THE EFFECT OF A SOUNDING-OUT STEP FOR COVER-COPY-COMPARE ON RATE OF WORD ACQUISITION

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ABSTRACT

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by Megan Drivas

Spelling has proven difficult for students, and traditional spelling instruction has not been able to successfully teach all students how to spell effectively. Cover-copy-compare (CCC) is an intervention that relies on self-correction to increase spelling performance for those students. Refinements to CCC have been investigated to maximize its effectiveness and efficiency. One such refinement is the addition of a sounding out step (CCC+SO). Given the inconsistency in the research of CCC+SO, the current study sought to further examine the sounding out variation while addressing some of the methodological limitations of the previous research. An alternating treatments design was used with three second and third graders from two schools in the Midwestern United States. All of the participants practiced spelling words using both intervention strategies for 6-7 weeks and demonstrated considerable growth in spelling performance from baseline to intervention, both in the CCC and CCC+SO conditions, but results indicated little to no difference between spelling performance across conditions.

Keywords: CCC, alternating treatments design, spelling, acquisition, maintenance

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CHAPTER I

INTRODUCTION

Many school-aged children have difficulties with spelling, an important subject involving early literacy skills (International Dyslexia Association, 2015). Although other academic areas like reading and mathematics receive a great amount of attention, spelling is a subject that is mistakenly considered to be less important by both teachers and students despite the amount of difficulty that many students experience (Nies & Belfiore, 2006). Students with disabilities, in particular, may not respond well to traditional spelling instruction because it does not include key factors of explicit instruction that can maximize the amount of learning for each student (Alber & Walshe, 2004).

Traditional spelling instruction usually involves a list of words assigned to a class at the beginning of the week. At the end of the week, the class is tested on the spelling of the words in the list (Alber & Walshe, 2004). This type of spelling instruction is implicit and essentially requires that students memorize a list of words each week instead of explicitly teaching students how to spell. Traditional spelling instruction has demonstrated that it is effective for some students, but unfortunately, many students go from grade level to grade level without mastering the skills needed to spell words correctly. When students respond poorly to traditional instruction, a new approach should be carefully implemented to successfully teach the students. An example is self-correction. Self-correction procedures allow students to immediately check and correct their errors, which promotes practicing correct responses, thereby promoting learning (Alber & Walshe, 2004).

Cover-copy-compare (CCC) is a self-correction procedure that has proven to be an effective method of instruction for spelling (Erion, Davenport, Rodax, Sholl, & Hardy, 2009).

Other variations of the procedure have emerged to maximize its effectiveness and efficiency including the addition of a sounding out step (CCC+SO) (Fisher, 2012; Mann, Bushell, & Morriss, 2010; Mann, 2014). The purpose of the current study is to provide further examination of CCC+SO to determine if adding the sounding out step to CCC leads to a faster rate of acquisition of spelling words than CCC.

CHAPTER II

LITERATURE REVIEW

Spelling is one of the most important elements of written expression. It affects not only how students put their thoughts into writing, but it also affects their reading skills (Moats, 2005/2006). Almost 15% of the population in the United States experiences difficulties in spelling (International Dyslexia Association, 2015). School-aged children who have spelling difficulties are likely to experience difficulties in other academic areas like reading and academic achievement in general, and other classmates may even target them because they are perceived as lazy or unintelligent, and that can continue on into adulthood (Destefano, 1978).

Spelling is a difficult task for many students and is considered to be more difficult than reading because grapheme-to-phoneme decisions are much more common in spelling. Reading allows students to use context clues from sentences or passages to assist them while assistance like that does not exist in spelling, where the exact letter sequences are required to spell a word (Fulk & Stormont-Spurgin, 1995). Given this distinct difficulty, students with learning disabilities (LD) have significantly lower achievement levels in spelling than students without learning disabilities. Research suggests that could be a result of teachers who lack knowledge and training on effective spelling instruction (Graham, Morphy, Harris, Fink-Chorzempa, Saddler, Moran, & Mason, 2008; Fulk & Stormont-Spurgin, 1995). It is critical that children receive effective spelling instruction early on to facilitate higher literacy skills and academic achievement.

Traditional spelling instruction used in schools typically has not been successful for all students, especially those with learning disabilities (Wirtz, Gardner, Weber, & Bullara, 1996). Teachers often assign a predetermined number of words to the class every week, and the students

are usually tested on the spelling of the words at the end of the week. The weekly words are sometimes assigned in a specific order according to their phonological and morphological similarities (Alber & Walshe, 2004).

Self-correction is an instructional procedure developed to combat this problem. The procedure requires that students compare their mistakes to a model and then rewrite the correct answer, effectively correcting themselves on their own (Alber & Walshe, 2004). According to most research, students who use self-correction procedures spell more accurately than students who are taught using traditional spelling methods. Additionally, it has been shown that students using the self-correction procedure acquire words faster and maintain performance longer (Viel-Ruma, Houchins, & Fredrick, 2007). A key component to self-correction is the immediacy of the corrective feedback that students can provide for themselves rather than completing several items incorrectly before receiving feedback from a teacher. This could lead to students practicing incorrectly, which could thereby inhibit learning (Erion et al., 2009). Additionally, self-correction procedures are important because they teach students to be independent and to be responsible for their own learning, which is the ideal goal (Joseph & Konrad, 2011).

Cover-copy-compare (CCC) is an intervention utilizing self-correction procedures that is usually entirely self-managed. It is the most effective spelling intervention to date according to most research (Erion et al., 2009). CCC is a straightforward way for children to self-manage their spelling performance. To use CCC, children look at a word, study it, then cover it up and try to spell the word without looking at it. They would then uncover the word to see if they spelled it correctly. If they spelled the word correctly, they move on to the next word, but if they spelled the word incorrectly, they repeat the process for the same word (Mann et al., 2010). Allowing the

student's last response in each trial to be an accurate response is thought to reinforce accurate responses and prevent responses that are incorrect (Skinner, McLaughlin, & Logan, 1997).

There are many advantages to the CCC method beyond its effectiveness. First, it is a simple procedure that does not require teachers to have any specialized training or equipment (Skinner et al., 1997). The simplicity of CCC allows students to spend more time learning rather than wasting time on something they are implicitly expected to learn, like memorizing an isolated list of words each week without being provided any evidence-based strategies to do so (Fulk & Stormont-Spurgin, 1995). Second, as previously stated, students can self-manage the intervention once they are shown how to use it, making it possible for them to work on their own. This saves time and makes CCC a very practical method for use in classrooms (Skinner et al., 1997). Finally, CCC seems to have an effect on student motivation because students are less intimidated when they can evaluate their own performance, especially if they are accustomed to negative evaluations (Skinner et al., 1997). With any intervention, improving student motivation is beneficial because it increases meaningful responses, which therefore increases accuracy. When students perform at high levels of accuracy, it increases the probability of learning (Archer & Hughes, 2011).

Research suggests that CCC is an effective spelling intervention, but it is important to know for whom the procedure is effective. According to a meta-analysis examining CCC, it seems to have a greater effect for students with disabilities than students without disabilities, especially for students with ADHD (Joseph & Konrad, 2011). Generally, students who have skill deficits demonstrate the most benefits from CCC.

Further examination indicates that students with a wide range of disabilities can benefit from the CCC method. Using an alternating treatments design with three students who qualified

for special education services under the category of LD, Viel-Ruma et al. (2007) compared CCC with the traditional teaching methods used in schools. Results indicated that spelling performance greatly improved when using the CCC method compared to the traditional repetition method, and participants reached the required 80% accuracy level, which indicated mastery of a skill. This study makes a convincing argument that students with difficulties in written expression specifically can use CCC to improve their spelling performance, which is valuable (Viel-Ruma et al., 2007).

Beyond research on students with LD, there is evidence that CCC can benefit adolescents with conduct disorder. An interesting case study supported CCC's effectiveness with a 16-year-old with conduct disorder in a psychiatric residential facility (Hubbert, Weber, & McLaughlin, 2000). The authors compared traditional spelling instruction to CCC using an alternating treatments design and measured the number of correct letter sequences. They found that the participant performed with significantly higher spelling accuracy when using the CCC method (Hubbert et al., 2000). Not only does this research provide evidence that CCC can be effective for yet another type of disability, but it also shows that CCC can benefit students outside of a traditional school setting.

Other than students with LD and conduct disorder, research has also indicated that CCC is an effective spelling intervention for students with attention deficit disorder. Alber and Walshe (2004) looked at six students in the fifth grade who either had learning disabilities or attention deficit disorder. The authors compared self-correction after each individual word and self-correction after an entire list of words using an alternating treatments design. They measured the number of words spelled accurately. The results show that students spelled words more accurately when self-correcting after each word than they did after the whole list. This is further

support for the effectiveness of CCC, which allows students to self-correct after each word. Additionally, it supports the idea that CCC can be effective for students with varying levels of ability to learn new spelling words (Alber & Walshe, 2004).

A large body of research examines the effect of CCC on acquisition, the first stage of the learning hierarchy. The second stage of the learning hierarchy is fluency, and the third stage of the learning hierarchy is generalization (Skinner et al., 1997). Most CCC studies focus on the acquisition phase of the learning hierarchy because CCC involves acquiring spelling skills. Through practicing the acquired skills, students can become more fluent and automatic when spelling words.

Within the acquisition phase of the learning hierarchy, many researchers have examined how refinements of the CCC method can be effective. Erion et al. (2009) looked at two versions of CCC to determine if three repetitions (CCC3) of the self-correction process would be more effective than the usual single repetition (CCC1). Four typically developing students participated in the study using an alternating treatments design. Performance in the CCC condition was more accurate than performance in the baseline condition for all participants, but results varied for all participants between the CCC1 and CCC3 conditions (Erion et al., 2009).

In addition to varying the number of repetitions used in the CCC method, some research has looked at other refinements to make CCC more effective. Adding a sounding out step to CCC (CCC+SO) has become a common research topic. One study compared CCC to CCC+SO using a multi-element design to measure the percentage of correctly spelled words (Mann et al., 2010). Five typically developing students were taught to say each sound in the word before they attempted to spell it in the CCC+SO condition. The Woodcock Johnson Test of Achievement was administered to identify the participants as having spelling abilities significantly below their

reading level. The study consisted of pre-testing sessions, practice sessions, and post-test sessions. The pre-tests were used to identify five unknown words to be practiced during the practice session each day. Words were dictated to the participants until they misspelled five words. During the practice sessions, the unknown words were practiced using both the traditional CCC method and the CCC+SO method. The following day, post-test sessions occurred for each condition. The words were again dictated to the participants. Words from the sounding out condition were sounded out on the post-test, and words in the traditional condition were not sounded out. Results indicated that sounding out produced higher levels of spelling accuracy than CCC. An important limitation of that study is that the design did not rule out the possibility of carry-over effects from the sounding out condition. There was not a procedure in place to prevent students from sounding out in the no-sounding out condition. Additionally, any increases in spelling performance in the CCC+SO condition could have been due to the fact that participants were continuing to sound out words in the post-tests.

Fisher (2012) improved the methodology of the previous CCC+SO study by using a multiple baseline design to decrease the possibility of carry-over effects. In this study, traditional CCC was the baseline phase, and CCC+SO was the intervention phase. The participants were five second- and third-grade students, one of which qualified for special education services with a learning disability. The participants were recruited through teacher nomination of students who had difficulty spelling. Stimulus words were selected based on the school district's spelling curriculum.

The study also consisted of pre-testing sessions, study sessions, and post-testing sessions. During the pre-tests, participants were tested on words from their spelling curriculum until they spelled five words wrong. During the study sessions, participants practiced spelling the words

from the pre-test using the traditional CCC method. At different times, each participant moved to the CCC+SO method. During the post-test, participants were tested on the words from he previous day's study sessions. The author measured the participants' spelling between the pre- and post-tests using both correct letter sequences and whole words correct. Although adjustments were made to improve the research, results were inconsistent. The author indicated that there was not a discernable difference from pre-test to post-test between CCC and CCC+SO (Fisher, 2012). The results lead to the need for future examination of CCC and CCC+SO for spelling.

Further examination of the sounding out variation of CCC is important because data suggests that spelling and reading have a correlational relationship (Graham, Harris, & Fink-Chorzempa, 2002). High performance in one area may indicate higher performance in the other. Sounding out the words as students spell them combines the alphabetic principle of reading with spelling to hopefully improve spelling performance. During early reading instruction, students are taught to associate letters with their most common sound beginning in kindergarten (Archer & Hughes, 2011). Using this method that is taught to children from a young age could assist them in improving spelling performance.

The current study will further examine the sounding out variation of CCC. Additionally, the current study will examine the rate of spelling word acquisition, which has not been done before. Although research suggests that CCC can help students acquire spelling words, no one has looked at acquisition rate. The rate of acquisition is important and can be useful for teachers in the classroom. Every child learns at a different rate. Understanding how to increase the acquisition rate of spelling words for children who naturally have a slower rate of learning can assist teachers in bringing those students up to speed with the rest of the class. The purpose of the current study is to compare the rate of acquisition of spelling words between CCC and

CCC+SO by using an alternating treatments design that will measure the number of correctly spelled words.

CHAPTER III

METHODOLOGY

Participants and Setting

Participants included three elementary school students. Demographic information on the participants, including race/ethnicity, gender, age, special education classification, and free and reduced lunch eligibility, were collected from participants' teachers using the demographics form located in Appendix A. The demographic information collected from these forms can be seen in Table 1. Interventionists were two school psychology graduate students.

Table 1. Demographic Information

	Age	Grade	Race/ Ethnicity	Native Language	Free/ Reduced Lunch	Disability	School
Angela	8	2	Caucasian	English	No	SLI	Western
Bobby	7	2	Caucasian	English	No	SLD	Western
Stephanie	8	3	Caucasian	English	Yes	No	Eastern

Data were collected at two suburban elementary schools in the Midwestern region of the United States with sessions occurring 3-5 days a week for six to seven weeks. Data were collected in a quiet and private location outside of the classroom in both schools. The first school, Eastern Elementary, was comprised of about 362 students and served grades K-5. About 75% of students at Eastern Elementary received free/reduced lunch, and the racial/ethnic breakdown is as follows: 84% Caucasian, 6% African American, 5% Hispanic, 3% Two or More Races, 1% Asian, and 1% American Indian. The second school, Western Elementary, was comprised of about 400 students and served grades K-4. About 49% of students at Western Elementary receive free/reduced lunch, and the racial/ethnic breakdown is as follows: 78%

Caucasian, 7% Asian, 5% African American, 3% Two or More Races, 3% Hispanic, 3% American Indian, and 1% Pacific Islander.

Preliminary Testing

The *Test of Written Spelling, Fifth Edition* (TWS-5; Larsen, Hammill, & Moats, 2013) was administered to determine whether the participants displayed spelling difficulties compared to same-age peers. Results are described as standard scores ($M = 100$, $SD = 15$), and participants were required to score below the average range to be included in the study. In terms of technical adequacy, the TWS-5 has a large and representative standardization sample and the reliability of the test overall is adequate. The words used on the TWS-5 are educationally relevant, and the response format makes it a valid and useful test of spelling (Larsen et al., 2013).

An informal measure of phonics abilities was used to show that the participants demonstrate prerequisite skills for the sounding-out condition of the intervention. Participants were asked to recall the sound made by isolated letters of the alphabet. To meet the eligibility criteria for the current study, participants needed to demonstrate that they have the ability to recognize 85% of letter-sound combinations.

The results of the preliminary testing are shown in Table 2. All three participants met the eligibility criteria for the current study, scoring below the Average range (SS < 85) on the TWS-5 and producing at least 85% of letter-sound combinations on an informal measure of phonics abilities.

Table 2. Preliminary Test Results

	TWS-5 Standard Score (SS)	TWS-5 Percentile	Phonics Assessment – Percent Correct
Angela	82	12	88
Bobby	80	9	100
Stephanie	79	8	94

Procedure

Pretest

Prior to beginning intervention, pretesting was used to identify novel unknown words. Words were selected in conjunction with the school based on its spelling curriculum and were decodable to make the sounding out condition possible. The words used for pre-testing and stimuli selection included CVC words that begin with both continuous and stop sounds, CVCC words that end with consonant blends and double consonants, CCVCC, CCCVC, and CCCVCC words, y-derivative words, two-syllable words with a single consonant in the middle, VCe pattern words in which the vowel is long, and a variety of combinations of word roots, prefixes, and suffixes. Phonetically irregular words are considered sight words because students must recognize them upon sight, as they are not able to sound them out (Carnine, Silbert, Kame'enui, & Tarver, 2010).

The selected words were presented orally to the participants, and they were asked to spell them on a sheet of lined paper. Words spelled correctly were removed for each participant, and words spelled incorrectly were presented a second time. This testing continued until a total of 30 unknown words were identified. Unknown words were used to create two sets of stimuli. As participants approached mastery of all of the generated words, additional pretesting of novel words occurred as needed.

Stimuli Selection

Unknown words were divided into two sets of 5 words. The two sets of stimuli were then randomly assigned to either the CCC or CCC+SO condition. To create equivalent word lists for both conditions, each word on the first list had a similar, corresponding word on the second list. This was established by matching words by number of letters (Mann, 2014). Once a participant had acquired a word from either list by spelling it correctly in three consecutive sessions, the word was replaced by another word from the corresponding set (CCC or CCC+SO). To try to ensure that students would not be exposed to the unknown words from the pretest while the intervention took place, the interventionist worked with the teachers to select words that would not be taught before the intervention was completed. As a result, a total of 7 words were removed from the word lists.

Baseline

As previously stated, the stimuli were divided into two sets. The order of the set of stimuli that was presented to the participants was randomly determined. Unknown words identified from the pretest were presented orally in random order to the participants. They were required to spell the words on a sheet of lined paper. Baseline data were collected over a period of at least three sessions to determine whether words would be mastered with no intervention in place.

Training

Participants required training to use both conditions, CCC and CCC+SO. To do that, the interventionist followed the task analysis located in Appendix B. The words used during the

practice/training consisted of phonetically regular CVC words, like “cat” or “dog” to ensure that learning focused on the method rather than learning novel words.

CCC

Five words were presented on a sheet of lined, numbered paper. Participants were instructed to briefly study the word, cover the word, attempt to spell the word, and then compare their spelling to the correct spelling. If they spelled the word correctly, the interventionist praised the students before they moved on to the next word. If they spelled the word incorrectly, they repeated the CCC procedure from the beginning for the misspelled word until they spelled it correctly. Participants were praised for their effort after completing this procedure for all 5 words in the word list.

Although sounding out is a required step in the CCC+SO phase of the intervention, it was important to prevent sounding out during the CCC phase of the intervention. One step that was taken to help do this was to explicitly tell the participants before each session that they were not to use the sounding out method. During the session, the interventionist was required to listen to the participants as they completed the CCC procedure to try to make sure they were not sounding out. Additionally, the interventionist watched the participants’ mouths to look for sub-vocal sounding out. If any of the participants did sound out during the practice session, they were stopped and given the instruction, “Remember, don’t sound out any of these words.” These steps are outlined in the script in Appendix E.

CCC+SO

This practice condition was exactly the same as CCC with the following exception. An additional step was required in which participants were required to vocally sound out the word

before they covered it up. The interventionist reminded each participant to use the sounding out method before each session by using the prompt, "Remember to sound out all of these words out loud, so I can hear you." These steps are outlined in the script in Appendix F.

If any of the participants did not sound out during the practice session, they were stopped and reminded using the instruction above. Another error that could arise was that participants might sound out words incorrectly. If this error occurred, the interventionist corrected the error by immediately modeling the phoneme that was pronounced incorrectly. Participants were exposed to both conditions every day in random order.

Retention

Every day, before beginning any practice sessions, short-term retention tests were administered on words practiced during the previous day's sessions. Words were presented orally and randomly, and the participants were asked to spell the words on a sheet of lined paper. Students were instructed not to sound out words during the short-term retention tests regardless of which condition the words were assigned to.

At the end of every week, long-term retention tests were administered with the same procedure as the short-term retention tests to determine which words the participants would continue to spell correctly without the intervention in place. Words used in the long-term retention tests included all words that were identified as mastered from the short-term retention tests. Detailed scripts were followed when giving both the short- and long-term retention tests, which are located in Appendix G.

Response Measurement

Short-term retention tests were used to determine mastery of a word. When a participant spelled a word correctly on three consecutive retention tests, the word was added to a running cumulative record of word acquisition and removed from words that were currently being practiced. Accurately spelled words on short-term retention tests was the primary dependent variable. A word was considered accurately spelled if it identically matched the original word.

Measuring accurately spelled words allowed the cumulative number of words acquired to be graphed. A word was considered acquired or mastered when a participant accurately spelled the word on short-term retention tests over three consecutive sessions. Additionally, the dependent variable also allowed us to look at spelling words retained at the end of every week on long-term retention tests. A word was considered accurately spelled on long-term retention tests if it identically matched the original word.

Errors during practice sessions were also measured to determine if there was a relationship between the number of errors made and the practice condition (CCC or CCC+SO). Errors made were measured as a frequency count. An error was counted any time a word did not match the original word.

Interobserver Agreement

To demonstrate that the dependent variable was measured reliably, interobserver agreement (IOA) was documented by percentage agreement between observers on at least 20% of sessions for each participant. On daily short-term retention tests, ten words were dictated to participants, and they were asked to spell the words on a sheet of paper. Observers looked at the participants' written responses and independently scored them as correct or incorrect. Both score

sheets were evaluated item-by-item to calculate IOA. The number of agreements between observers was divided by the total number of items and then multiplied by 100% to obtain percent agreement.

IOA should range from 80-100% to be considered acceptable (Kratochwill et al., 2010). IOA for Angela's sessions was measured on 77% of all sessions with 99% agreement in scoring. IOA was measured on 74% of Bobby's sessions with 100% agreement in scoring. Finally, IOA for Stephanie's sessions was measured on 27% of all sessions with 100% agreement in scoring.

Treatment Integrity

To ensure that both intervention conditions were carried out correctly and consistently, experimenter behavior and participant adherence were examined by another observer using a checklist created for the current study located in Appendix B. A detailed task analysis for the intervention was included by clearly defining its components. The observer used the checklist to rate the occurrence of each treatment component to calculate the percentage of treatment integrity.

Treatment integrity should range from 80-100% to be considered acceptable (Reichow, Volkmar, & Cicchetti, 2008). An observer completed the checklist for 23% of Angela's sessions, for which 100% treatment integrity was calculated. The checklist was completed by an observer for 22% of Bobby's sessions with 100% treatment integrity. Finally, an observer completed the checklist for 27% of Stephanie's sessions, for which 97% treatment integrity was calculated.

Social Validity

To gain insight on their personal opinions of the study, specifically its acceptability and perceived benefit, the teachers and participants were given questionnaires. The teacher

questionnaires located in Appendix C are an adapted version of the *Intervention Rating Profile – 15* (IRP-15; Martens, Witt, Elliot, & Darveaux, 1985). The rating scale consists of 15 items on a 6-point Likert-type scale with options ranging from "Strongly Disagree" to "Strongly Agree." Higher scores indicate higher acceptability of the current intervention. To modify the original IRP-15, the words "problem behavior" were changed to "spelling difficulties" to make the items more relevant to the current study. The student questionnaires located in Appendix D are an adapted version of the *Kids Intervention Profile* that was used in a study by Hier (2012). The *Kids Intervention Profile* used in the study was itself an adapted version of the *Children's Intervention Rating Profile* (CIRP; Witt & Elliot, 1983). The rating scale consists of 8 items that are also on a 5-point Likert-type scale with options ranging from "Not at all" to "Very Much."

Experimental Design

A single-case, alternating treatments design was used to compare the effects of two distinct interventions. This required two conditions that are nearly identical but with different instructional techniques. To compare the two conditions, an alternating treatments design was the most logical because they needed to be compared simultaneously. Conditions were alternated randomly within a day to demonstrate an effect on acquisition of spelling words. A clear and consistent association between one condition and higher rates of acquisition was used to demonstrate control (Bailey & Burch, 2002).

With any alternating treatments design, there is always the issue of carry-over effects. This especially becomes a problem when the treatments occur multiple times a day or are short in duration. To minimize carryover effects, the current study counterbalanced the order of treatments, and it only alternated the treatments once per day with a short break between sessions

(Barlow & Hayes, 1979). A specific carryover effect issue is whether or not the participants would continue to use the sounding out procedure during the CCC method. Other research that has compared the CCC and CCC+SO method using an alternating treatments design did not attempt to minimize these carryover effects (Mann et al., 2010). To combat the problem, the interventionist instructed participants on when to use and not use the sounding out method. Prompts were included in daily scripts to remind the participants when they are expected to sound out the words and when they are expected not to.

Data Analysis

To determine whether there was evidence of a relationship between each intervention and spelling word acquisition, the researcher relied on visual analysis. The baseline data should have a consistent level and no trend to ensure that the participants would not acquire the target spelling words without receiving the intervention. Next, the cumulative number of words acquired was examined. Because words acquired were graphed cumulatively, the slope provided information on the rate of word acquisition. Comparison of the slopes for both CCC and CCC+SO made it possible to determine which intervention phase leads to faster acquisition of words. An effect was considered sufficient if there was a visible difference between the slopes, with steeper slope indicating faster rate of word acquisition.

CHAPTER IV

RESULTS

Figure 1 shows the cumulative number of spelling words mastered in each condition for Angela, Bobby, and Stephanie. These data were based on accurately spelling words correctly on three consecutive short-term retention tests. During baseline, participants mastered between 0 and 1 spelling word per condition. When intervention was implemented, all three participants demonstrated considerable growth in the number of words mastered. Angela's performance in Figure 1 indicates that, across conditions, she maintained fairly equal and consistent performance until about halfway through the intervention phase. The data begin to show a separation between performance in the CCC and CCC+SO conditions, with the latter indicative of faster acquisition. Overall, she mastered four more words in CCC+SO than in CCC. Unlike Angela's data, Bobby's data do not demonstrate any discernable difference between CCC and CCC+SO. He maintained nearly equal and consistent performance throughout the length of the intervention phase. Similar to Angela, Stephanie's performance initially was consistent across conditions. Her performance began to demonstrate a separation between the slopes of the CCC and CCC+SO lines after ten days of intervention, with the slope of CCC+SO being slightly steeper. She mastered four more words in CCC+SO than in CCC.

Performance on long-term retention tests is shown in Figure 2. The average percentage of words spelled correctly on long-term retention tests ranged from 80-94%. Participant performance does not appear to indicate any considerable difference across conditions in the ability to recall the spelling of previously mastered words. Angela's ability to correctly spell words mastered on short-term retention tests was slightly higher for words assigned to the CCC+SO condition than the CCC condition, with an overall average of 84%. Bobby and

Stephanie performed consistently across conditions with an overall average of 80% and 94% over time, respectively.

Errors made during practice sessions were also recorded and can be seen in Table 3. Participants demonstrated different patterns of spelling errors across conditions. Angela's performance during practice sessions indicates a higher number of errors in CCC than in CCC+SO. Bobby made an equal number of errors during practice conditions in CCC and CCC+SO. Stephanie's performance during practice sessions indicates a higher number of errors in CCC+SO than in CCC.

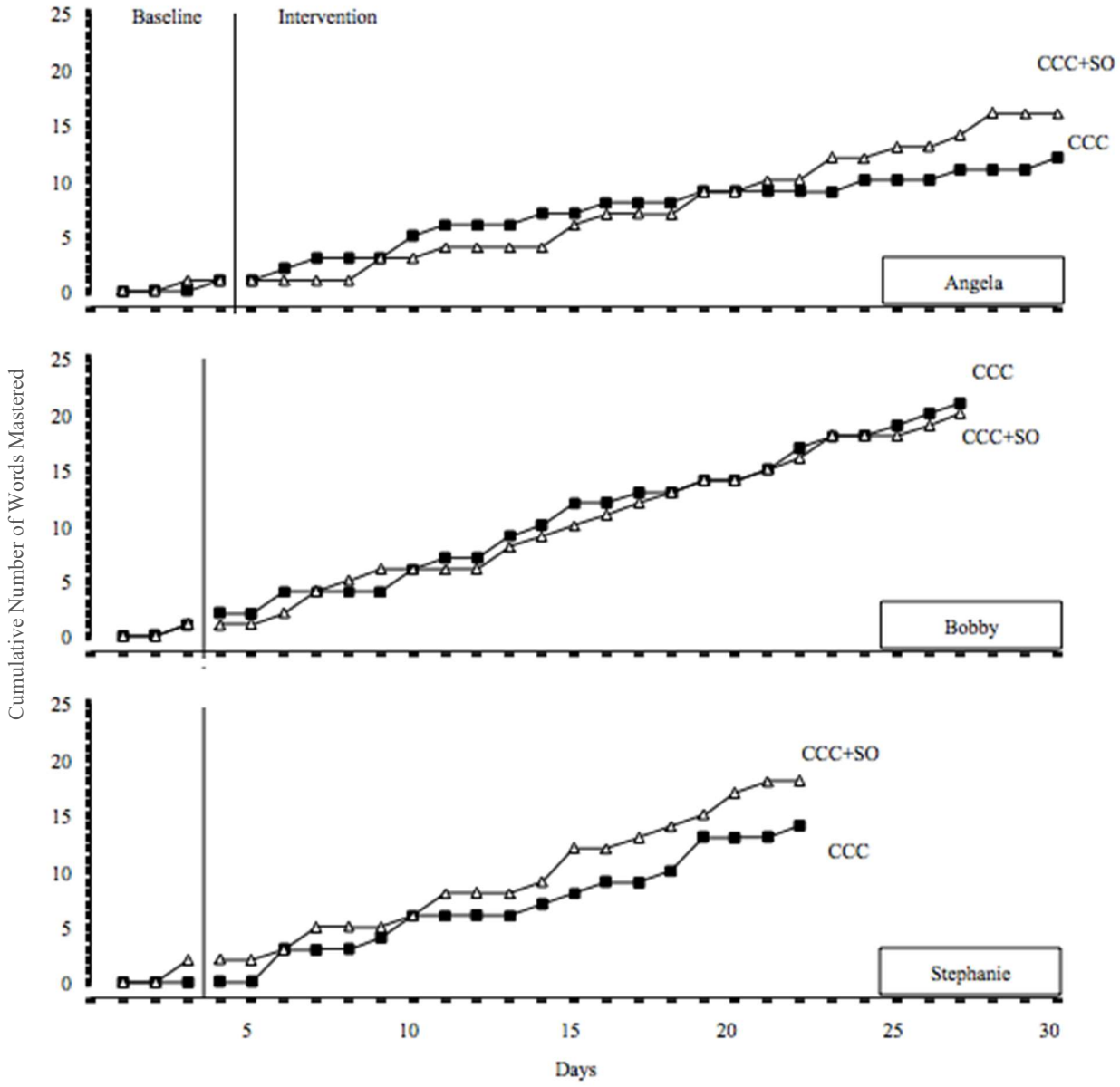

Figure 1. Cumulative Number of Words Mastered on Short-Term Retention Tests

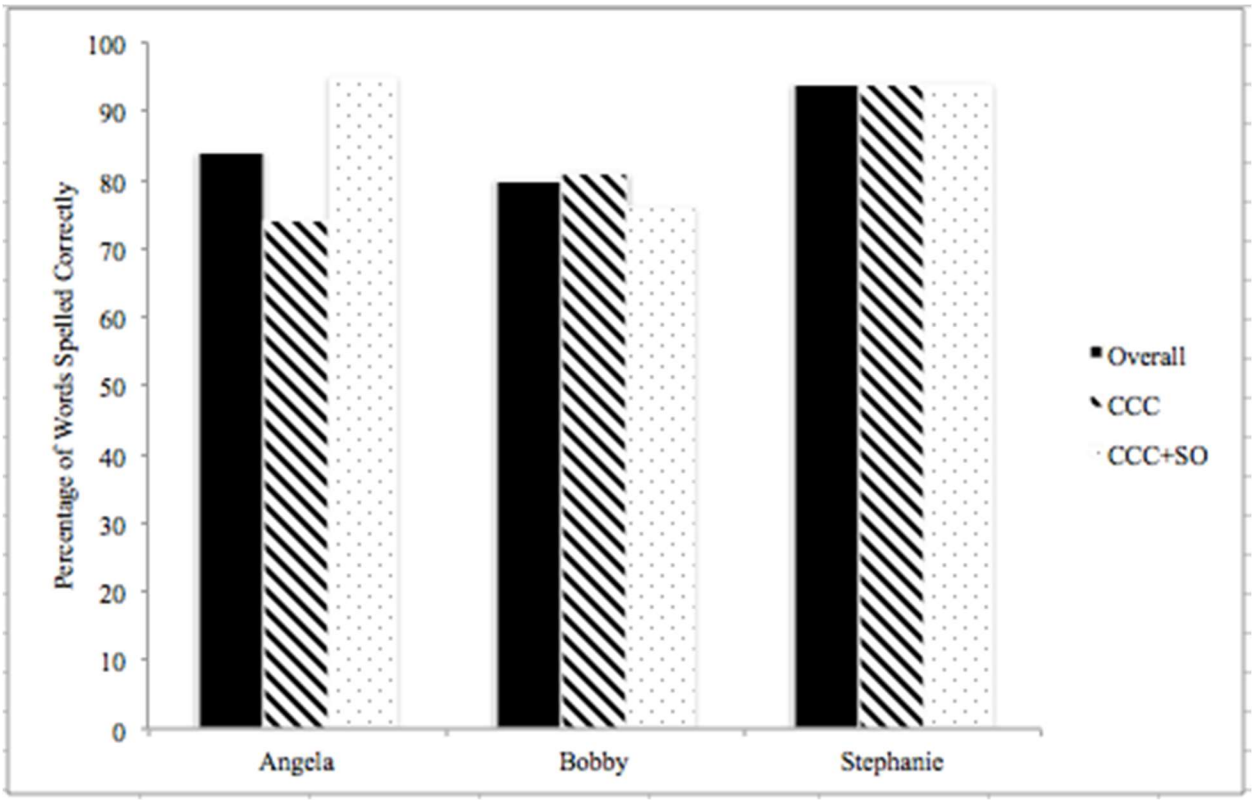

Figure 2. Percentage of Words Spelled Correctly on Long-Term Retention Tests

Table 3. Errors Made During Practice Sessions

	CCC	CCC+SO
Angela	28	9
Bobby	31	32
Stephanie	3	14

Social Validity Results

The two teachers that participated in the current study completed an adapted version of the IRP-15 (Martens et al., 1985) to gain insight on their personal opinions of the study. Teacher ratings can be found in Table 4 with an average rating for each item. Overall, both teachers' ratings indicated positive feelings about the intervention and its perceived benefits with ratings ranging between Slightly Agree and Strongly Agree. Prior to beginning the intervention, teachers

were shown how the intervention works, and they were given frequent updates on student progress. This information gave them a basis to answer the social validity questions.

To gain insight on the participants' personal opinions of the study, participants completed an adapted version of the CIRP (CIRP; Witt & Elliot, 1983). Individual participant ratings are shown in Table 5 along with an average rating for each item. All three participants' ratings indicated that they felt the intervention had improved their spelling and that they enjoyed the method used to improve their spelling performance. Participants were asked to give the condition they preferred a higher rating than the other condition. When asked whether they preferred CCC or CCC+SO, ratings were inconsistent across participants. Angela rated CCC+SO higher than CCC, while Stephanie rated CCC higher than CCC+SO, and Bobby rated both methods equally.

Table 4. Intervention Rating Profile – 15 (IRP-15) Results

	Mr. Lewis	Mrs. Smith	Item Avg.
This would be an acceptable intervention for students' spelling difficulties.	5	5	5
Most teachers would find this intervention appropriate for spelling difficulties	5	5	5
This intervention should prove effective in changing students' spelling difficulties.	5	5	5
I would suggest the use of this intervention to other teachers.	5	5	5
The students' spelling difficulties are severe enough to warrant the use of this intervention.	6	5	5.5
Most teachers would find this intervention suitable for the spelling difficulties described.	4	5	4.5
I would be willing to use this intervention in my classroom.	4	5	4.5
This intervention would not result in negative side effects for the students.	5	6	5.5
This intervention would be appropriate for a variety of students.	5	5	5
This intervention is consistent with those I have used in school.	4	5	4.5
This intervention is a fair way to handle the students' spelling difficulties.	5	5	5
The intervention is reasonable for students with spelling difficulties.	5	5	5
I like the procedures used in this intervention.	5	5	5
This intervention is a good way to handle the students' spelling difficulties.	5	5	5
Overall, this intervention would be beneficial for the students.	5	5	5

*Ratings on this scale range from 1-6 indicating level of agreement with each statement (1 = *Strongly Disagree*, 2 = *Disagree*, 3 = *Slightly Disagree*, 4 = *Slightly Agree*, 5 = *Agree*, 6 = *Strongly Agree*).

Table 5. Children's Intervention Rating Profile (CIRP) Results

	Angela	Bobby	Stephanie	Item Avg.
How much do you like practicing spelling with us each week?	5	5	3	4.33
Were there times when you didn't want to practice spelling with us?	1	1	2	1.33
Were there times when you wished you could practice spelling with us more?	5	5	3	4.33
How much do you think it helps when you practice spelling this way?	5	5	5	5
Do you think your spelling has improved?	5	5	4	4.67
Do you think your spelling has gotten worse?	1	1	1	1
How much do you like practicing spelling this way?	5	5	4	4.67
Do you think you would practice spelling this way from now on?	5	5	3	4.33
How much did you like practicing spelling without sounding out?	4	5	5	4.67
How much did you like practicing spelling with sounding out?	5	5	3	4.33

*Ratings on this scale range from 1-5 indicating level of agreement with each statement (1=Not at All, 2=A Little Bit, 3=Some, 4=A Lot, 5=Very Much).

CHAPTER V

DISCUSSION

Refinements to CCC have been investigated to maximize its effectiveness and efficiency (Erion et al., 2009; Fisher, 2012; Mann et al., 2010; Mann, 2014). One such refinement is the addition of a sounding out step (Fisher, 2012; Mann et al., 2010). While Mann and colleagues (2010) showed CCC+SO was more effective than CCC, Fisher (2012) did not. Because of the inconsistency in the research of the addition of a sounding out step to CCC, the current study sought to further examine the sounding out variation while addressing some of the methodological limitations of the previous research. All participants demonstrated considerable growth in the number of words mastered from baseline to intervention, both in the CCC and CCC+SO conditions, but results indicate little to no difference between spelling performance across conditions. While all three participants maintained mostly consistent acquisition rates across conditions, Angela and Stephanie began to show a difference in the cumulative number of words mastered after several sessions. Both participants mastered more words when practicing with CCC+SO than when practicing with CCC. The third participant, Bobby, maintained nearly equal performance across conditions throughout the entirety of the intervention phase.

Performance on long-term retention tests indicated that there was not a considerable difference across conditions. Bobby and Stephanie performed consistently on words assigned to the two conditions, while Angela showed a higher average spelling accuracy on words previously mastered in the CCC+SO condition than on words previously mastered in CCC. Data collection on practice session errors demonstrated that Angela made more errors in CCC than in CCC+SO, consistent with the rest of her performance. Bobby also performed consistently with the rest of his performance by demonstrating an equal number of errors during both practice

session conditions. Stephanie's performance during practice sessions indicated a slightly higher number of errors in CCC+SO than in CCC.

Previous research has demonstrated that participants achieved considerably higher percentages of correctly spelled words when sounding out than following the CCC method (Mann et al., 2010). The results of the current study showed little to no difference between traditional CCC and CCC+SO, which contradicts the previous study. The difference in results could be due to several potential reasons. The current study addressed several limitations of the previous study's methodology. For example, when testing for unknown words, Mann and colleagues defined an unknown word as a word that was spelled incorrectly once when the word was dictated to the participant. The current study required that the word be spelled incorrectly twice rather than once to increase the likelihood the words were truly unknown. In turn, this prevented words from mistakenly being considered mastered after using the CCC or CCC+SO method, when they were never unknown words from the start. Additionally, the current study improved the methodology by giving a basic phonics assessment to each participant prior to inclusion in the research. The assessment increased the likelihood that participants had the basic knowledge of letter-sound correspondence necessary to sound out words correctly during the CCC+SO condition.

Another change in methodology was in response to the idea that increases in spelling performance in the CCC+SO condition in the previous study could have been due to the fact that participants were instructed to sound out words on the CCC+SO post-tests but instructed not to sound out words on the CCC post-tests. By using two different measurement strategies for the two different sets of words, there is not an absolute way to know if spelling word accuracy was retained. To address this, participants in the current study were required to demonstrate that they

retained the spelling of words on all short-term retention tests without using the sounding out strategy taught to them during practice sessions. Retention of words from both practice conditions were measured in one, consistent manner.

Finally, an issue from the previous study included the possibility of carry-over effects from CCC+SO to CCC. More specifically, there was no procedure in place to ensure that participants would not continue to sound out words in the CCC condition after they had learned to do so in the CCC+SO condition. Despite the lack of prevention strategies, the data showed a clear difference across conditions. To further address the possibility of carry-over effects, the current study included daily scripts for the interventionists to read to the participants. The scripts included prompts to remind the participants when they were expected to sound out the words and when they were expected not to. The interventionist was then required to listen to the participants as they completed the CCC procedure to ensure they were not sounding out. The interventionist also watched the participants' mouths to look for sub-vocal sounding out. If any of the participants appeared to be sounding out during the CCC procedure, they were given a prompt to remind them not to. Anecdotally, these prompts were not needed often. This improvement to the methodology was a substantial change that likely prevented or decreased the possibility of carry-over effects.

This study adds to the large body of research demonstrating the benefits of CCC on spelling performance for children with and without disabilities. Both CCC and CCC+SO led to considerable increases in spelling words mastered for all three participants in the current study. Further, data suggest the sounding out variation and the traditional method may be equally effective. Generally, in terms of academic intervention for students in schools having difficulty spelling, the sounding out refinement may not be any more effective than CCC itself. It was

noted that the spelling curricula being used with two students in this study were teaching words that followed general spelling rules. In other words, the words were decodable and could therefore be used in a CCC+SO intervention effectively. Furthermore, words with common spelling patterns were grouped together and taught each week. Consistent and repeated practice combined with sounding out as can be found in CCC+SO may be an effective way for students to master these words. On the other hand, the curriculum being used with Stephanie included a number of words that do not follow general spelling words. Future interventions should focus on the decodability of the spelling words being taught and on the basic phonics abilities of the student prior to determining whether CCC or CCC+SO would be more appropriate for the student.

There were several limitations to the current study. First is the issue of carry-over effects. While the procedures put in place include prompting and frequent reminders about sounding out likely decreased the potential for carry-over effects, there is no way to know for certain if participants were sounding out words covertly when practicing words in the CCC condition. Secondly, there was no procedure in place to measure the frequency of prompts necessary to remind participants to sound out, to not sound out, or to correct an incorrect sound during practice sessions. Because CCC is a self-managed and independently carried out intervention, it is important to know if CCC+SO can be carried out independently without making sounding out errors. Anecdotally, this did not occur often, but data would support this further. A third limitation is that general praise statements were given to each participant by each interventionist without a procedure for systematic feedback during practice sessions. Although unlikely, a systematic method for delivering feedback across participants would ensure the amount of praise

given is equal across participants and across conditions, while removing the potential for responding that is influenced by differing amounts of praise.

Future research may consider evaluating the effects of CCC+SO by including it in a class-wide setting. Many classrooms utilize a daily spelling rotation that includes spelling with scrabble; grouping words with common endings, consonant blends, and digraphs; and using words in sentences. Adding CCC+SO as part of the students' daily spelling rotation may provide a class-wide example of its effectiveness, while gathering information on the intervention's perceived acceptability from both teachers and students. Also, an important area of all intervention research may be to assess the extent to which the words mastered during practice sessions can be generalized into other written expression activities. Future research could conduct an analysis of written exercises that were completed in the classroom to gather data about the ability to generalize words learned using CCC+SO. Future research may also consider a different method to measure efficiency of the practice conditions to determine if CCC+SO is more efficient than CCC. This could be done by measuring the length of time needed to complete practice sessions in each condition.

APPENDICES

APPENDIX A

DEMOGRAPHICS FORM

1. Date of Birth : _____ /_____ /_____

2. Gender : _____ Male
   _____ Female

3. Ethnicity : _____ Caucasian
   _____ Asian/Pacific Islander
   _____ African American
   _____ Native American
   _____ Latino/Hispanic
   _____ More than one race (specify) _____
   _____ Other (specify) _____

4. Grade : _____

5. Native English speaker? _____ Yes
   _____ No

6. If no to #5, how long has the participant been speaking English? _____

7. Receiving special education? _____ Yes
   _____ No

8. If yes to #7, under what eligibility? _____

9. Receiving free and reduced lunch? _____ Yes
   _____ No

APPENDIX B

TREATMENT INTEGRITY FORM/TASK ANALYSIS CHECKLIST

Participant: _____ Date:_____

Observer: _____

Individual Observed: _____

Implementation Checklist

*Check "yes" or "no" for each activity below to indicate if it was completed correctly during the observation **day**. Comments may be included in the "Notes" column.*

Task/Activity	Yes	No	Notes
Setting: The intervention took place in the designated setting			
Time: The intervention took place at the appropriate time			

*Check "yes" or "no" for each activity below to indicate if it was completed correctly during the observation **session**.*

Task/Activity	Yes	No	Notes
The participant was provided with lined paper, a list of words, and a cover sheet.			
Instructions were given to the participant indicating which condition was occurring before the intervention took place.			
The participant was reminded not to use the sounding out step in the CCC condition.			
The participant was reminded to use the sounding out step in the CCC+SO condition.			

*Check "yes" or "no" for each activity below to indicate if it was completed correctly on at least **80% of the trials** during the observation session.*

Task/Activity	Yes	No	Notes
The participant was given time to study the word on the provided word list.			
The participant then covered the word list with the cover sheet.			
The participant copied the word from memory on the lined paper.			
The participant uncovered the original word list and compared their response.			
If the word was spelled incorrectly, a line was drawn through the word, and the cover, copy, compare process was repeated.			

The process was continued until all words on the original list were copied and checked.			

APPENDIX C

INTERVENTION RATING PROFILE – 15 (IRP-15) – TEACHER VERSION

Teacher's Name: _____ Date: _____

Please circle the number which best describes your agreement or disagreement with each statement.

Strongly Disagree	Disagree	Slightly Disagree	Slightly Agree	Agree	Strongly Agree
1	2	3	4	5	6

1. This would be an acceptable intervention for students' spelling difficulties.
   1 2 3 4 5 6

2. Most teachers would find this intervention appropriate for spelling difficulties.
   1 2 3 4 5 6

3. This intervention should prove effective in changing students' spelling difficulties.
   1 2 3 4 5 6

4. I would suggest the use of this intervention to other teachers.
   1 2 3 4 5 6

5. The students' spelling difficulties are severe enough to warrant the use of this intervention.
   1 2 3 4 5 6

6. Most teachers would find this intervention suitable for the spelling difficulties described.
   1 2 3 4 5 6

7. I would be willing to use this intervention in my classroom.
   1 2 3 4 5 6

8. This intervention would not result in negative side effects for the students.
   1 2 3 4 5 6

9. This intervention would be appropriate for a variety of students.
   1 2 3 4 5 6

10. This intervention is consistent with those I have used in school.
    1 2 3 4 5 6

11. The intervention is a fair way to handle the students' spelling difficulties.
    1 2 3 4 5 6

12. The intervention is reasonable for students with spelling difficulties.

1	2	3	4	5	6

13. I like the procedures used in this intervention.

1	2	3	4	5	6

14. This intervention is a good way to handle the students' spelling difficulties.

1	2	3	4	5	6

15. Overall, this intervention would be beneficial for the students.

1	2	3	4	5	6

APPENDIX D

CHILDREN'S INTERVENTION RATING PROFILE - CIRP

Student Name: _____ Date: _____

1. How much do you like practicing spelling with us each week?

Not at all	A little bit	Some	A lot	Very much
1	2	3	4	5

2. Were there times when you didn't want to practice spelling with us?

Not at all	A little bit	Some	A lot	Very much
1	2	3	4	5

3. Were there times when you wished you could practice spelling with us more?

Not at all	A little bit	Some	A lot	Very much
1	2	3	4	5

4. How much do you think it helps when you practice spelling this way?

Not at all	A little bit	Some	A lot	Very much
1	2	3	4	5

5. Do you think your spelling has improved?

Not at all	A little bit	Some	A lot	Very much
1	2	3	4	5

6. Do you think your spelling has gotten worse?

Not at all	A little bit	Some	A lot	Very much
1	2	3	4	5

7. How much do you like practicing spelling this way?

Not at all	A little bit	Some	A lot	Very much
1	2	3	4	5

8. Do you think you would practice spelling this way from now on?

Not at all	A little bit	Some	A lot	Very much
1	2	3	4	5

APPENDIX E

CCC CONDITION: SCRIPTED DIRECTIONS

Introductory statements and expectations:

Tina, you're going to practice spelling some words with me today. As we practice, I want you to do your best. Don't sound out any of these words and try not to sound them out in your head either.

a. If a participant seems to be sounding out a word either out loud or sub-vocally, say **"Remember, don't sound out any of these words."** Provide this prompt as often as necessary.

Directions to administer before CCC Condition:

1. Place the numbered, lined paper, the list of five words, and the cover sheet next to each other in front of the participant.

2. Say to the participant, "**Here is a list of words that we are going to practice spelling. Look at the first word on the list, study it briefly, then cover it up and try to spell it without looking. When you're finished, uncover the word and see if you spelled it correctly. Do you have any questions? Be sure to do your best! Go ahead."** Make sure the participant completes every step in order.

a. If a participant skips any step (studying the word, covering it up, spelling the word, or comparing it to the model), the participant should be told to start the word over from the beginning by saying, **"Let's start this word over. Remember, study the word briefly, cover it up, spell the word without looking, and then uncover the word and see if you spelled it correctly. Ready?"**

b. If a participant takes more than 30 seconds to spell any word, prompt them by saying, **"Give it your best shot."** Provide this prompt as often as necessary.

c. If a participant spells any word incorrectly, instruct them to draw a line through the word and to try it again before moving on to the next word on the list. Do this until the word is spelled correctly.

3. At the end of the word list, praise the participant for their effort.

APPENDIX F

CCC+SO CONDITION: SCRIPTED DIRECTIONS

Introductory statements and expectations:

Tina, you're going to practice spelling some words with me today. As we practice, I want you to do your best. Sound out all of the words out loud, so I can hear you.

a. If a participant does not sound out a word out loud, say **"Remember, sound out all of the words out loud, so I can hear you."** Provide this prompt as often as necessary.

b. If a participant sounds out a word incorrectly, stop them immediately and model the phoneme that they missed. Then say, "**Try it again from the beginning."**

Directions to administer before CCC Condition:

1. Place the numbered, lined paper, the list of five words, and the cover sheet next to each other in front of the participant.

2. Say to the participant, "**Here is a list of words that we are going to practice spelling. Look at the first word on the list, study it briefly, sound it out loud, then cover it up and try to spell it without looking. When you're finished, uncover the word and see if you spelled it correctly. Do you have any questions? Be sure to do your best! Go ahead."** Make sure the participant completes every step in order.

a. If a participant skips any step (studying the word, sounding it out, covering it up, spelling the word, or comparing it to the model), the participant should be told to start the word over from the beginning by saying, **"Let's start this word over. Remember, study the word briefly, sound it out loud, cover it up, spell the word without looking, and then uncover the word and see if you spelled it correctly. Ready?"**

b. If a participant takes more than 30 seconds to spell any word, prompt them by saying, **"Give it your best shot."** Provide this prompt as often as necessary.

c. If a participant spells any word incorrectly, instruct them to draw a line through the word and to try it again before moving on to the next word on the list. Do this until the word is spelled correctly.

3. At the end of the word list, praise the participant for their effort.

APPENDIX G

RETENTION TESTS: SCRIPTED DIRECTIONS

Introductory statements and expectations:
Tina, you're going to spell some words that we have practiced spelling before. I want you to try your best.

Directions to administer before Retention test:
1. Place a lined and numbered piece of paper in front of the participant.

2. Say to the participant, "**I'm going to say some words out loud. After I say a word, try to spell it on this piece of paper. Put your pencil down when you are finished. Do you have any questions? Be sure to do your best!"**

a. If a participant takes more than 30 seconds to spell any word, prompt them by saying, **"Give it your best shot."** Provide this prompt as often as necessary.

b**.** If a participant spells any word incorrectly, do not indicate whether the spelling was correct and move on to the next word.

c. If no response for 5 seconds, say, "**Just try your best**." Use prompt as often as needed.

3. At the end of the word list, praise the participant for their effort.

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