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## **Employing copy, cover, compare to teach a middle school student with ADHD handwriting with appropriate form and spacing: A case report**

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### **Abstract**

Since most of the previous research has employed copy, cover, and compare with spelling or math, the purpose of this study was to evaluate the effectiveness of CCC on appropriate form and spacing of handwriting. Our participant was a 12-year-old male student diagnosed deficits in behavior and communication. He was enrolled in a middle school behavior intervention classroom in a large urban school district in the Pacific Northwest. The appropriate form and spacing of handwriting was the major dependent variable. A multiple baseline design across groups of letters (Sets) was implemented to assess the effectiveness of the CCC procedure. The overall outcomes indicated an increase in student performance. The issues related to employing CCC for handwriting were discussed.

**Keywords:** BI, behavior intervention classroom, handwriting, at risk students, multiple baseline design, Copy, Cover, Compare, CCC, data-based decisions, middle school

### **1. Introduction**

Handwriting is critical to academic success in addition to being necessary to communication across many settings<sup>[1]</sup>. Yet, it seems that schools are not committed to teaching handwriting to mastery or preventing writing difficulties<sup>[2]</sup>. In this day, when so much work takes place on the computer, handwriting has lost priority in the classroom. Studies have shown that students who have legible handwriting tend to do better academically, write more often, and are perceived to be more competent than peers with illegible handwriting<sup>[2]</sup>. Graham et al., asserts that handwriting relates causally to writing so a deficiency in handwriting can show a decrease in writing. Additionally, students with handwriting deficits lose time in idea generation, planning and revision in their writing<sup>[3]</sup>.

The failure of many school districts to acknowledge the overall importance of handwriting instruction has allowed many students to struggle in this area<sup>[1, 2]</sup>. Students in behavior intervention classrooms typically experience more academic success when efficient interventions regarding their behaviors are implemented<sup>[4]</sup>. A handwriting deficit can be the consequence of the amount of instruction time lost due to their inappropriate behavior or working on teaching behaviors and/or social skills that are not occurring at a high enough level or rate<sup>[4]</sup>.

Handwriting is "a complex skill involving an intricate interchange of not only visual and motor abilities, but also cognitive and perceptual processes, psychosocial, biomechanical, and environmental factors"<sup>[5]</sup>. It isn't sufficient to possess the visual-perceptive skills or motor coordination skills alone but rather, the writer must be able to incorporate both in order to be successful with handwriting.

Copy, cover, and compare (CCC) is currently viewed as an evidence-based procedure to teach various discrete skills to a wide range of students. These skills have ranged from spelling<sup>[6, 7, 8]</sup> geography,<sup>[9]</sup> and math facts<sup>[10, 11]</sup>. The goal of CCC is for the student to gain independence and take responsibility for their learning<sup>[12, 13]</sup>. CCC is a self-management strategy that allows students to practice academic skills repeatedly and to self-correct and to correct when prompted<sup>[14]</sup>.

This principle allows the students to receive immediate feedback so that they do not repeatedly practice a skill incorrectly. The student copies the sentence as shown by an example, the student covers the example and their work and writes the sentence three times. After the three sentences are completed, the student compares his or her work to the example. The whole process may be repeated until the student reaches mastery. By reviewing their work after each trial, the student is ensured that they practice correct handwriting. CCC is an appropriate intervention used across multiple settings to promote generalization and can be used with students with various disability designations ranging from autism [6, 15] to students with behavioral issues [11, 16].

The purpose of this study was to evaluate the effectiveness of CCC method with handwriting. We employed a student with behavioral issues to improve his handwriting. This was done so that he could be successful in the BI classroom, as well as the general education classroom. An additional goal was to replicate [17] and extend CCC to another the skill of handwriting lower case letters with a middle school student.

## 2. Method

### 2.1 Participant and Setting

The participant of this study was a student in a Middle School behavior intervention (BI) self-contained classroom in the Pacific Northwest. The participant was a 12-year-old boy with deficits in behavior and communication.

Our participant had recently moved from a self-contained BI classroom at the elementary level, where he spent the entire day in that environment. The elementary BI room was in a portable classroom outside the actual school building. The middle school BI program however is housed in the school building, and provides opportunities to earn classes out of the BI program. The BI program served students during all 6 periods of the school day. The participant during the time when the study began was in the BI classroom for all six periods of the school day. Each period was 55 minutes, (Thursdays were 46 minutes). Due to a district inclusion model, the student was put into general education core content area courses. The student is still served in the BI classroom three periods a day. The classroom was an integrated setting containing students from low-income families, students with Individualized Education Plans (IEP's) and students with 504 Behavior plans. All students ranged from 12 to 14 years of age. This classroom has been the setting for several research projects conducted by the classroom teacher.

Data collection occurred during the regular classroom routine. Data were collected during first period (8:45 a.m. to 9:00 a.m.) while other students were completing reading lessons with another staff member. Our participant was instructed individually and all of the sessions occurred at a table, in a secluded area of the classroom. The table was located behind a half-wall, in order to provide a quiet learning environment, away from the pressures of peers. The BI classroom was staffed by a certified teacher, an instructional assistant, and a student teacher (first author). In addition, other BI staff, including one certified teacher and two instructional assistants, would also be in and out of the classroom depending on the day.

### 3. Materials

The study utilized materials designed by the authors, CCC. The materials included a pencil, general-purpose handwriting

lined writing paper, and a CCC worksheet designed by the authors. This can be seen in Figure 1. Additionally, materials that were provided as rewards included a school wide token economy "bucks" and a gift card for 25 dollars.

### 4. Dependent Variable and Measurement

The purpose of the study was to increase the student's ability to write legibly (correct form and spacing of lowercase letters). He could make the letters correctly but the vertical and horizontal spacing of letters were often in error. Therefore, when given the visual prompt of the letter, and the instructional cue of "copy my letter," "your turn," and "now cover it and try it" the student was taught how to independently and accurately write the 26 letters of the alphabet in lowercase form, with appropriate form and spacing.

Our participant's handwriting was scored using a (✓) and (-) system. If the letter matched the form taught by the first author (had appropriate spacing, using the bottom half or the top half of the line as a guide) and if the letter did not "run into" any of the surrounding letters, then it received a ✓. If the letter failed to meet the criteria or only met one of the two criteria then it received a - on the data sheet. After four sessions of baseline, 18 sessions of intervention took place. Our participant's permanent product data were collected at the beginning and end of each session. For letters to be counted as correct and/or mastered, each letter needed correct size, form, and spacing as defined by first author criterion, for at least 2 assessments, which could occur on the same day.

### 5. Experimental Design and Conditions

The design of the study was a multiple baseline across three sets of letters (18, 19). A description of each condition follows.

**5.1 Baseline.** The typical teaching procedures were in effect. The first author orally dictated the pangram sentences to the participant. No praise or attention to spelling/ punctuation was given during this time. After each session the first author thanked the students for writing the sentence and doing their best work. The pangram sentence was said aloud, one word at a time and the participant was encouraged to ask for help with spelling if needed. The condition was in effect from 4 sessions for Set 1, 18 sessions for Set 2 and for 22 sessions for Set 3. Intervention never took place for Set 3.

**5.2 CCC.** The authors' example blank handwriting paper employed for CCC can be seen in Figure 1. One of the first three authors would model a letter, have the student write the letter, then cover both letters and write three letters. The authors chose not to create a different sheet because they wanted flexibility to work on the letters that the participant needed assistance. This also allowed the handwriting instruction to occur at the pace that met the student's needs. If the participant wrote his the letters incorrectly (either spacing or form) they were directed to "make another letter." The criterion was three correct letters, with appropriate spacing and form.

During these sessions, the participants saw the letter that the first author modeled, copied the letter, and then covered up first two letters to write the letter three times from memory. This allowed our participant to evaluate his own work [14]. If the letter was written correctly, the participant could move

on to another letter. If the letter was written in error, he was required to write the letter correctly three times. Once the participant reached mastery on Set 1 letters, when given the daily pangram assessment, a second set of letters was taught using CCC. The pangram sentence included all 26 letters of the alphabet. The participant was awarded one of the school's "bucks" for use in the student store for his compliance in the project. At the end of the session, the student was awarded a (+) or a (-) for his behavior when he worked with one of the authors. If he was compliant, respectful, and did his best work 80% of the time, he received a (+). If he was compliant, respectful, and did his best work less than 80% of the time he received a (-). At the end of the study, the total number of (+) was divided by the number of sessions. If this number was greater than 80%, the student would receive the twenty-five dollar GameStop gift card.

**6. Data Collection and Inter-observer Agreement**

Permanent product data were collected at the beginning and end of each session, when the student was asked to write a pangram (a sentence that contained every lowercase letter of the alphabet at least once). The student was encouraged to do the best that he could do, and to ask for the spelling of any of

the words he was unsure about. The first author gathered data by scoring the student's work.

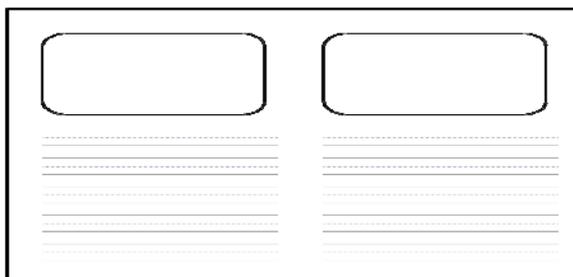
Another teacher education candidate, who was trained in how to score the letters, would be given the permanent product and asked to score the student's work, to obtain the interobserver agreement. The number of handwriting ✓□ and – given to the student by the two teachers was compared to each other. Interobserver agreement was calculated by dividing the smaller number of ✓□(correct) by the larger and multiplying by 100. . The overall average reliability was 85% with a range 70 to 100%.

**7. Results**

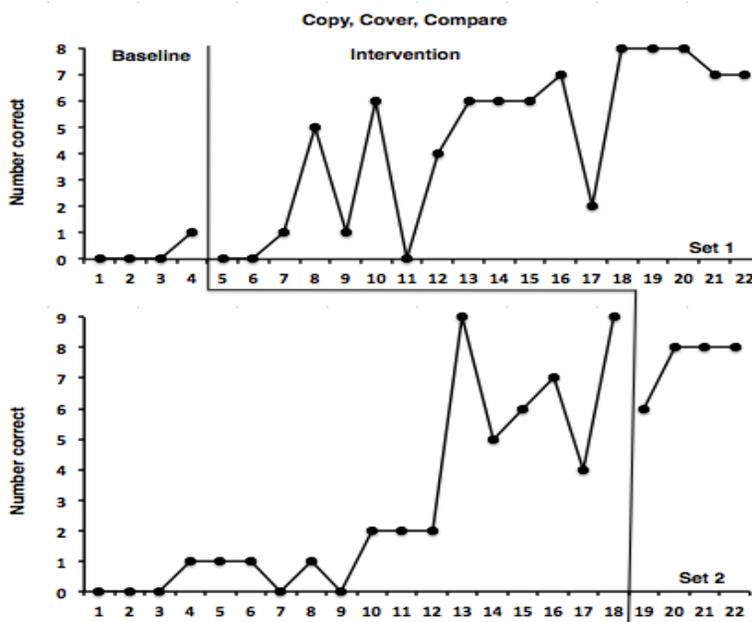
**7.1 Baseline**

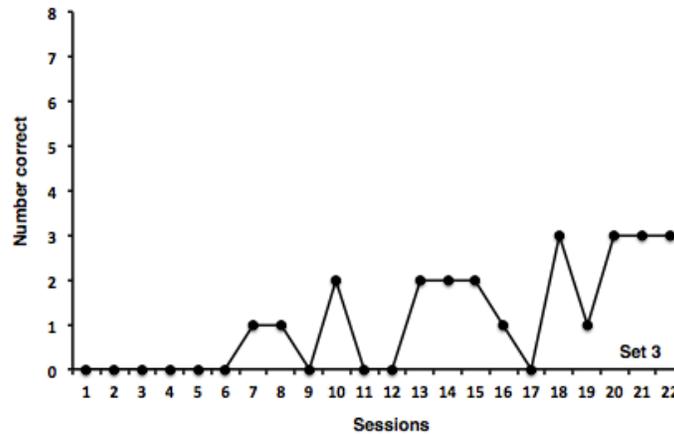
Baseline data for our participant indicated that he was unable at the beginning to correctly size none of the letters. In addition he was unable is able to correctly form or space none of the lower case letters except for one letter in Session 34. Our participant earned all (-) and no (✓). The number of total words written correctly during baseline and CCC are shown on Figure 1 for Participant 1. His mean for baseline was .75 correct letters (range 0 correct to 2 correct).

**Figure 1:** The blank writing paper used during CCC.



**Figure 2.** The number of handwriting points earned in baseline and CCC.





### 7.2 Copy, Cover, Compare

As seen in Figure 2, the participant's progress toward the instructional target of handwriting with appropriate form, size, and function improved during CCC. For CCC, the mean for CCC 11 correct (range 0 correct to 20 correct). The number of total words written correctly during baseline and CCC is shown on Figure 2 for Participant 1. For Set 1 words during baseline, the mean was 0 correct. During CCC the mean was 9.0 points (range 0 correct to 20 handwriting points). For Set 2 the number of handwriting points during baseline, the mean was 17 corrects (range 15 corrects to 19 handwriting points). For Set 3 words during baseline, the mean was 0 corrects (the participant never got any of Set 3 correct).

### 8. Discussion

The results of this study on the effectiveness of the first author designed CCC handwriting for a middle school BI student generated an increase in his ability to write the 26 lowercase letters of the alphabet with appropriate size, form, and spacing. Based on the improvements made within such a short period of time and with such infrequent sessions, two to three times per week for approximately eight weeks, the CCC program was effective with a student with behavior problems with noncompliance to adult requests, negative peer-to-peer interactions, and ADHD.

One strength of this study is that the student displayed an increase in his ability to write lowercase letters, with appropriate size, spacing, and function. Furthermore, the study was efficient and effective, easy to implement, reasonable cost, and enjoyable for both the student and the first authors as it implemented opportunities to engage more one-on-one learning time, which was effective for our participant and gave him positive attention.

The use of a multiple baseline design allowed the first author to make data based decisions for the participant. The first author was able to modify the intervention and the reinforcers during the sessions. If a participant was not performing to standard or progressing as high as the author expected, the first author reapplied the preference-based assessment to implement a more successful reinforcer to help make the participant achieve desired outcomes. In this case, ensuring consecutive days of mastery before moving onto next set of words help students over learn and the use of token economy for CCC helped the participant improve his handwriting.

The present research provides a very important demonstration as to the efficacy of employing CCC in the

area of handwriting. To our knowledge, this is the first example of employing CCC to teach handwriting. The adds to the data that has demonstrated the effectiveness of CCC [13]. However, in the present example handwriting was the behavior of interest. Also, our present outcomes replicate with a middle school BI student much of our prior research. CCC has been shown many times to be an effective classroom-based intervention across spelling, handwriting, and math fluency (6, 10, 12, 13 14, 15, 16, 20).

A weakness of the study is that timing was limited and the first author ran out of time to teach the participant Set 3. In addition, the participant had spotty attendance due to sickness and injuries sustained during the study. Sessions sometimes did not occur every day the student was at school due to behaviors that happened before and delayed the student in completing work. The student was not allowed to move on with his day until work from first period was completed, if he delayed his required work in first period, the would try to work with him later in the day, but it was not always successful. Therefore, the inconsistency especially in the beginning of the study of session implementation may have prevented more of an increase in the participant's ability. Halfway through the study, the participant began to refuse the rewards that the first author offered to him. Another reinforcer in the form of a \$25 gift card was introduced as a reinforcer. The participant was awarded with a (-) for non-compliance or a (+) for compliance. If he had 80% + signs, then he would earn his gift card. The combination of these factors led the researchers to determine this as a subjective finding that requires further analysis. With more classroom time and a better understanding of the participant's preferred reinforcers, intervention could be 100% successful across all the sets.

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