Effects of Sentence-Combining Instruction and Frequency Building to a Performance Criterion on Adolescents With Difficulty Constructing Sentences

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ABSTRACT: Adolescents with difficulty constructing sentences were provided with a multicomponent intervention: sentence-combining instruction and frequency building to a performance criterion. The study used a multiple-probe, single-case experimental design to evaluate the intervention's effects on accuracy and frequency of constructing simple and compound sentences. For all four participants, results indicated improved sentence construction of simple and compound sentences during and following intervention.

Expressive writing serves a useful purpose across a variety of settings. Expressive writing allows students to demonstrate knowledge and refine understanding (Bangert-Drowns, Hurley, & Wilkinson, 2004), and it is an important factor in promotion and salaried employment (National Commission on Writing, 2004). Expressive writing also enables participation in many online social activities, such as composing e-mails or posting messages to online social networks (Boyd, 2008). Writing has become a foundational skill to an increasingly global society and economic marketplace.

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A proficient repertoire in written expression requires fluency in a myriad of sentence-level skills, including handwriting, spelling, and sentence construction (Datchuk & Kubina, 2013; Graham et al., 2012), that interact and contribute to the progressively more complex skills of paragraph composition and strategies for composing and revising extended text (Berninger & Amtmann, 2003). Students with writing difficulty unfortunately struggle with numerous expressive writing skills, including sentence construction (Graham, 2006). Their writing typically contains short, choppy, or incomplete sentences with numerous mistakes in grammar, spelling, and punctuation (Kline, Schumaker, & Deshler, 1991; Newcomer & Barenbaum, 1991).

Adolescents who struggle with sentence construction may face a greater likelihood for sustained difficulty. Many states have adopted the Common Core State Standards, which set benchmarks for proficiency with numerous types of sentence constructions (e.g., simple and compound sentences) by the end of primary grades (National Governors Association Center for Best Practices, 2010). However, instructional time for sentence-level skills tends to decrease across primary to secondary grades (Graham, Harris, Fink-Chorzempa, & MacArthur, 2003; Graham et al., 2008).

BENEFITS OF FLUENT SENTENCE CONSTRUCTION

Given potential decreases in opportunities for instruction, adolescents with difficulty constructing sentences stand to benefit from interventions capable of efficiently building fluency. Fluency in sentence-level writing skills, specifically sentence construction, is thought to improve writing performance and contribute to the development of more complicated writing tasks, such as paragraph composition (Graham et al., 2012; Saddler & Graham, 2005). Fluency is achieved when a skill reaches high accuracy and frequency (Binder, 1996; Johnson & Layng, 1992; Kubina & Yurich, 2012). Fluency has several additional benefits (Binder, 1996; Haughton, 1974, 1981; Johnson & Street, 2004; Kubina, Amato, Schwilk, & Therrien, 2008; Kubina & Yurich, 2012; Lin, Kubina, & Shimamune, 2011; Lindsley, 1992; Olander, Collins, McArthur, Watts, & McDade, 1986), including successful completion of tasks requiring quick and accurate responding, application to closely related tasks, and retention of the fluent skill in absence of intervention. The sentence construction literature currently lacks robust methods of building fluency (Datchuk & Kubina, 2013).

Sentence-combining instruction (SCI), however, is a promising approach for improving sentence construction (Graham & Perin, 2007).

PREVIOUS RESEARCH

Sentence-Combining Instruction

SCI requires students to combine several simple sentences or phrases, called *sentence kernels*, into one sentence with a connector (Saddler, 2012; Strong, 1986). Connectors include adjectives, conjunctions, and dependent clauses. Students are initially provided cues to use the appropriate connectors, such as *and* or *but*. Over time, they receive fewer cues and/or sentence kernels from the instructor, eventually applying the skill of sentence combining to their own sentences and extended compositions, such as multiparagraph stories and essays. Table 1 displays examples of sentence kernels, with and without cues, combined into simple or compound sentences.

Previous research has shown SCI to be effective with a range of grade levels. Two meta-analyses (Graham & Perin, 2007; Hillocks, 1986) reported that students enrolled from elementary to postsecondary grades improved the quality of their writing following SCI. Hillocks (1986) reported an average effect size of 0.35 for students in secondary and postsecondary settings. Graham and Perin (2007) calculated an average weighted effect size of 0.50 for students in primary and intermediate grades. Three recent intervention studies examined the effects of SCI on fourth-grade students struggling with sentence construction and learning disabilities (Saddler, Asaro, & Behforooz, 2008; Saddler, Behforooz, & Asaro, 2008; Saddler & Graham, 2005).

Table 1. Sample Pairs of Sentence Kernels, With and Without Cues, Combined Into Simple and Compound Sentences

	Pairs of Sentence Kernels	*Examples of Correct Combination*
Cued	We had a brand new car. The engine started smoking. (*but*)	We had a brand new car, but the engine started smoking.
	Tom ate a sandwich. Tom ate some chips. (*and*)	Tom ate a sandwich and some chips.
Noncued	Tom bought a hat. Susan bought a baseball.	Tom bought a hat, and Susan bought a baseball.
	The mailman walked past the dog. My neighbor walked past the dog.	The mailman and my neighbor walked past the dog.

Students in all three studies improved performance on the Test of Written Language–3 (Hammill & Larsen, 1996), increased amounts of correct combinations of sentences, and increased mean words per t-unit (Hunt, 1965). Mean words per t-unit served as a measure of sentence complexity by averaging the amount of words used per complete sentence. Application or transfer of SCI to paragraph construction, however, varied across studies and indicated only modest gains.

Modest application or transfer of SCI to paragraph composition may stem from a lack of fluency with sentence combining. In one experimental study of SCI (Saddler, Behforooz, & Asaro, 2008), the authors reasoned that "the participants may not have had enough practice opportunities during the intervention to internalize the constructions to the point where they could be fluently recalled during the actual writing process" (p. 86). Researchers (Saddler, Behforooz, & Asaro, 2008; Saddler & Graham, 2005) have recommended improving overall effects by augmenting or supplementing SCI with practice procedures designed specifically to achieve fluency. The practice procedures may increase the amount of response opportunities and allow students to combine a wider range of sentence kernels into complete sentences.

Pairing Instruction With Frequency Building to a Performance Criterion

One method of efficiently acquiring a skill to fluency includes pairing instruction with a systematic practice procedure referred to as *frequency building to a performance criterion* (FBPC). Instruction reduces errors and increases correct responding to achieve a high percentage of accuracy, such as 90% to 95% (Archer & Hughes, 2011). After achieving a high degree of accuracy, FBPC explicitly builds frequency of the skill during carefully planned practice sessions. FBPC is not simply guided or independent practice; instead, it is a type of precise, timed practice. FBPC includes at least four components (Kubina & Yurich, 2012).

First, practice opportunities are segmented into timed trials, such as two 3-minute intervals. Second, timed trials feature more practice opportunities than are possible to complete within the given time interval, to maximize practice and avoid an imposed ceiling on performance. Third, students receive encouragement and error correction following each timed trial. Fourth, timed trials build frequency of the skill to an explicit goal or performance criterion. A performance criterion is the frequency achieved by students who are proficient with the skill. It is derived either from large samples representative of the

national population or from samples of the local population, such as a classroom or a school district (Johnson & Street, 2004; Kubina & Yurich, 2012). The performance criterion allows instructors to immediately judge the efficiency of intervention (Kubina, 2005), and it promotes higher levels of student performance (Therrien, 2004).

A well-known example of FBPC applies to repeated reading. Repeated reading typically requires students to orally reread a passage until they achieve a performance criterion (National Reading Panel, 2000). For example, students may reread Passage A until they meet a performance criterion of 100 correct words per minute before proceeding to Passage B, or a student may repeatedly read multiple passages (Passage A, B, C, etc.) with the goal of achieving 100 correct words per minute on any of the passages. Researchers have found robust effects for this strategy on both transfer and nontransfer reading passages (Therrien, 2004). Transfer passages measure student performance on new passages that were not used for instruction or practice. Nontransfer passages measure student performance on the same passage used for instruction or practice.

Several studies have also shown positive effects for FBPC on numeracy (Binder, Haughton, & Van Eyk, 1990; Brady & Kubina, 2010; Lin & Kubina, 2005) and retention of literacy skills (Brown, Dunne, & Cooper, 1996; Kubina et al., 2008; Kubina, Young, & Kilwein, 2004; Therrien, 2004). No previously published study has investigated the effects of SCI and FBPC on new nonpracticed sentence kernels (i.e., sentence kernels not previously used during instruction or practice). Studying this effect would increase confidence that students have achieved fluency with a range of sentence kernels, making the skill potentially more useful in closely related writing tasks.

THE SOLUTION

The benefits of achieving fluency and the high stakes associated with expressive writing calls for continued exploration of effective, meaningful interventions to achieve fluent sentence construction. The present study examined the effects of integrating SCI and FBPC on the accuracy and frequency of simple and compound sentences constructed by adolescents experiencing difficulty with sentence construction. Specifically, the research question was as follows: Does a combined SCI and FBPC strategy increase the rate of correct sentence combinations (i.e., simple and compound sentences) and decrease

incorrect sentence combinations on 3-minute transfer probes that feature new unpracticed sentence kernels?

EVIDENCE OF EFFECTIVENESS

Participants and Setting

Participants. Participants were four students enrolled in the seventh grade. All participants qualified for free and reduced-price lunch and were identified as African American. Dan, a 13-year-old male, received special education services for mild intellectual disability. Elmer, a 14-year-old male, received services for a specific learning disability in reading. Stacey, a 13-year-old female, and Edward, 16-year-old male, were not identified with a disability but received remedial reading and writing instruction during the previous school year.

Participant selection. Participant selection followed four steps. First, teachers nominated students, with or without disabilities, who exhibited difficulty constructing simple or compound sentences. Second, participants' performance on a 3-minute transfer probe of sentence combining fell below a local performance criterion. To establish this criterion, the principal of the school nominated 20 students enrolled in Grades 6 to 8 who passed the statewide writing assessment to complete one 3-minute transfer probe. Using a performance criterion based on high-performing students was thought to promote high levels of performance during intervention sessions and increase the probability that participants would succeed in the classroom. Scores indicated that the most frequently occurring performance among the high-performing writers was 8 correct combinations with 1 incorrect combination. In contrast, the participants' scores ranged from 0 correct and 1 incorrect (Dan) to 3 correct and 3 incorrect (Elmer).

Third, participants displayed average or above-average performance on a handwriting measure by writing approximately 60 correct letters per minute on an alphabet task (Phelps, Stempel, & Speck, 1985). This was included to ensure that participants possessed adequate handwriting speed, which would allow them to construct simple and compound sentences. Scores on the alphabet task varied across participants: Dan (69 correct letters per minute), Elmer (107), Stacey (80), and Edward (67). Fourth, students displayed oral reading performance above the second-grade level, to fluently read intervention materials. All four participants received remedial reading instruction during

the past year, and review of DIBELS progress-monitoring data (i.e., Dynamic Indicators of Basic Early Literacy Skills; Good & Kaminski, 2002) indicated that both Dan and Elmer performed within the *low risk* range on third-grade passages, while Elmer and Stacey performed within the same range on fourth-grade passages.

Setting. The participants attended an urban charter school in southern Louisiana. Intervention occurred during the summer semester for all participants. Participants received remedial instruction in mathematics and reading but no additional writing instruction. Intervention lessons typically occurred in an unoccupied classroom. During each lesson, participants worked individually with the first author at adjacent desks. On several occasions, due to transportation difficulties, intervention took place at the participant's home. For these sessions, the first author and the participant sat at a kitchen table or other free spaces within the home. The location of intervention sessions, school or home, was randomly distributed across baseline and treatment phases of the study.

Materials

Three-minute transfer probes. Each 3-minute transfer probe displayed 16 pairs of sentence kernels across two pages, as well as two blank lines below each pair for participants to construct a simple or compound sentence. Pairs of sentence kernels were not cued and did not feature conjunctions such as *and* or *but*. Figure 1 shows a sample 3-minute transfer probe. The first author created the sentence kernels or copied them from basal readers of fictional narratives. Based on the Spache readability formula (Ardoin, Williams, Christ, Klubnik, & Wellborn, 2010), sentence kernels ranged from a second- to third-grade readability. Each probe averaged 11 words per sentence kernels pair, or 176 words per assessment, and contained an even distribution of possible compound or simple sentences.

SCI and FBPC worksheets. Worksheets were created for use during the intervention phase. Each worksheet featured a series of single sentence kernels and/or pairs of sentence kernels, with or without cues of *and* or *but*. Lesson 1 worksheets had approximately 10 individual sentence kernels and 10 sentence kernel pairs with cues. Lesson 2 worksheets had 20 pairs of sentence kernels with cues, while Lesson 3 worksheets had 20 pairs of sentence kernels without cues (see Figure 2). Worksheets for Lessons 4–13, which included the FBPC component, were similar to the 3-minute transfer probes (i.e., 16

Directions: Rewrite these sentences using *and* or *but*. *A*

1) The sun shined in the sky. It started to rain.

2) The ship was in the harbor. The sailors were in the harbor.

3) Someone left the iron on. The living room caught on fire.

4) Betty bought an ice cream cone. Susan bought an ice cream cone.

5) The dog started barking. The cat fell off the couch.

6) Matthew drove down the street. Matthew picked up some milk at the store.

7) The mailman walked past the dog. My neighbor walked past the dog.

8) The dragon breathed fire. The villagers ran out of their houses.

Directions: Rewrite these sentences using *and* or *but*. *A*

9) David drew on his notebook. Mark drew on his notebook.

10) The test was hard. The class was hard.

11) The tornado knocked down the farm. The crops were ripped from the ground.

12) The detective read the case file. The door opened slowly.

13) Greg tried to be quiet. Greg coughed very loudly.

14) Tom brought home his math book. Tom forgot his homework in his desk.

15) The washing machine was new. The dryer was very old.

16) The pilot landed the plane roughly. Everyone cheered for joy.

Figure 1.

B **Directions:** Read each problem. Combine the sentences. Be careful, some you have to get rid of the exact same parts.

1) The puppy ripped the paper to shreds. I spanked him. (and)

2) The puppy messed in the house. He ate our lunch. (and)

3) The shirts are too big. The pants are too big. (and)

4) The kite flew into the air. The kite spun around. (and)

B **Directions:** Read each problem. Combine the sentences. Be careful, some you have to get rid of the exact same parts.

1) The wind was strong. She held onto the kite.

2) The bear rubbed his paw. The bear licked his wounds.

3) Sam made a cake for Jane's birthday. Tim made a cake for Jane's birthday.

4) Frank loves going to school. He never skips class.

5) The chicken picked up sticks. The chicken made a nest.

Figure 2.

pairs of sentence kernels across two pages) but shared none of the same sentence kernels. In keeping with the FBPC literature (Kubina & Yurich, 2012), worksheets for Lessons 4–13 also contained more pairs of sentence kernels than were possible to complete within the allotted time. Worksheets ranged from a second- to third-grade readability (Ardoin et al., 2010).

Response Measurement

The frequency of correct and incorrect sentence combinations on 3-minute transfer probes served as the dependent variable. Previous research has shown that correct and incorrect combinations are indicative of sentence construction skills, sentence complexity (i.e., constructing sentences of differing types, such as compound or complex), and overall writing quality (Hammill & Larsen, 1996; Saddler, Asaro, & Behforooz, 2008). Correct combinations were defined as two sentence kernels combined into a compound or simple sentence with the conjunctions *and* or *but*, including the elimination of any redundant subject or predicates, when applicable. Incorrect combinations were defined as an incomplete compound and simple sentence or one that included redundancies. For example, when prompted with the two sentence kernels "Billy hopped on his bike / Billy rode to the store," a student would correctly respond with "Billy hopped on his bike and rode to the store." An incorrect combination would be "Billy hopped on his bike and Billy rode to the store." Items skipped or incomplete were not counted as incorrect combinations, and spelling, punctuation, and capitalization did not factor into scoring responses as correct or incorrect.

Interobserver Agreement

The first author and a secondary observer, naïve to the purpose of the study, independently scored 33% of the 3-minute transfer probes. Exact agreement (Johnston & Pennypacker, 2009) for each assessment was calculated by dividing the number of agreements (correct or incorrect) by the total number of sentence combinations attempted and multiplying by 100. Percentage agreement averaged 90%, with a range of 50% to 100%. A low score of 50% stemmed from one instance where observers disagreed on scoring a student response as 1 correct and 1 incorrect versus 2 correct and 0 incorrect.

Experimental Procedures

Baseline. During baseline, participants attended a summer remedial program at their school approximately 3 days per week. Participants received instruction in reading decoding and mathematics but no writing instruction. At the end of each school day, participants were administered a 3-minute transfer probe and received no feedback on their performance.

SCI and FBPC. The first author served as instructor during intervention. The intervention replicated sentence-combining procedures from prior studies (Saddler, Asaro, & Behforooz, 2008; Saddler & Graham, 2005), except for two differences. Prior studies have used a peer-assisted learning strategy and provided instruction on applying sentence combining to paragraph compositions. In the current study, participants worked individually with the instructor and did not apply sentence combining to paragraphs.

The intervention program provided a maximum of 13 lessons. The first three lessons were the SCI component, while Lessons 4–13 were the FBPC component. At the end of each intervention session, participants completed a 3-minute transfer probe and received no feedback on their performance.

Lessons 1–3. The first three lessons were designed to build the accuracy of combining simple and compound sentences. Lessons followed a *model–lead–test* instructional format (Archer & Hughes, 2011). The instructor modeled correct responses, led participants through guided practice, delivered immediate error correction, and tested for independence. Participants provided oral responses during the first two lessons and gradually transitioned to more handwritten responses in the third lesson. Oral responses included reading sentence kernels, identifying similar subjects or predicates in pairs of adjacent sentence kernels, saying potential ways to combine sentence kernels into complete sentences, and identifying simple or compound sentences. Using a gradual transition from oral to handwritten responses made the lessons more efficient: Participants could verbally respond more quickly than handwriting their responses, and it allowed the instructor to provide error correction without delay. The duration for each of Lessons 1–3 was approximately 20 minutes.

At the beginning of Lesson 1, the instructor introduced sentence combining as a strategy "to write more complicated sentences that makes writing more interesting." The instructor first defined a complete sentence as having at least two parts: one that named someone

or something (subjects) and one that told more (predicates). Participants read aloud individual sentence kernels and identified both parts of a complete sentence (i.e., a part that named and a part that told more). The instructor then defined compound sentences as two related simple sentences combined into one sentence with a comma and conjunction. Participants read aloud pairs of sentence kernels and orally identified similar or different parts (i.e., the same or different subject and predicate). If participants orally identified pairs of sentence kernels with different subjects or predicates, then the instructor modeled combining sentence kernels into compound sentences using a comma and conjunction. If participants identified pairs of sentence kernels with similar subjects or predicates, then the instructor modeled combining sentence kernels into a simple sentence by eliminating redundancies and using a conjunction.

During Lesson 2, participants read pairs of sentence kernels aloud and verbally stated if the sentence kernels had similar parts of subjects or predicates. Following instructor feedback (i.e., similar parts turn into a simple sentence, and different parts turn into compound sentences), participants wrote simple or compound sentences with the sentence kernels. During Lesson 3, participants verbally identified pairs of sentence kernels as possible simple or compound sentences and then wrote the sentence. To proceed to the fourth lesson, participants had to achieve at least 90% accuracy on a 3-minute transfer probe. All participants in the present study successfully completed Lessons 1–3 without the need for reteaching.

Lessons 4–13. For Lessons 4–13, the focus of intervention shifted to building fluency, as through FBPC timed trials. Specifically, participants completed two timed trials of sentence combining during each lesson. Timed trials lasted 3 minutes each and required students to combine pairs of sentence kernels into simple or compound sentences. The instructor reminded participants of the performance criterion, then started the timer and told the participants to begin. Following each timed trial, participants received feedback on the number of correct and incorrect combinations. For incorrect combinations, the instructor verbally modeled the correct response. The instructor praised participants who met the criterion and encouraged those who did not meet the goal to keep trying. Each session had the same worksheet for both timed trials, but worksheets changed across sessions. Sessions for FBPC timed trials continued until the participant met the performance criterion of 8 correct and no more than 1 incorrect sentence combination on either the first or second trial for each worksheet or

until they received all 13 lessons. Two of the four participants met their performance criterion within 10 to 12 sessions. Regardless of their performance during the lesson, each session concluded with the administration of a novel 3-minute transfer probe.

Retention. Following the intervention phase, participants completed a final 3-minute transfer probe to measure retention of experimental effects. The days between the end of the intervention phase and the administration of the 3-minute transfer probe differed across participants because some participants left the area for summer vacation. For example, Dan completed an administration of the 3-minute probe 11 days following intervention, but Stacey completed it 26 days following intervention.

Procedural Integrity

The iPad application Audiotorium was used to record all experimental sessions. An independent observer randomly selected 30% of the audio recordings across experimental phases (SCI or FBPC) and scored the presence or absence of intervention steps specific to the planned lesson (see Appendix A: Implementation Guidelines). Procedural integrity averaged 95%, with a range of 90% to 100% across intervention sessions.

Intervention Acceptability

To assess acceptability of the intervention, participants completed a survey at the end of the study. The survey contained four acceptability statements and one open-ended question. The acceptability statements were rated by the participant on a Likert-type scale ranging from 1 (*strongly disagree*) to 5 (*strongly agree*). The five items are included in Appendix B.

Experimental Design and Data Analysis

The present study used a multiple-baseline design (Gast, 2010) across participants. The experimental design offered several advantages. To begin with, participants served as their own controls to allow for intraparticipant comparisons. Next, the staggered introduction of intervention across participants allowed for detection of a functional relation by allowing multiple opportunities to replicate effects. Detection of a functional relation can inform the efficacy of a new set of

intervention procedures (Kratochwill et al., 2013; Odom, 2009)—in this case, the combination of SCI and FBPC—by clearly showing a predictable and controllable effect of the independent variable on the dependent variable.

For data analysis, the researchers relied on visual analysis. Kazdin (2011) recommended analyzing data for changes in magnitude and rate. Magnitude involves changes in mean and level across experimental phases. *Mean* refers to average performance during an experimental phase. *Level* specifies the immediate impact of intervention by comparing performance at the end of one phase to the beginning of the next. *Trend* describes the slope of the data within each phase as moving upward, downward, or maintaining (also called a *zero trend*; Cooper, Heron, & Heward, 2007).

RESULTS

The frequencies for correct and incorrect sentence combinations per 3 minutes across baseline and intervention phases are displayed in Figure 3. Dots indicate correct combinations, and *X*'s are incorrect combinations. Data points appear across consecutive calendar days, except for the retention phase. The retention phase occurred on different days across participants, as described in more detail below. Table 2 displays descriptive statistics across participants and phases.

During baseline, Dan consistently displayed 0 correct and 3 incorrect combinations. Incorrect combinations immediately decreased in level to zero once intervention began. The frequency of correct combinations trended upward and remained stable at approximately 4. Dan did not reach the performance criterion, and this phase ended following Lesson 13 and 140 minutes of intervention. On a retention measure 11 days following intervention, Dan scored 3 correct and 0 incorrect sentence combinations, which was similar to his final data point during intervention.

Elmer consistently showed more incorrect than correct combinations during baseline, with trends in the undesired direction. During intervention, an immediate decrease in incorrect combinations and increase in correct combinations was observed. At Lesson 10, Elmer achieved the performance criterion during the intervention trials, so this phase ended after 116 minutes of intervention. At the end of the intervention phase, Elmer earned his highest score of 8 correct and 0 incorrect sentence combinations on the 3-minute transfer probe. A

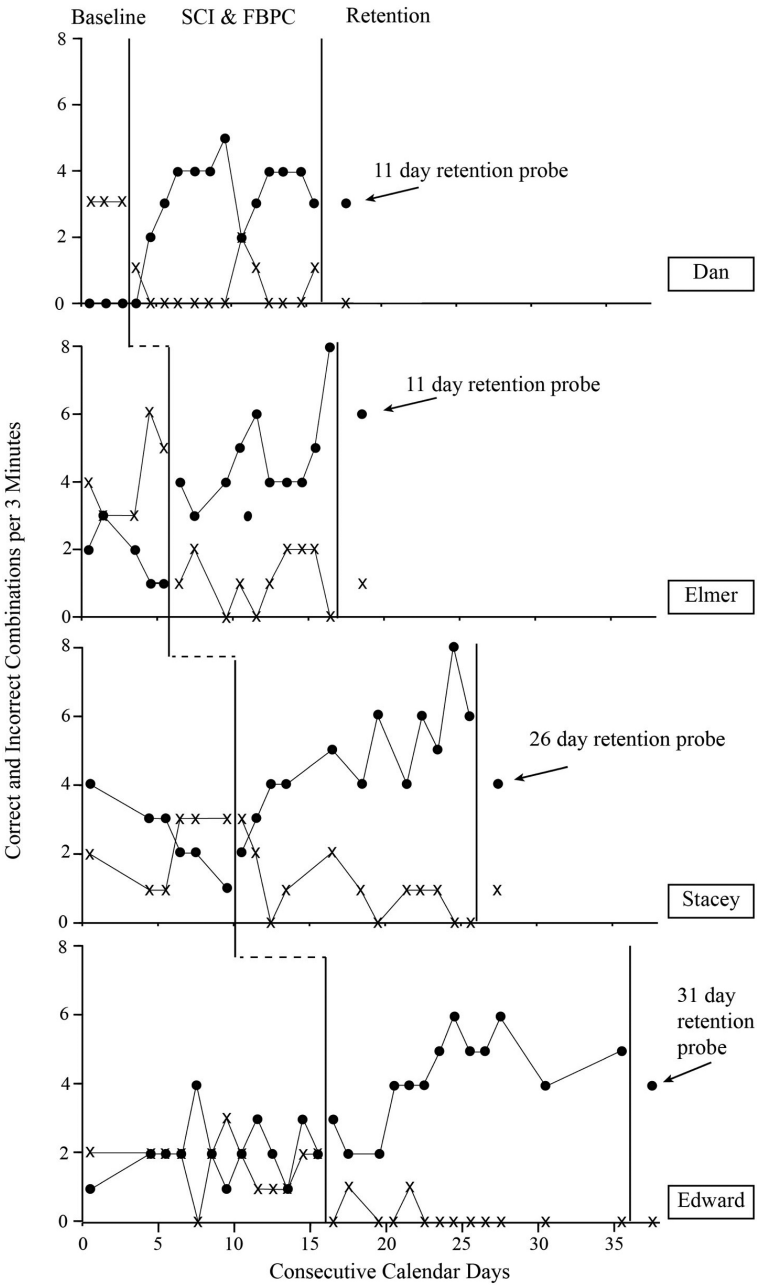
Baseline
SCI & FBPC
Retention
11 day retention probe
Dan
11 day retention probe
Elmer
26 day retention probe
Stacey
31 day retention probe
Edward
Correct and Incorrect Combinations per 3 Minutes
Consecutive Calendar Days
0
5
10
15
20
25
30
35
2
4
6
8

Figure 3.

Table 2. Mean Correct and Incorrect Combinations Across Time

Student: Phase	*Correct*	*Incorrect*
Dan		
Baseline	0.0	3.0
SCI and FBPC	3.2	0.4
Retention	3.0	0.0
Elmer		
Baseline	1.8	4.4
SCI and FBPC	4.7	1.1
Retention	6.0	1.0
Stacey		
Baseline	2.5	2.2
SCI and FBPC	4.8	1.0
Retention	4.0	1.0
Edward		
Baseline	2.1	1.7
SCI and FBPC	4.2	0.1
Retention	4.0	1.0

Note. SCI = sentence-combining instruction; FBPC = frequency building to a performance criterion.

retention assessment took place 11 days following intervention, and Elmer completed 6 correct and 1 incorrect combinations.

During baseline, Stacey's correct combinations exhibited a downward trend, from 4 to 1, while incorrect combinations were 2 or 3. During the SCI and FBPC intervention phase, the trend and mean of both data paths reversed: Correct combinations increased to a high of 8, while incorrect combinations declined to 0. Stacey met the performance criterion during intervention trials by Lesson 12, for a total of 132 minutes of intervention. A retention interval of 26 days from completion of the intervention phase revealed a performance of 4 correct and 1 incorrect sentence combinations, representing a slight decrease from the last data point of intervention.

Edward's mean performance during baseline was about 2 correct and 2 incorrect sentence combinations. Upon introduction of the SCI and FBPC phase, incorrect combinations immediately dropped in level and remained stable at 0 by the end of the intervention phase, while correct combinations increased to a mean of 5. Intervention trials stopped following Lesson 13 and 140 minutes without Edward achieving the performance criterion. The retention data showed a slight reduction 31 days following completion of intervention, with a performance of 4 correct and 1 incorrect sentence combinations.

Intervention Acceptability

Scores on the acceptability items were averaged and rounded to the nearest whole number. On a scale of 1 (*strongly disagree*) to 5 (*strongly agree*), participants responded with an average score of 5 across all items except "I like how writing simple and compound sentences was taught" (M = 4). Anecdotally, Stacey reported that she began to use sentence-combining techniques when writing in a daily journal. Elmer indicated that he looked forward to each session. As evidence, during his summer vacation (the time of the study), he rode a city bus for more than an hour each morning to participate. No participant recommended any changes to the way that intervention was delivered.

DISCUSSION

The present study used an intervention to achieve accuracy and fluency of constructed simple and compound sentences for adolescents with writing difficulties. Adolescents struggling with sentence construction face increased academic demands across grade levels (National Governors Association Center for Best Practices, 2010) but fewer opportunities for remediation (Graham et al., 2003, 2008). Prior research suggests that interventions emphasizing accuracy and fluency can lead to immediate gains in performance and retention of effects across time (Binder, 1996; Kubina & Yurich, 2012). This study evaluated the effects of merging SCI with a type of practice emphasizing fluency (FBPC) on students' performance on new unpracticed sentence kernels.

As the first study to investigate a combined SCI and FBPC approach to improving sentence construction using a multiple-baseline design, this investigation provides a practical demonstration of the functional relation between this promising strategy and performance on novel writing tasks. Compared to baseline, all participants increased the rate of correct sentence combinations, while incorrect combinations decreased or stayed stable. The data reveal a clear separation between correct and incorrect combinations during the SCI and FBPC phase, as well as a reversal for all participants who had more incorrect than correct combinations during baseline. The results suggest that SCI and FBPC have the potential to increase the use of sentence-combining techniques by students on a range of sentence kernels, including those not taught or practiced during the intervention.

Results extend two complementary bodies of intervention research. Prior research found that SCI increased the amount and complexity of constructed sentences (Saddler, Behforooz, & Asaro, 2008; Saddler & Graham, 2005) but did not assess speed and accuracy. Researchers have used FBPC to efficiently and effectively achieve fluency in mathematics and reading (Binder et al., 1990; Brady & Kubina, 2010; Brown et al., 1996; Kostewicz & Kubina, 2011; Kubina et al., 2004; Kubina et al., 2008; Lin & Kubina, 2005; Therrien, 2004), but this is the first application of these intervention principles to sentence combination skills. In the present study, participants completed the first three lessons of intervention designed to increase accuracy of responses. The procedures of the first three lessons were comparable to other SCI intervention studies (Saddler, Behforooz, & Asaro, 2008; Saddler & Graham, 2005). The remaining lessons of intervention entailed FBPC. These lessons contributed to improved fluency—namely, higher frequency and accuracy of correct combinations—lending support to recommendations that accuracy and fluency promote immediate gains during intervention (Binder, 1996; Graham et al., 2012; Kubina & Yurich, 2012).

With behavioral fluency, a performance standard indicates the known qualitative and quantitative degree of performance necessary for the attainment of fluency. Performance standards exist for many other academic areas, but few exist for writing interventions (Mason & Kubina, 2011; Kubina & Yurich, 2012). In the present study, the researchers set a performance criterion for intervention trials (i.e., 8 correct combinations and 0 or 1 incorrect per 3 minutes) based on a small sample of high-performing writers at the participating school. Participants who achieved the performance criterion (Elmer and Stacey) and those who came close (Dan and Edward) improved with more accurate and faster construction of syntactically mature sentences.

In addition to gains in sentence construction during intervention, the retention data support previous findings in the research literature suggesting that a combination of accuracy and fluency promotes retention (Bucklin, Dickinson, & Brethower, 2000; Hughes, Beverly, & Whitehead, 2007; Ivarie, 1986; Kubina et al., 2008; Olander et al., 1986). The intervention ended upon achievement of the performance criterion or after 13 lessons, whichever occurred first. Both participants who reached the performance criterion during intervention, Elmer and Stacey, displayed the highest frequency of correct combinations during retention. The other participants who did not

achieve the performance criterion showed only minimal declines in performance during retention, indicating that they benefited from the intervention even without achieving the performance criterion.

The retention data are particularly noteworthy, as all four participants exhibited favorable and enduring improvements in sentence construction after terminating the intervention, even after nearly 1 month since the final intervention session for two of the four participants. All participants at least doubled their average correct combinations per 3 minutes from baseline to retention, and their rate of incorrect combinations decreased to one or less at retention.

Two other significant facets of the intervention are its economy of time and acceptability. All participants received only 116 to 140 minutes of intervention and reported an extremely favorable view of the procedures. The approximate 2-hour duration of intervention appears to be a reasonable and manageable supplement to a teacher's current writing program.

Limitations and Future Directions

The study has several limitations and future directions. Two participants, Edward and Dan, did not reach the performance criterion before the end of the study. Both participants displayed the slowest handwriting compared to other participants during preassessment, with performances of 67 and 69 correct letters per minute, respectively. Lack of handwriting fluency likely constrained the possibility for more correct combinations within the time limits imposed by the study. Future research should investigate the impact of different handwriting speeds on attainment of fluent sentence construction.

The second limitation was the lack of a clearly established performance criterion derived from prior research or a larger sample of the population. Researchers in the present study set a performance criterion based on 20 high-performing writers enrolled in the participants' school. The locally derived performance criterion may not reflect the performance of the average student or match the expectations of secondary teachers. Future research should continue to explore the best methods for setting reasonable goals for intervention sessions.

The third limitation is that sentence combination is a narrower focus than sustained expressive writing tasks (e.g., essay or story composition). Fluency in sentence construction should promote development of closely related skills, but future research is needed to

establish the relationship between fluent sentence construction and other writing skills.

Fourth, the experimental design used in the present study did not permit analysis of individual components of intervention. Namely, the multiple-baseline design did not examine the separate or unique contributions of SCI versus FBPC. Future research could separate these effects with an experimental design, such as the alternating-treatments design (Barlow & Hayes, 1979).

With these limitations in mind, the present study contributes to a line of research demonstrating the practical utility of using a combined instructional strategy that teaches accuracy first, then shifts to fluency trials until a performance criterion is met. For four adolescents with difficulty constructing sentences, this strategy led to improved sentence combination skills that were maintained long after intervention was terminated. More research is needed to further explore the contribution of each component. JEBPS

APPENDIX A: IMPLEMENTATION GUIDELINES

Gather and Create Materials

Create worksheets and probes with numerous pairs of sentence kernels, with and without cues (i.e., conjunctions of *and* or *but*). A pair consists of two sentence kernels that can be combined into a simple or compound sentence. Sentence kernels can be copied from books or passages in your classroom curriculum or created on your own.

A list of needed materials follows:

- At least one 3-minute probe to help identify students with difficulty constructing simple and/or compound sentences.
- SCI and FBPC worksheets for Lesson 1, with at least 10 individual sentence kernels and 10 pairs of sentence kernels with cues.
- SCI and FBPC worksheets for Lessons 2 and 3, with at least 20 pairs of sentence kernels. Lesson 2 worksheets feature cues; Lesson 3 do not.
- SCI and FBPC worksheets for Lessons 4–13, which should each have at least 16 pairs of sentence kernels without cues. Some of these worksheets will be used during intervention sessions; others will be used to monitor progress (called *transfer probes*). Therefore, worksheets feature more sentence kernel pairs than are possible to complete in the allotted time of 3 minutes.

Identify Participants With Difficulty Constructing Simple and/or Compound Sentences

Administer at least one 3-minute transfer probe to students and score it for correct and incorrect combinations. Students with scores falling below the performance criterion and with adequate handwriting and reading proficiency may qualify for participation. The performance criterion used in the present study, 8 correct combinations and 0 or 1 incorrect , serves as a useful goal. However, future studies may show that the performance criterion needs changed. Monitoring the scientific literature through journals and professional magazines, such as *Journal of Evidence-Based Practices for Schools*, will communicate changes that occur due to research. Additionally, you may set a performance criterion specific to your school or classroom by administering one 3-minute transfer probe to a small group of students who are proficient constructing simple and compound sentences.

Lesson 1: Introduce and Model Sentence Combining (SCI and FBPC)

1. Introduce sentence combining as a way to write complete sentences and make sentences more interesting.
2. Model identifying parts of a complete sentence. A complete sentence has at least two parts: one that names (subject) and one that tells more (predicate).
3. Participants read aloud individual sentence kernels and identify the parts that name (subjects) and the parts that tell more (predicates).
4. Model combining pairs of sentence kernels into simple sentences. If a pair of sentence kernels contains similar parts (the same subject or predicate), then combine it into a simple sentence with a conjunction of *and* or *but*.
5. Model combining pairs of sentence kernels into compound sentences. If a pair of sentence kernels contains different but related parts (different subjects or predicates), then combine it into a compound sentence with a comma and conjunction of *and* or *but*.

Lesson 2: Guide Participants Through Combining Sentence Kernels Into Simple and Compound Sentences (SCI and FBPC)

1. Participants read aloud pairs of sentence kernels and identify any similar parts (same subject or predicate).

2. Provide immediate error correction if participants incorrectly identify similar or different parts. For correct responses, direct participants to combine the pair of sentence kernels into a simple or compound sentence with the given conjunction.

Lesson 3: Guided and Independent Practice (SCI and FBIC)

1. Participants read aloud pairs of sentence kernels and state if they can be combined into simple or compound sentences.
2. Provide immediate error correction by stating the correct combination: a simple or compound sentence. For correct responses, have participants write their combination on the worksheet.
3. Participants write an increasing number of combinations independently (1 combination, 5 combinations, then 10 combinations).
4. Collect worksheets at the end of the session, and score independently combined sentences for accuracy.
5. If scores are at or above 90%, then participants proceed to the next step. If scores fall below 90%, then participants repeat Lessons 1–3.

Lessons 4–13: Build Frequency of Sentence Combining (SCI and FBPC)

1. Each session features two copies of the same worksheet (e.g., two copies of Sheet A), but different worksheets are used across sessions (e.g., two copies of Sheet B on Tuesday, two copies of Sheet C on Wednesday).
2. At each session, participants complete two timed trials, 3 minutes each.
3. At the beginning of each timed trial, tell participants, "You will have 3 minutes to complete as many simple or compound sentences as you can. Work quickly and accurately. The goal is eight correct combinations with only zero or one incorrect combination. Any questions? Please begin."
4. When participants begin writing, start the timer giving participants 3 minutes.
5. At the end of each timing, review the worksheets and score their responses. Provide praise for correct combinations and model corrections for any incorrect combinations.
6. The lessons stop upon achievement of the performance criterion or following Lesson 13, whichever occurs first.

APPENDIX B: INTERVENTION ACCEPTABILITY QUESTIONS

Likert Scale Questions

1. Learning to write simple and compound sentences is important.
2. The writing instruction and practice this summer helped me learn to write simple and compound sentences better.
3. I like how writing simple and compound sentences was taught.
4. I will use what I learned in my classes.

Open-Ended Question

1. Is there anything you would change about the writing program?

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