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Effects of Difficult-to-Read Materials on Learning

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I am submitting herewith a dissertation written by Kala Lane Taylor entitled "Effects of Difficult-to-Read Materials on Learning." 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.

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Effects of Difficult-to-Read Materials on Learning

A Dissertation Presented for the

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Degree

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Kala Lane Hamilton Taylor

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Dedication

To my loving, tenacious parents, for making anything possible and never letting the boat sink.

To my Granny Jean, Aunt Reva, and Uncle Red, for providing the example of right living that created my life as I know it.

To Judy Lathrop, Steven Tipton, Chase Rogers, Ono Egodotaye, Tyler Bowles, and Ki Webb, for your love and teachings before leaving this world. I am living it for you.

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Abstract

Some researchers have found difficult-to-read, disfluent materials can improve learning. Thus, this dissertation is comprised of three studies investigating the effects of difficult-to-read materials on learning. In Study I, we used an adapted alternating treatments design to compare sight-word learning in three students with intellectual disability when flashcards were presented in easy-to-read (i.e., fluent) and difficult-to-read (i.e., disfluent) fonts. All students learned words presented in both fonts; however, two learned more words presented in fluent font, and the third experienced no differences between conditions.

Another area where difficult-to-read material could affect learning is multicultural reading curricula, which often include diverse names that differ phonetically from a student's native language. Study II was designed to determine whether diverse names in grade-level reading passages impact early elementary students' reading outcomes. We used a mixed-factors experimental design to evaluate and compare reading comprehension and comprehension rate on grade-level passages with simple, common names verses unfamiliar diverse names. Results indicated diverse names significantly reduced comprehension levels and rates. Effect sizes were moderate.

Considering the far-reaching benefits of multicultural education, we wanted to find a solution to the reading difficulties we found to be associated with unfamiliar diverse names. We designed Study III to evaluate the effectiveness of a simple pre-teaching intervention familiarizing students with diverse names before they read those names embedded in passages (i.e., constant time delay presented paired with a brief description and pictures). We used a between-subjects experimental design to compare the reading comprehension and

comprehension rate of students who did and did not receive the intervention. Results indicated students who received the intervention comprehended significantly more of the passage than students who did not. The effect size was large, supporting practical significance.

Overall, our findings demonstrate difficult-to-read material can hinder learning, particularly in unskilled readers. There is a need for aptitude-treatment interaction research, in addition to studies designed to evaluate academic outcomes in relation to multicultural content. Most importantly, researchers should validate simple and efficient methods teachers can use to familiarize their students with phonetically unfamiliar words, allowing students to benefit from multicultural content without hindering reading.

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List of Abbreviations

CFR	Computerized Flashcard Reading
CRT	Cognitive Reflection Test
CTD	Constant Time Delay
PSE	Postsecondary Education
S-R-S	Stimulus Response Stimulus
WCPM	Words Correct per Minute
WRC	Words Read Correctly
QC	Questions Correct
QCPM	Questions Correct per Minute

Chapter I

Introduction

Cognitive Load

Learning and comprehension are generally thought to be best supported by simple educational materials which reduce cognitive load (Allington, 2009; National Reading Panel, 2000). Cognitive researchers have suggested learning information that requires increased cognitive resources (i.e., information that increases cognitive load), or learning information presented in such a way that it increases the amount of cognitive resources used, burdens the limited human information processing system (Sweller, 1988; Sweller & Chandler, 1994). The effects of cognitive load have been used to explain differences between experts and novices. For instance, reading theorists hold that the cognitive resources of novice readers must be applied to basic reading skills such as decoding, leaving them less resources to apply to higher order reading skills such as comprehension, while the basic skills of proficient readers have become automated, allowing their cognitive resources to be focused solely on higher level skills such as comprehending the text (LaBerge & Samuels, 1974; Perfetti, 1985).

Cognitive Disfluency

It has also been suggested that retention of learned information is related to how deeply that information is processed, with deeper processing resulting in better retention of the learned material (Craik & Lockhart, 1972; Craik & Tulving, 1975). Some researchers have theorized that one way to induce deeper processing is to increase cognitive effort by introducing disfluency (i.e., making cognitive processing more difficult; Alter, 2013; Bjork, 1994; McDaniel & Butler, 2010). This could be because the presence of disfluency reduces the learner's confidence that they understand the material, signaling them to increase engagement with the material to attempt to understand it (Alter, 2013; Alter, Oppenheimer, Epley, & Eyre, 2007).

Perceptual fluency is the subjective ease of cognitively processing text (Katzir, Hershko, & Halamish, 2013). One way to introduce cognitive disfluency is to present text in a way that is perceptually difficult to read (i.e., reducing perceptual fluency). Some researchers have manipulated perceptual fluency by presenting subjects with intact text compared to text with missing letters, easy-to-read compared to hard-to-read font, or upright compared to inverted text, and found disfluent conditions enhanced recall and comprehension (deWinstanley, Bjork, & Bjork, 1996; Diemand-Yaumana, Oppenheimer, & Vaughn, 2011; Maki, Foley, Kajer, Thompson, & Willert, 1990; Sungkhasettee, Friedman, & Castel, 2011). However, findings related to perceptual fluency manipulations are mixed. For example, other researchers have altered text to appear disfluent by presenting hard-to-read fonts, small fonts, or blurred text, and found that the disfluent conditions resulted in decreased learning or had no effect on learning in their samples (e.g., Miele & Molden, 2010; Rhodes & Castel, 2008; Yue, Castel, & Bjork, 2013).

Aptitude-Treatment Interactions

The conflicting findings discussed earlier could potentially be explained by aptitude-treatment interactions. Novice readers are still applying their cognitive resources to basic reading skills such as decoding, while proficient readers have automated these skills, allowing more of their cognitive resources to be applied to higher level skills such as comprehension (LaBerge & Samuels, 1974; Perfetti, 1985). Thus, when attempting to read unfamiliar text, the cognitive load of novice readers is higher than that of proficient readings (Sweller, 1988; Sweller & Chandler, 1994). It is possible that perceptual fluency manipulations overtax the cognitive resources of less skilled readers to the point of hindering reading outcomes, while the same manipulations signal skilled readers to process information more deeply, enhancing reading

outcomes (Katzir et al., 2013). However, research supporting potential aptitude-treatment interactions related to perceptual fluency manipulations is unclear.

For instance, Katzir et al. (2013) independently manipulated font size, spacing, and line length of second- and fifth-grade texts from previous national reading assessments. The texts used for each grade were matched based on length and level of difficulty. Their findings indicated the disfluency manipulations of font size and line length (i.e., the text with the smaller fonts and also the text with the longer lines) significantly reduced the reading comprehension of their second-grade sample (i.e., the students with weaker reading skills). However, the font size disfluency manipulation significantly increased reading comprehension in their fifth-grade sample (i.e., the students with stronger reading skills).

French et al. (2013) manipulated the font of an expository paragraph and presented it to secondary students in grades 9, 10, and 11 on a PowerPoint slide. The students had previously been categorized into four ability levels based on their performance on tests widely used in the United Kingdom to measure ability and aptitude for learning. In addition to the four ability levels, some students included in the sample had been previously diagnosed with dyslexia by an educational psychologist. The British Dyslexia Association (n.d.) defines dyslexia as "a specific learning difficulty which mainly affects the development of literacy and language related skills." These diagnoses typically took place after a school referral due to a low score on the Edinburgh Reading Test 4 (Educational Assessment Unit, 2002). They found that students across ability levels who read the side presented in disfluent, *Monotype Corsiva* font preformed significantly better on a multiple-choice comprehension test than students who read the slide presented in

fluent, Arial font. Further, the students who had a previous diagnosis of dyslexia experienced the largest gains.

Finally, Thompson et al. (2013) printed the Cognitive Reflection Test (CRT; Frederick, 2005) in fluent and disfluent fonts and then administered it to college students. They found students with medium-high SAT scores performed significantly better when the CRT was presented in disfluent font. In a second experiment, this time with an educationally diverse sample (although all participants had at least a high school education), they found that individuals with higher estimated IQ scores performed better when the CRT was administered in disfluent font, while individuals with lower estimated IQ scores performed better when it was administered in fluent font.

Implications for Multicultural Education

Diverse words and names are often phonetically unfamiliar to young children and difficult for them to read. Thus, one area where cognitive load and/or disfluency may apply is multicultural education. Multicultural education is important to student success within and beyond the classroom. Diversity in the United States has increased rapidly, and projections suggest the majority of the student population will consist of students of color in less than a decade (U.S. Department of Education, 2016). To be personally relevant education needs to be connected to students' life experiences; however, schools still tend to mirror Anglocentric values (Gay, 1994). Multicultural education is designed to resolve this inequity, while also enhancing students' learning and engagement (Zirkel, 2008). To be competent global citizens, students must be capable of interacting with diverse individuals (Gay, 1994). Multicultural education supports this goal by reducing racial attitudes (Okoye-Johnson, 2011) and improving critical

thinking skills (Gurin, Dey, Hurtado, & Gurin, 2002; Zirkel, 2008). Elementary school is an ideal time for such educational initiatives, as conversations about race and ethnicity can reduce prejudice and stereotyping during this malleable period (Aboud & Doyle, 1996; Aboud & Fenwick, 1999).

The most common but least well-studied element of multicultural education is the inclusion of multicultural content in the curriculum (Zirkel, 2008). Including multicultural content places few demands on educators because it does not require major changes in pedagogical practices (Banks, 2004). One example of the content often included in multicultural education curriculums is diverse literature. Multicultural literature can increase students' understanding of diverse cultures and aid in starting critical conversations about changing oppressive situations (Souto-Manning, 2011). This literature includes diverse characters, and thus, diverse proper names. Exploring the diversity of names and conflicts involving people with diverse names can help children strengthen their identities (Peterson et al., 2015), and students of color with strong and positive racial identities have better educational outcomes (Chavous et al., 2003).

Despite the benefits of including diverse names in curriculum materials, such names often differ phonetically from students' native language and are difficult for young students to read; thus, they have the potential to impair reading fluency (i.e., reading speed and accuracy), and subsequently, reading comprehension. Substantial correlational research (for meta-analysis see Reschly, Busch, Betts, Deno, & Long, 2009) and numerous other studies support mechanisms by which reducing reading fluency is related to comprehension problems (Allington, 2009; Perfetti, 1985). When a student encounters an unfamiliar diverse name in a

passage, it will likely to be more difficult for them to produce the response of reading that name (i.e., require an increased response effort), than it would be for them to produce the response of reading a familiar name. Many researchers have found increasing response effort reduces response frequency (for review, see Friman & Poling, 1995). Although response effort has often been defined in terms of the physical effort required to emit a response (e.g., physical force required to press down a lever, physical distance an individual must travel to reach a recycling receptacle; Alling & Poling, 1995; Brothers, Krantz, & McClannahan, 1994), some have defined response effort in terms of the cognitive effort necessary to produce a response (e.g., high- verses low-effort math problems, drawing complex verses simple geometric figures; Neef, Shade, & Miller, 1994; Romani, McCoy, Wacker, & Radilla-Dalmau, 2014).

Further, young students who are still learning to read may not have developed the necessary problem solving schemas to approach unfamiliar diverse words effectively. Schemas are organized knowledge structures that provide representations of generic concepts in memory (Rumelhart & Norman, 1983), allowing individuals to recognize new examples within a category efficiently and utilize information from their schemas for problem solving (Gagne, Yekovich, & Yekovich, 1993). Learning mechanisms such as schemas serve to reduce cognitive load by circumventing the limited capacity working memory (Sweller & Chandler, 1994). Sweller (1988) indicates that the cognitive resources of novices within a given domain are applied to schema development, while individuals who are skilled within that domain have already developed schemas from previous experience. Thus, the skilled individuals experience a reduced cognitive load because they are not using resources for schema development, and because the schemas

they have already developed allow them to easily recognize problems and problem states, and to know which steps are needed to advance toward their goal (Sweller, 1988).

For example, when a skilled English-speaking reader encounters the unfamiliar word "Evgeni" embedded within a text, they will likely automatically recognize the word as a diverse proper name (e.g., a new example within their schema for diverse languages). Therefore, they will know the phonetic features and rules of the English language may not apply, and rather than attempting to decode the name, they will likely apply a strategy they have found effective under similar circumstances in their past. Such strategies might include only using the first letter of the name (i.e., E), or abbreviating the name (i.e., Ev). For the skilled reader, this process is carried out automatically; thus, it does not burden working memory and increase cognitive load (Sweller, 1988; Sweller & Chandler, 1994).

Conversely, when a novice English-speaking reader encounters the word "Evgeni" embedded within a text, they may not recognize the word as a name at all, causing them to miss information vital to comprehending the text. They may attempt to apply phonemic skills to decode the name, which is an inefficient strategy because phonetic features and rules differ across languages. Further, they likely have not developed problem solving strategies for encountering diverse languages. Thus, they will either have to ask for help, or develop and adopt a new strategy. For the novice reader, this process takes time and cognitive effort, and therefore may hinder reading fluency and comprehension (Allington, 2009; Perfetti, 1985; Reschly et al., 2009).

Summary and Purpose

Learning and comprehension are generally thought to be best supported by keeping educational materials simple in order to avoid inducing heavy cognitive load (Allington, 2009; National Reading Panel, 2000). In the area of reading, this is particularly true for novice readers who have not yet developed automated skills and must apply cognitive resources to basic tasks such as decoding, leaving less resources available for higher order tasks such as comprehension (LaBerge & Samuels, 1974; Perfetti, 1985). However, some theorists have suggested that increasing cognitive effort by introducing disfluency can induce the learner to process information more deeply and improve accurate responding (Alter, 2013; Alter, Oppenheimer, Epley, & Eyre, 2007).

Researchers have investigated the effects of text disfluency on comprehension, recognition, and recall (e.g., Diemand-Yaumana et al., 2011; Katzir et al., 2013; Sungkhasettee et al., 2011); but, we could not identify any studies where researchers investigated isolated word acquisition in students with disabilities. Thus, we designed Study I to extend research on perceptual fluency to stimulus-response-stimulus (S-R-S) flashcard learning trials. Using an adapted alternating treatments design (Sindelar, Rosenberg, & Wilson, 1985), we evaluated and compared isolated word acquisition in three adult postsecondary students with intellectual disability when flashcards were presented in fluent and disfluent fonts.

Another area where cognitive disfluency may apply is multicultural education. The inclusion of multicultural content in the curriculum places few demands on educators (Banks, 2004) and has become the most common element of multicultural education; however, it has not been well studied (Zirkel, 2008). One way that multicultural content is incorporated into

elementary school curricula is through the inclusion of multicultural literature. The diverse words and proper names included in this literature are often phonetically unfamiliar and difficult for young students to read; therefore, they may increase cognitive load and/or introduce cognitive disfluency. Thus, Study II was designed to extend research on cognitive disfluency to diverse names in children's texts. Specifically, we used a mixed-factors experimental design to determine whether the presence of diverse names in grade-level reading passages affects reading comprehension and reading comprehension rate. To protect internal validity, passages were counterbalanced and randomly assigned to students.

As multicultural literature has specific benefits to learners (e.g., increasing understanding of diverse cultures, helping children strengthen their identities; Peterson et al., 2015; Souto-Manning, 2011), we wanted to find a solutions to the potential reading difficulties presented by diverse names. Study III was designed to investigate the effectiveness of an intervention designed to familiarize students with diverse names before they read those names embedded within passages. Specifically, we used a between-subjects experimental design to determine whether a simple pre-teaching intervention (i.e., constant time delay presented with computerized flashcards paired with a brief description and pictures) could improve students' reading comprehension and reading comprehension rate on a passage including diverse names. Students were randomly assigned to either the pre-teaching, or the no pre-teaching condition.

Research Questions

The following questions are considered:

Study I. Does cognitive disfluency created by altering fonts to make them difficult to read hinder or help sight-word acquisition in students with intellectual disability?

Study II. Do difficult-to-read diverse names hinder elementary students' reading comprehension and reading comprehension rate?

Study III. Can reading difficulties presented by diverse names (i.e., impaired reading comprehension and reading comprehension rate) be effectively mediated with a simple intervention (i.e., computerized flashcard reading using constant time delay paired with a brief introduction to characters)?

Chapter II

Study I: Disfluent Font Can Hinder Sight-Word Acquisition in Students with Intellectual Disability

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Abstract

Students with intellectual disability often have difficulty reading commonly used words. Researchers have found altering printed text from fluent, easy-to-read font, to disfluent, difficult-to-read font can enhance comprehension and recall. An adapted alternating treatments design was used to evaluate and compare sight-word acquisition and maintenance in three postsecondary students with intellectual disability when flashcards were presented in fluent (i.e., 14-point Arial) and disfluent (i.e., 14-point Juice ITC reduced to 70% transparency) fonts. Results showed all three students acquired and maintained both fluent and disfluent words, with two of the three students learning more fluent words. These findings suggest altering fonts to make them difficult to read can hinder, rather than enhance, word learning in students with intellectual disability. Directions for future research are provided with a focus on the need for aptitude-treatment interaction studies.

Students with intellectual disability often have difficulty reading simple, commonly used words, and this can hinder their development of advanced reading and daily living skills (Browder, Hines, McCarthy, & Fees, 1984; Browder & Spooner, 2011; Cuvo & Klatt, 1992). Teaching students with disabilities to read words in isolation improves meaningful outcomes. For instance, after receiving sight-word training, individuals with intellectual disability have demonstrated increased autonomy by: (a) shopping for groceries on a list (Lalli & Browder, 1993); (b) identifying food items on restaurant menus (Smith, Schuster, Collins, & Kleinert, 2011); (c) using sight-words to self-initiate job-related task completion (Browder & Minarovic, 2000); and (d) following instructions for using the telephone, preparing food, and completing laundry (Browder et al., 1984).

Stimulus-response-stimulus (S-R-S) flashcard learning trials have been used to enhance sight-word acquisition, maintenance, and generalization in students with disabilities and reading difficulties (Belfiore, Skinner, & Ferkis, 1995; Forbes et al., 2013; Orelove, 1982; Yaw et al., 2012). When teaching students to read words in isolation, flashcard learning trials may involve the presentation of a stimulus (e.g., a word printed on a flashcard) followed by an interval for the student to respond by reading the word. After the student reads the word and/or after the response interval passes, a second stimulus is provided. If the student reads the word correctly, the instructor may say, "Yes, the word is _____." If the student reads the word incorrectly, the instructor may respond by saying, "No, the word is _____." If the student does not respond within the interval, the instructor may respond by reading the word. In all cases, after the student receives the feedback, they can be asked to repeat the word while the initial stimulus (e.g., flashcard) is still present. These response prompting procedures can increase accurate academic

responding rates and the probability the student's last response to a stimulus presentation is correct, both of which can enhance learning (Skinner & Smith, 1992). As words are repeatedly presented, response prompting procedures can result in the student reading the words correctly before the prompt is delivered; thus, stimulus control is transferred from the verbal prompt (e.g., instructor reading the word correctly) to the printed word (Demchak, 1990).

Researchers have investigated procedures designed to enhance S-R-S learning trials by increasing learning trial rates (e.g., using briefer response intervals) and/or rates of accurate responding (Skinner, Fletcher, & Henington, 1996). These procedures include altering fixed response intervals (e.g., McCallum, Skinner, & Hutchins, 2004; Yaw et al., 2014), allowing the learner to self-determine response intervals (e.g., Cazzell et al., 2016; Cazzell et al., 2017), and providing additional opportunities for the learner to respond after each learning trial (e.g., Belfiore et al., 1995; Ferkis, Belfiore, & Skinner, 1997). Some findings from researchers investigating perceptual fluency suggest merely altering the manner in which stimulus words are presented could enhance learning (e.g., Sungkhasettee, Friedman, & Castel, 2011). Perceptual fluency involves the subjective ease with which text is cognitively processed (Katzir, Hershko, & Halamish, 2013). The difficulty of reading printed text can be increased by altering its appearance in a manner that reduces perceptual fluency (Alter, Oppenheimer, Epley, & Eyre, 2007). For example, altering the font of a text from fluent (i.e., easy-to-read) to disfluent (i.e., difficult-to-read) can increase the time, effort, and cognitive resources (e.g., working memory, attention) required to read that text (Alter, 2013).

There are opposing theories with implications for the effects of text manipulations on learning. Learning activities that require a high cognitive load, whether due to the complexity of

the information being acquired or the way that information is presented, increases the burden on the human information processing system (Sweller, 1988). Thus, some have suggested simplifying learning materials in order to reduce cognitive load can enhance learning (Sweller & Chandler, 1994). Others have suggested altering learning materials in a manner that increases cognitive effort (i.e., introducing perceptual disfluency) can enhance learning by influencing the learner to process information more deeply (e.g., Alter, 2013; Bjork, 1994).

Research on perceptual fluency manipulations is mixed. Some researchers found altering materials to create perceptual disfluency (e.g., presenting paragraphs with deleted letters, printing text in disfluent fonts) can enhance recall and comprehension (Diemand-Yaumana, Oppenheimer, & Vaughn, 2011; Maki, Foley, Kajer, Thompson, & Willert, 1990; Sungkhasettee et al., 2011). For example, Diemand-Yaumana et al. (2011) increased high school students' test performance by altering their learning materials from fluent font (i.e., Arial) to disfluent font (e.g., **Haettenschweiler**). Others found altering materials to create perceptual disfluency decreased recall or comprehension (Miele & Molden, 2010; Yue, Castel, & Bjork, 2013). For instance, Miele and Molden (2010) found changing text to a disfluent font (i.e., from Times New Roman to italicized *Juice ITC*) decreased passage comprehension in adults.

Some evidence suggests aptitude-treatment interactions may account for the conflicting findings discussed above, but these results also are mixed. Katzir et al. (2013) found decreasing font size significantly enhanced reading comprehension in fifth-grade students but significantly reduced reading comprehension in second-grade students, who presumably had weaker reading skills or lower aptitudes. French et al. (2013) presented secondary students from grades 9, 10, and 11 with an expository paragraph in either disfluent (i.e., *Monotype Corsiva*) or fluent (i.e.,

Arial) font. The students had previously been categorized into four ability levels, with some students being classified as dyslexic. Results showed students across ability levels who read the disfluent font preformed significantly better on a multiple-choice comprehension test. The students who had been previously diagnosed with dyslexia (i.e., those with the weakest reading skills) showed the largest gains.

Purpose

S-R-S flashcard learning trials have been used to enhance isolated word acquisition in students with disabilities (Belfiore et al., 1995; Cazzell et al., 2016; Forbes et al., 2013; Orelove, 1982; Yaw et al., 2012). Researchers have investigated methods to enhance learning via flashcard learning trials by altering response intervals and providing additional opportunities to respond (e.g., Ferkis et al., 1997; Yaw et al., 2014). There is some empirical evidence and theoretical support suggesting that having students read words printed in a disfluent font, a simple modification, could enhance their learning during S-R-S flashcard trials (e.g., Diemand-Yaumana et al., 2013; Katzir et al., 2013). Thus, we designed the current study to extend research on perceptual fluency to S-R-S flashcard learning trials. Specifically, we used an adapted alternating treatments design (Sindelar, Rosenberg, & Wilson, 1985) to evaluate and compare sight-word learning in three adult postsecondary students when flashcards were presented in fluent and disfluent font.

Method

Participants and Setting

This study was conducted in a metropolitan area in the southeastern United States. The primary experimenter was a school psychology PhD student who had prior experience teaching

sight-words to individuals with intellectual disability using S-R-S flashcard learning trials. Two additional school psychology PhD students served as secondary experimenters.

Participants were three students (Sadie, Tom, and Emily) enrolled in a postsecondary education (PSE) program for students with intellectual disability. A description of student characteristics is provided in Table 1.1. The students' program director requested the experimenters work with these students to enhance their word reading. The director nominated Sadie because during the previous year, she had successfully learned to read commonly used first- through third-grade words via S-R-S flashcard learning trials. He reported this experience enhanced Sadie's reading esteem and time spent reading. The program director nominated the other two students because they were enrolled in elective classes which included a variety of difficult words, and he believed learning to read these words could enhance their experience in their college courses.

Sessions were conducted in a quiet conference room (approximately 12 feet by 20 feet) containing a table and at least three chairs. The room was located in the same general area where the students in the PSE program met at the beginning of each school day. The students also received their program specific instruction in the same general area.

Materials

The primary experimenter created pretest, assessment, and treatment flashcards on 3 x 5 inch index cards using a personal computer and laser printer. Words included in the pretesting sessions, as well as those assessed after each treatment, were printed in 14-point Times New Roman font. Fluent words used during the treatment sessions were printed in 14-point Arial font (fluent text font looked like this), and disfluent words were printed in 14-point Juice ITC font

reduced to 70% transparency (disfluent text font looked like this). We selected the disfluent font and transparency because our 10-person research team judged it as readable, but also requiring more effort to read than a standard font.

Design and Procedures

An experimenter conducted sessions three days per week. For each student, we used an adapted alternating treatments design to compare learning when flashcards were presented in fluent font versus disfluent font. We adapted the alternating treatments design described by Sindelar et al. (1985) to include a no-treatment condition to assess for threats to internal validity including history effects, testing effects, and carryover effects.

Independent and dependent variables. The primary independent variable in this study was font type (fluent versus disfluent). The primary dependent variable was the number of acquired words. We considered a word acquired when it was read correctly, within 3 s, across two consecutive assessments. Thus, participants' could not begin acquiring words until after their second assessment. In order to compare the participants' learning across conditions, the experimenter recorded the cumulative fluent, disfluent, and no-treatment words acquired by each participant across sessions.

Pretesting. To obtain unknown words, the experimenter conducted three assessments across three days. For Sadie, we used fourth-grade Dolch words (e.g., few, rock, dream; "Dolch words—4th grade," n.d.). For Emily and Tom, we used words related to the courses in which they were currently enrolled. Emily's words pertained to human development (e.g., anorexia, hormonal, germinal; Santrock, 2013; Sigelman & Rider, 2012), and Tom's words pertained to biology and ecology (e.g., acidosis, glycemic, epidemiology; Mader, 2007; Shuster, Vigna,

Tontonoz, & Gunjan, 2014). Each participant's words were printed on index cards in 14-point Times New Roman font. During each assessment, the experimenter told the participant that he/she would be presented with words which he/she should try to read within 3 s. Then, the experimenter presented the flashcards to the participant in random order for 3 s each. Words read correctly in any session were considered known and removed from the pool. Pretesting procedures identified 63, 114, and 117 unknown words for Sadie, Emily, and Tom respectfully.

Next, we used stratified random assignment based on word length to assign the unknown words to three word sets. Three strata were created for each participant. For Sadie, these were 3 letter words, 4 letter words, and 5 letter words; for Emily and Tom, these were words with 5-8 letters, words with 9-12 letters, and words with 13-17 letters. For each student, an equal number of words from each strata was assigned to each word set (i.e., fluent, disfluent, and no-treatment). When a word was acquired a new word from the same strata was assigned. For example, Sadie initially had 8 words assigned to each condition, fluent, disfluent, and control. For each condition we assigned three 3-letter words, three 4-letter words, and two 5-letter words. When Sadie acquired a 3-letter word in the fluent condition, a new 3-letter word assigned to the fluent condition was randomly selected to replace the acquired word.

To ensure the participants could read the disfluent text, the experimenter also assessed each participant using five predetermined known words printed in disfluent text immediately following his or her last pretesting session. Sadie appeared surprised by the font change as she exclaimed, "What the heck!" following the presentation of the first disfluent word. Neither Tom nor Emily commented on the font change. All three students read all of the known words correctly within 3 s.

Alternating treatments. The alternating treatments phase consisted of 11, 12, and 9 sessions conducted over 24, 29, and 22 days for Sadie, Emily, and Tom, respectively. Each session included a treatment followed by an assessment. The experimenter printed instructional flashcards for each of the words. Each treatment session targeted 16 unacquired words: 8 fluent and 8 disfluent. Before implementing S-R-S learning trials, the 16 flashcards were placed in random order. Next, the experimenter ran S-R-S learning trials for each of the 16 words. This process was then repeated two more times. Thus, during each treatment session, each student completed 48 learning trials, with three trials for each word.

After the participant was seated the experimenter read the following instructions:

I am going to have you read some words on flashcards. Each time I show you a flashcard, try your best to read the word. After 3 seconds, I will read the word aloud and you will repeat the word. Then we will move on to the next word. Do you have any questions?

After a word was presented, if the student read the word correctly or incorrectly before the 3-s response interval expired, the experimenter immediately read the word aloud. If the student did not respond within the 3-s interval, the experimenter read the word when the interval expired. After the experimenter read the word, if the student did not repeat the word within 3 s, the experimenter prompted the student to repeat the word. Immediately after the student repeated the word the experimenter presented the next flashcard.

For Sadie and Tom, instruction time averaged 4 min 8 s and 4 min 11 s, respectively. Both Sadie and Tom immediately attempted to read each word and then repeated the word after it was stated by the experimenter. Neither Sadie nor Tom ever needed to be prompted to follow instructions. For Emily, instruction time averaged 7 min 36 s. Emily's average instruction time

was longer than that of the other students because Emily rarely stated any word aloud during the 3-s response interval. Also, in the first and fourth sessions Emily needed one prompt per session to repeat the word after the experimenter. No additional prompts were needed across students.

Sadie's fluent word list became exhausted after her seventh session; therefore, the experimenter began transferring words (9 total) from her no-treatment word set in the eighth session. None of Sadie's transferred words had been assessed after they were assigned to the no-treatment condition. Emily and Tom's initial word pools contained more words than Sadie's initial word pool; thus, it was not necessary to transfer no-treatment words during their interventions.

Following the completion of each treatment, the experimenter assessed the participants using procedures identical to pretesting (i.e., words printed in 14-point Times New Roman font, presented in random order, 3 s to read each word). The first assessment included 24 unknown words: the 8 words assigned to each treatment condition and the first 8 randomly sequenced no-treatment words. When a word was acquired (i.e., read correctly, within 3 s, across two consecutive assessments) it was removed from the treatment sessions and replaced with the next unknown word from that set. To provide opportunities to practice acquired words, all assessments included targeted words and previously acquired words. Consequently, the treatment always included 16 target words, but the number of words assessed increased as words were acquired.

Maintenance. An experimenter conducted two maintenance assessments. Although the students did not finish the alternating treatments phase at the same time, maintenance

assessments were conducted 17 and 19 days following each student's last treatment session. Only acquired words were assessed and procedures were identical to all other assessments.

Procedural Integrity and Interobserver Agreement

An independent observer scored procedural integrity (see Appendix E) and words read correctly within 3 s for a minimum of 33%, 36%, and 50% of the pretesting, alternating treatments, and maintenance sessions, respectively. Procedural integrity was 100%. To calculate interobserver agreement, for each assessment on a word-by-word basis, we divided the number of agreements on words read correctly by the number of agreements plus disagreements, and then multiplied by 100. Interobserver agreement ranged from 92% to 100% across sessions.

Results

Figures 1.1 through 1.3 display the cumulative number of words each student acquired across phases and conditions. Summative acquisition and maintenance data is displayed in Table 1.2. As we did not consider words to be acquired until they were read correctly within 3 s across two consecutive assessments, increases in words acquired did not occur until the second assessment.

Sadie showed immediate increases in fluent and disfluent words acquired after S-R-S flashcard learning procedures were applied (see Figure 1.1). Across the first 6 sessions, Sadie acquired more fluent than disfluent words; however, the difference in word acquisition was not consistent across sessions. Following the sixth treatment session, Sadie consistently acquired more fluent than disfluent words; thus, the separation in words acquired across the font formats grew over the final 5 sessions. These growing differences suggest that the fluent font resulted in greater word acquisition than the disfluent font (Yaw et al., 2014). Across the 10 sessions where

word acquisition was possible, Sadie acquired 23 fluent words (2.3 words per session), 14 disfluent words (1.4 words per session), and 1 no-treatment word. On both maintenance assessments (see Table 1.2), Sadie read 7/14 (50%) acquired disfluent words correctly and the 1 (100%) acquired no-treatment word correctly. Sadie read 14/23 (61%) and 15/23 (65%) acquired fluent words correctly on the first and second maintenance assessments, respectively. Thus, Sadie maintained at least 50% more fluent words than disfluent words.

Figure 1.2 shows that Emily immediately began acquiring fluent and disfluent words after S-R-S flashcard learning procedures were applied. When comparing fluent and disfluent words acquired, few differences were present across the first 6 sessions, but a growing separation favoring the fluent words took place across the final 6 sessions. Across the 11 sessions where word acquisition was possible, Emily acquired 28 fluent words (2.5 words per session), 21 disfluent words (1.9 words per session), and 0 no-treatment words. During the first maintenance assessment, Emily read 24/28 (86%) acquired fluent words correctly and 16/21 (76%) acquired disfluent words correctly (see Table 1.2). During the second maintenance assessment she read 26/28 (93%) acquired fluent words correctly and 18/21 (86%) acquired disfluent words correctly. Thus, Emily maintained at least 44% more fluent words than disfluent words.

Figure 1.3 displays the cumulative number of words Tom acquired across phases and conditions. Due to scheduling conflicts, Tom exited the study after the ninth session. Tom immediately began acquiring both fluent and disfluent words after S-R-S flashcard learning procedures were introduced. When comparing words acquired, no consistent differences emerged across fluent and disfluent conditions. Across the eight sessions where word acquisition was possible, Tom acquired 14 fluent words (1.8 words per session), 12 disfluent

words (1.5 words per session), and 0 no-treatment words. During both maintenance assessments, Tom read 10/14 (71%) acquired fluent words correctly (see Table 1.2). He read 9/12 (75%) acquired disfluent words correctly during the first maintenance assessment and 8/12 (67%) acquired disfluent words correctly during the second maintenance assessment. Thus, Tom's maintenance and word acquisition data are similar, as both suggest little difference in learning across the fluent and disfluent words.

Discussion

The increase in fluent and disfluent words acquired and the absence of, or small increase in no-treatment words acquired (i.e., Emily and Tom acquired zero no-treatment words, Sadie acquired one), suggests the S-R-S flashcard learning procedures, as opposed to an uncontrolled threat to internal validity, caused the students to learn both fluent and disfluent words (Sindelar et al., 1985). For example, if the students were acquiring words due to repeated assessments (i.e., testing effects), learning outside of the experiment (i.e., history effects), or if one of the treatments was causing the acquisition of words in the other set (i.e., carryover effects), we should have observed similar increases in the acquisition of no-treatment words (Skinner & Shapiro, 1989). All students demonstrated the ability to read acquired words after the intervention ceased (50% to 93% maintenance across conditions and students). Thus, the current study supports earlier researchers who demonstrated students with disabilities can acquire and maintain words using S-R-S flashcard learning procedures (e.g., Belfiore et al., 1995; Forbes et al., 2013; Orelove, 1982; Yaw et al., 2012).

When comparing the two treatments, all three students acquired and maintained more fluent than disfluent words. Visual analysis of the repeated measures graphs shows both Emily

and Sadie acquired more fluent words, and this difference favoring fluent words was consistent following the sixth treatment sessions, as evidenced by the two data sets showing growing divergences (Yaw et al., 2014). The third student, Tom, showed no consistent differences in word acquisition per session across the two font types. These findings, which suggest altering text from fluent to disfluent font had either no effect (see Tom's data) or a detrimental effect (see Sadie's and Emily's data) on acquisition and maintenance, do not support the hypothesis that altering text from fluent to disfluent enhances learning (e.g., Alter, 2013). However, additional studies are needed before any definitive conclusions are drawn.

The current study involved researcher-led, one-on-one S-R-S flashcard learning trials using fixed 3-s response intervals. Our findings cannot be generalized to other forms of isolated word instruction. Another limitation of the current study is we only measured acquisition and maintenance of isolated word reading. Researchers should consider conducting similar studies using more functional dependent variables. Teaching words in disfluent fonts could enhance students' ability to read words encountered in different contexts. For example, researchers may find students with intellectual disability are better able to read and understand acquired disfluent words when those words are embedded within connected text (e.g., a sentence or passage) or encountered in daily life (e.g., the word "women" carved into a plaque on a bathroom door).

Researchers have found training across multiple exemplars may enhance generalized responding (Stokes and Baer, 1977; Wunderlich, Vollmer, Donaldson, & Phillips, 2014). In the current study, learning was assessed using stimuli presented in Time New Roman font. During our S-R-S learning trials, each word was presented either in a single fluent font (Ariel) or a single disfluent font (Juice ITC font reduced to 70% transparency). Another direction for future

researchers would be investigating the use of different fonts during each S-R-S learning trial. For example, each session could include six trials per word and during each trial researchers could present the word in a different font. For such studies, dependent variables could include acquisition (e.g., reading the word correctly in the same font), maintenance, and generalization (e.g., reading the word correctly when presented in an unused novel font or different context).

The current study was conducted with only three adult students with intellectual disability, which is an important limitation because findings across studies support the need for further aptitude-treatment interaction research (French et al., 2013; Katzir et al., 2013). Cognitive load theories suggest proficient readers who expend fewer cognitive resources when reading material printed in standard font may benefit from the additional cognitive resources applied when text is altered to create disfluency (Sweller, 1988). Conversely, students with weaker aptitudes (e.g., weaker reading skills and/or cognitive abilities) may have to expend so much of their cognitive resources when reading standard fluent text, that the additional effort required to process disfluent text overburdens these limited resources and interferes with learning (LaBerge & Samuels, 1974; Perfetti, 1985; Wong, 1986). In the current study, the disfluent stimuli may have overburdened Emily and Sadie's cognitive resources, hindering their ability to learn the words presented in disfluent font (Wong, 1986). Future researchers may find altering text from fluent to disfluent only enhances learning after students have reached a critical level of skill development, which would be consistent with cognitive load theories that may explain the current finding (e.g., Sweller, 1988).

Despite the current findings, it would be premature to conclude all perceptual disfluency manipulations would be ineffective for the current participants. It is possible the disfluency

manipulation was not sufficient to cause an increase in sight-word acquisition, suggesting future researchers may want to conduct studies investigating a dosage-like effect. Also, researchers may find the degree of perceptual disfluency interacts with reading skill development or cognitive functioning. For example, a milder disfluency manipulation (e.g., 50% transparency) could be effective for less skilled readers while a stronger manipulation (e.g., 90% transparency) could hinder their learning.

Whereas previous researchers exposed students to intact printed passages or PowerPoint© slides and measured comprehension, recall, and recognition (e.g., French et al., 2013; Katzir et al., 2013), we used S-R-S flashcard learning trials to teach isolated words. Future researchers should investigate whether perceptual disfluency functions differently when students are reading for comprehension as opposed to learning sight-words. Additionally, although all of the students included in our study appeared to enjoy the intervention, social validity was not formally assessed, which is a limitation of this study which should be addressed in future research.

Conclusions

S-R-S learning trials have been used to enhance isolated word reading in students with disabilities (Belfiore et al., 1995; Forbes et al., 2013; Orelove, 1982; Yaw et al., 2012). Previous research on perceptual disfluency led us to conduct the current study in order to determine whether presenting words in a disfluent font could enhance word learning during S-R-S flashcard learning trials (French et al., 2013; Katzir et al., 2013). Unfortunately, this simple modification hindered learning in two of the students in our study, and did not result in any consistent learning differences in the third student.

The current study has heuristic value and suggests researchers investigating the generalizability or external validity of perceptual disfluency may be able to identify when perceptual disfluency can enhance learning and when it is detrimental to learning. Mixed results across previous studies in tandem with our current findings suggest a need for additional research investigating interactions among learner characteristics (e.g., levels of reading skill development), learning targets (e.g., word acquisition versus comprehension), and disfluency dosage in order to enhance our understanding of the causal mechanisms associated with perceptual disfluency manipulations. Until these studies are complete, our current results have applied value and suggest any attempt to improve learning in individuals with disabilities via altering perceptual fluency should be carefully evaluated; otherwise attempts to enhance learning could have the opposite effect.

Chapter III

Study II: Evaluating the Effect of Unfamiliar Diverse Names on Elementary Students' Reading Comprehension and Comprehension Rate

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Abstract

Multicultural education is designed to resolve inequity in education and improve the learning outcomes of all students. Elementary school multicultural reading curricula include diverse characters, and thus, diverse proper names. Diverse names are often unfamiliar and differ phonetically from students' native language. Therefore, they may be difficult for young students to read, and have the potential to increase cognitive load and/or create cognitive disfluency. The purpose of this study was to determine whether the presence of diverse names in grade-level reading passages impacts students' reading comprehension and reading comprehension rate. A mixed-factors experimental design was used to evaluate the effects of altering standard reading passages to include diverse names (i.e., names of Russian origin). Results indicated the presence of diverse names significantly reduced comprehension levels and rates in first- through third-grade students. Discussion focuses on a need for studies designed to validate strategies which familiarize students with difficult-to-read diverse words, allowing them to benefit from multicultural material without the risk of hindering reading outcomes.

Diversity in the United States is rapidly increasing. It is projected that 56 percent of the student population will consist of students of color by the year 2024 (U.S. Department of Education, 2016). Although many children spend their early years in enclaves that are culturally and ethnically isolated, in order to be successful global citizens, they must be able to interact with those who are different from themselves (Gay, 1994). Multicultural education challenges racism, prejudice, and ethnocentrism, and fosters value development and respect for diversity (Gay, 1994; Suh & Samuel, 2011). Children's beliefs about race are malleable, and prejudice and stereotyping can be reduced by discussions about race and ethnicity (Aboud & Doyle, 1996; Aboud & Fenwick, 1999). The utility of multicultural education as a means of reducing students' racial attitudes is supported by multiple studies (for meta-analysis, see Okoye-Johnson, 2011).

In addition to social outcomes, multicultural education may improve academic outcomes and critical thinking skills (Gurin et al., 2002; Zirkel, 2008). There are significant achievement gaps between white students and students of color (Hemphill & Vanneman, 2010; Vanneman, Hamilton, Baldwin Anderson, & Rahman, 2009), and Anglocentric school environments likely contribute to this disparity. For education to be relevant it must be connected to students' life experiences and perspectives, and yet schools often mirror Anglocentric cultural values (Gay, 1994). Multicultural education is designed to remedy this inequity and improve the academic achievement of students of color (Zirkel, 2008). As teaching and learning are cultural processes, multicultural education should make education more personally meaningful, socially applicable, culturally accurate, and pedagogically solid (Gay, 1994).

Multicultural education provides benefits across ethnicities and races (Zirkel, 2008). It fosters self-understanding, and strengthens self-concept and ethnic identity (Gay, 1994). Further,

students of color with strong and positive racial identities have greater academic self-confidence, perceive school as more important, are more likely to graduate from high school, and are more likely to attend college than peers whose racial identity is not strong and positive (Chavous et al., 2003).

The Importance of Names

Both general and multicultural elementary school literature curricula include names. Names are critical to identity, and naming practices reflect cultural ideals and norms (Souto-Manning, 2011). Although naming practices across cultures are diverse, anthropological researchers have determined that there are some important universal naming principals, including classification (e.g., identifying one's parents or geographical origin) and differentiation (Alford, 1988).

Names also hold significant influence. For instance, social psychologists have found individuals view letters included in their own names as more attractive than letters not included in their names (Nuttin, 1985), an effect which remains stable across many linguistic and ethnographic communities (Nuttin, 1987). Infrequent or unusual names tend to be labeled undesirable (Bredart, Brennen, & Valentine, 1996). Further, researchers have found first names considered unusual and unattractive to be associated with harsher school grading than names considered common and attractive (Erwin & Calev, 1984; Harari & McDavid, 1973).

Cognitive Disfluency

The most prevalent and least studied element of multicultural education is the inclusion of multicultural content in the curriculum (Zirkel, 2008). Multicultural reading curricula include diverse literature, and thus, diverse proper names and terms. The inclusion of multicultural

literature has many benefits such as a heightened understanding of diverse culture, precipitating critical conversations about oppression (Souto-Manning, 2011), and helping children to strengthen their identities (Peterson et al., 2015). However, unfamiliar diverse names included in multicultural literature curricula can be difficult for students to read and have the potential to impact reading fluency and comprehension.

Some researchers have suggested simplified learning materials enhance learning by decreasing cognitive load, or the amount of cognitive resources required to process information (e.g., Sweller, 1988; Sweller & Chandler, 1994). Others suggest altering learning materials to increase cognitive disfluency (decrease the ease of processing) can lead to better learning outcomes by signaling the learner to process information more deeply (e.g., Atler, 2013; Bjork, 1994; McDaniel & Butler, 2010). Because diverse names are often difficult to read, they have the potential to introduce cognitive disfluency, particularly in novice readers whose basic reading skills have not yet become automated (LaBerge & Samuels, 1974; Perfetti, 1985). Thus, the current study was designed to extend research on cognitive disfluency to elementary school students reading passages including diverse names. Specifically, a mixed-factors experimental design was used to evaluate the effects of unfamiliar diverse names on reading comprehension and reading comprehension rate in 74 first- through third-grade students.

Method

Participants and Setting

Participants included 74 students from a rural southeastern elementary school. The student body of the school was predominantly Caucasian, 76%, followed by Hispanic, 15% (National Center for Education Statistics [NCES], 2016). The participants in our sample were

enrolled in first, second, and third grade (n = 28, n = 28, and n = 18, respectively); 34 participants were female and 40 participants were male. Seven participants were receiving speech, English language, or special education services at the time of the study. Procedures were conducted on two days in May at the end of the spring semester. Experimenters worked individually with participants in a quiet room.

Materials and Measures

Two passages per grade (a total of six passages) were selected from the 2008-2009 Texas Primary Reading Inventory Development Study (Texas Education Agency, 2010) for use in this study. The passages were selected based on data provided by Ciancio et al. (2015) indicating similarities in comprehension accuracy (percent questions correct) and comprehension rate scores (percent questions correct per minute spent reading), and also based on appropriateness for the study (i.e., the inclusion of names). Passages for each grade were adapted to be similar lengths and balanced to include the same number of names.

Each passage had nine associated factual and inferential comprehension questions and a scoring rubric, which we used to measure reading comprehension and comprehension rate (also adapted from the Texas Primary Reading Inventory Development Study; Texas Education Agency, 2010). The questions were open-ended and measured three variations of comprehension. “Right There” questions simply required recalling information explicitly provided within the passage, “Think and Search” questions required recalling information explicitly provided while also making connections among information provided across sentences, and “Author and You” questions required making inferences about information that

was not explicitly provided (Ciancio et al., 2015). Responses to the comprehension questions were scored via a rubric listing correct answers (see Appendix C).

For each standard passage we developed an experimental version by substituting simple, commonly used names with unfamiliar Russian names. For example, in the experimental version of one of the second-grade passages, we used the name Aristarkh to replace the name Adam (see Table 2.1, for a list of all names by passage and condition). We chose Russian names because this population is very limited in our geographic area; thus, the participants in our sample were unlikely to be familiar with names of this origin. Each participant read both grade-level passages; one passage in the standard version and one passage in the experimental version. To protect internal validity, passages were counterbalanced and passage combinations were randomly assigned to participants. Appendix C includes the experimental version of each passage, the associated comprehension questions, and rubric listing possible correct answers.

Dependent Variables

The primary dependent variables in this study are reading comprehension (i.e., percent correct) and reading comprehension rate (i.e., percent correct per minute). Reading comprehension was calculated by dividing the number of comprehension questions each participant answered correctly by the total number of comprehension questions and then multiplying that number by 100. Reading comprehension rate was calculated by multiplying each participant's reading comprehension score by 60, and then dividing by seconds spent reading.

Procedures

Passages were administered individually to each participant by school psychology PhD students. Most experimenters had prior experience administering and scoring brief reading probes. All experimenters received additional training during two training sessions prior to beginning the study. During procedures, the experimenters audio recorded each participant as they read the passages and answered comprehension questions.

Participants were individually pulled from their classrooms for data collection, which took place in a quiet room. Each participant read two passages, one standard and one experimental. The order in which the reading conditions were presented was randomly assigned to participants. Experimenters read the following standard instructions to participants:

> *Please read this story out loud. The title of the story is_____. If you get stuck, I will tell you the word so you can keep reading. When you finish reading, I will ask you questions about what you read, so do your best reading. Start here (experimenter points to the first word of the passage). Begin.*

The experimenter started a stopwatch when the participant began to read. As the participant read, the experimenter recorded errors using standard oral reading fluency assessment procedures (e.g., Good & Kaminski, 2002). If the participant paused for more than 3 seconds, the experimenter provided the word. If the participant paused for more than 3 seconds on a proper name, the experimenter provided the name once; if this happened again, the experimenter instructed the participant to go on to the next word.

Prior to beginning the study two exclusionary criteria were established to reduce frustration in participants with weak reading skills. If a participant could not read any of the

words in the first line of the passage correctly, or did not finish reading the passage in 10 minutes, procedures were halted. No participants met either exclusionary criterion.

After the first passage was completed, the experimenter recorded the number of seconds it took the participant to read the passage and then immediately administered the associated comprehension questions. The participant verbally answered the 9 open-ended comprehension questions without referring back to the passage, while the experimenter recorded the participant's answers. This procedure was immediately replicated for the second passage.

Answers to the comprehension questions were scored using the rubrics provided in Appendix C. To maintain consistency in scoring across participants, when a participant provided an answer not listed in the rubric, it was recorded for later review.

Interscorer Agreement and Procedural Integrity

To obtain an estimate of interscorer agreement on participants' reading speeds, total words read correctly, and comprehension accuracy, a second experimenter observed 29% of the sessions (21 of 73) and independently scored seconds spent reading, words read correctly, comprehension accuracy, and recorded the primary experimenter's procedural integrity (see Appendix E for procedural integrity checklists). Pearson product-moment correlations between the primary and secondary experimenter's scores were calculated for these cases. The correlation for seconds spent reading was $r = 1.00$ for both the standard and experimental conditions. The correlation between the two raters for words read correctly was also $r = 1.00$ for both conditions. The correlation for comprehension accuracy was $r = .99$ for both conditions.

Participants provided 56 comprehension question answers that were not listed on the rubric. For these cases, two experimenters independently scored comprehension accuracy. They

agreed on 54 out of 56 of these cases (96%). The procedural integrity data indicated the procedures for each condition were administered correctly by each experimenter (e.g., in correct order; standard instructions), 100% of the time.

Results

Before analyses were conducted, the data were screened for missing or faulty scores. One case was excluded due to missing data from the experimental passage. The remaining 73 cases were included in all analyses. To correct for multiple comparisons, Bonferroni adjusted alpha levels of .025 were used to determine statistical significance (Bland & Altman, 1995). A standardized effect size for mean differences, Cohen's *d* (Cohen, 1988), was computed for each significant effect.

Descriptive Statistics

Descriptive statistics were calculated by passage and condition for the participants' reading speed, words read correctly (including and excluding name errors), reading rate, reading comprehension, and reading comprehension rate (see Tables 2.2 – 2.7). Table 2.2 displays the participants' reading speed for the standard and experimental conditions, defined as seconds spent reading the passage. As expected, the overall mean reading speed for the standard passages (M = 168.48 s) was faster than the overall mean reading speed for the experimental passages (M = 220.55 s).

Table 2.3 displays the number of words the participants read correctly in each condition (WRC). The overall mean number of words read correctly was higher in the standard condition (M = 193.15 WRC) than the experimental condition (M = 174.22 WRC); thus, the participants made more errors when reading the experimental passages. However, when the errors they made

on names were excluded, the mean number of words the participants read correctly in each condition was nearly equivalent (*M* = 196.12 WRC and *M* = 195.85 WRC for the standard and experimental conditions, respectively; see Table 2.4). This indicates the difference in the number of errors across conditions is accounted for by errors made on diverse names.

Table 2.5 displays the participants' reading rate, defined as the number of words read correctly per minute spent reading (WCPM). The participants' overall mean reading rate scores were higher in the standard condition (*M* = 81.25 WCPM) than the experimental condition (*M* = 52.85 WCPM), indicating the participants read more words correctly per minute spent reading the standard passages than the experimental passages. Table 2.6 displays participants' reading comprehension (percent comprehension questions correct; % QC) in each condition. As expected, the overall mean percentage of comprehension questions the participants answered correctly was higher for the standard passages (*M* = 71.84% QC) than the experimental passages (*M* = 60.43% QC), indicating the participants comprehended more of the standard passages than the experimental passages. Reading comprehension rate scores, or the percentage of questions answered correctly per minute spent reading (QCPM), are displayed in Table 2.7. As expected, the participants' mean reading comprehension rate (see Table 2.7) was also higher for the standard passages (*M* = 33.03% QCPM) than the experimental passages (*M* = 20.31% QCPM).

Reading Comprehension

A 2x3 mixed-factors ANOVA was used to test the effects of the two passage types on the participants' reading comprehension, or percent comprehension questions answered correctly across the three grades. Results revealed a main effect for passage type, indicating reading comprehension was significantly higher on the standard passages than the experimental passages,

$F(1,70) = 9.35$, $p = .003$ (see Figure 2.1). The standardized effect size for the mean difference was moderate ($d = 0.52$) and suggests meaningful differences in reading comprehension between passage types. There was not a significant interaction between passage type and grade, $F(2,70) = 0.26$, $p = .771$, indicating the means fell along a similar pattern across all three grades, with higher reading comprehension scores for standard passages than experimental passages. There was also not a main effect for grade, $F(2,70) = 0.11$, $p = .893$, indicating the participants performed similarly across passage types, regardless of grade.

Reading Comprehension Rate

A second 2x3 mixed factors ANOVA was used to test the effects of passage type on participants' reading comprehension rate, or percent comprehension questions answered correctly per minute spent reading. Results revealed a main effect for passage type, indicating reading comprehension rate was significantly higher on the standard passages than the experimental passages, $F(1,70) = 37.12$, $p < .001$ (see Figure 2.2). Again, the standardized effect size was moderate ($d = 0.77$), suggesting meaningful differences in reading comprehension rate between passage types. There was not a significant interaction between reading comprehension rate and grade, $F(2,70) = 0.16$, $p = .849$, indicating there were consistent differences between reading comprehension rate when reading standard verses experimental passages across grades. There was also not a main effect for grade, $F(2,70) = 3.86$, $p = .026$, suggesting regardless of grade, the participants performed similarly across passage types. Note, if we had not used conservative, Bonferroni adjusted alpha levels (.025) to correct for multiple comparisons, the grade effect would be considered significant; regardless, the purpose of this study is not to evaluate grade differences in reading ability.

Discussion

For the participants in our sample, there were significant differences between the two passage types favoring the standard passages for both reading comprehension and reading comprehension rate. Standardized effect size calculations indicated moderate effect sizes, which indicate meaningful differences which Cohen (1969) described as large enough to be discerned by the naked eye. If we assigned a standard letter grade to our participants' reading comprehension scores, the average student would have earned a grade of C on the passage including common names, and a grade of D on the passage including unfamiliar diverse names. As the standard and experimental version of each passage was equivalent except the included names, the passage combinations were randomly assigned to participants, and the passages were counterbalanced so that approximately the same number of participants received the experimental and the standard version of each passage, the current findings indicate reading comprehension and reading comprehension rate were significantly hindered by the presence of the diverse names.

Thus, our findings do not support the hypothesis that increasing cognitive effort by introducing disfluency (e.g., making text more difficult to read) improves learning (e.g., Alter, 2013; Alter et al., 2007). Conversely, our findings are in line with automaticity models of reading suggesting novice readers, whose basic reading skills have yet to become automated, have less cognitive resources available to apply to higher-order skills such as comprehension (LaBerge & Samuels, 1974; Perfetti, 1985; Wong, 1986). Thus, the differences in our participants' reading comprehension and comprehension rate between conditions may indicate

the unfamiliar diverse names overburdened the cognitive resources of our first- through third-grade participants (Sweller, 1988; Sweller & Chandler, 1994).

As reading fluency is linked to reading comprehension (Fuchs et al., 2001; Reschly et al., 2009), the lower comprehension and comprehension rate scores on the experimental passages could also be related to diverse names hindering reading fluency. Our descriptive statistics indicated the participants were able to read the standard passages more quickly (mean difference = 52 s) and with less errors (i.e., with better fluency). Participants read an average of 18.9 more words correctly in the standard passages than the experimental passages. However, when we subtracted errors made when reading names, the mean number of words the participants read correctly in each condition was nearly equivalent (mean difference = 0.3 WRC). This indicates the additional errors made on the experimental passages were almost exclusively errors made when reading the diverse names.

The current study has several additional limitations. The number of letters and syllables in the names included in the standard and experimental passages was not balanced. The names in the experimental passages were longer and included more syllables then the names in the standard passages, and as such, automatically took longer to read. Future researchers should investigate whether these effects are still present when names are matched according to number of syllables or time required to read. Further, as our study only included Russian names, and phonetic features and rules differ across languages, future researchers should explore whether these effects are still present when names of other origins are used.

Another limitation to this study is the lack of multicultural passages. We chose to use passages from the 2008-2009 Texas Primary Reading Inventory Development Study (Texas

Education Agency, 2010) because of evidence supporting similarities in reading comprehension and reading comprehension rate scores. Although the names included in the experimental passages were diverse, the content of the passages was not; therefore, the passages are not authentic to the material included in multicultural curricula. Future researchers should consider evaluating reading outcomes when standard passages are matched to passages from authentic multicultural children's literature.

Despite the limitations of the current study, it has important applied implications. The world is becoming increasingly interdependent and diversity in the United States continues to grow. There is a need to resolve inequity in education and to foster students' ability to interact competently with diverse individuals. However, our findings indicate unfamiliar diverse names, which are included in multicultural learning materials, can cause reading difficulties. Future researchers should continue to evaluate how reading outcomes relate to unfamiliar diverse names and words.

If these words affect reading negatively, interventions mitigating negative effects need to be developed and validated. For instance, researchers may find using time delay procedures or narratives to teach students unfamiliar names alleviates any undesirable effects on reading outcomes. As fluent reading supports comprehension (Reschly et al., 2009), researchers should specifically consider investigating pre-teaching interventions designed to teach students to read diverse names fluently. Such studies could provide teachers with efficient tools to prepare their students to read unfamiliar words included in diverse material, allowing students to experience the far-reaching benefits of multicultural education without the risk of hindering reading.

Chapter IV

Study III: A Pre-Teaching Intervention for Unfamiliar Diverse Names in Children's Literature

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Abstract

Children's literature may contain unfamiliar diverse names which can hinder reading comprehension and comprehension rate. The current study was designed to evaluate a possible remedy to this problem. Before our second-grade participants read a grade-level passage including diverse names, we used a computerized flashcard reading intervention to pre-teach the names. Additionally, participants were shown pictures of the characters while the characters were briefly described. Between-subjects analysis revealed pre-teaching the unfamiliar diverse names significantly enhanced the reading comprehension of our participants, but did not affect their reading comprehension rate. Discussion focuses on developing and validating procedures that enhance students' ability to benefit from multicultural reading curricula.

Multicultural education increases familiarity with diverse cultures to foster inclusiveness and help students grow into successful global citizens. Reading stories which include characters with diverse names can help students explore and strengthen their identities (Peterson, Gunn, Brice, & Alley, 2015). However, diverse names often are unfamiliar, and phonetic features and rules differ across languages; thus, these names can be difficult for students to read. While some researchers have found increasing the complexity of learning materials can improve learning (Atler, 2013; Bjork, 1994), most hold that simplifying materials supports learning by reducing cognitive load (Allington, 2009; National Reading Panel, 2000).

In Study II, we presented first- through third-grade students with two passages, one standard passage containing simple common names, such as Adam, and one experimental passage containing unfamiliar Russian names, such as Agafya. We found students' reading comprehension and reading comprehension rate was significantly higher on the standard passages than the experimental passages. As diverse material has been found to benefit students in multiple ways, including reducing prejudice, enhancing respect for diversity, strengthening identity, and improving engagement (Gay, 1994; Okoye-Johnson, 2011; Suh & Samuel, 2011; Zirkel, 2008), we wanted to develop a remedy to the reading problems we found to be associated with diverse names. Thus, the current study was designed to evaluate the effectiveness of a pre-teaching intervention for unfamiliar diverse names.

Time Delay Instruction

Research supports a link between reading fluency and reading comprehension (Fuchs, Fuchs, Hosp, & Jenkins, 2001; Reschly et al., 2009). For children to learn to read words fluently, it sometimes is necessary for them to practice those words in isolation (Carnine, Silbert,

Kame'enui, & Tarver, 2004). Time delay is an evidence-based practice that is used to enhance isolated word reading outcomes such as acquisition, maintenance, and generalization (Belfiore, Skinner, & Ferkis, 1995; Browder, Ahlgrim-Delzell, Spooner, Mims, & Baker, 2009; Browder & Xin, 1998; Cuvo & Klatt, 1992; Yaw et al., 2012).

When constant time delay (CTD) is used to teach students words in isolation, the words may be presented on flashcards. Initially, a zero-delay trial, where the word is presented on a flashcard and simultaneously read aloud by the instructor, is used to provide the student with the correct pronunciation of the word (Browder & Xin, 1998). In additional trials, presentation of the word is followed by a fixed interval for the student to respond by reading the word (e.g., Black et al., 2016). After the student responds by reading the word, or the interval expires, a second stimulus is provided (e.g., feedback indicating that the response was correct or providing the correct word if the response was incorrect or absent). After the second stimulus, the student can be required to repeat the word a second time, which enhances learning by increasing rates of accurate academic responding and the probability that the student's final response to the stimulus is correct (Skinner & Smith, 1992). As time delay trials are repeated with the same words, these response prompting procedures eventually transfer stimulus control from the verbal prompt (e.g., the instructor reading the word) to the printed word (Browder et al., 2009; Demchak, 1990).

Computerized Flashcard Reading Interventions

To increase the integrity of CTD word learning trials and reduce the time required for teachers to administer such procedures, target words can be presented on a computer (i.e., computerized flashcard reading; CFR). Multiple researchers have used CFR intervention programs to successfully teach sight words to students (e.g., Cazzell, Skinner, et al., 2016;

Cazzell, Taylor, et al., 2017; Hilton, Hopkins, Skinner, & McCane-Bowling, 2011; Kodak, Fisher, Clements, & Bouxsein; Yaw et al., 2011; Yaw et al., 2012). These intervention programs involve the presentation of the stimulus word on the computer screen, followed by an interval for the student to respond, followed by an audio presentation of the stimulus word, followed by a second response interval (Cazzell, Skinner, et al., 2016; Cazzell, Taylor, et al., 2017). CFR programs enhance learning by providing relatively immediate feedback and prompting high rates of responding (Hilton et al., 2011; Kodak et al., 2011; Worsdell et al., 2005).

Purpose

In Study II, we found early elementary students' reading comprehension and reading comprehension rate was hindered by the presence of unfamiliar diverse names in grade-level reading passages. The purpose of the current study was to investigate a possible remedy to this problem. We used an evidence-based intervention (i.e., constant time delay) presented via computerized flashcards, and a brief description with pictures, to familiarize students with the diverse names before they read them embedded within text. Specifically, we used a between-subjects design to evaluate and compare the reading comprehension and reading comprehension rate of students who received the pre-teaching intervention before reading a passage with diverse names, to that of students who did not receive the intervention before reading that passage.

Method

Participants and Setting

The participants in this study were 67 second-grade students from two rural southeastern elementary schools (30 participants from school A; 37 participants from school B). The student body of both schools was predominately Caucasian, 76% for school A and 95% for school B

(NCES, 2016). Approximately 50% of the participants were male (*n* = 33) and 50% were female (*n* = 34). Five of the participants were receiving speech, special education, or English language services from their school at the time of the study. Procedures took place within the schools, on two days in the fall of 2017. All procedures were conducted by experimenters working individually with participants in a quiet room.

Materials and Measures

Passage and comprehension questions. The experimental passage, associated comprehension questions, and scoring rubric from Study II, titled "New Friend," were used in this study. These materials were adapted from the 2008-2009 Texas Primary Reading Inventory Development Study (Texas Education Agency, 2010). All participants read the "New Friend" passage including diverse names and answered the nine associated factual and inferential comprehension questions, which were used to measure reading comprehension and reading comprehension rate. The questions were open ended and scored using a rubric listing possible correct answers. A detailed description of the questions and rubric are provided under the materials and measures subheading in Chapter III. Additionally, the New Friend passage, comprehension questions, and rubric are included in Appendix C.

Pre-teaching intervention. We developed an intervention to pre-teach the three names in the passage to half of the participants (randomly assigned), before they read the passage and answered the comprehension questions. The intervention consisted of a CFR program using CTD procedures to teach the names in the passage, and a brief description with clipart pictures to introduce the gender of the characters in the passage. All participants in the pre-teaching

condition completed the intervention one-on-one with an experimenter, prior to reading the passage. Intervention procedures took approximately 6 minutes.

CFR program. We created the CFR program using Microsoft® PowerPoint® and a personal laptop. Similar programs have successfully been used by previous researchers to teach sight words to participants (Cazzell, Skinner, et al., 2016; Cazzell, Taylor, et al., 2017; Hilton et al., 2011; Hopkins, Hilton, & Skinner, 2011; Yaw et al., 2011; Yaw et al., 2012). The CFR program consisted of 15 zero-delay trials (5 trials for each of the three names) followed by 15, 3-s fixed-interval trials (again, 5 trials per name). In the zero-delay trials, each name appeared on the screen and an audio recording of the name played simultaneously (e.g., Katenka appeared on the screen and the participant simultaneously heard "Katenka" read aloud by the computer), then there was a 3-s delay for the participant to repeat (i.e., practice) the name before the next name appeared. These zero-delay trials were included so the participants would not have the opportunity to respond incorrectly to the name before hearing the correct pronunciation (Browder et al., 2009).

In the 3-s fixed-interval trials, the name appeared on the screen, there was a 3-s pause for the participant to read the name, the audio recording played, there was an additional 3-s pause for the participant to repeat the name (e.g., Katenka appeared on the screen, the participant read Katenka, the participant heard Katenka read aloud, the participant repeated Katenka), and then the process was repeated with the next name. The initial fixed interval allowed the participant 3 s to practice reading each name independently before the recording of the name was played. The later fixed interval gave the participant an additional opportunity to practice the name before the next name appeared. During all of the CTD trials (both zero-delay and 3-s fixed-interval),

participants were required to repeat the name after hearing the audio recording in order to increase the number of accurate responses as well as the probability that the last response to the names was accurate (Skinner & Smith, 1992).

Description and pictures. In addition to the CFR program, a clipart picture (approximately 3 x 5 in) representing each character was printed on a letter-sized piece of paper (3 total; see Appendix D). Each of these pieces of paper included the black and white clipart picture, and the character's name printed in bold, 48-point Arial font. The purpose of the pictures was to help participants identify the gender of the characters in the passage.

Dependent Variables

This study included two primary dependent variables, reading comprehension and reading comprehension rate. Both variables were measured via nine open-ended comprehension questions scored with a rubric (see Appendix C). The questions and rubric were adapted from the Texas Primary Reading Inventory Development Study (Texas Education Agency, 2010), and a detailed description of both is provided under the materials and measures subheading in Chapter III. Reading comprehension was calculated by dividing the number of comprehension questions each participant answered correctly by the total number of comprehension questions and then multiplying that number by 100. Reading comprehension rate was calculated by multiplying each participant's reading comprehension score by 60, and then dividing by seconds spent reading.

Procedures

Pre-teaching procedures, passages, and comprehension questions were administered individually to each participant by school psychology PhD students. All experimenters had

previous experience administering and scoring brief reading probes, and they received training in study procedures prior to beginning the study. The participants were individually escorted from their classrooms for data collection, which took place in a quiet room. The experimenters' audio recorded each participant as they completed the pre-teaching procedures (pre-teaching condition only), read the passage, and answered comprehension questions.

Pre-teaching procedures (pre-teaching condition only). Half of the participants (randomly assigned; $n = 34$) received the pre-teaching intervention immediately before reading the passage. Each participant in the pre-teaching condition completed the CFR program one-on-one with an experimenter, and was then presented with the pictures of the characters (see Appendix D) while the experimenter stated each character's gender. Prior to beginning the CFR program, the participant was given the following instructions:

> *This computer is going to teach you the names of the characters in a story you are about to read. It will show you each name and read it aloud to you; then, you will repeat the name.*

Then, the computer presented 15 zero-delay learning trials for the three names included in the pre-taught experimental passage, in random order (i.e., each name was presented 5 times total). After the participant completed the zero-delay trials, they were given additional instructions:

> *Now the computer is going to show you the names again. This time, try to read the name before the computer says it. Then, after the computer says the name, you will say the name again. So you say the name before and after.*

The computer then presented an additional 15 learning trials (5 trials per name, in random order), this time using 3-s fixed-intervals. Thus, each participant completed a total of 30 learning trials in all, 10 per name.

Next, the experimenter told the participant they would show them pictures of the characters in the story. The experimenter presented one picture at a time, stating:

Lidochka is a girl in the story (picture one).

Katenka is a woman in the story (picture two).

Annushka is a girl in the story (picture three).

The last picture concluded the pre-teaching procedures and was immediately followed by presentation of the New Friend passage.

Passage and comprehension question procedures (pre-teaching and no pre-teaching condition). Regardless of their assigned condition, all participants read the same single passage including diverse names (i.e., New Friend) and answered the associated comprehension questions. The New Friend passage, questions, and scoring rubric is provided in Appendix C. The exact procedures from Study II were used to administer the passage and comprehension questions. Thus, participants received standard instructions and their reading was evaluated using typical oral reading fluency assessment procedures. If the participant paused for more than 3 s on a name, they were given the name only once; if they paused on that name again, they were asked to go on to the next word. Comprehension questions were answered orally without referring back to the passage and scored by a rubric (Appendix C). An in-depth description of the procedures used for the passage and comprehension questions is provided in Chapter III under the procedures sub-heading.

To reduce frustration in participants with weak reading skills, the two exclusionary criteria used in Study II also were used in this study. If a participant could not read any words in the first line of the passage correctly, or did not finish reading the passage in 10 minutes, procedures were halted. No participants met either exclusionary criterion.

Interscorer Agreement and Procedural Integrity

To estimate interscorer agreement on the participants' reading speeds, total words read correctly, and comprehension accuracy, a second experimenter listened to the audio recordings of 30% of the sessions (10 sessions from each condition, 20 of 67 sessions total), and independently scored seconds spent reading, words read correctly, and comprehension accuracy. Pearson product-moment correlations between the two experimenter's scores were calculated for these cases. For seconds spent reading, the correlation was $r = 1.00$ for both conditions. The correlation between the two raters for words read correctly was $r = .99$ and $r = .95$ for the pre-teaching and no pre-teaching conditions, respectfully. For comprehension accuracy, correlations were $r = .96$ and $r = .97$ for the pre-teaching and no pre-teaching conditions, respectfully.

The second experimenter also evaluated the primary experimenter's procedural integrity using a checklist designed to measure whether procedures were correctly administered (see Appendix E for experimental protocols). The procedural integrity data indicated that all experimenters administered both conditions correctly (e.g., delivered procedures in order; provided standard instructions) 100% of the time. Participants provided 21 comprehension question answers that were not listed on the rubric. For these cases, two experimenters independently scored comprehension accuracy, and agreed on 19 out of 21 cases (90%).

Results

The data were screened for missing or faulty scores before analyses were conducted, none of which were found. All 67 cases were included in all analyses. To correct for multiple comparisons, Bonferroni adjusted alpha levels of .025 were used to determine statistical significance (Bland & Altman, 1995). A standardized effect size for mean differences, Cohen's *d* (Cohen, 1988), was computed for each significant effect.

Descriptive Statistics

Descriptive statistics by condition were calculated for participants' reading speed, words correctly (including and excluding name reading errors), reading rate, reading comprehension, and reading comprehension rate (see Table 3.1). Reading speed was defined as seconds to read the passage. The participants' mean reading speed was similar in both the pre-teaching (*M* = 237.15 s) and the no pre-teaching conditions (*M* = 234.15 s). The mean number of words participants read correctly (WRC) was higher in the pre-teaching condition (*M* = 209.09 WRC) than the no pre-teaching condition (*M* = 197.09 WRC). Participants in the pre-teaching condition made an average of approximately 12 fewer word reading errors than participants in the no pre-teaching condition. However, when excluding errors made on names (calculated by adding the number errors made on names to the number of words read correctly), mean number of words read correctly was similar across conditions (*M* = 223.21 WRC in the pre-teaching condition, *M* = 220.94 WRC in the no pre-teaching condition). This indicates increased number of errors made by participants in the no pre-teaching condition is largely accounted for by errors made on names.

The participants' mean reading rate scores (i.e., number of words read correctly per minute spent reading; WCPM) were also similar across conditions (*M* = 61.94 WCOM and *M* = 58.78 WCPM for the pre-teaching and no pre-teaching conditions, respectfully). Thus, the participants read a similar number of words correctly per minute spent reading regardless of whether or not they received the pre-teaching intervention. Reading comprehension scores (i.e., percentage of comprehension questions answered correctly; % QC) were higher in the pre-teaching condition (*M* = 81.05% QC) than the no pre-teaching condition (*M* = 65.32% QC), indicating participants who received the pre-teaching intervention comprehended more of the passage than participants who did not receive the intervention.

Reading comprehension rate was defined as the percentage of comprehension questions answered correctly per minute of reading time (QCPM). Mean reading comprehension rate scores were similar across conditions (*M* = 24.19% QCPM and *M* = 19.85% QCPM for the pre-teaching and no pre-teaching conditions, respectfully). Therefore, participants answered a similar number of comprehension questions correctly per minute of reading time regardless of whether they received the pre-teaching intervention.

Reading Comprehension

Reading comprehension was defined as the percentage of comprehension questions answered correctly. Within each group, boxplot analysis indicated no outlying reading comprehension scores. Scores were normally distributed across conditions. For pre-teaching, skewness = -.235, *SE* = .403 and kurtosis = -.728, *SE* = .788. For no pre-teaching, skewness = -.202, *SE* = .409 and kurtosis = -.714, *SE* = .798. Normal distribution of scores was also supported by visual inspection of Normal Q-Q Plots. As Levene's test indicated the assumption

of homogeneity of variances was violated (p = .021), we used a Welch (1947) t-test to compare participants' reading comprehension scores across conditions.

Participants in the pre-teaching condition answered a mean of 81% (SD = 13%) comprehension questions correctly, while those in the no pre-teaching condition answered a mean of 65% (SD = 21%) correctly. This difference was statistically significant, $t(52.445) = 3.71$, p = .001 (see Figure 3.2). Further, the standardized effect size for the mean difference was large (d = .91), suggesting the pre-teaching intervention was practically useful for increasing reading comprehension.

Reading Comprehension Rate

Reading comprehension rate was defined as the percentage of comprehension questions answered correctly per minute spent reading. Reading comprehension rate scores were normally distributed for the pre-teaching condition (skewness = .986, SE = .403; kurtosis = .734, SE = .788), and for the no pre-teaching condition (skewness = .615, SE = .409; kurtosis = -.586, SE = .798). Visual inspection of Normal Q-Q Plots also indicated scores were normally distributed for both conditions. Boxplot analysis revealed one outlier (a participant in the pre-teaching condition who achieved a high score; see Figure 3.1). After rescoring the audiotape for this participant and determining the data point was genuine (i.e., an accurate score rather than a data entry or measurement error), we decided to include all data from this case in our analysis. Further exploration confirmed excluding the outlier would not affect the significance of our statistical analysis. As the assumption of homogeneity of variances was not violated (p = .940; determined via Levene's test), an independent samples t-test was used to compare participants' reading comprehension rate across conditions.

In the pre-teaching condition, participants' mean reading comprehension rate was 24% (*SD* = 11%). This indicates for each minute spent reading, this group answered 24% of the comprehension questions correctly. In the no pre-teaching group, reading comprehension rate was 20% (*SD* = 11%). Analysis indicated these differences were not statistically significant, $t(65) = 1.61$, $p = .113$ (see Figure 3.3).

Discussion

The students in our sample who received the pre-teaching intervention comprehended significantly more of the passage than the students who did not receive the intervention. Further, the effect size was large, suggesting our intervention has a high degree of practical value. As all of the participants read the same passage, and the pre-teaching and no pre-teaching conditions were randomly assigned to participants, the current results suggest the pre-teaching intervention, as opposed to an uncontrolled threat to internal validity, enhanced reading comprehension. There were no significant differences in reading comprehension rate scores between the two groups. These findings have implications related to theory and practice.

There are several reasons pre-teaching diverse names could enhance reading comprehension. For instance, pre-teaching could improve students' reading speed and accuracy (i.e., fluency), which is associated with reading comprehension (e.g., Allington, 2009; Perfetti, 1985; Reschly et al., 2009). However, descriptive statistics indicated our participants' reading speed and reading rate were similar regardless of whether they received the pre-teaching intervention (mean difference of 3 s for reading speed; 3 WCPM for reading rate). Thus, our current findings do not indicate the statistically significant increases in reading comprehension where related to enhancing reading speed or fluency.

Alternatively, pre-teaching the names may have reduced participants' cognitive load. Our descriptive analyses indicated participants in the pre-teaching condition read the diverse names correctly more often than participants who did not receive the intervention. Thus, the pre-teaching intervention may have allowed participants to expend less cognitive resources addressing the names (e.g., decoding), leaving them more resources to apply to comprehension (LaBerge & Samuels, 1974; Perfetti, 1985; Wong, 1986). If so, this finding supports the hypothesis that reducing cognitive load improves learning (Sweller, 1988; Sweller & Chandler, 1994).

Although our intervention significantly improved reading comprehension (i.e., percent correct), it did not affect reading comprehension rate. In other words, participants who received the intervention did comprehend more of the passage than their peers, but they comprehended the same amount of the passage per minute of reading time. As previous findings indicate learning rates (e.g., reading comprehension rate) should be considered in addition to learning outcomes such as percent correct (Rønberg & Petersen, 2016; Skinner, 2008; Yaw et al., 2014), future researchers might consider adapting this intervention in ways designed to increase students' ability to read diverse names fluently. For instance, future researchers could investigate whether providing additional opportunities to respond, more learning trials, or the opportunity to self-determine response trials would enhance learning rates.

While our intervention included two components (i.e., the CFR program and the clipart pictures with a verbal introduction to the gender of each character), we did not evaluate the effectiveness of the components individually. Future researchers may want to investigate which component of the intervention has the largest effect on reading comprehension. For instance,

component analysis may reveal the pictures and description cause comparable gains in reading comprehension scores when used alone. If so, using only the pictures and description would significantly decrease the time required to deliver the intervention, increasing its efficiency.

The following additional limitations, common to Study II, should also be addressed by future researchers. Importantly, our passage included diverse names, but the content of the passage was not diverse, and thus does not authentically represent the material included in multicultural curricula. Future researchers should consider using similar procedures to investigate pre-teaching interventions with authentic multicultural material. Further, our study was limited to Russian names, and cannot be generalized to names from other origins. This limitation is particularly relevant considering phonetic features and rules differ across languages.

The current study also did not include a condition with common names. Thus, we cannot definitively determine how the performance of our current sample in such a condition would compare to their performance in the pre-teaching and no pre-teaching conditions including diverse names. However, Study II, completed with a similar sample, did include a control condition with common names for the same New Friend passage we used in the current study. Further, the experimental condition in Study II was equivalent to the no pre-teaching condition in the current study (i.e., same passage, procedures, comprehension questions), and both yielded similar descriptive statistics (see Table 3.2). Thus, it is likely our participants would have performed similarly to those in Study II in a condition with common names.

Despite the limitations associated with the current study, the results do have applied implications. Large effect size calculations indicate our intervention has practical value for increasing students' comprehension when reading passages include unfamiliar diverse names. To

illustrate this point, if we were to assign standard letter grades to our participants' performance, the average participant who completed the pre-teaching intervention would receive a grade of B (i.e., 81%) for reading comprehension, while the average participant who did not complete the intervention would receive a grade of D (i.e., 65%).

Pre-teaching the diverse names, and providing a visual image to associate with the characters, may have peaked the participants' interest in the passages and increased their attention. Additionally, our intervention could be a valuable tool for sparking discussions about diverse cultural and linguistic backgrounds. For instance, one of our participants commented that the names were from a different language and he would like to know which one. As children's beliefs are malleable, early elementary school is an ideal time for these conversations, and they can be used to reduce racial attitudes and stereotyping (Aboud & Doyle, 1996; Aboud & Fenwick, 1999; Okoye-Johnson, 2011).

The most commonly implemented element of multicultural education is the inclusion of multicultural content in the curriculum (Zirkel, 2008). This content frequently includes unfamiliar diverse names and terms which often differ phonetically from students' native language. However, our research is the first we are aware of to evaluate the effects of these words on student reading outcomes. There is a need for more studies designed to investigate how unfamiliar diverse names and terms interact with academic outcomes across subjects (e.g., reading, math, science). In areas in which these words present learning difficulties, tools could be developed which allow students to achieve maximum academic as well as social benefits from multicultural materials. The present study is a first step in this process, identifying one

intervention which can improve students' reading comprehension on passages including unfamiliar diverse names.

Chapter V

General Discussion and Directions for Future Research

This dissertation consists of three studies designed to investigate the effects of difficult-to-read material (i.e., materials thought to induce perceptual disfluency) on student learning. While previous researchers evaluated the effects of perceptual disfluency on recall, recognition, and comprehension (Diemand-Yaumana et al., 2011; Katiz et al., 2013; Sungkhasette et el., 2011), Study I extends this research to isolated word acquisition using S-R-S flashcard learning trials. We used an adapted alternating treatments design to compare learning when three postsecondary students with intellectual disabilities were presented with words in fluent and disfluent fonts. Although all three of our participants were able to learn words presented in both fluent and disfluent fonts, two demonstrated superior learning in the fluent condition, and the third demonstrated no consistent differences across the two font types.

In Study II, we investigated another application where difficult-to-read material could create cognitive disfluency. Multicultural curricula content include unfamiliar diverse words and proper names which are often phonetically unfamiliar to young students. These words have the potential to increase cognitive load and/or introduce cognitive disfluency. Thus, Study II extends research on cognitive disfluency to the presence of unfamiliar diverse names in early elementary school texts. Using a mixed-factors experimental design, we evaluated and compared the effect of diverse names embedded in grade-level passages on first- through third-grade students' reading comprehension and reading comprehension rate. Findings indicated both of these reading outcomes were significantly hindered by the presence of diverse names, and standardized effect sizes were moderate. Consequently, Study I and II failed to support previous research indicating difficult-to-read materials enhance learning (e.g., Alter, 2013).

Considering the benefits of exposure to diverse learning materials, we wanted to develop a possible solution to the reading difficulties we found to be associated with diverse names in Study II. Thus, Study III was designed to investigate the effectiveness of a potential pre-teaching intervention for unfamiliar diverse names (i.e., CTD procedures presented with computerized flashcards paired with a brief description and pictures). Using a between-subjects experimental design, we evaluated and compared second-grade students' reading outcomes on a passage including diverse names. Participants who received the pre-teaching intervention comprehended significantly more of the passage than participants who did not receive the intervention, but there were not significant differences in reading comprehension rate. The standardized effect size for reading comprehension was large, indicating the intervention has significant practical value for achieving reading comprehension gains.

Implications

Learning is generally thought to be supported by keeping educational materials simple and avoiding heavy cognitive load (Allington, 2009; National Reading Panel, 2000). However, some researchers have found difficult-to-read materials can improve learning, presumably by creating cognitive disfluency (Alter, 2013; Alter et al., 2007). Mixed results across previous research indicate the causal mechanisms and moderators associated with perceptual disfluency manipulations such as difficult-to-read text have yet to be understood.

Learner characteristics such as reading skill development may moderate responses to disfluent materials. Results from Study I and II indicate difficult-to-read materials (i.e., disfluent font, phonetically unfamiliar words) can hinder learning and comprehension in unskilled readers, including young students and students with intellectual disability. If cognitive resources are

indeed limited (Sweller, 1988; Sweller & Chandler, 1994), unskilled readers may expend so much effort on basic reading skills that the additional cognitive effort required to process disfluent material hinders their learning (LaBerge & Samuels, 1974; Perfetti, 1985; Wong, 1986). Conversely, proficient readers who have automated basic skills may benefit from disfluent materials, which could cue them to use their available cognitive resources to process information more deeply (Bjork, 1994). If findings indicate perceptual disfluency is detrimental to students who have not reached a critical level of skill development, strategies to help those students approach necessary learning materials that also induce cognitive disfluency could be developed.

Future researchers should attempt to clarify when and why disfluency manipulations are effective. Studies which assess for interactions between learner characteristics (e.g., cognitive development or reading level), disfluency dosage, and learning targets (e.g., recall, comprehension) may help to answer these questions. Additionally, disfluency could affect certain types of reading comprehension, but not others. There were three types of comprehension questions used in Studies II and III. Future researchers could investigate whether disfluency has different effects when the answers to comprehension questions are explicitly provided in the material compared to when students need to make inferences to answer the questions. Until there is clear understanding of when disfluency improves learning, decisions to use learning materials which have the potential to induce cognitive disfluency in practice should be made cautiously. In particular, the use of interventions involving altering textual fluency for individuals with disabilities should be considered on a case-by-case basis to avoid the risk of hindering learning.

The implications of results from Study II are complicated. Considering the rapidly increasing diversity of the United States, the history of cultural inequity in education, and the move toward an overall global civilization, the practical and moral importance of multicultural education is unequivocal. Including multicultural content in the curriculum places little demand on educators (Banks, 2004), and has become the most common but least studied element of multicultural education (Zirkel, 2008).

Multicultural curricula content includes diverse names and terms, and because phonetic features and rules differ across languages, these words may be particularly difficult for young students to read. We could not identify any studies empirically investigating the effects of multicultural content on student reading outcomes such as fluency and comprehension. Study II is an important first step in this process, evaluating the effects of unfamiliar diverse names on early elementary students' reading. Unfortunately, our findings indicate the presence of diverse names in grade-level passages can hinder reading comprehension and comprehension rate. Considering the importance of reading skill development, if multicultural content hinders comprehension in novice readers, methods which allow students to benefit from multicultural content without hindering reading should be developed. Therefore, in Study III, we designed and evaluated an intervention to familiarize students with diverse names before they encounter them in grade-level passages. The second-grade participants who completed our intervention achieved significantly higher reading comprehension scores than those who did not.

Although our intervention improved reading comprehension, it did not significantly affect reading comprehension rate. The purpose of reading is comprehension, but given limitations to teacher and student time, it is important to considering learning rates in addition to

learning outcomes such as comprehension (Rønberg & Petersen, 2016; Skinner, 2008; Yaw et al., 2014). Failure to consider learning rates (e.g., reading rate, reading comprehension rate) may result in researchers recommending interventions which appear to improve learning but actually reduce learning because of the increased amount of time they require (Skinner, 2008). However, learning rates also have to be balanced with the importance of the skill being learned. Future researchers might consider evaluating whether adaptations of our intervention, such as increased learning trials or opportunities to respond, will enhance learning rates.

Limitations and Additional Directions for Future Research

The sample characteristics and dependent variables of the studies included in this dissertation limit the external validity of our results. In Study I, our participants included only three adult students with intellectual disability; thus, it is limited by sample size and diversity of disability type. Since our study is only the second we could identify evaluating disfluency effects in students with disabilities, and French et al. (2013) found textual disfluency improved learning in students with dyslexia (the opposite of our results), future researchers may consider assessing for these effects with students with a variety of disabilities, larger sample sizes, and more functional dependent variables (e.g., reading words embedded within text or in authentic settings). As training across multiple exemplars has been shown to enhance generalized responding (Stokes and Baer, 1977; Wunderlich et al., 2014), researchers may find interventions that teach students with disabilities words in a variety of difficult-to-read fonts can enhance their ability to read those words in authentic settings (e.g., “men” and “women” on bathroom doors).

In Studies II and III, our participants were from rural schools and were predominantly Caucasian American. Future researchers should examine reading outcomes related to unfamiliar

diverse names with economically, racially, and linguistically diverse samples. Further, they should consider evaluating for cultural moderators. Naming practices tend to reflect cultural ideals and norms (Souto-Manning, 2011), and unfamiliar diverse names could affect reading outcomes differently depending on cultural variables. For example, researchers may find unfamiliar names do not affect the reading outcomes of students from cultures where names are commonly complex or non-phonetic, or those whose schools or communities vary widely in ethnicity and language.

Additionally, our findings in Studies II and III are limited to reading outcomes and early elementary students. Future researchers should evaluate the effects of diverse names on academic performance across subjects (e.g., percent correct on math word problems). Since students generally become proficient readers as they advance through elementary school, the effects of diverse names on reading outcomes should also be evaluated in late elementary school, middle school, and high school. Researchers may find diverse names no longer affect, or have different effects, on reading comprehension or comprehension rate once students transition from learning to read to reading to learn. Such research would provide information as to which students or groups of students could benefit from strategies designed to help them read diverse names and words, and guide the development of appropriate interventions.

While the intervention we developed for Study III improved students' reading comprehension, it was administered via one-on-one instruction, which is likely not feasible if a teacher needs to provide the intervention to his/her entire class. Ideally, efficient class-wide methods and/or interventions will be developed which do not place excessive strain on already limited teacher time. Listening While Reading, which Hawkins, Musti-Rao, Hale, McGuire, and

Hailley (2010) found to be effective in improving comprehension and vocabulary knowledge when delivered class-wide, is one intervention which may be effective for texts including unfamiliar diverse words. Future researchers should also consider evaluating the effectiveness of our intervention when it is adapted for class-wide applications.

In classrooms where computers are available, students could complete the CFR program independently (Kodak et al., 2011). Instructions could be presented class-wide or added into the program. Time-delay procedures have also been successfully implemented in class-wide formats (McCallum, Skinner, Turner, & Saecker, 2006). Thus, presenting the CFR program on a projector with students responding in choral fashion may prove to be effective. In either case, the second portion of our intervention (pictures of the characters and a one sentence description) could easily be added to the end of the CFR program, or presented class-wide. Further, component analyses could be conducted to determine whether completing the entire intervention is necessary to achieve gains in reading comprehension, or only portions of the intervention are needed.

Although the passages used in Studies II and III included diverse names, and diverse names are included in multicultural literature, the passages we used in are not authentic multicultural texts. Because the design of Study II required two similar passages per grade level, rather than attempting to develop multicultural passages of equivalent difficulty, we elected to use passages with large-scale data indicating similar comprehension accuracy and comprehension rate scores by altering them to include diverse names (e.g., substituting Aristarkh for Adam). Future researchers should design similar studies using matched passages from authentic multicultural children's literature.

Conclusion

The findings in this line of research lead us to encourage educators to consider student characteristics and learning goals when selecting learning materials and interventions. As we have yet to understand the causal mechanisms related to cognitive disfluency, and perceptual disfluency manipulations similar to those used in Study I have failed to produce consistent results, we suggest educators evaluate font manipulations on a case-by-case basis to avoid the risk of hindering learning. In terms of the inclusion of multicultural content in the curriculum, all widely implement educational practices necessitate careful empirical evaluation. Broad goals such as raising inclusive global citizens must be considered as well as educational goals such as proficient reading. If we find educational practices interfere with either of these outcomes, methods must be developed which allow for the attainment of both goals.

Part of the inspiration for Studies II and III was anecdotal accounts from teachers of removing or replacing diverse names from learning materials with the intention of helping their students read the material more effectively. We wanted to determine whether diverse names were indeed resulting in reading difficulties, and if so, develop an intervention which allowed for the inclusion of the names without hindering reading. We hope this dissertation inspires research which leads to methods that allow teachers to feel competent addressing diverse words which may be difficult for their students to read. Until this research is complete, we recommend early elementary teachers familiarize their students with diverse names and terms before presenting them embedded within learning materials.

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Appendices

Appendix A

Tables and Figures

Table 1.1

Student Characteristics

				Scores		
Student	Age	Sex	Diagnosis	IQ	Basic Reading Skills[a]	Basic Reading GE[a]
Sadie	29	F	ID	57[b]	<40	K.5
Emily	21	F	ID	49[c]	86	6.8
Tom	20	M	ID; ASD	66[c]	73	4.1

Note. IQ and Basic Reading Skills scores are standard scores with a mean of 100 and a standard deviation of 15. The Basic Reading Skills grade equivalency score indicates the student's performance relative to the grade level of the norming sample at which the mean score is equivalent to that of the student (Schrank, Mather, & McGrew, 2014). The first digit represents year and the second digit represents month. GE = grade equivalency score; ID = intellectual disability; ASD = autism spectrum disorder; K = kindergarten.
[a]Basic Reading Skills cluster scores and Basic Reading Skills cluster grade equivalency scores are from the Woodcock-Johnson IV Tests of Achievement (Schrank et al., 2014). [b]Full Scale IQ from the Wechsler Adult Intelligence Scale IV (Wechsler, 2009). [c]Full Scale IQ from the Wechsler Intelligence Scale for Children IV (Wechsler et al., 2003).

Table 1.2

Total Words Acquired Across Instructional Sessions and Total Acquired Words Read Correctly During Each Maintenance Session

	Acquired			Maintained					
Student	F	D	C	F		D		C	
				M1	M2	M1	M2	M1	M2
Sadie	23	14	1	14 (61%)	15 (65%)	7 (50%)	7 (50%)	1 (100%)	1 (100%)
Emily	28	21	0	24 (86%)	26 (93%)	16 (76%)	18 (86%)	0 (0%)	0 (0%)
Tom	14	12	0	10 (71%)	10 (71%)	9 (75%)	8 (67%)	0 (0%)	0 (0%)

Note. F = fluent; D = disfluent; C = control; M1 = maintenance session one; M2 = maintenance session two.

Table 2.1

Included Names by Passage and Condition.

Passage	Standard Condition	Experimental Condition
	First Grade	
Baseball	Pam	Agafya
	Bob	Evgeni
The Game	Pat	Varya
	Deb	Anfisa
	Second Grade	
New Friend	Rose	Annushka
	Joy	Katenka
	Cara	Lidochka
Spring Break	Adam	Aristarkh
	Kate	Lizaveta
	Dr. Black	Dr. Nadezhda
	Third Grade	
Bully at School	Mary	Yevpraksiya
	Jason	Alyosha
	Adam	Vyacheslav
Football Game	John	Innokentiy
	Brian	Avksentiy
	Mike	Konstantin

Note. The only difference between the standard and experimental version of each passage was the names.

Table 2.2

Descriptive Statistics for Reading Speed in Seconds under Each Condition and Story

Passage	# of Words	Condition	Minimum	Maximum	Mean	SD
All Grades						
		Standard	62	536	168.48	92.53
		Experimental	70	597	220.55	99.10
First Grade						
Baseball	125	Standard	62	536	176.77	130.11
	125	Experimental	83	355	170.64	65.46
The Game	118	Standard	65	242	121.64	48.79
	118	Experimental	70	383	164.92	86.63
Overall		Standard	62	536	148.19	98.95
		Experimental	70	383	167.89	74.93
Second Grade						
New Friend	231	Standard	67	476	189.57	116.57
	231	Experimental	139	428	242.43	79.21
Spring Break	217	Standard	96	347	152.64	61.70
	217	Experimental	114	597	237.86	125.36
Overall		Standard	67	476	171.11	93.43
		Experimental	114	597	240.14	102.92
Third Grade						
Bully at School	263	Standard	106	303	168.22	71.64
	263	Experimental	177	358	221.11	55.76
Football Game	335	Standard	142	414	221.44	77.96
	335	Experimental	230	534	316.89	100.66
Overall		Standard	106	414	194.83	77.62
		Experimental	177	534	269.06	93.02

Table 2.3

Descriptive Statistics for Words Read Correctly under Each Condition and Story

Passage	# of Words	Condition	Minimum	Maximum	Mean	SD
All Grades						
		Standard	85	333	193.15	73.40
		Experimental	58	299	174.22	66.25
First Grade						
Baseball	125	Standard	85	125	113.62	12.31
	125	Experimental	98	117	107.79	4.90
The Game	118	Standard	97	117	108.64	6.60
	118	Experimental	70	109	99.23	11.23
Overall		Standard	85	125	111.04	9.89
		Experimental	70	117	103.67	9.44
Second Grade						
New Friend	231	Standard	132	230	211.86	26.45
	231	Experimental	184	216	200.79	8.51
Spring Break	217	Standard	197	216	210.57	5.17
	217	Experimental	58	208	174.93	36.97
Overall		Standard	132	230	211.21	18.71
		Experimental	58	216	187.86	29.43
Third Grade						
Bully at School	263	Standard	242	263	254.78	7.41
	263	Experimental	204	231	224.89	8.27
Football Game	335	Standard	294	333	321.67	13.49
	335	Experimental	281	299	292.78	7.90
Overall		Standard	242	333	288.22	36.00
		Experimental	204	299	258.83	35.80

Note. Words read correctly is calculated by subtracting total errors from total number of words read.

Table 2.4

Descriptive Statistics for Words Read Correctly Excluding Name Errors under Each Condition and Story

Passage	# of Words	Condition	Minimum	Maximum	Mean	SD
All Grades						
		Standard	87	333	196.12	73.39
		Experimental	75	333	195.85	74.58
First Grade						
Baseball	125	Standard	87	125	113.85	11.93
	125	Experimental	111	124	119.07	3.93
The Game	118	Standard	104	117	112.07	3.87
	118	Experimental	82	118	109.69	10.43
Overall		Standard	87	125	112.93	8.60
		Experimental	82	124	114.56	8.98
Second Grade						
New Friend	231	Standard	154	231	219.36	20.87
	231	Experimental	212	231	225.21	4.95
Spring Break	217	Standard	204	217	212.14	4.13
	217	Experimental	75	217	199.50	38.07
Overall		Standard	154	231	215.75	15.21
		Experimental	75	231	212.36	29.68
Third Grade						
Bully at School	263	Standard	247	263	256.56	5.22
	263	Experimental	240	263	258.22	7.12
Football Game	335	Standard	294	333	324.22	12.37
	335	Experimental	311	333	326.00	9.17
Overall		Standard	247	333	290.39	36.01
		Experimental	240	333	292.11	35.77

Note. Words read correctly excluding name errors is calculated by subtracting total errors from total words read, and then adding total name errors.

Table 2.5

Descriptive Statistics for Reading Rate under Each Condition and Story

Passage	# of Words	Condition	Minimum	Maximum	Mean	SD
All Grades						
		Standard	9.91	205.97	81.28	37.13
		Experimental	9.43	104.74	52.85	20.79
First Grade						
Baseball	125	Standard	9.51	120	56.40	32.21
	125	Experimental	16.56	80.24	42.94	16.17
The Game	118	Standard	20.05	108	62.03	25.30
	118	Experimental	10.97	90.00	47.72	22.04
Overall		Standard	9.51	120	59.32	28.41
		Experimental	10.97	90.00	44.28	18.89
Second Grade						
New Friend	231	Standard	16.64	205.97	89.64	48.43
	231	Experimental	26.78	90.00	55.05	18.96
Spring Break	217	Standard	35.45	133.75	91.23	25.00
	217	Experimental	9.43	104.74	55.47	27.52
Overall		Standard	16.64	205.97	90.43	37.83
		Experimental	9.43	104.74	55.26	23.19
Third Grade						
Bully at School	263	Standard	49.11	146.60	105.04	38.53
	263	Experimental	34.19	76.95	63.95	13.43
Football Game	335	Standard	42.61	140.70	94.89	26.62
	335	Experimental	31.57	77.74	59.93	16.44
Overall		Standard	42.61	146.60	99.97	32.55
		Experimental	31.57	77.74	61.94	14.71

Note. Reading rate is calculated by multiplying total number of words read correctly by 60, and then dividing by seconds spent reading.

Table 2.6

Descriptive Statistics for Reading Comprehension (Percent Correct) under Each Condition and Story

Passage	# of Words	Condition	Minimum	Maximum	Mean	SD
All Grades						
		Standard	0.00	100.00	71.84	22.61
		Experimental	0.00	100.00	60.43	21.67
First Grade						
Baseball	125	Standard	22.22	100.00	60.68	24.27
	125	Experimental	11.11	100.00	50.79	26.04
The Game	118	Standard	44.44	100.00	77.78	19.00
	118	Experimental	33.33	88.89	70.94	16.69
Overall		Standard	22.22	100.00	69.55	22.98
		Experimental	11.11	100.00	60.49	23.94
Second Grade						
New Friend	231	Standard	33.33	100.00	73.02	20.77
	231	Experimental	33.33	88.89	61.90	20.31
Spring Break	217	Standard	0.00	100.00	74.60	25.20
	217	Experimental	0.00	88.89	56.35	21.56
Overall		Standard	0.00	100.00	73.81	22.67
		Experimental	0.00	88.89	59.13	20.74
Third Grade						
Bully at School	263	Standard	77.78	100.00	90.12	8.69
	263	Experimental	33.33	100.00	70.37	22.22
Football Game	335	Standard	22.22	88.89	54.32	17.95
	335	Experimental	33.33	77.78	54.32	16.14
Overall		Standard	22.22	100.00	72.22	22.95
		Experimental	33.33	100.00	62.35	20.57

Note. Reading comprehension is calculated by dividing the number of comprehension questions answered correctly by the total number of comprehension questions, and then multiplying by 100.

Table 2.7

Descriptive Statistics for Reading Comprehension Rate under Each Condition and Story

Passage	# of Words	Condition	Minimum	Maximum	Mean	SD
All Grades						
		Standard	0.00	97.00	33.03	19.82
		Experimental	0.00	67.00	20.31	12.56
First Grade						
Baseball	125	Standard	2.00	97.00	30.78	24.25
	125	Experimental	3.00	44.00	20.43	12.38
The Game	118	Standard	14.00	92.00	45.82	23.48
	118	Experimental	5.00	67.00	32.07	15.46
Overall		Standard	2.00	97.00	38.58	24.61
		Experimental	3.00	67.00	26.04	14.90
Second Grade						
New Friend	231	Standard	6.00	60.00	30.89	17.26
	231	Experimental	7.00	37.00	17.38	9.27
Spring Break	217	Standard	0.00	49.00	32.00	14.54
	217	Experimental	0.00	38.00	17.56	11.47
Overall		Standard	0.00	60.00	31.45	15.67
		Experimental	0.00	38.00	17.47	10.24
Third Grade						
Bully at School	263	Standard	18.00	57.00	37.58	15.50
	263	Experimental	6.00	33.00	20.84	9.21
Football Game	335	Standard	3.00	28.00	16.72	7.79
	335	Experimental	5.00	20.00	11.40	5.50
Overall		Standard	3.00	57.00	27.15	16.03
		Experimental	5.00	33.00	16.12	8.82

Note. Reading comprehension rate is calculated by multiplying the percentage of comprehension question answered correctly by 60, and then dividing by seconds spent reading.

Table 3.1

Descriptive Statistics for Reading Scores by Condition

Measure	Condition	Minimum	Maximum	Mean	SD
Speed in Seconds	P	108.00	494.00	237.15	97.81
	NP	112.00	519.00	234.15	95.77
Words Read Correctly	P	179.00	231.00	209.09	13.24
	NP	136.00	217.00	197.09	15.56
Words Read Correctly	P	198.00	233.00	223.21	7.47
Excluding Name Errors[a]	NP	163.00	231.00	220.94	13.35
Reading Rate	P	24.41	125.56	61.94	25.79
(words correct per minute)	NP	15.72	109.82	58.78	23.51
Reading Comprehension**	P	56.00	100.00	81.05	12.69
(percent correct)	NP	22.00	100.00	65.32	20.93
Reading Comprehension Rate*	P	7.00	56.00	24.19	11.29
(percent correct per minute)	NP	4.00	42.00	19.85	10.76

Note. For the pre-teaching condition, $n = 34$; for the no pre-teaching condition, $n = 33$. P = pre-teaching; NP = no pre-teaching.

[a]Words read correctly excluding name errors is calculated by subtracting total errors from total words read, and then adding total name errors.

*$p = .113$

** $p = .001$, $d = .91$

Table 3.2

Descriptive Statistics across Studies for Equivalent Conditions of the "New Friend" Passage with Diverse Names

Study	Accuracy			Speed	Rates	
	WRC	WRC-NE	%QC		WCPM	% QCPM
II	200.79	225.21	61.90	242.43	55.05	17.38
III	197.09	220.94	65.32	234.15	58.78	19.85

Note. The "New Friend" passage including diverse names was delivered with identical procedures in Study II (i.e., experimental condition) and Study III (i.e., no pre-teaching condition). Speed is measured in seconds. WRC = words read correctly; WRC-NE = words read correctly excluding errors made on names; % QC = reading comprehension; % QCPM = reading comprehension rate.

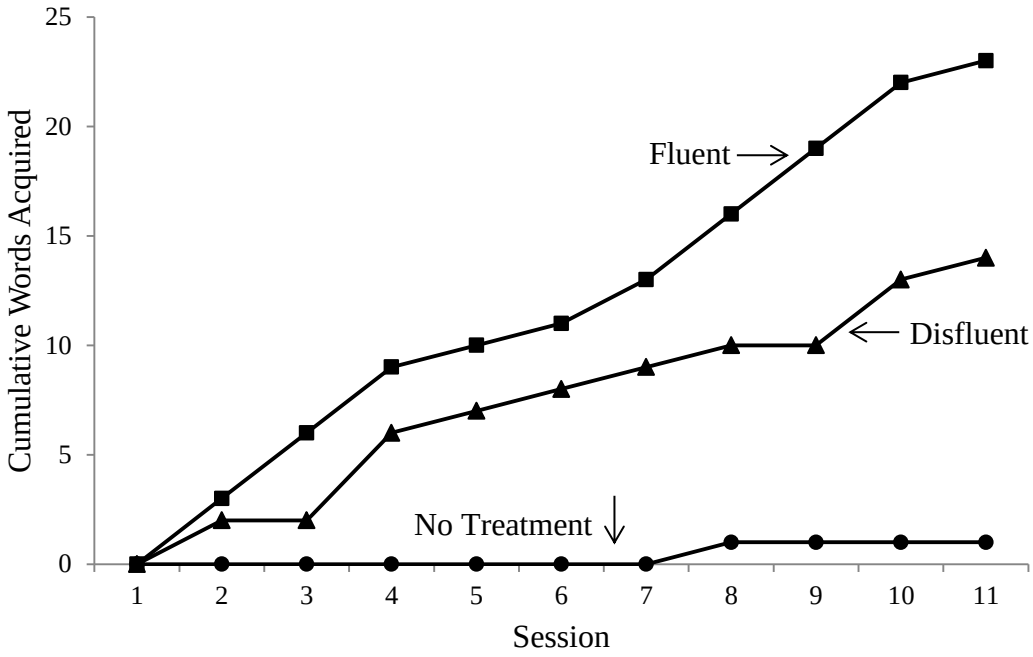

Figure 1.1. Cumulative number of words Sadie acquired across conditions.

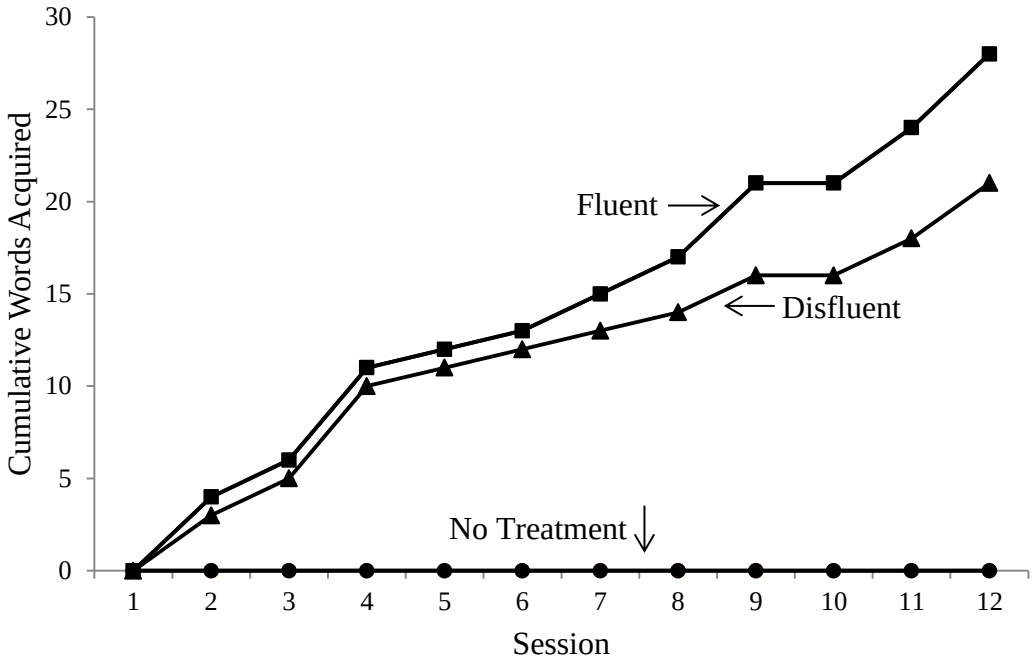

Figure 1.2. Cumulative number of words Emily acquired across conditions.

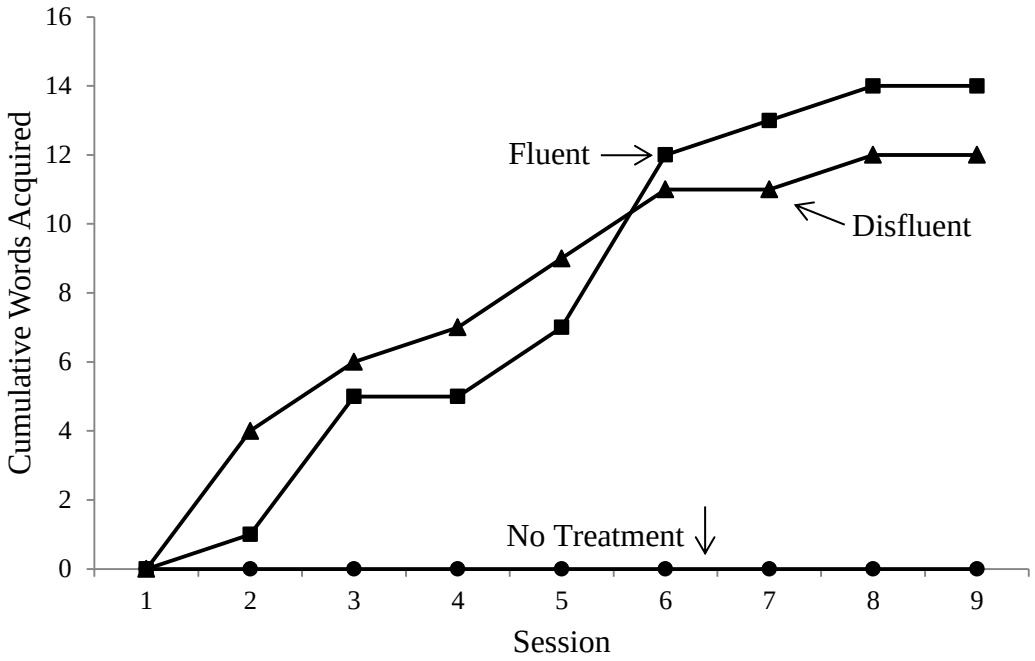

Figure 1.3. Cumulative number of words Tom acquired across conditions.

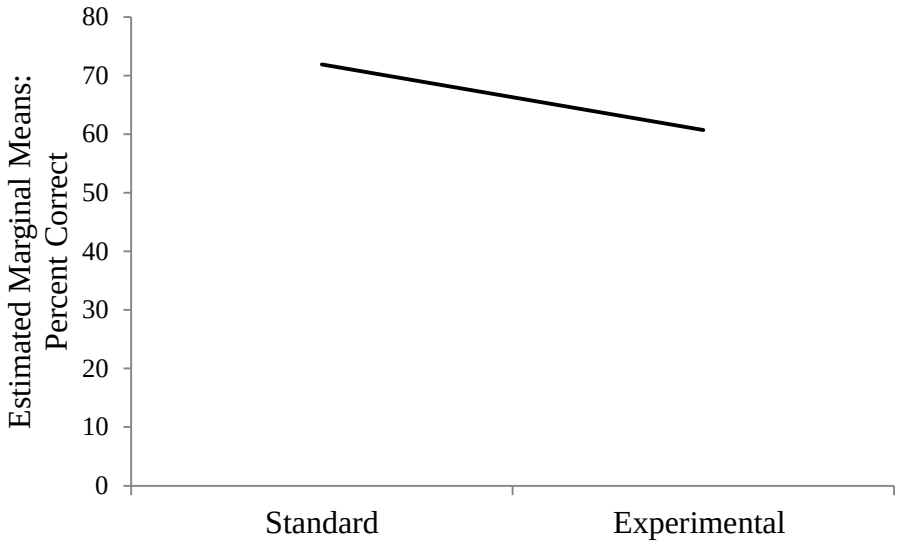

Figure 2.1. Main effect of passage type in reading comprehension scores.

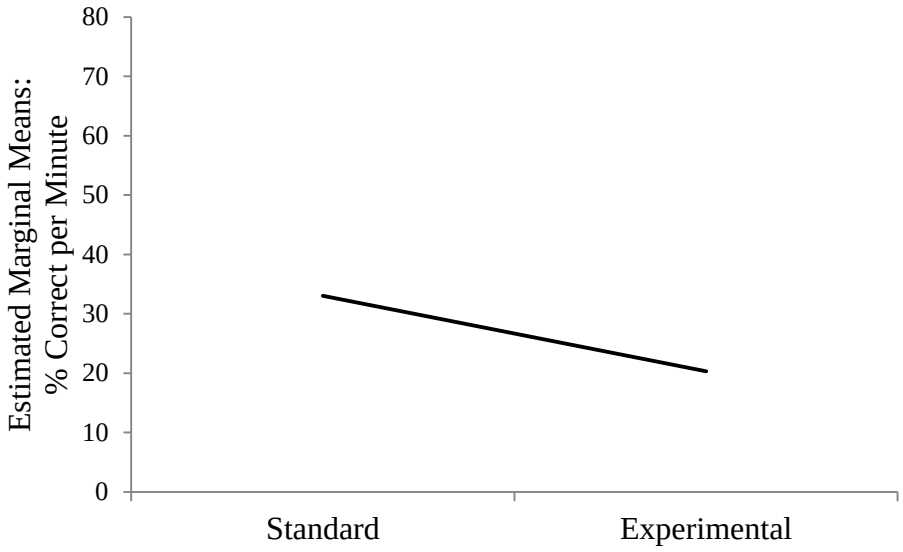

Figure 2.2. Main effect of passage type in reading comprehension rate scores.

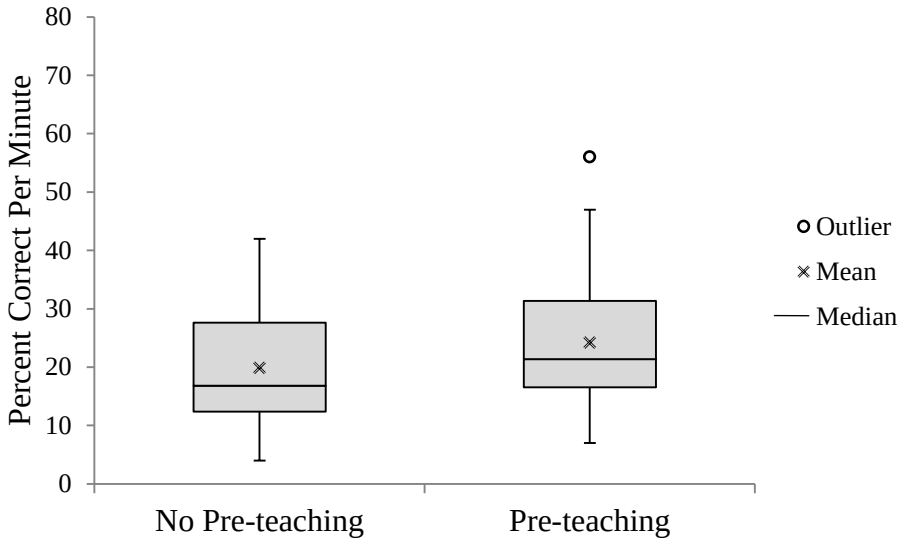

Figure 3.1. Box plot of reading comprehension rate scores by condition.

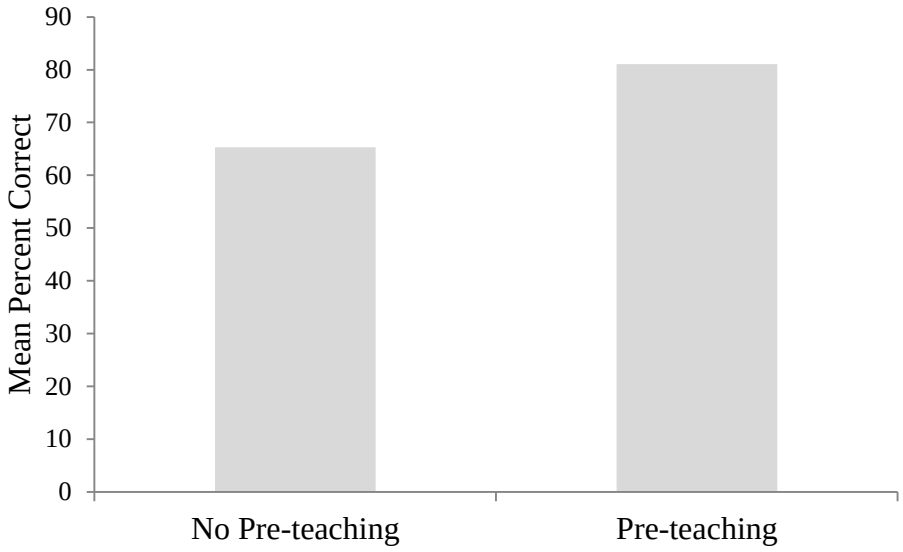

Figure 3.2. Significant effect of condition in reading comprehension scores.

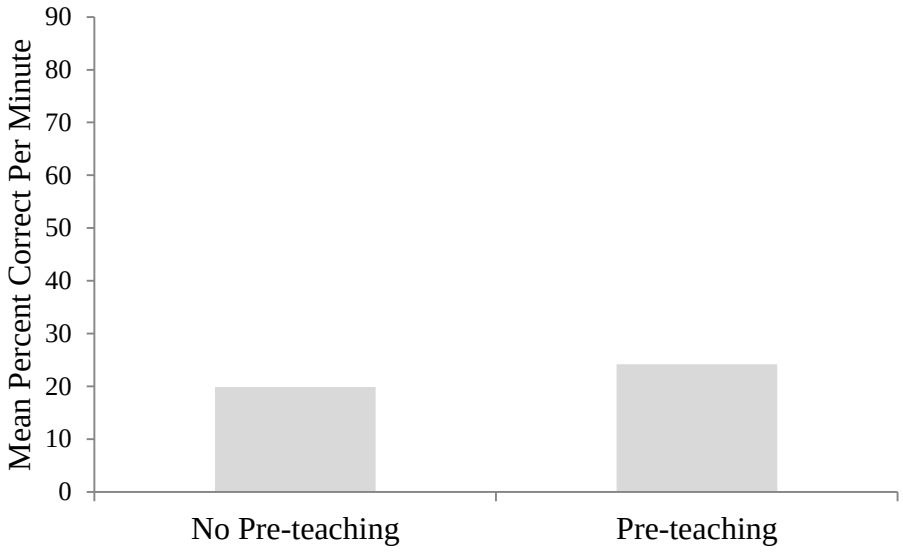

Figure 3.3. Reading comprehension rate scores by condition.

Appendix B

Study I Targeted Words

Acquired words are in Italics. Bolded words in Sadie's fluent list were borrowed from the no-treatment list.

Sadie

No-treatment word set: *bad*, plate, few, yard, west, hang, bug, edge, awake, brick, care, mark, pen, dream, fresh, led, learn, path, shine, ago, spot

Disfluent word set: ant, *large*, *shake*, *nap*, *count*, *pot*, *wing*, thin, *hid*, *rich*, *bit*, lost, *bone*, brave, *desk*, fight, *kept*, *even*, *place*, teeth, dry

Fluent word set: *clock*, *pay*, *teach*, *pie*, *wool*, *sure*, *rock*, *gold*, *fur*, *case*, *early*, *knock*, *neck*, *busy*, *mouth*, *cap*, *river*, *air*, lake, *beans*, *lap*, **spot, ago, *fresh*, *bug*, dream, pen, edge, *west*, brick**

Emily

No-treatment set: explicit, consummate, eclectic, clique, reciprocity, equilibration, morphemes, constructivist, anorexia, stagnation, rubella, epigenesist, lateralization, cataracts, compensation, fatuous, zygote, schema, pragmatics, moratorium, savant, Adler, indulgent, disoriented, menarche, Bronfenbrenner, ethnocentrism, Ainsworth, hormones, deficiency, bereavement, hypothetical, androgyny, accommodation, proximal, rapport, egocentrism, cochlear

Disfluent set: *hemophilia*, *socioemotional*, *embryonic*, *congenital*, *meiosis*, *bulimia*, *immune*, *discontinuity*, *hormonal*, *dialectical*, *endocrine*, *placenta*, *schizophrenia*, *celiac*, *sarcopenia*, *centration*, immunodeficiency, *optimization*, *cesarean*, *ethology*, anencephaly, *euthanasia*, *phonics*, delirium, amniocentesis, osteoarthritis, prolonged, libido, Klinefelter, Kaufman, Achenbach, cumulative, morality, heteronomous, homogamy, ageism, assimilation, climacteric

Fluent set: *Chomsky*, *delinquent*, *hospice*, *cephalocaudal*, *animism*, *self-efficacy*, *myelination*, *semantic*, *longitudinal*, *sequential*, *glaucoma*, *menopause*, *diathesis*, implicit, *crystallized*, *coercive*, *ethnic*, *metacognition*, *amnion*, *pituitary*, *disenfranchised*, *oxytocin*, *chorion*, *affectionate*, *blastocyst*, *continuity*, *episodic*, *germinal*, *gerontology*, centenarian, postformal, autonomous, metalinguistic, eldercare, psychoanalytic, Freud, hypothesis, Lamaze

Tom

No-treatment set: acidosis, alleles, follicular, hemoglobin, mitochondria, lymphatic, acetylcholine, neuromodulator, extraembryonic, carcinogen, bipedalism, endergonic, microtubule, perennial, gonadotropic, bryophyte, capillaries, cohesion, denitrification, immunoglobulin, myoglobin, cirrhosis, cardiovascular, carbohydrate, esophagus, jaundice,

glycogen, dendrites, deoxyribose, chemiosmosis, lipase, parthenogenesis, chorion, fovea, endometrium, desmosome, cephalization, insulin, heterotrophs

Disfluent set: *emulsify*, *cerebellum*, *chromatin*, *amygdala*, *osteoclast*, *gastrulation*, *fermentation*, *malnutrition*, *lichen*, *dinoflagellate*, *calcitonin*, *anaerobic*, norepinephrine, mechanoreceptor, monosaccharide, angiogenesis, ovaries, micronutrients, mesophyll, guanine, cholesterol, lysosome, epinephrine, hepatitis, aldosterone, biogeography, exocytosis, electrocardiogram, blastocyst, gastrovascular, acromegaly, catastrophism, enzyme, paleontology, ectotherm, denatured, peptidase, glycemic, bronchi

Fluent set: *epistasis*, *adhesion*, *hypothalamus*, *amniocentesis*, *nondisjunction*, *deciduous*, *eterozygous*, *bronchiole*, *centromere*, *nucleotide*, *chlorophyll*, *diencephalon*, *centriole*, epithelial, anaphylactic, chordate, chemoautotroph, *embryo*, epidemiology, endocytosis, diaphragm, nitrification, gallbladder, neutrophil, marsupial, myelin, ciliate, organelle, heterochromatin, pathogen, melanin, leukemia, parathyroid, dopamine, microsporocyte, fibrocartilage, anatomy, phylogeny, neurotransmitter

Appendix C

Experimental Passages and Comprehension Questions

Passages and comprehension questions were selected from the Texas Primary Reading Inventory Development Study (Texas Education Agency, 2010) based on data indicating similarities in comprehension accuracy and comprehension rate scores (Ciancio et al., 2015), and appropriateness for the study (i.e., the inclusion of names). Passages for each grade were adapted to be similar lengths and balanced to include the same number of names. All passages were used in Study II. Only the second grade New Friend passage was used in Study III. First grade passages were printed in 18 point Arial font; second and third grade passages were printed in 14 point Arial font; and all passages were printed on one page. The only difference in the standard and experimental version of each passage is the included names (see Table 2.1for included names by passage and condition).

Answers to the comprehension questions are italicized. When answering the comprehension questions, if a student referred to the correct character without providing a name, or indicated the correct character but pronounced the name incorrectly, their answer was scored as correct. To maintain consistency in scoring across students, if a student provided an answer not included in the rubric, the experimenter recorded the answer verbatim for later review. A second experimenter later reviewed and scored these answers and estimates of interrater reliability were calculated.

Grade 1 – Story 1

Baseball

Agafya is so happy. Today Agafya is going to her first baseball game with Evgeni.

First, Agafya and Evgeni look for seats. Then they sit down next to a lot of people.

Agafya smells popcorn and hotdogs. The man selling snacks is near Agafya and Evgeni. Evgeni puts up his hand. The man sees Evgeni. Evgeni gets Agafya a hotdog and a soda.

The game starts. All the people yell and clap. The game begins with the first toss of the baseball. The player misses the ball.

On the next throw, the player hits the ball very hard.

The crowd shouts, “Homerun!”

After the game, Agafya says, “This was a super day. I saw my first ball game and first homerun on the same day.”

Baseball Rubric

1. Where does Agafya go? *(To her first baseball game. To a baseball game.)*

2. What is the first thing Agafya and Evgeni do when they get to the baseball game? *(Find their seats.)*

3. What does Agafya smell? *(Popcorn. Hot dogs.)*

4. How do you know that there are a lot of people at the game? *(They [Agafya and Evgeni] sat down next to lots of people. There was a crowd at the game.)*

5. What happens with the first toss of the baseball? *(The player tries to hit the ball but misses. Player misses the ball.)*

6. Why does Agafya say this was a super day? *(She saw her first baseball game. She saw her first homerun. She saw her first game and first homerun on the same day.)*

7. Why does Evgeni put up his hand? (*So the man selling food/drinks will see him. To get food/drinks.)*

8. Why is the crowd excited after the player hits the second ball? *(He hit a home run.)*

9. Why do the people yell and clap when the game starts? *(They're happy. They're excited. Note: a lot of answers would work for this one, note if you're unsure)*

Grade 1 – Story 2

The Game

It is Varya's birthday party. She is six today. She loves cake and presents. There is one gift Varya really wants from mom and Anfisa. She wants a new game.

"Anfisa," Varya asks, "do you think Mom got me that game?" Anfisa has a big grin on her face.

Varya says, "Anfisa, you are smiling. That means you know I will get my game!"

It is time to open the gifts. Varya opens the gift from her mother first. She smiles as she opens it.

Varya stops smiling. The game is not in the box! She feels sad.

Anfisa says, “Open my gift.” Varya opens the box from Anfisa and smiles. Her new game is in the box.

The Game Rubric

1. How old is Varya today? *(6 years old.)*

2. What does Varya want for her birthday? *(A new game.)*

3. What gift does Varya open first? (*The one from her mother. Her mother’s.*)
4. What does Varya do at the party? (*Open presents. Has cake. Smiles. Feels sad.)*

5. Why does Varya think she will get her new game? *(Anfisa smiles/has a big grin on her face when Varya asks her if she thinks Varya will get the new game.)*

6. Why does Varya smile when she opens the present that Anfisa gave her? *(The game is in the box.)*

7. Why is today special for Varya ? (*It’s her birthday*.)

8. Why is Varya smiling when she opens her gift from her mom? *(She thinks her game will be in the box.)*

9. Why does Anfisa want Varya to open her gift next? *(She knows that she is giving a game to Varya, so the game will be in the box. Then Varya will be happy.)*

Grade 2 – Story 1

New Friend

In the summer, Annushka and Katenka moved to Texas. Annushka was sad. She left all of her friends behind and she did not know how she would find new ones. Katenka told Annushka to look 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, Katenka 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.”

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

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

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

"Annushka."

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

"Okay, Lidochka!" said Annushka

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

New Friend Rubric

1. Where did Annushka move to? (*Texas.)*

2. Where did Annushka and Katenka go? (*The park.)*

3. According to the story, how was Annushka feeling about moving? (*Sad.)*

4. At the beginning of the story, why was Annushka sad? (*She left her friends behind. She didn't know how she would make new friends.)*

5. What did Katenka 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 Annushka and Lidochka make at the end of the afternoon? (*To meet at the park the next day.)*

7. When Annushka 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 Lidochka know that Annushka was new? (*Lidochka had never seen Annushka there before. Lidochka didn't recognize Annushka.)*

9. How do you know that Annushka and Lidochka became friends? (*They played together. They made plans to meet up the next day.)*

Grade 2 – Story 2

Spring Break

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

Lizaveta was worried.

Lizaveta took Aristarkh to the hospital. Dr. Nadezhda took Aristarkh to have X-rays and get a shot. After the X-ray, Dr. Nadezhda told Aristarkh his leg was broken. Aristarkh and Lizaveta would have to spend a day in the hospital.

Dr. Nadezhda put a cast on Aristarkh's leg and said he would have to wear it for five weeks. Dr. Nadezhda also said Aristarkh would have to learn to walk with crutches.

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

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

Spring Break Rubric

1. Who were Aristarkh and Lizaveta planning to visit on spring break? (*They were going to visit his grandparents.*)

2. What did Dr. Nadezhda put on Aristarkh's leg? (A cast)

3. How long was Aristarkh supposed to wear a cast? (*5 weeks.*)

4. What was Aristarkh doing when he broke his leg? (*Riding his bike.*)

5. Why did Aristarkh get a shot? *(To stop his leg from hurting.)*

6. Why would Aristarkh have to learn to walk on crutches? (*His leg would be in a cast.*)

7. What did Lizaveta say that made Aristarkh feel better? (*Lizaveta told him they would go to see his grandparents when his cast came off.*)

8. Why did Aristarkh 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 Aristarkh think it would be a great vacation after all? (*Aristarkh got to see his grandparents after all.)*

Grade 3 – Story 1

A Bully at School

Every day during recess, Yevpraksiya, Alyosha and their classmates played together. Vyacheslav didn't play with anybody. Instead, Vyacheslav tossed the playground balls over the fence and threw the swings up over the swing set bars so no one could swing. Vyacheslav even called the other kids names and stole their snacks. All the kids at school were afraid of Vyacheslav.

One Friday, Vyacheslav missed school and everyone enjoyed recess.

Yevpraksiya said, "Recess should be like this every day."

Yevpraksiya and Alyosha hoped Vyacheslav would not be back, but on Monday Vyacheslav showed up with a big cast on his right arm. All of the other kids wanted to know what happened to Vyacheslav, but no one dared to ask.

That day at recess, Yevpraksiya and Alyosha ran out to play. They noticed Vyacheslav lagging behind. Vyacheslav was struggling to tie his shoe.

"Should we help Vyacheslav?" Yevpraksiya asked.

"No way," said Alyosha.

But Yevpraksiya walked slowly over to Vyacheslav anyway.

"Can I help you?" she asked.

Vyacheslav looked up at her and grunted. Yevpraksiya bent down and quickly tied Vyacheslav's shoe. Then she ran back to Alyosha.

"Why did you help Vyacheslav?" asked Alyosha. "He's never nice to us."

She shrugged. "Maybe if we're nice to Vyacheslav, Vyacheslav will start to be a little nicer to us."

Over the next few weeks, Vyacheslav needed help many times because of his cast. Everyone in the class helped Vyacheslav, especially Yevpraksiya and Alyosha. When Vyacheslav's cast finally came off, he was a little bit nicer to everyone. Well, at least he stopped stealing their snacks.

A Bully at School Rubric

1. Who played together during recess? (*Yevpraksiya, Alyosha or Yevpraksiya, Alyosha and their classmates. The classmates. All the kids except for the bully.)*

2. What was on Vyacheslav's arm? (*A cast. A big cast.*)

3. What did Yevpraksiya do to help Vyacheslav? (*Tie his shoe)*

4. What did Vyacheslav do at recess? (*Didn't play with anyone. Tossed playground balls over the fence. Threw swings over the bars. Called names. Stole snacks.)*

5. Why did Yevpraksiya help Vyacheslav? (*She thought that if they were nice to him, he might be nicer to them. Vyacheslav needed help tying his shoe.)*

6. Why was Vyacheslav a little bit nicer after his cast came off? (*The other students helped him. He saw that the other kids were nice even though he had been mean to them.)*

7. Why did Yevpraksiya run quickly back towards Alyosha after tying Vyacheslav's shoe? (*She was afraid of him. She was scared.)*

8. Why was Vyacheslav struggling to tie his shoe? (*He had a cast on his arm. He couldn't move his fingers very well, it's hard to do things when you have a cast on.)*

9. Why did Alyosha not want to help Vyacheslav? *(He was afraid of him.)*

Grade 3 – Story 2

Football Game

Innokentiy has been playing football for three years now and loves it. Innokentiy's position is receiver. At first he wasn't very good, but he has gotten better. For the past few weeks, he has spent afternoons practicing with his older brother. Last week Coach Avksentiy was astonished with Innokentiy's improvement. Coach Avksentiy gave Innokentiy more playing time in practice. The quarterback, Konstantin, threw Innokentiy several passes that day and Innokentiy caught all of them. Konstantin and Innokentiy played great together. Never before had Innokentiy thought himself to be such an integral player on the team. Coach Avksentiy said his improvement was so great that he was going to start in the next game. Innokentiy had never started before. He was thrilled.

Innokentiy was both nervous and excited as the game started. On the sideline, Coach Avksentiy told Innokentiy that in the first play Konstantin would throw him a long pass. Konstantin threw downfield, Innokentiy ran as fast as he could but missed it by just inches. He was embarrassed. On the sideline, Konstantin and Coach Avksentiy reassured Innokentiy. They

could tell he was nervous. A few plays later, Coach Avksentiy told Konstantin to throw a long pass again. The whistle blew and the ball was snapped. Again, Innokentiy ran as fast as he could when Konstantin threw the ball. He jumped and grabbed it from the air just like his brother taught him. Innokentiy fell down, clutching the ball. Coach Avksentiy and Innokentiy's teammates were cheering and running toward him. He couldn't understand why they were so excited, until he saw that he was in the end zone! Innokentiy had scored his first touchdown! Konstantin ran to Innokentiy saying "I knew you could do it."

They went on to win the game 17-10. Innokentiy didn't score again, but he had proven himself on the field. What's more important is that he had proven to himself that he could do it. Innokentiy's confidence soared, and he knew that his hard work had been worth the effort.

Football Game Rubric

1. What position does the Innokentiy play on the football team? *(Receiver.)*

2. What did Coach Avksentiy tell Innokentiy? *(He was going to start in the next game. Konstantin [the quarterback] would throw him a long pass.)*

3. What kind play was the first play of the game? *(A long pass. A pass.)*

4. Who helped Innokentiy improve? *(His older brother. The coach. Konstantin [the quarterback]. He helped himself by practicing.)*

5. Why was Innokentiy excited about the next game? *(The coach told him he would start. He had been practicing and getting better. Because he gets to play.)*

6. Why were Innokentiy's teammates running toward him? *(He made a touchdown. He caught the pass. They were celebrating.)*

7. Why did Coach Avksentiy think Innokentiy had improved? *(He caught all the passes at practice. He practiced well. He and Konstantin [the quarterback] played great together.)*

8. Why did Konstantin decide to throw a second long pass to Innokentiy? *(He knew Innokentiy was nervous when he threw him the first pass).*

9. Why did Innokentiy's confidence soar? *(He had proven himself. He scored his first touchdown. He had worked hard and gotten better).*

Appendix D

Study III Pre-teaching Pictures

Lidochka

Annushka

Katenka

Appendix E

Experimental Protocols

Study I

1. _____ The experimenter set up a workstation with three chairs.
2. _____ The student was instructed that he/she would be shown a series of flashcards, and that he/she should attempt to read the word on each card aloud within 3 s.
3. _____ The student attempted to read the words, if he/she did not read the word within 3 s, or read the word incorrectly, the experimenter read the word to him/her, and then the student repeated the word aloud.
4. _____ The experimenter shuffled and presented the cards two additional times.
5. _____ After the intervention was completed, the student was shown a series of flashcards and asked to attempt to read the word on each card aloud within 3 s.
6. _____ The experimenter sorted words read correctly into two piles and words read incorrectly into two additional piles.
7. _____ Upon completing the assessment flashcards, the session was complete and the student was allowed to leave the room.
8. _____ The experimenters determined interobserver agreement.
9. _____ The experimenter removed acquired words from the intervention flashcards and replaced them with new words from the flow list.
10. _____ The experimenter added the new words to the assessment card deck.

Study II

1. _____ The experimenter obtained assent.
2. _____ The experimenter introduced the standard passage correctly and completed scoring according to protocol.
3. _____ The experimenter introduced the experimental passage correctly and completed scoring according to protocol.
4. _____ If the student read the diverse name incorrectly, the experimenter provided the name only once.
5. _____ The experimenter read the comprehension questions to the student and scored them according to protocol.

Study III

1. _____ The experimenter obtained assent.
2. _____ The experimenter introduced the passages and completed scoring according to protocol.
3. _____ If the student was assigned to the pre-teaching condition, the experimenter provided instructions according to protocol.
4. _____ The experimenter administered the pre-teaching procedures for the experimental passage plus training condition according to protocol.
5. _____ If the student read a diverse name incorrectly, the experimenter provided the name only once.
6. _____ The experimenter read the comprehension questions to the student and scored them according to protocol.

Appendix F

Study I Student Consent Form

My name is Kala Taylor and I am a graduate student in the Ph.D. School Psychology Program at the University of Tennessee. I am studying reading and would appreciate your help. If you decide to help, you will be asked to spend about 5 minutes per session reading some words on flashcards. If you choose to help, you can quit at any time by letting me know you wish to quit. You will not be punished for choosing to quit the study.

If you agree to help, please mark the space next to "yes." If you do not want to help, please mark the space next to "no" and your teacher will give you something else to work on while we do this study. Please write your name on the line below.

Thank you for your help.

Sincerely,
Kala Taylor

____ yes

____ no

Name:_____

Date:_____

Appendix G

Study II Assent and Consent Forms

Study II Student Assent Form

My name is _____ and I am a graduate student in the Ph.D. School Psychology Program at the University of Tennessee. I am studying reading and would like to have your help. If you decide to help, you will be asked to spend a few minutes reading aloud and answering questions about what you read. While you read, you will be recorded on an audio tape so that we can listen to it later.

If you choose to participate, you can quit the study at any time by letting me or your teacher know you wish to quit. You will not be penalized for quitting the study. How well you do on this task will not affect your grades.

If you agree to participate please mark the space next to "yes". If you do not want to participate, please mark the space next to "no." Please write your name on the line below.

Thank you for your help.

Sincerely,
Kala Taylor

____ yes

____ no

Name:_____ Date:_____

Study II Parent Consent Form

Dear Parent,

My name is Kala Taylor, and I am a graduate student in the School Psychology doctoral program at the University of Tennessee. I am currently working on a research project designed to investigate reading comprehension, and I am seeking your consent for your child to participate in this research. This research will be supervised by my advisor, Dr. Christopher H. Skinner, a professor at the University of Tennessee.

If you agree to allow your child to participate, your child will work one-on-one with a UT school psychology student. Your child will be asked to read a word list and two passages aloud as the UT student records their reading errors and the time they spend reading. If your child has difficulty reading a word, the UT student will read it to them. After completing each passage, your child will be

asked to answer 10 multiple choice questions about the passage they just read. The study will require that your child spend approximately 10-15 minutes participating in these reading activities on a day that has been arranged by his or her teacher. An audio recording will be made as your child reads so that we can double check our scoring procedures. On the audio recording, your child will be identified with a number, such as "student 0015," that cannot be linked back to your child's name.

If you agree to allow your child to participate, your child may quit the study at any time. You may also withdraw permission for your child to participate at any time. Participation in the study and performance on the reading tasks will have no effect on your child's grades. Although the results of our research may be shared with others through professional publications and presentations, your child's name will never be revealed. Your child's name will not be written on his/her performance data, and all data will be stored securely and will be made available only to persons conducting the study.

The possible risks associated with participation in this research are your child becoming fatigued or bored while reading the word list and passages. In order to minimize these risks, we will be working one-on-one with your child for a short period of time. Your child will not benefit directly from participating in this research; however, the findings of this study will add to the understanding of reading and thus potentially contribute to the development of methods which enhance the education of children.

If you have any questions about this study or consent form, feel free to contact me, Kala Taylor, at ktaylo77@vols.utk.edu or (859) 582-5148, or my advisor, Chris Skinner, at cskinne1@utk.edu or (865) 974-8403. If you have questions about your child's rights as a participant, please contact the University of Tennessee IRB Compliance Officer at utkirb@utk.edu or (865) 974-7697. If you agree to allow your child to participate in this research, please check the box, sign the form in the space provided, and return the form to your child's teacher.

Thank you for your and your child's time and consideration,

Kala Taylor
University of Tennessee, Educational Psychology and Counseling
Knoxville, TN 37996
(859) 582-5148
Ktaylo77@vols.utk.edu

CONSENT FOR STUDENT PARTICIPATION

_____ I have read the above information. I have received a copy of this form. I agree to allow my child to participate in this research.

Child's Name (printed): _____

Signature: _____ Date: _____
Parent or Legal Guardian

Study II Teacher Consent Form

Dear Teacher,

My name is Kala Taylor, and I am a graduate student in the School Psychology Ph.D. program at the University of Tennessee. I would like to conduct research in your classroom during the 2016 Spring semester under the supervision of my advisor, Dr. Christopher H. Skinner, a professor at the University of Tennessee. The purpose of my study is to determine whether the presence of foreign names in primary students reading probes affects reading comprehension and comprehension rate during silent and aloud reading, and to determine whether difficulty reading passages is related to decoding problems or comprehension problems. I have obtained the relevant school, district, and university approvals to contact you for participation in this research.

If you agree for your classroom to participate, I will give you consent forms to send home with your students. Before participating in the study, students who received permission to participate will be read an assent form and asked to indicate their willingness to participate. They will be told that they can stop participating at any time.

Each student will read two grade-level passages; one standard (i.e., with typical, American names) and one experimental (i.e., with foreign names), and answer 10 comprehension questions per passage. They will also read a word list of 10-15 pre-identified phonetically difficult words. In total, experimental procedures will take less than 10 minutes per student. Data will be collected by trained school psychology graduate student researchers working individually with students.

The possible risks associated with participation in this research include students becoming fatigued or bored while reading the word list and passages. In order to minimize these risks, we will be working one-on-one with each student for a short period of time. Students will not benefit directly from participating in this research; however, the findings of this study will add to the understanding of reading and thus potentially contribute to the development of methods which enhance the education of children.

Your name will not be recorded on any study materials. Student participants' names will not be recorded on the data forms; rather, students will be assigned code numbers so they cannot be identified. Participation in this study is voluntary, which means that you do not have to participate and can stop at any time without penalty. Your students may also choose to stop participating at any time. Although the results of our research may be shared with others through professional publications or presentation, your name or the names of your students will never be revealed.

Enclosed is a copy of this letter for your records. If you agree to participate in this research, please complete the section below on one copy of this letter and return it to me. Your signature indicates that you have read and understand the information above, that you willingly agree for your classroom to participate, and that you may withdraw at any time and discontinue participation without penalty. If you have any questions about this study or consent form, feel free to contact me, Kala Taylor, at ktaylo77@vols.utk.edu or (859) 582-5148, or my advisor, Chris Skinner, at cskinne1@utk.edu or (865) 974-8403. If you have questions about your rights as a participant, please contact the University of Tennessee IRB Compliance Officer at utkirb@utk.edu or (865) 974-7697.

Thank you for your time and consideration,
Kala Taylor, B.S.

University of Tennessee, Department Educational Psychology and Counseling
Knoxville, TN 37996
(859) 582-5148

TEACHER CONSENT

I have read the above information. I have received a copy of this form. I agree to participate in this study.

Participant's Name (printed) _____

Participant's Signature_____

Date _____

Appendix H

Study III Assent and Consent Forms

Study III Student Assent Form

My name is _____ and I am a graduate student in the Ph.D. School Psychology Program at the University of Tennessee. I am studying reading and would like to have your help. If you decide to help, you will be asked to spend a few minutes reading one or two stories aloud and answering questions about what you read. While you read, you will be recorded on an audio tape so that we can listen to it later. You also might be asked to complete a computer program to teach you the names in the story before you read them.

If you choose to participate, you can quit the study at any time by letting me or your teacher know you wish to quit. You will not be penalized for quitting the study. How well you do on this task will not affect your grades.

If you agree to participate please mark the space next to "yes". If you do not want to participate, please mark the space next to "no." Please write your name on the line below.

Thank you for your help.

Sincerely,
Kala Taylor

____ yes

____ no

Name:_____ Date:_____

Study III Parent Consent Form

Dear Parent,

My name is Kala Taylor, and I am a graduate student in the School Psychology doctoral program at the University of Tennessee. I am currently working on a research project designed to investigate reading comprehension. I am seeking your consent for your child to participate in this research, supervised by my advisor, Dr. Christopher H. Skinner, a professor at the University of Tennessee.

If you agree to allow your child to participate, your child will work one-on-one with a UT school psychology student. Your child will be asked to read one or two passages aloud. Before reading

the passage(s), your child may be randomly selected to practice some of the difficult words included in the passages on flashcards presented on a laptop computer. As your child reads the passage(s), the UT student will record their reading errors and the time they spend reading. If your child has difficulty reading a word, the UT student will read it to them. After completing each passage, your child will be asked to answer 9 multiple choice questions about the passage they just read. The study will require that your child spend approximately 10-15 minutes participating in these reading activities on a day that has been arranged by his or her teacher. An audio recording will be made as your child reads so that we can double check our scoring procedures. On the audio recording, your child will be identified with a number, such as "student 0015," that cannot be linked back to your child's name.

If you agree to allow your child to participate, your child may quit the study at any time. You may also withdraw permission for your child to participate at any time. Participation in the study and performance on the reading tasks will have no effect on your child's grades. Although the results of our research may be shared with others through professional publications and presentations, your child's name will never be revealed. Your child's name will not be written on his/her performance data, and all data will be stored securely and will be made available only to persons conducting the study.

The other possible risks associated with participation in this research are your child becoming fatigued or bored while reading the words and passage(s). In order to minimize these risks, we will be working one-on-one with your child for a short period of time. Your child will not benefit directly from participating in this research; however, the findings of this study will add to the understanding of reading and potentially contribute to the development of methods which enhance the education of children.

If you have any questions about this study or consent form, feel free to contact me, Kala Taylor, at ktaylo77@vols.utk.edu or (859) 582-5148, or my advisor, Chris Skinner, at cskinne1@utk.edu or (865) 974-8403. If you have questions about your child's rights as a participant, please contact the University of Tennessee IRB Compliance Officer at utkirb@utk.edu or (865) 974-

7697. If you agree to allow your child to participate in this research, please check the box, sign the form in the space provided, and return the form to your child's teacher.

Thank you for your and your child's time and consideration,
Kala Taylor
University of Tennessee, Educational Psychology and Counseling
Knoxville, TN 37996
(859) 582-5148
Ktaylo77@vols.utk.edu

CONSENT FOR STUDENT PARTICIPATION

_____ I have read the above information. I have received a copy of this form. I agree to allow my child to participate in this research.

Child's Name (printed): _____

Signature: _____ Date: _____

Parent or Legal Guardian

Study III Teacher Consent Form

Dear Teacher,

My name is Kala Taylor, and I am a graduate student in the School Psychology Ph.D. program at the University of Tennessee. I would like to conduct research in your classroom during the 2017 Spring semester under the supervision of my advisor, Dr. Christopher H. Skinner, a professor at the University of Tennessee. I recently conducted a study which indicated that the presence of foreign names in primary students reading probes negatively affected reading comprehension and comprehension rate in our sample. Now, I am conducting a study to further validate my initial results, and to determine whether a simple, quick preteaching intervention can remedy this problem. I have obtained the relevant school, district, and university approvals to contact you for participation in this research.

If you agree for your classroom to participate, I will give you consent forms to send home with your students. Before participating in the study, students who received permission to participate will be read an assent form and asked to indicate their willingness to participate. They will be told that they can stop participating at any time. Each student will read one or two grade-level passages which include either typical, American names, or foreign names, and then answer 9 comprehension questions per passage. Some students will also receive a simple computerized flashcard reading intervention to teach them the three names included in the experimental passage. In total, experimental procedures will take less than 15 minutes per student. Data will be collected by trained school psychology graduate student researchers working individually with students.

The possible risks associated with participation in this research include students becoming fatigued or bored while reading the word list and passages. In order to minimize these risks, we will be working one-on-one with each student for a short period of time. Students will not benefit directly from participating in this research; however, the findings of this study will add to our understanding of reading and potentially contribute to the development of methods which enhance the education of children.

Your name will not be recorded on any study materials. Student participants' names will not be recorded on the data forms; rather, students will be assigned code numbers so they cannot be identified. Participation in this study is voluntary, which means that you do not have to participate and can stop at any time without penalty. Your students may also choose to stop participating at any time. Although the results of our research may be shared with others through professional publications or

presentation, your name and the names of your students will never be revealed.

Enclosed is a copy of this letter for your records. If you agree to participate in this research, please complete the section below on one copy of this letter and return it to me. Your signature indicates that you have read and understand the information above, that you willingly agree for your classroom to participate, and that you may withdraw at any time and discontinue participation without penalty. If you have any questions about this study or consent form, feel free to contact me, Kala Taylor, at ktaylo77@vols.utk.edu or (859) 582-5148, or my advisor, Chris Skinner, at cskinne1@utk.edu or (865) 974-8403. If you have questions about your rights as a participant, please contact the University of Tennessee IRB Compliance Officer at utkirb@utk.edu or (865) 974-7697.

Thank you for your time and consideration,
Kala Taylor, B.S.

University of Tennessee, Department Educational Psychology and Counseling
Knoxville, TN 37996
(859) 582-5148

TEACHER CONSENT

I have read the above information. I have received a copy of this form. I agree to participate in this study.

Participant's Name (printed) _____

Participant's Signature_____

Date _____

Vita

Kala Taylor was born in Asheville, NC to Dr. Jack and Amelia Taylor. She attended Carolina Day School prior to moving to Richmond, KY in 1997, where her family opened Barnes Mill Animal Hospital. Kala completed her secondary schooling at Model Laboratory School. In 2004, she enrolled in Eastern Kentucky University where she sampled a variety of majors before gaining clarity that she had more work to do before choosing a career path. After obtaining needed life experience, she enrolled in Millsaps College in Jackson, MS. Her practicum experiences in the Jackson Public School System ignited her passion for working with marginalized children. Kala graduated Summa Cum Laude in December of 2013 with her BS in Psychology, and enrolled in the School Psychology PhD Program at University of Tennessee the following August as a Chancellor's Fellow. While there, her research has been recognized by the National Association of School Psychologists and the American Academy of School Psychology. Kala earned her MS in Applied Educational Psychology in May 2017, and she will complete her pre-doctoral internship with the Nebraska Internship Consortium in Professional Psychology at Boys Town. In August of 2019, Kala will complete her doctoral training and finally earn the title of "Little Dr. Taylor."

Kala is the long-term public relations and social networking manager of her family's veterinary practice. She is an avid aerialist, trap-neuter-return advocate, and aspiring gardener. She has an innate ability to locate and acquire animals in need of help, at times to the annoyance of her father the veterinarian. She lives with her two dogs, Sweet Pea and Bo Diddley, and cats, Delilah and Flannel; without them her life could not be complete.