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# Brief Experimental Analysis of Reading Intervention Components for English-Language Learners

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# BRIEF EXPERIMENTAL ANALYSIS OF READING INTERVENTION COMPONENTS FOR ENGLISH-LANGUAGE LEARNERS

by

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# ABSTRACT

Brief Experimental Analysis of Reading

Intervention Components for

English-Language Learners

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Identifying effective instructional modifications for English-language learners (ELL) experiencing reading problems is a difficult task given the vast individual differences in language proficiency, motivation, and school experience. To address this issue, this study investigated the utility of brief experimental analysis as a means to quickly identify the most effective instructional components to increase reading performance for five ELL. Using a multielement design, five treatments were administered one by one with increasing language support. There were individual differences in response and effective treatments were identified for all participants. Further, an extended analysis of alternating baseline conditions with the hypothesized effective treatment indicated that selected interventions increased reading rates for four participants over time. A combination of the two most effective interventions based on

results from the brief experimental analysis increased reading performance for the fifth student. These procedures appear to hold promise for quickly identifying effective instructional components for individual ELL.

(127 pages)

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# INTRODUCTION

Several million children from a multitude of ethnic backgrounds currently learn English as a second language in the United States (National Center for Educational Statistics, 2000). These children are often referred to as English-language learners (ELL), because the term encompasses those that have limited English proficiency, as well as those that have adequate conversational skills in English, but are continuing to develop complex English-language skills (Gersten & Baker, 2000). ELL are a rapidly growing segment in our educational system, but in many cases they are overrepresented in special education settings (Gersten & Woodward, 1994). According to Meyer and Patton (2001), the proportion of ethnic minorities in special education programs is much greater than their representation in the school population as a whole. Though one cannot deny that some of these children legitimately require special education, because they are failing to perform as expected academically, many individuals question the necessity of special education for a large number of ELL (Artiles & Trent, 2000).

Typically, ELL are misclassified due to the difficulty in differentiating between poor performance that stems from limited language ability and that of a learning disorder. In a study conducted by the Office of Civil Rights from 1974 to 1978, many limited English proficiency students were placed in special education programs without proper assessment procedures (Artiles & Trent, 1994). Inadequate assessment materials and procedures for this population remains a problem due to insufficient norming on standardized assessment measures and the notable shortage of bilingual examiners (Artiles & Trent).

The failure of effective early interventions is a second critical reason for the overrepresentation of minority children in special education (August & Hakuta, 1997). Research has clearly established that early intervention for at-risk learners is more effective than treatment applied after problems have intensified (Donovon & Cross, 2002). However, teachers report that it is very difficult to identify ways to intervene when ELL are not adequately responding to teaching, which is partially due to a minimum of time and resources, thus hindering treatment feasibility in the classroom (Gersten & Baker, 2000).

Waiting for the student to have extreme difficulty learning before recognition and referral occur, often termed the "wait to fail model" (Vaughn & Fuchs, 2003), has very unfortunate consequences. First, students are deprived of essential preventative remedial support, which is regrettable considering that this provision has been consistent in demonstrating greater effectiveness than later treatment, when the problem has intensified and has additional complexities (Donovan & Cross, 2002). Second, late, or even lack of identification for students with special needs deprives students of legally entitled special education and related services. Given the historic number of referrals of ELL for special education evaluations, investigations on practical procedures that identify early interventions that accelerate learning are warranted.

Even when appropriate resources are available, so that ELL receive appropriate identification and instruction; it may take up to seven years for students to obtain a proficiency level in English that enables them to work on academic tasks that are cognitively demanding (Hakuta, Butler, & Witt, 2000). This delay makes it difficult for

teachers to find time within a school day to simultaneously teach students academic content and English-language skills. If academic achievement scores are an accurate gauge of the academic content learned by ELL, then current educational programs do not appear to be sufficiently meeting the needs of these children, with scores that are significantly below the national average. It is evident that effective assessment measures are needed in areas like reading, to determine: (a) when academic difficulties are occurring, (b) what interventions promote progress, and (c) whether there has been any progress, on a frequent basis during the school year.

One well-developed, technically strong measure, curriculum-based measurement (CBM), is a time-efficient and inexpensive method of assessment for identifying students with reading problems, anytime during a school year (Deno, Fuchs, & Marston, 2001). CBM involves the administration of short probes composed of curriculum material that the student is expected to know over a certain period of time. CBM probes that are frequently administered show sensitivity to small but meaningful academic performance changes over a relatively short amount of time (Marston, Fuchs, & Deno, 1986).

Investigators who have studied the technical qualities of CBM report a strong correlation between CBM and traditional standardized measures of decoding and comprehension, and it appears to be a valid method of measuring reading competence (Shinn, 1998). According to Deno (2003), current research studies have demonstrated reliability and validity levels for CBM procedures with ELL in both their native language and English, which are comparable to those of native speakers of English.

Given CBM's psychometric technical qualities and sensitivity to treatment

changes, CBM is a tool that can be used to quickly determine the effectiveness of interventions. One promising assessment approach for selecting the most effective intervention, brief experimental analysis, uses CBM as an evaluation method to quickly compare the effect of two or more treatment alternatives on academic performance. Procedurally, one instructional variable is applied at a time with increasing intensity, and without replication, to evaluate the relative effectiveness of each variable on reading performance. The basis of the academic problem is determined using various types of procedures, which include incentives, demonstrations, practice, feedback, and curriculum revision, with the incorporation of a CBM probe that is given after a brief instructional trial. The purpose of brief experimental analysis is to find a match in terms of the skills of the student, classroom instruction, and task demand, which promotes academic performance for students who are not responding adequately to classroom instruction and curriculum.

Daly, Martens, Hamler, Dool, and Eckert (1999) implemented brief experimental analysis using CBM with four regular education students having difficulties with reading. The treatment conditions were conducted in a hierarchal manner, from the least to the most intrusive intervention, in terms of time spent with the students and resources, in order to identify the most effective and efficient intervention. Using a multielement, single-subject design, four reading treatments were sequentially applied after a baseline condition, including contingent reward, repeated readings, listening passage preview, sequential modification, and an easier materials condition, with each student responding to at least one condition.

Two of the four participants improved, using repeated readings and sequential modification; one student improved in the listening passage preview, repeated readings, and sequential modification condition; while another student benefited from the listening passage preview, repeated readings, and easier material condition (Daly et al., 1999). These results exemplify the utility of using CBM with brief experimental analysis to identify interventions that address individual variation in academic responding to different instructional components.

Brief experimental analysis using CBM provides a more individualized reading assessment measure that corresponds with learning in the regular academic environment as well as an excellent link to intervention. This is due to the incorporation of several potentially effective interventions combined with content that is from the students own curriculum. Thus, brief experimental analysis using CBM is a valuable resource that could be used for comparing and selecting effective instructional components for students having difficulty with reading tasks, and in particular, for a large number of ELL that are currently struggling academically.

Due to the increasing number of ELL with academic problems within the public educational system, it is of the utmost importance that researchers develop practical procedures that help educators recognize reading difficulties in a proactive (early identification of at-risk readers) rather than a reactive manner (severe reading problem that requires special education). Then once a problem is identified, assessment methods must accurately identify instructional components that promote academic growth when traditional classroom instruction is not effective.

Currently, it is notable that there is a limited amount of research-based literature on effective reading interventions for ELL populations. The lack of empirically supported treatment options is compounded by the extensive variance in ELL language and school experiences (Lam, 1992). However, brief experimental analysis provides an empirically supported method that directly compares potential interventions based on the student's individual need or problem, in order to predict which intervention may best increase reading level over time on an individual basis. It is also notable that literature containing research on the effectiveness of brief experimental analysis with ELL is severely limited. Thus, it is imperative that brief experimental analysis using CBM be examined by researchers as a tool for educators, so that appropriate interventions for ELL who are experiencing difficulties in reading are determined.

# REVIEW OF LITERATURE

Brief experimental analysis is an approach that may be used by school practitioners to directly test instructional variables in order to identify those that improve academic performance. Though many investigators have researched the procedures and the consistency of effects within brief experimental analysis designs to select effective interventions for students with learning difficulties, very few investigators have addressed the specific needs of ELL. This is unfortunate considering that there is an increasing number of ELL who are at-risk for failure, as well as those who are already receiving special education services.

In the following literature review, specific academic concerns with ELL are followed by a review of the empirically based instructional practices that promote academic performance for these students. Then, the empirical basis supporting CBM's technical features for monitoring students' reading levels, reading growth over time, and utility for instructional planning are discussed. Finally, an overview of the emerging research on brief experimental analysis that quickly compares the effects of multiple treatment options on an individual's academic performance, as well as growth across time will be presented.

## Academic Concerns for English-Language Learners

According to Pallas, Natriello, and McDill (1989) by the year 2020, the number of children of Hispanic origin in U.S. schools will be 1 in 4. The educational plight of these

children is a national concern, due to the high rate of grade retention for this population (Gersten & Woodward, 1994). Even though research has shown that grade retention is an ineffective method of dealing with learning and motivation difficulties, few school systems have found successful approaches for educating non-English speaking children (Allington & McGill-Franzen, 1989). It is even more discouraging that Hispanics have the highest dropout rate of any ethnic group in the U.S. (Gersten & Woodward). According to the data collected by the National Center for Educational Statistics in 2000, only 64% of Hispanics from age 18 to 24 completed secondary schooling, in comparison to 84% of African Americans and 92% of Caucasians.

Research on ELL indicates that students are successfully learning English in our schools; however, complete mastery of the English language is typically not obtained until after seven years of instruction (Hakutu et al., 2000). Despite the support of successful English as a Second Language (ESL) programs, teachers are confronted with the dual task of teaching academic content while students are learning English for an extended period of time. As a result, academic achievement scores for ELL are significantly below the national average (National Center for Educational Statistics, 2000). Moreover, the achievement gap for children who are behind in reading increases substantially, according to assessment measures in later grades (Gersten & Woodward, 1994). Thus, it is apparent that public school programs need to be enhanced to meet the needs for a number of these children. Unfortunately, teachers report that they are uncertain how to adapt and present curricula that helps ELL learn academic content (Gersten & Baker, 2000). With a shortage of personnel trained to work with this

population, many general education teachers have resorted to special education referral as the primary method to remediate these difficulties.

Although professionals may consider special education an effective way to give ELL specialized services, the research findings do not support this assumption (Gersten & Woodward, 1994; Moecker, 1992). For instance, a common dilemma that is faced after referral pertains to how useful special education may be when there is a limited amount of research on effective special education strategies with these students and few special educators who have been trained in second language instructional skills (Gersten & Woodward).

A study conducted to gauge the progress of ELL in special education showed that few made significant academic progress over a 2-year period (Wilkinson & Ortiz, 1986). Overall, the group showed no gains in reading and actually dropped on test scores from cognitive and academic measures (Gersten & Woodward, 1994). In addition, ELL participating in special education typically have less access to general education curriculum and less interaction with more skilled students, which results in the delay of language development. More importantly, very little is known about ELL with disabilities, and in particular, there are very few empirically based interventions for these students (August & Hakuta, 1997; Gersten & Baker, 2000).

## Underreferral and Overreferral of English-Language Learners

Currently, there is a problem with both underreferral and overreferral concerning

special education services for ELL (Lander, 2003; Ortiz & Kushner, 1997). Overreferral in school districts results from large numbers of ELL being inappropriately placed in special education, which is considered excessive even when school spending and student and community poverty are controlled (Lander). A disproportional number is considered to be an inequity issue, if students are being placed due to poor instruction in the regular education classroom or because of inadequate assessment (Fuchs, Fuchs, & Speece, 2002).

Inequity is a potential issue because the tendency to overrefer may be due to an inability to discriminate between poor performance related to language experience and poor performance due to a learning disability. Many standardized tests that assess the ELL ability to learn are technically inadequate or result in test scores that have different meanings when given to this population (Shinn, 1998). After studying reading performance for ELL and native English-speaking students, Garcia (1991) reported that there was a clear underestimation of the ELL performance due to limited prior background knowledge of test topics, unfamiliarity with vocabulary terms, and a tendency to interpret the test literally. Thus, scores from these assessments may be measuring the development of English language rather than learning potential. Norm-referenced comparison with similar native language students is also difficult given that ELL have substantial variability in language, length of residence in U. S., language proficiency, and prior school experience (Lam, 1992).

Recently, underreferral has become a problem, in part because of stricter legal and procedural safeguards, which has made school personnel reluctant to refer students with

limited English proficiency to special education (Gersten & Woodward, 1994). Some schools have dealt with the dilemma by waiting until the student has reached a reasonable level of proficiency in English, which is termed the "wait to fail" model (Vaughn & Fuchs, 2003). The result is that students with academic problems and learning disabilities do not receive the services to which they are legally entitled. This poor outcome emphasizes the need for efficient measures that will ensure that the interests of ELL are being served.

## Effective Instructional Practices with ELL

Many experts attribute the failure of effective proactive interventions or classroom programs as a critical reason for slow achievement rates for ELL that often results in special education referrals (August & Hakuta, 1997; Ortiz & Kushner, 1997). Typical accommodations for prereferral interventions reported by teachers, for example, are seating changes, pairing and cooperative learning, adjustments in expectations, and time to complete work (Fletcher, Bos, & Johnson, 1999).

According to the National Academy of Sciences' research synthesis on effective practices with ELL, there are very few well-controlled empirical studies that have demonstrated improved academic performance for these students (August & Hakuta, 1997). However, findings from this research synthesis yielded a few basic instructional strategies in the classroom, supported by limited experimental evidence, that are potentially beneficial to ELL. Specifically, findings from studies have demonstrated that the following procedures effectively increase academic development: (a) specifying task

outcomes and teaching what students must do to accomplish tasks with demonstrations using physical gestures and visual cues, (b) explaining ideas several times using multiple examples, (c) providing oral and written practice opportunities with increasingly complex English requirements, (d) frequently checking for comprehension, and (e) monitoring students' progress. When these basic components are in place, then ELL may learn as expected. For those students who do not adequately respond to these basic instructional components, additional support may be needed.

To further investigate current instructional practices with ELL, Gersten and Baker (2000) conducted a study to synthesize findings from published studies with perceptions of various informants that represented different positions on effective instruction and intervention for ELL. The informants included teachers, developmental specialists, administrators, and researchers. In summary, successful strategies consistently employed by teachers are: (a) review of prior knowledge; (b) explicit teaching of formal English grammar and vocabulary development with correction, while presenting academic content; and (c) consideration of language demands and academic content. However, the research findings did not indicate whether content acquisition adversely affects language development or builds more complex academic language. This synthesis revealed a need for additional intervention studies that clarify how to (a) add context variables that enrich intervention progress, (b) modulate content learning with language demands, and (c) incorporate opportunities to practice oral and written language with content learning.

For native English readers experiencing reading difficulties, there are several key individual interventions that have received substantial support as methods for increasing

oral reading rates and comprehension, including: listening passage preview (Daly & Martens, 1994; Graves & Palmer, 1981), repeated readings (Dowhower, 1987; Layton & Koenig, 1998; Meyer & Felton, 1999), and error correction (Jenkins & Larson, 1979). These consist of basic effective teaching strategies including modeling, skill practice, and performance feedback.

Listening passage preview is an empirically supported intervention used to enhance reading fluency through modeling. This phonetic approach has demonstrated its effectiveness in several studies. A study conducted by Skinner and Adamson (1993) incorporated fast-rate, slow-rate, and silent previewing interventions with 12 students with reading difficulties. All of the previewing techniques resulted in lower error rates relative to baseline. Further, 6 students read more words correctly under the fast-rate listening passage preview condition, whereas 6 students read more words correctly per minute during the slow-rate listening passage preview with fewer errors.

Another study conducted by Rose and Sherry (1984) again compared the effects of silent previewing and the effects of listening passage preview. The results of the study showed that listening passage preview increased correct oral reading rates and decreased error rates across the majority of the 5 special education students. These results were replicated in another study (Rose, 1984) with 6 elementary students with learning disabilities. It was found that listening passage preview resulted in higher correct oral reading rates than silent previewing or baseline.

Repeated readings is the most researched and familiar approach to teaching reading fluency, according to Meyer and Felton (1999). The repeated readings

intervention was founded on the notion that fluid readers decode automatically, thus leaving an opportunity to comprehend material (Meyer & Felton). According to Samuels (1979), the goals associated with repeated readings include increasing reading speed, generalizing that speed to other materials, and enhancing comprehension through each additional reading (Meyer & Felton).

Meyer and Felton (1999) analyzed several studies to determine the effectiveness of repeated readings. It was found that second grade readers with slow reading rates (Dowhower, 1987) as well as other elementary school students who were poor readers (Faulkner & Levy, 1994; Herman, 1985; Rashotte & Torgesen, 1985) actually improved reading fluency as measured by the number of words read per minute. In addition, there has been demonstrated improvement in word recognition accuracy for both poor and disabled readers (Flynn, Rahbar, & Deering, 1998; Herman, 1985).

Error correction has received attention recently, because it is a teaching technique that is considered both efficient and effective (Barbetta, Heron, & Heward, 1993; Barbetta, Heward, & Bradley, 1993; Barbetta, Heward, Bradley, & Miller, 1994). This was demonstrated in a series of studies conducted by Barbetta and colleagues with elementary students with developmental disabilities. One of the factors that the authors found for positively influencing reading accuracy was having the student repeat the correct word if it was read incorrectly, with the help of a teacher (Barbetta, Heron, et al., 1993). The researchers also found that this method was more effective when the teacher immediately made the correction, with the student repeating the word thereafter, rather then waiting until the end of the reading session (Barbetta et al., 1994). Error correction

has the additional benefit of requiring a minimal amount of time to implement (Nelson, Alber, & Gordy, 2004).

Interventions teaching vocabulary may be just as critical as interventions that increase opportunities to practice reading. Several studies have shown that vocabulary strongly correlates with reading (Beck & McKeown, 1991; Biemiller, 2003) and that students with lower vocabulary knowledge have increased reading difficulties in upper grade levels because of the need for higher reading vocabulary (Chall, Jacobs, & Baldwin, 1990; Madden, Slavin, Karweit, Dolan, & Wasik, 1993; Pinnel, Lyons, Deford, Bryk, & Seltzer, 1994). Vocabulary knowledge is largely dependent on home influences and school instruction, which indicates that a student's success in terms of both vocabulary acquisition and reading comprehension are influenced by both parents and teachers (Biemiller). Thus, for ELL that come from environments in which English language acquisition is limited, there may be some benefit for interventions that include vocabulary and word context to expedite reading success.

Despite the potential importance of vocabulary, few studies have investigated methods that promote vocabulary for elementary students (Biemiller, 2003). One of the few studies that investigated effective teaching practices for ELL was conducted by Rousseau and Tam (1991) and addressed ELL with speech and language deficits. In the study, Rousseau and Tam compared the academic benefit of two previewing techniques, in which discussion of key words was followed by reading silently or following along as a teacher read, to determine oral reading performance and comprehension. The authors suggested that the key words method of learning for ELL might provide language support

in addition to the strictly phonetic approach used in listening passage preview interventions that have been found to successfully increase oral reading and comprehension in native English-speaking students.

When comparing the silent reading and key words discussion with listening passage preview and key words discussion, six of eight participating students read more words correctly during the listening passage preview condition, relative to baseline, than in the silent reading condition. In a follow up study, the two intervention components, listening passage preview and key words discussion, were compared independently and in a combined condition, using an alternative design (Rousseau, Tam, & Ramnain, 1993). The authors found that key words used alone was more effective than listening passage preview, but the combination of the two components was the most effective for all five of the participating ELL. The benefit of key words was further validated with an ELL in a study conducted by O'Donnell, Weber, and McLaughlin (2003). Through implementation of the key words intervention, the authors found an increase in reading comprehension and oral reading fluency, and there was a decrease in reading errors.

The goal of vocabulary instruction or the preteaching of key words is to increase understanding of context-area text (Beck & McKeown, 1991); however, greater generalization effects depend on instruction that promotes deeper processing of word knowledge (word meaning and context; Bryant, Goodwin, Bryant, & Higgins, 2003). For example, Burns, Dean, and Foley (2004) compared the effects of traditional, drill sandwich, and incremental rehearsal flash card methods on retention of learned vocabulary words with middle school students. During the three conditions, there was a

gradual increase in the amount of word repetition, practice with unknown items, and interspersal spacing between known and unknown words, respectively. Specifically, traditional practiced 100% unknown words one time, drill sandwich practiced 30% unknown and 70% known words three times, and incremental rehearsal practiced 10% unknown to 90% known words nine times with word definitions. Each treatment sequence continued to be applied until nine new words were learned. Results indicated that the incremental rehearsal condition led to better retention than did the drill sandwich or traditional flash card condition. In a later study, Burns et al. showed that incremental rehearsal increased reading fluency and comprehension performance of learning disabled students.

In summary, ELL require interventions that specifically support both major content area learning as well as English development. To accomplish this, results from studies investigating effective teaching show that students would benefit from traditional effective teaching strategies such as modeling, practice, and feedback (August & Hakuta, 1997). However, results from research studies (Rousseau et al., 1993) and expert observations (Gersten & Baker, 2000) suggest that ELL may require additional intervention support that provides review of prior knowledge, vocabulary development, and frequent oral and written practice opportunities in content areas.

## Curriculum-Based Measurement

Because of the scarcity of empirically based interventions and the variability in student educational and language experience, student progress may need to be evaluated

under several treatment conditions before adequate progress is achieved. In order to quickly determine if an intervention is effective for a student who is experiencing reading difficulties, academic progress must be monitored with a measurement system that is immediately sensitive to individual responsiveness and potential for continued growth, within a short period of time. One informal measure, CBM, demonstrates these technical features, thus enabling teachers to effectively monitor a student's progress (Shinn, 1998). Curriculum-based measurement involves having a student read grade appropriate passages, while an examiner or teacher records oral reading fluency (ORF), which is calculated as the number of correctly read words per minute.

Findings from numerous studies have demonstrated adequate psychometric properties for CBM. First, the test-retest reliability of CBM, in terms of reading fluency for ELL and English-speaking populations, is quite high at $r = .87$ and .92, respectively (Baker, Plasencia-Peinado, & Lezcano-Lytle, 1998). In addition, Baker et al. calculated that split-half reliability is extremely high, at .99 for both groups. Second, according to Marston (1989), criterion-related validity for CBM, when compared to other published norm-referenced reading measures like the Stanford Diagnostic Reading Test (Karlsen, Madden, & Gardner, 1975) and the Woodcock Reading Mastery Test (Woodcock, 1973) ranged from $r = .73$ to .91. Findings from later studies have shown a correlation between oral reading and published measures of global reading skills that range from $r = .63$ to .90 (Marston). Results from a validation study by Madelaine and Wheldall (1999) demonstrated high correlations between reading aloud measures and reading comprehension measures on standardized tests, which indicated that ORF is both a good

performance indicator of comprehension ability, as well as general reading ability. Finally, empirical data have shown a high correlation between CBM reading scores and teacher judgments of student English reading proficiency (Marston & Deno, 1982).

The sensitivity of CBM, according to Shinn and Bamonto (1998), is a way of defining the differences among individuals who do and do not demonstrate a skill, as well as differences within individuals over time (improvement of skills in an area should lead to higher test scores over time). Marston et al. (1986) verified the sensitivity of this measure by examining short-term reading progress for 10- and 16-week intervals with the use of both standardized reading tests and CBM. It was determined by Marston et al. that though the standardized assessment measures identified improvement, CBM showed greater growth in reading performance and correlated strongly with teacher perceptions of student improvement. Thus, CBM measures are sensitive enough to quickly determine whether instructional changes are effective if student progress is frequently monitored.

## Brief Experimental Analysis Using Curriculum-Based Measurement

While CBM provides a method to frequently assess student reading level and growth over time, the assessment goal is ultimately to assess and select an intervention that addresses the cause for the student's academic difficulty. If a student is not learning even when effective teaching is in place, then the consideration of some type of additional instructional support is warranted. However, students instructional needs vary widely and individual differences in instructional needs are greatly influenced by

language, home, and school experience, particularly for ELL (Lam, 1992).

Several studies have recently investigated the effects of brief experimental analysis procedures to quickly compare different interventions to determine what instructional method matches a student's needs. Basically, the experimental analysis process attempts to identify relationships between environmental variables (instructional methods) and student behavior (academic performance; Iwata et al., 2000). Brief experimental analysis consists of systematic single-session applications of various instructional methods to determine which treatment produces the highest level of academic performance, in order to formulate a hypothesis about which instructional method will continue to produce growth over time for an individual student. This focus on data-driven treatment selection for critical skill development increases the probability of positive outcomes for students. The utility of brief experimental analysis for increasing academic performance has been examined in several studies, with promising results, and is a method that may provide educators with a more efficient yet effective assessment methodology when evaluating and selecting intervention components (Daly et al. 1999).

McComas, Wacker, and Cooper (1996) conducted one of the first brief experimental analyses, using a multielement design with two students with disabilities. In the study, McComas et al. examined the effects of study guides and paraphrasing on comprehension quiz scores, to address each student's reading problems on low- and high-demand instructional materials. From the implementation of these procedures, it was determined that one of the students exhibited higher performance when presented with the study guide approach, relative to the baseline, whereas there was no distinct

difference across the instructional conditions during the low-demand task. The other student performed in an acceptable manner on the low-demand task condition during both treatment conditions (though performance was lower than that of the other student), and the student's performance on high-demand tasks showed the greatest gains when the study guide approach was implemented. Thus, through the use of experimental analysis, McComas et al. identified effective instructional strategies for both students, and determined that the most increased performance stemmed from using study guides in a high-demand condition.

Daly et al. (1999) further investigated the efficiency of the approach used in the McComas et al. (1996) study by examining the combination of brief experimental analysis and hierarchically ordered effective intervention components with empirically derived principles of effective academic instruction for greater applicability in school settings. In this study, Daly et al. implemented the following strategies: a reward for rapid reading, repeated readings, listening passage preview, treatment for both instructional and high content overlap passages, and lower level reading materials. Treatments were administered from least to most intrusive, in terms of adult involvement and resources, in order to identify the treatment package that required a minimum amount of adult involvement to increase performance. Treatment effects were assessed using CBM procedures on the reading passage used during treatment as well as a probe consisting of high content overlap with the instructional reading passage (i.e., 80% similar words) to assess generalization of treatment effects on similar but different reading passages.

The results of this study revealed that at least one instructional strategy using CBM worked for each student, but that different interventions were effective per student. Thus, these results indicated that this method could be used to distinguish efficient strategies for remediating reading difficulties, which are based on individualized needs. This is particularly relevant for ELL who have the time-consuming and dual task of learning the English language as well as relating that knowledge to academic subjects. Therefore, implementation of this analysis can provide the ability to efficiently assess the effect of various reading interventions in an idiographic manner to find an effective strategy that promotes larger gains in learning, in the least amount of time, to help limit the amount of time that a student is removed from ongoing classroom instruction (Watson & Ray, 1997), which is critical when attempting to decrease the substantial achievement gap prevalent between ELL and native English-speaking students (August & Hakuta, 1997; Donovan & Cross, 2002).

Eckert, Ardoin, Daisey, and Scarola (2000) examined the use of a single-subject design, alternating treatments, for the selection of the most effective intervention option. The authors conducted a study in which five skill-based reading interventions on ORF were evaluated for four students experiencing reading difficulties. It was presented in a sequential, hierarchal application that allowed for comparisons between interventions and baseline. The study included skill-based, performance-based, and combined skill-based and performance-based interventions. Eckert and colleagues found that three of the four participants' performance improved by combining the skill-based and performance-based interventions. These results replicated the results of prior studies (Daly et al., 1999;

McComas et al., 1996) in terms of establishing the utility of incorporating brief experimental analysis to identify reading interventions. Further, it extended research by demonstrating the importance of assessing the combination of instructional and motivation treatments to produce the best possible student performance.

## Extended Analysis

Initial studies examined the utility of brief experimental analysis for selecting interventions based on single exposures to treatment and brief evaluations of intervention efficacy (Jones & Wickstrom, 2002), which provided very little evidence that brief experimental analysis results were stable across time (Eckert et al., 2000). It was noted by Eckert and colleagues that an extended analysis should be conducted along with the brief experimental analysis to increase reliability and decrease the likelihood of erroneous conclusions. More recently, researchers have approached this issue by implementing and examining the effects of a selected treatment over time during an extended analysis.

Noell, Freeland, Witt, and Gansle (2001), for example, employed brief experimental analysis as a means to identify treatment components that were conceptually relevant for a specific type or cause of an academic problem. The researchers compared the relative effects of two interventions on oral reading rates to determine if 12 students were exhibiting a skill or performance deficit. A three-phase brief experimental analysis was first implemented with a baseline, instructional, and incentive intervention condition followed by an extended analysis of alternating treatment comparisons for 3 to 4 weeks.

Results of the extended analysis indicated that the comparison of ORF scores with a baseline phase obtained during the brief experimental analysis correctly identified which of the two interventions was an effective treatment or an ineffective treatment for 83% of cases. Through implementing this method, the researcher had the ability to determine whether a simple motivational strategy would be more effective as compared to a more intense instructional strategy over time.

Jones and Wickstrom (2002) employed brief experimental analysis using a multielement design as a way to test for more specific and common reasons for academic failure. More importantly, Jones and Wickstrom investigated whether the results of individualized, selected treatments and control conditions were consistent across time. As in prior studies, treatments were implemented in a hierarchal manner based on the level of resources and time available, with five at-risk students. However, treatments were applied that addressed several functions that may be causing reading difficulties including: performance deficit (contingent reward), lack of practice opportunities for fluency (repeated readings), not enough support for acquisition (phrase drill), or difficult reading material (easier materials). These treatment conditions were tested once, with the most effective strategy being selected, then later withdrawn, and finally reinstated to rule out effects of measurement and practice.

The results of the brief experimental sessions indicated that all students responded to at least one strategy, with two students responding to phrase drill, and the other three responding to the repeated readings strategy. The treatments continued to increase reading performance when compared to the baseline condition for sessions conducted

during the extended analysis.

In another study, Daly, Murdoch, Lillenstein, Webber, and Lentz (2002), showed that treatments selected based on brief experimental analysis effectively increased reading fluency and decreased reading errors over time during the extended analysis, for five students experiencing reading difficulties.

These series of studies, which included extended analyses, produced stable effects across time for selected strategies based on brief experimental analysis results, which were conducted to determine efficient interventions or interventions that addressed specific reasons for reading deficits (Daly et al., 2002; Jones & Wickstrom, 2002; Noell et al., 2001). Given that there are different instructional techniques that can be utilized to increase the likelihood of active responding by the student at different proficiency levels, this method provides teachers with a more efficient and reliable method for evaluating and selecting effective interventions that can be feasibly implemented into the classroom (Daly et al., 1999). With the implementation of these interventions throughout the academic school year, teachers would have the ability to identify students who continue to have difficulties despite reasonable general education support, so that appropriate recommendations (i.e., special education) could be made.

However, to date, few interventions have been included in studies examining the utility of brief experimental analysis. An important extension of this assessment process is to include a brief analysis of treatments that may directly support reading deficit problems often exhibited by ELL, such as lower vocabulary level or instructional needs, with a combination of oral and written practice. Few studies have examined the effects

of written retell (along with oral reading) when conducting brief experimental analysis. Written retell has several advantages, which include: (a) ease of group administration, (b) provision of writing practice to students with content material, and (c) face validity for reading comprehension (Fuchs & Fuchs, 1992).

## Purpose and Objectives of the Present Study

This literature review identified several critical problems that our schools are encountering. First, many ELL are poor readers, and without support through intervention, the problem becomes severe enough that many of these students require remedial instruction and potentially, special education services (Gersten & Woodward, 1994). The importance of reading skills in all academic content areas establishes the need for school-based interventions that promote reading mastery for ELL before problems become severe in later grades.

Although a few well-controlled studies provide basic instructional approaches that effectively promote reading, some individual students may not respond to traditional classroom instruction and may require changes in the intensity, frequency, and duration of basic effective teaching strategies or require a different level or type of task. Individual differences between ELL that may influence reading progress are compounded by a wide variability in language acquisition, prior school experience, and home support (Lam, 1992). If poor reading performance is not detected and remediated when learning difficulties first emerge, then the achievement gap between poor and good readers widens as students progress through school (August & Hakuta, 1997; Donovan & Cross, 2002;

National Center for Educational Statistics, 2000).

In schools with limited resources, efficient methods are needed to quickly identify what instructional components work for a student. Findings from several studies demonstrated that a brief application of a small number of empirically based treatments, combined with varied duration, intensity, and frequency of effective teaching factors, might identify an effective academic intervention with a minimum of instructional components necessary to improve academic performance for students experiencing reading problems (Daly et al., 1999; Daly et al., 2002; Jones & Wickstrom, 2002; Noell et al., 2002). However, reports in which investigators examined the utility of this approach for selecting interventions for individual ELL who were experiencing reading problems could not be located. Given the number of students experiencing reading difficulties and the variability in language and school experience between individual ELL (August & Hakuta, 1997), an assessment methodology that addresses individual differences when identifying the most effective and efficient intervention is warranted. Research on brief experimental analysis for academic performance with ELL would have important implications for improving the performance of ELL prior to consideration of special education eligibility testing.

## Problem Statement

The primary goal of the study was to examine the utility of brief experimental analysis for selecting intervention procedures to improve reading fluency and comprehension for ELL. The first objective was to examine individual differences in

response to brief experimental analysis using CBM. The second objective was to assess which intervention overall provided the most benefit for the ELL that participated in the study. The third objective was to evaluate different intervention methodology to determine which improved reading performance the most. The fourth objective was to measure the stability of each chosen treatment for each ELL through an extended analysis. Specific research questions included:

1. What was the most effective and efficient intervention for each student using brief experimental analysis during the oral reading fluency condition on the instructional probes?

2. What was the most effective and efficient intervention for each student using brief experimental analysis during the oral reading fluency condition on the generalization probes?

3. What intervention differences in method were found for improving reading performance among the ELL participating in the study?

4. What were the effects of the selected interventions on oral reading fluency on the instructional probes across time and participants during the extended analysis?

# METHODS

## Participants

Participants included 2 Latino females (Nicole and Danielle) and 3 Latino males (Roberto, Oscar, and Hector). Two of the participants were in first grade (Roberto and Nicole), one in third grade (Danielle), one in fourth grade (Oscar), and one in fifth grade (Hector). Although Spanish was each students' native language, they no longer required ESL services due to scores within an upper English fluency limited proficiency range determined by the IDEA Proficiency Test (IPT) Oral Language Test (Del Vecchio & Guerreo, 1995). The students fell in the low socioeconomic status (SES) category, which was determined by enrollment in the federal school lunch program.

The five participating students were initially referred by their teacher for intervention services due to concerns with reading fluency, comprehension, and reading grades of D or lower. Students were further distinguished as at-risk, based on a difference in performance level as compared to same grade level peers, and below an instructional range on a class-wide reading assessment. A student was considered at-risk if he or she scored within the lower 16% of the class and scored within an at-risk reading level (i.e, below 40 words per minute for first grade and below 100 words per minute for second through fifth grades) or seven median errors per minute (Good, Simmons, Kameenui, Kaminski, & Wallin, 2002). Demonstration of the ability to read at a minimum of 20 words per minute on a first grade reading probe (conducted prior to experimental conditions) was also obtained for each student to ensure that adequate

reading growth could be measured with intervention (Fuchs, 1993). Finally, written consent from the parents and the students to participate in this study was obtained and documented on a consent form approved by the Institutional Review Board (IRB; see Appendices A and B). All of the aforementioned criteria had to be met for the students to be included in the study.

## Setting

All participants attended a public elementary school in a rural district in a northwestern state. The school population of approximately 520 students from kindergarten through fifth grade consisted of 35% Hispanic and 65% Caucasian students. Approximately 55% of these students qualified for federal free or reduced lunch program.

Initial school-wide reading assessments were conducted for all students by trained teachers in the regular education classroom. However, all experimental sessions were conducted in a quiet workroom with graduate or undergraduate students who were trained in the experimental procedures of this study. The room was equipped with a table and two chairs, as well as materials necessary for experimental conditions.

## Materials

### *Instructional Passages*

The instructional passages were randomly drawn from grade level textbooks that were part of the students' curriculum. The average passage length was 114 words for the first grade passages (range, 77-163), 158 words for the third grade passages (range, 124-

180), 177 words for the fourth-grade passages (range, 128-269), and 159 words for the fifth-grade passages (range, 121-211). Readability scores for the first- and third-grade passages were computed using the Spache formula (Spache, 1953). Readability scores were calculated for the fourth- and fifth-grade passages using the Dale-Chall formula (Dale & Chall, 1948).

*Generalization Passages*

The generalization passages contained a high percentage of the same words from the corresponding instructional passages (Daly, Martens, Kilmer, & Massie, 1996). Generalization passages for the first, third, fourth, and fifth grade were created by rewriting the instructional passages using the majority of the words from that passage (i.e., 87% of the words on average) as a different story. These passages were also similar in length and readability.

The average generalization passage length was 111 words for the first-grade passages (range, 69-127), 108 words for the third-grade passages (range, 85-161), 111 words for the fourth-grade passages (range, 92-138), and 114 words for the fifth-grade passages (range, 92-130). The average amount of word overlap was 86% for the first-grade passages (range, 78-91), 89% for the third-grade passages (range, 83-95), 87% for the fourth-grade passages (range, 80-94), and 85% for the fifth-grade passages (range, 81-89). Similar to the instructional passages, readability scores for the first- and third-grade passages were computed using the Spache formula (Spache, 1953), and the Dale-Chall formula (Dale & Chall, 1948) was used to determine readability scores for the fourth- and fifth-grade passages.

*Maze Passages*

A maze passage was also developed from each of the instructional passages (see Appendix C). The maze was constructed by keeping the first and last sentence in the passage intact. Then every fifth or sixth word from the passage was omitted and replaced with three word choices. The three word choices presented to the student included the deleted word plus two word distracters. To distinguish the distracter word as a clear incorrect choice, the distracter word did not make contextual sense, rhyme with the word, or have a similar sound or letters. However, the distracter word was of similar word length with no more than one letter shorter or longer than the correct word choice.

*Tangible Reinforcers*

Tangible items (i.e., pencils, balls, stickers) were used in this study as reinforcers (see Appendix D). The items were presented in a small plastic tote, which was called the "treasure chest" and the students were allowed to view the items prior to reward conditions.

*Procedural Protocols*

Scripted procedural protocols constructed for baseline and experimental interventions were used to ensure procedural integrity. These protocols sequentially listed the intervention steps to be implemented by the experimenters, such as scripted verbal instructions, prompts, modeling , and feedback (see Appendix E). For procedural integrity, an independent rater marked each step that was completed as written and calculated the percentage of steps completed correctly.

## Dependent Variables

The effects of baseline and intervention conditions on student reading performance were determined by three dependent variables: oral reading fluency, written retell fluency, and maze fluency.

### *Oral Reading Fluency*

ORF was the primary dependent measure, which was determined by the number of words read correctly in the instructional or generalization passages. A correctly read word was defined as an unprompted word that was read aloud by the student with correct pronunciation in three seconds. Standardized directions, as described by Daly et al. (2002) were given by the examiners, and the students were instructed to read aloud from the beginning of each passage. On this measure, the students read aloud from a reading instructional or generalization passage, while the examiner followed along on a separate copy of the passage. The examiner marked a word incorrect if the student omitted, mispronounced, or substituted a word. If a student failed to attempt to read a word within three seconds (i.e., as silently counted as "One thousand one, one thousand two, one thousand three" by an examiner), the examiner read the word for the student and marked the word as an error. Finally, if an entire line of text was omitted, then the entire line of words was recorded as one error. The words not marked by the examiner were calculated by subtracting incorrect words from the total words read to determine the ORF of the student. To ensure that students were provided with equal reading opportunities in all intervention conditions, students were asked to read an entire passage aloud; however,

ORF was calculated during the first minute of the passage.

The ORF criteria used in these procedures demonstrated a test-retest reliability for elementary students that ranged from $r = .92$ and .97, and alternate-form reliability when using different reading passages for the same grade level ranged from $r = .89$-.94 (Tindal, Marston, & Deno, 1983). Additionally, research on ORF and standardized and comprehension measures of reading have yielded correlations between these two types of measures ranging from $r = .63$-.90 (Marston, 1989). Baker and Good (1995) reported similar acceptable technical characteristics of ORF with ELL. Specifically, the reliability coefficients of CBM English reading with ELL (i.e., demonstrated minimal to fluent Spanish and English language proficiency) was reported as $r = .99$ for an estimation of reading level and $r = .5$ for an estimation of slope with no significant difference between the English only and ELL. Correlations of $r = .7$ or greater were obtained between the curriculum-based measures and Stanford reading measures as well as teacher ratings, thereby supporting construct validity. Alternatively, moderate correlations ($r = .44$-.62) were obtained between CBM and language measures and teacher rating of language ability, suggesting that CBM English reading scores were more highly related to reading than language.

*Written Retell Fluency*

Written retell fluency was used in this study to measure the effects of the intervention on the students' ability to comprehend and conceptualize information from a passage into written format. After the student read the instructional passage, the examiner removed the passage and asked the student to write about what he or she just

read. The two-minute timing started immediately after the examiner instructed the student to begin writing about the story. If the student did not respond after three seconds, the examiner prompted the student one time by stating, "Try to write everything you can." The generalization passage followed the same format as the instructional passage, and the student was instructed after reading the passage to write about everything that he or she just read.

Written retell fluency was assessed by calculating the total number of words written, regardless of whether the words pertained to the passage (Shinn & Good, 1992). Words that were calculated included: (a) incorrectly spelled words, (b) numbers, (c) isolated letters functioning as words (e.g., I, a), (d) abbreviations, and (e) incorrectly capitalized words (Shinn & Good). Hyphenated words were scored as one word.

Fuchs, Fuchs, and Maxwell (1988) reported correlations of $r$ =.76 between total recognizable words and the comprehension subtest of the Stanford Achievement Test (SAT; Gardner, Rudman, Karlsen, & Merwin, 1982). The correlations ranged from $r$ = .60-.79 with other informal measures of comprehension (Shinn & Good, 1992).

*Maze Fluency*

Maze fluency was used in this study to gauge the effects of intervention on the students' ability to comprehend information from a story. Immediately after each passage was read aloud, students were presented with the same passage, constructed in a maze format. The examiner instructed the students to circle the word that correctly completed each sentence. Each student was given two minutes to complete the maze condition. Maze fluency performance was scored as the number of correct word choices.

The technical qualities of the maze fluency assessment have been empirically validated as a measure of reading comprehension. For example, Shin, Deno, and Espin (2000) reported an alternate form reliability coefficient of $r = .81$. Further, an analysis of sensitivity of the maze measure for growth over time indicated that the mean maze growth rate was significantly greater than that for the initial maze measure, and that students differed significantly from one another in individual growth rates. Correlations reported between maze measures and other reading measures range between $r = .77$ and .90 (*Stanford Achievement Test*, *Gates MacGinitie Reading Tests*, *Metropolitan Achievement Test*, and *California Achievement Test*) demonstrating acceptable criterion validity (Fuchs & Fuchs, 1992; Shinn et al., 2000).

## Independent Variables and Intervention Conditions

### *Baseline*

No instruction was provided during the baseline condition, for either the instructional or the generalization passages. Each student was told by the examiner to read the entire passage, while the examiner recorded errors and determined ORF during the first minute. Immediately after the student read the passage to the examiner, he or she was asked to write down what he or she just read. The student was given two minutes to record all that he or she could recall about the passage. A maze fluency probe was then administered for two minutes. Finally, a generalization passage followed by written retell were conducted with the student. The ORF, written retell fluency, and maze fluency

performance scores were calculated at the end of the reading session and scores were shared with each student.

*Contingent Reward*

Following baseline, contingent reward was the first intervention procedure administered. The contingent reward condition was an attempt to rule out the possibility that poor student reading rates were the result of a performance deficit (Lentz, 1988) by evaluating the effect of highly motivating incentives (i.e., tangibles) upon performance. Procedures used in this study were based on previous research, which indicated that rewards are often useful in determining whether a deficit is skill or performance related (Noell, Witt, Gilbertson, Ranier, & Freeland, 1997).

Prior to reading a passage, students were told that they could earn a reward of their choice from a "treasure chest" if they increased their score from the prior (baseline) condition. The ELL were informed before the assessment began that the treasure would be offered in only the reward condition. Students were allowed to briefly examine the items in the "treasure chest" and choose an item. Instructional and generalization passages were then administered using the same procedures described in the baseline. Students were given the opportunity to earn a reward in all of the contingent reward conditions.

*Listening Passage Preview*

The listening passage preview condition was implemented to determine whether the student could improve his or her reading accuracy through experimenter modeling

and error correction (Daly, Martens, Dool, & Hintze, 1998). Because it entailed more experimenter involvement than contingency reward, but less time, it was the next logical treatment.

Listening passage preview required the experimenter to model or read the instructional passage to the student while the student followed along. After the passage was modeled by the examiner, the student practiced reading the passage aloud. The examiner corrected word errors by saying the word correctly if the student misprounced, omitted, or did not read the word within three seconds. Instructional and generalization passages were then administered using the same procedures described in the baseline.

*Repeated Readings*

Repeated readings is considered beneficial because of the repeated learning trials (overlearning), and when combined with error correction, it provides the student with the opportunity to improve reading fluency without repeatedly incorporating incorrect words into his or her vocabulary (Dowhower, 1987; Layton & Koenig, 1998; Meyer & Felton, 1999).

In the repeated readings condition, the student read the instructional passage four times aloud (Daly et al., 1998), and the experimenter provided error correction for the first three reading trials. The experimenter told the student how fast he or she read the passage and how many words he or she missed. The experimenter also stated that if a word was unknown to the student, than he or she would tell the student the word. Therefore, when the student hesitated on a word for more than 3 seconds, mispronounced a word, or omitted a word, the experimenter told the student the word and

had him or her repeat the word correctly before continuing to read. Instructional and generalization passages were then administered using the same procedures described in the baseline.

*Key Words*

The key words treatment is a preteaching condition that enables students to comprehend unknown words more readily through presentation and discussion of word definition and usage (Rousseau et al., 1993). After presenting a copy of a reading passage to the student, the examiner asked him or her to circle up to five words from the passage that he or she could not define. The student then practiced reading the passage out loud, while the examiner corrected errors (words that were mispronounced or omitted). Then the examiner had the student repeat the word correctly before continuing to read.

Following reading practice, the examiner selected words that were either reading errors or key words from the passage, which represented main concepts (if five words had not already been circled by the student). The five unknown key words were then presented to the student by the examiner on a whiteboard or blackboard. The examiner read each word aloud to the student and asked him or her to repeat the word. Next, the examiner defined each word through verbal explanations, gestures, modeling, or some combination to convey the meaning of the word. Finally, the examiner used each word in a sentence. Instructional and generalization passages were then administered using the same procedures described in the baseline.

*Incremental Rehearsal*

The incremental rehearsal condition was designed to teach new items by interspersing unknown words with those previously learned (MacQuarrie, Tucker, Burns, & Hartman, 2002). Incremental rehearsal has a high success rate due to (a) the use of highly repetitive words, (b) the gradual introduction of unknown words, (c) the amount of material already known to the student, and (d) enough spacing for the student to move unknown words from short-term to long-term memory (MacQuarrie et al.). Overall, incremental rehearsal is considered an effective means for students to rehearse rote-learning in an individual setting, so that there is improvement for deficits in basic skills (MacQuarrie et al.).

In this condition, students were asked to practice reading an instructional passage. Five unknown words were chosen by either the student or the examiner. This entailed instructing the student to circle as many as five unknown words. If fewer than five words were selected, than the examiner used words that had been calculated as errors during oral reading or key words for story comprehension. Next, students rehearsed words within a practice sequence which was designed to teach new or unknown items, through interspersing words that have been previously learned (MacQuarrie et al., 2002).

The practice sequence began with the presentation of one unknown word written on a whiteboard or blackboard. The examiner pronounced the word in English, gave the word definition, and used the word in a sentence. Then the student was asked to say the word, define it, and use it in a sentence. This word then became the first known word in the practice sequence. Next, a second unknown word was presented, pronounced,

defined, and used in a sentence by the examiner. The student was presented with the second unknown word followed by the first word and asked to say it, define it, and use each word presented. This practice sequence continued until all five words had been presented by the examiner. Thus, the student repeatedly moved through the sequence of known and unknown words ending with a ratio of one unknown word to four known words, respectively. Immediately after the practice sequence, the examiner administered the instructional, maze, and generalization passage to determine ORF, written retell fluency, and maze fluency performance.

## Experimental Design

Single-subject design (Kazdin, 1982) was utilized to assist in the identification of educationally relevant variables that were effective for each ELL with reading problems. A brief multielement design was used to compare the relative effects of various intervention conditions to the baseline, on oral reading, written retell, and maze fluency, on a case-by-case basis (Cooper et al., 1992; Harding, Wacker, Cooper, Millard, & Jensen-Kovalan, 1994). In this design, all participants' ORF, written retell fluency, and maze fluency performance scores were first evaluated under a baseline condition.

Similar to Daly et al. (1998) the baseline was followed by treatments that were chosen in an order that: (a) attempted to minimize treatment intensity (i.e., least to most complex in terms of language practice, administration time, materials, and adult support; see Table 1); and (b) were appropriate for different dimensions of student responding (i.e., contingency reward to improve a performance deficit, repeated readings to improve

fluency skill problems, listening passage preview to improve acquisition problems, etc.). The decision-making criterion for choosing the most effective intervention for each student is located in Appendix F. The intervention that produced the greatest gains compared to the baseline and other interventions was then repeated to form a minireversal design (Martens, Eckert, Bradley, & Ardoin, 1999).

The ORF performance was evaluated initially during a school-wide assessment conducted with all attending students in the participating school, in order to identify reading problems. A reading probe, individually administered to each student for one minute in September, November, February, and April, during the school year, was used to determine reading performance. From this assessment, teachers were asked to identify and refer students who were performing within the lower 16th percentile of their class, and who met the inclusion criteria of this study.

Each student referred was provided with a consent form in both English and Spanish to give to his or her parents. He or she was told that if the forms were filled out and returned to the teacher or researcher, then a treat would be provided. Not all of the students returned their consent forms, but for those students that did return a form, a treat was provided, as well as a summary of the study rationale and procedures. Assent to participate in the study was then obtained from the student.

After the students were recruited for the study, baseline and experimental intervention conditions were initiated in a standard order from the least to the most intrusive (contingent reward, listening passage preview, repeated readings, key words, and incremental rehearsal conditions) on appropriate reading level passages for each

Table 1

*Brief Descriptions of Individual Intervention Components*

| Treatment | Description | Duration | Components |
|---|---|---|---|
| Contingent reward | Student provided with the opportunity to earn a reward for increasing the score from the previous probe administered without interventions. | 3 minutes | Incentives for increased performance. |
| Listening passage preview | Examiner models the passage, the student reads the passage, ORF is determined. | 5 minutes | Modeling plus oral reading drill practice of passage one time with error correction. |
| Repeated readings | Student reads passage four times, errors are corrected, he or she is told how quickly he or she read, fourth time, ORF is determined. | 8 minutes | Oral reading drill practice four times plus error correction. |
| Key words | Five key words are selected and presented on a whiteboard or chalkboard. The examiner reads, the student repeats, the word is defined by the examiner and used in a sentence. | 10 minutes | Practice one time plus examiner presentation of key words and word meaning. |

(*table continues*)

| Treatment | Description | Duration | Components |
|---|---|---|---|
| Incremental rehearsal | Errors from passage are determined, unknown words are included with already learned words, the word error is rehearsed four times and defined in a sentence. | 12 minutes | Oral practice several times, 10% known and 90% unknown word oral reading, word meaning, and sentence formation plus corrective feedback. |

student. The level of intrusiveness was determined by the amount of intervention time, extent of organization of materials, and level of adult or potential peer tutor involvement. Students that exhibited grade level reading ability during baseline were not included in the study.

All experimental conditions were conducted by trained research assistants who worked individually with each student in a workroom or library at the school setting. Experimenters were graduate and undergraduate psychology students who had demonstrated 100% accuracy in trial runs of all assessment and experimental procedures prior to the onset of the study. A general procedure was followed during all experimental conditions. Each student was removed from the classroom three times a week for approximately 15-minute sessions. No more than two baseline or intervention conditions were implemented per session and only one session was conducted per school day. Baseline, contingent reward, and listening passage preview conditions lasted

approximately 2-5 minutes, whereas the repeated readings, key words, and incremental rehearsal conditions lasted approximately 8-12 minutes. Each of the aforementioned time approximations was dependent on the ability of each ELL. Students were given a brief 3-minute break between two consecutive intervention conditions whenever two interventions were presented within one session.

During each condition, research assistants administered intervention and assessment procedures using relevant procedural checklists. In general, the intervention and assessment procedures included the experimenter applying an intervention, having the students read an entire instructional passage, and then assessing ORF and written retell fluency performance from that story. Students were then administered a maze fluency measure to determine comprehension. Finally, students were administered a generalization reading passage to gauge ORF and written retell performance without prior instruction on a high overlap content passage. Praise was given for effort and students were consistently given feedback on their performance for the instructional, generalization, and retell procedures.

## Training for Administration of Assessment and Expermental Procedures

Research assistants (i.e., undergraduate and graduate psychology students) were trained to assist in administering the experimental intervention and baseline conditions by the primary researcher. Training included (a) discussing the rationale of each experimental condition and assessment procedures, (b) introducing procedural checklists

(see Appendix D) that included a step-by-step description of how assessment and experimental sessions were to be conducted, (c) verbally describing intervention procedures for the administration of the ORF and retell assessment probes and each experimental condition, and (d) modeling all administration steps. Following the training period, research assistants role played the intervention procedures as the trainer observed and checked the steps implemented correctly on a procedural checklist until assistants implemented all procedures with 100% accuracy on all required procedural steps for each intervention and assessment and obtained 90% or more interscorer reliability with the primary researcher (see procedures below).

## Interscorer Agreement and Procedural Integrity

A secondary observer scored the assessment measures to determine interscorer agreement during 37 (41%) of the sessions. Secondary scorers worked alongside the examiner and independently recorded the errors of each student to determine ORF, written retell fluency, maze fluency, and generalization. The mean agreement for each of the dependent measures was then computed by dividing the lower estimate by the higher estimate and multiplying by 100 (House, House, & Campbell, 1981). In all, 180 (40%) of the assessment measures were evaluated to determine interobserver agreement. The mean interobserver agreement on all of the fluency measures, which includes ORF, written retell fluency, and maze fluency, was 100%.

The secondary observers also assessed procedural integrity during 37 (41%) of the experimental sessions, across all students. Using the procedural checklist, the

observer placed a checkmark next to each step that was completed during a session. After the sessions, the integrity of experimental procedures were computed by dividing the number of steps the examiner explained by the total number of procedural steps listed, which was then multiplied by 100. The average for correctly implemented experimental conditions was 99% (range, 84%-100%).

# RESULTS

## Brief Experimental Analysis

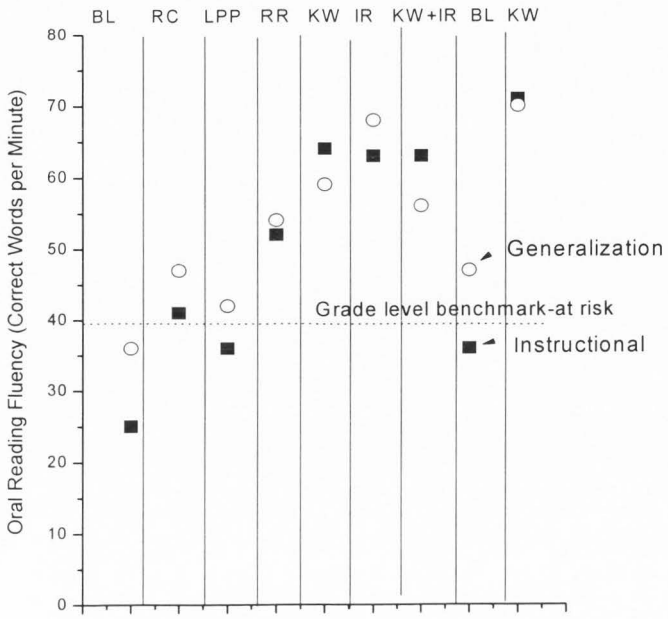
The individual ORF performances of the 5 participants in the instructional and generalization passages during the brief experimental analysis are displayed in Figure 1, Figure 2, and Figure 3, whereas written fluency and maze fluency are presented in Figure 4. Decision making for intervention effectiveness for extended analysis was primarily based on the greatest incremental gains in ORF on the instructional probe with intervention as compared to baseline and benchmark grade level at-risk cut off criterion (Fuchs, Fuchs, Hamlett, Walz, & Germann, 1993; Hasbrouck & Tindal, 1992).

Secondarily, treatment effectiveness was judged based on increase gains of 2 or more words per minute on the generalization probe from baseline generalization performance. Finally, the effectiveness of reward in conjunction with the most effective intervention was evaluated on ORF performance for students whose performance increased with contingent reward alone on instructional and generalization probes, relative to baseline, but had greater gains with instruction alone. Each individual's performance will be discussed from lower to upper grade students followed by a summary of the general findings of all 5 participants during the brief experimental analysis.

### *Roberto*

During baseline, Roberto's ORF performance fell below grade level, with 25 correct words per minute on the instructional probe and 37 correct words per minute on

Roberto




Nicole

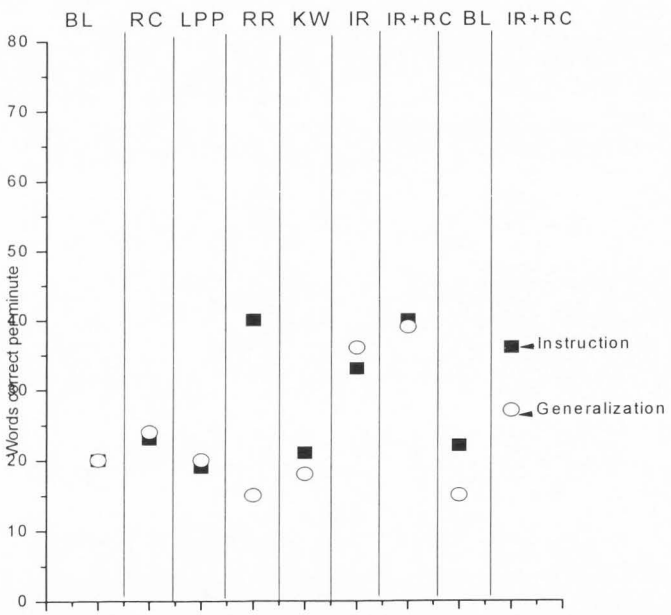
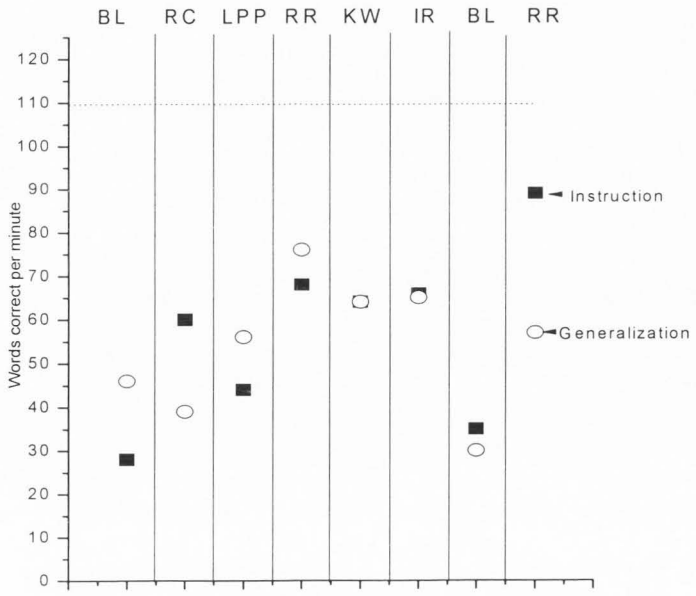



*Figure 1.* Number of correct words per minute on the instructional (square symbol) and generalization (open circle symbol) passages during brief experimental analysis for Roberto and Nicole.

Danielle




Oscar

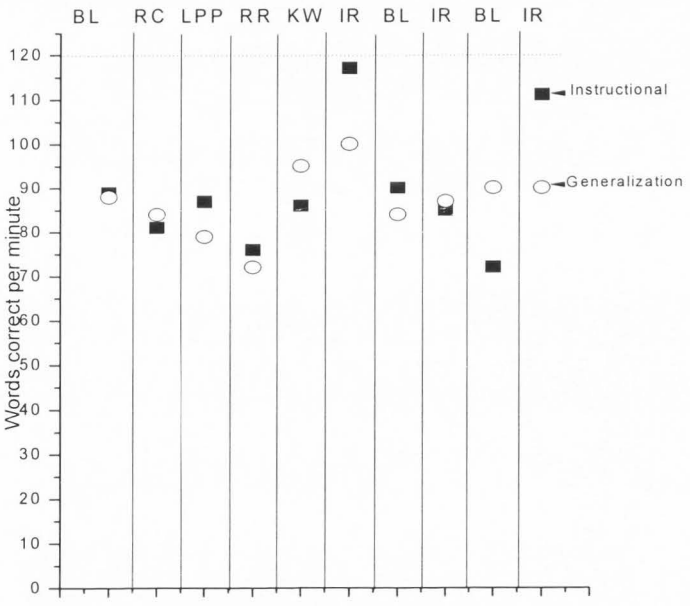



*Figure 2.* Number of correct words per minute on the instructional (square symbol) and generalization (open circle symbol) passages during brief experimental analysis for Danielle and Oscar.

Hector

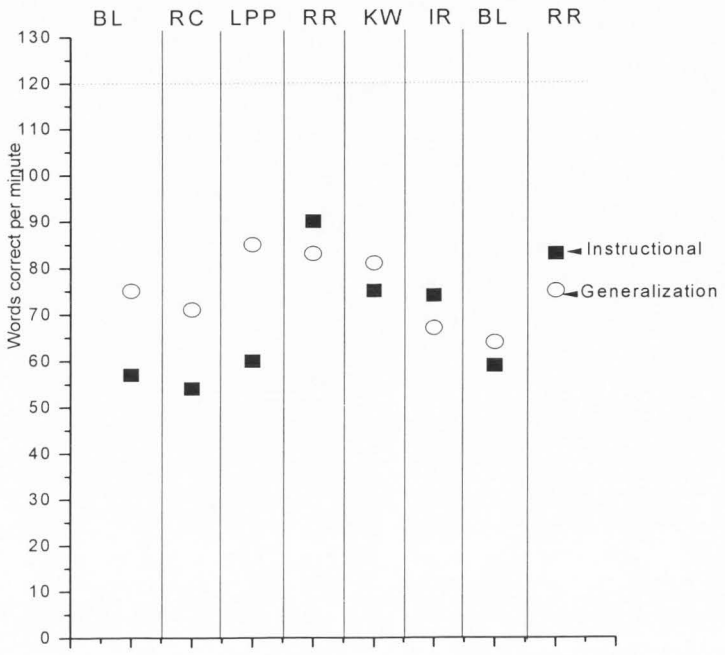



*Figure 3.* Number of correct words per minute on the instructional (square symbol) and generalization (open circle symbol) passages during brief experimental analysis for Hector.

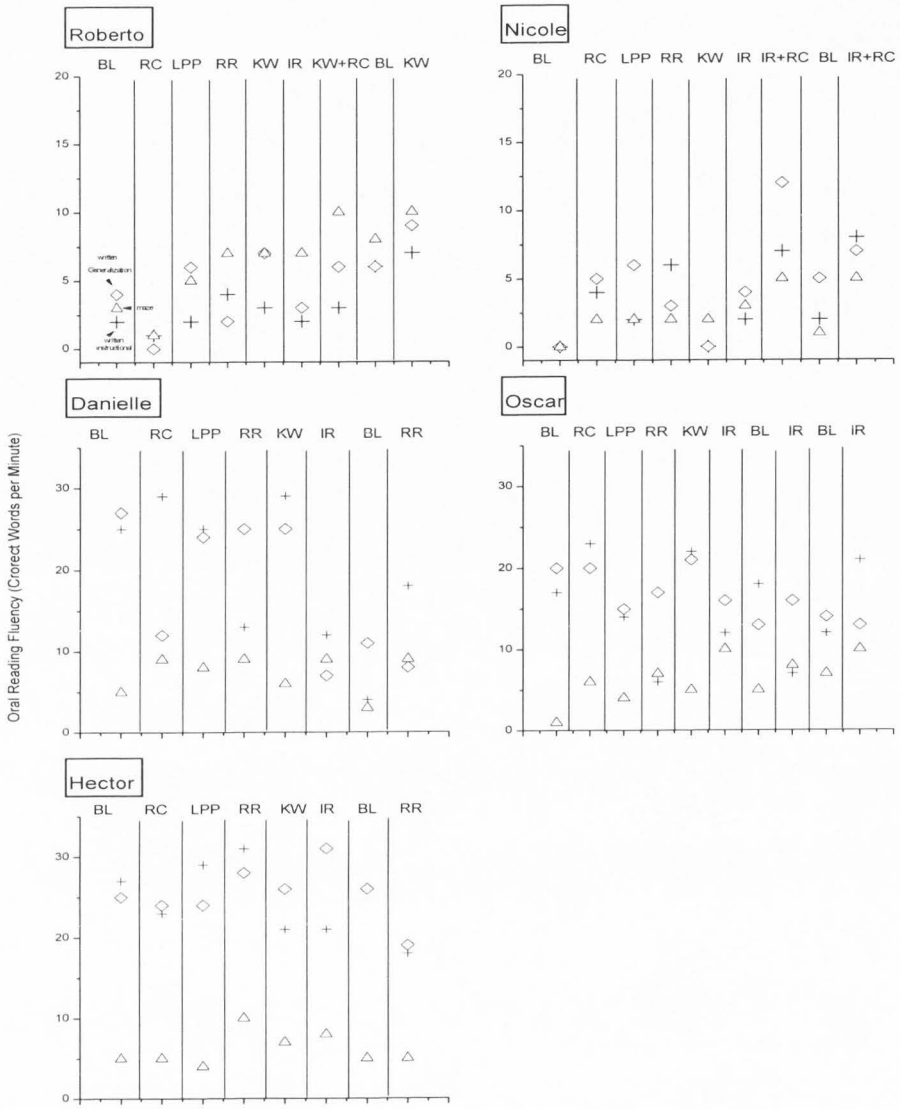



*Figure 4.* Number of correct words on the instructional written retell fluency (cross symbol), generalization written retell fluency (diamond symbol), and instructional maze fluency (triangle symbol) conditions during brief experimental analysis for Roberto, Nicole, Danielle, Oscar, and Hector.

the generalization probe. However, reading rates improved with intervention and showed the most improvement on the ratio difference between baseline and treatment during the key words condition, with 64 correct words per minute on the instructional probe and 59 correct words per minute on the generalization probe. There were also observable improvements on written retell fluency and maze fluency. Although incremental rehearsal gains were similar, key words was chosen as the simplest and most effective intervention due to decreased adult effort and time.

Because ORF performance also increased with a reward contingent on increased performance, key words was paired with reward contingency to determine whether this combination would produce greater gains in reading performance than key words alone. This paired treatment result showed additional gains on the maze measure, but no improvement on the ORF or written retell measures.

A return to baseline yielded 36 correct words per minute during the instructional probe and 47 correct words per minute during the generalization probe, whereas implementation of the key words condition after baseline yielded 71 correct words per minute during the instructional probe and 70 correct words per minute during the generalization probe. Thus, it replicated the initial results and showed that the simplest and most effective treatment condition for increasing Roberto's reading performance was the key words condition.

*Nicole*

Nicole's ORF performance at baseline fell below grade level, with 20 correct words per minute on both the instructional and generalization probes. However, reading

rates improved with intervention, with the most improvement on the ratio differences between baseline and repeated readings during the instructional passage, with 41 correct words per minute; however, reading performance decreased below baseline performance on the generalization passage, with 15 correct words per minute. Alternatively, ORF performance gains were greatest on both the instructional and generalization probes in the incremental rehearsal condition, with 32 correct words per minute on the instructional probe and 36 correct words per minute on the generalization probe. Further, the incremental rehearsal condition produced greater performance improvements on the maze fluency measure and instructional written retell as compared to performance during repeated readings.

Because ORF increased during the reward contingency condition, the decision was made to pair incremental rehearsal with reward contingency to assess if the combination would yield greater reading performance. This paired treatment showed additional gains on both the instructional and generalization passages in terms of ORF, with 36 correct words per minute on the instructional probe and 27 correct words per minute on the generalization probe. There was also improvement on the written retell fluency and maze fluency conditions. Replication of the initial results from the reapplication of the incremental rehearsal and reward contingency conditions indicated that these combined treatments were the simplest and most effective in terms of performance on all of the fluency measures, relative to baseline.

*Danielle*

At baseline, Danielle's ORF performance fell below grade level, with 28 correct

words per minute on the instructional probe and 46 correct words per minute on the generalization probe. Reading rates improved with intervention, with the most improvement on the ratio difference between baseline and treatment during the repeated readings condition. The repeated readings condition yielded an increase of 68 correct words per minute on the instructional probe and 76 correct words per minute on the generalization probe. Repeated readings also improved maze fluency performance, relative to the baseline; whereas there were no additional gains on written retell fluency.

When there was a return to baseline, Danielle read 35 correct words per minute on the instructional probe and 30 correct words per minute on the generalization probe. During reapplication of the repeated readings condition, there was replication of Danielle's improvement in reading, with 89 correct words per minute on the instructional probe and 57 correct words per minute on the generalization probe. There was also improvement on the maze fluency measure. This indicated that repeated readings was the simplest, most effective treatment condition relative to baseline performance.

*Oscar*

Oscar's ORF performance at baseline was below grade level, with 89 correct words per minute on the instructional probe and 88 correct words per minute on the generalization probe. His reading rates improved with intervention and he showed the most improvement on the ratio difference between baseline and treatment during the incremental rehearsal condition, with 127 correct words per minute on the instructional probe and 100 correct words per minute on the generalization probe. Incremental rehearsal also improved Oscar's performance on the maze fluency measure, whereas his

performance on the written retell fluency measures showed no additional gains, relative to the baseline.

With a return to baseline, Oscar read 90 correct words per minute on the instructional probe and 84 correct words per minute on the generalization probe. Reapplication of the incremental rehearsal condition did not yield improved results, relative to the baseline, with 85 correct words per minute on the instructional probe and 87 correct words per minute on the generalization probe. Further, there was no improvement on written retell fluency.

Therefore, there was a return to baseline, and Oscar read 72 correct words per minute on the instructional probe and 90 correct words per minute on the generalization probe. Incremental rehearsal was implemented again, with more favorable results during the second application. Oscar read 111 correct words per minute on the instructional probe and 90 correct words per minute on the generalization probe. There was also improvement on the written retell fluency and maze fluency conditions, relative to baseline. This indicated that the incremental rehearsal condition was the simplest, most effective treatment for Oscar in terms of reading and writing performance, relative to baseline and other treatment conditions.

*Hector*

Hector's ORF performance at baseline was below grade level, with 57 correct words per minute on the instructional probe and 75 correct words per minute on the generalization probe. For Hector, reading rates improved with intervention and he showed the most improvement on the ratio difference between baseline and treatment

during the repeated readings condition with overcorrection. He read 90 correct words per minute on the instructional probe and 83 correct words per minute on the generalization probe. Repeated readings also improved Hector's written retell fluency and maze fluency performance when compared to the baseline.

With a return to baseline, Hector read 61 correct words per minute on the instructional probe and 70 correct words per minute on the generalization probe. Reapplication of the repeated readings condition with overcorrection yielded reading results of 81 correct words per minute on the instructional probe and 78 correct words per minute on the generalization probe. This indicated that the repeated readings condition was the simplest, most effective treatment for improving Hector's ORF and maze fluency performance relative to the baseline and other treatment conditions. However, Hector's error rate, on average, was greater than four errors during instructional reading probes. Thus, an error correction strategy was added to the repeated reading treatment component for further extended analysis.

In general, all participants showed improvement relative to the baseline with one or more treatments on the instructional and generalization passages. Moreover, different or more treatments on the instructional and generalization passages. Moreover, different interventions were identified between subjects, with two students showing improved reading performance as compared to no instruction, with the most intensive treatment, incremental rehearsal. One student responded to the second most intensive intervention, key words, and two students responded to the repeated readings intervention. Students did not show as extensive of gains on the least intensive

intervention, listening passage preview.

The results of the treatment selection were based on additional reading, maze, and written retell measures on passage probes, which were also compared to ORF, due to a potential decrease in adult effort for assessment of intervention progress on mazes and additional gains in written retell. Although maze fluency showed consistent growth for each of the participants with intervention, growth was minimal between interventions with no difference in intervention performance for Danielle and Roberto. For the remaining three students, although gains were slight, treatment selection based on greatest gains in maze performance corresponded to treatment selected with performance on the instructional passages. Treatment selection based on written retell corresponded to the same treatment selection as ORF for only one student, Hector.

## Extended Analysis

Figures 5 and 6 display the ORF results of the extended analysis. Means, ranges, standard deviations, and medians for each experimental condition and across dependent measures are displayed in Table 2. In order to further assess the reliability of the treatment effects, the percentage of nonoverlapping data (PND) was computed between the baseline and the intervention condition. The PND was calculated by dividing the number of data points within a training condition that fell above the highest data point obtained during baseline, by the total number of data points measured during the considered training phase, multiplied by 100. This percentage indicates the amount of time in which the intervention performance was greater than the baseline performance.

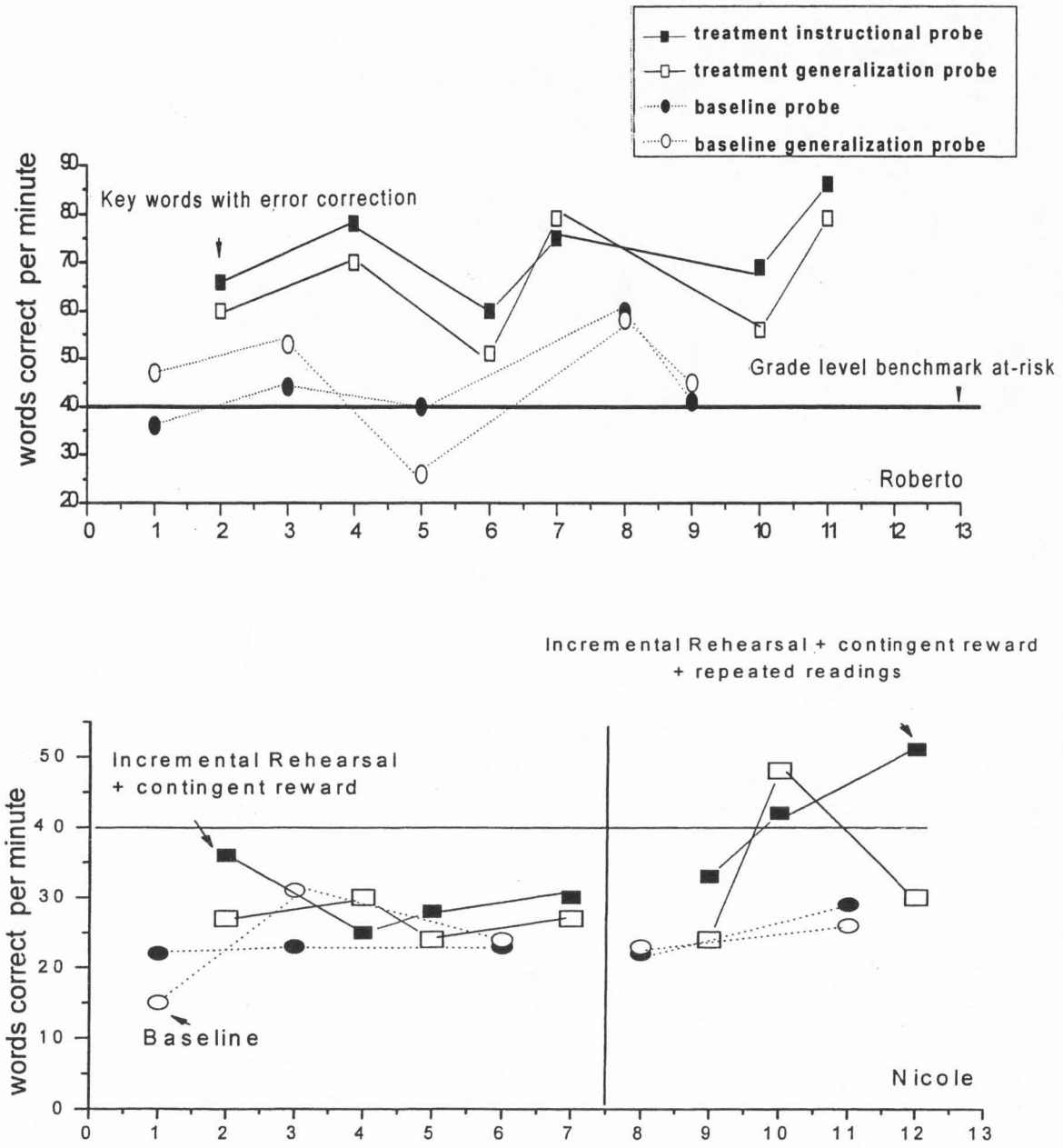



*Figure 5.* Number of correct words per minute on the instructional and generalization passages during extended analysis for Roberto and Nicole.

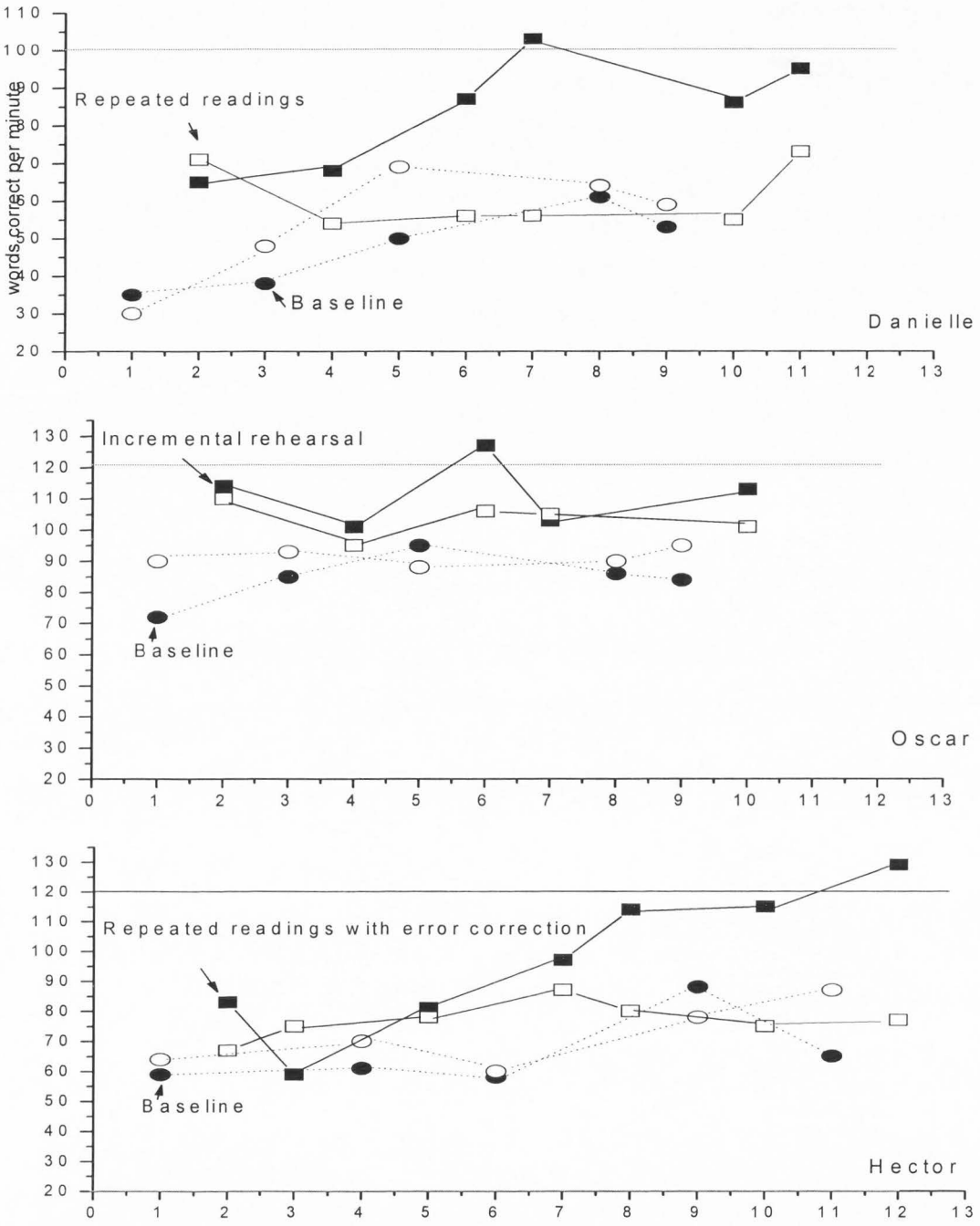



*Figure 6.* Number of correct words per minute on the instructional and generalization passages during extended analysis for Danielle, Oscar, and Hector.

Table 2

*Descriptive Statistics for the Five Participants During Extended Analysis*

| Participants | CW – IP | *SD* | Median | CW – GP | *SD* | Median |
|---|---|---|---|---|---|---|
| Roberto | | | | | | |
| Baseline (ORF) | 44.20 (36-60) | 9.28 | 41.00 | 45.80 (26-58) | 12.19 | 47.00 |
| Treatment (ORF) | 72.33 (60-86) | 9.27 | 72.00 | 65.83 (51-79) | 11.96 | 65.00 |
| Baseline (WRF) | 2.45 (6-12) | 2.45 | 10.00 | 10.90 (6-17) | 4.19 | 10.00 |
| Treatment (WRF) | 11.10 (6-18) | 4.20 | 10.00 | 6.42 (1-13) | 4.03 | 6.00 |
| Baseline (MF) | 6.00 (4-9) | 2.35 | 5.00 | | | |
| Treatment (MF) | 9.50 (5-10) | 2.23 | 9.50 | | | |
| Nicole | | | | | | |
| Baseline (ORF) | 23.80 (22-29) | 2.95 | 23.00 | 23.80 (15-31) | 5.81 | 24.00 |
| Treatment (ORF) | 29.75 (25-36) | 4.65 | 30.50 | 27.00 (24-30) | 2.45 | 27.00 |
| Modification (ORF) | 42.00 (33-51) | 9.00 | 42.00 | 34.00 (24-48) | 12.49 | 30.00 |
| Baseline (WRF) | 6.00 (5-8) | 2.55 | 7.00 | 6.40 (3-11) | 3.13 | 5.00 |
| Treatment (WRF) | 8.25 (4-12) | 3.50 | 8.50 | 7.00 (4-9) | 2.16 | 7.50 |
| Modification (WRF) | 11.67 (11-12) | 0.58 | 12.00 | 7.67 (4-10) | 3.21 | 9.00 |
| Baseline (MF) | 1.80 (0-4) | 1.87 | 3.00 | | | |
| Treatment (MF) | 3.00 (2-4) | 0.82 | 3.00 | | | |
| Modification (MF) | 3.67 (2-5) | 1.53 | 4.00 | | | |
| Danielle | | | | | | |
| Baseline (ORF) | 47.40 (38-61) | 10.78 | 50.00 | 54.00 (48-69) | 15.51 | 59.00 |
| Treatment (ORF) | 84.00 (65-103) | 14.91 | 86.50 | 60.83 (54-73) | 8.70 | 56.00 |
| Baseline (WRF) | 14.40 (7-25) | 9.66 | 12.00 | 11.80 (9-13) | 1.79 | 13.00 |
| Treatment (WRF) | 13.67 (7-29) | 8.55 | 10.00 | 8.17 (1-12) | 4.22 | 9.00 |
| Baseline (MF) | 6.40 (6-9) | 2.19 | 7.00 | | | |
| Treatment (MF) | 9.33 (7-11) | 1.37 | 9.50 | | | |
| Oscar | | | | | | |
| Baseline (ORF) | 84.40 (84-95) | 8.20 | 85.00 | 91.20 (88-95) | 2.77 | 90.00 |
| Treatment (ORF) | 111.60 (93-114) | 10.38 | 113.00 | 103.40 (81-144) | 5.68 | 105.00 |
| Baseline (WRF) | 12.20 (3-22) | 6.72 | 12.00 | 17.20 (15-20) | 2.77 | 17.00 |
| Treatment (WRF) | 16.60 (4-23) | 8.38 | 21.00 | 21.20 (17-25) | 2.95 | 22.00 |
| Baseline (MF) | 8.20 (7-11) | 1.64 | 8.00 | | | |
| Treatment (MF) | 10.20 (7-12) | 2.17 | 11.00 | | | |
| Hector | | | | | | |
| Baseline (ORF) | 66.20 (58-88) | 12.48 | 61.00 | 71.80 (60-87) | 10.87 | 70.00 |
| Treatment (ORF) | 96.86 (81-129) | 24.27 | 97.00 | 77.00 (75-87) | 6.03 | 77.00 |
| Baseline (WRF) | 25.20 (20-33) | 5.59 | 23.00 | 26.40 (25-30) | 2.07 | 26.00 |
| Treatment (WRF) | 24.14 (13-29) | 5.64 | 24.00 | 25.00 (8-31) | 7.77 | 27.00 |
| Baseline (MF) | 7.60 (5-10) | 1.95 | 7.00 | | | |
| Treatment (MF) | 10.14 (8-14) | 2.28 | 9.00 | | | |

*Note*. CW-IP = correct words in instructional passage; *SD* = standard deviation; CW-GP = correct words in generalization passage; ORF = oral reading fluency; WRF = written retell fluency; MF = maze fluency.

Mathur, Kavale, Quinn, Forness, and Rutherford (1998) reported that PND scores above 50% are necessary to conclude that a treatment is at least mildly effective. Table 3 summarizes the PND points between baseline and independent practice conditions for each participant. Each individual's ORF performance will be discussed from lower to upper grade students followed by a summary of the general findings of all 5 participants during the extended analysis on the maze and written retell reading probes.

*Roberto*

Roberto's ORF performance during the extended analysis steadily increased with intervention and on average was 72.33 correct words (*SD* = 9.27) on the instructional probes, which was significantly greater than the baseline average of 44.20 correct words (*SD* = 9.28). Roberto's performance on the generalization probes also yielded greater results with intervention, with an ORF average of 65.83 correct words (*SD* = 11.96) in comparison to a baseline average of 45.80 correct words (*SD* = 12.19). With treatment, Roberto's ORF performance always exceeded the benchmark grade level criterion on instructional probes with clear differentiation with PND of 100% between baseline and intervention where PND was 67% between baseline and treatment generalization probes.

*Nicole*

For Nicole, her ORF performance during the first four treatment sessions was an average of 29.75 correct words (*SD* = 4.65) on the instructional probe with intervention, which was slightly greater than baseline average at 22.67 correct words (*SD* = 0.58). However, no consistent performance gains were made over time with the incremental

Table 3

*Percentage of Nonoverlapping Data Points Between Baseline and Treatment Conditions on ORF Probes*

| Student | Instructional baseline to treatment (%) | Generalization baseline to treatment (%) |
|---|---|---|
| Roberto | 100% | 67% |
| Nicole | 50% | 0% |
| | 100% (modified) | 67% (modified) |
| Danielle | 100% | 33% |
| Oscar | 100% | 100% |
| Hector | 57% | 15% |

rehearsal plus contingent reward intervention on either the instructional or generalization probes obtaining PND of 50% and 0%, respectively.

Because the most intense intervention paired with contingent reward did not sufficiently increase Nicole's performance over time, repeated readings was added to increase practice. This treatment was selected due to the substantial ORF gains on the instructional probe during the brief experimental analysis. With additional practice, Nicole's ORF score rapidly increased above the benchmark grade level criterion within three sessions during the treatment condition with PND of 100%. Specifically, she obtained an average score of 42.00 correct words ($SD = 9.00$) as compared to a baseline average score of 25.50 correct words ($SD = 4.95$). Alternatively, ORF performance on

the generalization was variable, with an average of 34.00 correct words (*SD* = 12.49). Due to the end of the school year, treatment sessions ended before stability in generalization performance was obtained.

*Danielle*

Danielle showed increased ORF performance on both the baseline and instructional conditions during the extended analysis, though there was steadier growth and greater gains during the instructional probes, with an average of 84.00 words correct during treatment (*SD* = 14.91) in comparison to a baseline performance that averaged 47.40 correct words (*SD* = 10.78). Moreover, there was a clear differentiation between the treatment (PND = 100%) and baseline on the instructional probe and within 4 sessions Danielle's ORF performance exceeded the benchmark grade level criterion; however performance remained slightly below the benchmark for the last 3 sessions. Alternatively, there was very little improvement in terms of ORF performance on the generalization probes with no clear differentiation (PND = 33%) between the two conditions.

*Oscar*

Oscar showed increased ORF performance on the instructional conditions during the extended analysis, with an average of 111.60 words correct during treatment (*SD* = 10.38) in comparison to a baseline performance that averaged 84.40 correct words (*SD* = 8.20). Moreover, Oscar's ORF performance exceeded the benchmark grade level criterion on the instructional probe within three treatment sessions; however performance

remained slightly below the benchmark for the last four sessions. Overall, there was 100% PND points between treatment and baseline on both instructional and generalization probes. However, on average, he showed less improvement in terms of ORF performance on the generalization probes than the instructional probes with an average of 91.20 (*SD* = 2.77) during baseline to an average 103.40 (*SD* = 5.68) on the treatment generalization probe.

*Hector*

Hector showed improvement in terms of his reading fluency, with an average of 96.86 correct words (*SD* = 24.27) on the instructional probes and 66.20 correct words (*SD* = 12.48) at baseline. There is a clear differentiation between treatment and baseline performance on the instructional probe, though obtained PND was at 57%. In comparison, there was only a minimal increase in his ORF performance during the generalization probes with PND of 15%.

Overall, the brief experimental analysis identified an effective reading strategy as compared to baseline in four of the five cases, with Roberto responding to key words plus overcorrection, Danielle to repeated readings, Oscar to incremental rehearsal, and Hector to repeated readings and overcorrection. However, greater average gains and greater PND points were obtained on the instructional probes as compared to the generalization probes. Four of the five students reached the benchmark criterion on the instructional probe with the selected treatment from the results of the brief experimental analysis, but only Roberto reached the benchmark criterion on the generalization probe with the selected treatment based on results from the brief experimental analysis. Maze

performance on the baseline and instructional probe is shown in Figure 7. All students showed greater performance on the treatment maze probe averaging an increase of 2 words per minute in median score (range: 1.0 and 3.2 increase in maze words correct). Moreover, an average of 62% on PND points (range: 43%-83%) between baseline and treatment suggest that a substantial number of maze performance scores fell above the highest baseline performance (Scruggs, Mastropieri, & Castro, 1987). However, clear visible gains in maze slope with interventions were not observed for any student.

Figure 8 displays written retell fluency data for instructional and generalization probes. Overall, variable performance with no clear differentiation between written retell performance with and without treatment was observed for 4 of the 5 students. A slight improvement in written retell was observed with Nicole with a combination of incremental rehearsal, contingent reward, and repeated readings interventions, although few data points were collected under this condition.

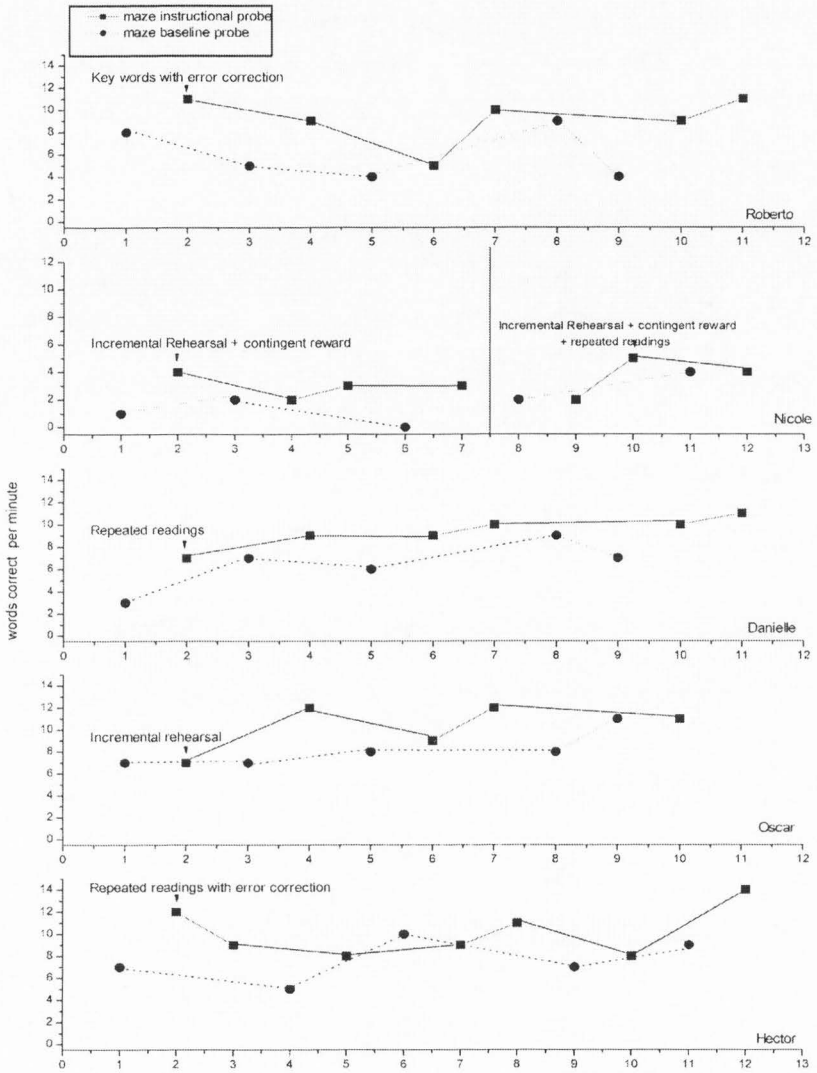



*Figure 7.* Number of words correct in the maze fluency condition during extended analysis for Roberto, Natalie, Danielle, Oscar, and Hector.

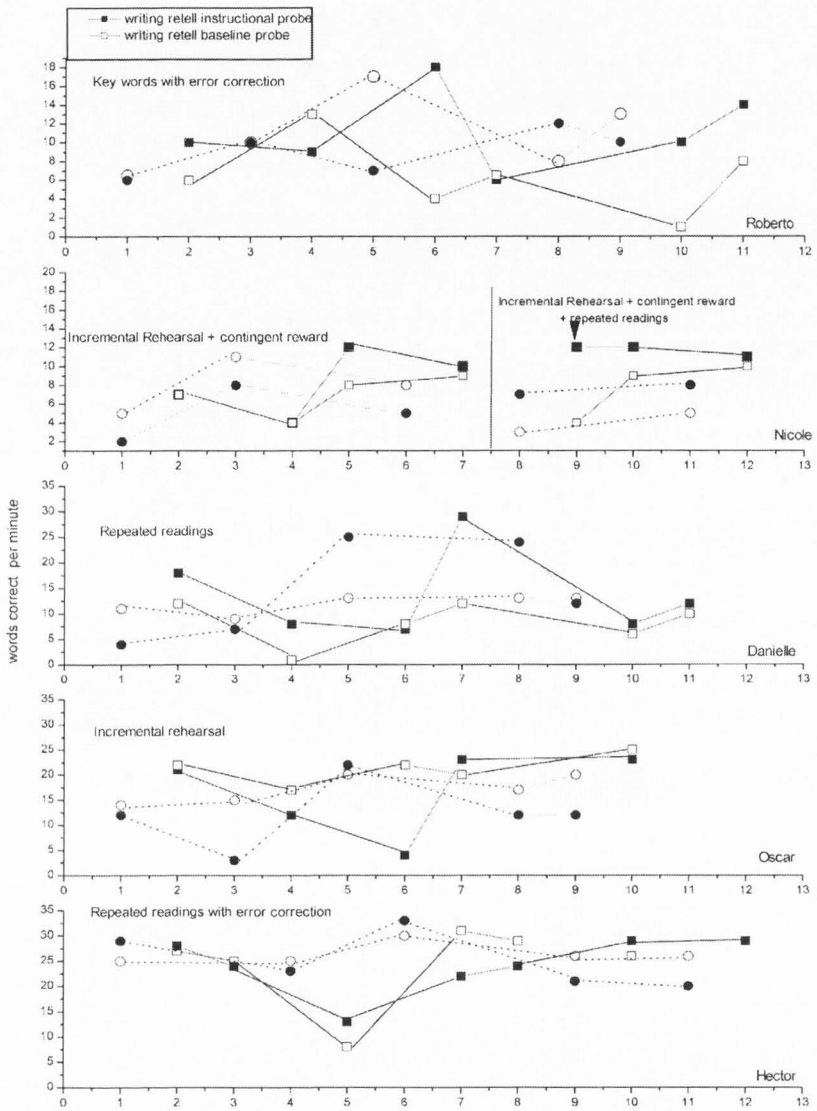



*Figure 8.* Number of words correct in the written retell fluency condition during extended analysis for Roberto, Natalie, Danielle, Oscar, and Hector.

# DISCUSSION

The overall purpose of this study was to evaluate the utility of using brief experimental analysis with CBM to determine effective and time efficient reading interventions for ELL that could be utilized within the classroom. Similar to previous studies (Daly et al., 1999; Eckert et al., 2000; Jones & Wickstrom, 2002; McComas et al., 1996; Noell et al., 2001) reading interventions were identified that increased participant performance, with individual differences in response to treatment.

The findings of this study indicate that the instructional needs of ELL can be isolated and confirmed using brief experimental analysis. To address ELL needs, the method used in this study extended the research of Daly et al. (1999) by implementing treatments sequentially, in relation to time and resources, from simple to more complex, and provided more complex language components. As in prior studies (Daly et al.; Jones & Wickstrom, 2002), brief experimental analysis was investigated to confirm effective reading interventions, which emphasized modeling, practice, and feedback via listening passage preview and repeated readings. In this study, the evaluation of interventions such as key words and incremental rehearsal provided the opportunity to determine whether the practicing of vocabulary words, which were located in the reading passages, would provide benefit for individuals whose second language was English. These empirically based treatments were selected for this study because they efficiently provided a means to teach word meaning with practice to promote understanding of the reading passage.

According to Biemiller (2003) there is substantial evidence that vocabulary is a

major determinant that may be limiting reading performance and is influenced by variations in home language support and school instruction. Direct teaching of vocabulary has been supported although on a limited basis to enhance reading comprehension within a short period of time (Bryant et al., 2003). Vocabulary building is of critical importance to students who are simultaneously learning new context and becoming more fluent in the English language (Gersten & Baker, 2000; O'Donnell et al., 2003). Results from this study showed that one student increased response to the presentation and defining of key words with error correction and one student increased response to continued exposure to unknown words, which were defined and used in sentences with corrective feedback. However, two of the five ELL in this study had the greatest performance when orally practicing reading several times without additional vocabulary support.

Further, an extended analysis of the effects of each treatment on ORF performance in instructional and generalization passages confirmed positive results for the idiosyncratic interventions. The descriptive statistics on change in ORF level between the baseline and treatment conditions, which included means, range, and PND points, support the overall stability of the brief experimental analysis results on the instructional probes and to a lesser extent on the generalization of skills. More importantly, four of the five students were able to increase slope, and showed growth within a relatively short period of time, with consistent performance that was near or above the benchmark criteria or above that of at-risk performance for reading difficulties on the instructional probe.

In the case of Nicole, a low ORF response on the instructional probe was obtained

with the selected treatment, but ORF performance was enhanced with a combination of the treatments used in the study. A number of factors may have influenced the lower performance results when given the selected treatment. For example, during baseline, Nicole had the lowest proficiency level as compared to other student participants. Thus, she had to make greater gains to meet the benchmark. In addition, Nicole's sessions were of the longest duration due to slower reading rates, which increased Nicole's effort and decreased treatment efficiency. According to the research assistants, even when Nicole was earning rewards on small gains, she had a very difficult time remaining focused.

Nicole's extended analysis results may also have been influenced by the decision-making process for treatment selection. Results from prior studies showed reliance on ORF increases on the instructional probes given during the brief analysis whereas in this study (Jones & Wickstrom, 2002; Noell et al., 2001) treatment selection was partially dependent on ORF increases on both instructional and generalization probes. A review of Nicole's data obtained during the brief experimental analysis shows a substantial increase in ORF performance on the instructional probe with repeated readings. However, there was not a corresponding increase on the generalization probe. Therefore, the more stringent criteria used in this study led to the selection of the incremental rehearsal treatment. Although not tested over time, repeated readings rather than a combination with vocabulary may have been the most efficient treatment for Nicole over time.

Although students typically increased fluency during the instructional probe, results were not supportive of consistent increased fluency when students read a

generalization probe. Daly et al. (1999) noted similar results in terms of generalization, which the authors hypothesized was due to choosing the simplest intervention that produced the highest response rate, without carefully configuring a better instructional level in terms of reading materials. In this study, the lower-than-expected performance on the generalization probes may also be a result of the additional fluency conditions (written retell, maze) administered between the generalization probes. These supplementary measures may have distracted the students from the original task or decreased attention and motivation due to additional effort, so that the ability to generalize similar reading content was hindered.

The utility of maze assessment for treatment selection using the brief experimental analysis approach was also examined in this study. Utilizing maze data as a screener for potentially effective interventions on reading comprehension has several advantages such as simple scoring and time-saving group administration. Moreover, Fuchs and Fuchs (1992) found that teachers report greater face validity of mazes as a measure of comprehension and reading rates although oral reading rates are highly correlated with comprehension ability. As a screener for early identification of reading failure, Ardoin et al. (2005) found that one administration of a CBM probe is a better predictor of overall reading achievement than the maze and some group-administered norm-referenced achievement tests.

Although mazes may not be a sensitive tool for screening at-risk reading, the ease and face validity of maze scores suggest that maze probes are a potentially acceptable tool if scores are psychometrically sensitive enough for treatment selection. For effective

treatment identification within the brief experimental analysis design, results in this study showed a general increase in maze performance with the introduction of treatment, however, the poor differentiation in scores between treatments did not enable us to identify which treatment would be most effective over time. Although a larger sample is required for confident conclusions, these results suggest that mazes may indicate whether or not treatment would be beneficial. However, mazes may not be a sensitive measure that distinguishes student growth between alternative treatment options using the brief analysis approach used in prior studies.

A brief analysis of improvements in written recall, which was based on the content of a reading passage was also examined in this study. A multivocal synthesis of recent literature on effective instructional needs for ELL with professional interviews conducted by Gersten and Baker (2000) revealed a concern with time management during the school day that would balance the double demand of English language development and acquisition of curriculum content. Additionally, observational data in classrooms indicates that for ELL, additional strategies are needed to increase oral and written English practice while meeting the goal of content learning (Ramirez, 1992; Ruiz, 1995).

In order to enhance language activity within the reading curriculum requirements, the participants in this study were provided with frequent opportunities to use both oral and written English skills with intervention designed to improve reading skills. Although oral reading improved, written performance was variable during all experimental conditions with no clear changes or differentiation between baseline and treatment in change of growth over time or level regardless of writing measurement. However,

increased rates of ORF responses may have been influenced by the participants' conveyance of his or her thoughts in a written format. The effects of additional written practice of oral reading material on reading comprehension or oral reading rates could be examined by comparing reading performance with and without written practice in future studies. In addition, future research should address whether support, such as brief feedback, could efficiently enhance students English-writing skills by practicing these skills while simultaneously learning reading skills.

## Limitations

The findings of this study must be interpreted with caution, for several reasons. First, the small sample of ELL participants in this study limits the present findings because it is not representative of the entire population. In particular, there are severe limitations in generalization due to the differences in English-language proficiency, school experience, English language development programs, as well as the length of time in the U.S (Lam, 1992). Further, because there is such diversity amongst ELL, there is no way of generalizing specific interventions for this population. Therefore, there is no ability to distinguish between interventions that are primarily helpful for ELL and those that are helpful for at-risk populations.

A second limitation of the study pertains to how beneficial brief experimental analysis using CBM may be within the classroom environment. Though all interventions were completed within 12 minutes per individual, with some components showing more efficiency in terms of being administered in small groups, research assistants

implemented the interventions. Thus, the ability for educators or peer tutors to generalize and consistently use more time and labor intensive interventions with high integrity such as key words and incremental rehearsal as a classroom intervention is unknown. Given the lack of fidelity often found with teacher implementation of interventions (Wickstrom, Jones, LaFleur, & Witt, 1998), brief experimental analysis using CBM needs to be explored further as a practical intervention that could be used within the classroom.

A third limitation is the potential effect of multiple assessments on reading performance. Because students also completed maze and written retell probes prior to generalization probes, student endurance may have influenced the low results obtained on these probes.

A fourth limitation is the potential effect of vocabulary practice on the mastery of vocabulary words orally read or defined during the instruction trial. Unknown words were identified in this study either by having students circle any unknown words or counting a word as unknown if a word was misread during oral reading practice. Although this strategy has been suggested by reading experts as a means for identifying individual unknown words (O'Donnell et al., 2003), this or other strategies have not yet been empirically supported. Because this study only focused on ORF deficits initially, the amount of words read correctly was monitored, rather than the acquisition of vocabulary. Due to the importance of vocabulary building for both English language development and reading comprehension, it would be beneficial to determine the long-term benefits of word identification strategies, like key words and incremental rehearsal, on vocabulary development for ELL, in future studies.

The final limitation to the study is that the procedures used did not allow an evaluation of the difference in effectiveness of the least and most effective treatment selected, based on the data from the brief experimental analysis, over time. However, a follow up study to compare high and low treatments may provide support for the utility of this assessment procedure.

## Practical Implications

Limitations notwithstanding, the use of brief experimental analysis using CBM showed individual differences in response to intervention, with brief exposure to treatments administered sequentially, in relation to time, resources, and language support, with each student showing growth over time. Even the most complex intervention session (i.e., repeated readings and incremental rehearsal) was completed within 15 minutes. To further decrease teacher effort, reading and vocabulary practice can be implemented with small groups of children (Rousseau et al., 1993) and with peer tutors (Dufrene, Noell, & Gilbertson, 2005). Thus, these findings further support the effective use of these interventions for classroom settings, in which teachers can efficiently administer reading interventions in an idiographic manner, prior to making recommendations for specialized services (i.e., special education).

An important practical implication of this process is that it allows for data-based decision-making to test hypotheses and to determine the level of resources needed to promote reading growth. Once an intervention was identified, student responsiveness or nonresponsiveness to an intervention was determined within five to six sessions. Thus,

within several weeks, school personnel may determine a student's level of responsiveness to either a simple classroom intervention or a complex intervention that warrants special education resources. In addition, assessment of intervention effects can be evaluated using CBM many times throughout the school year, unlike traditional assessment measures, which only look at one point in time. Therefore, for students that exhibit learning difficulties in reading and comprehension, it may be valuable to implement brief experimental analysis to determine the best approach for each student.

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# APPENDICES

# Appendix A: Informed Consent (English Form)

BASIC READING SKILLS PROGRAM

We are writing to request permission to work with your child on basic reading skills. Your child would be working with graduate and undergraduate students from the School Psychology Program at USU for 15 minutes a day to practice and learn basic reading skills. These students are under the supervision of Professor Donna Gilbertson, Ph.D. The goal of this project is to study time saving strategies that may help increase children's academic skills and working behaviors.

We feel this program will benefit your child by giving him or her the opportunity to improve reading skills as well as his or her working behaviors. As part of this project, your child will first be asked to read and write for a few minutes as we try various ways that would best improve reading and writing. Once we have identified the type of teaching that works best for your child, we will continue to work on reading and writing for 15 minutes each day for about four weeks. If classroom behavior is also a concern, then we will work with your child to find and compare behavior plans that may both increase your child's classroom working behaviors as well as academic skills.

Your child's records will remain confidential. Only the investigator and research team will have access to the records. These records will be kept in a locked file for one year and then will be destroyed. If your child's results are included in any research reports, his or her name will not be included in the report. However, your child's progress will be shared with you at the end of this study. And with your permission, we can share what works best for your child with his or her teacher.

Your decision to have your child's participation in this reading research program is voluntary. If, at any time, you feel the program is not beneficial, then you may withdraw your child from the program. During the course of this project, if any new information such as risks or benefits or any changes that might cause you to change your mind develop, then you will be contacted immediately and your consent will be requested again.

The Institutional Review Board (IRB) for the protection of human subjects at Utah State University has reviewed and approved this research project.

You have been given two copies of this Informed Consent. Please sign both copies and retain one copy for your files. Please contact us at your earliest convenience if you have any further questions. We can be reached at Lincoln Elementary, or 797-2034, Donna Gilbertson.

Donna Gilbertson, Ph.D.
Utah State University
School Psychology Department

Kimberley Malloy, B.S.
USU Graduate Student

797-2034

**By signing this form, you are giving consent for your child to participate in the reading research program.**

Signature of Parent or Guardian: _____

I certify that the research study has been explained to the above individual, by my research staff, or me and that the individual understands the nature and purpose, the possible risks and benefits associated with taking part in this research study. Any questions that have been raised have been answered.

Student Consent:

I understand that my parent(s) know about this **reading class** and that permission has been given to me to participate. I understand that it is up to me to participate even if my parents say yes. If I do not want to be in this group, I do not have to and no one will be upset if I do not participate or if I change my mind later and want to stop. I can ask any questions I have about **the reading class** now or later. By signing below, I agree to participate.

Signature of Student: _____

Appendix B: Informed Consent (Spanish Form)

ACUERDO
PROGRAMA DE LAS HABILIDADES BASICAS DE LA LECTURA

Introducción/Propósito.

Estamos escribiendo para pedir el permiso de trabajar con su niño en habilidades básicas de la lectura. Su niño estaría trabajando con los estudiantes del Bachillerato que pertenecen a la escuela de psicología de la Universidad Estatal de Utah por 15 minutos al día para practicar y para aprender habilidades de la lectura. Estos estudiantes están bajo supervisión de profesor Donna Gilbertson, Ph.D. La meta de este proyecto es estudiar las estrategias del ahorro de tiempo que pueden ayudar a aumentar habilidades académicas de children.s y comportamientos de trabajo.

Procedimientos / Beneficios.

Pensamos que este proyecto ayudará a su niño al darle la oportunidad de mejorar sus habilidades de lectura así como sus comportamientos de trabajo. Como parte de este proyecto, se pedirá a su niño que primero nos lea a nosotros palabras o letras por algunos minutos, al mismo tiempo que intentamos varias maneras para que mejore lo mejor posible sus habilidades de lectura. Una vez que hayamos encontrado el tipo de enseñar que los trabajos lo más mejor posible para su niño, nosotros trabajarán en la lectura con su niño por 15 minutos cada día durante cuatro semanas. Si el comportamiento de la sala de clase es también una preocupación, entonces trabajaremos con su niño para encontrar un plan que pueda aumentar sus habilidades de trabajo de la sala de clase del niño y habilidades académicas.

Confidencialidad

Los expedientes de su niño serán utilizados confidencialmente. Solamente el equipo de investigación tendrán acceso a los expedientes. Si los resultados del trabajo con su niño se incluyen en cualquiera de los informes que se hagan, el nombre de su niño no será incluido en el informe. Sin embargo, el progreso que su niño tenga será compartido con usted en el final de este estudio. Teniendo su permiso nosotros podemos dar recomendaciones al profesor de su niño para los métodos enseñanza que mejor funciona con su niño.

Acuerdo Voluntario / Nuevos Resultados.

Su decisión de permitir la participación de su niño en este programa de investigación es voluntaria. Si en cualquier momento piensa que el programa no es beneficioso para su niño, usted puede decider retirar a su niño del programa. Durante el transcurso de este proyecto, si cualquier nueva información tal como riesgos o ventajas o cambios que hacer cambiar lo que piensa de este proyecto, entonces nosotros lo contactamos inmediatamente y le solicitaremos nuevamente su permiso o contentimiento de dejar a que su niño continue participando en el estudio.

Aprobación Institucional Del Que Examina el Estudio.

El Comité Examinador Institucional (IRB) para la protección de los derechos de los participantes en cualquier estudio de la Universidad Estatal de Utah ha revisado y aprobado éste proyecto de investigación.

Explicación / Ofrecimiento para contestar preguntas / copia del acuerdo.

Le han dado a usted dos copias de este acuerdo. Por favor firme ambas copias y conserve una copia para usted. Firmando esta forma, usted está dando el permiso para que su niño participe en el programa de investigación de la lectura. Aunque Donna Gilbertson ha explicado a usted en que consiste el estudio, por favor sepa que puede contactarnos en cualquier momento si usted tiene alguna pregunta relacionado al estudio. Puede localizarnos en la Escuela Primaria Lincoln o llamar al telefono de Donna Gilbertson, 797-2034.

Firma del Padre o del Guardián legal: _____

Acuerdo Del Estudiante:

Entiendo que mi madre/padre está(n) enterado(s) de esta clase de la lectura y que me han dado permiso para participar. Entiendo que es mi decision participar aun cuando mis padres dicen que sí. Si no quiero estar en este grupo no tengo por que hacerlo y nadie puedo molestarse si no quier participar en el studio o si cambio de idea más adelante y no deseo continuar. Tengo el derecho de hacer cualquier pregunta que tenga sobre el grupo ya sea ahora o más adelante. Firmando esta hojo, yo estoy de acuerdo en participar.

Firma del Estudiante: _____

Certifico que el estudio ha sido explicado a la persona que firma este acuerdo por me (Donna) o por mi equipo de investigación, y qué ésta persona entiene la naturaleza y el propósito del estudio, los posibles riesgos y las ventajas asociadas al participar en éste estudio. Cualquier pregunta que surgieron fueron contestadas debidamente.

Firma del PI:_____ _____

Donna Gilbertson, PhD.
Universidad Estatal de Utah
Departamento de Psicología
797-2034

Kimberley J. Malloy
Asistente de Investigación

# Appendix C: Maze Passages

Name:
Teacher:
Date:

Each day I fly _____ (painter, through, laughter) the zoo, watching as the people pass by. They stare, and make _____ (hearts, ankles, sounds) like "oh" and "wow." Sometimes the smaller people cannot _____ (ten, for, see) anything because their legs are too short. The people do not _____ (watch, purple, steep) me because I am a small size. I quickly fly out of _____ (she, the, stay) way before they can see me. If you asked the _____ (people, grass, tails) why they do not watch me, they would say that I was not important enough to watch. They see me as a _____ (common, litter, bring), everyday animal, not special like the jaguar. I love living in the _____ (hop, and, zoo). Unlike those who are _____ (angle, they, caged), I have my freedom. I have freedom to _____ (explore, angered, apples) and lay my eggs in safe places. People are very messy creatures, _____ (oranges, dropping, rainbow) garbage everywhere, but their garbage shall be my dinner. The best place for a _____ (bank, legs, bird) to live is the zoo.

# Appendix D: Treasure Chest Items

____ 1. Candy

____ 2. Fruit roll ups

____ 3. Fruit punch drink

____ 4. Pencils

____ 5. Erasers

____ 6. Pens

____ 7. Markers

____ 8. Stickers

____ 9. Small toys

____ 10. Hair decorations

# Appendix E: Procedural Protocol

**Baseline** **STUDENT:_____ DATE:_____**

**Instruction Generalization**

I: ____G:____ "WHEN I SAY 'START', BEGIN READING ALOUD AT THE TOP OF THE PAGE. READ ACROSS THE PAGE (DEMONSTRATE BY POINTING). TRY TO READ EACH WORD. IF YOU COME ACROSS A WORD THAT YOU DO NOT KNOW, I WILL TELL YOU. BE SURE TO DO YOUR BEST READING. DO YOU HAVE ANY QUESTIONS?"

I: ____G:____ "START." Begin your stopwatch for one minute when first word is read.

I: ____G:____ Mark errors. Tell the student a word only if the word is not read after three seconds.

I: ____G:____ After one minute draw a vertical line after last word read but let student finish reading entire probe.

I: ____G:____ "PLEASE WRITE ALL ABOUT WHAT YOU JUST READ. TRY TO WRITE EVERYTHING YOU CAN. BEGIN."

I: ____G:____ Begin your stopwatch for two minutes.

*If child does not start after 3 seconds say "TRY TO WRITE EVERYTHING YOU CAN". Stop if the child does not begin after 10 more seconds.*

I: ____G:____ "YOU WROTE __ WORDS CORRECT" after the probe is scored.

I: ____ MAZE: Place the maze probe in front of the child. READ THIS STORY. YOU WILL COME ACROSS BLANKS OR LINES WITH THREE WORDS WRITTEN UNDER THE LINE. WHEN YOU COME TO A BLANK, CIRCLE THE WORD THAT BEST FITS INTO THE STORY. BEGIN.

I: ____ Begin your stopwatch for one minute and stop the child when the timer rings.

**Reward Contingency** **STUDENT:** **DATE:**

____ "THE LAST TIME THAT YOU READ A STORY, YOU READ ____ WORDS CORRECTLY. I AM GOING TO GIVE YOU AN OPPORTUNITY TO READ THIS STORY AGAIN. IF YOU CAN READ MORE WORDS THIS TIME THAN LAST TIME, THEN YOU CAN PICK ANYTHING YOU LIKE FROM THE TREASURE CHEST." Show the student the treasure chest.

____ Ask "DO YOU SEE ANYTHING IN THERE THAT YOU WOULD LIKE TO EARN?"

**Assessment Probe:**

____ "WHEN I SAY 'START', BEGIN READING ALOUD AT THE TOP OF THE PAGE. READ ACROSS THE PAGE (DEMONSTRATE BY POINTING). TRY TO READ EACH WORD. IF YOU COME ACROSS A WORD THAT YOU DO NOT KNOW, I WILL TELL YOU. THE GOAL IS FOR YOU TO READ AS MANY WORDS AS YOU CAN CORRECTLY IN ONE MINUTE. BE SURE TO DO YOUR BEST READING. DO YOU HAVE ANY QUESTIONS?"

____ "START." Begin your stopwatch for one minute. Follow along on your copy and mark errors. If the student pauses on a word, wait only three seconds, tell the student the word, and move on.

____ After one-minute draw a vertical line after the last word read but let student read entire probe.

____ "YOU READ __ WORDS CORRECT" after the probe is scored. Give the reward of goal is met.

____ "THE LAST TIME THAT YOU WROTE ABOUT A STORY, YOU WROTE ____ WORDS. PLEASE WRITE ALL ABOUT WHAT YOU JUST READ. TRY TO WRITE EVERYTHING YOU CAN AND WRITE MORE WORDS FOR A REWARD. BEGIN."

____ Begin your stopwatch for two minutes.

*If child does not start after 3 seconds say "TRY TO WRITE EVERYTHING YOU CAN". Stop if the child does not begin after 10 more seconds.*

____ "YOU WROTE __ WORDS CORRECT" after the probe is scored. Give the reward if goal is met.

____ MAZE: Place the maze probe in front of the child. READ THIS STORY. YOU WILL COME ACROSS BLANKS OR LINES WITH THREE WORDS WRITTEN UNDER THE LINE. WHEN YOU COME TO A BLANK, CIRCLE THE WORD THAT BEST FITS INTO THE STORY. THE LAST TIME THAT YOU WROTE ABOUT A STORY, YOU WROTE ____ WORDS. BEGIN.

____ Begin your stopwatch for one minute and stop the child when the timer rings.

____ "YOU GOT __ WORDS CORRECT" after the probe is scored. Give the reward of goal is met.

**Generalization Assessment:**

____ Remove the instructional passage and replace it with the Generalization passage.

____ Say: "NOW I WOULD LIKE FOR YOU TO READ THIS STORY. THIS TIME YOU CAN EARN THE REWARD FOR DOING WELL. IN ORDER TO EARN THE REWARD YOU WILL HAVE TO BEAT YOUR LAST SCORE, WHILE MAKING NO MORE THAN THREE ERRORS. WHEN I SAY 'BEGIN', START READING ALOUD AT THE TOP OF THE PAGE (point to the top of the page) AND READ ACROSS THE PAGE (demonstrate by pointing). TRY TO READ EACH WORD. IF YOU COME ACROSS A WORD YOU DO NOT KNOW, I WILL TELL IT TO YOU. DO NOT STOP READING UNTIL I SAY 'STOP'. BE SURE TO DO YOUR BEST READING."

____ Say: "START!" and start the stopwatch for one minute when the first word is read

____ Mark errors. If the student hesitates on a word for more than 3 seconds, say the word and put a slash through it.

____ Bracket the last word read and tell the student to stop reading.

____ "YOU READ __ WORDS CORRECT" after the probe is scored. Give the reward if goal is met. "THE LAST TIME THAT YOU WROTE ABOUT A STORY, YOU WROTE ____ WORDS ABOUT THE STORY. PLEASE WRITE ALL ABOUT WHAT YOU JUST READ. TRY TO WRITE EVERYTHING YOU CAN AND WRITE MORE WORDS FOR A REWARD. BEGIN."

____ Begin your stopwatch for two minutes.

*If child does not start after 3 seconds say "TRY TO WRITE EVERYTHING YOU CAN". Stop if the child does not begin after 10 more seconds.*

____ "YOU WROTE __ WORDS CORRECT" after the probe is scored. Give the reward of goal is met.

**Listening Passage Preview** **STUDENT:** _____ **DATE:** _____

____ Place the Instructional Passage in front of the student. "HERE IS A STORY THAT I WOULD LIKE FOR YOU TO READ. HOWEVER, I AM GOING TO READ THE STORY TO YOU FIRST. PLEASE FOLLOW ALONG WITH YOUR FINGER, READING THE WORDS TO YOURSELF AS I SAY THEM."

____ **MODEL:** Read the entire passage at a pace that slightly slower than you would read the passage. Make sure the student to follow along with his/her finger.

____ **PRACTICE**: "NOW I WANT YOU TO PRACTICE READING THE STORY TO HELP YOU GET BETTER AT READING. READ THE STORY ALOUD. TRY TO READ EACH WORD. IF YOU COME TO A WORD YOU DO NOT KNOW, I WILL TELL IT TO YOU.

____ **ERROR CORRECTION while practicing**: When a student hesitates on a word for more than 3 seconds, misreads, or omits a word, tell the word to the child and have child repeat the word correctly.

**2 ASSESSMENTS (first on same story (instructional) and on generalization probe)**

**Instruction Generalization**

I: ____G:____ "WHEN I SAY 'START', BEGIN READING ALOUD AT THE TOP OF THE PAGE. READ ACROSS THE PAGE (DEMONSTRATE BY POINTING). TRY TO READ EACH WORD. IF YOU COME ACROSS A WORD THAT YOU DO NOT KNOW, I WILL TELL YOU. BE SURE TO DO YOUR BEST READING. DO YOU HAVE ANY QUESTIONS?"

I: ____G:____ "START." Begin your stopwatch for one minute when first word is read.

I: ____G:____ Mark errors. Tell the student a word only if a read is not read after three seconds

I: ____G:____ After one minute draw a vertical line after last word read, but let student finish reading entire probe

I: ____G:____ "PLEASE WRITE ALL ABOUT WHAT YOU JUST READ. TRY TO WRITE EVERYTHING YOU CAN. BEGIN."

I: ____ G:____ Begin your stopwatch for two minutes.

*If child does not start after 3 seconds say "TRY TO WRITE EVERYTHING YOU CAN". Stop if the child does not begin after 10 more seconds.*

I: ____ G:____ "YOU WROTE __ WORDS CORRECT" after the probe is scored.

I: ____ MAZE: Place the maze probe in front of the child. READ THIS STORY. YOU WILL COME ACROSS BLANKS OR LINES WITH THREE WORDS WRITTEN UNDER THE LINE. WHEN YOU COME TO A BLANK, CIRCLE THE WORD THAT BEST FITS INTO THE STORY. BEGIN.

I: ____ Begin your stopwatch for one minute and stop the child when the timer rings.

**Repeated Readings** **STUDENT:_____ DATE:_____**

____ Place the Instructional Passage in front of the student
"HERE IS A STORY THAT I WOULD LIKE FOR YOU TO READ FOR ME. TO GET BETTER AT READING. I AM GOING TO HAVE YOU READ THIS STORY FOUR TIMES. EACH TIME I WILL TELL YOU HOW FAST YOU READ THE STORY AND HOW MANY WORDS YOU MISSED. READ THE STORY ALOUD. IF YOU COME TO A WORD YOU DO NOT KNOW, I WILL TELL YOU."

____ The examiner says "BEGIN!" and starts the stopwatch when the student says the first word.

____ **ERROR CORRECTION:** When a student hesitates on a word for more than 3 seconds, mispronounces a word, or omits a word, say the word to the child and have him repeat the word correctly before continuing to read.

____ Have the student read the passage <u>three</u> times with error correction

**2 ASSESSMENTS ((first on same story (instructional) and on generalization probe))**

**Instruction Generalization**

I: ____G:____ "WHEN I SAY 'START', BEGIN READING ALOUD AT THE TOP OF THE PAGE. READ ACROSS THE PAGE (DEMONSTRATE BY POINTING). TRY TO READ EACH WORD. IF YOU COME ACROSS A WORD THAT YOU DO NOT KNOW, I WILL TELL YOU. BE SURE TO DO YOUR BEST READING. DO YOU HAVE ANY QUESTIONS?"

I: ____G:____ "START." Begin your stopwatch for one minute when first word is read.

I: ____G:____ Mark errors. <u>Tell the student a word only if a read is not read after three seconds</u>

I: ____G:____ After one minute draw a vertical line after last word read but let student finish reading entire probe

I: ____G:____ "PLEASE WRITE ALL ABOUT WHAT YOU JUST READ. TRY TO WRITE EVERYTHING YOU CAN. BEGIN."

I: ____G:____ Begin your stopwatch for two minutes.

*If child does not start after 3 seconds say "TRY TO WRITE EVERYTHING YOU CAN". Stop if the child does not begin after 10 more seconds.*

I: ____ G:____ "YOU WROTE __ WORDS CORRECT" after the probe is scored.

I: ____ MAZE: Place the maze probe in front of the child. READ THIS STORY. YOU WILL COME ACROSS BLANKS OR LINES WITH THREE WORDS WRITTEN UNDER THE LINE. WHEN YOU COME TO A BLANK, CIRCLE THE WORD THAT BEST FITS INTO THE STORY. BEGIN.

I: ____ Begin your stopwatch for one minute and stop the child when the timer rings.

**Key Words** **STUDENT:** **DATE:**

____ Place the probe in front of the student.
"CIRCLE ANY WORD THAT LOOKS HARD TO READ AND WOULD BE HARD TO EXPLAIN."

____ **PRACTICE:** "NOW I WANT YOU TO PRACTICE READING THE STORY TO HELP YOU GET BETTER AT READING. READ THE STORY ALOUD. IF YOU COME TO A WORD YOU DO NOT KNOW, I WILL TELL IT TO YOU.

____ **ERROR CORRECTION:** When a student hesitates on a word for more than 3 seconds, mispronounces a word, or omits a word, say the word to the child and have him repeat the word correctly before continuing to read. CIRLCE any word that you had to correct.

____ Write the first 5 circles words on the board. If 5 words are not circled, select words that were errors during practice. If you still do not have 5 words, select words from key words listed on your probe.

____ Read the five words to the student, and ask the student to repeat the words. "THIS IS ___. WHAT IS THE WORD?"

____ Define the word through verbal explanation, gestures, and/or modeling to convey the meaning. "THIS WORD MEANS…..

____ Use the word in a sentence. "YOU COULD USE THE WORD IN THIS SENTENCE…."

**2 ASSESSMENTS (first on same story (instructional) and on generalization probe)**

**Instruction Generalization**

I: ____G:____ "WHEN I SAY 'START', BEGIN READING ALOUD AT THE TOP OF THE PAGE. READ ACROSS THE PAGE (DEMONSTRATE BY POINTING). TRY TO READ EACH WORD. IF YOU COME ACROSS A WORD THAT YOU DO NOT KNOW, I WILL TELL YOU. BE SURE TO DO YOUR BEST READING. DO YOU HAVE ANY QUESTIONS?"

I: ____G:____ "START." Begin your stopwatch for one minute when first word is read.

I: ____G:____ Mark errors. Tell the student a word only if a read is not read after

three seconds

I: ____ G:____ After one minute draw a vertical line after last word read, but let student finish reading entire probe

I: ____ G:____ "PLEASE WRITE ALL ABOUT WHAT YOU JUST READ. TRY TO WRITE EVERYTHING YOU CAN. BEGIN."

I: ____ G:____ Begin your stopwatch for two minutes.

*If child does not start after 3 seconds say "TRY TO WRITE EVERYTHING YOU CAN". Stop if the child does not begin after 10 more seconds.*

I: ____ G:____ "YOU WROTE __ WORDS CORRECT" after the probe is scored.

I: ____ Place the maze probe in front of the child. READ THIS STORY. YOU WILL COME ACROSS BLANKS OR LINES WITH THREE WORDS WRITTEN UNDER THE LINE. WHEN YOU COME TO A BLANK, CIRCLE THE WORD THAT BEST FITS INTO THE STORY. BEGIN.

I: ____ Begin your stopwatch for one minute and stop the child when the timer rings.

**Incremental Rehearsal** **STUDENT:** **DATE:**

____ Place the probe in front of the student.
"CIRCLE ANY WORD THAT LOOKS HARD TO READ AND WOULD BE HARD TO EXPLAIN."

____ **PRACTICE:** "NOW I WANT YOU TO PRACTICE READING THE STORY TO HELP YOU GET BETTER AT READING. READ THE STORY ALOUD. IF YOU COME TO A WORD YOU DO NOT KNOW, I WILL TELL IT TO YOU.

____ **ERROR CORRECTION:** When a student hesitates on a word for more than 3 seconds, mispronounces a word, or omits a word, say the word to the child and have him repeat the word correctly before continuing to read. CIRLCE any word that you had to correct.

____ Write the first 5 circles words on the board. If 5 words are not circled, select words that were errors during practice. If you still do not have 5 words, select words from key words listed on your probe.

____ Read the FIRST word to the student, define the word through verbal explanation, gestures, and/or modeling to convey the meaning. "THIS WORD MEANS….. Use the word in a sentence. "YOU COULD USE THE WORD IN THIS SENTENCE…."

____ Ask the student to say the word, define it, and use it in a sentence.
At all times: *If there is no response in 10 seconds, give the answer and have them repeat it.*

____ Present the SECOND word and pronounce the word, define it and use it in a sentence.
Ask the student to say the word, define it, and use it in a sentence.
THEN present the FIRST word asking the student to say the word, define it, and use it in a sentence. Correct any errors.

____ Present the THIRD word and pronounce the word, define it and use it in a sentence.
Ask the student to say the word, define it, and use it in a sentence.
THEN present the SECOND word asking for to read, define, and use the word in a sentence.
THEN present the FIRST word asking for to read, define, and use the word in a sentence.

____ Present the FOURTH word and pronounce the word, define it and use it in a

sentence.
Ask the student to say the word, define it, and use it in a sentence.
THEN Present the THIRD word asking for to read, define, and use the word in a sentence.
THEN present the SECOND word asking for to read, define, and use the word in a sentence.
THEN present the FIRST word asking for to read, define, and use the word in a sentence.

____ Present the FIFTH word and pronounce the word, define it and use it in a sentence.
Ask the student to say the word, define it, and use it in a sentence.
THEN Present the FOURTH word asking for to read, define, and use the word in a sentence.
THEN present the THIRD word asking for to read, define, and use the word in a sentence.
THEN present the SECOND word asking for to read, define, and use the word in a sentence.
THEN present the FIRST word asking for to read, define, and use the word in a sentence.

**2 ASSESSMENTS ((first on same story (instructional) and on generalization probe))**

**Instruction Generalization**

I: ____G:____ "WHEN I SAY 'START', BEGIN READING ALOUD AT THE TOP OF THE PAGE. READ ACROSS THE PAGE (DEMONSTRATE BY POINTING). TRY TO READ EACH WORD. IF YOU COME ACROSS A WORD THAT YOU DO NOT KNOW, I WILL TELL YOU. BE SURE TO DO YOUR BEST READING. DO YOU HAVE ANY QUESTIONS?"

I: ____G:____ "START." Begin your stopwatch for one minute when first word is read.

I: ____G:____ Mark errors. Tell the student a word only if a read is not read after three seconds

I: ____G:____ After one minute draw a vertical line after last word read but let student finish reading entire probe

I: ____G:____ "PLEASE WRITE ALL ABOUT WHAT YOU JUST READ. TRY TO WRITE EVERYTHING YOU CAN. BEGIN."

I: ____ G:____ Begin your stopwatch for two minutes.

*If child does not start after 3 seconds say "TRY TO WRITE EVERYTHING YOU CAN". Stop if the child does not begin after 10 more seconds.*

I: ____ G:____ "YOU WROTE __ WORDS CORRECT" after the probe is scored.

I: ____ MAZE: Place the maze probe in front of the child. READ THIS STORY. YOU WILL COME ACROSS BLANKS OR LINES WITH THREE WORDS WRITTEN UNDER THE LINE. WHEN YOU COME TO A BLANK, CIRCLE THE WORD THAT BEST FITS INTO THE STORY. BEGIN.

I: ____ Begin your stopwatch for one minute and stop the child when the timer rings.

# Appendix F: Treatment Selection Guide

Guidelines for selecting effective treatment components based on brief experimental analysis results:

1. Implementing baseline, RC, LPP, RR, KW, and IR. Go to Step 2.

2. Choose all treatment(s) that meets the following three criterions.
   (a) ORF > 2 or more words than baseline score in instructional and generalization passage and
   (b) Maze > 1 word than baseline on instructional and
   (c) Written > 10% words written during baseline

   If there is more than one treatment selected, then go to step 3. However, if one treatment is selected then go to Step 5.

3. Choose between the treatments selected in step 2 the treatment(s) that follows the following criterions:
   (a) Has the largest ORF ratio when treatment is compared to baseline and
   (b) Has an increased effect of > 2 ORF or more on generalization passage.

   If two treatments meet these criteria, then select the treatment that has the highest maze or written assessment relative to baseline and each compared treatment. If two treatments are selected, then go to step 4. However, if one treatment is selected then go to Step 5.

4. Choose the simplest treatment (RC simpler than LPP simpler than RR simpler than KW simpler than IR). If two treatments are selected, assess the combination of the two highest treatments. Go to Step 5.

5. If the reward condition was not selected and if the reward condition increased >2 ORF from baseline, assess if reward would further increase the effect of the selected instructional treatment. To do this, test the reward condition in combination with the selected instructional treatment. If ORF of this combined treatment is >2 ORF, then select this treatment. Go to Step 6.

6. If there are > 4 errors in ORF in the selected treatment, add error correction. Go to Step 7.

7. After testing each intervention once, conduct a withdrawal and replication of the baseline condition to determine if the hypothesis that the performance would decrease without intervention support is confirmed. Following the implementation of a second baseline condition, conduct a replication of the selected treatment at Step 6 to further validate that the treatment is likely to be effective for that student.