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A Comparison of Four Reading Interventions for Struggling Elementary Students Using Brief Experimental Analysis and Extended Intervention Analysis

Abstract: Brief experimental analyses (BEA) have been used to identify reading interventions to increase the oral reading fluency (ORF) of students having difficulty learning to read. Four interventions, repeated reading, listening passage preview, phrase drill, and contingent reinforcement were implemented with four elementary aged students performing below grade level in reading. Previous studies have included an extended intervention analysis (EA) following a BEA, but have failed to include all interventions performed during the BEA. This study extends the research by including all interventions in the EA to determine if the BEA was successful. Results indicated the BEA correctly identified the most effective intervention for increasing ORF for two of the four students.

Concern regarding the lack of development of reading skills is shared by practitioners, researchers, and legislators (Lee, Grigg, & Donahue, 2007). Previous research demonstrated that 85 to 90% of students who experience reading difficulties could achieve grade level performance if provided with an early and effective intervention (e.g., Coyne, Kameenui, Simmons, & Harn, 2004; Torgesen, 2000). However, leaders in the field of literacy intervention suggested many students (at least 12% of students in a classroom) would fail to make adequate progress towards improving oral reading fluency (ORF) rates without additional effective intervention outside of typical class-wide instruction (e.g., Fuchs & Fuchs, 2005; McMaster, Fuchs, Fuchs, & Compton, 2005).

Formative research found ORF the most valid indicator of overall reading performance (National Institute of Child Health and Human Development, 2000; Snow, Burns, & Griffin, 1998). Interventions targeting ORF can be separated into two categories: those providing modeling and/or practice and those involving reinforcement. Three interventions that fall under the category of modeling and/or practice are repeated reading, listening passage preview, and phrase drill (Begeny, Daly, & Valleley, 2006; Daly, Lentz, & Boyer, 1996). During the repeated reading intervention, students practice reading a passage at their instructional level until a predetermined level of fluency is obtained. Research of this intervention has consistently confirmed its effectiveness (Ardoin, Eckert, & Cole, 2008; Carver & Hoffman, 1981; O'Shea, Sindelar, & O'Shea, 1985). Modeling has also been used to improve students' reading fluency. McCurdy, Cundari, and Lentz (1990) found students improved their ORF by observing, listening to, and following along as a teacher read to them.

Additionally, prompting and error correction are effective in increasing reading rates by immediately correcting the error and repeatedly practicing the correct pronunciation of the previously erred word (Nelson, Alber, & Grody, 2004; Wordsdell et al., 2005).

Previous research indicated reading problems might also manifest as an unwillingness to perform the specified skill (Lentz, 1988). A performance deficit occurs when a student is able to read the material and chooses not to read. One type of consequence for this behavior is termed contingent reinforcement. In other words, reinforcement is contingent upon increased oral reading rates. The reinforcing of correct reading behavior has been an effective technique used to increase reading fluency rates (Carnine, Silbert, Kame'enui, & Tarver, 2004; Skinner, Pappas, & Davis, 2005).

Although the previously mentioned interventions demonstrated success in increasing ORF, choosing the most effective approach for each student can be difficult (Daly, Witt, Martens, & Dool, 1997). Daly et al. (1997) noted academic problems might be characterized as skill deficiencies, fluency problems, performance problems, or some combination of these factors. Therefore, determining methods to aid instructional decision making is critical in matching students' instructional needs with appropriate interventions and facilitating the use of empirically-based interventions (Codding et al., 2007).

One tool, brief experimental analysis (BEA), is a reliable, time-efficient, and cost-effective assessment for determining students' instructional needs (Daly et al., 1997). BEA is based on the premise that variations of instructional variables contribute to students' reading performance. These instructional variables are tested using a randomized sequence of interventions to measure the immediate effect on reading fluency. Using this methodology, practitioners merge measures of academic performance with the manipulation of treatment conditions. As a result, interventions that produce the highest initial ORF rate can be identified and implemented. Thus, the primary purpose of the BEA is to determine the intervention with the greatest effect on ORF for individual students through a quick evaluation of interventions using a single-subject design methodology (Daly & Martens, 1997).

Although initial results have confirmed the success of BEAs to determine effective interventions to increase ORF (Daly & Martens, 1999; Hintze, Daly, & Shapiro, 1998; Daly, Shroder, & Robinson, 2002; Hintze, Daly, & Shapiro, 1998), the incorporation of an extended intervention analysis (EA) to validate the results of BEAs has been highly inconsistent. Researchers have conducted extended analyses to confirm the results of a single intervention (Daly, Bonfiglio, Mattson, Persampieri, & Foremann-Yates, 2005; Daly, Murdoch, Lillenstein, Webber, & Lentz, 2002; Jones & Wickstrom, 2002; Noell, Freeland, Witt, & Gansle, 2001; VanAuken, Chafouleas, Bradley, & Martens, 2002) and have utilized different methods within the EA phase to come to this conclusion. For example, Noell et al. (2001) demonstrated the stability of a BEA with four struggling readers. A BEA evaluating the effectiveness of 10 or more treatment conditions in three different skill areas was conducted, and at least one effective strategy was identified. An EA across all three skill domains was employed with the most effective intervention used for each student. The BEA results were comparable to the results of the EA in 83% of the cases. However, the researchers chose to use interventions from three different skill areas (i.e., letter identification, word recognition, and sentence fluency), so each student would invariably improve due to the skill level of the student.

In another study, Jones and Wickstrom (2002) compared the effects of a BEA to an EA which lasted several weeks. The researchers compared the effects of four interventions on ORF. After the most effec-

tive intervention was determined through a BEA, an EA of the chosen strategy was implemented. Four of the five students performed better under the instructional condition than under the control condition. However, it is unknown whether the other interventions would have resulted in greater gains in ORF when implemented under the same conditions since only the preferred strategy was examined in the EA. VanAuken et al. (2002) also compared the most and least effective BEA interventions in an EA, and excluded all other interventions tested during the BEA. Baranek, Fineup, and Pace (2011), McComas et al. (2009), Petursdottir et al. (2009), and Wilbur & Cushman (2006) included an EA after implementing a BEA, however, only the most successful intervention(s) were tested during the EA.

Although preliminary evidence exists for the use of BEA to identify effective interventions with students experiencing reading fluency deficits (Jones & Wickstrom, 2002; Noell et al., 2001), limited research exists when examining the effectiveness of the preferred intervention (indicated by the BEA) to the other interventions not as successful during the BEA (Burns & Wagner, 2008). Therefore, the purpose of this study was to evaluate the agreement between the results obtained during the BEA and EA phases for referred students experiencing skills deficits in reading. The authors hypothesized that if the BEA methodology provides an efficient and accurate method for intervention selection, the intervention identified to yield the greatest performance (i.e., most Words Correct Per Minute [WCPM]) within the BEA should also be the most effective intervention during the EA.

Method

Participants, Selection, and Setting

Participants included four students in second and third grades who were nominated by their teachers as having difficulties with ORF. Isaac, Karl, and Mary were in the second grade and David was in the third grade. Students were selected from a rural elementary school in the Southeastern United States. (See Table 1 for individual student demographics). A 1-min timed sample of students' oral reading was completed to confirm difficulties with reading passages at their grade level. The criterion for inclusion was a performance below the 25th percentile for their grade level (i.e., 42 WCPM for second grade and 62 WCPM for third grade; Hasbrouck & Tindal, 2006).

All individual assessments and experimental conditions were conducted on school premises in a vacant classroom occupied only by the student who received the intervention and the researcher. The classroom contained one oblong table with two chairs, one on each side of the table. The researcher sat in the middle on one side of the table while the student sat directly opposite the researcher.

Materials

Instructional grade level passages.

Instructional grade level passages were administered during the curriculum-based assessment (CBA), baseline, BEA, EA, and follow-up phases of the study. All passages were administered on each student's grade level. The passages used for this study were obtained from AIMSweb (2002; a scientifically-based progress monitoring program). AIMSweb passages repeatedly have been shown to be both reliable and valid (Ardoin & Christ, 2009; Christ & Silberglitt, 2007; Howe & Shinn, 2002). The standard deviation for the passages in grades 2 and 3 were 19.2 - 28.1, the standard error of measurement (SEM) was 9.9 - 10.5, and the alternate-form reliability was 0.83 - 0.86, respectively. Since the SEM was within +1 standard deviation of the mean for all passages at each grade level, passages were randomly selected with no passage being administered more than once.

Independent Variables

The intervention conditions consisted of four independent variables that used empirically validated reading interventions as reviewed by existing literature (Ardoin, McCall, & Klubnik, 2007; Eckert, Ardoin, Daly, & Martens, 2002; Gortmaker, Daly, McCurdy, Persampieri, & Hergenrader, 2007). The specific intervention conditions used in the BEA and EA included: (a) Repeated Reading, (b) Listening Passage Preview, (c) Phrase Drill, and (d) Contingent Reinforcement. Each intervention condition is described below.

Repeated Reading (RR). The RR intervention was chosen to increase the students' opportunities to respond by having them orally read grade level passages four times. The predetermined number of readings was selected as a result of maximum practice gains reported in the literature (Rashotte & Torgesen, 1985; Therrien, 2004). Under the RR intervention condition, the student first read the same passage three times and on the fourth reading, the researcher stopped the student after 1 min and calculated the student's ORF as measured by WCPM. This score was entered on the data form, and scores for the previous three readings were not recorded. A total of 3 - 4 RR interventions were administered per student during the EA phase to obtain an increasing trend within the data.

Listening Passage Preview (LPP). The researcher read the passage aloud at a slightly faster pace than each student was able to read on his or her own. Thus, fluent reading was modeled while the student followed along using his or her finger as a guide on a separate page. While reading, the researcher observed the student to make sure he or she was following along correctly. After the researcher completed the passage, the student independently read the passage once with no immediate corrective feedback given. WCPM were calculated after 1 min and this score was recorded (Daly & Martens, 1994, 1999; Shapiro, 2004). A total of 3 - 4 LPP interventions were administered per student during the EA phase to obtain an increasing trend within the data.

Phrase Drill (PD). Under the PD intervention condition, the student read the passage while the researcher underlined words read incorrectly. After the student completed the passage, the researcher showed the student each word read incorrectly, read the word aloud, and had the student repeat the phrase that contained the misread word three times. After all missed words were read correctly and phrases were drilled, the student read the passage again and WCPM were calculated after 1 min and recorded (Begeny et al. 2006; O'Shea, Munson, & O'Shea, 1984; Shapiro, 2004). A total of 3 - 6 PD interventions were administered per student during the EA phase to obtain an increasing trend within the data.

Contingent Reinforcement (CR). The CR condition was implemented to control for those students who may have had the potential to read instructional level passages, but who chose not to do so (i.e., performance deficit or 'won't do' versus a skill deficit or 'can't do' concern; Witt & Beck, 1999). Immediately following baseline, each student was asked to provide the researcher with a list of five items he or she was willing to work for if progress was made in the CR condition (e.g., candy, pencils, and trinkets). Each item was written on a separate piece of paper and placed in an envelope. At the beginning of each CR session, the researcher said, "This envelope has five pieces of paper with an item that you can choose to earn written on each one. If you read better than you did before, you will be able to pick one." After the student read the passage, the researcher calculated the student's progress. If the student increased his or her ORF by 10% or more (as determined from the WCPM obtained in the baseline phase) he or she was allowed to choose a piece of paper from the envelope (Billingsley, 1977). After the selection was made and the reinforcer provided, the piece of

paper was put back into the envelope and the score was recorded. A total of 3 - 5 CR interventions were administered per student during the EA phase to obtain an increasing trend within the data.

Dependent Variable

The dependent variable in this study was ORF as measured by WCPM on grade level reading passages for each intervention. Fuchs, Fuchs, Hosp, and Jenkins (2001) indicated almost half of U.S. students benefit from interventions targeted towards improving ORF. To measure ORF, the student read a passage for 1 min and the number of words read correctly served as the index for fluency. A word read correctly was defined as a word pronounced accurately within 3 s. Self-corrections, insertions, and repetitions were not considered errors (Shapiro, 2004). Comprehension was not assessed in this study as the focus was to monitor very brief interventions that solely targeted ORF. It was believed that assessment of reading comprehension might add a confounding variable and extra time to the interventions.

Assessment and Intervention Procedures

The study was conducted in five phases over a six-week period of time. First, a CBA was administered by the researchers to determine who met the predetermined requirements for inclusion in the study. Second, baseline data were collected. Third, a BEA was conducted to identify an effective instructional intervention for each student. Fourth, an EA phase was implemented, including all interventions, to determine the most effective intervention over time. Fifth, the participants read from grade level general outcome measures (GOM) throughout the EA phase to determine the effects of the interventions on novel passages. In addition, a follow-up passage was administered two weeks after the final condition in the EA phase to determine maintenance of the interventions. No additional reading interventions were implemented while the study was conducted. Each phase is described in the procedures section below.

Procedures

Baseline. During the baseline phase, no instruction was provided. The primary researcher administered three grade level passages during one session to determine the student's preintervention WCPM. Each passage was administered for 1 min. After 1 min, the researcher stopped the student and calculated the WCPM by subtracting the number of errors from the total number of words read. A total of three passages were read so that level, trend, and variability could be assessed (Hayes, Barlow, & Nelson-Gray, 1999). The median scores determined the students' preintervention or baseline performance and were used to ensure a representative sample of reading was obtained (Christ & Coolong-Chaffin, 2007).

Brief experimental analysis (BEA). A BEA was conducted to examine the effects of the four intervention conditions on ORF using novel passages for each student. All interventions in the BEA were randomly selected for each participant and administered consecutively in the scope of one day. The BEA consisted of administering each intervention one time such that one data point was plotted for each intervention (Wilber & Cushman, 2006). For example, during the RR condition of the BEA, the student read the passage three times. On the fourth trial, the student read the passage and the score was calculated and graphed. A single intervention was determined to be most effective based on visual analysis (Mong & Mong, 2012).

Extended intervention analysis (EA). During the EA phase, the BEA selected strategy was compared to the three other interventions not considered to be as effective. Interventions were implemented over a three-week time period using an alternating-treat-

ment design until divergence among intervention conditions was established through visual analysis of the data. Each intervention condition was presented in a randomized order. No one reading intervention was followed by that same intervention. A maximum of four intervention conditions were administered per day. Each intervention condition consisted of a minimum of three data points and a maximum of 24 data points to evaluate divergence among the conditions. All interventions were implemented using standard procedures outlined in the independent variables section.

General outcome measures (GOM). To determine intervention effects on novel passages, GOM passages were administered at the end of each set of intervention conditions during the EA phase. For each GOM, the students read three different grade-level passages, and the median score was graphed.

Follow-up. To evaluate maintenance of gains obtained during the EA, a single follow-up data point was collected for each student two weeks following termination of intervention data collection. One novel grade-level passage was randomly chosen, and each student was administered the intervention found most effective during the BEA. WCPM were calculated following the intervention as previously described. No additional intervention conditions were implemented during the follow-up phase.

Experimental Design

A multi-element or alternating-treatment design was used to evaluate ORF during the BEA and EA phases (Daly et al., 2002) and to evaluate the comparative effectiveness of the four interventions. These interventions were alternated in rapid succession and differences (i.e., level change, divergence) were measured during the EA phase (Hayes et al., 1999). Intervention conditions were counterbalanced to control for potential carry over and order effects.

Effect size was calculated using the percentage of all nonoverlapping data points (PAND) (Olive & Smith, 2005). Previous researchers (Campbell, 2004; Olive & Smith, 2005) concluded that PAND is valid for documenting the effects of interventions in single subject research. PAND was calculated by determining the total number of data points that did not overlap between baseline and intervention phases, then dividing the overlapping data points by the total number of intervention data points. The highest baseline data point was used to establish the overlap of baseline data points with intervention data points. Scruggs and Mastropieri (1998) established the following benchmarks for PAND interpretation: PAND scores below 50% suggest an ineffective intervention effect, PAND scores between 50% and 70% suggest a questionable intervention effect, PAND scores between 70% and 90% suggest an effective intervention effect, and PAND scores above 90% suggest a very effective intervention effect.

Treatment Integrity

Treatment integrity checklists for baseline, BEA, and each intervention condition were developed to standardize and maintain administration fidelity. Treatment integrity was calculated by dividing the number of items on the checklist completed appropriately by the number of items on the checklist and multiplying by 100.

Treatment integrity, calculated across 75% of sessions, resulted in the following treatment integrity means: (a) baseline - 100% (range 99-100%); (b) BEA - 99% (range 99-100%); and (c) EA conditions RR was 96% (range 94-97%), LPP – 94% (range 92-96%), PD - 95% (range 91-96%), and CR - 92% (range 90-94%). The overall mean for integrity across all conditions in this study was 94% (range 90-96%).

A second observer was present for a minimum of 33% of sessions across all phases and evaluated interobserver agreement (IOA) for treat-

ment integrity. IOA was calculated by dividing the agreed upon number of steps completed for each session by the number of available steps to complete for each session and multiplying by 100. Mean IOA was: (a) baseline - 100% (b) BEA - 99% (range 99-100%); and (c) intervention conditions RR - 97% (range 92-100%), LPP - 95% (range 90-98%), PD - 95% (range 93-97%), and CR - 94% (range 91-95%). Overall IOA for this study was 93%.

Interscorer Agreement

Interscorer agreement (ISA) is the percent of agreement between two or more raters when scoring passages. Two researchers scored 20 sample passages independently. The rules were clarified until there was at least 90% agreement on a set of 60 sample probes before researchers administered or scored passages used in this study. The primary researcher was consistently available to discuss any discrepancies. Two researchers independently scored 33% of the total passages across all phases of the study. The mean ISA was as follows: (a) baseline - 99% (range 99-100%); (b) BEA - 98% (range 97-100%); and (c) intervention conditions RR - 98% (range 97-100%), LPP - 97% (range 96-97%), PD - 99% (98-100%); and CR – 97% (range 96-99%). Overall ISA for this study was 98%.

Results

Table 1 displays the individual results for the four participants. During baseline, David, Isaac, and Karl displayed a gradual increase in level and trend of WCPM. Mary displayed a decrease in both level and trend for WCPM. The following median baseline scores were obtained: (a) David - 49 WCPM (b) Mary - 17 WCPM, (c) Isaac - 45 WCPM, and (d) Karl - 59 WCPM.

In the BEA phase, David's highest WCPM were obtained under the PD condition (95 WCPM). Additionally, his next highest WCPM were obtained under the RR condition (88 WCPM). Mary's highest WCPM were obtained under the RR condition (27 WCPM) but the LPP (24 WCPM) and PD (21 WCPM) conditions were similar in WCPM. Isaac also obtained his highest WCPM under the RR condition (76 WCPM) and his next highest WCPM was under the LPP condition (66 WCPM). Karl's highest WCPM (74) was

Table 1

Students' Demographic Information

Student	Gender	Ethnicity	Age	Grade	SPED Ruling
David	M	AA	11	3	None
Mary	F	AA	8	2	EmD
Isaac	M	AA	8	2	None
Karl	M	P	7	2	None

Note. F = female, M = male, AA = African American, P = Pakistani, SPED Ruling = special education ruling, EmD = emotional disability.

obtained under the LPP condition; however, he also had similar WCPM under the RR (69 WCPM) and CR (65 WCPM) conditions.

During the EA phase, David obtained his highest mean WCPM (100.8; range 84-114) and highest median WCPM data point (103) under RR. Although the RR intervention was the most effective for David, it should be noted the PAND was 100% for all interventions, suggesting all interventions were effective at increasing David's ORF. Mary obtained her highest mean WCPM (40.0) under both PD and RR conditions while her highest median WCPM data point (43) occurred under the RR condition. The PAND was 100% for all interventions suggesting all interventions were effective at increasing Mary's ORF.

Similar to David, Isaac obtained his highest mean WCPM (82.3; range 74-91) and highest median WCPM data point (82) under RR. This finding was supported by PAND as RR (100%) was the only intervention effective at increasing Isaac's ORF. Based on the PAND results, LPP (0%), CR (33%), and PD (20%) interventions were all ineffective.

Karl obtained his highest mean WCPM (60.7; range 53-81) and his highest median WCPM data point (75) under the LPP intervention. This finding was supported by PAND as LPP (100%) was the only intervention effective at increasing Karl's ORF. Based on the PAND results, CR (20%) and PD (0%) interventions were ineffective, while RR (50%) had questionable effects. These findings suggest two (Isaac and Karl) of the four students' EA phase results supported the results of the BEA.

In comparison to his baseline WCPM (45), Isaac's GOM was within the same SEM range (50 WCPM) indicating limited generalization from intervention passages. Conversely, David's performance on GOM passages increased from 49 WCPM during baseline to 78 WCPM after the first week of interventions. He continued to increase WCPM throughout the intervention as evidenced by the median GOM (81 WCPM). Mary's baseline score of 17 WCPM increased to a median of 27 WCPM on the GOM. Karl's baseline of 59 WCPM did not significantly increase when compared to the median GOM (60 WCPM).

Two-Week Follow-Up

To assess the maintenance of ORF, a follow-up assessment was administered two weeks following the final session of the EA phase. The WCPM obtained in the follow-up phase was compared to the median WCPM of each intervention in the EA phase. Results revealed WCPM obtained in the follow-up phase were higher than the median WCPM in EA phase for all students under at least two intervention conditions. Specifically, Isaac obtained 91 WCPM during the follow-up phase which was higher than all intervention conditions in the EA. Karl obtained 75 WCPM in follow up which was higher than the median data points for three conditions in the EA (e.g., CR, RR, and PD) and equal to his median performance in the LPP condition. During the follow-up condition, David read 98 WCPM which was higher than all median data points for all conditions. Finally, Mary read 39 WCPM which was greater than her performance in the CR and LPP conditions.

Discussion

The current study evaluated the consistency of responsiveness to intervention conditions during the BEA and EA phases. Overall, the results indicate the BEA predicted effective EA interventions with two of the four students. Both Isaac's and Karl's highest BEA interventions (RR and LPP, respectively) were the most effective during the EA phase. Although Isaac and Karl's BEA and EA produced similar results, their WCPM on at least two interventions during the BEA were in close proximity (+/- 10 WCPM). Accordingly,

research suggests for curriculum-based measures, the probable range of SEM is 6 - 13 WCPM (Christ & Silberglitt, 2007). Therefore, because the interventions in the BEA for Isaac (RR and LPP), David, (PD and LPP), and Karl (LPP and RR) were within the SEM, caution should be taken when reporting the most successful BEA. Additionally, although the preferred interventions during the EA phase were considered successful according to PAND for Isaac and Karl, their GOM did not significantly increase during the study. Moreover, David's and Mary's BEA selected interventions did not result in the highest WCPM during the EA; however, each of their interventions was considered effective according to PAND, and both students' GOM increased by 32 WCPM and 10 WCPM, respectively, during the EA phase. Although preliminary evidence exists for the effectiveness of BEA, the current study found the BEA was no more successful than chance alone.

Although the present study offers an evaluation of using empirically based reading interventions within a BEA and EA, several limitations can be identified. One limitation is the methodology used to conduct the follow up to intervention. In future studies, this posttreatment condition could be more informative if all treatment interventions were administered rather than only using the intervention predicted to be most effective during the BEA phase. In addition, a more sophisticated single-subject design could be utilized to evaluate changes in ORF. Specifically, the utilization of more rigorous designs (e.g., withdrawal, independent verifications, and multiple baseline) may yield more convincing results.

A second limitation is the small sample size. Although there was a dispersion of characteristics (e.g., educational classification, grade level, and gender) across the four students, there were only three students from general education and one student from special education in the study. Therefore, the small number of students limits the generalizability of the current findings. Further research should be conducted with more students and greater variability across demographic areas to increase the external validity of the study.

A third limitation of the study is related to the methodology used in conducting the BEA. Although the BEA, as a whole, took a short time to administer, it was conducted outside of the classroom with trained researchers. Due to concerns associated with the treatment integrity of interventions conducted by personnel who may not be familiar with the procedures (e.g., Wickstrom, Jones, LaFleur, & Witt, 1998), future studies should evaluate the level of consultation and assistance needed to train practitioners or other school personnel to conduct BEAs and implement the intervention procedures used in the current study.

A fourth limitation is the research design implemented in the EA. The alternating treatments design is effective in evaluating outcomes in a brief period of time as all conditions can be evaluated within the same phase. However, multiple treatment interference is always a concern with this design as the students were exposed to all intervention conditions (Hayes, et al., 1999). This methodology forces an examination of the effect of all the interventions upon the students' oral reading ability. Future researchers should include evaluations of each intervention separately over an extended period of time to rule out potential carry over effects. In relation, the intervention conditions were implemented over a very brief period of time in the EA (i.e., 24 total sessions). Future research should evaluate student outcomes following the longer periods of implementation and across more sessions. In relation, future studies should evaluate outcomes for other important target variables (e.g., comprehension, state-wide testing results, behavioral outcomes) potentially related to deficits in ORF.

A fifth limitation is the possibility that threats to internal validity (e.g., maturation, and

ongoing class instruction) increased students' ORF beyond that of the intervention. All students were enrolled in school and the study occurred during the school year. Possible improvement was due to some undetermined cause not accounted for within the study design such as classroom instructional time and learning experiences.

In conclusion, the results of this study indicate the inclusion of a brief experimental analysis in determining appropriate reading interventions may not be an effective tool in the identification of appropriate instructional level reading interventions. This is a significant finding because most of the extant literature promotes the use of a BEA for struggling readers.

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