INFORMATION TO USERS

This manuscript has been reproduced from the microfilm master. UMI films the text directly from the original or copy submitted. Thus, some thesis and dissertation copies are in typewriter face, while others may be from any type of computer printer.

The quality of this reproduction is dependent upon the quality of the copy submitted. Broken or indistinct print, colored or poor quality illustrations and photographs, print bleedthrough, substandard margins, and improper alignment can adversely affect reproduction.

In the unlikely event that the author did not send UMI a complete manuscript and there are missing pages, these will be noted. Also, if unauthorized copyright material had to be removed, a note will indicate the deletion.

Oversize materials (e.g., maps, drawings, charts) are reproduced by sectioning the original, beginning at the upper left-hand corner and continuing from left to right in equal sections with small overlaps.

Photographs included in the original manuscript have been reproduced xerographically in this copy. Higher quality 6" x 9" black and white photographic prints are available for any photographs or illustrations appearing in this copy for an additional charge. Contact UMI directly to order.
USING FUNCTIONAL ANALYSIS TO DETERMINE TREATMENT FOR READING FLUENCY AND RECALLS OF FIVE ELEMENTARY STUDENTS WITH DISABILITIES

DISSERTATION

Presented in Partial Fulfillment of the Requirements for the Degree Doctor of Philosophy in the Graduate School of The Ohio State University

By

Richard G. Welsch, M. A.

*****

The Ohio State University
2001

Dissertation Committee:

Dr. Timothy E. Heron, Advisor

Dr. William L. Heward

Dr. Diane M. Sainato

Approved By

Advisor
College of Education
This study was conducted to determine the effects using functional analysis as a method to determine a best intervention program for improving oral reading fluency. The subjects were 5 elementary boys with learning or developmental disabilities enrolled in public school. The study took place in a resource room within the context of ongoing reading instruction.

Throughout the study, the students worked individually in the back of the room with the experimenter for about 5 minutes per day. Following a two-session baseline condition, four brief conditions were administered for the purpose of testing. These included: (a) repeated reading; (b) repeated reading with easier materials; (c) listening passage preview; and (d) listening passage preview with easier materials. Hypotheses regarding effective treatment were then tested in an extended analysis. Finally, the selected best interventions were implemented and their effectiveness was monitored across time.

During all sessions, the experimenter collected data on one-minute readings. The dependent variables were the number of words read correct per minute, errors per minute, and recalls per minute across instructional and generalization passages.

Differential response patterns were obtained for all participants during the brief analysis. Functional relationships among the number of words read correct per minute
and best intervention programs determined through brief analysis were shown for all 5 students in instructional passages. Generalized outcomes were consistent across all students only when a criterion for generalization was applied. Additionally, the best intervention program determined through brief analysis had an effect on the number of recalls for instructional passages. The results of the current study suggest that functional analysis is an effective procedure for determining the comparative usefulness of instructional methods, especially within the context of a thorough educational assessment.
Dedicated to my wife, Holly.
ACKNOWLEDGMENTS

I express appreciation to Dr. Timothy E. Heron, my advisor. Through his kindness he has helped me throughout my doctoral program. It is said that "It is not genius, not glory, nor love that reflects the greatness of the human soul; It is kindness" (Henri-Dominique Lacordouire). I am fortunate and blessed that I was able to build on our past relationship from my master's program. I look forward to continuing as colleagues in the future.

Many thanks go to my other committee members, Drs. William L. Heward and Diane M. Sainato, who provided academic guidance and social encouragement through the past three years.
VITA

February 8, 1965 ................................Bora – Youngstown, Ohio

1987 ..................................................B.S. Education, Youngstown State University

1994 ....................................................M.A. Education, The Ohio State University

PUBLICATIONS


FIELDS OF STUDY

Major Field: Education

Specialization: Special Education

Applied Behavior Analysis
TABLE OF CONTENTS

<table>
<thead>
<tr>
<th>Section</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Abstract</td>
<td>ii</td>
</tr>
<tr>
<td>Dedication</td>
<td>iv</td>
</tr>
<tr>
<td>Acknowledgments</td>
<td>v</td>
</tr>
<tr>
<td>Vita</td>
<td>vi</td>
</tr>
<tr>
<td>List of Tables</td>
<td>x</td>
</tr>
<tr>
<td>List of Figures</td>
<td>xi</td>
</tr>
<tr>
<td>Chapters:</td>
<td></td>
</tr>
<tr>
<td>1. Introduction</td>
<td>1</td>
</tr>
<tr>
<td>2. Literature Review</td>
<td>5</td>
</tr>
<tr>
<td>2.1 Diagnostic-prescriptive teaching</td>
<td>5</td>
</tr>
<tr>
<td>2.2 Reading and oral reading fluency</td>
<td>7</td>
</tr>
<tr>
<td>2.2.1 Bottom-up theories</td>
<td>9</td>
</tr>
<tr>
<td>2.2.2 Top-down theories</td>
<td>9</td>
</tr>
<tr>
<td>2.2.3 Interactive theories</td>
<td>10</td>
</tr>
<tr>
<td>2.2.4 Oral reading fluency</td>
<td>10</td>
</tr>
<tr>
<td>2.3 Comprehension</td>
<td>18</td>
</tr>
<tr>
<td>2.4 Functional analysis</td>
<td>20</td>
</tr>
<tr>
<td>2.4.1 Procedural variations</td>
<td>22</td>
</tr>
<tr>
<td>2.4.2 Functional analysis and aberrant behaviors</td>
<td>23</td>
</tr>
<tr>
<td>2.4.3 Functional analysis and academic behaviors</td>
<td>24</td>
</tr>
<tr>
<td>2.5 Generality</td>
<td>27</td>
</tr>
<tr>
<td>2.6 Social validity</td>
<td>31</td>
</tr>
<tr>
<td>2.7 Summary of literature review</td>
<td>31</td>
</tr>
<tr>
<td>2.8 Purpose of the study</td>
<td>32</td>
</tr>
<tr>
<td>2.9 Research questions</td>
<td>33</td>
</tr>
</tbody>
</table>

vii
# Method

## 3.1 Participants ............................................................................................................. 34

## 3.2 Setting .................................................................................................................. 36

## 3.3 Experimenter ......................................................................................................... 36

## 3.4 Definitions of the dependent variables ................................................................... 37

3.4.1 Oral words read correct per minute (instructional passage) ... 37
3.4.2 Errors per minute (instructional passage) ......................................................... 37
3.4.3 Recalls (instructional passage) ........................................................................ 38
3.4.4 Oral words read correct per minute (generalization passage) ........ 39
3.4.5 Errors per minute (generalization passage) ....................................................... 39
3.4.6 Recalls (generalization passage) ..................................................................... 39
3.4.7 Social validity ..................................................................................................... 39

## 3.5 Definitions of the independent variables ............................................................... 40

3.5.1 Baseline-grade level ......................................................................................... 40
3.5.2 Baseline-easier material .................................................................................. 40
3.5.3 Repeated readings ............................................................................................ 40
3.5.4 Listening passage preview ............................................................................... 40
3.5.5 Repeated reading-easier materials .................................................................. 40
3.5.6 Listening passage preview/easier material ...................................................... 41

## 3.6 Interobserver agreement/reliability ................................................................. 41

3.6.1 Reliability (dependent variables) ...................................................................... 41
3.6.2 Interobserver agreement (independent variables) ........................................... 42

## 3.7 Materials .................................................................................................................. 42

3.7.1 Instructional passages ....................................................................................... 42
3.7.2 Generalization passages .................................................................................. 42

## 3.8 Experimental Design ............................................................................................. 43

## 3.9 Procedure ................................................................................................................. 44

3.9.1 Brief experimental analyses ............................................................................. 44
3.9.2 Extended analysis ............................................................................................. 44
3.9.3 Best treatment ................................................................................................... 45

## 3.10 General Procedures .............................................................................................. 45

3.10.1 Baseline-grade level ......................................................................................... 45
3.10.2 Baseline-easier material .................................................................................. 45
3.10.3 Repeated readings ............................................................................................ 46
3.10.4 Listening passage preview ............................................................................... 46
3.10.5 Repeated reading-easier materials .................................................................. 47
3.10.6 Listening passage preview/easier material ...................................................... 47
3.10.7 Changing criterion for generalization passage ................................................. 47

## Results ......................................................................................................................... 49

## 4.1 Interobserver agreement/reliability ......................................................................... 49
4.1.1 Reliability ......................................................................................................... 49
4.1.2 Procedural integrity .......................................................................................... 57
## LIST OF TABLES

<table>
<thead>
<tr>
<th>Table</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>35</td>
</tr>
<tr>
<td>2.</td>
<td>38</td>
</tr>
<tr>
<td>3.</td>
<td>51</td>
</tr>
<tr>
<td>4.</td>
<td>53</td>
</tr>
<tr>
<td>5.</td>
<td>55</td>
</tr>
<tr>
<td>6.</td>
<td>85</td>
</tr>
<tr>
<td>7.</td>
<td>87</td>
</tr>
</tbody>
</table>

1. Student Demographic Information
2. Example of Recalls
3. Interobserver agreement of words read correctly per minute
4. Interobserver agreement of errors per minute
5. Interobserver agreement of recalls per minute
6. Summary of responses to student opinion questionnaire
7. Summary of responses to teacher opinion questionnaire
# LIST OF FIGURES

<table>
<thead>
<tr>
<th>Figure</th>
<th>Description</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Oral reading and comprehension performance in instructional and Generalization passages for Student 1</td>
<td>58</td>
</tr>
<tr>
<td>2.</td>
<td>Oral reading and comprehension performance in instructional and Generalization passages for Student 2</td>
<td>64</td>
</tr>
<tr>
<td>3.</td>
<td>Oral reading and comprehension performance in instructional and Generalization passages for Student 3</td>
<td>69</td>
</tr>
<tr>
<td>4.</td>
<td>Oral reading and comprehension performance in instructional and Generalization passages for Student 4</td>
<td>74</td>
</tr>
<tr>
<td>5.</td>
<td>Oral reading and comprehension performance in instructional and Generalization passages for Student 5</td>
<td>80</td>
</tr>
</tbody>
</table>
CHAPTER I
INTRODUCTION

Special education practitioners have continued to develop and refine their skills to meet the needs of students with disabilities. Since Congress passed the Education of All Handicapped Children Act of 1975, educators have worked formally to improve classroom conditions so students with disabilities can be successful. With more than 5.7 million children and youth with disabilities receiving special education services (U.S. Department of Education, 1998), success on an individual basis is not easily achieved.

Currently, there is no single educational challenge with greater urgency than that of ensuring that every child learns to read. Difficulty with reading is one of the primary reason students are referred for special education services (Taylor, 2000). Additionally, across all students, the National Assessment of Educational Progress (NAEP) reported that the percentage of students performing at or below the basic level (i.e., lower than proficient) of reading achievement as 62% for fourth grade, 74% for eighth grade, and 77% for twelfth grade (Donahue, Voelkl, Campbell & Mazzeo, 1999).

Learning to read is a complex process. Success involves decoding and comprehending text, and doing so quickly. Reading accurately and quickly is known as fluency. There are at least three reasons why special education teachers should be interested in the fluency of student reading responses. First, fluency involves rate
(Howell & Lorson-Howell, 1995), which indicates how well a student can perform a task per unit of time. Second, some behaviors in life must be done quickly; hence, fluency has functional implications. Third, fluency is related to comprehension, generalization, and skill maintenance.

Fluency had been known as the “neglected reading goal” (Allington, 1983). Reading teachers often focus on the accuracy of student responses and ignore how fast students read. Typically, daily lesson plans and teacher’s manuals rarely attend to instructing readers to become fluent (Allington, 1983; Zutell & Rasinski, 1991). Also, challenges with fluency have long been considered a common characteristic of students with disabilities and special needs. In general, less fluent readers have poorer comprehension (Carnine, Silbert, & Kameenui, 1990). Lack of reading fluency has become a descriptor of poor readers’ behavior. A study from the National Assessment of Educational Progress found that 44% of a nationally representative sample of 4th graders were disfluent, even with grade-level stories that the students had read under supportive testing conditions (Pinnell, Pikulski, Wixson, Campbell, & Beatty, 1995).

In recent years, increased interest in reading fluency has been noted. Researchers have worked towards unraveling the complexities of how reading fluency is developed and how it can be assessed. In 1997, and as an outgrowth of a Congressional request, a National Reading Panel (NRP) was charged to assess the status of research-based knowledge of various approaches to teaching children how to read. Following regional hearings, the NRP chose fluency as one of five topics for intensive study. Signaling its importance in the reading process. The NRP reviewed over 115,000 reading research studies, and selected those that met rigorous scientific standards in reaching its
conclusions. In its summary, the panel stated that “guided repeated oral reading procedures that included guidance from teachers, peers, or parents had a significant and positive impact on word recognition, fluency, and comprehension” (U.S. Department of Health and Human Services, 2000, p. 12).

In short, fluency is a vital dimension of reading and is needed by the successful reader. Our educational system tends to overlook instruction on reading fluency while stressing ill-defined whole-language, reading accuracy, and comprehension methods. Subsequently, many children are disfluent readers, and a national concern has emerged.

Assessment is another critical component of the educational process, especially within special education. Educational assessment of students with disabilities involves collecting information relevant to decisions regarding appropriate goals and objectives, teaching strategies, and program placements (Taylor, 2000). Assessment is particularly important within the context of the definition of special education; that is, specially design instruction to meet the individual needs of a student. Indeed, assessment is the cornerstone of a diagnostic-prescriptive teaching model, where assessment precedes teaching and evaluation. Assessment serves as the initial step in determining a student’s strengths and weaknesses.

Diagnostic-prescriptive teaching is an attempt to identify the most effective individual-specific teaching strategies (Ysseldyke & Salvia, 1974). Diagnostic-prescriptive teaching is predicated on four assumptions: (a) children come to school with strengths and weaknesses, (b) children’s strengths and weaknesses are relevant to learning academic skills, (c) there are reliable and valid measurement strategies to assess strengths and weaknesses, and (d) there is a link between strengths and weaknesses and
the relative effectiveness of differential instructional strategies. Further, diagnostic-prescriptive teaching models have emphasized obtaining pre-intervention data as a method to inform teaching. While seen as a useful starting point, there are shortcomings to this diagnostic-prescriptive teaching method.

On the other hand, functional assessment is the process of identifying the possible relationships between events in the environment and student behaviors (Dunlap et al., 1993). An emerging area of special education research has been to combine direct measures of student academic performance with the manipulation of treatment applications in brief or full session application. In doing so, the treatment conditions or teaching strategies that produce the highest level of student performance can be identified. The functional analysis approach has been used, albeit on an emerging basis, for identifying interventions of math (Hendrickson, Gable, Novak, & Peck, 1996), spelling (McComas et al., 1996) reading comprehension (McComas et al., 1996), and reading fluency (Daly, Martens, Dool, & Hintze, 1998; Daly, Martens, Hamler, Dool, & Eckert, 1999).
CHAPTER 2
LITERATURE REVIEW

The most prevailing characteristic of students with learning disabilities is their difficulty with reading (Heward, 2000). While accurate data are not available, estimates indicate that the majority of students referred for services under this category require remedial help with reading and related language arts.

Reading problems for children may be decreased by a number of academic teaching strategies. However, choosing the most efficient and effective strategy is difficult. Applications that extends functional analysis procedures to basic academic skills provides a link between academic difficulties and the interventions designed to address them (Lawry, Storey, & Danko, 1993). This chapter will describe diagnostic-prescriptive teaching and how it relates to meeting the instructional needs of students with disabilities. Next, reading and oral reading fluency will be defined, and studies investigating the effectiveness of fluency training will be presented. Further, literature pertaining to functional analysis will be reviewed. A discussion of generality and social validity will be examined in the final two sections.

Diagnostic-Prescriptive Teaching

Diagnostic-prescriptive teaching is based on the premise that children learn best when materials, teaching techniques, and reinforcers are applied differently to meet
unique student needs. It is through a diagnostic-prescriptive teaching process that the most effective instructional strategies for children are identified. The concept of diagnostic-prescriptive instruction in reading means that the individual strengths and weakness of each student are identified through various diagnostic procedures and that appropriate reading instruction is provided based on the diagnosis (Collins-Cheek & Cheek, 1984). Prescriptive teaching of children with disabilities is a direct outgrowth of educational and psychological testing completed to determine eligibility for services and for program planning.

Ysseldyke and Salvia (1974) delineated four underlying assumptions implicit in diagnostic-prescriptive teaching. First, children come to the teaching environment with strengths and weaknesses. Inter- and intra-individual differences in skill development make all learners unique. Secondly, children’s strengths and weaknesses are relevant to learning academic skills. Diagnostic-prescriptive teaching assumes that the areas of assessment are pertinent to future learning. A third assumption is that there are reliable and valid measurement strategies to assess children’s strengths and weaknesses. When important decisions are made based on test scores, the tool must measure what it claims to measure, and record data consistently. Finally, it is presumed that there is a link between strengths and weaknesses and the relative effectiveness of differential instructional strategies. To have value, diagnostic information should result in more than identifying and categorizing problems, it must lead to instructional change and, in turn, progress in learning (Gillett & Temple, 1990). Diagnostic information that results in labeling rather than in concrete direction for instruction is of limited value.
A diagnostic-prescriptive reading program has advantages because it focuses on heading off potential reading problems. It is part of the ongoing reading program, and it takes place in the general classroom under the leadership of the classroom teacher. The sooner a teacher recognizes a problem, the more likely it is that the problem will be diagnosed; and the appropriate steps are taken to correct the problem (Rubin, 1991). Effective teachers use the practice of systematically trying and evaluating a variety of instructional strategies and materials based on the needs of students (Salvia & Ysseldyke, 1988).

Reading and Oral Reading Fluency

The reading process is complex and not entirely understood. What Huey said in 1908 remains accurate today:

To completely understand what we do when we read would almost be the acme of . . . achievement, for it would be to describe very many of the most intricate workings of the human mind, as well as to unravel the tangled story of the most remarkable specific performance that civilization has learned in all its history. (p. 6)

Educators, linguists, psychologists and others interested in the reading process have contributed definitions of reading (Lapp & Flood, 1983). These definitions are frequently contradictory, emphasizing a different philosophy or a different aspect of the reading process. For example, a straightforward definition of reading is the decoding of print (Stoodt, 1981). A more complex definition is offered by Walcutt, Lamport, and McCracken (1974) in that reading is an activity involving the whole physical, intellectual, perceptual and spiritual life of an individual. In general, all definitions of reading fall into two categories: (a) reading as a decoding process (i.e., breaking of a visual/auditory code); and (b) reading for meaning (i.e., a comprehension process) (Lapp & Flood, 1983).
A definition of reading may also focus on word recognition and comprehension as a two-fold process. Such is the case with Maggart and Zintz (1992), who define reading as “the process by which the graphic symbols are translated into meaningful sound symbols in the reader’s experience (p. 11).”

The Gray-Robinson (Robinson, 1966) model is perhaps the most widely known explanation of reading (Stoodt, 1981). This model is based on those skills associated with the reading process: (1) perception, (2) comprehension, (3) reaction, (4) assimilation, and (5) rate (Robinson, 1966). Each skill component in the Gray-Robinson model has equal importance and is closely interrelated to form a congruous process.

Anderson et al. (1976) elaborated upon the idea of reading as the fluent, accurate recognition of words and as a process of reasoning and searching for meaning. They noted that reading involves three major cognitive functions: constructive processing, strategic processing, and the application of different kinds of knowledge. The constructive processing regards the reader having to generate the fabric that relates words and sentences accurately to each other and to the larger text. With regards to strategic processing, readers monitor their ongoing precise comprehension of words, sentences, or entire texts. The search for meaning is exemplified by the reader applying their own background knowledge of the text.

Reading teachers can make informed instructional decisions about methods, materials, and techniques based on their orientation to reading and how individuals learn to read. These orientations are usually organized in the literature under three general categories of theories: (a) bottom-up theories, (b) top-down theories, and (c) interactive theories.
Bottom-Up Theories

The theoretical orientations of the “top-down” and “bottom-up” approaches differ primarily in the way language is viewed (Maggart & Zintz, 1992). The bottom-up theories conceptualize language as systematic. Bottom-up theorists suggest that learning to read is based on the mastery of phoneme-grapheme correspondence. Hence, reading is composed of discrete parts that can be separated into units of instruction. The bottom-up approach to reading instruction is represented in classroom practices by skill-oriented teaching and phonics instruction. They stress that once individuals have learned to break the written language code, all they need to do to comprehend this written language is to apply it to their oral language knowledge. Torgesen (1999) believed that the vital role of phonological awareness in learning to read is one of the most important skills that has been learned about reading. Likewise, Troia, Roth, and Graham (1998), in a review of the literature, found that phonological processing is related to reading difficulties. Specifically, the research demonstrated that children who perform well on sound awareness tasks tend to become successful readers, whereas children who perform poorly on these tasks struggle with word identification and spelling.

Top-down Theories

In contrast, the top-down theories view language as systems that are related and dependent on each other. Here, reading is a total process that cannot be broken down into parts without distorting the process. Top-down theorists suggest that graphic and phonemic information are used only to fit with the syntactic and semantic clues the reader uses while processing text actively. In top-down models readers capitalize on the experiences and knowledge they bring to the reading process (Barchers, 1998).
down models have shifted the attention of many reading specialists away from a phonics-based approach to teaching reading focused on meaning. For example, the whole language philosophy (Goodman, 1992; Watson, 1989; Weaver, 1994) and the language experience approach (Stauffer, 1980; Van Allen, 1976) represent two well-known versions of the top-down approach in classrooms (Maggart & Zintz, 1992).

Interactive Theories

Interactive theories comprise the third orientation to reading. These theorists believe that efficient readers attend to meaning as well as to specific letters and words. Readers use the graphic, phonemic, syntactic, and semantic language systems to express and comprehend meaning. Interactive reading models state that the top-down processing of information is dependent on the bottom-up processing, and vice versa (Rubin, 1991). In other words, if the material is too difficult to decode, meaning will be affected; similarly, if the text is difficult to understand, the decoding process slowed down. Reading teachers who embrace the interactive theory present a balanced approach. This enables them to tailor the reading experience to capitalize on an individual’s strengths and to improve areas of weakness (Barchers, 1998). Matson (1996) noted that the majority of reading researchers and practicing teachers find that interactive theories are most helpful in understanding reading and in developing programs that lead to reading competence.

Oral Reading Fluency

There are several key terms associated with reading fluency. First, the word fluency has different meanings, depending on the context and the setting. For example, Binder (1996) defined fluency as the fluid combination of accuracy and speed that characterizes competence. Behavioral fluency has also been equated with automaticity, a
general term that embraces a wide range of behaviors. Our understanding of reading fluency has evolved from an emphasis on word recognition to a conception that includes comprehension and prosody. On one end of the continuum, Meyer and Felton (1999) defined reading fluency as the ability to read connected text rapidly, smoothly, effortlessly, and automatically with minimal conscious attention to decoding. In a broader view, Zutell and Rasinski (1991) suggest that in fluent reading the reader (a) reads effortlessly, (b) groups words into meaningful phrases, and (c) uses pitch, stress and intonation to convey the meaning and feelings of the author.

Second, rate is a term that helps quantify reading fluency. Rate reflects the ratio of the number of responses occurring divided by some period of time (Johnston & Pennypacker, 1993). Hence, rate describes the speed of reading. Often reading speed is reported by the number of words read per minute (e.g., Daly, Martens, Kilmer, & Massie, 1996; Noell et al., 1998). With rate measurement, reading speeds can be compared across students and between repeated measures of an individual student’s responses (Howell & Lorson-Howell, 1995). Reading rates should be viewed as occurring along a continuum. At the early stages of instruction, during acquisition, reading speed tends to be slow and even labored. Through practice, a more rapid rate of reading can be achieved.

Accuracy, like rate, is a dimensional quality of reading fluency. Accuracy focuses on the student’s ability to identify words correctly. A student progresses from acquisition of decoding skills to some level of accuracy. LaBerge and Samuels (1974) propose that readers move towards automatic decoding, enabling them to read more
accurately and more rapidly. Additionally, when words are known, it is possible that the syntactic/semantic constraints in connected discourse permits more accurate reading (Moyer, 1982).

Next, phrasing has a role in oral reading fluency. Mature readers have the ability to go beyond recognizing words quickly and accurately; they are able to group words together in a meaningful way (Bear, 1991). Because written text contains only minimal phrasing cues such as punctuation, readers must learn to segment text by attending to phrase boundaries, such as syntactic segments (Strecker, Roser, & Marinez, 1998).

Finally, prosodic features of oral reading -- pitch, stress, intonation, smoothness and expressiveness -- are important. Schreiber (1980) proposed that fluency concerns in poor readers occur because they cannot grasp the prosodic and rhythmic characteristics of language in written text.

Norms of oral reading fluency. Researchers have suggested standards for oral reading, and these standards help teachers interpret their students' performance. Starlin and Starlin (1974), for example, indicated that students in grades 1 through 3 read 50 to 70 words per minute with two or fewer errors, and that the rate for older readers be between 100 and 200 words per minute with two or fewer errors. Similarly, Mercer and Mercer (1985) suggested proficiency rates of reading text as 50 to 132 correct words per minute with two or fewer errors for grades K to 3, while children in grade 4 to 6 read 100 to 200 correct words per minute with two or fewer errors. Such broadly defined norms, however, do not give enough information to teachers who need guidelines for placement and instructional decisions.
Carnine, Silbert, and Kameenui (1990) presented guidelines for desired reading rates at various levels of instructional materials. These authors divided the first two grades into 3-month intervals and grade 3 into the first and second half of the school year and specified different rates within each division. For example, the student's reading rate should be 120 to 135 words per minute when the instructional level is at the first or second half of year 3, respectively. Since young readers typically make rapid growth in their oral reading performance, Carnine, Silbert, and Kameenui’s (1990) guidelines for desired reading rates provide a more sensitive and realistic comparison than suggested by Starlin and Starlin (1974) or Mercer and Mercer (1985).

Limited large-scale norms exist for groups of students who take the same test for oral reading fluency. Hasbrouck and Tindal (1992) established curriculum-based norms for grades 2 through 5. Data were collected from 9,000 students reading passages from their grade level text. Students were sampled from 5 western and mid-western states and represented proportionate numbers of students in general, remedial, and special education programs. Additionally, the schools ranged from large urban districts to racially mixed suburban and small city districts, to rural districts. Norms were reported for fall, winter, and spring performances across percentile rank and grades. For example, the norm for a fourth grade student at the 50th percentile was 99 words correct per minute during the fall, 112 words correct per minute during winter, and 118 words correct per minute during spring.
Methodologies to increase reading fluency. The body of research on reading fluency allows for identification of different strategies that have been effective to increase oral reading fluency. These instructional methods include repeated reading, guidance and feedback, reading time, and textual factors.

The extant literature contains several procedures for developing reading fluency through instructional practice. The most prevalent intervention is repeated reading. In this approach, learners practice reading one passage, at an appropriate instructional level, until some predetermined level of fluency is attained. Generally, each reading is timed and then the level of fluency is charted, often by the students. In some instances, a criterion (e.g., 100 words per minute) is established; in other cases, a specific number of repetitions (e.g., three to five) is specified. Research into repeated readings methods has consistently confirmed the efficacy of this approach (Dowhower, 1987; Herman, 1985; Layton & Koenig, 1988; Polk & Miller, 1994; Ransinski, 1990). In one study, for example, Dowhower (1987) investigated the effects of two repeated reading procedures on a group of second-grade transitional readers. Results indicate improved reading rate, accuracy, comprehension, and prosodic reading, regardless of the training procedure used. Similarly, Rasinski (1990) found repeated readings resulted in significant gains in reading speed and word recognition accuracy for a group of third-grade students.

Some researchers have combined repeated reading with other instructional components such as listening preview (Mefferd & Pettegrew, 1997; Rasinski, et al., 1994), precision teaching (Polk & Miller, 1994), computer-based instruction (Carver &
Hoffinan, 1981), and classwide peer tutoring (Kemps et al., 1994). Taken together, the investigations on repeated reading suggest that reading fluency can be improved when students practice reading one passage.

Another methodology to improve reading fluency is to focus the guidance and feedback the students receive while reading. Here the teachers' behavior of feedback and praise changes explicitly to respond to the students' reading performance. The implication is that instructional attention to the aspects of fluency enhances students' awareness of fluency production (Strecker et al., 1998). Programs in this category include guided reading, assisted reading, error correction, and contingent rewards. Research in guidance and feedback has produced mixed results in improving reading fluency (Gregori & McLaughlin, 1996; Noell et al., 1998; O'Shea et al., 1985; O'Shea et al., 1984). For example, O'Shea et al. (1985) found that reading fluency improved when students were cued to read faster. Likewise, Gregori and McLaughlin (1996) demonstrated that praise, error drill, and assisted reading can decrease the frequency of errors. Conversely, O'Shea et al. (1984) investigated three corrective feedback procedures (e.g., word supply, word drill, and phrase drill) and found no difference on fluency rates. However, the corrective feedback procedures controlled word recognition skills.

Still another methodology to improve reading fluency is based on increasing the amount of time students are engaged directly in reading. There has been widespread agreement about the value and efficacy of reading experience and practice in developing better readers. That is, a strong correlation exists between increased time students spend and their proficiencies (Pinnell et al., 1995). Experimental analysis has validated the method of providing students more reading experiences and measuring the effect on
reading fluency (Daly et al., 1994; Eldredge et al., 1996; Rasinski et al., 1994; Reutzel & Hollingsworth, 1993; Rose, 1984). Programs in this category include shared reading, choral reading, modeling, and passage previews.

Shared reading and choral reading occur when several children, or the teacher and the children, orally read text together. A shared reading approach would involve the learner spending more allocated time engaged actively in oral reading than a traditional round-robin procedure, that is exemplified by one student reading at a time. Researchers have demonstrated that shared book reading was superior to round-robin in improving fluency, vocabulary acquisition, comprehension, and in reducing reading errors (Eldredge et al., 1996; Reutzel & Hollingsworth, 1993). Also, Dowhower (1987) found that second-grade students who received assistance with a read-along procedure organized text into meaningful phrases better than students who practiced independently.

Previewing is any method that provides an opportunity for a learner to read or listen to a selection or a passage prior to instruction. Previewing increases the time a student interacts with the reading material. Daly and Martens (1994) examined the effect of subject previewing (i.e., the learner reads the assigned selection before the lesson), taped words preview (i.e., the learner reads along with an audio tape of a word list), and listening preview (i.e., the student follows along while a tape of the teacher reading the selection aloud is played) on rate of correctly read words. Subjects were 4 male students with learning disabilities, ages 8 to 11. The authors used a multielement design to compare the effects of the instructional techniques on reading performance, by measuring accuracy and fluency on reading passages and word lists. Their results showed that systematic prepractice procedures were related to improved accuracy and fluency.
Modeling provides an additional literacy experience for children. The theory is that skilled readers can provide rich oral reading models of appropriate reading rates and phrasal organization. Research has confirmed the value of good models of fluent reading on student's oral reading within the context of combined instructional approaches. For example, Rasinski et al. (1994) combined model reading, choral reading, and repeated reading to promote growth in reading fluency among 28 second graders. Students in an experimental group received a 15-minute fluency development lesson (i.e., model reading, choral reading, and repeated reading) at the beginning of each day for six months. Results showed that students who received the fluency development lessons had greater gains in reading rate, as compared to a control group. The researchers suggest that fluency building activities, including modeling, can successfully be implemented within the context of a traditional basal-oriented reading program. Similarly, Reutzel and Hollingsworth (1993) conducted a study that assessed the effects of developing oral reading fluency of 78 second-grade students using modeling, choral reading, and repeated reading. While measuring errors per minute, the results showed statistically different levels of fluency favoring the treatment group over the control group. Next, Noell et al. (1998) experimented with combining contingent rewards, modeling and practice to increase oral reading fluency skills of three 9-year old boys enrolled in a summer program. Results showed that a combination of instructional components, including modeling, was effective in producing substantial increases in the number of words read correctly for all participants.

Matching reading passage difficulty of engaging and appropriate text with student ability can foster oral reading fluency. Hence, the reading material itself plays a role in
fluency development. Reading researchers have identified these textual factors. Levy et al. (1997) found that students read faster and more accurately when the stories contained words that had been previously trained, as opposed to stories containing untrained words. Rashotte and Torgesen (1985) and Dowhower (1987) found that if one half of the words are shared between texts, reading speed of the subsequent text improve. Extending this idea, Daly et al. (1996) manipulated the overlap between what was taught and what was tested and how closely a student's skills matched the difficulty of the reading material. Results indicated that reading fluency was enhanced when assessment materials matched the student's skill level and were similar to those used during instruction.

Comprehension

Reading comprehension is the reader's ability to understand what is read; ultimately to be able to restate it in his or her own words (Harris & Hodges, 1981). The reader must be able to decode words on the printed page, recognize important elements of the text, manipulate the ideas presented, and reorganize them so they are recalled readily when needed. There is an interrelatedness between fluent reading and comprehension. Some educators hypothesize that efficient automatic readers are able to shift their processing resources to comprehension. Others argue that comprehension fosters fluency. This controversy on the subject of comprehension is due to its degree of difficulty and the inability to observe the ongoing neurological product.

Comprehension, like reading, is divided into a hierarchy, the scope of which includes literal, interpretive (inferential), and critical skills. Literal comprehension is the process of getting details verbatim from the text, and is thought of as the basic skill. Proficiency must be developed with literal comprehension before higher level skills can
Be acquired, making literal comprehension an integral part of the total reading process. Interpretive skills involve drawing conclusions, making generalizations, predicting outcomes, and synthesizing ideas. Drawing inferences and interpreting the language of the author is important in comprehending the inner meaning of the material read (Collins-Cheek, 1984). Finally, critical comprehension skills require that evaluative judgments and reasoning be put to use by the reader. Burns and Roe (1980) stated that critical reading is the evaluation of written material. Critical reading includes such skills as the ability to differentiate between fact and opinion, or between fantasy and reality, and to discern propaganda techniques (Rubin, 1991).

Comprehension has been studied repeatedly in the literature (e.g., Dowhower, 1987; Eldredge et al., 1996; Kamps et al., 1994; Layton & Koenig, 1998; Levy et al., 1997; O'Shea et al., 1984). There are a variety of methods regarding measuring comprehension and retention. For example, multiple-choice test composed of factual and inferential questions, oral recall tasks, and short-answer comprehension questions are popular methods.

While the primary means of reading comprehension assessment comes in answers to oral or written teacher-directed questions, several authors recommend the use of retells (Morrow et al., 1986). During retells or recall tasks, students construct meaning from a passage by reporting information freely that is personally relevant and interacts with their background. Retells avoid contextual clues embedded in teacher-directed questions that bias the assessment of comprehension. Researchers have investigated the area of reading comprehension using retelling assessments. For example, Askew (1985) explored the effects of a measurement task and retelling on sixth-grade students’ comprehension of
expository text. In another investigation, Morrow (1985) examined the effects of pre-school children's comprehension and sense of story structure using retelling as the dependent measure. Additionally, retelling is also used to evaluate the effects of study skills instruction as related to comprehension of expository tests (Adams, Carnine, & Gersten, 1982; Alexander, 1985; McCormick & Cooper, 1991).

Likewise, a number of techniques for aiding students in understanding text have been evaluated empirically in the literature. For example, previewing text has been found to have a positive effect on comprehension (Graves & Palmer, 1981; Graves & Cooke, 1980). One such study looked at the effects of previewing narrative text on 32 junior high aged students' comprehension and recall (Graves, Cooke, & Laberge, 1983). Using a 2 X 3 repeated-measures design, the authors found that previewing had a significant positive effect on factual and inferential comprehension questions. Students who received the previews produced more correct responses than those who did not receive previews.

Using a different methodology, a similar positive effect on comprehension was found for a group of second graders. That is, Dowhower (1987) found that a group of students instructed with guided oral reading showed significant gains in comprehension in comparison to the unassisted group who read alone. This relationship between fluency and comprehension is exemplified with other methodologies including shared reading (Eldredge et al., 1996), repeated readings (Layton & Koenig, 1998; Taylor, Wade, & Yekovich, 1985) and peer tutoring (Kamps et al., 1994).

Functional Analysis

Functional analysis is the experimental component of functional assessment, which is defined as the process of identifying the possible relationships between events in
the environment and student behavior (Dunlap et al., 1993). Hence, functional assessment
seeks to identify the operant function of behavior to aid in treatment selection. In
practice, functional assessment can occur along a continuum that extends from an indirect
assessment to descriptive procedures to an experimental level (Steege & Northup, 1998).
The indirect method is exemplified as being informal, subjective, and based primarily on
verbal or anecdotal reports. The descriptive method relies primarily on direct
observations within the natural environment to provide quantifiable data to determine
relationships between variables. The final level, functional analysis, is distinguished by
the experimental manipulation of person-environmental events thought to influence the
target behavior, and the documentation of behavior change under different conditions
(Hendrickson, Gale, Novak, & Peck, 1996). In other words, direct observations of
behavior in the presence and absence of specific variables are conducted experimentally
under controlled conditions.

Specifically, functional analysis technology has procedures designed to identify or
to rule out social contingencies such as positive reinforcement (e.g., attention, tangible)
or negative reinforcement (e.g., escape) that maintain the behavior of interest. For
example, in functional analysis, test settings are arranged such that participants are
exposed to particular antecedent and consequent events. If high rates of behavior are
correlated consistently with a particular test condition, the antecedents and consequences
are considered to be related functionally to the behavior of interest.

There are several advantages to conducting a functional analysis. Blakeslee,
Sugai, and Gruba (1994) stated that functional analysis promotes hypothesis-driven
treatment, emphasizes skill building, enhances the prospect of positive outcomes, and
increases the probability of maintenance and generalization of treatment effects. Additionally, functional analysis allows for empirical analysis of data so that conclusive statements can be made at the level of proof regarding variables controlling the behavior of interest (Heron & Harris, 2001). Identification of operant behavioral functions allows the researcher to base treatment on the outcome of assessment (Mace, 1994).

Procedural Variations

The literature has documented two procedural variations of functional assessment: full and brief. A defining feature of full functional analysis is that repeated measures are taken across multiple tests conditions to ascertain the contributing effects of suspected variables. Using a multielement manipulation of four different conditions, Iwata, Dorsey, Slifer, Bauman, and Richman (1982) provide an example of how full functional analysis could be conducted. The self-injurious behaviors of nine subjects with developmental disabilities were observed across an average of 30 sessions lasting approximately 15 minutes each. The experimental conditions of social disapproval, academic demand, unstructured play, and alone were assigned randomly. Results showed that six of the subjects had higher levels of self-injurious behavior consistently associated with a specific stimulus condition, suggesting a functional relation between distinct features of the environment and the behavior.

Often, clinical circumstances warrant time-limited conditions that demand a brief functional analysis. Brief functional analysis refers to how long an assessment is scheduled (Wacker et al., 1994). Here, experimental probe sessions are conducted in controlled and counterbalanced presentations. The probes are taken across the same conditions that maybe used during a full functional analysis, however, the time frame is
greatly reduced. In one such case, the functional analysis procedures described by Iwata et al (1982) was adapted by Derby et al. (1992) to meet the 90-minute time limit for outpatient clinic evaluations. Seventy-nine subjects, who had various forms of aberrant behavior, completed brief functional assessments using a brief multielement design. Subjects were exposed to four conditions (e.g., alone, attention for self-injury, escape from task for self-injury, and tangible for self-injury) for one 10-minute session each. These probes were used to determine which condition maintained self-injurious behavior. Following this, a second phase of three 10-minute sessions was conducted to replicate and verify the hypothesis of the condition maintaining the behavior. Results showed that a distinct maintaining condition for aberrant behavior was identified in most cases.

Several studies have been designed to evaluate the effectiveness of the brief versus full, or extended, functional analysis. These studies have reported frequent correspondence between results of these procedural variations (Rodgers, Zarcone, & Iwata, 1990; Tincani, Castrogiovanni, & Axelrod, 1999).

Functional Analysis and Aberrant Behaviors

Iwata and his colleagues in their work with self-injurious behavior (SIB) (Iwata et al., 1982) pioneered the use of test conditions to identify the functions of problem behavior. Presenting data from 152 subject, Iwata et al. (1994) replicated earlier results. The study investigated the reinforcing functions of SIB by exposing individuals with developmental disabilities to a series of highly controlled and systematically manipulated conditions. Results found that 95% of the cases resulted in differential responding to one of the test conditions, with social reinforcement being the element of SIB for over two
thirds of the subjects. Additionally, the methodology for the experimental analysis of behavior proved successful in identifying the maintaining contingencies for SIB.

Functional analysis has been used in the treatment of a wide variety of behavior disorders including bizarre speech (Mace & Lalli, 1991), hair pulling (Rapp, Miltenberger, Galensky, Ellingson, & Long, 1999), aggression (Sasso et al., 1992; Thompson, Fisher, Piazza, & Kuhn, 1998), pica (Mace & Knight, 1986) and tantrums (Carr & Newsom, 1985). Additionally, functional analysis of aberrant behaviors has been extended to school settings. For example, the effects on off-task behavior of children with conduct problems were examined through functional analysis (Cooper, Wacker, Sasso, Reimers, & Donn, 1990; Meyer, 1999). Also, Sasso, and his colleagues, (1992) included a phase in their study were teachers conducted A-B-C assessments the classroom to analyze aggressive behavior of two students with autism. These studies contain results that validate the method of assessing aberrant behaviors. Additionally, studies that looked at functional relations in school settings showed that instructional variables could be directly related to the occurrence of problem behaviors (Repp, 1994).

Functional Analysis and Academic Behaviors

Application of functional analysis technologies to academic behaviors has appeared recently in the literature. A functional analysis of academic behaviors provides information regarding the relative effects of different teaching strategies (Daly, Martens, Witt, & Dool, 1997). Whereas functional analysis of aberrant behavior focuses on behavior excess (i.e., high level of inappropriate responding), academic applications center on behavior deficits (i.e., fails to demonstrate desired responding). This approach to functional analysis combines direct measures of academic performance with academic
intervention research and is characterized by brief test conditions administered singularly. An advantage of this approach is the way it proposes treatment selection. With an individual functional analysis conducted on academic skills, the treatment, or treatment components, that improve student responding to a more acceptable level is chosen. Conversely, the work on aberrant behaviors infer which treatments are appropriate based a functional analysis.

Hendrickson, Gable, Novak, and Peck (1996) advocated functional assessment as a viable tool for evaluating instructional approaches used to teach academics to students. Within two case studies, the authors found that functional assessment can produce data that are relevant to instructional strategies and individual learner characteristics directly. Both cases employed functional assessments that included the formulation of hypotheses and the systematic introduction of different instructional strategies in analogue assessment sessions. The first case assessed three different strategies to teach addition facts to a 4th grade student across baseline, intervention, and replication phases. The analogue strategy assessment showed that the decomposition strategy produced a higher number of correct responses than the time delay and number line strategy. Additionally, similar results were reported in the replication phase. The authors concluded that this particular assessment revealed that decomposition may be a preferable strategy for teaching the student math computations. The second case used an alternating treatment design to examined three approaches to teach spelling in a group-format assessment of seven 3rd and 4th grade students. The results indicated that a robust strategy was identified for five of the seven students. These two cases showed that teachers identified those instructional elements that held the most promise by examining the effects of specific
antecedent events. These results were replicated with a second grade student who was displayed poor accuracy with math facts (Jolivette, Lassman, & Wehby, 1998).

This approach was extended to experimental analysis of spelling and reading comprehension by McComas et al. (1996). Four students, ages seven to ten, with learning disabilities participated in the study. Instructional strategies were developed to increase reading comprehension (2 students) or spelling skills (2 students) based on those used by the classroom teacher. Each strategy was introduced in sequence until improvements on performance were obtained. Percent correct data on 10-item exams of spelling and reading comprehension were collected within a brief multielement design. Effective and ineffective strategies were identified through a visual analysis of the data. Results showed changes in academic performance to be associated with at least one instructional strategy for each student. The authors discussed the usefulness of manipulating instructional strategies to identify effective stimulus prompts stating that a very brief analysis may identify effective instructional in some cases, whereas more extended analysis with more replications may be needed in other cases.

Additional aspects of reading have been the focus of functional analysis. Daly, Martens, Dool, and Hintze1 (1998) used brief functional analysis to select interventions for oral reading fluency. A series of reading interventions — repeated readings, listening passage preview, phase drill, contingent reinforcement, and instructional match — were applied to three students in a brief multielement format to test potential treatment components and their effectiveness at improving oral reading fluency. For each student, the assessment lead to the identification of a successful intervention and a mini-replication confirmed the initial level of responding.
This line of research on oral reading fluency was continued when Daly, Martens, Hamler, Dool, and Eckert (1999) extended functional analysis to include a sequential application of the reading interventions to improve 4 students' oral reading fluency. After a baseline, instructional treatments were combined with prior conditions until there was improvement in oral reading fluency in instructional passages and in passages with high content overlap. A multielement design, with a minireversal, afforded a visual display that indicated all participants improving their reading fluency in at least one condition.

Generality

A desirable outcome of oral reading fluency training is generality. Baer, Wolf, and Risley (1968) define generality as a behavior change that proves durable over time, appears in a wide variety of environments, or spreads to a wide variety of related behaviors. The term generalization is defined as the occurrence of pertinent behavior under different, non-trained conditions (Stokes & Baer, 1977). Generalization refers to two types of behavioral processes: stimulus generalization and response generalization. Stimulus generalization, also known as skill transfer, occurs when the use of a learned skill is observed under conditions other that the ones encountered during training (Cooper et al. 1987). For example, a child learns to read sight words in his kindergarten classroom and is the able to generalize this skill to reading the same sight words at home. Response generalization, or skill adaptation, occurs when the training of one skill causes a change in another functional untrained skill (Cooper et al, 1987). For example, a student learns to read the word “cat,” and then is able to generalize that skill to correctly read other /-at/ words such as hat, rat, bat, etc.
Stokes and Baer (1977) claim several strategies to program for generalization. The “train and hope” method is signified by any probe that documents generalization across responses, settings, and time after the intervention of interest has been implemented. Generalization is not explicitly programmed with this method of examination. Generalization may be programmed through sequential modification in which the experimental procedures are initiated systematically in every condition to which generalization is desired. Next, the transfer of behavioral control from the experimenter to stable and natural contingencies that operate in the environment exemplifies introduction of the natural maintaining contingencies. With training sufficient exemplars, programming involves training enough exemplars and non-exemplars of stimulus conditions or responses. Training loosely is a technique where teaching is conducted with relatively little control over stimuli and responses to maximize transfer to other situations and other forms of the behavior. Next, using indiscriminable contingencies is another way to program for generalization. When the subject can not discriminate in which setting a response will be reinforced or not, the power of intermittent schedules of reinforcement aids generalization. Programming common stimuli is a tactic that affects generalization because sufficient stimulus components, or “salient” stimuli, occur in both the training and generalization setting. Mediating generalization refers to establishing a response as part of the new behavior that is likely to be used in other situations. Additionally, generalization may be mediated by choosing stimuli that are easy for the student to transport to many settings. The final technique, training to generalize, involves reinforcing generalization itself as if it were a behavior of interest.
Some research suggests that a fluent reading repertoire promotes generality (Daly et al., 1996). Generality in reading behavior would refer to students who read fluently in a wide variety of environments (school, home, church), with a variety of texts (academic, content, literature-based), and over time. Daly et al. (1996) conducted a study with 4 students (age 8 to 12 years) who were identified with learning disabilities. This study examined the effects of matching a student’s performance in oral reading and the proportion of words that overlapped between passages. Using a multielement design, Daly and his colleagues measured accuracy and fluency in novel passages. Results showed that when students’ skill levels are matched to instructional materials, their performance during instruction was more accurate and fluent, and produced a greater degree of generalization to new passages. Further, these results were maintained at a one-month follow-up. This study suggests that a fluent performance of skill promotes generalization to novel items, times, and settings by increasing response competition (Wolery, Bailey, & Sugai, 1988).

Layton and Koenig (1998) conducted a study to explore the effects of repeated reading on reading performance of four elementary students with low vision. Within the procedures of the experiment, the authors assessed the impact of repeated reading on general reading, outside the training setting, by measuring student performance once a week from a basal reader that was being used in the classroom. Additionally, probes were conducted using the repeated reading technique four weeks following the intervention to assess maintenance. Results showed that the students were able to generalize the change in their reading rate to classroom reading and were able to sustain their ability to read at increased levels one month after the study.
Several other studies failed to find increases in oral reading rates across passages. For example, Rose (1984a, 1984b), Rose and Beattie (1986), and Rose and Sherry (1984) used alternating treatment designs to evaluate the effects of listening passage preview interventions. During these studies, students were exposed to three conditions: (a) a control; (b) a silent reading condition; and (c) an assessment-only condition. In these experiments, reading rates increased on passages that were previewed. However, these increases did not generalize to non-treatment text. In essence, main effects for increased fluency were shown only for passages that included a listening preview.

Generality would also be a desirable outcome for functional assessment technologies. Overall, few studies involving functional assessment methodologies reported data of the generality of behavior change. Of these, all the studies used functional assessment to determine treatment of problem behaviors. For example Lawry, Storey, and Danko (1993) reported that a functional assessment-based intervention to reduce problem behaviors of a 5-year-old student during circle time was effective in the target setting but did not generalize to a free play setting. In contrast, Blair, Umbreit, and Bos (1999) found that problem behaviors of four young children were virtually eliminated during intervention, with similar outcomes in generality settings. Additionally, problem behaviors of two nontargeted peers were also eliminated demonstrating generality across subjects.

A number of studies that examined functional assessment-based intervention collected maintenance data (Clarke et al., 1995; Cooper et al., 1992; Kern et al., 1994; Umbreit, 1996; Umbreit & Blair, 1997). Again, all of these studies examined change of
maladaptive behaviors. Measures of treatment durability ranged from 5 to 11 weeks, and reported successful, persistent behavior change for their respective follow-up periods.

Social Validity

Schwartz and Baer (1991) described social validity as a measure of acceptability or viability of a particular intervention. They suggested that opinions from consumers be used to enhance viability of effective changes in programs. Wolf (1978) suggested three aspects of social validation: (a) social significance of the goals; (b) social appropriateness of the procedures; and (c) social importance of the effects. In other words, the goals must be specific to what society wants, the procedures must be acceptable to the participants and the consumers, and the consumers are satisfied with the effects. It is clear that assessing the social validity of oral reading fluency teaching methods would be important to make future educational planning decisions. The literature provides an indication that educators recognize the beneficial effects of functional analysis, teachers consider school-based functional analysis procedures acceptable (Sasso et al., 1992), and teachers, parents and students are satisfied with the results (Jolivette, Lassman, & Wehby, 1998).

Summary of Literature Review

The literature review has highlighted several key points. First, reading fluency is a vital dimension of skilled reader, and many teachers often overlooked or de-emphasize reading fluency instruction. Additionally, many children, especially those with disabilities, are disfluent readers. Second, many instructional methodologies have been shown to be effective in increasing students' rate of reading words accurately. Successful interventions include repeated reading, guidance and feedback, reading time, and textual
factors. Finally, assessment may play an important role in selecting the most effective intervention for oral reading fluency for individual students.

Treatment selection and evaluation of interventions has moved from a diagnostic-prescriptive procedure to a functional assessment approach of identifying the possible relationships between events in the environment and student performance. A functional analysis of academic behaviors provides information regarding the relative effects of different teaching methods. A few studies have applied functional assessment procedures to select interventions for oral reading fluency.

Purpose of the Study

The main purpose of this investigation is to replicate Daly et al.'s, (1998) and Daly et al.'s, (1999) studies that examined procedures for conducting brief functional analyses of the effects of reading interventions on oral reading fluency. In these studies, they administered brief functional analysis conditions to students with poor oral reading fluency. Hypotheses regarding effective treatments were then tested in an extended analysis, confirming the selected treatment components.

Overall, however, the literature is sparse with respect to using functional analysis as a basis for determining the comparative usefulness of reading methods, despite a robust literature on the utility of functional analysis in other special education contexts (e.g., Iwata, Dorsey, Slifer, Bauman, & Richman, 1994; Kern, Childs, Dunlap, Clarke, & Falk, 1994). Where such literature exists in reading (Daly et al., 1998; Daly et al., 1999), studies tend to address elementary school children in general education classrooms. Furthermore, the focus of such studies has targeted oral reading. Few, if any, studies have
examined effects of fluency training on comprehension. Hence, a distinguishing feature of the present study is to extend the line of functional assessment research in reading by including students with learning disabilities and measuring reading comprehension.

Research Questions

The following research questions will be the focus of this study:

1. What is the effect of a best intervention program determined through functional analysis on improved oral reading fluency (rate of correct and rate of incorrect words read) on instructional passages?

2. What is the effect of a best intervention program determined through functional analysis on improved oral reading fluency (rate of correct and rate of incorrect words read) on generalization passages?

3. What is the effect of a best intervention program determined through functional analysis on improved oral reading fluency on rate of recalls?

4. Do students and teachers prefer the use of brief functional analysis to identify effective strategies to improve oral reading fluency?
CHAPTER 3

METHOD

This section describes the participants and setting. The dependent variables, independent variables, and IOA are defined and their measurement is discussed. A description of materials that were used during the study is included. Finally, the experimental design used in the study and the procedures (general and specific) are described.

Participants

The experimenter selected five students with disabilities to serve as participants. The students were from grades three and four, and had been nominated by their teachers, based on difficulties with oral reading fluency (see Table 1 for individual student characteristics). A 1-minute timed sampling of the participants' oral reading was collected to validate difficulties with oral reading fluency. The criterion for participation was for the students to perform below the 25 percentile for their grade level (i.e., 70 words correct per minute for grade 3 or 89 words correct per minute for grade 4) (Hasbrouck & Tindal, 1992). As a precondition, students who participate had secured parental and/or guardian permission to do so, following appropriate protocols outlined by the Behavioral and Social Sciences Institutional Review Board at The Ohio State University.
Table 1: Student Demographic Information

* Scores derived from the Woodcock Johnson Psychoeducational Battery-Revised, Broad Reading scale, maintained in students’ permanent records.

The experimenter sent letters requesting permission to the parents/guardians of the students targeted to participate (see Appendix A). The permission letters provided the parents with a brief outline of the study, and described precisely what their child will engage in during the course of the study if he or she was permitted to participate. Each parent or guardian gave written permission for their child to serve as a participant (see Appendix B).

All the students met the state of Ohio eligibility requirements for special education services. The disability category for four students was specific learning disability, while one student had developmental disabilities. All of the students received reading instruction in a special education resource room as per their individualized
education program (IEP). Standardized test scores for total reading and comprehension indicated that all these students had significant reading problems that put them at risk for academic failure.

**Setting**

The study was conducted in an elementary school located in central Ohio. At the beginning of each session, the participants were directed to the back of the classroom. This work area was separated from the resource room by file cabinets and study carrels, and was also used by volunteer reading tutors throughout the week. The area was clean, quiet, and well illuminated. It contained a row of 4 study carrels and student tables with chairs. The study was conducted within the context of ongoing activities (i.e., the study was conducted with the participants while other classroom students maintain their regular academic activities and routines). Students were seated at a study carrel while the experimenter was seated next to the participant (See Appendix C). The experimenter met individually with each student for approximately 5 to 10 minutes between 9:30 a.m. and 10:45 a.m.

**Experimenter**

The experimenter was a doctoral candidate in the School of Physical Activity and Educational Services at The Ohio State University and is in the third year of his Ph.D. program in special education and applied behavior analysis. Before beginning graduate study and while working on a master’s degree at Ohio State, he accumulated seven years of experience teaching students with multiple disabilities. After completing the Master of Arts degree, he worked for three years as a Special Education Supervisor and one year as a Staff Development Coordinator for a county school office.
Definitions of the Dependent Variables

Three main dependent variables served as the indicators of treatment effectiveness. These dependent variables were: (a) oral words read correct per minute, (b) oral errors per minute, and (c) recalls per minute. During each session, a measure of correct words per minute, errors per minute, and recalls was collected across an instructional and a generalization passage.

Oral words read correct per minute (instructional passage). The number of words read orally correctly per minute (WRC/min) in instructional passages served as the index of student fluency. A word read correctly was defined as a word that was verbally pronounced accurately, given the reading context, within 3 seconds. For example, when shown the word “farm” the student orally pronounced the word accurately within 3 seconds. If the student said /fɑːm, /fɜːr, or any other variation, or it took longer than 3 seconds to say the word, an incorrect response was reported. Self-corrections within 3 seconds were counted as words read correctly.

Errors per minute (instructional passage). Words read orally incorrectly per minute were also recorded in the instructional passages. As stated previously, an error was defined as a word that was not pronounced correctly within 3 seconds, or was stated as an incorrect word. For example, if the student was shown the word “elephant,” and said “elegant”, an error was recorded. Omissions, mispronunciations, substitutions and hesitations for more than 3 seconds were recorded as errors. If a student skipped an entire line, each word was counted as an error. Additionally, if a student struggled to pronounce a word or hesitated longer than 3 seconds, the student was told the word, and it was counted as an error.
Recalls (instructional passage). The rate of oral recalls from the instructional passages served as the measure of student comprehension. Recording and scoring recall of information was based on a count of the number of key words or descriptive phrases retold that were directly related to the passage read by the student. A recall was defined as a key word (i.e., noun or verb) or a descriptive phrase (i.e., adjective or adverb) of which the content comes directly from the passage. Correct recalls were non-prompted key words and descriptive phrases that were orally retold accurately one time only, during a one minute counting period. Repeats, or words, that were not part of or related to the reading, were not counted (see Table 2).

<table>
<thead>
<tr>
<th>Sample Passage</th>
<th>Examples of correct key words</th>
<th>Examples of correct descriptive words and phrases</th>
</tr>
</thead>
<tbody>
<tr>
<td>Some farms are used to grow corn or wheat. On some farms, such animals as pigs or goats or turkeys are raised. But in Japan, a few years ago, a scientist began a new kind of farm. It was a farm for raising shrimp. Shrimp belong to the same family as lobsters and crabs.</td>
<td>1. corn</td>
<td>1. some</td>
</tr>
<tr>
<td></td>
<td>2. wheat</td>
<td>2. a few years ago</td>
</tr>
<tr>
<td></td>
<td>3. animals</td>
<td>3. new kind</td>
</tr>
<tr>
<td></td>
<td>4. pigs</td>
<td>4. same</td>
</tr>
<tr>
<td></td>
<td>5. goats</td>
<td></td>
</tr>
<tr>
<td></td>
<td>6. used</td>
<td></td>
</tr>
<tr>
<td></td>
<td>7. grow</td>
<td></td>
</tr>
<tr>
<td></td>
<td>8. raised</td>
<td></td>
</tr>
<tr>
<td></td>
<td>9. Japan</td>
<td></td>
</tr>
<tr>
<td></td>
<td>10. began</td>
<td></td>
</tr>
</tbody>
</table>

Table 2: Example of Recalls
Oral words read correct per minute (generalization passage). The number of words read correctly per minute (WRC/min) in generalization passages served as the generality index of student fluency. A word read correctly in the generalization passage was defined and reported as described for instructional passages.

Errors per minute (generalization passage). Words read incorrectly per minute were also recorded in the generalization passages. Errors were defined and recorded as described for instructional passages.

Recalls (generalization passage). The rate of oral recalls from the generalization passages served as the generality measure of student comprehension. Correct recalls were key words and descriptive phrases that were orally retold accurately one time only, within one minute. Recording and scoring recall followed the guidelines described for instructional passages.

Social validity. Student preferences regarding the brief functional assessment and the best intervention program were measured through a questionnaire (see Appendix D). Additionally, the teachers were asked to complete a questionnaire to measure acceptability (see Appendix E). The questionnaires were completed by the participants following the last day of instruction. Open-ended questions were used. The items focused on the usefulness and effectiveness of the assessment and the instruction. The experimenter helped students who had difficulty writing their answers independently to complete the survey, verbally presenting it and/or tape recording their answers. The results of the questionnaire were complied and reported by the investigator.
Definitions of the Independent Variables

**Baseline-grade level (B-GL).** During the baseline-grade level condition, the student read an entire instructional passage (approximately 120 words in length). The instructional passage had a readability that was on grade level to the student's skill level at which they were being instructed. The reported data were based on the student's reading fluency performance (i.e., WRC/min. and errors per minute).

**Baseline-easier material (B-EM).** The B-EM condition served as a control condition to estimate the magnitude of effects of treatment conditions that included easier material as a component. Students read passages that were one grade level below the level at which they were being instructed. The reported results were based on the participant's reading performance during the first minute of the passage.

**Repeated readings (RR).** RR was intended to increase students' opportunity to respond in curricular materials by having them orally read the instructional passages four times. As an index of student performance during this condition, data were collected and plotted based on the first minute of the last reading of the instructional text and the first minute of orally reading the generalization passage.

**Listening passage preview (LPP).** In the LPP condition, the experimenter first read the instructional passage to the students, modeling fluent reading. The student then read the story, without directions to imitate the model. The reported results were based on the student's reading performance during the first minute of the oral reading of the instructional passage and the first minute of the generalization passage.

**Repeated reading-easier materials (RR/EM).** The RR/EM condition was the same as RR, except that the treatment was carried out in passages that were one grade level
below the student’s current instructional level. The purpose of this condition was to
determine whether easier materials might improve a student’s responding to other
treatment components by creating a more optimal instructional match (Daly et al., 1996).
The reported results were based on the participant’s reading performance during the first
minute of the final reading of the passage and the first minute of the generalization
passage.

Listening passage preview/easier material (LPP/EM). The LPP/EM condition was
the same as LPP, except that the treatment was carried out in passages that were one
grade level below the student’s current instructional level. Like the RR/EM condition,
the purpose of this condition was to determine whether easier materials might improve a
student’s responding to other treatment components by creating a more optimal
instructional match (Daly et al., 1996). The reported results were based on the
participant’s reading performance during the first minute of the reading of the
instructional passage and the first minute of the generalization passage.

Interobserver Agreement/Reliability

Reliability (dependent variables). Reliability refers to the extent to which the
measurement procedure produces the same value when brought into repeated contact
with the same sample of the subject’s behavior (Johnston & Pennypacker, 1993) All
sessions were audiotaped. An independent observer scored approximately 30% of the
passages for rate of WRC and errors to produce data on reliability. Reliability data were
also collected for rate of correct recalls. The accuracy percentage for the point-by-point
comparison of correct and incorrect responses during oral reading fluency and recalls
were calculated using an adapted formula for calculating agreement scores for permanent
products (Cooper, Heron, & Heward, 1987). The number of agreements divided by the total of agreements and disagreements, multiplied by 100 equals the percentage of agreement.

**Interobserver agreement (independent variables).** Independent observers also assessed treatment integrity. A checklist was developed that described the instruction/assessment sequence for each treatment condition (see Appendix F). The total number of steps completed was then be divided by the total number of steps in the treatment. Treatment integrity was assessed for approximately 30% of the sessions.

**Materials**

**Instructional passages.** Reading passages were chosen randomly several from basal reading series, including Silver, Burdett, and Ginn (Pearson et al., 1989) and Reading Mastery III (Engelman & Hanner, 1995) (See Appendix G). Only narrative and expository texts were used. Readability scores were obtained for all passages. Readability is a term used to describe the relative ease or difficulty of a passage. The level of difficulty is usually expressed in terms of grade equivalent. A passage with a rating of 2.5 would be deemed readable for a student in the fifth month of second grade. The lower the readability score, the easier it is to understand the document. The Flesch-Kincaid Grade Level formula (Microsoft, 2000; Flesch, 1951) (See Appendix H), which estimated the difficulty level of a document, was used to calculate the readability scores for the instructional passages.

**Generalization passages.** The generalization passages were chosen randomly from the Silver, Burdett, and Ginn (Pearson et al., 1989) and the Reading Mastery III reading series (Engelman & Hanner, 1995). Selections were similar in length to
instructional passages. Generalization passages had a readability level that was comparable to the students' instructional level. Readability scores were calculated similar to those described for instructional passages.

Experimental Design

The analysis of student performance was conducted in three parts. First, a brief experimental analysis was conducted in which conditions were administered consistent with Daly, et al (1999). In short, the conditions were baseline-grade level, baseline-easier material, repeated readings, listening passage preview, repeated readings/easier materials, and listening passage preview/easier materials. These conditions were counterbalanced across subjects. Students were exposed to each condition one time for the purpose of assessment.

Next, an extended analysis was implemented. Here, multielement design-type features were used to compare the effects of best treatment combinations to another, less effective, condition on an individual basis. This portion of the analysis was designed to test specific hypotheses regarding the effects of combinations of treatment components on student's reading fluency, based on the results of the brief analysis, by rapidly alternating two treatment conditions. In the multielement, or alternating treatment, design each data point (a) served as a basis for the prediction of future levels of behavior under that treatment, (b) provided verification of previous predictions of performance under that treatment, and (c) replicated the differential effects of other treatment conditions (Cooper, Heron, Heward, 1987).

Finally, to evaluate treatment across time, the treatment that produced the best results during the extended analysis was implemented for 15 to 25 sessions.
Procedure

Brief experimental analyses. A brief analysis was conducted in which six test
conditions were administered to each student. The order of presentation was
counterbalanced across the subjects. Two conditions, Baseline-grade level (B-GL) and
Baseline-easier materials (B-EM), served as control conditions. The data from these
conditions was used to evaluate the magnitude of treatment effects. There were four
treatment conditions: Repeated Readings (RR), Listening Passage Preview (LPP),
Repeated Readings/Easier Materials (RR/EM), and Listening Passage Preview/Easier
Materials (LPP/EM).

Extended analysis. The results of the brief analysis was examined individually for
each participant. Decisions were made regarding combinations of treatment components
that improved oral reading rates. Hypotheses of a best treatment condition was based on
the simplest condition that produced the largest positive effect in words read correct per
minute in instructional passages. The larger and more visible the difference across the
three treatment conditions, as compared to the control conditions, the more confident the
claim of experimental control. Because high generalization and increased comprehension
were considered collateral effects of fluency, oral reading fluency data collected on
generalization passages and recalls were considered during selection of best treatment
only when differential response rates were not reported for treatment conditions. If, for
example, RR produced a large effect on reading fluency in the instructional passage but
LPP did not improve reading fluency substantially above the effects of RR, RR was
chosen over LPP as a treatment component. In other words, the simplest and fewest
number of treatment components(s) that produce the largest effect, based on visual
analysis, was selected for further analysis. The chosen treatment package was alternated repeatedly with a different condition from the assessment four to six times to demonstrate prediction, verification, and replication.

**Best treatment.** At the conclusion of the assessment, the intervention packages that produced the best positive results on oral reading fluency were implemented over time (approximately 25 additional sessions). Student progress was monitored repeatedly.

**General Procedures**

**Baseline-grade level (B-GL).** During B-GL, the subject read an instructional passage (approximately 120 words in length) for one minute. The instructional passage had a readability that was on grade level to the student’s skill level at which they were being instructed. If a student struggled to pronounce a word or hesitated longer than 3 seconds, the student was told the word, and it was counted as an error. The reported results on the instructional passage were based on the student’s reading performance during the one-minute oral reading. The student then read the generalization passage for one minute. Data were collected during real-time observations, with each session being audiotaped for IOA.

**Baseline-easier material (B-EM).** The B-EM condition served as a control condition to estimate the magnitude of effects of treatment conditions that include easier material as a component. Students read passages that were one grade level below the level at which they were being instructed. If a student struggled to pronounce a word or hesitated longer than 3 seconds, the student was told the word, and it was counted as an error. The reported results were based on the participant’s reading performance during
the first minute of the instructional and generalization passages. Data were collected during real-time observations, with each session being audiotaped for IOA.

**Repeated readings (RR).** RR was intended to increase students’ opportunity to respond in curricular materials by having them orally read the instructional passages repeatedly four times. If a student struggled to pronounce a word or hesitated longer than 3 seconds, the student was told the word, and it was counted as an error. After each reading, the experimenter told the student the number of words read correctly and incorrectly per minute and recorded this information for each reading. As an index of student performance during this condition, data were collected and plotted based on the first minute of the last reading of the instructional text and the first minute of the generalization passage. Data were collected during real-time observations, with each session being audiotaped for IOA.

**Listening passage preview (LPP).** In the LPP condition, the experimenter first read the instructional passage to the students, modeling fluent reading. The student then read the story for one minute, without directions to imitate the model. If a student struggled to pronounce a word or hesitated longer than 3 seconds, the student was told the word, and it was counted as an error. After the reading, the experimenter told the student the number of words read correctly and incorrectly per minute, and record this information. The reported results were based on the student’s reading performance during the first minute of the final reading of the instructional passage and the first minute of the generalization passage. Data were collected during real-time observations, with each session being audio-taped for IOA.
Repeated reading/easier materials (RR/EM). The RR/EM condition was the same as RR, except that the treatment was carried out in passages that were one grade level below the student’s current instructional level. The purpose of this condition was to determine whether easier materials might improve a student’s responding to other treatment components by creating a more optimal instructional match (Daly et al., 1996). The reported results were based on the participant’s reading performance during the first minute of the final reading of the instructional passage and the first minute of the generalization passage. If a student struggled to pronounce a word or hesitated longer than 3 seconds, the student was told the word, and it was counted as an error. Data were collected during real-time observations, with each session being audiotaped for IOA.

Listening passage preview/easier material (LPP/EM). The LPP/EM condition was the same as LPP, except that the treatment was carried out with passages that were one grade level below the student’s current instructional level. Like the RR/EM condition, the purpose of this condition was to determine whether easier materials might improve a student’s responding to other treatment components by creating a more optimal instructional match (Daly et al., 1996). If a student struggled to pronounce a word or hesitated longer than 3 seconds, the student was told the word, and it was counted as an error. The reported results were based on the participant’s reading performance during the first minute of the reading of the instructional passage and the first minute of the generalization passage.

Changing criterion for generalization passage. During the best treatment phase an additional criterion was applied to the generalization passage to increase response rates. During the changing criterion, normal best treatment procedures were in effect for the
instructional and generalization passages. Students continued to read passages for one minute and the experimenter continued collecting data on all three main dependent variables – oral words read correct per minute, oral errors per minute, and recalls per minute – as described previously. However, the student was given the opportunity to earn a reinforcer if he reached a target score for words read correctly per minute for the generalization passage. A target score was calculated for each student, by averaging the number of words read correctly per minute in the previous four generalization passages, and increasing this by about ten percent. Additionally, the target score was increased by about ten percent when the student met the criterion for three out of four sessions. Reinforcers that the students were able to earn included additional time with the experimenter, visit to the principal, walk around the school, sticker, and a pencil. Rewards were selected on an indiscriminative bases by having the students choose an unmarked sealed envelope from a jar.
CHAPTER 4
RESULTS

This chapter presents the results of the study. Interobserver Agreement/Reliability data for the dependent variable are presented first. Next, procedural integrity for the independent variable is presented. Data on student performance – words read correctly per minute, errors per minute, and recalls per minute – across each condition are then presented graphically and discussed. Finally, social validity, as measured by responses to student and teacher questionnaires, is summarized.

Interobserver Agreement/Reliability

Reliability

Data on oral reading fluency and comprehension were collected daily by the experimenter across instructional and generalization passages. To demonstrate reliability of the data, another trained observer collected data using an audiotape. The observer followed the same procedures as the experimenter used throughout the study. The percentage of correct and incorrect responses during oral reading fluency and recalls was calculated using a formula for calculating agreement scores for permanent products (Cooper et al., 1987). The number of agreements divided by the total of agreements and disagreements, multiplied by 100 equaled the percentage of agreement.
Tables 3 through 5 summarize the agreement between the experimenter and the trained observer when recording the three dependent variables: words read correctly per minute, errors per minute, and recalls per minute. Reliability data were collected one day a week for the duration of the study, for a total of 11 times. The independent observer assessed 28% of the sessions for Students 1 and 5, 31% of the sessions for Student 2, 25% of the sessions for Student 3, and 26% of the sessions for Student 4.

**Words read correctly.** Table 3 summarizes the agreement between the experimenter and the trained observer in recording the number of words read correctly per minute across instructional and generalization passages. Mean agreement for instructional passages was 99.9%, range 98.2 to 100%. Mean agreement for generalization passages was 99.9%, range 96 to 100%. There were two occasions when the experimenter and the second observer disagreed on the number of word read correctly in instructional passages. Additionally, there were two occasions of disagreement on the number of words read correctly in generalization passages.

**Errors.** Table 4 summarizes the agreement between the experimenter and the trained observer in recording the number of errors per minute across instructional and generalization passages. Mean agreement for instructional passages was 99%, range 87.5 to 100%. Mean agreement for generalization passages was 99.6%, range 80 to 100%. There were two occasions when the experimenter and the second observer disagreed on the number of errors in instructional passages. Additionally, there were three occasions of disagreement on the number of errors in generalization passages.
<table>
<thead>
<tr>
<th>Session (#)^2</th>
<th>Student</th>
<th>Obs. 1</th>
<th>Obs. 2</th>
<th>Percent Agreement</th>
<th>Obs. 1</th>
<th>Obs. 2</th>
<th>Percent Agreement</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 (4)</td>
<td>1</td>
<td>50</td>
<td>50</td>
<td>100</td>
<td>14</td>
<td>14</td>
<td>100</td>
</tr>
<tr>
<td>(3)</td>
<td>2</td>
<td>25</td>
<td>25</td>
<td>100</td>
<td>26</td>
<td>26</td>
<td>100</td>
</tr>
<tr>
<td>(3)</td>
<td>3</td>
<td>44</td>
<td>44</td>
<td>100</td>
<td>23</td>
<td>23</td>
<td>100</td>
</tr>
<tr>
<td>(3)</td>
<td>4</td>
<td>42</td>
<td>42</td>
<td>100</td>
<td>40</td>
<td>40</td>
<td>100</td>
</tr>
<tr>
<td>(2)</td>
<td>5</td>
<td>30</td>
<td>30</td>
<td>100</td>
<td>*</td>
<td>*</td>
<td>*</td>
</tr>
<tr>
<td>2 (8)</td>
<td>1</td>
<td>48</td>
<td>48</td>
<td>100</td>
<td>22</td>
<td>22</td>
<td>100</td>
</tr>
<tr>
<td>(7)</td>
<td>2</td>
<td>49</td>
<td>49</td>
<td>100</td>
<td>30</td>
<td>30</td>
<td>100</td>
</tr>
<tr>
<td>(7)</td>
<td>3</td>
<td>43</td>
<td>43</td>
<td>100</td>
<td>30</td>
<td>30</td>
<td>100</td>
</tr>
<tr>
<td>(6)</td>
<td>4</td>
<td>62</td>
<td>62</td>
<td>100</td>
<td>58</td>
<td>58</td>
<td>100</td>
</tr>
<tr>
<td>(5)</td>
<td>5</td>
<td>69</td>
<td>69</td>
<td>100</td>
<td>44</td>
<td>44</td>
<td>100</td>
</tr>
<tr>
<td>3 (10)</td>
<td>1</td>
<td>32</td>
<td>32</td>
<td>100</td>
<td>31</td>
<td>31</td>
<td>100</td>
</tr>
<tr>
<td>(10)</td>
<td>2</td>
<td>54</td>
<td>54</td>
<td>100</td>
<td>24</td>
<td>24</td>
<td>100</td>
</tr>
<tr>
<td>(9)</td>
<td>3</td>
<td>66</td>
<td>66</td>
<td>100</td>
<td>30</td>
<td>30</td>
<td>100</td>
</tr>
<tr>
<td>(10)</td>
<td>4</td>
<td>41</td>
<td>41</td>
<td>100</td>
<td>52</td>
<td>52</td>
<td>100</td>
</tr>
<tr>
<td>(8)</td>
<td>5</td>
<td>34</td>
<td>34</td>
<td>100</td>
<td>31</td>
<td>31</td>
<td>100</td>
</tr>
<tr>
<td>4 (14)</td>
<td>1</td>
<td>48</td>
<td>48</td>
<td>100</td>
<td>17</td>
<td>17</td>
<td>100</td>
</tr>
<tr>
<td>(13)</td>
<td>2</td>
<td>61</td>
<td>61</td>
<td>100</td>
<td>28</td>
<td>28</td>
<td>100</td>
</tr>
<tr>
<td>(14)</td>
<td>3</td>
<td>58</td>
<td>58</td>
<td>100</td>
<td>20</td>
<td>20</td>
<td>100</td>
</tr>
<tr>
<td>(13)</td>
<td>5</td>
<td>97</td>
<td>97</td>
<td>100</td>
<td>32</td>
<td>32</td>
<td>100</td>
</tr>
<tr>
<td>5 (19)</td>
<td>1</td>
<td>65</td>
<td>65</td>
<td>100</td>
<td>20</td>
<td>20</td>
<td>100</td>
</tr>
<tr>
<td>(18)</td>
<td>2</td>
<td>57</td>
<td>57</td>
<td>100</td>
<td>13</td>
<td>13</td>
<td>100</td>
</tr>
<tr>
<td>(17)</td>
<td>3</td>
<td>78</td>
<td>78</td>
<td>100</td>
<td>27</td>
<td>27</td>
<td>100</td>
</tr>
<tr>
<td>(18)</td>
<td>4</td>
<td>53</td>
<td>53</td>
<td>100</td>
<td>21</td>
<td>21</td>
<td>100</td>
</tr>
<tr>
<td>(17)</td>
<td>5</td>
<td>61</td>
<td>61</td>
<td>100</td>
<td>23</td>
<td>23</td>
<td>100</td>
</tr>
<tr>
<td>6 (21)</td>
<td>1</td>
<td>57</td>
<td>56</td>
<td>98.2</td>
<td>28</td>
<td>28</td>
<td>100</td>
</tr>
<tr>
<td>(20)</td>
<td>2</td>
<td>71</td>
<td>71</td>
<td>100</td>
<td>22</td>
<td>22</td>
<td>100</td>
</tr>
<tr>
<td>7 (26)</td>
<td>1</td>
<td>65</td>
<td>65</td>
<td>100</td>
<td>11</td>
<td>11</td>
<td>100</td>
</tr>
<tr>
<td>(26)</td>
<td>2</td>
<td>69</td>
<td>69</td>
<td>100</td>
<td>38</td>
<td>38</td>
<td>100</td>
</tr>
<tr>
<td>(24)</td>
<td>3</td>
<td>68</td>
<td>68</td>
<td>100</td>
<td>24</td>
<td>25</td>
<td>96.0</td>
</tr>
</tbody>
</table>

Table 3: Interobserver Agreement of Words Read Correctly per Minute
Table 3 (continued)

<table>
<thead>
<tr>
<th></th>
<th>4</th>
<th>82</th>
<th>82</th>
<th>100</th>
<th>43</th>
<th>43</th>
<th>100</th>
</tr>
</thead>
<tbody>
<tr>
<td>8</td>
<td>(28)</td>
<td>1</td>
<td>62</td>
<td>62</td>
<td>100</td>
<td>33</td>
<td>33</td>
</tr>
<tr>
<td></td>
<td>(27)</td>
<td>2</td>
<td>72</td>
<td>72</td>
<td>100</td>
<td>28</td>
<td>28</td>
</tr>
<tr>
<td></td>
<td>(28)</td>
<td>3</td>
<td>86</td>
<td>86</td>
<td>100</td>
<td>22</td>
<td>22</td>
</tr>
<tr>
<td></td>
<td>(25)</td>
<td>4</td>
<td>63</td>
<td>63</td>
<td>100</td>
<td>59</td>
<td>59</td>
</tr>
<tr>
<td></td>
<td>(23)</td>
<td>5</td>
<td>64</td>
<td>64</td>
<td>100</td>
<td>47</td>
<td>47</td>
</tr>
<tr>
<td>9</td>
<td>(30)</td>
<td>1</td>
<td>59</td>
<td>59</td>
<td>100</td>
<td>39</td>
<td>39</td>
</tr>
<tr>
<td></td>
<td>(29)</td>
<td>2</td>
<td>48</td>
<td>48</td>
<td>100</td>
<td>40</td>
<td>40</td>
</tr>
<tr>
<td></td>
<td>(30)</td>
<td>3</td>
<td>68</td>
<td>68</td>
<td>100</td>
<td>55</td>
<td>56</td>
</tr>
<tr>
<td></td>
<td>(27)</td>
<td>4</td>
<td>56</td>
<td>56</td>
<td>100</td>
<td>53</td>
<td>53</td>
</tr>
<tr>
<td></td>
<td>(25)</td>
<td>5</td>
<td>60</td>
<td>60</td>
<td>100</td>
<td>37</td>
<td>37</td>
</tr>
<tr>
<td>10</td>
<td>(35)</td>
<td>1</td>
<td>74</td>
<td>73</td>
<td>98.6</td>
<td>30</td>
<td>30</td>
</tr>
<tr>
<td></td>
<td>(33)</td>
<td>2</td>
<td>63</td>
<td>63</td>
<td>100</td>
<td>43</td>
<td>43</td>
</tr>
<tr>
<td></td>
<td>(35)</td>
<td>3</td>
<td>89</td>
<td>89</td>
<td>100</td>
<td>57</td>
<td>57</td>
</tr>
<tr>
<td></td>
<td>(31)</td>
<td>4</td>
<td>77</td>
<td>77</td>
<td>100</td>
<td>61</td>
<td>61</td>
</tr>
<tr>
<td></td>
<td>(30)</td>
<td>5</td>
<td>65</td>
<td>65</td>
<td>100</td>
<td>50</td>
<td>50</td>
</tr>
<tr>
<td>11</td>
<td>(38)</td>
<td>1</td>
<td>77</td>
<td>77</td>
<td>100</td>
<td>32</td>
<td>32</td>
</tr>
<tr>
<td></td>
<td>(35)</td>
<td>2</td>
<td>78</td>
<td>78</td>
<td>100</td>
<td>46</td>
<td>46</td>
</tr>
<tr>
<td></td>
<td>(39)</td>
<td>3</td>
<td>89</td>
<td>89</td>
<td>100</td>
<td>60</td>
<td>60</td>
</tr>
<tr>
<td></td>
<td>(34)</td>
<td>4</td>
<td>92</td>
<td>92</td>
<td>100</td>
<td>61</td>
<td>61</td>
</tr>
<tr>
<td></td>
<td>(35)</td>
<td>5</td>
<td>68</td>
<td>68</td>
<td>100</td>
<td>53</td>
<td>53</td>
</tr>
</tbody>
</table>

Total: 3173 3171 99.9 1763 1765 99.9

a = Number in parenthesis shows actual session number

* = Generalization passage not presented during baseline condition
<table>
<thead>
<tr>
<th>Session (#)*</th>
<th>Student</th>
<th>Obs. 1</th>
<th>Obs. 2</th>
<th>Percent Agreement</th>
<th>Obs. 1</th>
<th>Obs. 2</th>
<th>Percent Agreement</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 (4)</td>
<td>1</td>
<td>4</td>
<td>4</td>
<td>100</td>
<td>8</td>
<td>8</td>
<td>100</td>
</tr>
<tr>
<td>(3)</td>
<td>2</td>
<td>4</td>
<td>4</td>
<td>100</td>
<td>5</td>
<td>5</td>
<td>100</td>
</tr>
<tr>
<td>(3)</td>
<td>3</td>
<td>2</td>
<td>2</td>
<td>100</td>
<td>6</td>
<td>6</td>
<td>100</td>
</tr>
<tr>
<td>(3)</td>
<td>4</td>
<td>5</td>
<td>5</td>
<td>100</td>
<td>3</td>
<td>3</td>
<td>100</td>
</tr>
<tr>
<td>(2)</td>
<td>5</td>
<td>11</td>
<td>11</td>
<td>100</td>
<td>*</td>
<td>*</td>
<td>*</td>
</tr>
<tr>
<td>2 (8)</td>
<td>1</td>
<td>3</td>
<td>3</td>
<td>100</td>
<td>7</td>
<td>7</td>
<td>100</td>
</tr>
<tr>
<td>(7)</td>
<td>2</td>
<td>7</td>
<td>7</td>
<td>100</td>
<td>5</td>
<td>5</td>
<td>100</td>
</tr>
<tr>
<td>(7)</td>
<td>3</td>
<td>1</td>
<td>1</td>
<td>100</td>
<td>3</td>
<td>3</td>
<td>100</td>
</tr>
<tr>
<td>(6)</td>
<td>4</td>
<td>3</td>
<td>3</td>
<td>100</td>
<td>4</td>
<td>4</td>
<td>100</td>
</tr>
<tr>
<td>(5)</td>
<td>5</td>
<td>7</td>
<td>7</td>
<td>100</td>
<td>4</td>
<td>4</td>
<td>100</td>
</tr>
<tr>
<td>3 (10)</td>
<td>1</td>
<td>8</td>
<td>8</td>
<td>100</td>
<td>6</td>
<td>6</td>
<td>100</td>
</tr>
<tr>
<td>(10)</td>
<td>2</td>
<td>1</td>
<td>1</td>
<td>100</td>
<td>7</td>
<td>7</td>
<td>100</td>
</tr>
<tr>
<td>(9)</td>
<td>3</td>
<td>2</td>
<td>2</td>
<td>100</td>
<td>3</td>
<td>3</td>
<td>100</td>
</tr>
<tr>
<td>(10)</td>
<td>4</td>
<td>16</td>
<td>16</td>
<td>100</td>
<td>1</td>
<td>1</td>
<td>100</td>
</tr>
<tr>
<td>(8)</td>
<td>5</td>
<td>10</td>
<td>10</td>
<td>100</td>
<td>6</td>
<td>6</td>
<td>100</td>
</tr>
<tr>
<td>4 (14)</td>
<td>1</td>
<td>2</td>
<td>2</td>
<td>100</td>
<td>6</td>
<td>6</td>
<td>100</td>
</tr>
<tr>
<td>(13)</td>
<td>2</td>
<td>7</td>
<td>8</td>
<td>87.5</td>
<td>7</td>
<td>7</td>
<td>100</td>
</tr>
<tr>
<td>(14)</td>
<td>3</td>
<td>4</td>
<td>4</td>
<td>100</td>
<td>5</td>
<td>5</td>
<td>100</td>
</tr>
<tr>
<td>(13)</td>
<td>5</td>
<td>4</td>
<td>4</td>
<td>100</td>
<td>9</td>
<td>9</td>
<td>100</td>
</tr>
<tr>
<td>5 (19)</td>
<td>1</td>
<td>4</td>
<td>4</td>
<td>100</td>
<td>7</td>
<td>7</td>
<td>100</td>
</tr>
<tr>
<td>(18)</td>
<td>2</td>
<td>5</td>
<td>5</td>
<td>100</td>
<td>6</td>
<td>6</td>
<td>100</td>
</tr>
<tr>
<td>(17)</td>
<td>3</td>
<td>2</td>
<td>2</td>
<td>100</td>
<td>6</td>
<td>6</td>
<td>100</td>
</tr>
<tr>
<td>(18)</td>
<td>4</td>
<td>3</td>
<td>3</td>
<td>100</td>
<td>12</td>
<td>12</td>
<td>100</td>
</tr>
<tr>
<td>(17)</td>
<td>5</td>
<td>6</td>
<td>6</td>
<td>100</td>
<td>8</td>
<td>8</td>
<td>100</td>
</tr>
<tr>
<td>6 (21)</td>
<td>1</td>
<td>4</td>
<td>4</td>
<td>100</td>
<td>5</td>
<td>4</td>
<td>80</td>
</tr>
<tr>
<td>(20)</td>
<td>2</td>
<td>3</td>
<td>3</td>
<td>100</td>
<td>9</td>
<td>9</td>
<td>100</td>
</tr>
<tr>
<td>7 (26)</td>
<td>1</td>
<td>2</td>
<td>2</td>
<td>100</td>
<td>11</td>
<td>10</td>
<td>90.9</td>
</tr>
<tr>
<td>(26)</td>
<td>2</td>
<td>3</td>
<td>3</td>
<td>100</td>
<td>4</td>
<td>4</td>
<td>100</td>
</tr>
<tr>
<td>(24)</td>
<td>3</td>
<td>2</td>
<td>2</td>
<td>100</td>
<td>5</td>
<td>5</td>
<td>100</td>
</tr>
<tr>
<td>(23)</td>
<td>4</td>
<td>0</td>
<td>0</td>
<td>100</td>
<td>4</td>
<td>4</td>
<td>100</td>
</tr>
<tr>
<td>(21)</td>
<td>5</td>
<td>2</td>
<td>2</td>
<td>100</td>
<td>8</td>
<td>8</td>
<td>100</td>
</tr>
<tr>
<td>8 (28)</td>
<td>1</td>
<td>3</td>
<td>3</td>
<td>100</td>
<td>3</td>
<td>3</td>
<td>100</td>
</tr>
<tr>
<td>(27)</td>
<td>2</td>
<td>14</td>
<td>14</td>
<td>100</td>
<td>7</td>
<td>7</td>
<td>100</td>
</tr>
<tr>
<td>(28)</td>
<td>3</td>
<td>2</td>
<td>2</td>
<td>100</td>
<td>7</td>
<td>7</td>
<td>100</td>
</tr>
</tbody>
</table>

*Continued*

Table 4: Interobserver Agreement of Errors per Minute
Table 4 (continued)

<p>| | | | | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>(25)</td>
<td>4</td>
<td>3</td>
<td>3</td>
<td>100</td>
<td>4</td>
</tr>
<tr>
<td>(23)</td>
<td>5</td>
<td>3</td>
<td>3</td>
<td>100</td>
<td>10</td>
</tr>
<tr>
<td>9 (30)</td>
<td>1</td>
<td>5</td>
<td>5</td>
<td>100</td>
<td>3</td>
</tr>
<tr>
<td>(29)</td>
<td>2</td>
<td>5</td>
<td>5</td>
<td>100</td>
<td>4</td>
</tr>
<tr>
<td>(30)</td>
<td>3</td>
<td>0</td>
<td>0</td>
<td>100</td>
<td>5</td>
</tr>
<tr>
<td>(27)</td>
<td>4</td>
<td>0</td>
<td>0</td>
<td>100</td>
<td>3</td>
</tr>
<tr>
<td>(25)</td>
<td>5</td>
<td>9</td>
<td>10</td>
<td>90</td>
<td>5</td>
</tr>
<tr>
<td>10 (35)</td>
<td>1</td>
<td>3</td>
<td>3</td>
<td>100</td>
<td>8</td>
</tr>
<tr>
<td>(33)</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>100</td>
<td>2</td>
</tr>
<tr>
<td>(35)</td>
<td>3</td>
<td>2</td>
<td>2</td>
<td>100</td>
<td>4</td>
</tr>
<tr>
<td>(31)</td>
<td>4</td>
<td>0</td>
<td>0</td>
<td>100</td>
<td>2</td>
</tr>
<tr>
<td>(30)</td>
<td>5</td>
<td>6</td>
<td>6</td>
<td>100</td>
<td>4</td>
</tr>
<tr>
<td>11 (38)</td>
<td>1</td>
<td>3</td>
<td>3</td>
<td>100</td>
<td>5</td>
</tr>
<tr>
<td>(35)</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>100</td>
<td>6</td>
</tr>
<tr>
<td>(39)</td>
<td>3</td>
<td>0</td>
<td>0</td>
<td>100</td>
<td>5</td>
</tr>
<tr>
<td>(34)</td>
<td>4</td>
<td>0</td>
<td>0</td>
<td>100</td>
<td>4</td>
</tr>
<tr>
<td>(35)</td>
<td>5</td>
<td>5</td>
<td>5</td>
<td>100</td>
<td>3</td>
</tr>
</tbody>
</table>

| Total: | 204 | 206 | 99 | 274 | 273 | 99.6 |

a = Number in parenthesis shows actual session number

* = Generalization passage not presented during baseline condition
<table>
<thead>
<tr>
<th>Session (#)*</th>
<th>Student</th>
<th>Obs. 1</th>
<th>Obs. 2</th>
<th>Percent Agreement</th>
<th>Obs. 1</th>
<th>Obs. 2</th>
<th>Percent Agreement</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 (4)</td>
<td>1</td>
<td>10</td>
<td>10</td>
<td>100</td>
<td>4</td>
<td>4</td>
<td>100</td>
</tr>
<tr>
<td>(3)</td>
<td>2</td>
<td>5</td>
<td>5</td>
<td>100</td>
<td>2</td>
<td>2</td>
<td>100</td>
</tr>
<tr>
<td>(3)</td>
<td>3</td>
<td>5</td>
<td>5</td>
<td>100</td>
<td>5</td>
<td>5</td>
<td>100</td>
</tr>
<tr>
<td>(3)</td>
<td>4</td>
<td>6</td>
<td>7</td>
<td>85.7</td>
<td>4</td>
<td>4</td>
<td>100</td>
</tr>
<tr>
<td>(2)</td>
<td>5</td>
<td>4</td>
<td>4</td>
<td>100</td>
<td>*</td>
<td>*</td>
<td>*</td>
</tr>
<tr>
<td>2 (8)</td>
<td>1</td>
<td>11</td>
<td>11</td>
<td>100</td>
<td>11</td>
<td>11</td>
<td>100</td>
</tr>
<tr>
<td>(7)</td>
<td>2</td>
<td>11</td>
<td>11</td>
<td>100</td>
<td>2</td>
<td>2</td>
<td>100</td>
</tr>
<tr>
<td>(7)</td>
<td>3</td>
<td>9</td>
<td>9</td>
<td>100</td>
<td>7</td>
<td>7</td>
<td>100</td>
</tr>
<tr>
<td>(6)</td>
<td>4</td>
<td>7</td>
<td>7</td>
<td>100</td>
<td>8</td>
<td>8</td>
<td>100</td>
</tr>
<tr>
<td>(5)</td>
<td>5</td>
<td>6</td>
<td>6</td>
<td>100</td>
<td>12</td>
<td>10</td>
<td>83.3</td>
</tr>
<tr>
<td>3 (10)</td>
<td>1</td>
<td>14</td>
<td>14</td>
<td>100</td>
<td>10</td>
<td>10</td>
<td>100</td>
</tr>
<tr>
<td>(10)</td>
<td>2</td>
<td>7</td>
<td>8</td>
<td>100</td>
<td>5</td>
<td>5</td>
<td>100</td>
</tr>
<tr>
<td>(9)</td>
<td>3</td>
<td>9</td>
<td>9</td>
<td>100</td>
<td>6</td>
<td>6</td>
<td>100</td>
</tr>
<tr>
<td>(10)</td>
<td>4</td>
<td>2</td>
<td>2</td>
<td>100</td>
<td>4</td>
<td>4</td>
<td>100</td>
</tr>
<tr>
<td>(8)</td>
<td>5</td>
<td>12</td>
<td>12</td>
<td>100</td>
<td>8</td>
<td>8</td>
<td>100</td>
</tr>
<tr>
<td>4 (14)</td>
<td>1</td>
<td>14</td>
<td>14</td>
<td>100</td>
<td>7</td>
<td>7</td>
<td>100</td>
</tr>
<tr>
<td>(13)</td>
<td>2</td>
<td>4</td>
<td>4</td>
<td>100</td>
<td>9</td>
<td>9</td>
<td>100</td>
</tr>
<tr>
<td>(14)</td>
<td>3</td>
<td>10</td>
<td>10</td>
<td>100</td>
<td>4</td>
<td>4</td>
<td>100</td>
</tr>
<tr>
<td>(13)</td>
<td>5</td>
<td>14</td>
<td>14</td>
<td>100</td>
<td>5</td>
<td>5</td>
<td>100</td>
</tr>
<tr>
<td>5 (19)</td>
<td>1</td>
<td>19</td>
<td>18</td>
<td>94.7</td>
<td>7</td>
<td>7</td>
<td>100</td>
</tr>
<tr>
<td>(18)</td>
<td>2</td>
<td>13</td>
<td>11</td>
<td>84.6</td>
<td>2</td>
<td>2</td>
<td>100</td>
</tr>
<tr>
<td>(17)</td>
<td>3</td>
<td>20</td>
<td>20</td>
<td>100</td>
<td>5</td>
<td>5</td>
<td>100</td>
</tr>
<tr>
<td>(18)</td>
<td>4</td>
<td>4</td>
<td>4</td>
<td>100</td>
<td>1</td>
<td>1</td>
<td>100</td>
</tr>
<tr>
<td>(17)</td>
<td>5</td>
<td>17</td>
<td>17</td>
<td>100</td>
<td>5</td>
<td>5</td>
<td>100</td>
</tr>
<tr>
<td>6 (21)</td>
<td>1</td>
<td>13</td>
<td>13</td>
<td>100</td>
<td>14</td>
<td>14</td>
<td>100</td>
</tr>
<tr>
<td>(20)</td>
<td>2</td>
<td>13</td>
<td>13</td>
<td>100</td>
<td>2</td>
<td>2</td>
<td>100</td>
</tr>
<tr>
<td>7 (26)</td>
<td>1</td>
<td>22</td>
<td>22</td>
<td>100</td>
<td>6</td>
<td>6</td>
<td>100</td>
</tr>
<tr>
<td>(26)</td>
<td>2</td>
<td>15</td>
<td>15</td>
<td>100</td>
<td>11</td>
<td>11</td>
<td>100</td>
</tr>
<tr>
<td>(24)</td>
<td>3</td>
<td>15</td>
<td>15</td>
<td>100</td>
<td>6</td>
<td>6</td>
<td>100</td>
</tr>
<tr>
<td>(23)</td>
<td>4</td>
<td>7</td>
<td>7</td>
<td>100</td>
<td>11</td>
<td>11</td>
<td>100</td>
</tr>
<tr>
<td>(21)</td>
<td>5</td>
<td>16</td>
<td>16</td>
<td>100</td>
<td>10</td>
<td>10</td>
<td>100</td>
</tr>
<tr>
<td>8 (28)</td>
<td>1</td>
<td>22</td>
<td>22</td>
<td>100</td>
<td>12</td>
<td>12</td>
<td>100</td>
</tr>
<tr>
<td>(27)</td>
<td>2</td>
<td>19</td>
<td>19</td>
<td>100</td>
<td>4</td>
<td>4</td>
<td>100</td>
</tr>
<tr>
<td>(28)</td>
<td>3</td>
<td>23</td>
<td>23</td>
<td>100</td>
<td>6</td>
<td>6</td>
<td>100</td>
</tr>
</tbody>
</table>

Table 5: **Interobserver Agreement of Recalls per Minute**
Table 5 (continued)

<table>
<thead>
<tr>
<th></th>
<th>4</th>
<th>11</th>
<th>11</th>
<th>100</th>
<th>7</th>
<th>7</th>
<th>100</th>
</tr>
</thead>
<tbody>
<tr>
<td>25</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>23</td>
<td>5</td>
<td>15</td>
<td>15</td>
<td>100</td>
<td>6</td>
<td>6</td>
<td>100</td>
</tr>
<tr>
<td>29</td>
<td>2</td>
<td>15</td>
<td>15</td>
<td>100</td>
<td>7</td>
<td>7</td>
<td>100</td>
</tr>
<tr>
<td>30</td>
<td>3</td>
<td>19</td>
<td>19</td>
<td>100</td>
<td>10</td>
<td>10</td>
<td>100</td>
</tr>
<tr>
<td>27</td>
<td>4</td>
<td>8</td>
<td>8</td>
<td>100</td>
<td>7</td>
<td>7</td>
<td>100</td>
</tr>
<tr>
<td>25</td>
<td>5</td>
<td>12</td>
<td>12</td>
<td>100</td>
<td>13</td>
<td>13</td>
<td>100</td>
</tr>
<tr>
<td>30</td>
<td>5</td>
<td>19</td>
<td>19</td>
<td>100</td>
<td>10</td>
<td>10</td>
<td>100</td>
</tr>
<tr>
<td>27</td>
<td>4</td>
<td>8</td>
<td>8</td>
<td>100</td>
<td>7</td>
<td>7</td>
<td>100</td>
</tr>
<tr>
<td>29</td>
<td>2</td>
<td>15</td>
<td>15</td>
<td>100</td>
<td>7</td>
<td>7</td>
<td>100</td>
</tr>
<tr>
<td>30</td>
<td>3</td>
<td>19</td>
<td>19</td>
<td>100</td>
<td>10</td>
<td>10</td>
<td>100</td>
</tr>
<tr>
<td>27</td>
<td>4</td>
<td>8</td>
<td>8</td>
<td>100</td>
<td>7</td>
<td>7</td>
<td>100</td>
</tr>
<tr>
<td>25</td>
<td>5</td>
<td>12</td>
<td>12</td>
<td>100</td>
<td>13</td>
<td>13</td>
<td>100</td>
</tr>
<tr>
<td>10</td>
<td>1</td>
<td>27</td>
<td>27</td>
<td>100</td>
<td>15</td>
<td>15</td>
<td>100</td>
</tr>
<tr>
<td>35</td>
<td>3</td>
<td>25</td>
<td>25</td>
<td>100</td>
<td>11</td>
<td>11</td>
<td>100</td>
</tr>
<tr>
<td>31</td>
<td>4</td>
<td>17</td>
<td>17</td>
<td>100</td>
<td>10</td>
<td>10</td>
<td>100</td>
</tr>
<tr>
<td>30</td>
<td>5</td>
<td>14</td>
<td>14</td>
<td>100</td>
<td>12</td>
<td>12</td>
<td>100</td>
</tr>
<tr>
<td>11</td>
<td>1</td>
<td>25</td>
<td>25</td>
<td>100</td>
<td>14</td>
<td>14</td>
<td>100</td>
</tr>
<tr>
<td>35</td>
<td>3</td>
<td>28</td>
<td>28</td>
<td>100</td>
<td>15</td>
<td>15</td>
<td>100</td>
</tr>
<tr>
<td>34</td>
<td>4</td>
<td>16</td>
<td>16</td>
<td>100</td>
<td>11</td>
<td>11</td>
<td>100</td>
</tr>
<tr>
<td>35</td>
<td>5</td>
<td>19</td>
<td>19</td>
<td>100</td>
<td>14</td>
<td>14</td>
<td>93.3</td>
</tr>
</tbody>
</table>

Total: 710 709 99.9 384 385 99.7

a = Number in parenthesis shows actual session number

* = Generalization passage not presented during baseline condition

**Recalls.** Table 5 summarizes the agreement between the experimenter and the trained observer in recording the number of correct recalls per minute across instructional and generalization passages. Mean agreement for instructional passages was 99.9%, range 85.7 to 100%. Mean agreement for generalization passages was 99.7%, range 83.3 to 100%. There were three occasions when the experimenter and the second observer
disagreed on the number of correct recalls for instructional passages. Additionally, there were two occasions of disagreement on the number of correct recalls for generalization passages.

Procedural Integrity

To ensure that the experimental procedures were implemented as intended, procedural integrity was conducted on the independent variable. Having the audiotapes of full sessions reviewed by an observer assessed integrity. Using a checklist (see Appendix F), the independent observers assessed 28% of the sessions for Students 1 and 5, 31% of the sessions for Student 2, 25% of the sessions for Student 3, and 26% of the sessions for Student 4. Results of the procedural integrity measure indicated that the experimenter correctly implemented the procedure for 100% of the sessions observed throughout the study.

Results for Individual Students

Student 1

Figure 1 presents a graphical representation of the performance by Student 1 across all three dependent variables for the 40 days of the study. The top tier depicts the number of words read correctly per minute for instructional passages (open data points) and for generalization passages (closed data points). The center tier shows the number of errors per minute for instructional passages (open data points) and for generalization passages (closed data points). Finally, the bottom tier portrays the number of recalls per minute for instructional passages (open data points) and for generalization passages (closed data points). Each graph begins with a two session baseline condition. Then, the
Figure 1: Oral reading and comprehension performance in instructional (open data points) and generalization (closed data points) passages for Student 1. BL=Baseline. Horizontal lines represent changing criterion for generalization passages.
brief analysis phase is presented in which the student was exposed to the four treatment conditions for one session each for the purpose of assessment. The third section of the graph shows results for an extended analysis phase in which the RR/EM and LPP conditions were alternated across eight sessions. Finally, data from the best treatment (i.e., RR/EM) phase are displayed for the remaining 26 sessions.

**Words read correctly per minute.** During baseline, Student 1 read 24 words correct per minute in material on grade level (B-GL). When given a reading passage that was one grade level lower (B-EM), he read 23 words correct per minute, essentially indicating no difference between the leveled material.

In the brief analysis phase, the order of the analog sessions was LPP/EM, RR/EM, LPP, and RR. Student 1’s performance on instructional passages was 47, 50, 55, and 38 words correct per minute respectively. For generalization passages, Student 1 read 13 words correct during LPP/EM, 14 words correct during RR/EM, 15 words correct during LPP, and 36 words correct during RR. When analyzing these data, it was hypothesized that the LPP condition may have been the most effective for Student 1 because LPP produced the greatest performance increase from the control condition for the instructional passage. In other words, the score of 55 words in the LPP condition yielded 31 more words correct than the performance in the B-GL condition. The condition that produced the second highest performance increase in instructional passages for Student 1 was RR/EM, which was 27 more words correct than B-EM. Hence, LPP and RR/EM were chosen for the extended analysis phase of the study for Student 1.

In the extended analysis phase, the response rate – meaning the words read correct per minute – for instructional passages under the RR/EM condition showed a slight
increase in trend. When RR/EM was in effect, Student 1 had a mean score of 61 words read correctly, range 54 to 69. There was a slight decreasing trend in the response pattern for instructional passages under the LPP condition. When LPP was in effect, Student 1 had a mean score of 38.8, range 27 to 48. A differential response pattern was shown between RR/EM and LPP for instructional passages, with RR/EM producing the higher response rate. Performance with generalization passages showed a steady level for RR/EM and LPP conditions. When RR/EM was in effect, Student 1 produced a mean score of 29 words read correctly per minute, range 27 to 33. When LPP was in effect, Student 1 had a mean score of 22.3, range 17 to 31.

During the best treatment phase, RR/EM was implemented. Student 1's response pattern showed an increasing trend for instructional passages, with a little variability. His performance of words read correctly yielded a mean of 62.2, range 42 to 77. During generalization passages, Student 1's overall mean was 26.2, range 11 to 39. Student 1 showed a steady performance pattern through session number 30, at which point a three-sequence criterion was applied as follows: First, a target of 27 word correct per minute was established. Student 1 exceeded his target for 3 out of 4 sessions, averaging 33.3 words read correctly, range 23 to 39. Next, the target was increased 10% to 30 words, and Student 1 exceeded or met this target for the next three sessions; he averaged 33.3, range 30 to 36. Finally, the target was increased to 33 words. Student 1's average was 33.8, range 29 to 39. He exceeded his target for 2 out of 4 sessions.

So, overall, when the criterion was established and changed over 11 sessions, Student 1 met or exceeded this criterion for 8 sessions. He failed to meet the criterion on
3 days. Additionally, when the criterion was implemented, Student 1 yielded 5 sessions in which he exceeded all other previous response rates in generalization passages.

**Errors per minute.** During baseline, Student 1 had 4 errors per minute in material on grade level (B-GL). When given a reading passage that was one grade level lower (B-EM), he had 5 errors per minute, a negligible difference between these levels.

In the brief analysis phase, the order of the analog sessions was LPP/EM, RR/EM, LPP, and RR. The number of errors for Student 1 on instructional passages was 2, 4, 1, and 4 errors respectively. For generalization passages, Student 1 had 5 errors during LPP/EM, 8 errors during RR/EM, 7 errors during LPP, and 6 errors during RR.

In the extended analysis phase, the error rate – the number of errors per minute – for instructional passages under the RR/EM condition showed a slight decreasing trend. When RR/EM was in effect, Student 1 had a mean score of 3.5 errors, range 2 to 5. When LPP was in effect, Student 1 had a mean score of 4.8 errors, range 2 to 8. There was overlap of the data paths for RR/EM and LPP conditions. Errors for generalization passages showed a steady level for both RR/EM and LPP conditions. When RR/EM was in effect, Student 1 had a mean score of 6.3 errors, range 5 to 8. When LPP was in effect, Student 1 had a mean score of 6.8 errors, range 7 to 8.

During the best treatment phase, RR/EM was implemented. Student 1’s error pattern showed a steady trend for instructional passages, with some variability. His errors had a mean of 2.7, range 0 to 6. During generalization passages, Student 1’s overall mean was 6.1 errors, range 2 to 11. The data path for errors in generalization passages was steady with quite a bit of variability.
Recalls per minute. During baseline, Student 1 had 2 correct recalls per minute in material on grade level (B-GL). When given a reading passage that was one grade level lower (B-EM), he had 5 correct recalls per minute, more than 2.5 times the number of recalls as when he was on grade level.

In the brief analysis phase, the order of the analog sessions was LPP/EM, RR/EM, LPP, and RR. Student 1’s performance on recalls was 5, 10, 16, and 10 recalls per minute respectively. For generalization passages, Student 1 had 3 recalls during LPP/EM, 4 recalls during RR/EM, 4 recalls during LPP, and 10 recalls per minute during RR.

In the extended analysis phase, the number of recalls per minute for instructional passages under the RR/EM condition showed a robust increasing trend. When RR/EM was in effect, Student 1 had a mean score of 15.5 recalls, range 9 to 21. There was a stable response pattern for instructional passages under the LPP condition. When LPP was in effect, Student 1 had a mean score of 12.5 recalls, range 11 to 14. A differential response pattern was shown between RR/EM and LPP for instructional passages, with RR/EM producing the higher response rate. Performance within generalization passages showed a common steady level for RR/EM and LPP conditions. When RR/EM was in effect, Student 1 had a mean score of 7.3 recalls, range 4 to 10. When LPP was in effect, Student 1 had a mean score of 7.8 recalls, range 3 to 11.

During the best treatment phase, RR/EM was implemented. Student 1’s response pattern showed an increasing trend for instructional passages, with some variability. His performance had a mean of 21.4 recalls, range 11 to 31. During generalization passages, Student 1’s overall mean was 9.7, range 2 to 18. The data path for recalls in
generalization passages had significant variability early in the best treatment phase (sessions 15 to 23), but an increasing trend with less variability was displayed at the end of this phase (sessions 24 to 40).

**Student 2**

Figure 2 presents a graphical representation of the performance by Student 2 across all three dependent variables for the 36 days of the study. The top tier depicts the number of words read correctly per minute for instructional passages (open data points) and for generalization passages (closed data points). The center tier shows the number of errors per minute for instructional passages (open data points) and for generalization passages (closed data points). Finally, the bottom tier portrays the number of recalls per minute for instructional passages (open data points) and for generalization passages (closed data points). Each graph begins with a two session baseline condition. Then, the brief analysis phase is presented in which the student was exposed to the four treatment conditions for one session each for the purpose of assessment. The third section of the graph shows results for an extended analysis phase in which the RR and RR/EM conditions were alternated across 11 sessions. Finally, data from the best treatment (i.e., RR/EM) phase are displayed for the remaining 19 sessions.

**Words read correctly per minute.** During baseline, Student 2 read 24 words correct per minute in material on grade level (B-GL). When given a reading passage that was one grade level lower (B-EM), he read 19 words correct per minute.

In the brief analysis phase, the order of the analog sessions was LPP, LPP/EM, RR, and RR/EM. Student 2's performance on instructional passages was 25, 29, 49, and 33 words correct per minute respectively. For generalization passages, Student 1 read 26
Figure 2: Oral reading and comprehension performance in instructional (open data points) and generalization (closed data points) passages for Student 2. BL=Baseline. Horizontal lines represent changing criterion for generalization passages.
words correct during LPP, 25 words correct during LPP/EM, 36 words correct during RR, and 25 words correct during RR/EM. When analyzing these data, it was hypothesized that the RR condition may have been the most effective for Student 2 because RR produced the greatest performance increase from the control condition for the instructional passage. In other words, the score of 49 words in the RR condition yielded 25 more words correct than the performance in the B-GL condition. The condition that produced the second highest performance increase in instructional passages for Student 2 was RR/EM, which was 13 more words correct than B-EM. Hence, RR and RR/EM were chosen for the extended analysis phase of the study for Student 2.

In the extended analysis phase, the number of words read correctly per minute for instructional passages under the RR condition showed a slight decrease in trend. When RR was in effect, Student 2 had a mean score of 48.3 words read correctly, range 37 to 61. There was an increasing trend in the response pattern for instructional passages under the RR/EM condition. When RR/EM was in effect, Student 2 had a mean score of 57.2, range 42 to 65. A differential response pattern was shown between RR and RR/EM for instructional passages, with RR/EM producing the higher response rate. Performance with generalization passages showed a steady level for RR and RR/EM conditions. When RR was in effect, Student 2 produced a mean score of 26.8 words read correctly per minute, range 20 to 36. When RR/EM was in effect, Student 2 had a mean score of 24.8, range 21 to 29.

During the best treatment phase, RR/EM was implemented. Student 2’s response pattern showed an increasing trend for instructional passages, with some variability. His performance of words read correctly yielded a mean of 64.1, range 53 to 80. During
generalization passages, Student 2’s overall mean was 32, range 13 to 47. Student 2 showed a variable performance pattern through session number 28, at which point a three-sequence criterion was applied as follows: First, a target of 35 word correct per minute was established. Student 2 exceeded his target for 3 out of 4 sessions, averaging 35.3 words read correctly, range 26 to 40. Next, the target was increased 10% to 39 words, and Student 2 exceeded this target for the next three sessions; he averaged 43, range 40 to 46. Finally, the target was increased to 44 words. Student 2 exceeded this target for the last session, with 47 words correct per minute.

Overall, when the criterion was established and changed over 8 sessions, Student 2 met or exceeded this criterion for 7 sessions. He failed to meet the criterion on 1 day. Additionally, when the criterion was implemented, Student 2 experienced 4 sessions in which he exceeded all other previous response rates in generalization passages.

**Errors per minute.** During baseline, Student 2 had 3 errors per minute in material on grade level (B-GL). When given a reading passage that was one grade level lower (B-EM), he had 9 errors per minute, 3 times the number of errors as when he was on grade level.

In the brief analysis phase, the order of the analog sessions was LPP, LPP/EM, RR, and RR/EM. The number of errors for Student 2 on instructional passages was 4, 6, 6, and 3 errors respectively. For generalization passages, Student 2 had 5 errors during LPP, 7 errors during LPP/EM, 7 errors during RR, and 5 errors during RR/EM.

In the extended analysis phase, the number of errors per minute for instructional passages under the RR condition showed a steady trend. When RR was in effect, Student 2 had a mean score of 6.3 errors, range 4 to 9. When RR/EM was in effect, Student 2 had
a mean score of 4.8 errors, range 1 to 8. There was overlap of the data paths for RR and RR/EM conditions. Errors for generalization passages showed a steady level with variability for RR and RR/EM conditions. When RR was in effect, Student 2 had a mean score of 6.3 errors, range 5 to 8. When RR/EM was in effect, Student 2 had a mean score of 7.6 errors, range 6 to 9.

During the best treatment phase, RR/EM was implemented. Student 2’s error pattern showed a steady trend for instructional passages, with some variability. His errors had a mean of 3.4, range 1 to 12. During generalization passages, Student 2’s overall mean was 5.9 errors, range 2 to 10. The data path for errors in generalization passages was steady with quite a bit of variability. The data paths for errors in instructional and generalization passages overlapped several times during this phase.

Recalls per minute. During baseline, Student 2 had 4 correct recalls per minute in material on grade level (B-GL). When given a reading passage that was one grade level lower (B-EM), he had 2 correct recalls per minute, half the number of recalls as when he was on grade level.

In the brief analysis phase, the order of the analog sessions was LPP, LPP/EM, RR, and RR/EM. Student 2’s performance on recalls was 5, 4, 7, and 8 recalls per minute respectively. For generalization passages, Student 2 had 5 recalls during LPP, 7 recalls during LPP/EM, 5 recalls during RR, and 4 recalls per minute during RR/EM.

In the extended analysis phase, the number of recalls per minute for instructional passages under the RR condition showed a steady trend. When RR was in effect, Student 2 had a mean score of 9.2 recalls, range 9 to 12. There was a slight increase in trend for instructional passages under the RR/EM condition. When RR/EM was in effect, Student
2 had a mean score of 11.6 recalls, range 7 to 19. There was an overlapping response pattern shown between RR and RR/EM for instructional passages, with RR/EM producing the higher response rate. Performance within generalization passages showed a common steady level for RR and RR/EM conditions. When RR was in effect, Student 2 had a mean score of 4.8 recalls, range 3 to 9. When RR/EM was in effect, Student 2 had a mean score of 4 recalls, range 2 to 6.

During the best treatment phase, RR/EM was implemented. Student 2’s response pattern showed a slight increasing trend for instructional passages, with some variability. His performance had a mean of 15.3 recalls, range 7 to 21. During generalization passages, Student 2’s overall mean was 7.9, range 2 to 14. The data path for recalls in generalization passages showed a slight increase in trend, with some variability.

Student 3

Figure 3 presents a graphical representation of the performance by Student 3 across all three dependent variables for the 40 days of the study. The top tier depicts the number of words read correctly per minute for instructional passages (open data points) and for generalization passages (closed data points). The center tier shows the number of errors per minute for instructional passages (open data points) and for generalization passages (closed data points). Finally, the bottom tier portrays the number of recalls per minute for instructional passages (open data points) and for generalization passages (closed data points). Each graph begins with a two session baseline condition. Then, the brief analysis phase is presented in which the student was exposed to the four treatment conditions for one session each for the purpose of assessment. The third section of the graph shows results for an extended analysis phase in which the RR/EM and RR
Figure 3: Oral reading and comprehension performance in instructional (open data points) and generalization (closed data points) passages for Student 3. BL=Baseline. Horizontal lines represent changing criterion for generalization passages.
conditions were alternated across ten sessions. Finally, data from the best treatment (i.e., RR/EM) phase are displayed for the remaining 24 sessions.

**Words read correctly per minute.** During baseline, Student 3 read 22 words correct per minute in material on grade level (B-GL). When given a reading passage that was one grade level lower (B-EM), he read 28 words correct per minute, essentially indicating a light difference between the leveled material.

In the brief analysis phase, the order of the analog sessions was RR/EM, RR, LPP/EM, and LPP. Student 3’s performance on instructional passages was 44, 36, 28, and 31 words correct per minute respectively. For generalization passages, Student 3 read 23 words correct during RR/EM, 28 words correct during RR, 22 words correct during LPP/EM, and 37 words correct during LPP. When analyzing these data, it was hypothesized that the RR/EM condition may have been the most effective for Student 3 because RR/EM produced the greatest performance increase from the control condition for the instructional passage. In other words, the score of 44 words in the RR/EM condition yielded 16 more words correct than the performance in the B-GL condition. The condition that produced the second highest performance increase in instructional passages for Student 3 was RR, which was 14 more words correct than B-EM. Hence, RR/EM and RR were chosen for the extended analysis phase of the study for Student 3.

In the extended analysis phase, the number of words read correct per minute for instructional passages under the RR/EM condition showed a slight increase in trend. When RR/EM was in effect, Student 3 had a mean score of 59.6 words read correctly, range 43 to 66. There was a slight decreasing trend in the response pattern for instructional passages under the RR condition. When RR was in effect, Student 3 had a
mean score of 57.2, range 45 to 70. There was overlap in the data paths between RR/EM and RR for instructional passages, with RR/EM producing the overall higher mean response rate. Performance with generalization passages showed a steady level for RR/EM condition. When RR/EM was in effect, Student 3 produced a mean score of 32.6 words read correctly per minute, range 31 to 36. Performance with generalization passages showed a slight decrease in trend for RR condition. When RR was in effect, Student 3 had a mean score of 25.4, range 18 to 34.

During the best treatment phase, RR/EM was implemented. Student 3’s response pattern showed an increasing trend for instructional passages, with a little variability. His performance of words read correctly yielded a mean of 77.5, range 63 to 93. During generalization passages, Student 3’s overall mean was 42, range 22 to 61. Student 3 showed a steady performance pattern through session number 29, at which point a three-sequence criterion was applied as follows: First, a target of 37 word correct per minute was established. Student 3 exceeded his target for 3 out of 3 sessions, averaging 52 words read correctly, range 47 to 55. Next, the target was increased to the average of the last three sessions to 52 words, and Student 3 exceeded this target for the 3 out of 4 sessions; he averaged 56 words correct, range 50 to 61. Finally, the target was increased to 57 words. Student 3’s average was 57, range 52 to 61. He exceeded his target for 2 out of 4 sessions.

In sum, when the criterion was established and changed over 11 sessions, Student 1 met or exceeded this criterion for 8 sessions. He failed to meet the criterion across 3 days. Additionally, when the criterion was in implemented, Student 3 exceeded all other previous response rates in generalization passages.
Errors per minute. During baseline, Student 3 had 4 errors per minute in material on grade level (B-GL). When given a reading passage that was one grade level lower (B-EM), he had 3 errors per minute, essentially no difference between these levels.

In the brief analysis phase, the order of the analog sessions was RR/EM, RR, LPP/EM, and LPP. The number of errors for Student 3 on instructional passages was 2, 4, 4, and 5 errors respectively. For generalization passages, Student 3 had 6 errors during RR/EM, 4 errors during RR, 6 errors during LPP/EM, and 3 errors during LPP.

In the extended analysis phase, the error rate for instructional passages under the RR/EM condition showed a slight increasing trend. When RR/EM was in effect, Student 3 had a mean score of 1.8 errors, range 0 to 3. When RR was in effect, Student 3 had a mean score of 5.2 errors, range 1 to 13. There was overlap of the data paths for RR/EM and RR conditions. Errors for generalization passages showed a steady level for both RR/EM and RR conditions, with one out-liar data point. When RR/EM was in effect, Student 3 had a mean score of 5.6 errors, range 4 to 14. When RR was in effect, Student 3 had a mean score of 4.2 errors, range 3 to 5.

During the best treatment phase, RR/EM was implemented. Student 3’s error pattern showed a low steady trend for instructional passages, with some variability. His errors had a mean of 1, range 0 to 3. During generalization passages, Student 3’s overall mean was 4 errors, range 2 to 7. The data path for errors in generalization passages was steady with some variability.

Recalls per minute. During baseline, Student 3 had 1 correct recalls per minute in material on grade level (B-GL). When given a reading passage that was one grade level
lower (B-EM), he had 5 correct recalls per minute, 5 times the number of recalls as when he was on grade level.

In the brief analysis phase, the order of the analog sessions was RR/EM, RR, LPP/EM, and LPP. Student 3’s performance on recalls was 5, 0, 7, and 2 recalls per minute respectively. For generalization passages, Student 3 had 5 recalls during RR/EM, 5 recalls during RR, 5 recalls during LPP/EM, and 3 recalls per minute during LPP.

In the extended analysis phase, the recall rate for instructional passages under the RR/EM condition showed an increasing trend. When RR/EM was in effect, Student 3 had a mean score of 11 recalls, range 9 to 14. There was a stable response pattern for instructional passages under the RR condition. When RR was in effect, Student 3 had a mean score of 9.2 recalls, range 7 to 12. Overlapping data paths was shown between RR/EM and RR for instructional passages, with RR/EM producing the higher mean response rate. Performance within generalization passages showed a common slight decreasing trend for RR/EM and RR conditions. When RR/EM was in effect, Student 3 had a mean score of 6 recalls, range 4 to 9. When RR was in effect, Student 3 had a mean score of 4.2 recalls, range 2 to 8.

During the best treatment phase, RR/EM was implemented. Student 3’s response pattern showed an increasing trend for instructional passages, with some variability. His performance had a mean of 20 recalls, range 10 to 28. During generalization passages, Student 3’s overall mean was 9.5, range 3 to 18.

**Student 4**

Figure 4 presents a graphical representation of the performance by Student 4 across all three dependent variables for the 35 days of the study. The top tier depicts the
Figure 4: Oral reading and comprehension performance in instructional (open data points) and generalization (closed data points) passages for Student 4. BL=Baseline. Horizontal lines represent changing criterion for generalization passages.
number of words read correctly per minute for instructional passages (open data points) and for generalization passages (closed data points). The center tier shows the number of errors per minute for instructional passages (open data points) and for generalization passages (closed data points). Finally, the bottom tier portrays the number of recalls per minute for instructional passages (open data points) and for generalization passages (closed data points). Each graph begins with a two session baseline condition. Then, the brief analysis phase is presented in which the student was exposed to the four treatment conditions for one session each for the purpose of assessment. The third section of the graph shows results for an extended analysis phase in which the RR and LPP conditions were alternated across eleven sessions. Finally, data from the best treatment (i.e., RR) phase are displayed for the remaining 18 sessions.

Words read correctly per minute. During baseline, Student 4 read 21 words correct per minute in material on grade level (B-GL). When given a reading passage that was one grade level lower (B-EM), he read 43 words correct per minute, essentially double from grade-level material.

In the brief analysis phase, the order of the analog sessions was RR, RR/EM, LPP/EM, and LPP. Student 4's performance on instructional passages was 42, 62, 40, and 62 words correct per minute respectively. For generalization passages, Student 4 read 40 words correct during RR, 45 words correct during RR/EM, 61 words correct during LPP/EM, and 58 words correct during LPP. When analyzing these data, it was hypothesized that the LPP condition may have been the most effective for Student 4 because LPP produced the greatest performance increase from the control condition for the instructional passage. In other words, the score of 62 words in the LPP condition
yielded 41 more words correct than the performance in the B-GL condition. The condition that produced the second highest performance increase in instructional passages for Student 4 was RR, which was 21 more words correct than B-EM. Hence, LPP and RR were chosen for the extended analysis phase of the study for Student 4.

In the extended analysis phase, the number of words read correctly per minute for instructional passages under the RR condition showed a slight decreasing trend. When RR was in effect, Student 4 had a mean score of 61.3 words read correctly, range 49 to 77. There was a steady trend in the response pattern for instructional passages under the LPP condition. When LPP was in effect, Student 4 had a mean score of 53.8, range 41 to 67. An overlapping response pattern was shown between RR and LPP for instructional passages, with RR producing the higher mean response rate. Performance with generalization passages showed a decreasing trend for RR and LPP conditions. When RR was in effect, Student 4 produced a mean score of 34.2 words read correctly per minute, range 20 to 54. When LPP was in effect, Student 4 had a mean score of 42.4, range 29 to 52.

During the best treatment phase, RR was implemented. Student 4’s response pattern showed an increasing trend for instructional passages, with some variability. His performance of words read correctly yielded a mean of 70.5, range 46 to 92. During generalization passages, Student 4’s overall mean was 48, range 19 to 62. Student 4 showed a variable performance pattern through session number 26, at which point a three-sequence criterion was applied as follows: First, a target of 52 word correct per minute was established. Student 4 exceeded his target for 3 out of 3 sessions, averaging 56 words read correctly, range 53 to 62. Next, the target was increased about 10% to 57
words, and Student 4 exceeded or met this target for 3 out of 4 sessions; he averaged 58.5, range 55 to 61. Finally, the target was increased to 60 words. Student 4’s average was 59, range 57 to 61. He exceeded his target for 1 out of 2 sessions.

Hence, when the criterion was established and changed over 9 sessions, Student 4 met or exceeded this criterion for 7 sessions. He failed to meet the criterion for 2 days. Additionally, when the criterion was in implemented, Student 1 yielded 3 sessions in which he exceeded all other previous response rates in generalization passages.

**Errors per minute.** During baseline, Student 4 had 9 errors per minute in material on grade level (B-GL). When given a reading passage that was one grade level lower (B-EM), he had 2 errors per minute, a difference of 4.5 times fewer errors.

In the brief analysis phase, the order of the analog sessions was RR, RR/EM, LPP/EM, and LPP. The number of errors for Student 4 on instructional passages was 6, 7, 9, and 7 errors respectively. For generalization passages, Student 4 had 4 errors during RR, 9 errors during RR/EM, 6 errors during LPP/EM, and 8 errors during LPP.

In the extended analysis phase, the number of errors per minute for instructional passages under the RR condition showed a slight increasing trend. When RR was in effect, Student 4 had a mean score of 4.2 errors, range 3 to 6. When LPP was in effect, Student 4 had a mean score of 5.6 errors, range 2 to 16. There was overlap of the data paths for RR and LPP conditions. Errors for generalization passages showed a slight increasing trend for both RR and LPP conditions. When RR was in effect, Student 4 had a mean score of 5.8 errors, range 3 to 8. When LPP was in effect, Student 4 had a mean score of 4.6 errors, range 1 to 8.
During the best treatment phase, RR was implemented. Student 4’s error pattern showed a steady trend for instructional passages, with some variability. His errors had a mean of 1.7, range 0 to 4. During generalization passages, Student 4’s overall mean was 4.5 errors, range 1 to 14. The data path for errors in generalization passages was decreasing (sessions 18 to 22) then steady with quite a bit of variability.

**Recalls per minute.** During baseline, Student 4 had 4 correct recalls per minute in material on grade level (B-GL). When given a reading passage that was one grade level lower (B-EM), he had 2 correct recalls per minute, half the number of recalls as when he was on grade level.

In the brief analysis phase, the order of the analog sessions was RR, RR/EM, LPP/EM, and LPP. Student 4’s performance on recalls was 6, 7, 9, and 7 recalls per minute respectively. For generalization passages, Student 4 had 4 recalls during RR, 9 recalls during RR/EM, 6 recalls during LPP/EM, and 8 recalls per minute during LPP.

In the extended analysis phase, the recall rate for instructional passages under the RR condition showed a steady trend. When RR was in effect, Student 4 had a mean score of 8 recalls, range 6 to 12. Likewise, there was a stable response pattern for instructional passages under the LPP condition. When LPP was in effect, Student 4 had a mean score of 5 recalls, range 2 to 7. A similar response pattern was shown between RR and LPP for instructional passages. Performance within generalization passages showed a common steady level for RR and LPP conditions. When RR was in effect, Student 4 had a mean score of 3.5 recalls, range 2 to 6. When LPP was in effect, Student 4 had a mean score of 4.6 recalls, range 3 to 6.
During the best treatment phase, RR/EM was implemented. Student 4’s response pattern showed an increasing trend for instructional passages, with some variability. His performance had a mean of 11.2 recalls, range 4 to 16. During generalization passages, Student 4’s overall mean was 8.1 recalls, range 1 to 13.

Student 5

Figure 5 presents a graphical representation of the performance by Student 5 across all three dependent variables for the 36 days of the study. The top tier depicts the number of words read correctly per minute for instructional passages (open data points) and for generalization passages (closed data points). The center tier shows the number of errors per minute for instructional passages (open data points) and for generalization passages (closed data points). Finally, the bottom tier portrays the number of recalls per minute for instructional passages (open data points) and for generalization passages (closed data points). Each graph begins with a two session baseline condition. Then, the brief analysis phase is presented in which the student was exposed to the four treatment conditions for one session each for the purpose of assessment. The third section of the graph shows results for an extended analysis phase in which the RR/EM and LPP conditions were alternated across eight sessions. Finally, data from the best treatment (i.e., RR/EM) phase are displayed for the remaining 22 sessions.

Words read correctly per minute. During baseline, Student 5 read 30 words correct per minute in material on grade level (B-GL). When given a reading passage that was one grade level lower (B-EM), he read 25 words correct per minute.
Figure 5: Oral reading and comprehension performance in instructional (open data points) and generalization (closed data points) passages for Student 5. BL=Baseline. Horizontal lines represent changing criterion for generalization passages.
In the brief analysis phase, the order of the analog sessions was LPP/EM, RR, RR/EM, and LPP. Student 5’s performance on instructional passages was 59, 60, 69, and 67 words correct per minute respectively. For generalization passages, Student 5 read 13 words correct during LPP/EM, 37 words correct during RR, 44 words correct during RR/EM, and 29 words correct during LPP. When analyzing these data, it was hypothesized that the RR/EM condition may have been the most effective for Student 5 because RR/EM produced the greatest performance increase from the control condition for the instructional passage. In other words, the score of 69 words in the RR/EM condition yielded 44 more words correct than the performance in the B-GL condition. The condition that produced the second highest performance increase in instructional passages for Student 5 was LPP, which was 37 more words correct than B-EM. Hence, RR/EM and LPP were chosen for the extended analysis phase of the study for Student 5.

In the extended analysis phase, the response rate for instructional passages under the RR/EM condition showed a slight increase in trend. When RR/EM was in effect, Student 5 had a mean score of 64.8 words read correctly, range 62 to 67. There was a slight decreasing trend in the response pattern for instructional passages under the LPP condition. When LPP was in effect, Student 5 had a mean score of 34, range 19 to 50. A differential response pattern was shown between RR/EM and LPP for instructional passages, with RR/EM producing the higher response rate. Performance with generalization passages showed a decreasing trend for RR/EM and a steady level for LPP. When RR/EM was in effect, Student 5 produced a mean score of 36.3 words read correctly per minute, range 27 to 46. When LPP was in effect, Student 5 had a mean score of 33, range 30 to 41.
During the best treatment phase, RR/EM was implemented. Student 5's response pattern showed a slight increasing trend for instructional passages, with some variability. His performance of words read correctly yielded a mean of 73.5, range 59 to 92. During generalization passages, Student 5's overall mean was 42.9, range 23 to 55. Student 5 showed a variable performance pattern through session number 24, at which point a three-sequence criterion was applied as follows: First, a target of 44 word correct per minute was established. Student 5 exceeded his target for 3 out of 5 sessions, averaging 45.2 words read correctly, range 37 to 50. Next, the target was increased 10% to 48 words, and Student 5 exceeded this target for the next three sessions; he averaged 51.3, range 50 to 54. Finally, the target was increased to 53 words. Student 5's average was 51.3, range 47 to 55. He exceeded or met his target for 2 out of 4 sessions.

So, overall, when the criterion was established and changed over 12 sessions, Student 5 met or exceeded this criterion for 8 sessions. He failed to meet the criterion on 4 days. Additionally, when the criterion was implemented, Student 5 yielded 3 sessions in which he exceeded all other previous response rates in generalization passages.

**Errors per minute.** During baseline, Student 5 had 11 errors per minute in material on grade level (B-GL). When given a reading passage that was one grade level lower (B-EM), he had 14 errors per minute, a negligible difference between these levels.

In the brief analysis phase, the order of the analog sessions was LPP/EM, RR, RR/EM, and LPP. The number of errors for Student 5 on instructional passages was 2, 8, 7, and 4 errors respectively. For generalization passages, Student 5 had 10 errors during LPP/EM, 7 errors during RR, 14 errors during RR/EM, and 11 errors during LPP.
In the extended analysis phase, the error rate – the number of errors per minute – for instructional passages under the RR/EM condition showed a steady trend. When RR/EM was in effect, Student 5 had a mean score of 3.8 errors, range 3 to 5. When LPP was in effect, Student 5 had a mean score of 9.3 errors, range 5 to 14. There was an increasing trend for LPP. Errors for generalization passages showed a steady level for both RR/EM and LPP conditions. When RR/EM was in effect, Student 5 had a mean score of 9 errors, range 7 to 11. When LPP was in effect, Student 5 had a mean score of 9 errors, range 6 to 12.

During the best treatment phase, RR/EM was implemented. Student 5’s error pattern showed a small increasing trend for instructional passages, with some variability. His errors had a mean of 3.3, range 0 to 9. During generalization passages, Student 5’s overall mean was 6.7 errors, range 2 to 15. The data path for errors in generalization passages was decreasing with quite a bit of variability.

Recalls per minute. During baseline, Student 5 had 4 correct recalls per minute in material on grade level (B-GL). When given a reading passage that was one grade level lower (B-EM), he had 5 correct recalls per minute, a negligible difference.

In the brief analysis phase, the order of the analog sessions was LPP/EM, RR, RR/EM, and LPP. Student 5’s performance on recalls was 12, 20, 6, and 9 recalls per minute respectively. For generalization passages, Student 5 had 1 recall during LPP/EM, 8 recalls during RR, 12 recalls during RR/EM, and 4 recalls per minute during LPP.

In the extended analysis phase, the number of recalls per minute for instructional passages under the RR/EM condition showed an increasing trend. When RR/EM was in effect, Student 5 had a mean score of 11.5 recalls, range 9 to 14. There was a stable
response pattern for instructional passages under the LPP condition. When LPP was in effect, Student 5 had a mean score of 12 recalls, range 9 to 16. Performance within generalization passages showed a common steady level for RR/EM and LPP conditions. When RR/EM was in effect, Student 5 had a mean score of 5.5 recalls, range 3 to 9. When LPP was in effect, Student 5 had a mean score of 7.8 recalls, range 6 to 9.

During the best treatment phase, RR/EM was implemented. Student 5’s response pattern showed an increasing trend for instructional passages, with some variability. His performance had a mean of 17.9 recalls, range 12 to 25. During generalization passages, Student 5’s overall mean was 9.7, range 2 to 16. The data path for recalls in generalization passages showed an increasing trend with some variability.

Social Validity

After the study concluded, the five students and the special education teacher were asked to respond to a questionnaire (see Appendices D and E). The teachers were asked to read and respond to the questions. Students were interviewed individually by the experimenter.

Students

Table 6 summarizes the students’ responses. Questions on the interview were a mix of forced-choice and open-ended formats to reflect students’ views. The questions were used to determine an overall evaluation of the study (Questions 4 and 7), likes and dislikes about the procedures (Questions 1, 2 and 6), and preference for teaching method for oral reading fluency (Questions 3 and 5).
<table>
<thead>
<tr>
<th>Question</th>
<th>Response</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. What did you like best about this study?</td>
<td>• Reading.</td>
</tr>
<tr>
<td></td>
<td>• Loved it. Reading new stories.</td>
</tr>
<tr>
<td></td>
<td>• It was fun.</td>
</tr>
<tr>
<td></td>
<td>• Getting prizes</td>
</tr>
<tr>
<td></td>
<td>• Going faster.</td>
</tr>
<tr>
<td>2. What did you like least about this study?</td>
<td>• Hard readings</td>
</tr>
<tr>
<td></td>
<td>• Nothing</td>
</tr>
<tr>
<td></td>
<td>• Late for recess</td>
</tr>
<tr>
<td></td>
<td>• Remembering what I read</td>
</tr>
<tr>
<td>3. Think back to the beginning of the study when several different</td>
<td>Yes (5 out of 5)</td>
</tr>
<tr>
<td>methods to teach reading fluency were presented. Do you think this is</td>
<td></td>
</tr>
<tr>
<td>a good way to see which teaching method is the best for a student?</td>
<td></td>
</tr>
<tr>
<td>4. Which activity did you think helped you more?</td>
<td>Repeated reading (1 out of 5)</td>
</tr>
<tr>
<td></td>
<td>Listening passage preview (1 out of 5)</td>
</tr>
<tr>
<td></td>
<td>Repeated reading with easier material (3 out of 5)</td>
</tr>
<tr>
<td>5. If you could change any part of this study, what would you change?</td>
<td>Nothing (3 out of 5)</td>
</tr>
<tr>
<td>7. Do you believe that what you learned in this study will help you in</td>
<td>• Yes, my teacher thinks I do not read well. This is the way to get to read better.</td>
</tr>
<tr>
<td>school in the future? Why or why not?</td>
<td>• Yes, my score is good.</td>
</tr>
<tr>
<td></td>
<td>• Yes, because it does.</td>
</tr>
<tr>
<td></td>
<td>• Yes, I am faster.</td>
</tr>
<tr>
<td></td>
<td>• Yes, reading class next year.</td>
</tr>
</tbody>
</table>

Table 6: Summary of Responses to Student Opinion Questionnaire
Overall, the students responded positively at the conclusion of the study. They liked reading, building fluency, and participating in the study. All students agreed that alternating several teaching methods might be a good way to find out which method is best for them. All students stated that the selected method helped them read more fluently. Three students identified RR/EM as the condition that helped them the most, while one student each identified RR and LPP.

When asked to about what they would change regarding the study, three students stated "nothing", while 2 did not respond. However, when identifying unfavorable elements in the study the difficulty of the passages, recording recalls, and the scheduling of some sessions was stated.

Teacher Responses

Table 7 summarizes the teacher's responses. The teacher liked having the study implemented in her classroom, and indicated that the students enjoyed their participation. The teacher believed the best treatment methods helped her students read more fluently. Further, the teacher indicated that graphing the students' performance aided analysis. When asked to comment on the procedures used in the study, the teacher indicated that the procedures were not difficult to implement, yet she had some concerns about the amount of time was required. The teacher believed that brief functional analysis is a useful way to assess instructional methods and determine which method is best for a particular student. She stated that functional assessment would provide information, in addition to information already available, necessary to plan and implement effective programming for students with disabilities.
1. After hearing a description of the study conducted, how important do you think the study is in terms of its contribution to teaching technologies and assessment procedures for students with learning disabilities?

Brief functional analysis may help us find a teaching strategy that is more effective for a student who is not achieving. I am always looking for strategies that work.

2. The study investigated the utility of conduction a brief functional analysis to determine the most effective teaching method to increase oral reading fluency. How important is this type of assessment for students with disabilities?

As a method to test teaching strategies, it can be very important to special education. MFE’s generally do not give enough information to make all educational decisions. This assessment could provide vital information that the teacher needs for planning instruction.

3. How feasible would it be to integrate a brief functional analysis into the assessment methods you currently use to gain information regarding your students?

While it is simple to do, it looks like it would be a bit time consuming. However, it can be a good tool to have available for a student who is not making much progress.

4. Under what conditions would you most likely use a brief functional analysis?

I would need to be able to schedule time to work with the students individually. This would work well in a co-teaching classroom where the students can easily be pulled out for assessment.

5. How has participation in the study effected your students?

The students always looked forward to reading time and being able to work one-on-one with another person. The graphs were great! The progress was easy to see.

6. Please comment on aspects of the study that you liked best.

I think it was great to get some diagnostic help with the students. The results of the study can aid in planning/instruction next year.

7. Please comment on the aspects of the study that you did not like.

Having someone come into my class on a daily basis was a challenge. I felt bad when there was a change in the schedule.

Table 7: Summary of Responses to Teacher Opinion Questionnaire

87
CHAPTER 5
DISCUSSION

This chapter discusses the finding of the study, which examined procedures for conducting brief functional analyses reading interventions on oral reading fluency of elementary students with disabilities. First, the results of the study will be addressed in relation to the research questions and the relevant body of extant literature. Next, limitations to the study will be presented, followed by the implications for classroom practice. Finally, suggestions for future research will be provided.

Relationship of Results to Research Questions

What is the effect of a best intervention program determined through functional analysis on improved oral reading fluency (rate of correct and rate of incorrect words read) on instructional passages?

The results of this investigation show a functional relationship between the best intervention programs determined through functional analysis and improvement in oral reading fluency. For all 5 students participating in the study, the rate of words read correctly from instructional passages improved during the best treatment condition. Additionally, the rate of errors from instructional passages remained at a steady low level or a decreasing trend across the students.
The results of this study related to Research Question 1 support previous findings of Daly et al. (1998) and Daly et al. (1999). In these studies, they administered brief functional analysis conditions to students with poor oral reading fluency to identify effective treatment. In each case, differential response patterns were obtained and confirmed in a mini-replication. Each student responded to different treatment conditions. For example in Daly et al. (1998) the largest treatment effects were produced by repeated reading for the first student, repeated reading in instructional and generalization passages for the second students, and listening passage preview for the final student. Likewise in Daly et al. (1999) two students showed the largest treatment effects with repeated readings with sequential modification, while one student each had the highest response rate with listening passage preview/repeated readings/sequential modification and listening passage preview/repeated reading/easier material. These results suggest that brief functional analyses can be conducted successfully with academic behaviors like oral reading fluency.

Likewise, the current study replicates Daly et al. (1998) and Daly et al. (1999), showing that a brief functional analysis can be conducted successfully with oral reading fluency behavior. In the present study, when a series of interventions was applied to the five students, the students responded to different treatment conditions. Specifically, Students 1 and 4 had the highest rate of words read correctly in the LPP condition, whereas Student 2 had the best performance in the RR condition. Students 3 and 5 performed best in the RR/EM condition.

Additionally, the current study extends the literature by providing data on academic applications of functional analysis with students with disabilities. In particular,
McComas et al. (1996) showed that functional analysis facilitated the identification of instructional variables to teach spelling or reading comprehension to 4 students with learning disabilities. In McComas et al. (1996) these children with learning disabilities were assessed to determine effective instructional strategies through brief analysis. Each student responded to different treatment conditions.

However, it is likely that brief functional analysis may not produce clearly discriminable results across conditions for all students. The extended analysis phase of the current study produced some interesting results. For instance, during extended analysis a multielement design was used to examine whether clearly differential responding emerged across the most promising two interventions from the brief analysis. The extended analysis results confirmed the best treatment for Students 3 and 5 (i.e., RR/EM was the most successful intervention in both the brief and the extended analysis). However, for Students 1, 2, and 4, the extended analysis showed that the most successful treatment condition was different than the condition indicated by the brief analysis. These results stand in contrast to the literature that has reported frequent correspondence between results of brief and extended analyses (Kahng & Iwata, 1999; Rodgers et al., 1990; Tincani et al., 1999). Specifically, Kahng and Iwata (1999) reported that outcomes obtained from brief functional analyses showed a similar and moderately high degree of correspondence with outcomes based on full functional analyses for 50 individuals with self-injurious behavior. That is to say, outcomes obtained from examining the contributing effects of the conditions of attention, tangible, demand, alone, and play over 5 days were as informative as conducting a more extended analysis of these same variables over a longer period of time. Likewise, Tincani et al. (1999) compared a brief
and an extended functional analyses with three adults with serious developmental disabilities who exhibited aggressive behavior. Their results showed that the brief and extended analyses revealed the same controlling variables for each subject, corroborating the key findings of Kahng and Iwata (1999). In essence, the predictive value of the brief assessment was powerful, yielding data that could ultimately (a) reduce the need for longer assessment periods, (b) speed up the initiation of best treatments presumably for the betterment of the individual, and (c) meet a social validity standard and least restrictive alternative that call for acceptable, effective, and less intrusive approaches to be used during treatment regimes.

Hence, the value of brief analysis of instructional methods may best be used within a decision framework for progressing from brief to a more extended experimental analysis (Volmer et al., 1995). Volmer et al. (1995) makes the point that “decisions about assessment length can be data based” (p. 570). They describe an assessment sequence that moves through four phases beginning with brief analysis and concluding in extended analysis that may control for experimental confounds.

What is the effect of a best intervention program determined through functional analysis on improved oral reading fluency (rate of correct and rate of incorrect words read) on generalization passages?

Effects on generalization passages were an important collateral variable analyzed in the present study. For all 5 students participating in the study, the number of words read correctly per minute increased during the best treatment phase of the study. Students 2 and 4 showed a steady increasing trend beginning with the implementation of the best treatment (RR/EM and RR, respectively). For Students 1, 3, and 5, limited
generalized increases were observed early in the best treatment phase. However, explicit generalization programming increased their response rates for words read correctly in generalization passages. Mid-way through the best treatment phase, a changing criterion was applied to student performance in an effort to increase students' oral reading performance in generalization passages. All five students showed trend increases as a function of the added reinforcement. Errors per minute for generalization passages remained in a steady range for all the participants illustrating a need for programming for generalization. More specifically, this finding suggests the generalization can not be assumed, a point initially made by Baer et al. (1968) and echoed over the years by other researchers who have observed main effects but lamented generalized effects in the absence of specific contingencies to produce them (Koegel & Rincover, 1977). It may be that the interventions used in this study did not produce the "biggest bang for the buck" in terms of outcomes. Indeed, greater generalized increases might have been observed with other treatments to increase oral reading fluency.

Still, the data from this study and previous research show a similar relationship among best intervention and improvement in generalization passages (Daly et al., 1998; Daly et al., 1999). In Daly et al. (1998), 2 out of 3 subject required sequential modification (a form of generalization programming) to increase their rates in generalization passages. When sequential modification was in effect, the number of correct words per minute showed the highest levels in generalization passages, and low level of correct words were reported for conditions that did not include sequential
modification. Likewise, in Daly et al. (1999), repeated application of treatments to the
generalization passage was necessary for all but 1 student to achieve generalized
outcomes.

What is the effect of a best intervention program determined through functional analysis
on improved oral reading fluency on rate of recalls?

Improvements in the rate of recalls were found for all students during
instructional and generalization passages. Data indicate increasing trends for each
student, with Student 2 showing some variability. Additionally, consistently higher rates
of recalls were noted across all students for instructional passages over generalization
passages. Hence, a functional relationship can be claimed between the rate of recalls and
a best intervention program determined through functional analysis on improved oral
reading fluency.

Based on a review of the literature, the present study appears to be the first to
investigate comprehension directly as an outcome of a best intervention program
determined through functional analysis. However, all the students experienced a repeated
reading intervention. Hence, the present study replicated the findings of earlier
experiments (Layton & Koenig, 1998; Taylor et al., 1985) insofar as a similar positive
effect on comprehension was found for repeated readings. In Taylor et al. (1985) 45 fifth-
graders read passages under the conditions of repeated reading and phrasing. Afterwards,
a measure of comprehension was taken from free and cumulative recall scores. Results
showed that repeated readings had the highest effect on poor readers' recalls over the
phrasing condition.
Do students and teachers prefer the use of brief functional analysis to identify effective strategies to improve oral reading fluency?

Students. Overall, students viewed the brief assessment positively. These results, however, cannot easily be compared to or contrasted with other studies that use functional assessment for academic instruction because social validity data were not presented in past studies. The extant literature does not have specific examples documenting students' opinions of brief functional analyses, especially as they relate to academic subject matter. In the current study, when asked about the procedure of "testing" different teaching methods, all five students thought brief analysis was a good practice for teachers. Within the context of the larger study, all students stated that the selected best treatment method helped them read more fluently. Students 1, 2, and 5 identified RR/EM as the condition that helped them the most, while Student 3 preferred RR and Student 4 LPP. All students, except Student 4, identified the condition that was selected for best treatment as the one they preferred.

Although they were positive about the study, there were aspects that the students did not like. For example, Student 1 stated that "some of the stories were hard to read." Student 4 stated that he did not like the recall activity. Student 5 stated that he did not like being late for recess, a problem that occurred a couple times when experimental sessions extended longer than planned.

Teacher. The special education teacher completed a Teacher Opinion Questionnaire (see Appendix E). The teacher enjoyed having the study conducted in her classroom, and she believed that the students enjoyed the techniques. The teacher
believed the best treatment methods helped her students read more fluently. Further, the teacher indicated that graphing the students' performance aided analysis.

When asked to comment on the procedures used in the study, the teacher indicated that they were not difficult to implement, yet she had some concerns about the amount of time was required. The teacher believed that brief functional analysis was a good way to assess instructional methods and determine the best method for a particular student. She stated that functional assessment provided information, in addition to information already available, necessary to plan and implement effective programming for students with disabilities. These results confirm the findings of Jolivette et al. (1998). Specifically, teachers in the Jolivette et al. (1998) study indicated satisfaction with the use of functional assessment to identify effective instructional methods for academic skills. Additionally, the current results parallels the literature on functional assessment research on aberrant behavior. Blair et al. (1999), Kelley, Heffer, Gresham, and Elliott (1989) and Umbreit and Blair (1997) reported high treatment acceptability with teachers. Ervin et al. (1998) collected data with a teacher satisfaction scale, indicating that interventions based on functional assessments were effective and feasible in classroom settings.

Limitations

Participants and Setting

Because the study was conducted within a pull-out reading intervention model for children with disabilities, the sample of students as well as the type of setting limited external validity. The students were third and fourth graders who were in this setting because their educational needs were met by small-group instruction and low
teacher/pupil ratio. Further, the demographic characteristics of the students (i.e., all were Caucasian) limit external validity. Therefore, caution should be used in generalizing the results to the universe of students with developmental or learning disabilities. However, the subjects were representative of a range of children with disabilities, especially those identified as being in need of oral reading fluency training. The classroom was unique in that it was a pull-out program with the experimenter coming in to work one-on-one with students. Again, caution should be used in generalizing the results of the study to other settings, especially those where two teachers are not present in the classroom.

Treatment

The current study examined the instructional strategies of repeated reading, listening passage preview, and instructional level. While these tactics have a literature base showing their positive effect on oral reading fluency, there are many other strategies that could have been explored. These include guided reading, choral reading, assisted reading, error correction and contingent rewards. In the present study, the best intervention programs that were selected for each subject were limited to the strategies that were tested in the brief analysis phase. Indeed a totally different instructional strategy, not explored in the present study, may have had a greater impact on the oral reading fluency performance of one or all of the subjects. Further it is difficult to say, and well beyond the scope of the study, to suggest how a best treatment determined through either brief or full functional analysis might change as the students age, change grade level, or as the content or material change. Still, as stated previously, functional analysis offers the practitioner a decision making framework for determining best treatment even amidst changes in age, grade, or content.
Additionally, a practice effect confound may have influenced the results.

Anecdotal observations noted that before the study began, the participants did not have experiences freely reporting information from material read. Initially, the students had hesitations and stumbled to remember content from the text. As the study progressed, the students became more comfortable with the task and were able to supply recalls quickly regarding a passage when asked.

**Endurance**

Endurance is the ability to maintain high response rates for progressively longer period of time (Binder, 1996). Clearly, endurance is an important aspect of reading. However, endurance was not examined in this study. In the current study, all reading was limited to one-minute timings. One-minute timings are an effective tool for assessment purposes, but the results can not be extrapolated directly as to the relationship between the treatments and academic responding of longer duration.

**Implications**

There are at least two groups for whom implications of this study may be relevant: faculty teaching at the pre-service level, and general and special education classroom teachers and practitioners in the field.

**Faculty Teaching at the Preservice Level**

 Teachers should be able to implement effective practices – best practices – to improve student performance (Peters & Heron, 1992). Functional analysis is an assessment technology that has been studied extensively across behaviors, learners, and settings (Cooper et al., 1990; Daly et al., 1998; Daly et al., 1999; Hendrickson et al., 1996; Iwata et al., 1982; Iwata et al., 1994; Mace & Lalli, 1991; McComas et al., 1996; 97
Sasso et al., 1992). The data from this study suggest that brief experimental analysis for identifying instructional components can be an integral part of a comprehensive educational assessment and subsequent remediation.

Future application of functional assessment techniques for the purpose of identifying effective academic interventions should include an initial teacher-training component. That is, faculty at institutions of higher education need the skills to teach functional analysis effectively at the preservice level. With all the demands on faculty time, such a recommendation may seem challenging, yet Iwata et al. (2000) found that basic skills for conducting functional analyses of behavior disorders can be acquired in as little as a 2-hour training period. University personnel who are responsible for preservice training can acquire these skills through several venues, including: (a) pre-conference workshops (e.g., Association for Behavior Analysis) in which experts teach while faculty members learn, (b) workshops conducted by learned societies (e.g., Council for Exceptional Children) who historically have sponsored stand-alone training, and (c) commercial vendors who hire experts to teach at regional facilities. Each of these alternatives has advantages for busy professors who have multiple contingencies on their time.

Additionally, this training-of-trainers model should exhibit what is known about effective professional development. For instance, when faculty present functional analysis skills, participants should be engaged in active response patterns. Materials should be presented, available, and easily adaptable for students. Finally, a formal system of follow-up should be implemented so faculty can be responsive to participants and that they continue to have contact with trainers after the original training workshop.
General and Special Education Classroom Practice

An important point for practitioners to realize is that the functional analysis procedures outlined in this study are compatible with educational assessment and individually designed instruction. Special educators need a variety of information about their students. Special education services are designed to meet the individual needs of students. Whereas instructional plans must be highly individualized, teachers obtain precise information about their students through assessment. Educational assessment of students with disabilities is the systematic process of gathering educationally relevant information to make legal and instructional decisions (McLoughlin & Lewis, 1990). Functional analysis can be a part of a multi-faceted effort to understand the student and the conditions in which the learner can be successful. Taylor (2000) noted that if appropriate assessment procedures are conducted, the information that is obtained could be used to enhance the teaching process. Mirroring the goal of academic applications of functional analysis.

Additionally, for a number of reasons, functional assessment procedures are easily integrated into the classroom environment. First, functional assessment procedures build on methods of collecting data that teachers currently use. Most classroom teachers count behaviors of students at least at some level. Second, the teacher assesses a student's performance and forms a hypothesis that is based on the information gathered. Third, an abundance of academic strategies can be found in the literature. However, determining the specific strategy that will best meet the needs of a particular student is difficult. Using functional analysis can reduce the time the teacher expends searching through trial and error. Fourth, functional assessment is the link between assessment of problematic
behavior and academic difficulties and the interventions designed to address them (Lawry et al., 1993). Without empirical data and testing procedures, less effective interventions may be initiated, resulting in prolonged academic failure and delaying even more the onset of effective treatment.

Overall, the procedures reported here should be of interest to classroom teachers and school psychologists. These educational examiners can expand their direct assessment skills by "testing" treatments before planning instruction or making recommendations. This process should ensure data-based decision making. The use of a brief analysis allows the educator to make accurate and relatively quick decisions about promising intervention packages in a standard format. Such an assessment produces outcome data that are directly relevant to classroom instruction. This compliments the discussion by Wacker, Northup, and Cooper (1992), who stated that brief experimental assessments are preferred over indirect measures (e.g., checklist or surveys) because they lower the degree of inference needed to identify maintaining contingencies and treatments.

The current study progressed from brief to an extended experimental analysis to replicate and validate treatment selection. One advantage of the use of separate phases within the decision framework is that educators can let the data drive how much assessment is needed. The separate phases allow the teacher to confirm prior observation more rigorously. The brief analysis phase may produce a primary hypothesis on effective treatment. The extended analysis, with the ability to examine variability, level, and trend, reduces the reliance on a single exposure to each test condition as a means of identifying effective intervention components.
Suggestions for Future Research

The results of this study provided evidence of the effectiveness and the utility of conducting functional analyses for identifying instructional components to improve oral reading fluency. At the same time, several issues have arisen that call for future research to be conducted in this area.

Replication with in an academic context is an important avenue to pursue with functional analysis. Stated succinctly, this study should be replicated and extended (Cooper et al., 1987). Systematic replication should occur initially with in the areas that have been studied (Johnston & Pennypacker, 1993). For instance, further replication across grade levels, content areas, methods, and use of natural classroom conditions should provide researchers with a greater understanding of the effects of functional analysis on treatment selection. Such studies would include subjects with different characteristics, such disabilities and economic backgrounds, different content areas such as math and writing, and different settings such as general education classrooms.

Another replication that could be conducted involves training classroom teachers to conduct functional analyses for aiding in selecting teaching methods. While the utility of staff training in functional analysis of aberrant behavior has been explored in the literature (Iwata et al, 2000; Shore, Iwata, Vollmer, Lerman, & Zarcone, 1995), parallel studies with academic application is lacking. Several studies could be conducted in this manner, assessing the extent to which untrained individuals could implement a functional analysis with minimal instruction, and the amount of training that may be necessary to produce a high degree of procedural accuracy.
As discussed earlier in this chapter, brief functional analysis as used in the current study may not produce clearly discriminable results across conditions for all students. Future studies might employ research designs to further evaluate the internal and external validity of brief functional analysis in academic practices. The brief analysis of reading interventions can be evaluated by comparing their results to extended experimental analysis, as it was reported in the current study, or by examining the results that are produced in natural classroom settings across time. Additionally, future studies may explore procedures of conducting all the analog sessions of the brief functional analysis phase during one day, reminiscent of the procedures used by Iwata et al. (1994) and Wacker et al. (1994). One advantage of this would be the reduction of history effects between analog conditions.

With respect to interventions to increase oral reading fluency, further studies can extend the line of research. One area is the selection and testing of other treatments or combining treatments. While the current study was limited by the methods of repeated readings, listening passage preview, and instructional level, future studies can explore a plethora of strategies to increase reading fluency. For example, using choral reading or phase drill interventions as test conditions may provide high rates of responding for some learners.

Importantly, research should continue to consider ways to foster maintenance and generality. The question of retention, rates of decay and re-learning of performance at fluent levels is largely unexplored (Maloney, Desjardins, & Broad, 1990), yet have significant ramifications for teaching and learning. The degree to which the learner’s new improved skills generalize to new materials or new responses remains a critical issue.
When interventions failed to produce immediate effects in generalization passages, generalization programming was necessary. Future studies might explore means to design interventions that are more likely to lead to generalization. Also, because students typically read silently for comprehension, research should attempt to measure directly the impact of fluency training on students' rate of silent reading comprehension (Skinner, Logan, Robinson, & Robinson, 1997). If interventions designed to improve rates of accurate oral reading are to be truly effective, then they also must increase students' silent reading fluency.

Summary

This study was conducted to determine the effects using functional analysis as a method to determine a best intervention program for improving oral reading fluency. The subjects were 5 elementary boys with learning or developmental disabilities, enrolled in public school. The study took place in a resource room within the context of ongoing reading instruction.

Throughout the study, the students worked individually in the back of the room with the experimenter for about 5 minutes per day. Following a two-session baseline condition, four brief conditions were administered for the purpose of testing. These included: (a) repeated reading; (b) repeated reading with easier materials; (c) listening passage preview; and (d) listening passage preview with easier materials. Hypotheses regarding effective treatment were then tested in an extended analysis. Finally, the selected best interventions were implemented and their effectiveness was monitored across time.
During all sessions, the experimenter collected data on one-minute readings. The dependent variables were the number of words read correct per minute, errors per minute, and recalls per minute across instructional and generalization passages.

Differential response patterns were obtained for all participants during the brief analysis. Functional relationships among the number of words read correct per minute and best intervention programs determined through brief analysis were shown for all 5 students in instructional passages. Generalized outcomes were consistent across all students only when a criterion for generalization was applied. Additionally, the best intervention program determined through brief analysis had an effect on the number of recalls for instructional passages. The results of the current study suggest that functional analysis is an effective procedure for determining the comparative usefulness of instructional methods, especially within the context of a thorough educational assessment.
APPENDIX A

Letter to Parents
December 12, 2000

Dear Parent/Guardian:

I am doctoral candidate at The Ohio State University, pursuing an advanced degree in special education. Part of the requirement for this program involves a research project. I will be working on this project in your child’s classroom, under the supervision of Dr. Timothy Heron, faculty advisor at The Ohio State University. The topic I have chosen for this project is oral reading fluency.

Reading fluency is reading quickly and accurately, and is an important element of a skilled reader. Fluency is related to comprehension, generalization, and maintenance of skill. My goal is to assess your child in three different teaching strategies that have been effective in improving oral reading fluency. The teaching strategy that is shown to be the most effective for your individual child will be selected and used for fluency instruction.

During the study, the classroom procedures will continue as usual. The study will take place during the reading lesson. Your child will work with me, one-on-one, in a different part of the classroom for approximately 10 minutes a day. During each session, an instructional passage will be used to teach your child to read more fluently. Then your child will be asked to read a new passage to test if the newly learned fluency skill transfers to an unread passage. Your child will also be asked to recall information from the passages to measure the effect of fluent reading on comprehension.

For purposes of this study, your child will be assured confidentiality and your child’s name will not be used in any reports. Achievement test scores will be used from your child’s permanent school records for purpose of comparison only, and your child’s identity will remain anonymous. The record sheets used in class will be destroyed upon completion of the study. Your child has been selected and nominated for this study by the teacher to improve oral reading fluency.

The study will be conducted for three to four months, Monday through Friday, and each session will be approximately 10 minutes per day. Your child’s participation in this study is completely voluntary, and you may withdraw your child at any point during the study, without penalty.
Enclosed please find the "Parent/Guardian Consent Form." If you have any questions regarding the study, please feel free to call Richard Welsch at Dr. Heron’s office at 292-7632.

Sincerely,

______________________________
Richard Welsch, Co-investigator
Ph.D. Candidate
The Ohio State University

______________________________
Timothy Heron, Principal Investigator
Faculty Advisor
The Ohio State University

Enclosure
APPENDIX B

Parent/Guardian Consent Form
Parent Consent for Child’s Participation in Educational Research

I agree to allow my child to participate in a research entitled: Improving Oral Reading Fluency: An Examination from Brief Functional Analysis to Treatment.

Dr. Timothy Heron, Principal Investigator, or Richard Welsch, co-investigator has explained the purpose of the study, the procedures to be followed, and the expected duration of my child’s participation. Possible benefits of the study have been described, as have alternative procedures, if such procedures are applicable and available.

I acknowledge that I have had an opportunity to obtain additional information regarding the study and any questions I have raised have been answered to my full satisfaction. Furthermore, I understand that I am (my child is) free to withdraw consent at any time and to discontinue participation in the study without prejudice to me or my child.

Also, I give consent to the persons conducting this research to have access to my child’s achievement test scores found with school records and for instructional sessions to be audiotaped.

Finally, I acknowledge that I have read and fully understand the consent form. I sign it freely and voluntarily. A copy has been given to me.

Name of Child: _____________________________

Date: ______________ Signed: ________________

(Participant)

Signed: ______________ Signed: ________________

(Principal Investigator or his authorized representative) (Person authorized to consent for participant, if required)

Witness: ___________________________
APPENDIX C

Classroom Schematic
Classroom Schematic

- Cupboards
- Sink
- Student Work Table
- Chalkboard
- Room Divider
- Study Carrels
- Files
- Teacher Desk
- Windows
- Students Work Table
- Door
APPENDIX D

Student Opinion Questionnaire
Student Questionnaire

Name: ________________________________ Date: __________________

2. What did you like best about this study?

3. What did you like least about this study?

4. Think back to the beginning of the study when several different methods to teach reading fluency were presented. Do you think this is a good way to see which teaching method is the best for a student?
   ______ yes ______ no

5. Do you think the best treatment helped you read more fluently?
   ______ yes ______ no

6. Which activity did you think helped you more?
   ______ Repeated reading
   ______ Listening passage preview
   ______ Easier material/repeated reading
   ______ Easier material/listening passage preview

7. If you could change any part of this study, what would you change?

7. Do you believe that what you learned in this study will help you in school in the future? Why or why not?
APPENDIX E

Teacher Opinion Questionnaire
Teacher Questionnaire

1. After hearing a description of the study conducted, how important do you think the study is in terms of its contribution to teaching technologies and assessment procedures for students with learning disabilities? Explain.

2. The study investigated the utility of conducting a brief functional analysis to determine the most effective teaching method to increase oral reading fluency. How important is this type of assessment for students with disabilities? Explain.

3. How feasible would it be to integrate a brief functional analysis into the assessment methods you currently use to gain information regarding your students?

4. Under what conditions would you most likely use a brief functional analysis?

5. How has participation in the study affected your students?

6. Please comment on aspects of the study that you liked best.

7. Please comment on the aspects of the study that you did not like.
APPENDIX F

Procedural Interobserver Agreement Checklists
Procedural Integrity Checklist

Student’s Name: ______________________  Session # ____________
Observer: ______________________________  Date: ________________
Condition: Baseline-On grade level

<p>| | | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1. The experimenter asks the student to orally read the entire instructional passage (on grade level).</td>
<td></td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>2. The experimenter provides a signal to start reading and times the reading.</td>
<td></td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>3. Data on the first minute of the reading are recorded.</td>
<td></td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>4. The experimenter says: “When I say begin, recall as much as you can remember from the passage. Ready, begin.”</td>
<td></td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>5. The experimenter asks the student to orally read the generalization passage (on grade level).</td>
<td></td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>6. Data on the first minute of the reading are recorded.</td>
<td></td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>7. The experimenter says: “When I say begin, recall as much as you can remember from the passage. Ready, begin.”</td>
<td></td>
<td>Yes</td>
<td>No</td>
</tr>
</tbody>
</table>
### Procedural Integrity Checklist

<p>| | | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Student's Name:</strong></td>
<td><strong>Session #</strong></td>
<td><strong>Observer:</strong></td>
<td><strong>Date:</strong></td>
</tr>
<tr>
<td><strong>Condition:</strong> Baseline - Easier Material</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<p>| | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1. The experimenter asks the student to orally read the entire instructional passage (one grade level lower).</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2. The experimenter provides a signal to start reading and times the reading.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3. Data on the first minute of the reading are recorded.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4. The experimenter says: “When I say begin, recall as much as you can remember from the passage. Ready, begin.”</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5. The experimenter asks the student to orally read the generalization passage (on grade level).</td>
<td></td>
<td></td>
</tr>
<tr>
<td>6. Data on the first minute of the reading are recorded.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>7. The experimenter says: “When I say begin, recall as much as you can remember from the passage. Ready, begin.”</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Procedural Integrity Checklist

Student’s Name: ______________________  Session #: _____________
Observer: ____________________________  Date: ________________
Condition: Repeated Reading

<p>| | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1. The experimenter asks the student to orally read the entire instructional passage.</td>
<td>____ Yes ____ No</td>
<td></td>
</tr>
<tr>
<td>2. The experimenter provides a signal to start reading and times the reading.</td>
<td>____ Yes ____ No</td>
<td></td>
</tr>
<tr>
<td>3. When the student is finished reading, the experimenter tells him/her the number of words read correctly and incorrectly per minute.</td>
<td>____ Yes ____ No</td>
<td></td>
</tr>
<tr>
<td>4. The experimenter provides a prompt to orally read the instructional passage a second time.</td>
<td>____ Yes ____ No</td>
<td></td>
</tr>
<tr>
<td>5. The experimenter provides a signal to start reading and times the reading.</td>
<td>____ Yes ____ No</td>
<td></td>
</tr>
<tr>
<td>6. When the student is finished reading, the experimenter tells him/her the number of words read correctly and incorrectly per minute.</td>
<td>____ Yes ____ No</td>
<td></td>
</tr>
<tr>
<td>7. The experimenter provides a prompt to orally read the instructional passage a third time.</td>
<td>____ Yes ____ No</td>
<td></td>
</tr>
<tr>
<td>8. The experimenter provides a signal to start reading and times the reading.</td>
<td>____ Yes ____ No</td>
<td></td>
</tr>
</tbody>
</table>
9. When the student is finished reading, the experimenter tells him/her the number of words read correctly and incorrectly per minute. ___ Yes ___ No

10. The experimenter provides a prompt to orally read the instructional passage a fourth time. ___ Yes ___ No

11. The experimenter provides a signal to start reading and times the reading. ___ Yes ___ No

12. When the student is finished reading, the experimenter tells him/her the number of words read correctly and incorrectly per minute. ___ Yes ___ No

13. Data on the first minute of the reading are recorded. ___ Yes ___ No

14. The experimenter says: “When I say begin, recall as much as you can remember from the passage. Ready, begin.” ___ Yes ___ No

15. The experimenter asks the student to orally read the generalization passage. ___ Yes ___ No

16. Data on the first minute of the reading are recorded. ___ Yes ___ No

17. The experimenter says: “When I say begin, recall as much as you can remember from the passage. Ready, begin.” ___ Yes ___ No
# Procedural Integrity Checklist

**Student’s Name:** ______________________  **Session #** __________

**Observer:** ______________________  **Date:** __________

**Condition:**  **Listening Passage Preview**

<table>
<thead>
<tr>
<th><strong>1. The experimenter orally reads the instructional passage to the student, modeling fluent reading.</strong></th>
<th><em>Yes</em>  <em>No</em></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>2. The experimenter asks the student to orally read the instructional passage.</strong></td>
<td><em>Yes</em>  <em>No</em></td>
</tr>
<tr>
<td><strong>3. The experimenter provides a signal to start reading and times the reading.</strong></td>
<td><em>Yes</em>  <em>No</em></td>
</tr>
<tr>
<td><strong>4. When the student is finished reading, the experimenter tells him/her the number of words read correctly and incorrectly per minute.</strong></td>
<td><em>Yes</em>  <em>No</em></td>
</tr>
<tr>
<td><strong>5. Data on the first minute of the reading are recorded.</strong></td>
<td><em>Yes</em>  <em>No</em></td>
</tr>
<tr>
<td><strong>6. The experimenter says: “When I say begin, recall as much as you can remember from the passage. Ready, begin.”</strong></td>
<td><em>Yes</em>  <em>No</em></td>
</tr>
<tr>
<td><strong>7. The experimenter asks the student to orally read the generalization passage.</strong></td>
<td><em>Yes</em>  <em>No</em></td>
</tr>
<tr>
<td><strong>8. Data on the first minute of the reading are recorded.</strong></td>
<td><em>Yes</em>  <em>No</em></td>
</tr>
<tr>
<td><strong>9. The experimenter says: “When I say begin, recall as much as you can remember from the passage. Ready, begin.”</strong></td>
<td><em>Yes</em>  <em>No</em></td>
</tr>
</tbody>
</table>
Procedural Integrity Checklist

Student’s Name: ___________________________  Session # _____________
Observer: ________________________________  Date: __________________

Condition: Repeated Reading/Easier Material

<table>
<thead>
<tr>
<th>Step</th>
<th>Description</th>
<th>Yes</th>
<th>No</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>The experimenter asks the student to orally read the entire instructional passage (one grade level lower).</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2.</td>
<td>The experimenter provides a signal to start reading and times the reading.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3.</td>
<td>When the student is finished reading, the experimenter tells him/her the number of words read correctly and incorrectly per minute.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4.</td>
<td>The experimenter provides a prompt to orally read the instructional passage (one grade level lower) a second time.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5.</td>
<td>The experimenter provides a signal to start reading and times the reading.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>6.</td>
<td>When the student is finished reading, the experimenter tells him/her the number of words read correctly and incorrectly per minute.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>7.</td>
<td>The experimenter provides a prompt to orally read the instructional passage (one grade level lower) a third time.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>8.</td>
<td>The experimenter provides a signal to start reading and times the reading.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
9. When the student is finished reading, the experimenter tells him/her the number of words read correctly and incorrectly per minute.  
   ___ Yes ___ No

10. The experimenter provides a prompt to orally read the instructional passage (one grade level lower) a fourth time.  
    ___ Yes ___ No

11. The experimenter provides a signal to start reading and times the reading.  
    ___ Yes ___ No

12. When the student is finished reading, the experimenter tells him/her the number of words read correctly and incorrectly per minute.  
    ___ Yes ___ No

13. Data on the first minute of the reading are recorded.  
    ___ Yes ___ No

14. The experimenter says: “When I say begin, recall as much as you can remember from the passage. Ready, begin.”  
    ___ Yes ___ No

15. The experimenter asks the student to orally read the generalization passage.  
    ___ Yes ___ No

16. Data on the first minute of the reading are recorded.  
    ___ Yes ___ No

17. The experimenter says: “When I say begin, recall as much as you can remember from the passage. Ready, begin.”  
    ___ Yes ___ No
### Procedural Integrity Checklist

**Student’s Name:** __________________________  **Session #** __________________________

**Observer:** __________________________  **Date:** __________________________

**Condition:** Listening Passage Preview/Easier Material

<table>
<thead>
<tr>
<th>1. The experimenter orally reads the instructional passage (one grade level lower) to the student, modeling fluent reading.</th>
<th>____ Yes  ____ No</th>
</tr>
</thead>
<tbody>
<tr>
<td>2. The experimenter asks the student to orally read the instructional passage.</td>
<td>____ Yes  ____ No</td>
</tr>
<tr>
<td>3. The experimenter provides a signal to start reading and times the reading.</td>
<td>____ Yes  ____ No</td>
</tr>
<tr>
<td>4. When the student is finished reading, the experimenter tells him/her the number of words read correctly and incorrectly per minute.</td>
<td>____ Yes  ____ No</td>
</tr>
<tr>
<td>5. Data on the first minute of the reading are recorded.</td>
<td>____ Yes  ____ No</td>
</tr>
<tr>
<td>6. The experimenter says: “When I say begin, recall as much as you can remember from the passage. Ready, begin.”</td>
<td>____ Yes  ____ No</td>
</tr>
<tr>
<td>7. The experimenter asks the student to orally read the generalization passage (One grade level lower).</td>
<td>____ Yes  ____ No</td>
</tr>
<tr>
<td>8. Data on the first minute of the reading are recorded.</td>
<td>____ Yes  ____ No</td>
</tr>
<tr>
<td>9. The experimenter says: “When I say begin, recall as much as you can remember from the passage. Ready, begin.”</td>
<td>____ Yes  ____ No</td>
</tr>
</tbody>
</table>
“That sure is the fastest train set I’ve ever seen,” he would say. “Just look at that engine, that coach, that flat car, that caboose, and that track. A fine train set like that must cost a lot of money.”

“Come on,” said his brothers and sisters. “We’ll be late for school.”

“What are you getting Peter for his birthday?” the children asked Ma and Pa. “He sure wants that train set in Mindy’s window!”

“We’re not telling.” Said Ma. “No one can keep a secret in this family.”

“We’ve got ten dollars to spend,” said Pa. “Let’s go see what the train costs.”
"What happened to that train in the window?" Frank asked. "I've got four dollars, and I wanted to buy it."

"I've just sold the engine, the track, and the coach," said Mr. Mindy, "but the caboose is four dollars."

"It's a very fine caboose," said Frank "but not much use on its own."

"It's a start," said Mr. Mindy

Maria had three dollars saved. I'll go and see what that train set coasts she thought.

"How much is that train set you had in the window?" she asked.

"Thirty dollars for the set," said Mr. Mindy, "but I've just sold the engine, the track, the coach, and the caboose. The flat car is all that is left. But that is three dollars."

"Well," said Maria, "a flat car's nor much use on its own, but I'll take it."
We went out into the garage and spread out sticks and newspapers and made a kite. I fastened on the kite string and went to the closet and got rags for the tail.

"Do you have some paper and two pencils?" Gloria asked.

"Because now we are making the wishes."

I didn’t know what she was planning, but I went in the house and got pencils and paper.

"All right," Gloria said, taking one of the pencils. "Every wish you want to have come true you write on a long thin piece of paper. You don’t tell me your wishes, and I won’t tell you mine. If you tell, your wishes won’t come true."
APPENDIX H

The Flesch-Kincaid Grade Level Formula
The Flesch-Kincaid Grade Level Formula

The Flesch-Kincaid Grade Level provides the writer of the document with a value that indicates the minimum education level required for the reader to be able to understand the document. The lower the score, the easier it is to understand the document (scale is 0 to 12).

The formula for the Flesch-Kincaid Grade Level is:

Grade level = (.39 X \langle ASL \rangle) + (11.8 X \langle ASW \rangle) - 15.59

Where \langle ASL \rangle is the average sentence length (number of words/number of sentences)
and \langle ASW \rangle is the average number of syllables per word (number of syllables/number of words).
LIST OF REFERENCES


131


133

Heron, T. E., & Harris, K. C. (2001). The educational consultant: Helping professionals, parents, and students in inclusive classrooms (4th ed.). Austin, TX: PRO-ED.


