2016

Influence of Motivation on Phonics Effectiveness

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INFLUENCE OF MOTIVATION ON PHONICS EFFECTIVENESS

A Thesis

Submitted to the Graduate Faculty of the
Louisiana State University and
Agricultural and Mechanical College
in partial fulfillment of the
requirements for the degree of
Master of Arts

in

The Department of Psychology

by
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B. S., Valdosta State University, 2014
August 2016

Table of Contents

List of Tables

List of Figures

Abstract

Reading is a basic life skill, and is paramount to students' success in school. In fact, skilled readers tend to succeed in subject areas including mathematics, social studies, and science (Valleley & Shriver, 2003). Phonics is one of the cornerstones of learning to read. Without mastering phonics, students are more likely to experience persistent difficulties in reading (Elbro, 1996; Bus and Marinus H. van IJzendoorn, 1999; Rose, 2006). However, student motivation to read can impact the effectiveness of reading programs (Melekoglu, 2011). The current study examines the influence of motivation on the effectiveness of a phonics program with six first-graders who have struggled to learn to read. Students' rates of learning to read were similar for phonics instruction programs utilizing combined constant time delay instruction and percentile shaping as they were for a phonics program utilizing constant time delay instruction alone.

Introduction

Reading is a complex skill requiring the coordination of a myriad of information, linguistic, and cognitive processes. Anderson, Hiebert, Scott, and Wilkinson (1985) compare reading to a symphony orchestra, illustrating how, like an orchestra, reading can be broken down into sets of subskills such as knowledge of letters and letter sounds. However, reading can only take place when these subskills are integrated for the purpose of taking away meaning from text. Furthermore, successful reading requires a great deal of practice. Beginning readers must learn to manipulate phonemes and associate letters with the appropriate sound correspondences, identify common spelling patterns, and be able to accomplish all of these processes with speed, accuracy, and proper expression (National Reading Panel, 2000). Readers must then be able to construct the meaning of sentences and text, and retain the information read in memory. While command of these skills takes time, mastery is imperative to functional development and long-term success. The relationship between reading proficiency and educational attainment has been frequently documented (Ogle, Sen, Pahlke, Kastberg, & Roey, 2003). Measures of literacy ability and reading proficiency have been shown to predict high school graduation, degrees earned, occupational status, and income earned (Raudenbush & Kasim, 1998; Wigfield & Guthrie, 1997). Furthermore, a high level of literacy proficiency is often central to participation in many social institutions (Wagner, 1999).

The process of learning to read can be broken down into several skills, that come to be known as the "Fab Five": phonemic awareness, phonics, fluency, vocabulary, and comprehension (Konza, 2014). The most fundamental of these skills, phonemic awareness is the ability to manipulate phonemes in spoken language. Phonics involves blending and segmenting phonemes with letters. Fluency requires that readers process text with speed, accuracy, and

proper expression. Vocabulary is word knowledge, and plays a prominent role in reading comprehension. Finally, comprehension is the ability to understand what has been read, and is the ultimate goal of learning to read. Each of these skills is vital in its own right, and the most effective reading programs employ a balanced instructional approach (Pressley, 1998; Spiegel, 1992; Strickland, 1998). However, understanding the relationship between sounds and letters is the cornerstone of reading an alphabetic language, thus the phonics step is "non-negotiable" if students are to become independent readers (Hulme, Bowyer-Crane, Carroll, Duff, & Snowling, 2012).

Phonics instruction is a strategy of teaching reading that scaffolds letter-sound acquisition and their role in reading and spelling words (Harris & Hodges, 1995). Several types of phonics programs have shown to be effective at teaching letter-sound correspondences and spelling acquisition. Synthetic phonics programs teach students to convert letters into phonemes and then blend the phonemes to form words. Analytic phonics teaches students to interpret letter sounds after a word has already been identified. Phonics-through-spelling programs teach students to transform sounds into letters to write words. Phonics in context programs teach students to use their knowledge of letter-sound correspondences and context clues to identify unfamiliar words in text. Analogy phonics programs teach students to use pieces of written words they already know to identify new words (National Reading Panel, 2000).

Phonics instruction makes a critical contribution to children's growth in reading. Systematic phonics instruction has shown to be more effective in teaching children to read than alternative programs that do not contain a phonics component (Ehri, Nunes, Stahl, & Willows, 2001). Phonics instruction is also superior to non-phonics reading instruction in (a) preventing reading difficulties among at-risk students, and (b) helping to remediate pre-existing reading

difficulties in disabled readers (National Reading Panel, 2000). Furthermore, spelling skills are boosted by phonics instruction in kindergarten and first-grade learners (Vadasy & Sanders, 2010; Maddox & Feng, 2013). Finally, reading comprehension skills have shown improvement from phonics programs in younger students as well as reading disabled students (Connelly, Johnston, & Thompson, 2001; Lovett, Borden, DeLuca, Lacerenza, Benson, & Brackstone, 1994).

The type of reading instruction students receive may be a factor in their understanding of language structure and their ability to transfer this knowledge to reading. Brophy and Good (1984) found that students of teachers who use explicit instruction techniques have higher achievement scores than control students. Research syntheses continue to advocate the use of explicit instruction as an effective model for teaching children to read (Chall, 2002; Duffy et al., 1986; Hall, 2002; National Reading Panel, 2000; Pearson & Dole, 1987; Roller, 2001; Snow, Burns, & Griffin, 1998). Archer and Hughes (2011) even claim that explicit instruction is "one of the best tools available" to maximize students' academic growth. Effective explicit instructional strategies should be unambiguous and direct in their design and delivery. Strategies should include scaffolds that guide students through learning with clear statements about the purpose of learning each new skill, clear explanations and demonstrations of the target skill, and students should be supported with feedback until independent mastery is achieved (Archer & Hughes, 2001).

Constant time delay is an explicit instructional strategy that fades the use of prompts in a systematic way while delivering reinforcement, thereby increasing the likelihood that behaviors will take place without prompting in the future (Neitzel & Wolery, 2009). When a learner is first acquiring a skill, there is no delay between instruction and delivery of the controlling prompt. The instructor then immediately provides a model of the target. The student will imitate the

instructor, and the instructor will provide praise. As the learner becomes more proficient with the new skill instead of immediately delivering a controlling prompt, a response interval of a fixed duration is inserted. After the response interval has passed, the controlling prompt is delivered. Constant time delay instruction has been successfully used for teaching students with mental retardation to use reading decoding strategies (Tucker Cohen, Wolff Heller, Alberto, & Fredrick, 2008), improving reading fluency for students with reading deficits (Pruitt & Cooper, 2008), and building accuracy and fluency for letter, sound, and word identification (Ault, Gast, & Wolery, 1998; Burns, Dean, & Foley, 2004; Hughes & Fredrick, 2006; Jitendra, Edwards, Sacks, & Jacobson, 2004; Rivera, Al-Otaiba, & Koorland, 2006; Stevens & Schuster, 1988). Furthermore, constant time delay instruction has shown to result in more rapid learning as compared to other response-prompting procedures (Ault et al., 1988; Ault, Gast, & Wolery, 1988; Doyle, Wolery, Gast, & Ault, 1990; Wolery, Ault, Gast, Doyle, & Griffen, 1990). Based on these studies, it appears that CTD is an efficient, evidence-based instructional strategy.

Shaping is a technique used to promote changes in existing behavior (Athens, Vollmer, & St. Peter Pipkin, 2007). Shaping is a method for establishing behaviors and uses differential reinforcement of successive approximations to a target behavior (Cooper, Heron, & Heyward, 2007). However, behavior shaping has been thought to resemble an art form, in which the advancement of treatment is left to the trainer's discretion (Galbicka, 1994; Lattal & Neef, 1996; Platt, 1973). Percentile shaping standardizes the shaping process in such a way that percentile shaping uses preset guidelines to determine the progression of reinforcement criteria. A percentile shaping procedure should include the following characteristics:

> (a) It should set criteria relative to current behavior and change them rapidly as behavior changes. (b) It should establish criteria in such a way that some sufficiently large proportion of responses is reinforced, but that proportion cannot be so large as to dilute the differential nature of the contingency. (c) It should provide reinforcement consistently and intermittently,

> despite any changes in behavior upon which that reinforcement ultimately depends. (d) Finally, it should provide some terminal response definition. (Galbicka, 1994, para. 16)

Studies examining a wide range of behaviors have found percentile shaping to be consistently valuable for implementing behavior change (Lamb, Kirby, Morral, Galbicka, & Iguchi, 2004; Lamb, Morral, Kirby, Iguchi, & Galbicka, 2004; Lamb, Morral, Galbicka, Kirby, & Iguchi, 2005; Miller & Neuringer, 2000; Athens & Vollmer, 2007). Percentile shaping schedules should be coupled with an instructional strategy, so as to teach students the desired behavioral responses that will be reinforced during shaping.

However, few studies to date have investigated the role of motivation in the efficacy of phonics instruction (National Reading Panel, 2000). Studies have shown that when struggling readers are not motivated to read, their opportunities to learn decrease significantly (Baker, Dreher, & Guthrie, 2000). As such, motivation to read is vital to academic success. Motivation to read is an important component of literacy achievement in that motivation predicts reading comprehension growth (Guthrie et al., 2007; Taboada, Tonks, Wigfield, & Guthrie, 2009). Reading comprehension is viewed as the "essence of reading" (Durkin, 1993), and is essential to both academic learning as well as life-long learning. Additionally, students who are motivated to read become better readers, score higher on achievement tests, and have greater content knowledge than those who are not (Krashen, 1993; Cunningham & Stanovich, 1991; Stanovich & Cunningham, 1993). Therefore, reading motivation positively influences reading behavior. However, students are unlikely to be motivated to learn to read if instruction is portrayed as involving "dull drill" and "meaningless worksheets" (National Reading Panel, 2000). It would be in teachers' best interest to actively engage students and encourage them to perform their best on reading instructional trials.

Constant time delay instruction has been shown to be effective teaching procedure for establishing stimulus control (Swain, Lane, & Gast, 2015), while percentile shaping, on the other hand, is an effective method for adjusting reinforcement criteria (Athens, Vollmer, & St. Peter Pipkin, 2007). Both procedures have been used successfully in academic contexts, however, no research to date examines integrating these two behavior change strategies into an effective reading program. Furthermore, there remains a shortage of research on how best to motivate children in classrooms to learn letter-sound associations and to apply that knowledge to reading and writing (National Reading Panel, 2000). The goal of all phonics programs is to impart the skills necessary to use and manipulate alphabetic code so that learners can make normal progress in learning to read and comprehend written language. Therefore, development of a program for those readers who struggle to master phonics and may lack of motivation to read is crucial to their reading development and ultimate academic success. The current study aims to answer the following questions:

1. Are constant time delay instruction and percentile shaping effective and efficient methods for teaching elementary students phonics skills?
2. Does student motivation for reading influence the efficacy of phonics instruction based on constant time delay instruction and percentile shaping?

Method

Participants and Setting

Six first-grade students participated in the study. Robin was a six year-old African-American female. Quentin was a six year-old African-American male. Aleyeah was a six year-old African-American female. Alicia was a seven year-old Hispanic female. Tyson was a six-year old African-American male. Shane was a six year-old African-American male. All students were identified by their teachers as struggling readers, and scored within the frustrational range on a set of reading curriculum-based measures. Direct observation prior to the beginning of the study indicated that all participants exhibited auditory and visual acuity and receptive language appropriate for participation in this study. Participants were grouped according to their ability to identify letter sounds: students able to identify digraphs were placed in the Intermediate group and students unable to identify digraphs were placed in the Beginner group (described below). Sessions with students were conducted in a one-to-one instructional arrangement in vacant classrooms at the students' school.

Materials

Five sets of pseudowords were created for each reading group. Word sets for the Beginner group were created such that each set contained combinations of two and three letters generated from three consonants and one vowel for a total of 12 possible pseudowords. The letters Q, V, W, X, Y, and Z were removed from the pool of letters. For example, Set 1 was specific to the letter A, the first vowel in the alphabet, so Set 1 contained two- and three-letter words generated from combinations of three consonants (e.g. B, H, and N) and the letter A. Three-letter words were arranged in a consonant-vowel-consonant (CVC) pattern, and two-letter words were arranged in a vowel-consonant (VC) or a consonant-vowel (CV) pattern.

Word sets for the Intermediate group were created such that each set contained 12 pseudowords generated from two digraphs, two consonants, and one vowel. For example, Set 1 in the Intermediate group was specific to the letter A. Set 1 contained 12 words generated from a combination of two digraphs (e.g. PH and AI), two consonants (e.g. M and R), and the letter A. Word sets were printed in black ink, Times New Roman 140-point font on 8 ½ x 11-inch white paper and laminated.

Each treatment phase was randomly assigned one word set, which was utilized as instructional material for the duration of the treatment phase. Since students received no instruction on the word sets utilized in baseline, these word sets were reintroduced in return to baseline. Word sets utilized during instructional phases were only used one time. The order in which participants received word sets was counterbalanced across participants.

Pre-Treatment Measures

Researchers conducted a brief "Can't Do, Won't Do" (Duhon et al., 2004; VanDerHeyden & Witt, 2008) motivational assessment as a pre-treatment screener in order to ensure that participants demonstrated sensitivity to extrinsic reinforcement for reading. Criteria to be included in the study required an increase in the number of words read within one minute when offered material reinforcement as compared to the number of words read in one minute when reinforcement was not offered. Results of the Can't Do, Won't Do assessment indicated higher levels of reading performance for all participants when given the opportunity to earn a prize. See Table 1 below for pre-treatment assessment results. Following the Can't Do, Won't Do assessment, each participant generated a list of 5 items that he or she could choose from as a prize for proficient performance during sessions. This type of choice-based stimulus preference assessment was chosen because research has confirmed that students provided with a highly

preferred stimulus exhibit a higher rate of target behaviors than when provided with a less preferred stimulus (Cannella, O'Reilly, & Lancioni, 2005; Gwinn et al., 2005).

Experimental Design

An ABCABC reversal design was conducted across six students to ascertain the effectiveness of constant time delay instruction and percentile shaping in teaching phonics. Phase A was a baseline phase, phase B utilized constant time delay instruction and phase C used a combination of constant time delay instruction and percentile shaping to teach phonics skills. Sessions were conducted with each participant three times a week over a 12-week period.

Data Collection and Inter-Observer Agreement. At the beginning of each session on the first trial for each word/nonsense word, observers recorded the number of words from the set that the participant blended correctly without assistance in order to determine the rate of mastery of each instructional set across phases. After data was recorded, observers delivered reinforcement, if procedurally called for, and a training session followed in which observers provided instruction of letter sounds and blending of letter sounds. Graduate psychology students collected inter-observer agreement (IOA) during 20% of sessions across phases. IOA was calculated using a point-by-point method: number of agreements divided by number of agreements plus disagreements multiplied by 100. Observers agreed on 96% of trials.

Phase A: Baseline. For students' in each reading group, one set of words was randomly selected from the five sets appropriate to each students' reading level. At the beginning of each baseline session, the researcher obtained an attentional response by saying, "Are you ready to read?" Once an attentional response had been obtained, the general task direction was delivered (e.g. "Read these words"). The researcher then held each word card at chest level. The researcher

recorded responses without indicating to the participant whether his or her response was correct. Non-responses and incorrect responses did not receive credit as correct reading.

Phase B: Constant Time Delay Instruction. Just as in Phase A**,** the researcher obtained an attentional response and delivered the general task direction. Sessions consisted of five cycles through the assigned set of words. The first cycle implemented a 5-s prompt delay in which the researcher presented the word card and waited 5 s for an independent response. If the participant did not provide a response within 5 s of the presentation of the word card, the researcher modeled letter sounds and proper blending, and waited 5 s for the participant to imitate the verbal model. The first trial for each word was implemented without a 0-s delay trial to permit data collection, but since the delayed prompt did not interfere with data collection (it occurred after the time criterion) it was included to maximize use of instructional time. The researcher then demonstrated letter sounds and blending until the participant articulated the correct response. The researcher praised correct responding by saying, "Very good! That is correct. The word is '*an*'." The researcher responded to incorrect reading by saying, "That is not quite right. The word is '*an*.' Let's try together." The second cycle used a 0-s delay (i.e., the researcher presented the word card and immediately provided a verbal model) with a 5-s response interval until 100 % correct responding was observed. The third, fourth, and fifth cycles were identical to the first cycle.

Phase C: Constant Time Delay Instruction + Percentile Shaping. At the beginning of each session, the researcher explained to the participant that he or she may obtain prizes for successfully reading a goal number of words. For each cycle, the participant received one token for reaching his/her goal. At the end of the session, after all training cycles had been completed, participants cashed in tokens for prizes from their list. All participants' goal for the first session

in Phase C was one word read correctly per training cycle, so as to increase the probability that participants would contact reinforcement. Subsequent teaching sessions in Phase C used 1 + the median count of words read correctly during the previous session as criterion for reinforcement. Except for the opportunity to earn reinforcement contingent upon successful reading performance, the instructional format of Phase C was otherwise identical to that of Phase B.

Results

Participant responding is presented in Figures 1, 2, 3, 4, 5, and 6 below. Shane moved to another school during the study, so only half of his data was able to be collected. Additionally, a procedural error occurred on Robin's final two days of instruction, during the second implementation of combined CTDI + PS. Instead of reinforcement delivery contingent upon reading a goal number of words, reinforcement was delivered at each cycle, non-contingent on Robin's performance. On these days, Robin was given a prize for completing each of the four cycles regardless of how many words she read.

Table 1
Pre-treatment Assessment Results

Student	ORF	LS CBM	LS CDWD	WR CBM	WR CDWD
Alicia	11	18	22	13	13
Shane	10	45	90	9	15
Tyson	1	11	16	0	0
Quentin	1	18	32	3	4
Robin	5	36	39	6	11
Aleyeah	0	33	37	2	5

Note. ORF = oral reading fluency; LS CBM = letter sounds curriculum based measure; LS CDWD = letter sounds can't do won't do; WR CBM = word reading curriculum based measure; WR CDWD = word reading can't do won't do.

Findings suggest that both CTDI as well as a combination of CTDI and PS were effective in teaching phonics skills. In both conditions, all students read more words correctly during instructional phases than they did in baseline conditions.

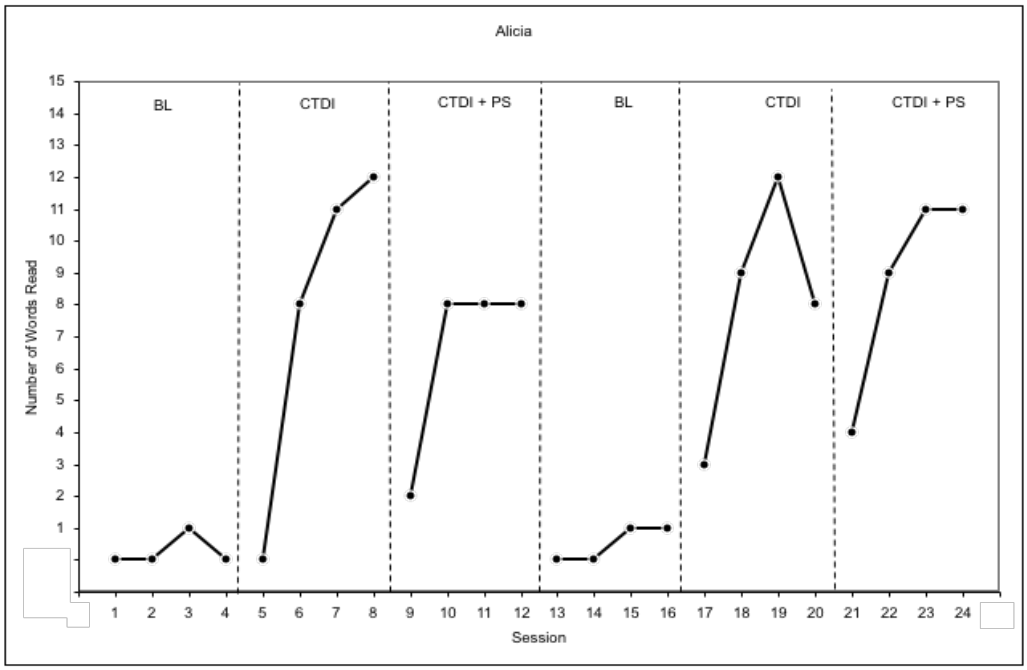

Figure 1. Results for Alicia represented as number of words read correctly during data collection cycles.

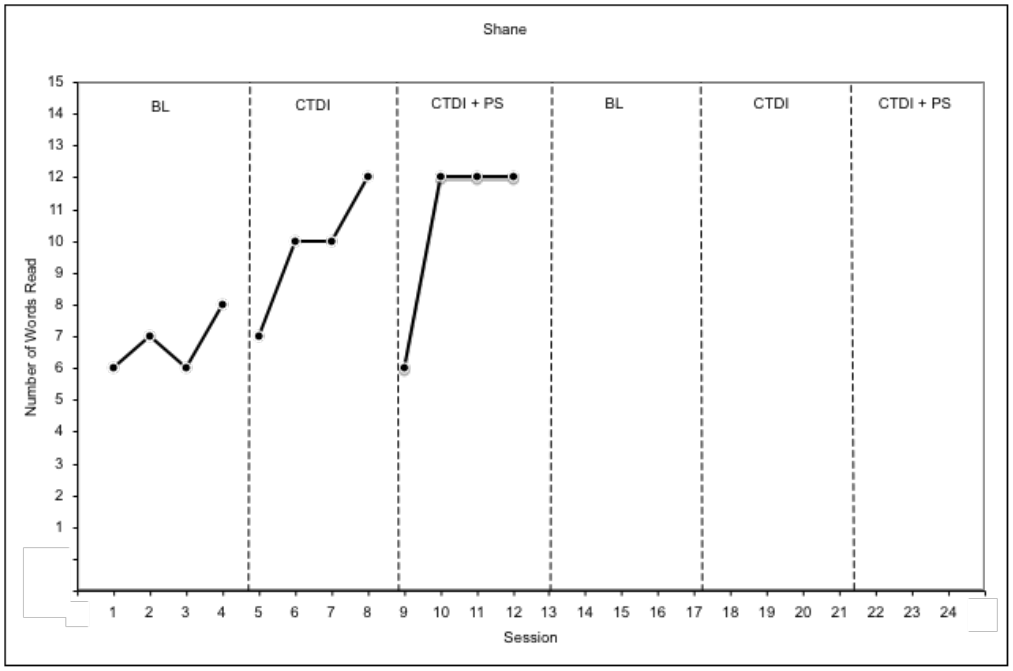

Figure 2. Results for Shane represented as number of words read correctly during data collection cycles.

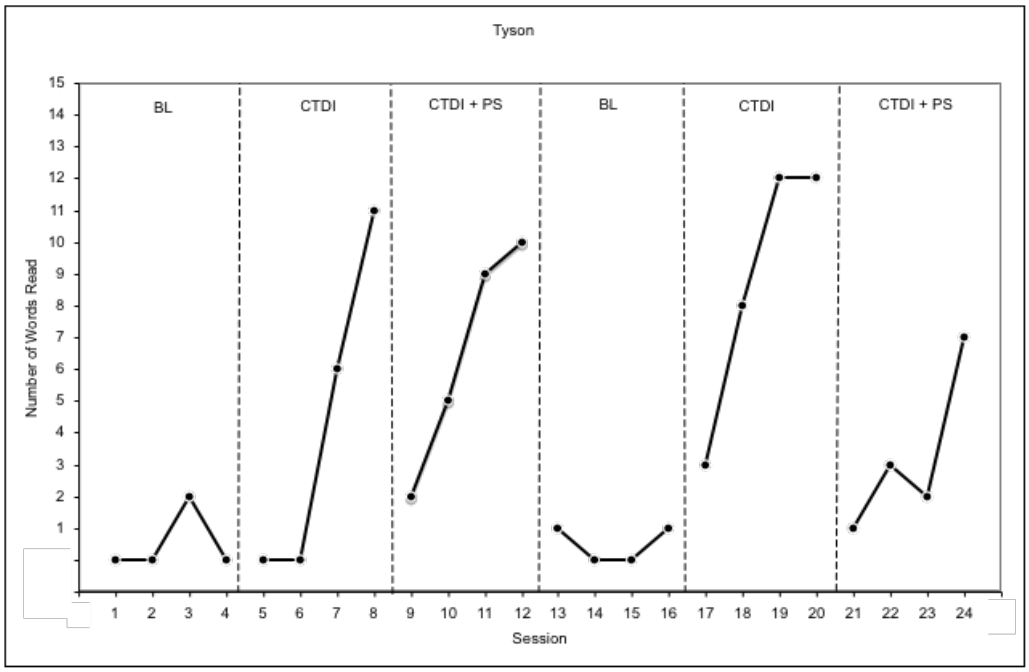

Figure 3. Results for Tyson represented as number of words read correctly during data collection cycles.

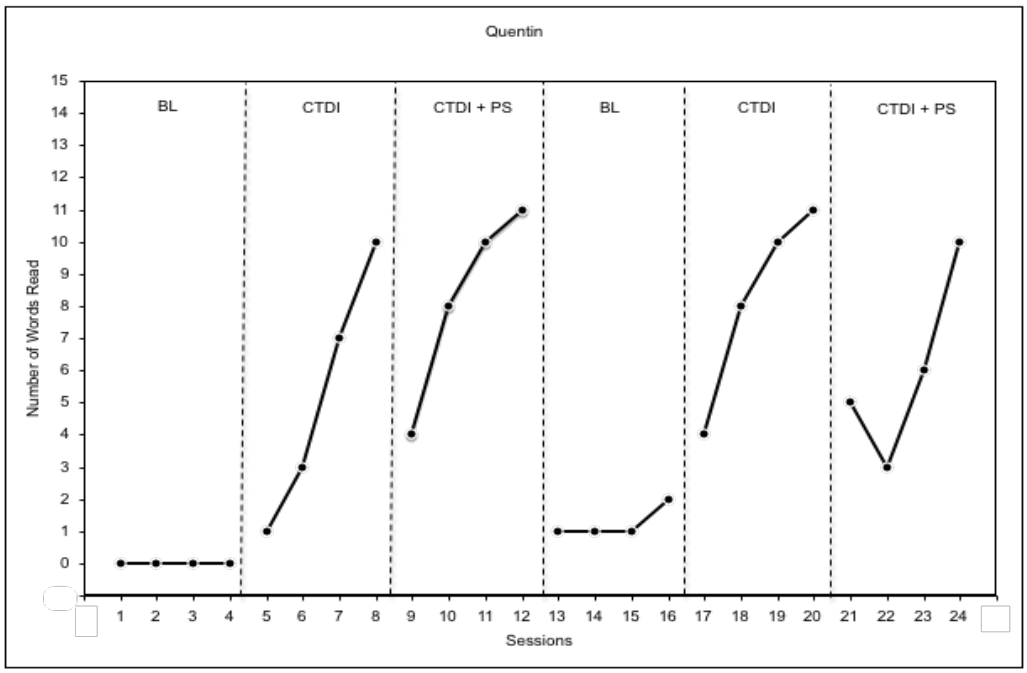

Figure 4. Results for Quentin represented as number of words read correctly during data collection cycles.

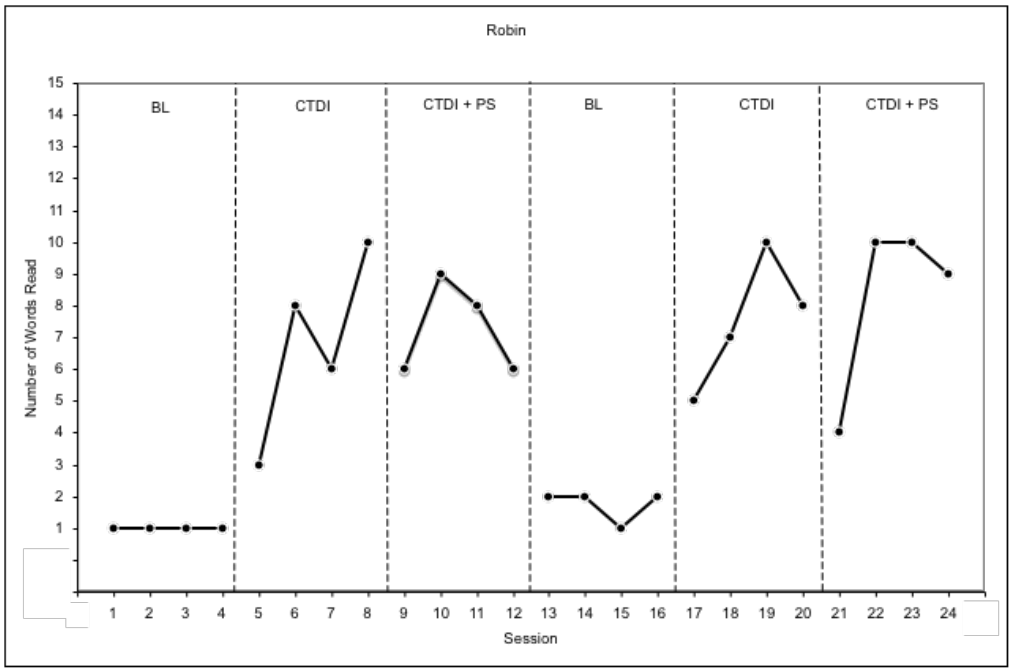

Figure 5. Results for Robin represented as number of words read correctly during data collection cycles.

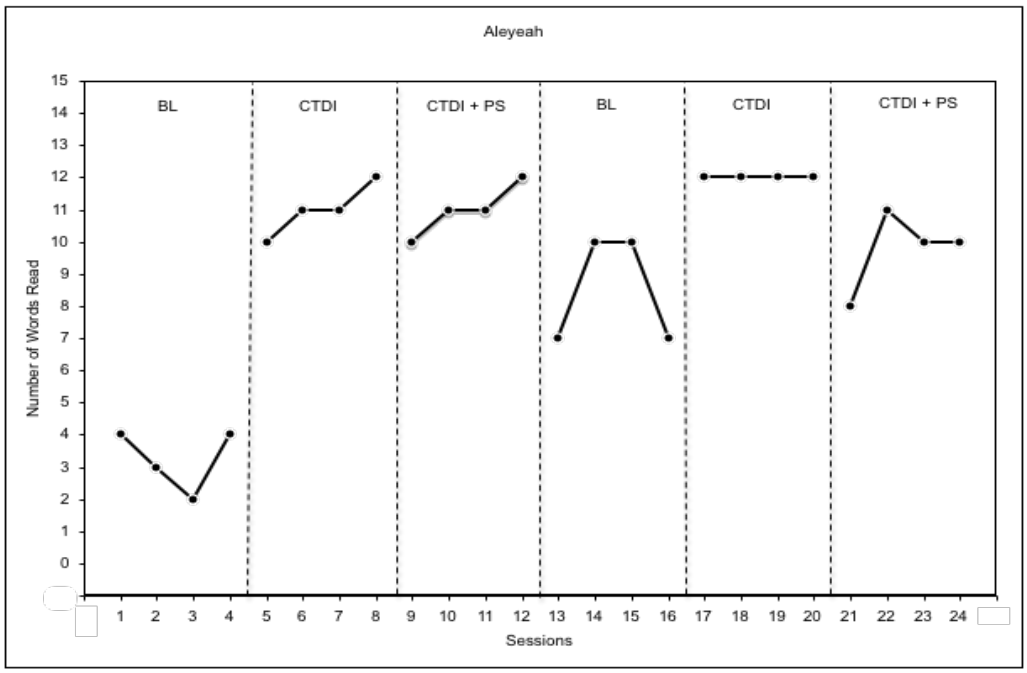

Figure 6. Results for Aleyeah represented as number of words read correctly during data collection cycles.

Discussion

This study investigated whether rates of learning to read would be influenced by the addition of systematic contingencies to instruction. In a tightly controlled instructional format with a dense schedule of praise and instructional feedback, the addition of material reinforcement on a PS schedule did not increase correct responding. Instruction combining CTDI and PS resulted in a number of correct responses comparable to CTDI alone, suggesting that students were equally motivated to read in both conditions.

These findings contradict earlier research concerning reinforcement schedules. Previous research has indicated that positive reinforcement is most effective when it is clearly linked to students' progress toward goals, as in percentile shaping (Schunk, 1984). However, results are consistent with findings comparing types of reinforcement (Barringer, 1979; Gettinger, 1983). Instructional practices utilizing verbal praise and corrective feedback have been shown to be related to positive attitudes toward learning, toward particular subject areas, and toward teachers (Schrag, 1993). Additionally, the finding that correctness feedback combined with praise was sufficient for these students to exhibit learning is congruent with many existing studies. Furthermore, eliminating material reinforcement from instruction has the following advantages: it reduces the possibility of individualized instruction being viewed as unfair, since students not receiving intensive intervention do not have the opportunity to earn reinforcers; eliminates the possibility of reinforcement stealing; reduces peer awareness of student performance; and reduces costs of treatment implementation (Skinner, Skinner, & Burton, 2009). However, use of material reinforcement might be a preferred option for instruction of noncompliant students. Qualitatively, students were more enthusiastic to participate in the program when told they would be awarded prizes for reaching their goal than when they did not.

One potential limitation of the study is the limited sample size. It is likely that there are students for whom a material reinforcement system would serve as a powerful motivator for reaching a predetermined goal, however, none were participants in this study. In this sense, extrinsic arbitrary reinforcement contingencies may be useful for some students, without being necessary for the majority of students. Additionally, it might be that the number of words read by each student was an underestimation of what students were capable of reading correctly. Students were given a 5 s response window to provide the correct word, however many students were able to read presented words correctly outside the 5 s window.

Future research should explore methods of identifying students who would benefit from additional material reinforcement. Furthermore, researchers should investigate how varying response intervals (e.g., 3 s, 5 s, 7s, 10 s) influences word mastery.

The current study extended existing research by exploring the influence of student motivation on phonics programming effectiveness. It was found that the addition of material reinforcement, delivered on a percentile shaping schedule, was equally (but no more) effective for teaching first-grade students phonics skills. Findings suggest that social reinforcement delivered contingent on correct responding, coupled with explicit performance feedback, is sufficient for teaching phonics skills to beginning readers.

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Appendix: IRB Approval

ACTION ON EXEMPTION APPROVAL REQUEST

Institutional Review Board
Dr. Dennis Landin, Chair
130 David Boyd Hall
Baton Rouge, LA 70803
P: 225.578.8692
F: 225.578.5983
irb@lsu.edu | lsu.edu/irb

TO: Rachel Bradley
Psychology

FROM: Dennis Landin
Chair, Institutional Review Board

DATE: September 11, 2015

RE: **IRB#** E9473

TITLE: Influence of Motivation on Phonics Effectiveness

New Protocol/Modification/Continuation: New Protocol

Review Date: 9/8/2015

Approved X **Disapproved**_____

Approval Date: 9/11/2015 **Approval Expiration Date:** 9/10/2018

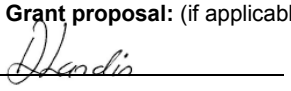
Exemption Category/Paragraph: 1

Signed Consent Waived?: No. Child assent and parental consent forms will need signatures..

Re-review frequency: (three years unless otherwise stated)

LSU Proposal Number (if applicable):

Protocol Matches Scope of Work in Grant proposal: (if applicable)

By: Dennis Landin, Chairman 

PRINCIPAL INVESTIGATOR: PLEASE READ THE FOLLOWING –
Continuing approval is CONDITIONAL on:

1. Adherence to the approved protocol, familiarity with, and adherence to the ethical standards of the Belmont Report, and LSU's Assurance of Compliance with DHHS regulations for the protection of human subjects*
2. Prior approval of a change in protocol, including revision of the consent documents or an increase in the number of subjects over that approved.
3. Obtaining renewed approval (or submittal of a termination report), prior to the approval expiration date, upon request by the IRB office (irrespective of when the project actually begins); notification of project termination.
4. Retention of documentation of informed consent and study records for at least 3 years after the study ends.
5. Continuing attention to the physical and psychological well-being and informed consent of the individual participants, including notification of new information that might affect consent.
6. A prompt report to the IRB of any adverse event affecting a participant potentially arising from the study.
7. Notification of the IRB of a serious compliance failure.
8. **SPECIAL NOTE:**

**All investigators and support staff have access to copies of the Belmont Report, LSU's Assurance with DHHS, DHHS (45 CFR 46) and FDA regulations governing use of human subjects, and other relevant documents in print in this office or on our World Wide Web site at http://www.lsu.edu/irb*

Vita

Rachel Bradley graduated with a Bachelor of Science degree in psychology in 2014 from Valdosta State University. Rachel is currently conducting her graduate work in Louisiana State University's school psychology doctoral program under the supervision of Dr. George Noell. Her research interests include educational policy, school-based consultation and intervention, and teacher-related factors associated with positive student outcomes.