Using Brief Experimental Analysis to Identify Effective Early Reading Interventions

By

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The Use of Brief Experimental Analysis in Identifying Early Reading Interventions

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The National Center for Educational Statistics in 2015 found that only thirty-six percent of fourth-grade and thirty-four percent of eighth-grade students performed at or above the proficient level in reading. These students do not have the skills necessary to support them in their education. Research has shown that BEA can be used to identify effective reading fluency interventions for struggling students and that these interventions can be effective when implemented across time (e.g., Eckert et al., 2002, Daly et al., 1999). Only one study to date (Petursdottir et al., 2009) has studied the ability of BEA to identify early reading interventions.

The present study examined the use of BEA in identifying effective early reading interventions. Three students entering 1st and 2nd grade were invited to participate in the study occurring over the summer months. BEA procedures were used to identify an intervention strategy for each student. The three intervention strategies assessed were repeated reading, modeling, and goal setting and incentive. Progress was measured bi-weekly using FAST probes in letter sound fluency, decodable word fluency, and oral

reading fluency. The results from the study suggest that BEA identified intervention strategies did improve reading performance for all three students.

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CHAPTER I

Introduction

Statement of the Problem

In 2013, the National Center for Educational Statistics found that 32% of fourth grade students were reading below basic achievement levels. In 2015, only 36% of fourth grade and 34% of eighth grade students performed at or above the proficient level in the National Assessment of Educational Progress reading report card (National Center for Educational Statistics, 2015). Overall, there has been an increase in students' average reading scores from 1992 to 2015. However, despite these improvements over the years, the percentage of students not meeting reading expectations is still high.

Many students do not have the skills necessary to support them in their education and are at risk for academic difficulties elsewhere. As children progress through school, reading becomes an increasingly important tool for continued success in all academic areas. Research has found that approximately 16% of students who are not reading proficiently by the end of third grade do not graduate from high school on time (Hernandez, 2012).

The research on reading development and the skills needed to be able to read successfully has been well-established. Student learn skills in a progression, described as the reading hierarchy (National Reading Panel, 2005; Shapiro, 2011). Students first develop phonemic awareness (i.e., the ability to hear and manipulate sounds in spoken language) and learn basic concepts of print (i.e., holding a book in the proper orientation, understanding the left-to-right progression of reading). Then, students begin mapping the

sounds they hear in spoken language to print (i.e., phonics) and begin to decode or "break-down" words. Next, students work to build fluency with those skills (i.e., reading quickly, accurately, and with proper expression) and finally, they learn to understand the text they are reading (i.e., comprehension). This research highlights the need to intervene as early as possible with students who are struggling to read and provide effective interventions for those students.

Haring, Lovett, Easton, and Hansen (1978) described how a student progresses when learning a new skill. The instructional hierarchy includes four stages of learning. First, the student begins to learn the basic components of the task but has yet to master those skills (i.e., Acquisition Stage). Next, the student learns all of the skills necessary to complete a task but is still learning to complete them quickly and accurately (i.e., Fluency Stage). Then, once the student has become fluent with those skills, they begin to learn to use them in different contexts (i.e., Generalization Stage). Finally, once the student has learned to transfer the skills to different context, they begin to learn to modify or adapt that skill to fit new situations (i.e., Adaptation Stage). Using this framework, Daly, Witt, Martens, and Dool (1997) developed five hypotheses explaining why a child is struggling to learn: (1) they do not want to do it, (2) they have not spent enough time doing it, (3) they have not had enough help to do it, (4) they have not had to do it that way before, and (5) it is too hard. While many of these hypotheses address the stages outlined in the instructional hierarchy, this framework provides a more complex view of how students learn. Through this research, it has become evident the importance of understanding the stage of learning a student is at in order best suit their educational and learning needs.

Current Study

Using the framework of the five hypotheses (Daly et al., 1997) the present study examined how brief experimental analysis (BEA) can be used to empirically identify effective early reading interventions for struggling early elementary students and what the effects of those BEA-identified interventions were across time. Specifically, the researcher used BEA methodology to examine whether a repeated reading, modeling, or goal setting and incentive intervention would be most effective for each participant. The identified intervention strategy was then applied to *Sound Partners* intervention materials four days a week for 45 minutes over the course of a 5-week summer reading program. Depending on each student's current level of performance, outcome measures included letter sound fluency, decodable word fluency, and oral reading fluency.

The purpose of this study was to extend the literature on the use of BEA to empirically identify effective academic interventions, specifically with early reading interventions. While much research has been conducted on BEA in the area of oral reading fluency, only one published study to date has examined its effectiveness with early readers (i.e., Petursdottir et al., 2009). The current study found that BEA did identify effective interventions for early reading students and the most effective intervention varied across students. The effects of the BEA-identified intervention strategy across a 4-week period were mixed.

Research Questions

The current study asked the following research questions:

1. Can BEA identify an effective reading intervention strategy for early readers?
2. What are the effects of the BEA-identified intervention across time?

Based on previous research regarding the effectiveness of BEA in identifying academic interventions, it was hypothesized that BEA would empirically identify effective interventions for early readers, and that implementing the BEA-identified intervention would positively impact early reading skills (i.e., letter sound fluency, decodable word fluency, oral reading fluency) across time.

CHAPTER II

Review of the Literature

Reading Development

In 1983, Jeanne Chall described the progression of literacy development. She described six stages of reading development. In order for an individual to move through the stages, they need to master the previous stages. Stage zero is called Preceding. This is the stage in which young children learn the concept of print. They learn that text moves from left to right and how to properly hold a book to begin reading. Stage one is called Initial Reading, or Decoding. At about age six and seven, children learn what sound goes with what letter and they learn how to map letter sounds to the symbol of the letter. Stage two is called Confirmation, Fluency, Ungluing from print. Between the ages of seven and eight, children take skills learned in the previous stage and practice to gain speed and accuracy. At age nine, children begin stage three which is called Reading for Learning. At this stage, children take their previous skills and begin to practice comprehending what they are reading to acquire new knowledge. At stage four, called Multiple Viewpoints, the student will begin to understand reading with multiple viewpoints and think critically about what they are reading. During stage five, called Construction and Reconstruction, the student will begin to merge old knowledge with what they are reading to create new knowledge. This stage also requires a lot of abstract thinking (Chall, 1983).

In 2005, the National Reading Panel reviewed the literature on reading instruction and identified components of reading similar to Chall's stages of reading. The five components identified are phonemic awareness, phonics, fluency, vocabulary, and

comprehension. The panel also recognized that instruction in the early stages of reading, such as phonemic awareness and phonics, helps students be successful as they learn to read fluently and then comprehend what they are reading.

Both Chall (1983) and the National Reading Panel (2005) emphasize that by fourth grade, students should be comprehending what they are reading and using reading as a tool for learning. Task demands in the classroom also change around that time with students being expected to use the assigned readings to learn content (Center For Public Education, 2015). If a child is unable to read proficiently, he or she is likely to struggle in other areas of academics. Early identification of these students is critical in order for their chances of success in later grades to increase. Not all students will respond to evidence-based reading instruction and interventions. For these students, additional and possibly individualized support is needed for them to succeed in all aspects of education.

This study examined the use of brief experimental analysis and its application to reading intervention selection. First, the literature review will discuss key aspects of brief experimental analysis. Second, the literature review will discuss how brief experimental analysis has been used in the past for selection of reading interventions. Finally, the literature will discuss how brief experimental analysis has been used to analyze its effectiveness in empirically selecting early reading interventions.

Intervention Selection

Understanding why a student is struggling is critical when developing supports to foster a student's academic growth. Daly and colleagues developed five hypotheses about why a student is not performing a skill that can guide the selection of interventions (Daly et al., 1997). The five hypotheses are the student does not want to do the task, the student

has not had enough time doing it, the student has not had enough help to do it, student has not had to do it that way before, and the material is too hard.

Hypothesis-based interventions. Using the five hypotheses outlined by Daly and colleagues (1997), many researchers have examined how testing interventions that correlate with these hypotheses resulted in identifying interventions that improved many students' performance.

The first hypothesis is "They do not want to do it." This hypothesis addresses a student's motivation to perform and engage in the activity. Intervention components that are commonly used are offering incentives for performance, offering students a choice of activity, and offering activities that are authentic and relevant to both the student and what is the student is expected to be able to do in the classroom. Two commonly used strategies are goal setting, which involve the teacher and the student setting a challenging yet achievable performance goal, and incentive, providing student with a reward based on increased performance. Conte and Hintze (2000) found support for the use of goal setting in improving oral reading fluency. Students in this study improved their oral reading fluency by approximately 1.6 to 2.3 words read correctly per minute per week.

The second hypothesis, "They have not spent enough time doing it," addresses the need for additional practice to increase fluency or proficiency with the material. Commonly used intervention components include increased active responding, increased practice, delayed feedback as to not interrupt the student, and increasing academic engaged time. These components also involve the use of highly structured and sequential tasks, giving enough time for the student to respond, providing continuous and active instruction, maintaining high rates of success within an appropriate level, decrease

distractions and intrusions on instructional time, and repeated practice. Repeated Reading has been established as an effective intervention that targets fluency (Rashotte & Torgesen, 1985; Swain, Leader-Janssen, Conley & Perry, 2013). Repeated Reading is described as reading a passage multiple times. This research has shown significant improvement in students' oral reading fluency. Swain and colleagues (2013) found that student receiving a Repeated Reading intervention saw an improvement of approximately 1.3 words read correctly per minute per week.

The third hypothesis is "They have not had enough help to do it." This hypothesis looks at the need for additional instruction and guidance with the material. This suggests the student has not acquired all the skills necessary to be able to complete the tasks independently. Intervention components that address these needs include providing feedback when the student is correct as well as when they are incorrect, repeatedly practicing errors they are consistently making, modeling how to do the tasks, guided practice, and explicit instruction. Strategies that can be used include active feedback, choral responding, response cards, and listening preview. Listening Preview, otherwise called Modeling, is also a well-established intervention strategy that targets acquisition of skills in addition to fluency (Daly & Martens, 1994; Swain, Leader-Janssen, Conley, & Perry, 2013). In Listening Preview, the student listens to someone read a passage aloud and follows along. Swain and colleagues (2013) also found that students receiving a Listening Preview (via audio recording or teacher) had an improvement rate of approximately 2 words read correctly per minute per week.

The fourth hypothesis, "They have not had to do it that way before," addresses the need for increased opportunities to generalize previously learned information. The

intervention components commonly used to address this concern include delayed and elaborate feedback to expand thinking, increased self-correction, connecting previously learned material to novel material and more complex skills, providing variety in task demands, and providing opportunities for the student or respond (Daly et al., 1997). This hypothesis has not been explored in the literature to date.

Finally, the fifth hypothesis is "It is too hard." This hypothesis addresses the need to ensure student have the prerequisite skills to complete a task and give material that is not only aligned with curriculum, but also aligned with instructional level (Daly et al., 1997).

Brief Experimental Analysis

Selecting from an array of multiple interventions can be a time- consuming process. Brief experimental analysis (BEA) can be used by teachers and other professionals to quickly find interventions that have the potential to be effective for students. BEA involves implementing interventions in a short time frame within a single-case experimental design in order select the most effective intervention for an individual student. With a variety of different interventions or treatments that show promise, BEA allows for the brief testing of multiple interventions in order to empirically select an intervention that works for an individual student. It is a complex, single case design in which an individual's performance during an intervention is compared to his or her own baseline performance rather than to a control group, as in group design studies. Single-case designs demonstrate relationships between independent variables and dependent variables. BEA is a variation of a multi-element design that allows the comparisons of multiple interventions to one another to help empirically identify potentially promising

interventions that could be implemented over a longer period of time. Since BEA is a brief process, it can be an efficient way to identify promising interventions that can reduce effort on the part of the individual administering the BEA and the student. Also, it can help identify how much support is needed for a student to be successful. The promising intervention identified in the BEA can then be implemented over time, and progress can be monitored (Coolong-Chaffin & Wagner, 2015).

Use of Brief Experimental in Academic Interventions

Current research on BEA has shown when the BEA-identified intervention is implemented over time, students continue to show progress in their reading growth (Eckert et al., 2002) and can be used to identify interventions that will be the most effective for students (Eckert et al., 2002; Daly et al., 1999). Research has also shown BEA can be an effective at identifying oral reading fluency interventions (Eckert et al., 2002, Andersen et al. 2013, and Daly et al., 1999), writing interventions (Parker et al., 2012) and math interventions (Mong & Mong, 2012).

While BEA has been examined in several different areas of academics, most of the research to date has examined the use of BEA with oral reading fluency interventions. For example, Daly et al. (1999) used BEA to test a variety of reading fluency interventions based on the five hypotheses described previously. The interventions examined were incentive for improved performance to assess the hypothesis of low motivation to perform, repeated reading to test the hypothesis that the student needs additional feedback, and listening passage preview to test the hypothesis that students needed additional instruction. Researchers tested the interventions in order from low adult involvement to high adult involvement. The purpose for this ordering was to find

the most effective intervention that required the least amount of adult involvement. Students were given a baseline assessment on both the instructional passage and a high content overlap (HCO) passage (i.e. passages that closely match what is instructed but are not exactly the same). A treatment was then applied to the instructional passage after which the student was assessed on their performance on both the instructional passage and the HCO passage. In some cases, researchers made materials easier if students were struggling with the passage. Their results found that all the students increased their score relative to baseline in at least one condition in both the instructional passages and the HCO passages.

Another study examined whether the effectiveness of an antecedent intervention (i.e., repeated reading and passage preview) could be enhanced by combining it with a consequent (i.e., contingent reinforcement for improved performance and performance feedback) for students with reading problems (Eckert et al., 2002). The researchers used BEA to also see if participants would show individual differences in their responsiveness to the interventions. Four of the six students showed enhanced performance when the antecedent intervention was combined with the consequent intervention. The students also showed individual differences in which consequent (e.g., contingent reinforcement verses performance feedback) was most effective. The results of this study suggested that individual differences do exist in learning and that BEA can effectively empirically identify what intervention is the most effective.

While the previous studies have used multiple replications during the BEA phases of the intervention, another study focused on whether one trial of BEA (OTBEA) was sufficient to determine an effective intervention (Andersen et al., 2013). The researchers

examined skill- and performance-based treatment components using BEA. Following the initial OTBEA phase, an extended analysis was conducted using an alternating treatments design to assess whether the predictions made during the OTBEA on effective intervention components would be seen throughout the extended analysis. The researchers found that one trial of the BEA interventions was sufficient to predict and effective intervention for three out of six participants with mixed results for other participants. This study highlights the importance of refining these processes to better serve educators.

Procedures among studies involving the use of BEA vary. Given the number of variations available within single case design and BEA, a meta-analysis of BEA research of reading fluency examined three components of BEA research; what magnitude of effect was needed to identify an intervention as the most effective within a BEA, what interventions led to the largest mean effect within BEA, and whether effects of the intervention were impacted by the type of passage (Burns & Wagner, 2008). Across the 13 studies included in this meta-analysis, the researchers found a no assumptions effect size of approximately 2.80 and a percentage of non-overlapping data (PND) of approximately 80% for the effective interventions compared to the other interventions, which are both considered strong effects (Parker & Brossart, 2003; Scruggs & Mastropieri, 1998). The researchers also found that repeated reading and listening passage preview interventions were the most commonly used and that a combination of listening passage preview, repeated reading, and performance feedback lead to the largest PND across the studies. Finally, the researchers found that while instructional level passages led to higher effects, the use of high-content overlap passages led to much less

variability. These findings help guide researchers as continued research is conducting in using BEA and provides continued evidence in the use of BEA to empirically identify effective reading fluency interventions.

Use of Brief Experimental Analysis in Early Reading Interventions

Some researchers have used other variants of single case design to find effective interventions. Daly et al. (2009) used a multiple-probe across tasks design to test the effectiveness of individualized instruction on letter sounds and nonsense words in addition to classroom instruction. Individualized instruction was given to a student who did not respond to incentive interventions. The student's performance was tested during baseline of a new theme before classroom instruction began. She continued to receive the same in class instruction and began to receive individualized instruction from the researchers. Researchers taught her phonemes in isolation by presenting them individually on a card, modeled the letter sound for her, and prompted her to repeat the sound back. If she made a mistake, the researcher would model the sound for her and ask her to repeat it. The researcher would then teach the student phonemes in combination by creating nonsense words in a consonant-vowel-consonant pattern (CVC), placing the cards in front of the student in that order, modeling the word for her, and asking her to repeat it. The results show that this instruction increased the student's correct number of responses during that time. This student needed more knowledge on phonemes in isolation before she could combine sounds to create nonsense words while other students needed to increase their motivation to learn. By testing an additional intervention, researchers increased her knowledge of phonemes both in isolation and combination.

To date, there is only one published study that has used BEA to test early reading interventions. Petursdottir and colleagues (2009) applied BEA to finding effective early reading interventions for kindergarteners who did not respond to class wide evidence-based intervention. Participants were drawn from a large-scale, multi-site study of Kindergarten Peer-Assisted Learning Strategies (K-PALS). Three classrooms were involved in this particular study. Researchers administered a Rapid Letter Sounds pretest to 46 kindergarten classrooms and the lowest 20% of students in those classrooms were identified as at risk and invited to participate. The students then received 20-30 minutes of K-PALS, a program designed to improve phonemic awareness and letter knowledge through peer assistance, reading intervention as part of their daily education. Five weeks into the program, researchers began monitoring students' progress with letter sound fluency, nonsense word fluency, and word identification fluency. Through these progress monitoring measures, researchers were able to identify four students who were not making gains to the K-PALS program and determined that these students needed an individualized instruction intervention. These students received BEA using interventions selected based on Daly's five hypotheses; modeling, Goal setting with incentive, and modeling plus goal setting with incentive. The BEA-identified interventions were applied to K-PALS material. One-on-one interventions were given on average 3.5 times a week for 5-10 weeks until the students reached the letter sound fluency goals. Student progress was recorded in a log along with attendance. All students showed a significant increase in their performance on all general outcome measures used after the BEA-identified intervention was implemented. Results show that early reading interventions

for kindergarteners can be empirically identified using BEA. These interventions also worked across time with continued improvement over the course of the 5-10 weeks.

CHAPTER III

Method

Participants and Setting

Participants were recruited from elementary schools in a mid-sized Midwestern city. Participants were invited to participate in a five-week summer reading program offered by a university and participate in the research study. School officials were asked to distribute information about the program to families of children who might benefit from additional reading support. Out of 22 students participating in the summer reading program, three students were selected to participate in the study. These students were selected based on initial assessments of reading that suggested they needed a phonics-based intervention. Students were entering 1st or 2nd grade for the following school year. The participants were two boys and one girl. Lindsay was a 7-year-old girl entering 2nd grade, Eric was a 7-year-old boy entering 2nd grade, and Carver was a 6-year- old boy entering 1st grade. The university is located in the same area as the elementary schools. The interventions took place in rooms that were approximately 10 feet by 10 feet with appropriately-sized tables and chairs for the participants.

Interventionist Training

Three undergraduate students were recruited to take part as interventionists in the summer reading program. All the undergraduates were entering their 4th year at the university, two were psychology majors and one was an education major. Interventionists received training from the author and the advisor on the interventions, outcome measures, and procedures of the study for approximately 8 hours across a two-day period.

The training included lecture on reading assessment procedures, intervention protocols, and fidelity and reliability assessment. The first day included training and instruction on the Formative Assessment System for Teachers (*FAST*), brief experimental analysis, and intervention protocols for students receiving fluency interventions. The second day included continued training and instruction on *FAST,* brief experimental analysis, and intervention and assessment protocols for the students receiving phonics interventions. The interventionists received time to practice the procedures and receive feedback throughout the training sessions.

Measures

Survey Level Assessment. The *Formative Assessment System for Teachers* (*FAST*) probes in letter sound fluency (LSF), decodable word fluency (DWF), and curriculum-based measures of oral reading fluency (CBM-R) were used for this study (Christ et al., 2013). Standardized procedures were used for all three measures. The students were given 3 probes at each grade level and the median words or letters read correct per minute was compared to national norms. The 10th percentile was used as the benchmark for determining instructional level and placement in the study. For LSF and DWF, one probe was given at grade level. Students were given a survey level assessment (SLA) to assess their present level of performance and identify an appropriate instructional level for the student. This is a process through which different assessments are administered to determine instructional level in reading. Students were assessed using curriculum based measures of oral reading fluency (CBM-R) beginning at grade level. Students were tested downward until they reached a level at which their performance was above the 10th percentile according to national norms. If a student's reading performance

fell below the 10th percentile on the lowest level of CBM-R materials, the student's skills in letter sound fluency and decodable word fluency were then assessed.

BEA measures. During the brief experimental analysis, probes were created for each student based on known and unknown letter sounds and words from the SLA completed in the previous session. Each probe had two known and two unknown letters and words to ensure the student could be partially successful on the probe and that the probes were of equal difficulty. These letters and words were arranged in a four-by-five table with a total of 20 letters or words on the page. These probes were used to assess intervention effectiveness during the BEA. See Appendix D for a sample probe.

Mastery monitoring measures. For each session during the intervention phase, probes were creating using the targeted sounds and words for each individual *Sound Partners* lesson. These probes were used as a mastery monitoring measure for each lesson, which allowed the researcher to see daily progress on the lessons. The *Sound Partners* intervention also included Mastery Tests after each set of 10 lessons. These Mastery Tests and the criteria associated with them were used to place the students in the *Sound Partners* materials, as well as after the completion of the lesson set to determine if the lessons need to be repeated. See Appendix A for a sample test.

Progress monitoring measures. *FAST* probes in LSF, DWF, and CBM-R were used as general outcome measures (GOM) during the intervention phase the following four weeks as progress monitoring. During the progress monitoring sessions, students were timed for one-minute and instructed to read the letters and words as quickly and accurately as they could. Interventionists recorded errors made during the one-minute period and reported the score as words or sounds read correct per minute.

BEA Conditions

Conditions to be tested were selected and created using the framework outlined by Daly et al, 1997. The following conditions looked at aspects of practice, modeling, and motivation, respectively. The first condition tested was a repeated reading intervention in which the student read a list of letters or words through 3 times and receive corrective feedback for errors after each reading. The second condition assessed was a modeling condition, where the student listened to the interventionist read the list before reading the list by him or herself. Then the student received corrective feedback on their errors before repeating the procedure. The third condition involved the use of goal setting and incentives, in which the student and the interventionist set a reading goal of the number of words and sounds read correct per minute for the student to achieve and if the student achieved that goal, they received some free time to play with games or a small toy as a prize. See Appendix B for copies of the protocols and Appendix C for probes used during the BEA phase.

Repeated Reading. The Repeated Reading intervention addressed the hypothesis that students have not had enough practice. For each Repeated Reading condition, interventionists followed a scripted protocol provided by the researchers. Following the pre-test, students read through the probe a total of 3 times, receiving corrective feedback on their errors. Following the three readings, the student was assessed again using the same probe to determine change in performance relative to baseline.

Modeling. The Modeling condition addressed the hypothesis that students have not had enough help or instruction. For each Modeling condition, interventionists followed a scripted protocol provided by the researcher. Following the pre-test, the

interventionist read through the probe, prompting the student to follow along. Once the interventionist finished reading, they prompted the student to read through the whole probe, giving corrective feedback on their errors. Once the student finished reading, the student was assessed again using the same probe to determine change in performance relative to baseline.

Goal Setting and Incentive. The Goal Setting and incentive condition addressed the hypothesis that the student does not want to do the task. For each Goal Setting and Incentive condition, interventionists followed a scripted protocol provided by the researcher. Following the pre-test, interventionists calculated a goal by multiplying the pre-test score of number of sounds and words read correct per minute by 1.20 to increase the score by 20 percent. Interventionists then told the students that they could get a prize if they could reach that goal. Students were assessed again using the same protocol to determine change in performance relative to baseline. If the student reached the goal or beat their previous score, they were able to receive a prize. If they did not beat their score, the interventionist told them they would have the opportunity to earn a prize later in the day.

Extended Analysis Interventions

Sound Partners. *Sound Partners* (Vadasy et al., 2005) is a phonics-based tutoring program that provides individual instruction in early reading skills. Interventions are designed to improve phonemic awareness, decoding, word identification, and spelling skills. It also provides instruction in phonological skills such as syllable segmenting and initial sound identification. The program is designed to be delivered by tutors with minimal training. This intervention allows for modeling from the tutor and repeated

practice. *Sound Partners* has shown to have a positive effect on early literacy skills (Jenkins, Peyton, Sanders, & Vadasy, 2004; Mooney, 2003; Vadasy, Jenkins, Antil, Wayne, & O'Connor, 1997a; Vadasy, & Sanders, 2008; Vadasy, Sanders, & Peyton, 2006).

The materials for *Sound Partners* were used during the intervention phase of this study. The researcher also adapted the *Sound Partners* intervention protocol to include additional aspects of the BEA identified intervention for individual students. The instructional content and purpose remained the same, however, aspects of the BEA identified strategy was incorporated into each of the sections of the instructional material. Each adapted intervention is described in the following sections and copies of the intervention protocols are found in Appendix D and probes used during the intervention phase are found in Appendix E.

Sound Partners Plus Repeated Reading. Interventionists followed a scripted protocol provided to them by the researcher. For each section of the lesson, students read the material two to three times depending on the length and complexity of the section. Sections that repeated material within a single reading were read twice while sections that were shorter or more complex were read three times. Throughout the lesson, students received corrective feedback on their errors and were provided opportunities to correct themselves.

Sound Partners Plus Modeling. Interventionists followed a scripted protocol provided to them by the researcher. For each section of the lesson, the student listened to the interventionist read the material before reading the material independently. While the interventionist read the material, the student was instructed to follow along. After the

interventionist modeled one section of the lesson, the student was instructed to read the section through by themselves. Throughout the lesson, the student received corrective feedback on their errors.

Sound Partners Plus Goal Setting and Incentive. Interventionists followed a scripted protocol provided to them by the researcher. This intervention was combined with an instructional intervention to ensure instruction was taking place. Following the lesson, students were told that if they beat their score from the initial pre-test or "cold read," they could earn a prize. If the student beat their previous score, they were able to receive a prize.

Inter-observer Agreement and Fidelity

Inter-observer agreement was assessed on 50% of all BEA and intervention sessions for each student. Interventionists listened to recorded sessions and independently scored the progress monitoring measures given to the students. Inter-observer agreement was calculated based by determining the number of total agreements between the interventionists for each letter sound or word and dividing it by agreements plus disagreements, and multiplying by 100 to obtain a percentage. The average of inter-observer agreement across observed sessions was 96.76%

Fidelity of intervention implementation was assessed with a checklist of specific steps and tutor behaviors during the sessions. Interventionists observed sessions in a clinical observation room and marked the steps completed using the checklist. The percentage of steps completed was calculated for 50% of the sessions. The average fidelity across the observed sessions was 96.42%

Procedure

Screening. During the first day of the summer reading program, interventionists administered the survey level assessments (SLA) to determine current level of proficiency. The SLA was given one-on-one in the clinic rooms at the university. Following the SLA, interventionists gave the Mastery Quizzes to place students in the *Sound Partners* material. Mastery Quizzes were given in order until the student did not pass the quiz. The lesson set that corresponded to the last Mastery Quiz was the lesson set that the student began at.

BEA. Following the survey level assessment, individualized probes were created for each student based on their performance during the SLA. These probes were used throughout the BEA phase of the study. A different probe was used in each intervention condition. Interventions were tested in a randomized order for each student. Each test started with a pre-test measure to assess current level of performance on the current probe. Students were asked to read as quickly and as accurately as they could for one minute. The interventionist then implemented the intervention using the same probe from the baseline condition. Immediately following the intervention, students were again asked to read the probe for one minute as quickly and as accurately as they could. The two interventions that yielded the highest gains relative to baseline performance were assessed again on the second day two more times, in an alternating order. Following the second BEA phase, the researcher and interventionist visually analyzed the graphed data from both BEA phases to determine which condition yielded the highest gain in words and sounds overall. The researcher looked for 3 replications of a condition producing a higher gain than the condition given before and after. Then, that condition was selected

and applied to the intervention. If the researchers were unable to determine the most effective intervention from visual analysis, an improvement score was calculated for each condition. The condition that yielded the highest mean improvement score was then applied to the intervention during the following weeks.

BEA-identified interventions. The BEA-identified strategies were applied to *Sound Partners* lesson protocol and materials for the following four weeks. Interventions were implemented during 45 minute, one-on-one sessions four times a week. Participants' performance on daily pre- and post-test probes were recorded on graphs by the students and in a computer file for researcher use. See Appendix E for sample probes used during the intervention phase.

Progress Monitoring. Progress monitoring data were collected twice a week using *FAST* CBM-R, decodable word fluency, and letter sound fluency, depending on the student's ability. Some students were unable to complete the CBM-R probes, due to instructional level.

CHAPTER IV

Results

Brief Experimental Analysis.

Lindsay. Lindsay had just completed 1st grade at the time of the study. Initial screening data suggested that Lindsay was reading below the 10th percentile on 1st grade *FAST* reading probes (i.e., CBM-R, DWF, LSF). Lindsay's scores of 40 letter sounds read correct and 8 decodable words read correct suggested that she would benefit from additional instruction in phonics. During the initial BEA phase, the Repeated Reading condition resulted in an increase of 19 words and sounds correct, the Modeling condition resulted in an increase of 25 words and sounds correct, and the Goal Setting and Incentive condition resulted in an increase of 5 words or sounds correct. The Repeated Reading and Modeling conditions were selected to be assessed during the second BEA phase due to having the largest improvement scores of the three conditions. During the second BEA phase, the first Repeated Reading condition resulted in an increase of 10 words and sounds correct, the first Modeling condition resulted in an increase of 38 words and sounds correct, the second Repeated Reading condition resulted in an increase of 32 words and sounds correct, and the second Modeling condition resulted in an increase of 31 words and sounds correct. After visual analysis of the improvement scores, the Modeling condition had a greater improvement score through four replications. These results suggested that the Modeling condition was the most effective for Lindsay (Fig. 1).

Eric. Eric had just completed 1st grade at the time of the study. Initial screening data suggested that Eric was reading below the 10th percentile on 1st grade *FAST* reading

probes (i.e., CBM-R, DWF, LSF). Eric's scores of 19 letter sounds read correct and 4 decodable words read correct suggested that he would benefit from additional instruction in phonics. During the initial BEA phase, the Repeated Reading condition resulted in an increase of 22 words and sounds correct, the Modeling condition resulted in an increase of 11 words and sounds correct, and the Goal Setting and Incentive condition resulted in an increase of 5 words and sounds correct. The Repeated Reading and Modeling conditions were selected to be assessed during the second BEA phase due to having the largest improvement scores of the three conditions. During the second BEA phase, the first Repeated Reading condition resulted in an increase of 6 words and sounds correct, the first Modeling condition resulted in a decrease of 7 words and sounds correct, the second Repeated Reading condition resulted in an increase of 13 words and sounds correct, and the second Modeling condition resulted in an increase of 17 words and sounds correct. After visual analysis of the improvement scores, the Repeated Reading condition appeared to have greater improvement score through three replications. However, due to the decrease during the first modeling condition of the second BEA phase, and average improvement score was calculated for both conditions using all replications. The average improvement for the Repeated Reading conditions was 13.66 words or sounds correct and the average improvement for the Modeling Conditions was 10.66. These results suggested that the Repeated Reading condition was the most effective for Eric (Fig. 3).

Carver. Carver had just completed Kindergarten at the time of the study. Carver's scores of 1 letter sounds read correct and 2 decodable words read correct on the initial screening data suggested that he would benefit from additional instruction in

phonics During the initial BEA phase, the Repeated Reading condition resulted in an increase of 41 words and sounds correct, the Modeling condition resulted in an increase of 34 words and sounds correct, and the Goal Setting and Incentive condition resulted in an increase of 10 words and sounds correct. The Repeated Reading and Modeling conditions were selected to be assessed during the second BEA phase due to having the largest improvement scores of the three conditions. During the second BEA phase, the first Repeated Reading condition resulted in an increase of 13 words and sounds correct, the first Modeling condition resulted in a decrease of 21 words and sounds correct, the second Repeated Reading condition resulted in an increase of 13 words and sounds correct, and the second Modeling condition resulted in an increase of 15 words and sounds correct. After visual analysis of the improvement scores, the Repeated Reading condition appeared to have greater improvement score through four replications. These results suggested that the Repeated Reading condition was the most effective for Carver (Fig. 5).

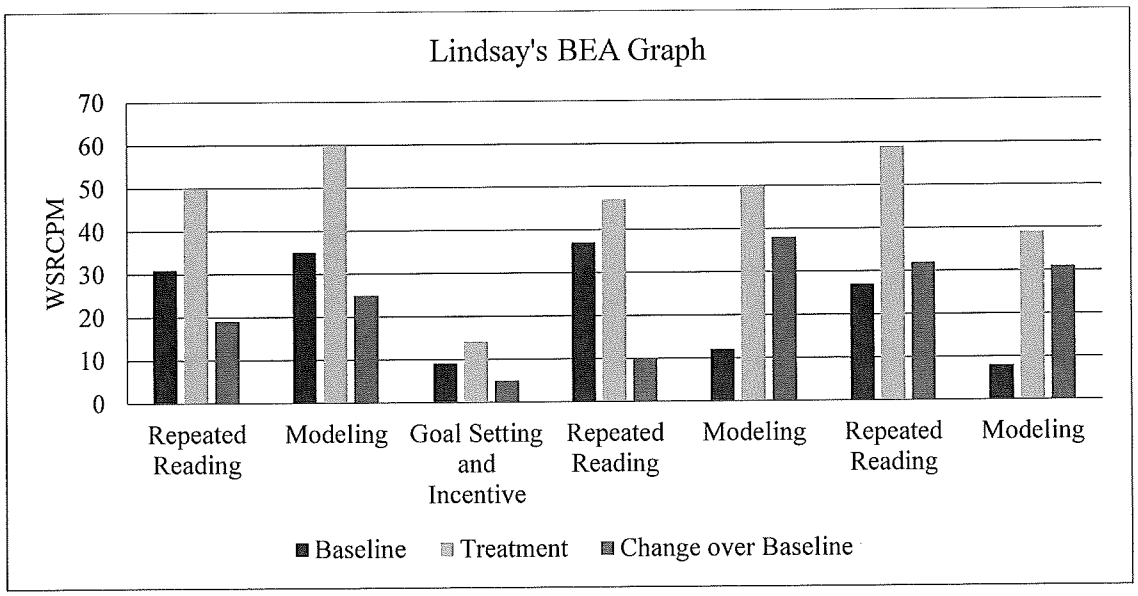

Figure 1. Bar graph depicting Lindsay's gains in words and sounds read correct per minute for the interventions of Repeated Reading, Modeling, and Goal Setting and Incentive.

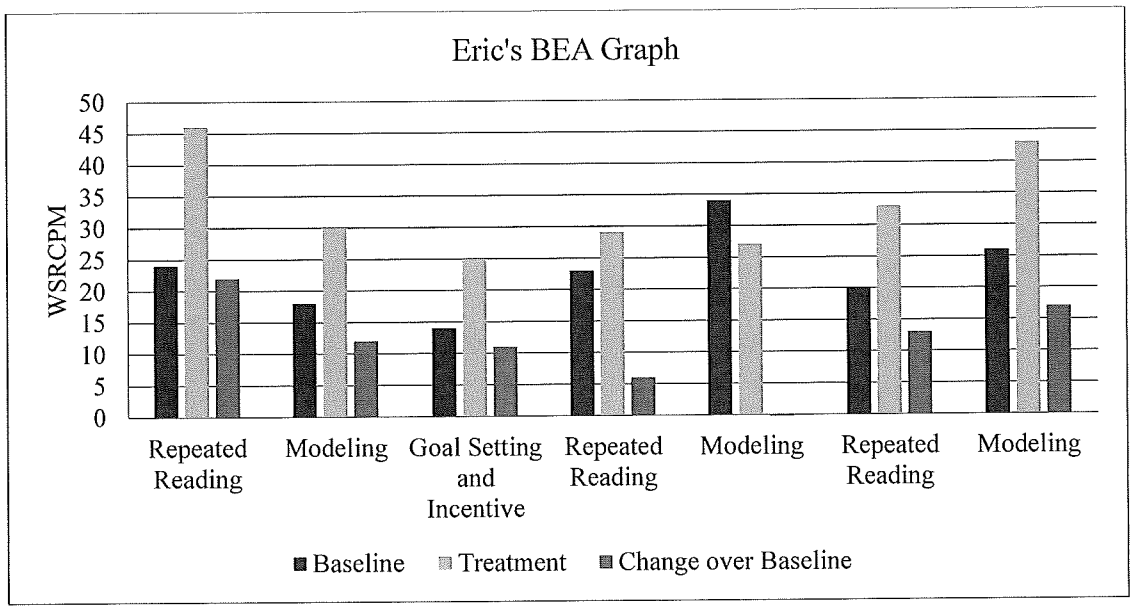

Figure 2. Bar graph depicting Eric's gains in words and sounds read correct per minute for the interventions of Repeated Reading, Modeling, and Goal Setting and Incentive.

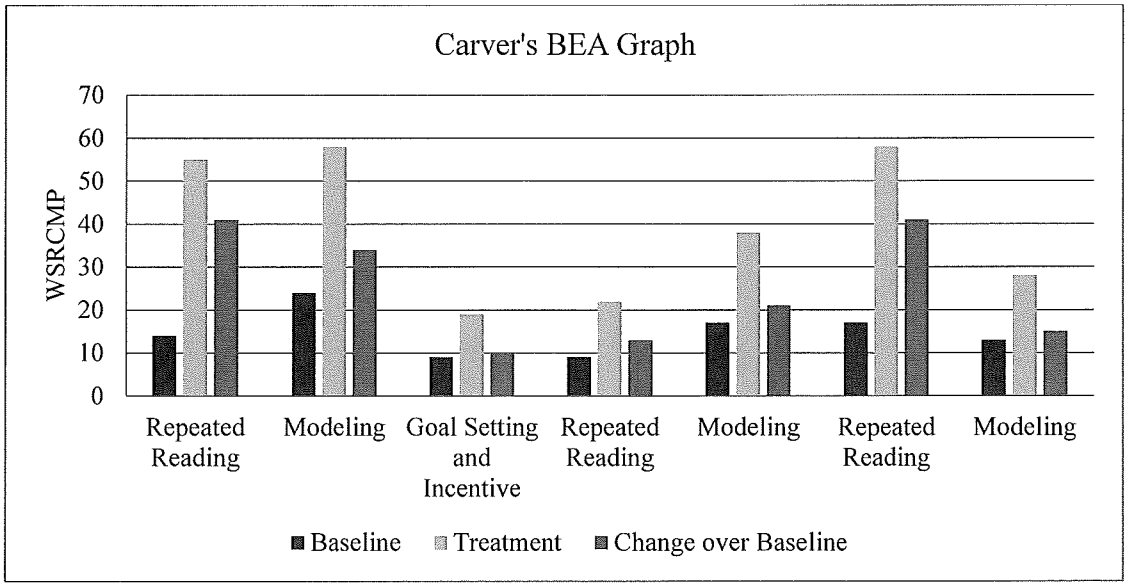

Figure 3. Bar graph depicting Carver's gains in words and sounds read correct per minute for the interventions of Repeated Reading, Modeling, and Goal Setting and Incentive.

Extended Analysis. Visual analysis of graphed performance was used to evaluate the effectiveness of the interventions for all students. In addition, Percentage of Non-Overlapping Data (PND) was used to compute effect size. When using PND to calculate effect size, 80 percent of non-overlapping data is considered to be a strong effect size (Scruggs and Mastropieri, 1998). A slope was also calculated to determine average growth over the intervention period on all GOMs.

Lindsay. Performance on Mastery Quizzes placed her at lesson one in *Sound Partners.* Lindsay made improvements from pre- to post-test on 60 percent of the lessons. For many of the other lessons, Lindsay tied her pre-test score (Fig. 4).

Lindsay made improvements in her LSF as well (Fig. 5). During baseline, Lindsay read 40 letter sounds correct per minute and during the intervention phase she read an average of 36.6 (range: 31-44) letter sounds correct per minute across 7 progress monitoring sessions. Lindsay had a significant drop in her score at the start of the

intervention phase. However, she made significant improvement in the following weeks with most of her data points trending upward. Lindsay's slope during the intervention phase for LSF suggests that Lindsay gained approximately 1.85 letter sounds per week. While there was some variability in her scores from session to session, most of the scores fall within 10 sounds correct per minute from each other. Lindsay also maintained 85% accuracy across all 7 progress monitoring sessions. The PND for LSF was 14%, suggesting the intervention had little to no effect on this measure.

Lindsay did not make improvements in her DWF (Fig. 6). During baseline, Lindsay read 8 decodable words correct per minute and during the intervention phase she read an average of 9.9 (range: 7-12) decodable words correct per minute across 7 progress monitoring sessions. The intervention did seem to have a positive impact on her performance immediately following initial implementation. Her performance across the sessions varied with her scores trending downward. Lindsay's slope during the intervention phase for Decodable Word Fluency suggests that Lindsay lost approximately .56 words per week. Overall, Lindsay did not improve her accuracy significantly across the 7 sessions, which ranged from 50% to 90%. The PND for Decodable Word Fluency was 71%, suggesting the intervention had a moderate effect on this measure.

Lindsay also made little improvement on her CBM-R (Fig. 7). During baseline, Lindsay read 33 words correct per minute and during the intervention phase she read an average of 30.2 (range: 21-41) words correct per minute across 5 progress monitoring sessions. The intervention did not seem to have a positive impact on her performance immediately following implementation. Her performance across the sessions varied significantly with her scores generally trending downward. Lindsay's slope for CBM-R

suggests that Lindsay remained at approximately the same level (-.2 words per week). Lindsay was able to maintain an accuracy of 80% or higher across all the progress monitoring sessions. The PND for Oral Reading Fluency was 40%, suggesting the intervention had little to no effect on this measure.

Overall, these results suggest that this intervention had a moderate impact on Lindsay's Letter Sound Fluency and Decodable Word Fluency.

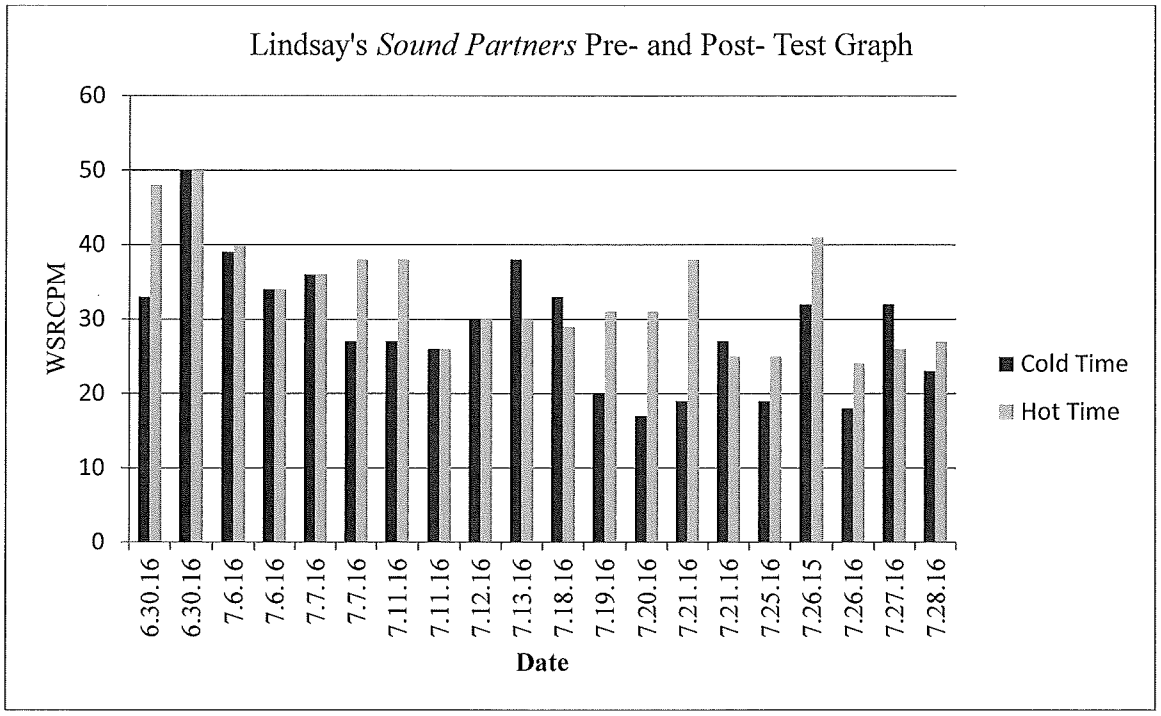

Figure 4. Bar graph depicting Lindsay's gains in words and sounds read correct per minute on lesson probes during the intervention phase.

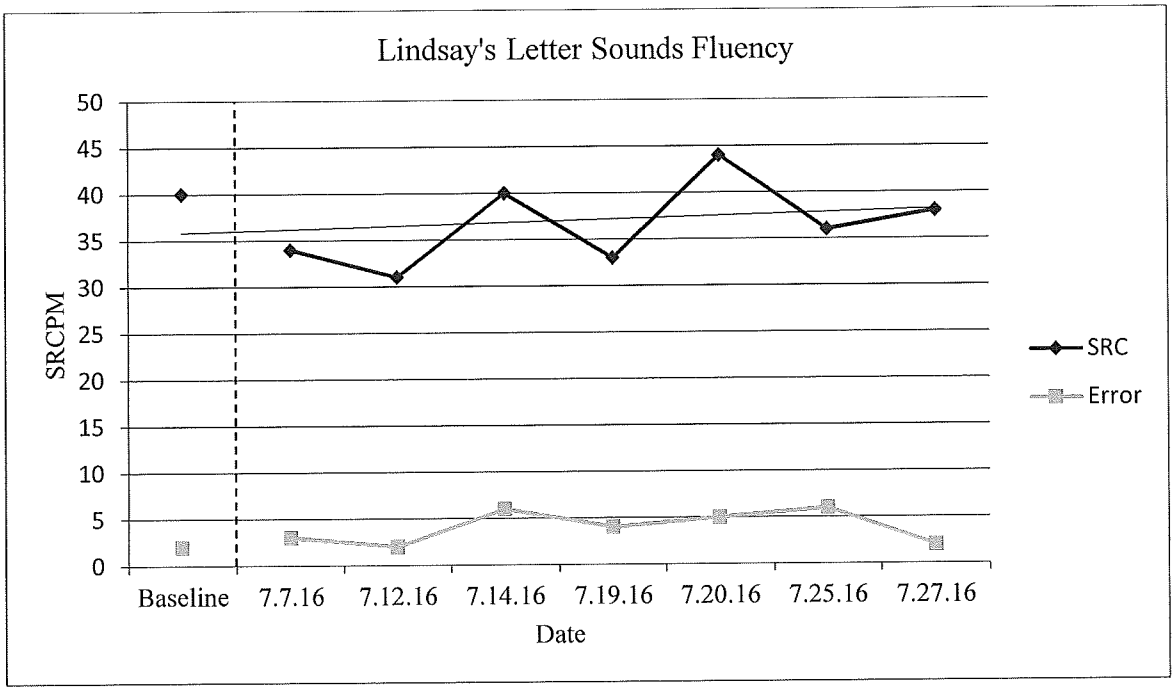

Figure 5. Line graph depicting Lindsay's gains in Letter Sound Fluency (LSF) during the intervention phase.

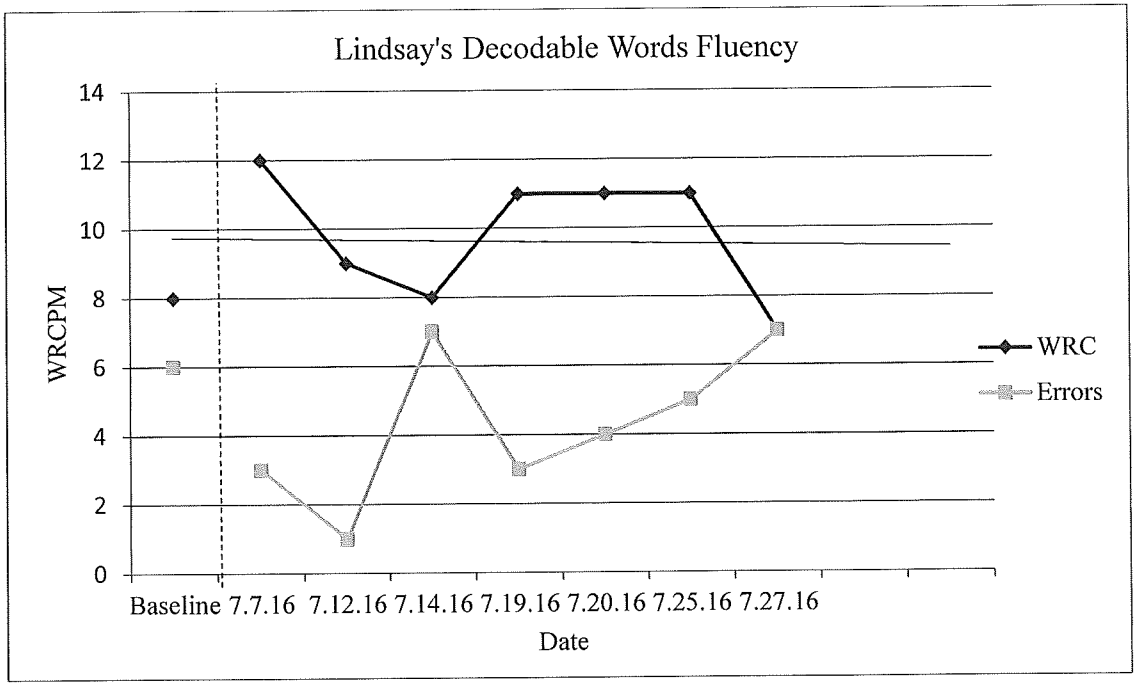

Figure 6. Line graph depicting Lindsay's gains in Decodable Word Fluency (DWF) during the intervention phase.

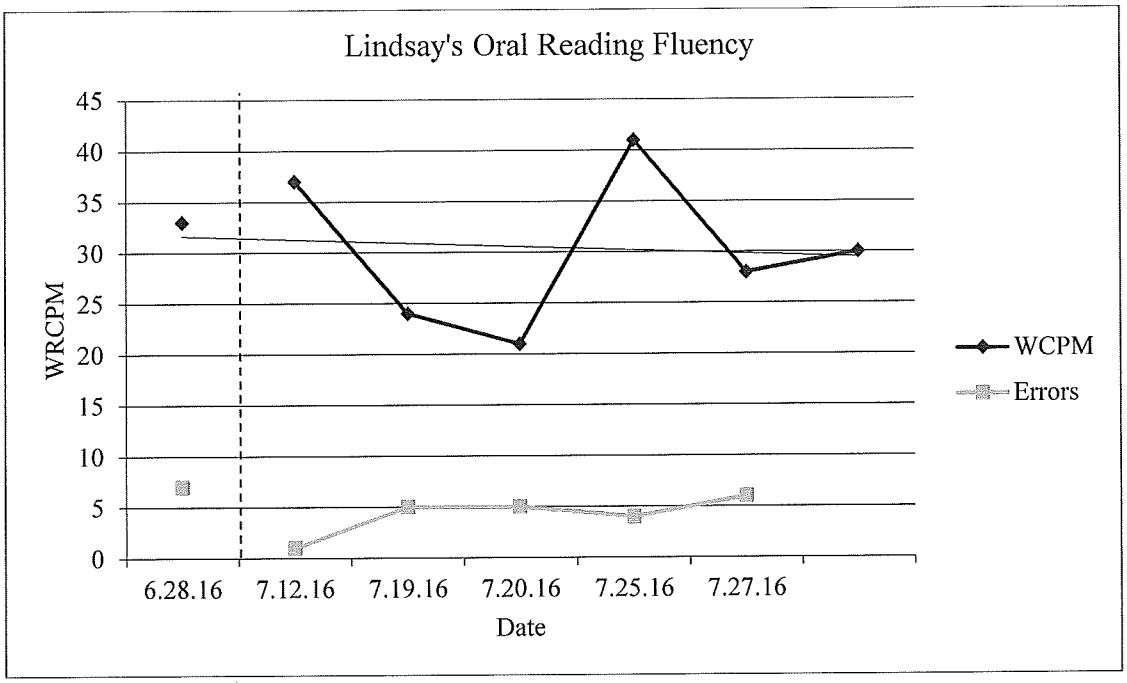

Figure 7. Line graph depicting Lindsay's gains in Oral Reading Fluency (CBM-R) during the intervention phase.

Eric. Performance on Mastery Quizzes placed him at lesson 21 in *Sound Partners.* Eric made improvements from pre- to post-test on 100% of the lessons (Fig. 8).

Eric made some improvements in his LSF as well (Fig. 9). During baseline, Eric read 19 letter sounds correct per minute and during the intervention phase he read an average of 21.1 (range: 16-32) letter sounds correct per minute across 7 progress monitoring sessions. The intervention appeared to have an initial impact on Eric's LSF scores, however, his scores were variable across the sessions with range of scores from 16 sounds correct to 32 sounds correct. Across the sessions, Eric remained fairly accurate, often getting less than 3 errors on a passage, and maintaining an accuracy above 75% on all passages. Eric slope during the intervention phase for LSF suggests that Eric lost approximately 1 letter sound per week. While there was some variability in his

scores from session to session, most of the scores fall within 10 sounds correct from each other. The PND for LSF was 43%, suggesting the intervention had little to no effect on this measure.

Eric also made some improvements in his DWF (Fig. 10). During baseline, Eric read 4 decodable words correct per minute and during the intervention phase she read an average of 5.3 (range: 2-7) decodable words correct per minute across 7 progress monitoring sessions. The intervention did seem to have a positive impact on his performance immediately following implementation. However, throughout the intervention, Eric also made a high number errors and during two of the progress monitoring session, his errors were significantly higher than his correct words. His performance across the sessions varied significantly, especially during the middle session. However, his score generally trended upward. Eric's slope during the intervention phase for DWF suggests that his performance remained the same. Eric also increased his accuracy from 40% to 54%. The PND for DWF was 71%, suggesting the intervention had a moderate effect on this measure.

Eric made significant improvement on his CBM-R (Fig. 11). During baseline, Eric read 14 words correct per minute and during the intervention phase he read an average of 21.1 (range: 15-27) words correct per minute across 7 progress monitoring sessions. The intervention did seem to have a positive impact on his performance immediately following implementation. His performance across the sessions varied slightly; however, his scores consistently trended upward. Erics's slope for CBM-R suggests that Eric gained 1.92 words per week. Eric also increased his accuracy from

50% to 89%. The PND for CBM-R was 100%, suggesting the intervention had a strong effect on this measure.

Overall, this intervention appeared to have the strongest effect on CBM-R, followed by DWF for Eric.

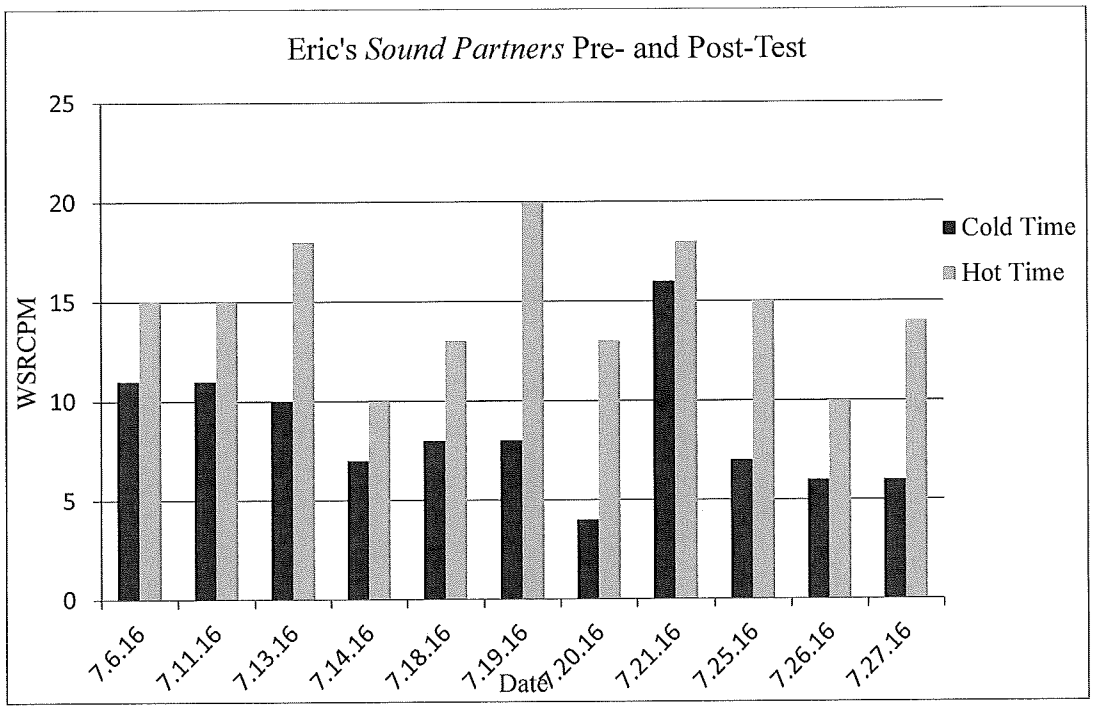

Figure 8. Bar graph depicting Eric's gains in words and sounds read correct per minute on lesson probes during the intervention phase.

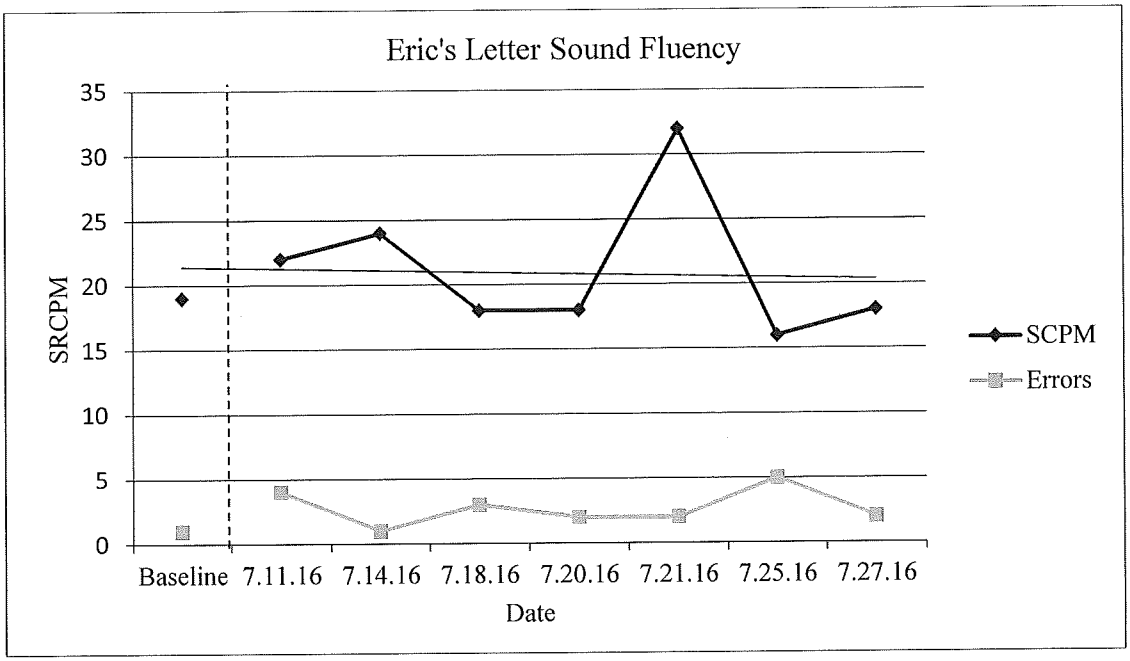

Figure 9. Line graph depicting Eric's gains in Letter Sound Fluency (LSF) during the intervention phase.

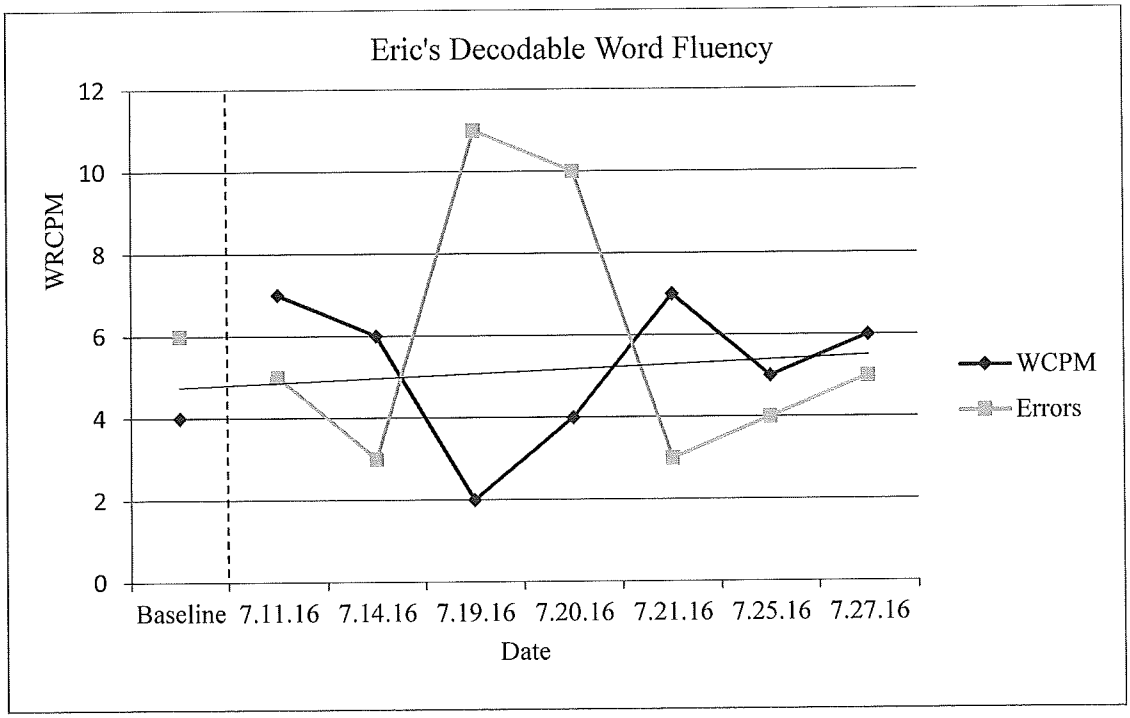

Figure 10. Line graph depicting Eric's gains in Decodable Word Fluency (DWF) duing the intervention phase.

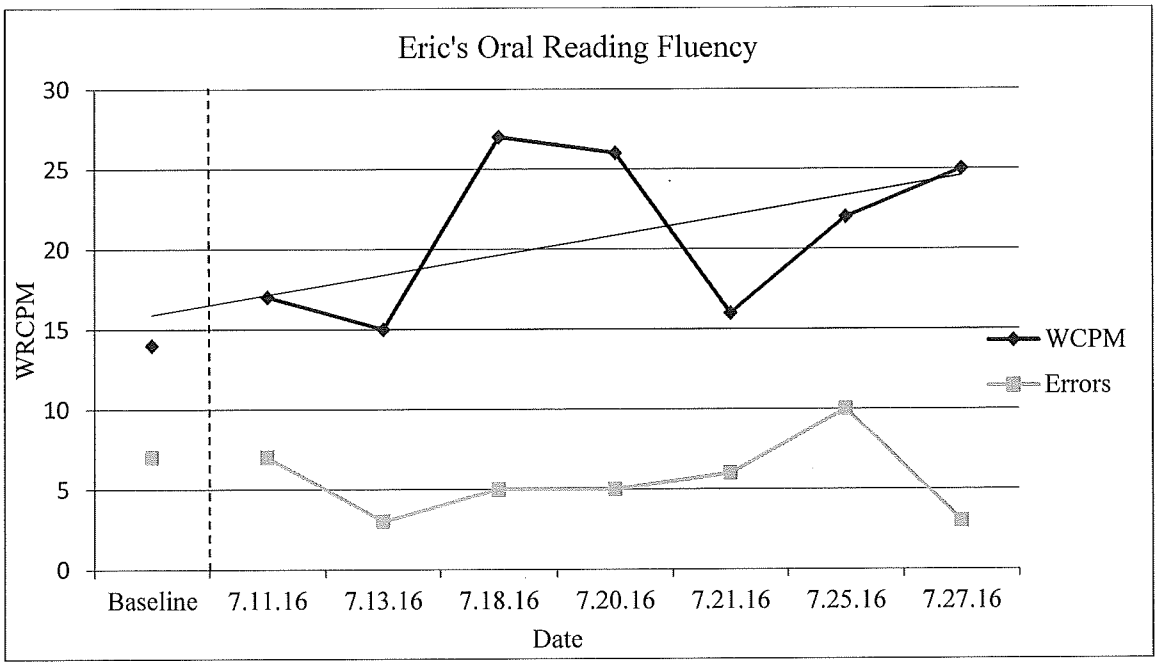

Figure 11. Line graph depicting Eric's gains in Oral Reading Fluency (CBM-R) during the intervention phase.

Carver. Performance on Mastery Quizzes placed him at lesson 11 in *Sound Partners.* Carver made improvements from pre- to post-test on 100 percent of the lessons (Fig. 12).

Carver made significant improvements in his LSF as well (Fig. 13). During baseline, Carver read 11 letter sounds correct per minute and during the intervention phase he read an average of 48.7 (range: 34-65) letter sound correct per minute across 7 progress monitoring sessions. The intervention appeared to have an immediate impact on Carver's LSF scores. Immediately following baseline, Carver increased his LSF score from 11 sounds correct per minute to 34 sounds correct per minute. Carver's scores also trended upward consistently between the sessions. Across the progress monitoring sessions, Carver maintained an accuracy above 80% on all passages. Carver's slope

during the intervention phase for LSF suggests that Carver gained approximately 10.78 letter sounds per week. The PND for LSF was 100%, suggesting the intervention had a strong effect on this measure.

Carver also made some improvements in his DWF (Fig. 14). During baseline, Carver read 2 decodable words correct per minute and during the intervention phase she read an average of 6.7 (range: 2-12) decodable words correct per minute across 7 progress monitoring sessions. The intervention did seem to have a positive impact on his performance immediately following implementation. However, throughout the intervention, Carver's performance varied significantly, with his score ranging from 2 to 12 words correct per minute. His errors would often be equal to or higher than his correct words. However, his score generally trended upward. Carver's slope during the intervention phase for DWF suggests that Carver lost .64 words per week. Carver was able to increase his accuracy from 20% to 66%. The PND for DWF was 85%, suggesting the intervention had a strong effect on this measure.

Overall, this intervention appeared to have a strong effect on both LSF and DWF for Carver.

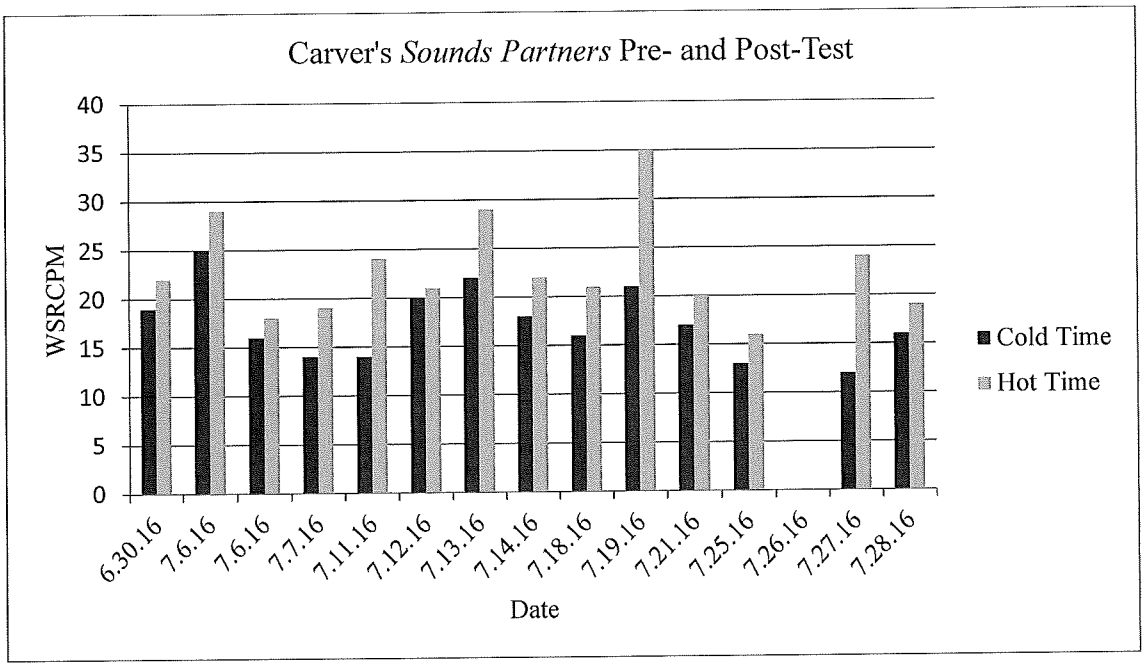

Figure 12. Bar graph depicting Carver's gains in words and sounds read correct per minute on lesson probes during the intervention phase.

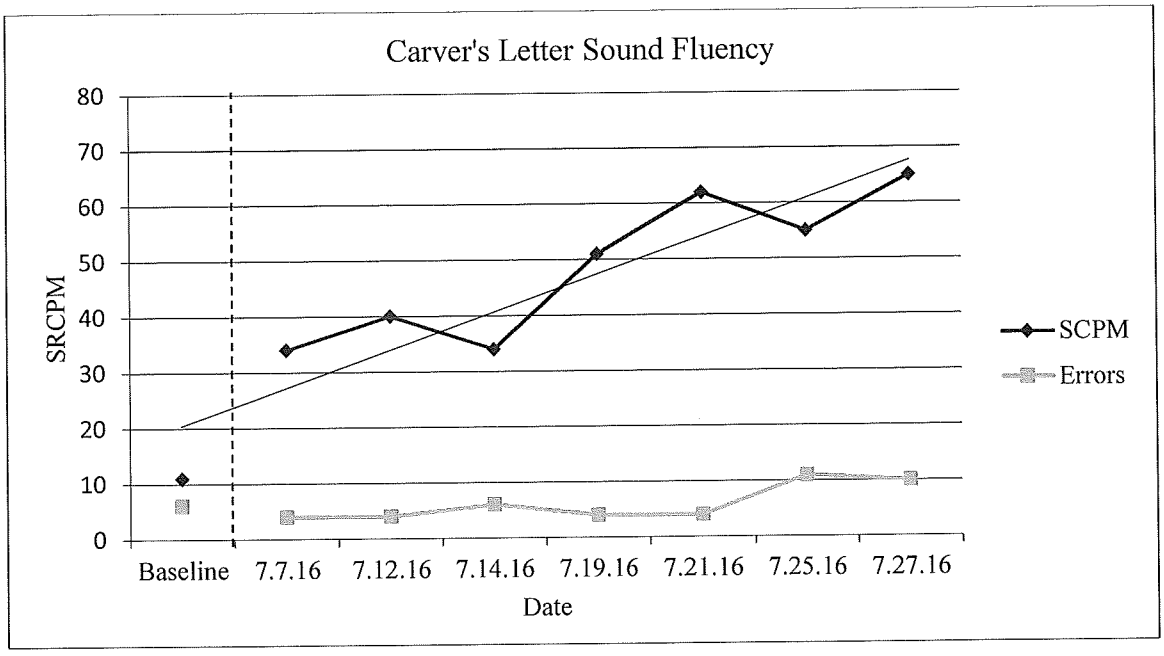

Figure 13. Line graph depicting Carver's gains in Letter Sound Fluency (LSF) during the intervention phase.

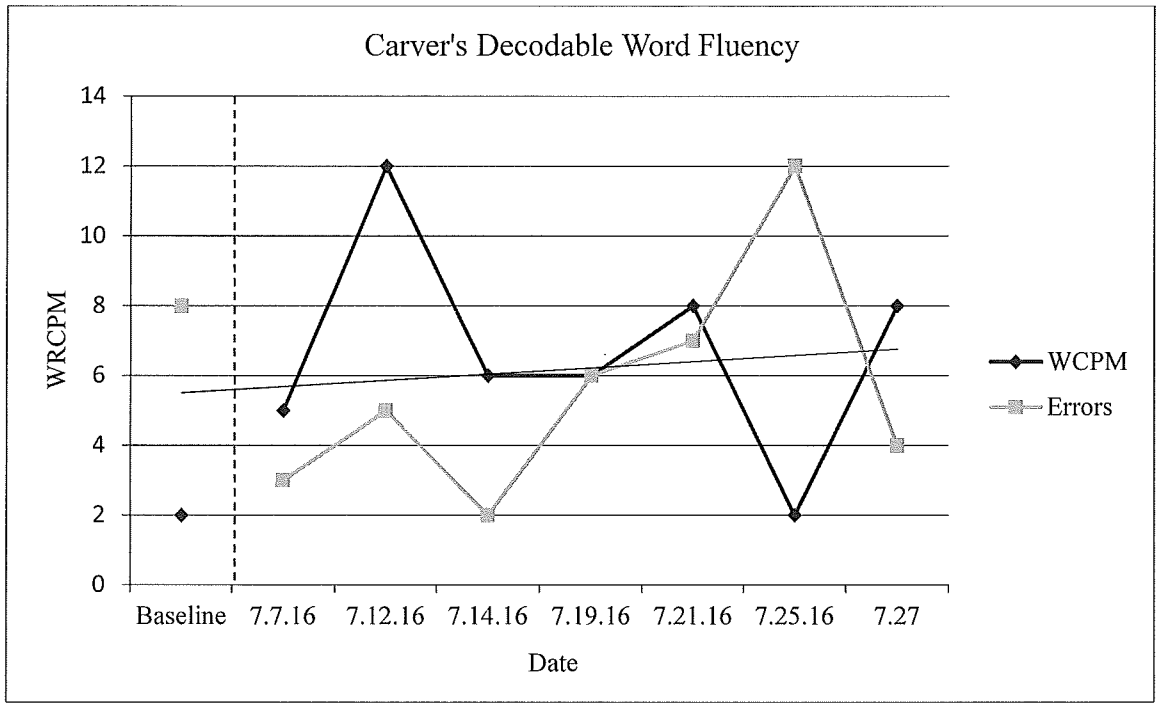

Figure 14. Line graph depicting Carver's gains in Decodable Word Fluency (DWF) during the intervention phase.

CHAPTER V

Discussion

The purpose of this study was to extend the literature on the use of BEA to empirically identify effective early reading interventions for struggling early elementary students. While much research has been done to suggest BEA can be used to identify effective interventions for oral reading fluency, only one study to date on the has looked at its use in early reading (Petursdottir et al., 2009). Three intervention strategies (i.e., Modeling, Repeated Reading, and Goal Setting plus Incentive) were compared to each other in a single-case design to evaluate the effectiveness on each participant's early reading skills. Then, the most effective intervention strategy for each participant was applied to *Sound Partners* materials for the 15 sessions to determine whether the students' reading skills would improve with the implementation of this strategy across time. Results indicated that BEA may be able to empirically identify effective interventions for early readers and is an extension of earlier work completed in the area of early reading and BEA (Petursdottir et al., 2009). For two participants, Repeated Reading was identified as the most effective intervention and for one participant, Modeling was identified as the most effective intervention. These results were obtained through different general outcome measures for different students. Overall, progress monitoring data and analysis of the data showed that the interventions had a moderate effect on at least one General Outcome Measure for all students. For Lindsay and Carver, the intervention appeared to have the strongest effect on Letter Sound Fluency and for Eric, the intervention had the strongest effect on Oral Reading Fluency. This study shows similar results to most other BEA studies in that different interventions are

identified for different students (Anderson et al., 2013; Coolong-Chaffin & Wagner, 2015; Daly et al., 1999; Eckert et al., 2002; Petursdottir et al., 2009).

The differences between identified interventions for each student speaks to the varied levels of adult and instructional support needed (Daly et. al., 1997). While some students need only a small amount of support, some students need more. The Goal Setting and Incentive intervention required the least amount of adult and instructional support. This intervention was not identified as the most effective for any student, suggesting all the students needed some level of instructional support. The Repeated Reading intervention requires a moderate amount of adult and instructional support in the form of corrective feedback. In the Modeling intervention, which requires the highest amount of adult and instructional support in this study, the student is receiving explicit instruction prior to attempting the material and then also receives corrective feedback on their performance. Repeated Reading was identified for two students, suggesting they only needed a moderate amount of adult support while Modeling was identified for the third student, suggesting she needed more explicit instruction on the material. These results are consistent with other studies which found differences in identified intervention across students (Eckert et al., 2002; Petursdottir et al., 2009).

The purpose for using multiple general outcome measures (GOM) in this study was to assess whether the intervention was targeting what was intended and whether the skills learned in the intervention would transfer to a more difficult skill. By using Letter Sound Fluency (LSF) and Decodable Word Fluency (DWF), the researcher was able to assess whether the students were becoming fluent at the individual sound level and whether they were becoming fluent in decoding small words. Since many schools begin

monitoring reading progress using fluency measures beginning in 1st and 2nd grade, the researcher also used Oral Reading Fluency (CBM-R) was to see if the additional practice in phonics would influence their overall reading fluency. All students made progress in LSF and/or DWF, which suggests the intervention was indeed effective in developing phonics and decoding skills. Some students made more improvement in either LSF or DWF. This suggests that while some students needed more instruction in individual sounds, some students have mastered those sounds and needed more instruction in decoding. The range for improvement can be limited if the student already has sufficient skills in one of the areas. Since only one of the two students given the CBM-R showed improvement, conclusions cannot be made about the effect of phonics instruction can have on overall reading fluency. This is similar to findings from Pettursdottir and colleagues (2008) who found that different general outcome measures were more sensitive to the intervention across students. For two participants, a letter sounds measure was more sensitive while a decoding measure was more sensitive for the other two.

The results of this study further adds to the literature on the use of BEA in empirically identifying academic interventions, specifically in regards to early reading. These results suggest that BEA can be used to effectively identify intervention strategies for early readers. The BEA phases of this study show that different intervention can have different results for students, which suggests not all students require the same level of support. In addition, the extended analysis phase of this study shows that implementing the identifyed intervention strategy within instruction resulted in improved scores for all students in at least one general outcome measure. This is similar to results in studies of the use of BEA for oral reading fluency, which have found that most students receiving

BEA identified interventions show progress in their reading skills (Anderson et al. 2013; Eckert et al. 2002).

This study also highlights the feasibility of BEAs for school purposes. Response to Intervention and models of multi-tiered systems and supports advocates for a spectrum of supports to be available to students (Wisconsin RtI Center, 2017). As highlighted in this study and many others, BEA can help teachers and educators determine the level of support needed for students and provide exactly what the student needs (Coolong-Chaffin & Wagner, 2015). In addition, the current study also trained undergraduate students to implement BEAs to students and required minimal training to be able to deliver these interventions effectively and efficiently. Given 8 hours of training, average implementation fidelity was 96.42% and inter-observer agreement on outcome measures was 96.76%. This demonstrates how quickly staff members could learn these procedures and implement them with success. Finally, the time needed to implement the BEA was approximately 60 minutes in total. Given the increasing level of needs in the schools and the limited amount of time educators have, finding the most effective intervention as quickly as possible is essential.

Limitations and Future Research

Though the findings from this study are promising, there are several limitations to consider. First, this study only included three students in a single-case design with only one baseline data point. These characteristics impact external validity, the ability to generalize the results beyond these particular participants and setting. When combined with previous research in this area, these results are not enough to make conclusions about BEAs effectiveness in identifying early reading interventions. Future research

should continue to expand the number of participants and use a more diverse and representative sample.

Another limitation of this study is that the instruction occurred over summer with limited weeks available to implement the intervention. With the little time available, this study was unable to examine sustained effects of the intervention beyond the completion of the intervention. In addition, little research is available on expected reading growth over the summer, with much research suggesting a loss in skills over the summer months (Kim, 2011; Rambo-Hernandex & McCoach, 2015). Based on AIMSweb normative data, students in 1st grade are expected to gain approximately .42 letter sounds per week, 1.00 nonsense words (nonreal consonant-vowel-consonant words), and 1.31 words per week on CBM-R measures over the course of the year (AIMSweb Technical Manual 2012). Results from this study showed variable results in regard to rate of improvement, however, some students made similar rates of improvement expected of a 1st grade student during school. While promising, it is difficult to determine if the intervention had a significant effect on reading performance compared to expected growth rates. Future research could extend progress monitoring beyond the intervention phase to analyze sustained effects of BEA identified interventions and analyze reading improvement during the summer months as compared to school year expectations.

Another limitation of this study is its applicability to the school setting. While the time and training necessary to deliver a BEA may be feasible, the interventions in this study were conducted in a one-on-one setting. Since the setting of this study varies significantly from many school settings, these results may not transfer to the school setting where the resources necessary to deliver these interventions in a similar

environment may not be available. Future research should look to conduct a similar study in a school setting to determine if the effects of these interventions can be seen in a different environment. Also, future research could analyze the effects of delivering the BEA identified interventions in a group verses a one-on-one setting.

Conclusions

The use of BEA in finding effective early reading interventions is a fairly unstudied topic. The first purpose of this study was to extend the research and determine if BEA can identify effective interventions for early readers. This study shows that BEA can be used to identify interventions for students that, when applied to instruction, show improvement in early reading measures. These results showed that the intervention identified for each student differed with two showing positive results with Repeated Reading and one showing positive results with Modeling.

This study shows how quickly a BEA can be implemented with little training required. Though BEA has shown positive results in identifying effective academic interventions, in a survey conducted with school psychologists, participants reported receiving minimal training in BEA (Chafouleas, Riley-Tilman, & Eckert, 2003). Teacher education programs could expose teachers to the BEA process and teach them to understand how to use this design. Since BEA is an efficient and effective design, it could be used to help teachers and other educators identify interventions that will be the most successful. Educators could use BEA to identify which interventions they have available will be most beneficial to the students. Future research is needed to continue to expand the literature regarding BEAs use in early reading and assess BEAs use in the school setting.

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Appendix A

Sample *Sound Partners* Master Test

Mastery Test 1

Use with Mastery Test 1—Tester Recording Sheet (see *Tutor Handbook*).

LESSONS 1–10

Sounds

▶ "Point to each letter. Say the sound."

h	m	a
s	t	n
d	o	c

(Provide student with Mastery Test 1—Student Recording Sheet found in *Tutor Handbook*.)

"Write the letter that makes the ____ sound."

Word Reading

▶ "Sound these words out, then read them fast."

mad	hot	cod
dot	cat	sad
and	ham	had
sat	Sam	Mac

Spelling

(Provide student with Mastery Test 1—Student Recording Sheet found in *Tutor Handbook*.)

"I say the word, and you write the word."

Appendix B

BEA Phase Protocols

Brief Experimental Analysis - Modeling

1) After the cold read Say, Now *We are going to read these (word or sounds) again. I will read first. Follow along with your finger.*
2) After you finish reading, say, *Now it's your turn. Read across the page and follow along with your finger. If you come to a (word or sound) you don't know I will tell it to you. Go ahead.*
    a) Error correction for words
        i) If the student makes an error say, *This word is ____. What word is this?*
            (1) If the student gives a correct response say, *Good this word is ___! Let's Keep Going!*
            (2) If the student gives an incorrect response, repeat step 2.a.i.
    b) Error correction for sounds
        i) If the student makes an error say, *this letter is _. It makes the _ sounds. What sound does _ make?*
            (1) If the student gives a correct response say, *Good, __ makes the __ sound! Let's keep going!*
            (2) If the student gives an incorrect response, repeat step 2.b.i.
3) Continue until student finishes reading all words or sounds.
4) Time the student again using the FAST protocol.

Brief Experimental Analysis – Repeated Reading

1) After the cold read Say, *Now we are going to read these (words or sounds) again. Read across the page and follow along with your finger. If you come to a (word or sound) you don't know I will tell it to you. Go ahead.*
    a) Error correction for words
        i) If the student makes an error say, *This word is ____. What word is this?*
            (1) If the student gives a correct response say, *Good this word is ___! Let's Keep Going!*
            (2) If the student gives an incorrect response, repeat step 2.a.i.
    b) Error correction for sounds
        i) If the student makes an error say, *this letter is _. It makes the _ sounds. What sound does _ make?*
            (1) If the student gives a correct response say, *Good, __ makes the __ sound! Let's keep going!*
            (2) If the student gives an incorrect response, repeat step 2.b.i.
2) Repeat the reading three times.
3) Time the student again using the FAST protocol.

Brief Experimental Analysis – Goal Setting and Incentive

1) After the cold read, calculate a 20 percent increase by multiplying the wrc by 1.20. Subtract the original score to determine the increase. Say *Now I'm going to time you again, this time, it you can beat your score by ___ words (or sounds), you can pick a prize from the prize box.*
2) Time the student again using the FAST protocol. If they increase their score by 20 percent, praise them for their efforts and allow them to select a prize from the prize box. If they beat their score but not by 20 percent, still praise them and allow them to pick a prize for still beating their score. If they do not beat their score, still praise them for the effort and assure them that they will have more opportunities to get a prize.

Appendix C

Sample Student and Assessor Forms of Pre- and Post-Test Probes for BEA Phase

Examiner Copy

pen	j	pen	pen	k
j	dim	pen	pen	dim
dim	k	j	dim	k
k	k	pen	dim	k
j	k	dim	j	j
j	dim	j	pen	pen

Cold Read: _____ Hot Read: _____

Student Copy

w	cap	w	n	rap
cap	rap	w	cap	n
w	w	cap	n	rap
n	cap	cap	n	n
w	w	rap	rap	n
n	cap	rap	rap	cap

Appendix D

Sound Partners and BEA Intervention Protocols

Sound Partners Protocol - Modeling

1) Say the Sounds Point to the first letter in the box or the larger letter in bold and say, *This letter is _, it makes the _ sound (use the letter sound that corresponds with the word below the letter). What sound does it make?* Wait for the child to respond.
   a) If the response is correct say, *Good, _ makes the _ sound. Let's try the next one* or *Let's keep going.* Repeat until all sample sounds have been read.
      (a) If the response is incorrect say, *_ makes the _ sound. Let's try it again.* Repeat Step 1.
2) Continue to the list of letters below. Say, *Now we are going to take turns reading these sounds. I will read first and while I read, I want you to follow along with your finger.*
   a) Read the list allowed to the student using your finger and making sure they are also following along with their finger.
   b) After you finish reading, say *Now it is your turn to read. Use your finger to follow the sounds.*
      i) If the student makes an error, stop the student and say, *this letter is _, it makes the _ sound. What sound does this letter make?*
         (1) If the response is correct say, *Good, _ makes the _ sound. Let's keep going!*
   c) After the student finishes, praise them for their hard work and effort.
3) First Sounds. The words are in the column on the right side of the page. Use the words in the boxes as practice words. You will say the first sound of the word and the student will also say the first sound of the word. Say, *The first sound in _____ is _.* (Point to the letter as you say the sound). *Now it's your turn, what is the first sound in the word ____* (Use the same word).
   a) If the response is correct say, *Good, the first sound in the word ____ is _. Let's try the next one.* Repeat Step 4 with any additional Practice Words.
   b) If the response is incorrect say, *The first sound in the word _____ is _. The letter _ makes the _ sound. Let's try again.* Repeat Step 4 with the same word.
4) For the rest of the non – practice words, say, *What is the first sound in the word ____?*
   a) If the response is correct say, *Good, the first sound in the word ____ is _. Let's try the next one* or *Let's keep going!* Repeat Step 5 with any additional words.
   b) If the response is incorrect say, *The first sound in the word _____ is _. The letter _ makes the _ sound. Let's try again.* Repeat Step 5 with the same word.
   c) Be sure to praise the student for their hard work and effort throughout.
5) Segmenting. The words are in the right hand column. Use the word(s) in boxes and practice words. Say, *Now we are going the break a word in to parts* (number of sound parts changes). *Let's practice first. The first word is ___. The sounds that create the word ___ are _,_,_.* (Point to the boxes as you say the sounds and continue until all sounds in the word are read). *Together, _, _, _,(point) make the word ____. Now it's your turn, break the word ___ into (number) parts (use the same word). Point to the boxes as you say each sound.*
   a) If the response is correct say, *Good, the sounds that make the word ___ are _, _, _. (point to the boxes as you say the sounds). Let's try the next one.* Repeat step 6 for all remaining practice words.
   b) If the response is incorrect say, *The sounds that make the word ___ are _, _, _. Let's try again!* Repeat Step 6 with the same word.
6) After completing all practice items say, *Now you try on your own. Break the word ____ into (number) parts. Be sure to point to the boxes as you say the sounds.*

a) If the response is correct say, *Good, the sounds that make the word ___ are _, _, _. (point to the boxes as you say the sounds). Let's try the next one.* Repeat step 6 for all remaining words.
b) If the response is incorrect say, *The three sounds that make the word ___ are _, _, _. (point to the boxes as you say the sounds) Let's try again!* Repeat Step 6 with the same word.
c) Praise the student for their hard work and effort.

7) Word Reading. Say, *Now we are going to read some words. Let's practice first. The sounds in this word are _, _, _. (Until all sounds in the word have been read). First we will say the sounds all together slowly (read the word and stretch out the sounds). Now we will say the sounds fast (read the word at a normal rate. The sounds _,_,_ create the word ___. Now you try the same word. Say the sounds slowly then all together.*
   a) If the response is correct say, *Good, the sounds that make this word are _, _, _. (continue until all sounds in the word have been read). When we put all the sounds together, the word is ___. Let's try the next one.* Repeat step 6 for all remaining practice words.
   b) If the response is incorrect say, *The sounds that make the word ___ are _, _, _. (continue until all the sounds in the word have been read). When we put the sounds together, the word is ____. Let's try again!* Repeat Step 6 with the same word.

8) Continue to non-practice words and say, *Now you try by yourself for the next words. First, sound out the word slowly, the read the word fast.*
   a) If the response is correct, do not stop the student and let them continue.
   b) If the response is incorrect say, *The sounds that make the word ___ are _, _, _. (continue until all the sounds in the word have been read). When we put the sounds together, the word is ____. Let's try again!* Repeat Step 6 with the same word.
   c) *Praise the student for their effort and hard work.*

9) Sight Words. Say, *Now we are going to read some words. Let's practice first. This word is ____. What word is this? (Point to the word as you say it, follow with the sounds)*
   a) If the response is correct say, *Good, this word is ____. Let's try the next one.* Repeat until all practice words are read.
   b) If the response is incorrect say, *This word is ____. (point to the words and follow the sounds) What word? (wait for child response)*
      i) If correct say, *Good, this word is ____. Let's try the next one.*
   c) Praise the student for their hard work.

10) Continue to non-practice words and say, *Now you try by yourself for the next words. Begin reading the words.*
   a) If the response is correct, do not stop the student and let them continue.
   b) If the response is incorrect say, *The sounds that make the word ___ are _, _, _. (continue until all the sounds in the word have been read). When we put the sounds together, the word is ____. Let's try again!* Repeat Step 6 with the same word.
   c) *Praise the student for their effort and hard work.*

11) Word Endings. Point to the letter in the box and say, *This letter is __ it makes the __ sound. What sound does it make?*
   a) If the response if correct say, *Good, __ makes the __ sound.*
   b) Then say the prompt that discusses what the word ending will do to the word. Example: When we see or hear the s at the end of hat, we know there is more than one hat.
   c) Say, *Now we are going to at __ to the end of some words. Listen to me.*

i) Using the list in the right column, say *if we add __ to the end of ____ we get ____. Now it's your turn. Add __ to the end of ____.*
   (1) If the response is correct, say *good! Let's keep going!*
   (2) If the response is incorrect say, *If we add __ to the end of ____ we get ____. Let's try again! Add __ to the end of ____.*
   (3) Repeat these steps until all the words in the right hand column have been read.

d) Continue to the list below. Say, *Now let's read some more words with the different endings. I will read first. Follow along with your finger.*
   i) Read the list of words to the student. After you have finished, say *Now it's your turn. Read across the page this way. Follow along with your finger.*
      (1) If the child makes a mistake, stop them and say *This word is _____. What word is this?*
         (a) If the child makes a correct response, say *Good, this word is ____. Let's keep going!*

12) Sentence reading and book reading. Say, *Now we are going to read the words in (a book or a sentence). I will read first and I want you to follow along with your finger.*

a) Read the sentence or book allowed to the student.

b) After you finish reading, say *Now it is your turn to read. Use your finger to follow the words.*
   i) If the student makes an error, stop the student and say, *That's not quite right, this word is What word is this??*
      (1) If the response is correct say, *Good, this word is ___. Let's keep going*

c) Praise the student for their hard work and effort. Praise improvement.

Sound Partners Protocol – Repeated Reading

1) Say the Sounds Point to the first letter in the box or the larger letter in bold and say, *This letter is _, it makes the _ sound (use the letter sound that corresponds with the word below the letter). What sound does it make?* Wait for the child to respond.
   a) If the response is correct say, *Good, _ makes the _ sound. Let's try the next one* or *Let's keep going.* Repeat until all sample sounds have been read.
   b) If the response is incorrect say, *_ makes the _ sound. Let's try it again.* Repeat Step 1.
2) Continue to the list of letters below. Say, *Now you are going to read some sounds. Follow along with your finger. If you come to a sound you don't know, I will tell it to you. Go ahead*
   a) If the student makes an error, stop the student and say, *this letter is _, it makes the _ sound. What sound does this letter make?*
      i) If the response is correct say, *Good, _ makes the _ sound. Let's keep going!*
      ii) If the response is incorrect say, *_ makes the _ sound. Let's try it again. What sound does this letter make?*
   b) After the student finishes, praise them for their hard work and effort.
   c) Have to student read through the list two more times following the error correction procedures outlined in 2.a.
3) First Sounds. The words are in the column on the right side of the page. Use the words in the boxes as practice words. Say, *Now we are going to figure out the first sounds of some words. What is the first sound in the word ____?*
   a) If the response is correct say, *Good, the first sound in the word ____ is _. Let's try the next one* or *Let's keep going!* Repeat Step 5 with any additional words.
   b) If the response is incorrect say, *The first sound in the word _____ is _. The letter _ makes the _ sound. Let's try again.* Repeat Step 5 with the same word.
   c) Repeat these procedures until the words have been read through 2 times.
   d) Be sure to praise the student for their hard work and effort throughout.
4) Segmenting. The words are in the right hand column. Use the word(s) in boxes and practice words. Say, *Now we are going the break a word in to __ parts* (number of sound parts changes). *Let's practice first. The first word is ___. The sounds that create the word ___ are _,_,_.* (Point to the boxes as you say the sounds and continue until all sounds in the word are read). *Together, _, _, _,(point) make the word ____. Now it's your turn, break the word ___ into (number) parts (use the same word). Point to the boxes as you say each sound.*
   a) If the response is correct say, *Good, the sounds that make the word ___ are _, _, _. (point to the boxes as you say the sounds). Let's try the next one.* Repeat step 6 for all remaining practice words.
   b) If the response is incorrect say, *The sounds that make the word ___ are _, _, _. Let's try again!* Repeat Step 6 with the same word.
5) After completing all practice items say, *Now you try on your own. Break the word ____ into (number) parts. Be sure to point to the boxes as you say the sounds.*
   a) If the response is correct say, *Good, the sounds that make the word ___ are _, _, _. (point to the boxes as you say the sounds). Let's try the next one.* Repeat step 6 for all remaining words.
   b) If the response is incorrect say, *The three sounds that make the word ___ are _, _, _. (point to the boxes as you say the sounds) Let's try again!* Repeat Step 6 with the same word.
   c) Praise the student for their hard work and effort.

d) Repeat these steps until all words have been read through 2 times.

6) Word Reading. Say, *Now we are going to read some words. Let's practice first. The sounds in this word are _, _, _. (Until all sounds in the word have been read). First we will say the sounds all together slowly (read the word and stretch out the sounds). Now we will say the sounds fast (read the word at a normal rate. The sounds _,_,_ create the word ___. Now you try the same word. Say the sounds slowly then all together.*
   a) If the response is correct say, *Good, the sounds that make this word are _, _, _. (continue until all sounds in the word have been read). When we put all the sounds together, the word is ___. Let's try the next one.* Repeat step 6 for all remaining practice words.
   b) If the response is incorrect say, *The sounds that make the word ___ are _, _, _. (continue until all the sounds in the word have been read). When we put the sounds together, the word is ____. Let's try again!* Repeat Step 6 with the same word.

7) Continue to non-practice words and say, *Now you try by yourself for the next words. First, sound out the word slowly, the read the word fast.*
   a) If the response is correct, do not stop the student and let them continue.
   b) If the response is incorrect say, *The sounds that make the word ___ are _, _, _. (continue until all the sounds in the word have been read). When we put the sounds together, the word is ____. Let's try again!* Repeat Step 6 with the same word.
   c) Praise the student for their effort and hard work.
   d) Repeat the steps until the words have been read through 3 times.

8) Sight Words. Say, *Now we are going to read some words. Let's practice first. What word is this? (Point to the word as you say it, follow with the sounds)*
   a) If the response is correct say, *Good, this word is ____. Let's try the next one.* Repeat until all practice words are read.
   b) If the response is incorrect say, *This word is ____. (point to the words and follow the sounds) What word? (wait for child response)*
      i) If correct say, *Good, this word is ____. Let's try the next one.*
      ii) If incorrect, repeat step 10.b.
   c) Praise the student for their hard work.

9) Continue to non-practice words and say, *Now you try by yourself for the next words. Begin reading the words.*
   a) If the response is correct, do not stop the student and let them continue.
   b) If the response is incorrect say, *This word is _____. What word?*
      i) Good this word is ____. Let's keep going!
   c) Praise the student for their effort and hard work.
   d) Repeat the steps until the student has read through all the words 3 times.

10) Word Endings. Point to the letter in the box and say, *This letter is __ it makes the __ sound. What sound does it make?*
   a) If the response if correct say, *Good, __ makes the __ sound.*
   b) Then say the prompt that discusses what the word ending will do to the word. Example: When we see or hear the s at the end of hat, we know there is more than one hat.
   c) Say, *Now we are going to at __ to the end of some words. Listen to me.*
      i) Using the first word in the right hand column as a practice word, say *if we add __ to the end of ____ we get ____. Now it's your turn. Add __ to the end of ____.*
         (1) If the response is correct, say *good! Let's keep going!*

(2) If the response is incorrect say, *If we add __ to the end of ____ we get ____. Let's try again!*

ii) With the remaining words, say *Now it's your turn, add __ to the end of _____.*

(1) If the response is correct, say good! Let's try another one.

(2) If the response is incorrect say, If we add __ to the end of _____ we get _____. Let's try again! Add __ to the end of ____.

(3) Repeat until all the words in the right hand column have been read.

d) Continue to the list below. Say, *Now I am going to have you try by yourself with these words. Read across the page and follow along with your finger.*

i) If the child makes a mistake, stop them and say *This word is ____. What word is this?*

(1) If the response is correct, say *Good, this word is ____. Let's keep going!*

11) Sentence reading and book reading. Say, *Now we are going to read the words in (a book or a sentence). I will read first and I want you to follow along with your finger. Use your finger to follow the words.*

a) If the student makes an error, stop the student and say, *This word is___ What word is this?*

i) If the response is correct say, *Good, this word is ___. Let's read that sentence again.*

b) Praise the student for their hard work and effort. Praise improvement.

c) Repeat steps until student has read through the sentence 3 times or the book 2 times.

Appendix E

Student and Examiner Forms of Pre- and Post-Test Lesson Probes for Intervention Phase

Examiner Copy

Lesson 1				
m	m	a	am	m
a	a	am	a	am
am	am	a	am	am
m	a	am	m	m
am	m	a	a	m
am	a	m	a	am

Cold Read: _____ Hot Read: _____

Student Copy

Lesson 1				
m	m	a	am	m
a	a	am	a	am
am	am	a	am	am
m	a	am	m	m
am	m	a	a	m
am	a	m	a	am

Appendix G

Parental Consent Form

Dear Parent or Guardian:

Your child is currently participating in a summer reading program through the University of Wisconsin-Eau Claire's Human Development Center. The program's aim is to improve your child's reading skills by providing individualized tutoring from University of Wisconsin-Eau Claire students. As a result of your child's participation in that program, he or she has been selected to participate in a study conducted by Melissa Coolong-Chaffin from the University of Wisconsin-Eau Claire. The purpose of the study is to simply evaluate the effectiveness of this program and determine the best interventions to use with students. The hope is to use the information gathered from this study to help educators develop effective interventions for children experiencing difficulty with reading.

If you agree to allow you child to participate in this study, he or she will continue to be a part of the summer program. He or she will receive the evidence-based reading intervention and we will assess his or her progress in reading by asking him or her to read aloud for one minute on a grade level story.

Your child's participation in this study is completely voluntary. You are not required to consent to your child's participation and declining will not jeopardize you or your child in any way. In addition, declining participation will not affect your child's ability to participate in the summer reading program. He or she will continue to receive tutoring through the summer reading program regardless of your decision. Finally, you have the option to withdraw your child's participation in the study at any time during the study.

All identifying information collected as part of this study will be kept confidential by the researchers. Furthermore, no personal identifiers (e.g., names) will be used by the researchers when presenting the study's findings.

Please read the attached consent form. If you decide to allow your child to participate in this study, please sign and date one of the attached consent forms and return it in the envelope provided. The second consent form and this letter are for your personal records.

Please feel free to contact me should you have any questions about your child's participation in this study. You may also contact Dr. Michael Axelrod, Chair of the University of Wisconsin-Eau Claire's Institutional Review Board, should you have any questions regarding you child's participation as a human subject in this study. Dr. Axelrod's contact information can be found in the attached consent form.

Sincerely,

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