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The effects of copy cover compare on handwriting skills for a second grade student with severe behavioral issues

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Abstract
The purpose of this study was to evaluate the effects of copy, cover, and compare (CCC) with the handwriting of a second grade student with severe behavior disorders in an urban elementary school. CCC has been employed with a wide range of skills ranging from sight words, spelling, and learning math facts. We evaluated CCC with a changing criterion design with four criterion changes. In the present case report, CCC was found to increase the handwriting legibility for our participant. This replicates our previous research using CCC in handwriting. The ease of implementing and evaluating CCC for handwriting was discussed.

Keywords: CCC, Handwriting, Legibility, Second-Grade Student, Behavior Disorders

Introduction

Letter formation and handwriting are very important aspects to the academic lives of students. The development of proper handwriting technique can happen as soon as preschool age when students begin to show interest in the spelling of their name and letters in print (Bayley, Broadbent & Pullinger, 2006). Once this interest takes place, parents or teachers can start working on the foundational aspects of writing. It is of the utmost importance that the person that begins the foundation of writing for the child uses proper steps and formations of each letter, or their future handwriting will lack the precision that is required (Callander & Nahmad-Williams, 2011). Although many assignments in children's schooling are turning digital, assignments requiring handwritten aspects are still a daily necessity. Typical issues with handwriting are excessive pencil pressure, spacing too close or too far and letters lacking the correct steps in formation (Schiffer-Danoff, 2000). Issues with handwriting can make it difficult for others, including the teacher to read work that a student has presented and thus, inhibits the learning process (Graham, 1999, 2010). In addition, poor handwriting lowers student grades in their written work (Graham,

Copy, cover, compare or cover, copy, compare (CCC) is a strategy used to promote learning and maintenance of new written skills in students of any age or ability (McLaughlin & Skinner, 1996; Skinner, McLaughlin, & Logan, 1997). An example of this strategy can be seen when a student copies the academic stimulus or handwriting letter, covers his or her work, copies it from memory, and finally evaluates their reproduction of the letters when to the original (Skinner et al., 1997). CCC has also been found to be successful at assisting in the synthesis of information for students though the use of self-correction (McLaughlin, Derby, & Weber, 2013). CCC also assists with students' retention and discrimination. By presenting previously mastered materials with new materials, students using this method are able to retain past knowledge and improve current skills (Joseph, Konrad, Cates, Vajcner, Eveligh, & Fishley, 2012; Konrad & Joseph, 2014). This procedure has been used extensively in spelling, math, and sight word instruction. A recent case report by Harvey, Conner-Boyle, McLaughlin, Derby, Weber, and Sanders, (2015) found that CCC could be employed to teach a middle school student with disabilities to improve his handwriting. They had their participant print the 26 lower case letters using teacher-selected words that contained all of the letters. When the first set of words was taught using CCC, his performance increased and maintained over time. However, with Set 2 words, improvements were found during baseline.

Due to time constraints, the words in Set 3 were not targeted using CCC. Those letters remained in baseline. These data indicate that the effects of CCC were delayed and different for each of the two sets where CCC had been employed. Clearly, more research on implementing and evaluating CCC needs to occur.

According to *Handwriting: The Way to Teach It*, repetition should be an aspect of handwriting instruction, but should not exceed single digit trials (Sassoon, 2003). Copy, Cover, Compare allows the participant to repeat the skill multiple times with different levels of prompting, not exceeding a number of trials that makes the practice less successful.

The purpose of this study was to evaluate the effects of copy, cover, compare on the handwriting of a second grade student in an urban elementary school. Since all but one example from the previous research with CCC has not involved handwriting, another purpose was to implement and evaluate the efficacy of CCC with handwriting with a young student.

Method

Participant and Setting

The participant was an eight-year-old second grade boy at the time data collection began. He was one of seven brothers and three sisters. The participant lived with his father at the time of the study. He had one younger sister and an older brother also attending his elementary school. The participant was not diagnosed with any disabilities, but had outbursts of violent behavior when having to participate in non-preferred activities. The behaviors exhibited were clenched fists, breaking items and acting aggressively towards other students and staff. The participant had tried to explain his behavior by stating it was "what happens at home". The participant alternated between being polite or violent in the structured classroom environment (same behavior as outbursts). The participant's performance in handwriting was below grade level expectations with many letter reversals and improper letter formations. The first author worked with the participant in order to improve his handwriting to a level that was acceptable for second grade and assist in fixing his improper letter formations.

The study took place in a large urban elementary school in the Pacific Northwest. Students were enrolled in this classroom for all academic time other than electives such as PE and Music. The study took place on Thursdays from 9:30-12:00 a.m. and Fridays from 1:00-3:00 p.m. During the data collection and instruction, there were 24 other students one certified teacher, and the first author in the classroom. The participant and author sat at a desk removed from the carpeted seating area and desks in the second grade classroom. During the study, the teacher read to the other students on the carpet. The study was conducted by the first author as part of an Endorsement in Special Education from a local private university in the Pacific Northwest (McLaughlin, B. Williams, R. Williams, Peck, Derby, Bjordahl, & Weber, 1999).

Materials

The materials used in this study included handwriting worksheets, pencils, data sheets and CCC worksheets. The worksheets were downloaded off of a website Writing Wizard (n.d.) that focused on letter formation. The papers had top and bottom lines as well as a dotted midline, in the size known as extra-large on the website (about a half an inch tall writing area). A table was used to record the data each session and graphs were also used to further analyze the data collection process, made by the author. An iPhone was used to record data sessions for reliability, due to the lack of available adults to conduct reliability during the sessions. Roar Grams, a school wide incentive program was also provided to the student as reinforcement. The Roar Grams could be traded for items as currency in the classroom environment weekly.

Dependent Variable

The dependent variable in this study was the participants' use of correct handwriting. The student had the opportunity to earn three points per letter, based on proper formation, size and alignment. Formation scores were based off of the correct steps in the correct order for forming each letter. If the participant followed the correct steps for formation, they received 1 point but if the steps were incorrect the participant received 0 points. Because the letters all remain below the midline, size was correct if the participant's letter remained between and touched or "bumped" both the baseline and midline. If the letter touched each lines and remained within them the participant received 1 point. If the letter did not touch both lines or did not remain between the two lines the participant received 0 points. Proper alignment was defined as the space between each letter when written. If the participant wrote each letter a finger space apart he received one point but if the spacing exceeded or was less than one finger space between letters, 0 points for alignment were awarded. Incorrect letters were letters that received 0 points (defined above) in any of the areas of formation, size or alignment.

The second measure was the percent of non-overlapping data points between baseline and each intervention (Scruggs, Mastropieri, & Casto, 1987; Scruggs & Mastropieri, 2001, 2013). This provides a measure of the effectiveness of an intervention.

Data Collection and Inter-Observer Agreement

For the study, permanent product recording was used through handwriting worksheets. Each written letter received a point based on proper formation, size and alignment. Formation scores were based off of the correct steps in the correct order for forming each letter. If the participant followed the correct steps for formation, they received 1 point but if the steps were incorrect the participant received 0 points. Because the letters all remain below the midline, size was correct if the participant's letter remained between and touched or "bumped" both the baseline and midline. If the letter touched each lines and remained within them the participant received 1 point. If the letter did not touch both lines or did not remain between the two lines the participant received 0 points. Proper alignment was defined as the space between each letter when written. If the participant wrote each letter a finger space apart he received one point but if the spacing exceeded or was less than one finger space between letters, 0 points for alignment were awarded. Incorrect letters were letters that received 0 points (defined above) in any of the areas of formation, size or alignment. The points were then calculated after each session and added together to make the cumulative session score. Each instance of correct formation, size and alignment gave the student one point

respectively, with a possible 3 points. A new criteria was developed after the participant exceeded the previous criteria during one session.

Interobserver agreement was taken in 33% of the trials by having another person trained in the grading protocol watch the recorded session and mark whether the child wrote the letter correctly or incorrectly based on the author's definitions. The second data collector was given an answer key showing proper formation, alignment and spacing as defined by the author. The two data collectors scored data independently and at different times. One data collector took data while the session was occurring and the other took it on the previously recorded session after it had occurred. The author compared the marks made by each observer and counted marks that were the same as agreements and marks that differed as disagreements. Point by point agreement ratio was used in order to calculate the interobserver agreement. The mean agreement was 100% because all point-by-point agreements totaled 100%.

Experimental Design

The criterion changing design (Kazdin, 2011; McLaughlin, 1983) was used to assess lowercase letters in this study across 13 letters that remain below the midline to evaluate the effects of CCC worksheets. A new criterion was only added if the handwriting points exceeded the previous criteria. During baseline the correct use of lower case letters a, c, e, m, n, o, r, s, u, v, w, x and z were recorded after the letters were verbally prompted for the student by the first author. Baseline data were taken in Sessions 1, 2 and 3 and intervention was implemented in Sessions 4-11. During intervention the student practiced lowercase letters using the CCC procedure typed on lined papers (previously explained) with the letters.

Baseline: During baseline the participant was verbally instructed by the author to write lowercase letters a, c, e, m, n, o, r, s, u, v, w, x and z. The author followed along as the student was writing, marking correct and incorrect points defined by the study. The participant did not see the documentation of their errors but was given praise during the sessions. When the participant became off task, the first author told him to continue writing and try his best. When the session was over the author praised the student for his hard work, gave him a Roar Gram and he returned to the activity in class. There were three sessions in baseline.

Copy, cover, and compare (CCC): CCC was employed as an attempt an increase in the participants handwriting skills. In conjunction with the copy, cover, compare strategy, Roar Grams (an incentive program implemented by the elementary school) were given to the student to help in the mastery of lowercase letters. Roar Grams were the school rewards that were used by the students to gain access to activities or positive consequences during the school day. The student received a worksheet with one line of modeled letters, a line of dots, and a last empty line to perform the task on his own. On the worksheet, the first line had the letter that was modeled for the student to copy, the second and third lines were dotted models and the last 2 lines were blank. The line with the dotted model was used when the participant got to the copy step. The student had to copy the letters in that day's instruction an average of 6 times in the copy step.

If the participant had questions about the formation or steps they were answered, but correction was not given. Once the letter was correctly copied, the participant moved on to the cover step. The participant moved to last two lines and covered all previous lines to write the letters independently on average six times. After the participant covered and wrote the letter, the he was allowed to look at the previously copied letters. The participant had the ability to choose which of the letters he made in the cover stage were his "best letters" and circled said letters.

Results

The overall results can be found in Figure 1. Solid red vertical lines represent the criterion ceiling for our participant during the intervention.

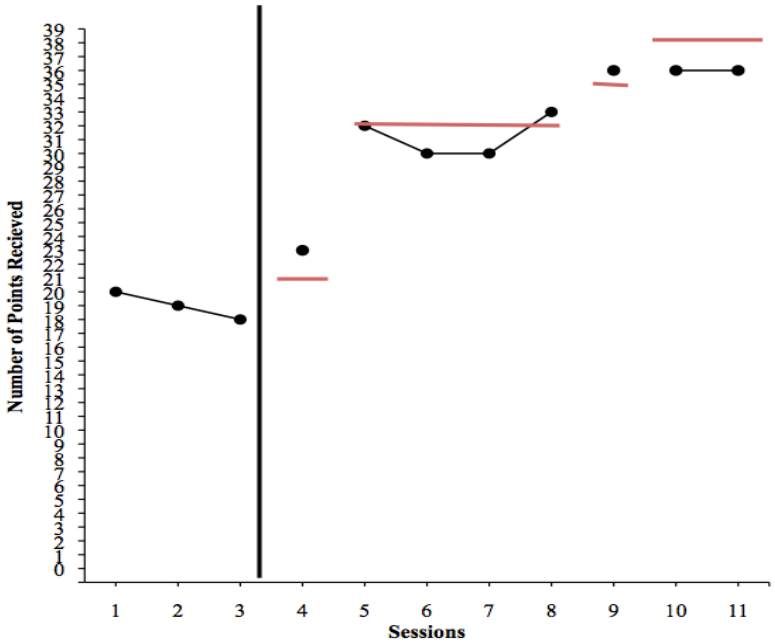

Fig 1: The number of handwriting points earned during baseline and the four criterion changes during CCC handwriting.

Baseline: During baseline, the student's average amount of points earned in handwriting was 19 points. The range was

18-20 points.

CCC Handwriting: The first criterion was set at 21 points. This was immediately exceeded in the first data point of intervention at 23 points. Criterion 2 was set at 32 points and began after the first point of intervention (Session 4) consisted of a 5-point increase from the previous baseline data. Session 5 continued an upward trend with a score of 32, which met the criteria but did not exceed it, per definition. Session 6 and 7 both received 30 points, which were below the criteria selected.

Criterion 3 occurred when Session 8 data exceeded the criteria of 32 points with 33 points, bypassing the previous criteria in place. Session 9 data exceeded Criteria 3, with 36 points and the new goal was placed into criterion 4.

Criterion 4 was set at 39 points and contained Sessions 10 and 11. This criterion was not exceeded due to data points of Sessions 10 and 11 remaining at 36 points. Overall, during CCC, our participant received an average of 32 points and a range from 23-36 points. The CC average of 32 points was 13 points above the baseline average of 19 points.

The percent of non-overlapping data points between baseline and CCC was 100%. This indicates that CCC was a highly effective intervention.

Discussion

The average score the participant received for the letters increased from 19 points in baseline to 32 points in intervention. CCC was a successful intervention for the participant because he was able to do several trials in a short period of time, analyze his work and see his improvement. Overall, CCC successfully helped the participant increase his proficiency in handwriting in the areas of formation, alignment and size. This adds to the data supporting the use of CCC as an evidence-based intervention (Joseph et al., 2013; Konrad & Konrad, 2014).

As Graham, Harris, and Fink, (2000) have indicated, handwriting instruction should be frequent and take place in the early grades. With the emphasis on high stakes testing, handwriting and spelling can easily become neglected in the elementary school years.

It was important that the participant increased his use of proper handwriting in order to be successful in the classroom environment and beyond. Proper handwriting allows alternative ways of communication throughout different environments (Graham, 1999; Graham et al., 2000). The participant increased his scores in all sections, formation, alignment and size in order to increase his final session scores.

The participant not only improved his handwriting abilities, but also his behavior with the first author as well. When the participant had the opportunity to work with the first author one-on-one, he was on task, respectful and calm about 70% of the time. Unfortunately, this behavioral trend did not generalize itself over to time he spend in the normal academic settings.

The participant told the first author that he enjoyed working with her and wanted to continue to improve his skills in handwriting. The participant also told the first author around session 10 that writing letters was a punishment at home, which came as a complete surprise. We may have chosen a different skill if we had known this in advance. That could also explain the magnitude of CCC and the use of the Roar Grams rewards.

Roar Grams were a very strong reward within the classroom and the elementary school. The participant was able to trade his Roar Grams for privileges (telling a joke before school announcements over the intercom, helping the lunch staff) or goods (fruit by the foot, pencils). The student also worked hard for praise from the first author and enjoyed earning her verbal attention.

The use of CCC to improve handwriting skills was the first to our knowledge. This outcome adds additional strength as to the efficacy of CCC and also adds a new skill, handwriting for use with that set of procedures. However, additional research appears needed before we could make a stronger statement regarding CCC and handwriting.

The error correction function of CCC is also an important aspect of employing CCC. Having the students correct their errors has been shown to improve student performance in a wide range of subject matter areas as well as with a wide range of students (Hochstetler, McLaughlin, Derby, & Kinney, 2013; Konrad, & Joseph, 2014: Manfred, McLaughlin, Derby, & Everson, 2014). Such error correction formats are also a component of DI flashcards (Thomas, McLaughlin, & Derby, 2015). DI flashcards have also been very successful in teaching skills to students with and without disabilities.

The study was very cost effective. Worksheets were the only cost to the author, which were made on the computer and printed on a personal printer. The reward of Roar Grams was free and provided by the elementary school administration. Others have indicated the lack of cost when employing CCC (Hochstetler et al., 2013; Konrad & Joseph, 2014; Joseph et al., 2012; Manfred et al., 2015; Skinner, McLaughlin, & Logan, 1997). Clearly, this should add to the already strong data base as to the efficacy of CCC.

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