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AN ANALYSIS OF INITIAL ACQUISITION AND MAINTENANCE OF SIGHT WORDS FOLLOWING PICTURE MATCHING AND COPY, COVER, AND COMPARE TEACHING METHODS

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This study compared the copy, cover, and compare method to a picture–word matching method for teaching sight word recognition. Participants were 5 kindergarten students with less than preprimer sight word vocabularies who were enrolled in a public school in the Pacific Northwest. A multielement design was used to evaluate the effects of the two interventions. Outcomes suggested that sight words taught using the copy, cover, and compare method resulted in better maintenance of word recognition when compared to the picture-matching intervention. Benefits to students and the practicality of employing the word-level teaching methods are discussed.

DESCRIPTORS: copy, cover, and compare method, reading acquisition, word recognition

The National Institute for Literacy (NIFL, 2001) identified five critical components to teaching children to read, which were summarized in the report of the National Reading Panel (2000). These components included phonemic awareness, phonics, fluency, vocabulary, and text comprehension instruction. The information provided in the NIFL document supported the use of reading methods that teach students to read via explicit teaching of phonemic awareness (Cunningham, 1990) and sound-blend patterns (Coleman, 1970), and providing immediate feedback on oral reading errors (Pany & McCoy, 1988). In assessing reading acquisition, supporters of the phonics-based method place importance on the actual pronunciation and identification of the target words. Essentially, the phonics instruction model is based on the notion that the purpose of reading instruction is to ensure that the student is able to correctly identify the words of a text and then be able to extract meaning (Hempenstall, 1999). By focusing on word-level cues, the reader can identify words without being distracted by other stimuli, such as pictures, being presented within the reading context. For example, Singh and Soloman (1990) found that presenting a compound stimulus of written word and picture interfered with word recognition for persons with mental retardation. Despite this finding, reading teachers often stress instructional methods that (a) teach language from whole to part, (b) ensure that word recognition skills are taught to the student in the context of actual reading and writing, and (c) immerse the classroom with literature (Levine, 1994). Specific recommendations to the emergent reader who encounters unknown words could be to "skip it," use prior information, or put in another word that makes sense (Levine).

Harzem, Lee, and Miles (1976) evaluated reading acquisition when (a) words were presented with a corresponding object, (b)

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words were presented with an unrelated object, (c) words were presented with a nonsense picture, and (d) words were presented in isolation. Harzem et al. found that reading acquisition was adversely affected when words were presented with a corresponding picture. Conversely, reading acquisition improved when the word was presented alone. In addition, emergent readers who rely on context and picture cues have been shown not to attend sufficiently to the written text (Juel, Griffith, & Gough, 1986; Stanovich, 1991). Thus, even though emergent readers are often instructed to look at pictures to determine unknown words, the research suggests that pictures act as distracters in reading performance (Didden, Prinsen, & Sigafoos, 2000; Samuels, 1967; Saunders & Soloman, 1984; Singh & Soloman, 1990).

Even though Singh and Soloman (1990) questioned the standard practice of providing children with books that contain pictures and words, several questions remain. First, the Singh and Soloman investigation was conducted with persons who had not acquired a reading repertoire that included basic words. Thus, it is possible that the blocking effect may not occur with persons who have acquired limited word recognition skills. In addition, blocking effects have been documented to occur only within very narrow reading contexts, such as when words are presented in isolation (Singh & Soloman), and maintenance of word recognition following word versus word plus picture teaching methods has not yet been assessed.

The purpose of the current investigation was fourfold. First, we compared two methods of instruction, one that matched words to pictures and one that presented words alone (i.e., copy, cover, and compare [CCC]). The instructional goal of each teaching strategy was to teach the students to correctly identify each sight word when presented in isolation. Second, in addition to the procedures conducted by Singh and Soloman (1990), we sought to determine if initial word recognition occurred across a variety of contexts using the two instructional methods. Third, we evaluated word recognition maintenance across both instructional procedures. Last, we sought to evaluate the utility of analogue conditions in the assessment of emergent reading skills. To accomplish these goals, a variety of stimulus contexts were used to evaluate initial sight word acquisition. To determine if these approaches would result in maintenance, 1-week follow-up probes were conducted.

METHOD

Participants and Setting

Clarissa, Emily, Grant, Nicholas, and Seth served as participants. All were students enrolled in a kindergarten classroom at a public elementary school in the Pacific Northwest. Each child attended kindergarten for 3 hr per day. None of the students had been diagnosed with any specific learning disabilities; however, they were selected for this study because of exhibited delays in reading ability based on teacher report. Teaching sessions took place in the hall outside the classroom. Each student was taught individually for 15 min.

Dependent Variables, Data Collection, and Interobserver Agreement

The dependent variable was the percentage of words read correctly. A word was counted as correct if the student read exactly what was written within 15 s of the word being presented. For example if the word was *television* and the student said "TV," the word was recorded as an incorrect response. Likewise, if the word was *dog* and the student said "dogs," the word was also recorded as an incorrect response. Raw scores were converted to percentages by dividing the number of correct words recorded by the

number of words possible and multiplying by 100%.

For interobserver agreement, two observers independently recorded student performance for 35% of the sessions. Each observer scored the session on a piece of paper that contained all of the words targeted for intervention. If the word was read correctly, the observer marked a plus, and if the word was read incorrectly, the observer either marked a minus or recorded the student's response. If both observers scored the word as either correct or incorrect, an agreement was counted. If there were differences, they were counted as disagreements. Interobserver agreement was calculated by dividing the number of agreements by the total number of agreements plus disagreements and multiplying by 100%. Interobserver agreement across the 5 subjects was 99% (range, 91% to 100%).

General Procedure

Twenty-three words, matched to corresponding pictures, were selected based on two criteria: (a) The word was not a high-frequency word identified via the *New Instant Word List* (Fry, 1980), and (b) the word matched a picture in the *ABC Games Book* (Lopshire, 1986). These 23 words were randomly separated to generate two low-frequency word lists: one list with 12 words and the other with 11 words. The authors then generated one story for each word list. The stories were about student activities before, during, and after school (Word List 1) and about going to the store to pick up work supplies (Word List 2). Word lists and stories are available from the first author.

The words were presented to the students in four stimulus contexts: (a) words in isolation, (b) words in the context of a sentence, (c) words in the context of a sentence with a picture that matched the target word, and (d) words in the context of a sentence with a matching picture and three distracter pictures. During all phases, the investigator read each sentence of the story to the student, substituting the word *what* for the target word. Following each sentence in which the target word was not identified, the investigator prompted the student to read the word with the question, "What's that word?" while pointing to the target word. For words in isolation, the investigator provided the verbal question, "What's this word?" and pointed to the target word.

Assessment Contexts

Words in isolation. Target words were presented to the students in a word-list format on a blank sheet of paper.

Words in the context of a sentence. Target words were presented in a sentence format on a separate sheet of paper for each word. To provide the students with adequate sentence context, each sentence contained a minimum of 50% high-frequency (preprimer to primer) words as identified in the *New Instant Word List* (Fry, 1980). In addition, if the student was unable to read an untargeted word, the word was read to the student.

Words in the context of a sentence with a matching picture. Target words were presented in the sentence context described above. In addition, a picture that matched the low-frequency target word was provided above the sentence.

Words in the context of a sentence with a matching picture and three distracter pictures. Target words were presented in the sentence context described above. In addition, four pictures were presented above each sentence, a matched picture and three distracter pictures. Distracter pictures consisted of two nonsense pictures and one picture that made sense in the context of the sentence but did not make sense phonetically. For example, a picture of an apple was presented to match the sentence, "Every morning Johnny eats an apple." For this sentence, the nonsense pic-

tures were of a ball and a car. Conversely, the picture that made sense but was not phonetically appropriate was a banana.

Experimental Design and Procedure

A five-phase investigation used a multielement design (Kazdin, 1982) in which different combinations of elements were presented across different stimulus conditions (Cooper, Wacker, Sasso, Reimers, & Donn, 1990). To control for multiple treatment interference, the order in which each intervention strategy was used was selected randomly prior to the investigation. Grant and Emily were assessed using the CCC method first (i.e., CCC, picture matching, CCC) in an ABA reversal design across instructional strategies. Seth, Clarissa, and Nicholas were assessed using the picture-matching intervention first (i.e., picture matching, CCC, CCC) in an ABB case study design. During Phase 1, the student's word recognition was assessed across all stimulus contexts using a brief multielement design (Cooper et al.). During Phase 2, baseline levels of the students' word recognition for the list was evaluated in one of the three contexts that provided picture or sentence cues. The specific context assessed was chosen randomly. During Phase 3, the student was taught to identify all the words to mastery using the CCC or the picture-matching teaching strategy. Phase 4 consisted of a posttest measure of intervention success in the stimulus context evaluated during Phase 2. Phase 5 took place 1 week after Phase 4 and was designed to assess maintenance of word recognition for both procedures. During Phase 5, the students were asked to read the words in isolation. For each student, these phases were completed for each intervention strategy.

Design Phases

Initial assessment of word recognition across word lists. During this condition, all four stimulus contexts were presented. The investigator read each sentence of the story in the above-mentioned manner. For each student, each stimulus context was evaluated for three sessions.

Baseline. Word identification performance was evaluated in one of the assessment contexts described above. The assessment context used for each student was determined on a random basis, and nontarget words were read to the student.

CCC or picture matching. For the CCC intervention, a piece of paper divided into three sections was used to complete the teaching sequence. The words for each list were written in uppercase letters, and five words were written on each page. In the first section, the target words were written out. In the second section, the words were written in dashed lines and the student was asked to trace them. The third section was left blank. Students were given pencils and erasers and were told to trace the words and then write them on their own. In addition, students were instructed to say the letter names out loud as they were writing them. The phonetic sounds of the letters in each word were not provided, only the names of the letters. The student was then prompted to say the word before starting the same procedure with the next word on the page. The student completed the teaching sequence until 100% word recognition was obtained for the five words presented for three straight trials. A new page of five words was then presented that contained two to three previously mastered words (i.e., two to three words from the previous list). The CCC procedure continued until all words on the target list were mastered. Mastery was defined as the participant's reading each word with 100% accuracy for three training trials.

For the picture-matching procedure, words from each list were typed in 18-point font and pasted onto separate note cards. A picture of each word was also pasted on separate note cards. Five note cards were ran-

domly selected with the target words and corresponding picture prompts. A memory game was played with the student in which each person took one stack of five note cards. The investigator presented one note card, either a word or a picture, and asked the student to lay down the corresponding word or picture note card from his or her stack. The game continued with the same five words until the student successfully matched the word to the corresponding picture with 100% accuracy. In addition to matching the picture to the word, the participant was required to say the word aloud. One target word and picture were added to the stack at a time. The investigator continued adding target words until the student was able to match the written word with the corresponding picture with 100% mastery. Mastery was defined as the participant's verbally identifying and matching the picture to each word with 100% accuracy for three training trials.

Posttest. When the student had successfully mastered all words, acquisition of word recognition was assessed using the same stimulus context used during Phase 2 (i.e., baseline). This phase was in effect for three sessions.

Words in isolation (maintenance). One week after the last posttest session, three additional sessions were conducted and each student was asked to identify the words presented in isolation. For this condition, target words were presented in a word-list format on a blank sheet of paper. The only prompt provided was the question, "What's this word?"

RESULTS

The results for each student are displayed in Figures 1 and 2. A summary of the number of sessions required reaching mastery of sight word recognition and the percentage of words read correctly during maintenance probes is provided in Table 1. Grant and Emily were taught using the CCC strategy first. Both students identified a higher percentage of words in the context of a single picture cue during pretesting. Thus, it appeared that they were effectively matching pictures to words prior to the intervention. For Grant, baseline for Word List 1 consisted of word identification in the context of a sentence. For Emily, baseline for Word List 1 consisted of word identification in the context of multiple pictures. As shown, the CCC intervention resulted in increased word recognition for both students during the posttest. More important, word recognition skills were maintained 1 week later, even though the words were presented in isolation.

During the initial assessment phase for Word List 2, Grant and Emily continued to identify more words when they were presented with a single picture cue. Additional baseline data for Word List 2 were taken in the multiple-picture contexts for Grant and the single-picture context for Emily. As shown, word identification was very low for each student (45% and 36% for Grant and Emily, respectively). Following the picture-matching intervention, word identification improved to 100% for each student. However, this increased performance was not maintained. Word acquisition with words in isolation failed to occur when the picture-matching task was used for initial word acquisition. During the next 10 sessions, experimental manipulations were repeated, with CCC being used as an intervention for Word List 2. After CCC was used as the intervention, word identification in isolation was mastered at 100%, and maintenance was obtained.

Clarissa, Nicholas, and Seth were taught using the picture-matching strategy first. As shown, these students identified a higher percentage of words in the context of a single picture cue during the initial assessments.

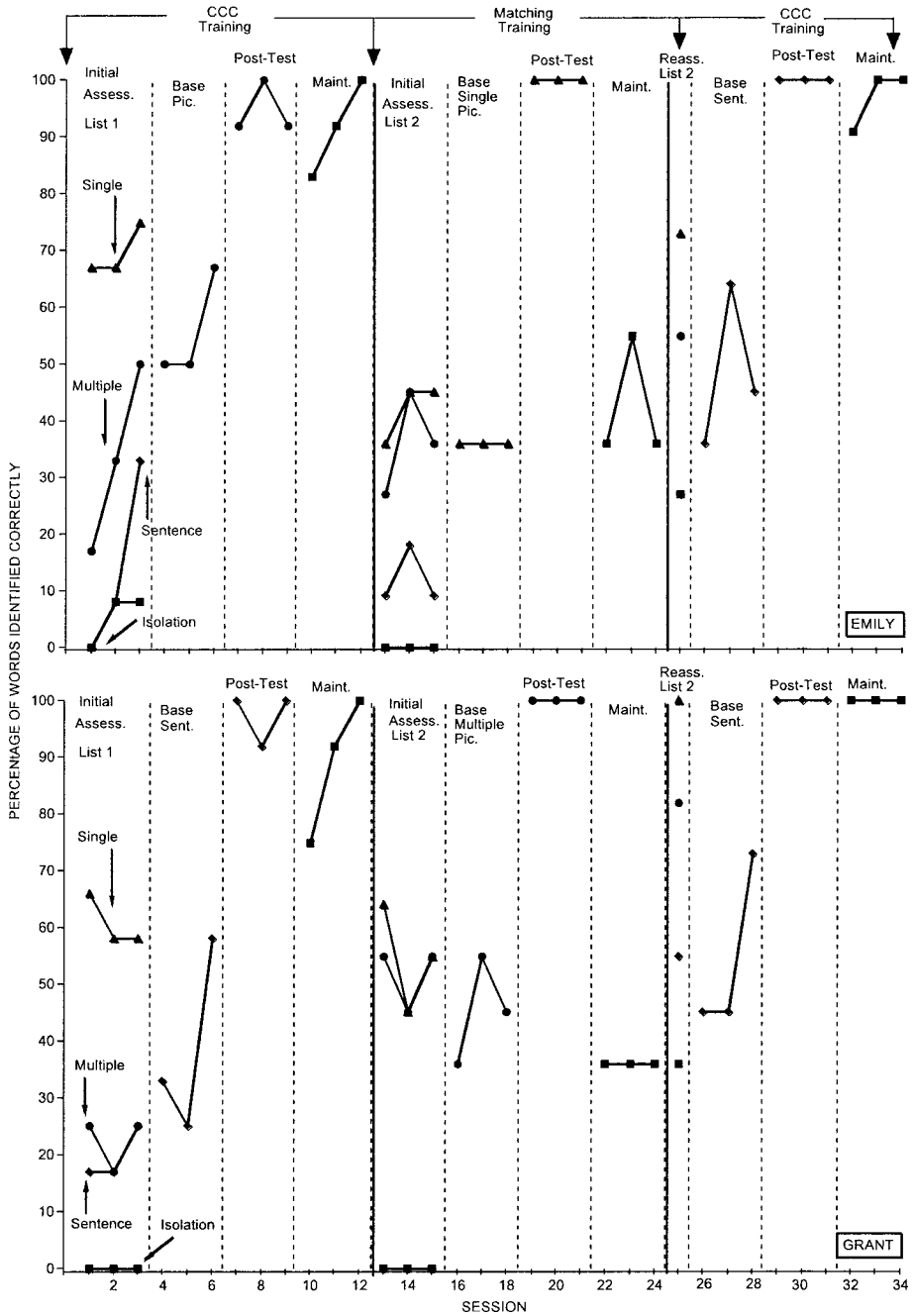

Figure 1. Percentage of words identified correctly by Emily and Grant across all conditions.

Additional baseline data were taken for Word List 1 in the multiple-picture context for Clarissa and the single-picture context for Nicholas and Seth. Word identification was fairly low for each student (55%, 75%, and 75% for Clarissa, Nicholas, and Seth, respectively). Following the picture-matching intervention, word identification improved to 100% for each student. However, during maintenance probes, increased per-

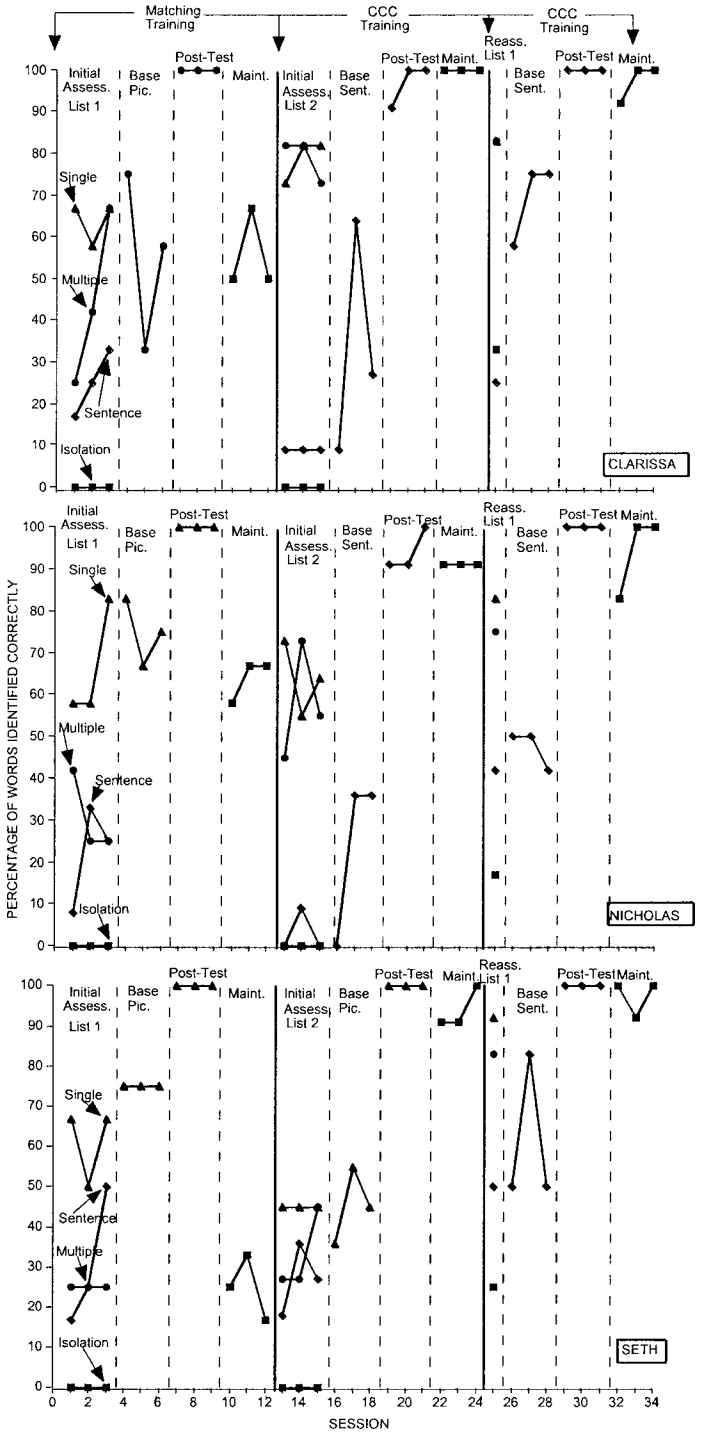

Figure 2. Percentage of words identified correctly by Clarissa, Nicholas, and Seth across all conditions.

Table 1
Number of Sessions Required to Reach Mastery of Sight Word Recognition and the Percentage of Words Read Correctly During Maintenance Probes

Training	Student	Method	Sessions to Mastery	Maintenance
1	Emily	CCC	10	91.6%
	Grant	CCC	7	89%
	Clarissa	Matching	6	55.6%
	Nicholas	Matching	7	64%
	Seth	Matching	5	25%
2	Emily	Matching	7	42.3%
	Grant	Matching	4	36%
	Clarissa	CCC	9	100%
	Nicholas	CCC	10	91%
	Seth	CCC	10	94%
3	Emily	CCC	9	97%
	Grant	CCC	6	100%
	Clarissa	CCC	8	97.3%
	Nicholas	CCC	9	94.3%
	Seth	CCC	8	97.3%

formance for each student was not maintained (i.e., Clarissa's performance decreased to 56%, Nicholas' performance decreased to 64%, and Seth's performance decreased to 25%). These results are very similar to those obtained for Emily.

During the initial assessment for Word List 2, Clarissa, Nicholas, and Seth continued to identify more words when they were presented with single pictures. Additional baseline data for Word List 2 were taken in the sentence context for Clarissa and Nicholas and in the single-picture context for Seth. The CCC intervention resulted in increased word recognition for all 3 students during the posttest. Once again, word recognition skills were maintained 1 week later when the words were presented in isolation. During the next 10 sessions, experimental manipulations were repeated, with CCC being used as an intervention for Word List 1 (i.e., the word list in which picture matching was previously used). After CCC was used as an intervention for this word list, word identification was maintained at 100%.

As shown in Table 1, the CCC intervention, although more effective at obtaining word recognition maintenance, required a larger number of training sessions before the participants reached word recognition mastery. Increased training was required even if the students had prior experience with the picture-matching intervention (9.2 vs. 8 training sessions, respectively).

DISCUSSION

The CCC method has been shown to teach math (Skinner, Bamberg, Smith, & Powell, 1993; Skinner, Beatty, Turco, & Rasavage, 1989; Stading, Williams, & McLaughlin, 1996), spelling (Hubbert, Weber, & McLaughlin, 2000; McAuley & McLaughlin, 1992; Pratt-Struthers, Bartalamay, Bell, & McLaughlin, 1994; Pratt-Struthers, Struthers, & Williams, 1983; Schermerhorn & McLaughlin, 1997), and geography (Skinner, Belfiore, & Pierce, 1992). The current investigation expanded the use of CCC by examining its effects for teaching correct identification of sight words. Specifically, the students correctly identified words in isolation an average of 96% of the time after being taught with the CCC method. More

important, word recognition was maintained at 1-week follow-up. Conversely, when the picture-matching method was used and pictures were removed, each student began to misidentify words. This combination of results, and those of previous studies, suggests that pictures act as distracters (Didden et al., 2000; Harzem et al., 1976; Qingzong & Elliot, 1998; Samuels, 1967; Saunders & Soloman, 1984; Singh & Soloman, 1990).

On a practical level, the two procedures were similar in cost, materials, and ease of implementation. The CCC method provided a means for self-checking (Skinner, McLaughlin, & Logan, 1997), whereas the picture-matching method did not. This self-correcting component, although not evaluated directly, allows students to work either in pairs or independently and attain multiple learning trials. For example, teachers could use the CCC method with very few modifications in a peer-tutoring format. Conversely, the picture-matching method would require teacher help or tutoring from older peers to ensure correct identification of words. Although the CCC method might prove to be more efficient in the classroom, it took more instructional time than the picture-matching method in our investigation. In the current study, students mastered the task of matching words to pictures almost twice as fast as they mastered word identification using the CCC method. We hypothesize that this is why teachers continue to instruct students to use picture cues (i.e., the teacher is reinforced by the student's ability to move quickly through his or her reading assignment). However, word recognition for words presented in isolation did not appear to be acquired when the picture-matching method was used. Thus, even though the CCC method required more training sessions, our results suggest that it is a superior procedure for teaching word recognition skills.

Future research is needed to expand the parameters for the effective use of CCC and the use of analogues to evaluate the utility of different teaching strategies. One way to accomplish this would be to reduce the amount of time the CCC method requires for mastery of word identification. Future research could examine whether teaching the sounds of the letters produces faster results than just teaching letter names, thus making it more feasible for use by teachers (Connell & Witt, 2004). By using systematic phonetic instructions with a CCC procedure, more components of the direct instruction model could be evaluated. One final extension would be to study the effects of CCC on increased reading comprehension. Our investigation was not designed to examine the effects of letter-sound instruction, specific context cues, or comprehension; however, studies on these functions may have further implications for the use of CCC.

Several limitations to the current investigation should be noted. First, for 3 of the participants, an ABB case study design was employed. This was the result of selecting the instructional strategies at random, thus controlling for treatment interference. Specifically, because each word list was mastered, a return to the picture-matching intervention was not possible. To remedy this problem, future investigations should use more than two word lists. Second, the maintenance data included only words presented in isolation. Therefore, it is possible that maintenance would have been obtained following the picture-matching method in other reading contexts. Third, the underlying mechanism responsible for our results was not identified. We cannot conclude that our results were the result of the "blocking effect" described by Singh and Soloman (1990). Alternatively, lack of maintenance may have been a function of the manner in which maintenance was assessed rather than the teaching methods used. Specifically, the CCC procedure required word identification

in the presence of the word only. Conversely, the matching procedure required word identification with both the word and the picture present. These different contexts were evaluated until mastery was obtained. However, maintenance was assessed only in a context that favored the CCC procedure. Because no pictures were present, picture reading is the most parsimonious explanation for the student reaching mastery using this procedure. To fully assess this possibility, additional research is needed in which mastery is obtained using only the picture-matching procedure.

Lastly, because the study ended at the conclusion of the kindergarten school year, long-term follow-up data were not obtained. Overall, the results of this study indicate that using word-level strategies to teach identification of sight words has better long-term effectiveness than picture-matching approaches. If the educational goal is to produce efficient readers who maintain skill performance, then training procedures must teach the terminal skill. Although the picture-matching procedure demonstrated quick results, it did not teach word recognition skills.

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STUDY QUESTIONS

1. Briefly summarize previous research on the effects of using supplementary pictures during reading instruction.

2. Describe the four preexperimental assessment contexts.

3. What were the two training methods evaluated in the current study, and how did they differ?

4. Procedural descriptions emphasized differences in task presentation. What additional information would be helpful to replicate the procedures?

5. What experimental design was used to compare the two training procedures in the current study?

6. Briefly summarize the results obtained with both procedures in terms of (a) the number of trials to mastery and (b) maintenance.

7. What feature of the maintenance test may have influenced the results of the study?

8. Describe one potential advantage and one potential disadvantage of the CCC procedure.

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