yahoos? (*Dangerous chasers. Chasers who don't follow the rules.*)

CATEGORY 2

4. What are two reasons people chase storms? (*To understand storms. For excitement. To take pictures.*)
5. Why do scientists want to understand storms? (*They will be able to predict them better. They can warn people when storms are coming.*)
6. What is one safety rule for chasing storms? (*Never chase alone. Always have an escape route. Always be alert or always be looking around.*)

CATEGORY 3

7. Why do scientists want to warn people about the weather? (*So people can be safe. Take shelter. Prepare. Get their houses ready. So people can hide. Leave town.*)
8. Why are safety rules needed for storm chasing? (*It could be deadly or dangerous. Tornadoes and lightning can kill you. You wouldn't want to be stuck in the middle of the storm. To keep you safe. To have a way to get out of a storm.*)
9. Why is driving while looking for storms dangerous? (*It's not safe to drive and look around at the same time. You might crash. You might get distracted. You should keep your eyes on the road.*)

Vita

Megan Schall was born in Boston, MA. She moved at 9 months to Nashville, TN, where she spent her childhood and adolescence. She obtained a B.A. in Psychology and Spanish at Wake Forest University in Winston-Salem, NC in 2011. After graduating, Megan attended The University of Tennessee's School Psychology Ph.D. program. In August of 2014, she received a M.S. in Applied Educational Psychology. Megan will receive her Ph.D. in August 2016 upon completion of a year-long pre-doctoral internship with the Tennessee Internship Consortium in Knoxville, Tn.