The Effects of Immediate Feedback, Goal Setting and Positive Reinforcement on the Reading Performance of a Fifth Grader With Learning Difficulties

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The purpose of this study was to evaluate the effects of a simple motivational treatment (consisting of immediate feedback, goal setting, and positive reinforcement) on the reading performance of an 11-year-old boy with learning difficulties. We applied an ABAB reversal design to test the impact of our approach. The dependent measure was the number of correctly read words from a children's book within 5 minutes. Results indicate that whenever the intervention was in place, the student showed greater achievements than during baseline conditions. The implications of employing simple motivational techniques to increase reading performance are outlined, and the limitations of the study are discussed.

Keywords: **reading performance, ABAB reversal design, motivational interventions, immediate feedback**

Introduction

Reading failure can likely lead to negative outcomes such as grade retention, dropping out, limited employment opportunities, and difficulties with basic life activities (Lyon, 2001). Clearly, the long-term effects of early problems in decoding letters to arrive at meaning can be devastating. Children who do not learn to read well during the primary grades typically struggle with this skill throughout their school careers (Leahy & Fitzpatrick, 2017; Snow et al., 1998). For these reasons, identifying effective methods for early instruction and intervention for students who experience difficulties in this area is crucial (Scanlon et al., 2016).

The ultimate purpose of reading is to comprehend text. There are numerous aspects that influence one's ability to extract the meaning of a printed or written work. The National Reading Panel's report (2000) lists five key elements

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of that ability: (1) phonemic awareness, (2) phonics or decoding, (3) fluency, (4) vocabulary, and (5) comprehension. It goes without saying that one needs to be familiar with the words of a given text in order to understand it. But even once students have developed ample phonemic awareness and sufficient decoding skills alongside acceptable vocabulary knowledge, they will still be unable to catch the meaning of a text if they cannot read fluently. Words must be captured quickly, correctly, and accurately to make understanding possible (Cartwright et al., 2015; Hudson et al., 2005; Schatschneider et al., 2004). For this purpose, students must be able to read between 100 and 150 words of an age-appropriate text per minute by the end of the fifth grade (Rasinski & Padak, 2005).

It takes years to acquire advanced fluency skills. The degree to which they develop depends heavily on one's motivation to engage in reading. Conversely, the extent of an inner drive to attend to this activity is highly influenced by one's ability to perform it well (Guthrie et al., 1999; Guthrie et al. 2001; Guthrie et al., 2007; Lin, Wong, & McBride-Chang, 2012;Wigfield & Guthrie, 1997).

Morgan and Fuchs (2007) have further delineated the relationship between fluency and motivation in several studies. Students tend to form early judgements of themselves as readers based upon a conscious reflection of their success or failure (Chapman et al., 2000; Guthrie et al., 2007). Research has revealed that the amount of self-initiated training correlates positively with later reading achievement (Guthrie et al., 2007; Guthrie et al., 2001; Lin et al., 2012). According to the theory of reasoned action by Fishbein and Ajzen (2011), a person's beliefs about a particular behavior (e.g., their reading self-concept) highly influence the frequency and effort with which they pursue something. This behavior, in turn, greatly affects that individual's performance. A recent study by Locher et al. (2021) has shown that reading self-concept has a positive influence on reading comprehension, intrinsic reading motivation, and reading behavior. Chapman et al. (2000) have asserted that success or failure in reading has a sensitive and rapid effect on reading-related self-perceptions, so that reading-related self-concept is formed as a result. Conversely, a negative reading-related self-concept also has a predictive effect on later actual lower achievement. Thus, a negative reinforcement of the interaction between success-related self-perception and reading performance can be assumed (Chapman et al., 2000). This adverse interaction affects reading fluency, bringing expected developmental performance increases to a halt (Quirk et al., 2009).

Therefore, prompt help is necessary, especially because the prognosis for low-achieving students with regard to secondary school seems to be negative otherwise (Hakkarainen et al., 2013). At the same time, several authors (e.g., Quirk et al., 2009; Cartwright et al., 2015) have emphasized the relevance of considering and embedding motivational aspects in learning to read that are also

connected to the reading-self-concept. This is possible through certain support options. The higher the reading motivation and the self-concept of students, the more sophisticated the respective skills of fifth to seventh graders (Berendes et al., 2019). According to Schwabe et al. (2021), reading motivation and an adequate reading self-concept should be major goals in education, and should be considered in everyday school life.

In their recent meta-analysis of the effects of reading fluency interventions, Zimmermann et al. (2021) identified immediate feedback and goal setting as two of the most beneficial means to increase the amount of text that struggling students decode within a certain time frame. If they receive some information on how they did right at the end of a task and have to contemplate how well they want to do next time, their performance is enhanced when they tackle the next task. According to Lechermeier and Fassnacht (2018), feedback can boost performances and self-concepts. A very promising way of giving feedback is presenting students with a line diagram that visually displays their achievement development (McDaniel et al., 2013).

Another motivational ingredient with the potential to make a difference is positive reinforcement. The research base on the effects of giving rewards to increase the likelihood of a given behavior occurring is extraordinarily strong. In their startling "mega-analysis of meta-analyses," Forness et al. (1997) identified this technique as an extremely potent approach to help students with disabilities in their learning. Moore et al. (2010) revealed that using positive reinforcement in the classroom leads to a higher response to teachers' demands, and Zecker (2006) stated that students with additional learning needs require more intensive reinforcement. A meta-analysis by Cameron et al. (2001) documented the impressive positive effects of rewards on student motivation, and Locher et al. (2021) indicated that learners need opportunities to succeed in reading. Both feedback and positive reinforcement address this issue.

However, as simple as these methods (immediate feedback, goal setting, and positive reinforcement) seem to be, there is hardly any research that has tested them with the aim of increasing the reading fluency of struggling students. One rare exception is the study by Gunter et al. (2003). The authors used the aforementioned motivational techniques with a nine-year-old female struggling reader to visualize her progress across time. Results showed that this small provision increased her reading fluency considerably. More research is needed to confirm or refute such results. Thus, the purpose of this study was to test the benefits of immediate feedback using line diagrams, coupled with goal setting and positive reinforcement, on the reading fluency of an 11-year-old boy with low motivation.

Methods

Participant, Setting, and Interventionist

The participant was Aaron (name changed to ensure anonymity), an 11-year-old boy from a fifth grade classroom. He attended an inclusive modern secondary school in a large city in Germany. Most of the students came from neighborhoods that were particularly vulnerable to stereotyping and discrimination. Aaron's parents migrated from Iran before he started school, and his family spoke mostly Persian at home. According to his class teacher, Aaron had trouble concentrating and staying on task. His general school performance was below that of his peers. He was considered at risk for a learning disability, but had not yet received an official diagnosis at the time of this study. Aaron was able to read at a fourth grade level, but found it very difficult to tackle longer passages effectively. The interventionist was a 25-year-old female graduate student in special education who had previous experience in working with children with severe learning difficulties.

Dependent Variable

The number of words read within a 5-minute period served as the dependent variable. We used the children's book *The Truth Told* by Mason Buttle (*Die ganze Wahrheit*) in a German translation by Connor (2021). The book's readability index (LIX, retrievable at www.psychometrica.de/lix.html) was just below 30, which indicates that the text had a very low complexity, a high percentage of short words and sentences, and little lexical variety. A stopwatch was used to measure the time. Aaron was asked to read the text aloud while the interventionist followed along. Whenever he made a mistake, he was corrected immediately. This correction consisted of just quickly naming the accurate word, which usually took less than a second. The interventionist determined the number of words read within the given time frame at the end of each session (see below). To enhance reliability, she recounted them based on the markings in the book after the study ended. There were no discrepancies.

Experimental Design and Procedures

The effects of the motivational techniques (feedback, goal setting, and positive reinforcement) on the reading performance were evaluated using an ABAB design (Alberto & Troutman, 2009). Both A-phases consisted of three daily measurements, while both B-phases consisted of five daily measurements. Every day of the study, the student was taken out of his class and brought to a resource room where he was able to concentrate on his reading. During baseline conditions, he was asked to simply read a book and was told to stop after five minutes.

During the two treatment phases of feedback, goal setting, and positive reinforcement, the interventionist informed the participant about his high score

from the previous baseline at the beginning of each session (in Phase A1, his peak performance was 615 words; in Phase A2, it was 657). She encouraged him to read at least as many words that day as he had when he reached his highest achievement in the previous A-phase. In addition, he was shown a line diagram with the measurement results from previous sessions. It included a horizontal line at 615 words for Phase B1 and at 657 words for Phase B2 to indicate the benchmark that the student was supposed to surpass. He was told that whenever he was able to beat his high score from the previous baseline, he could earn tokens that he could exchange for preferred stickers at the end of the experiment. In preparation for each treatment session, the interventionist counted the words in each line for the upcoming reading passages and wrote the cumulative sum with a pencil on the margin of the relevant page. This way, she was able to immediately determine how much the student had read on a particular day. As in the A-phase, the student was corrected immediately by the interventionist whenever he made a mistake.

Following the last session of the second B-phase, the interventionist asked the classroom teacher how she thought Aaron had responded to the feedback and positive reinforcement. In addition, she asked the student himself how he liked receiving information about his performance, being encouraged, and earning tokens. The interventionist took handwritten notes of the responses.

Results

Figure 1 displays the number of words read correctly during the 5-minute intervals on the Y axis and sessions across the X axis (with a horizontal dotted line to show the mean performance in each phase). Immediate changes could be observed from baseline to intervention. Every measurement in B1 exceeded the highest score in A1, and every measurement in B2 exceeded the high score in A2.

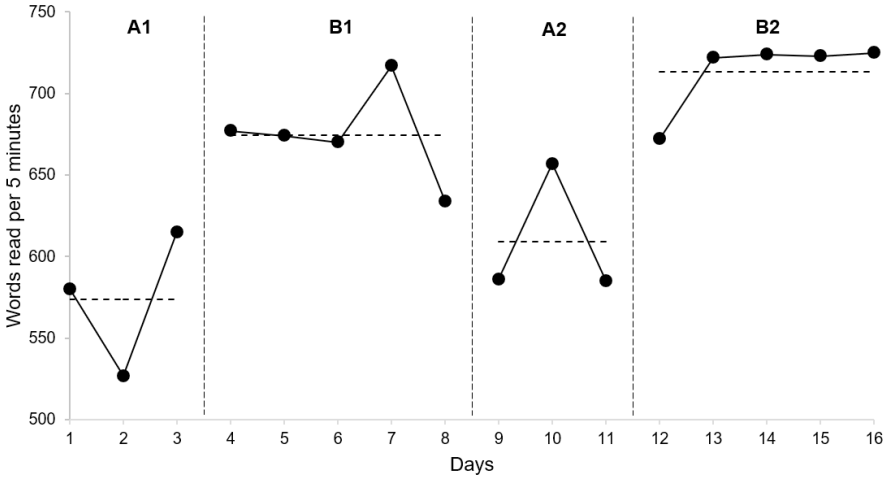

Figure 1. **Words Read Correctly for Each Treatment Condition**

Table 1 displays some descriptive data for Aaron across the four phases and presents four common non-overlap indices for single-case experimental designs: Percentage of Non-Overlapping Data (PND; Scruggs et al, 1987), Non-Overlap of All Pairs (NAP; Parker & Vannest, 2009), Percentage of all Non-Overlapping Data (PAND; Parker et al., 2007), and Tau-U (Parker et al., 2011). For the analysis, the two A phases and the two B phases, respectively, were combined.

Table 1. ***Descriptive Statistics and Overlap Indices for the Number of Words Read Correctly Within 5 Minutes***

Descriptive Statistics				
	A1	B1	A2	B2
Minimum	527	634	585	672
Maximum	615	717	657	725
M	574.00	674.40	609.33	713.20
SD	44.31	29.47	41.28	23.06
Overlap Indices				
	PND	NAP	PAND	Tau-U
Index	90	98	88	0.63

The mean improvements from A1 to B1 and from A2 to B2 can be considered moderately large. In the first case, they equaled 17.49%, and in the second case 17.05%. When Phases A1 and B2 were compared, the enhancement reached 24.25%. Even though the improvements were not extraordinarily high, they were noteworthy. All non-overlap indices reached substantial values. In each case, the magnitude of the performance gains ranged between large and very large (Vannest & Ninci, 2015; Vannest & Sallese, 2021).

In a last step, we conducted a piecewise regression analysis in an effort to detect possible level effects (comparing each phase with the previous one). As can be seen in Table 2, all relevant differences (A1 vs. B1, B1 vs. A2, and A2 vs. B2) reached statistical significance (one-tailed) at the conventional level (5%). This means that with a probability of more than 95%, the disparities in reading performance between the phases cannot be explained by chance, but are attributable to the intervention.

Table 2. ***Piecewise Regression Model for Words Read Correctly Within 5 Minutes***

	B	*SE*	*t*	*p*	*Delta* R^2
Intercept	565.83	23.87	23.71	<.001**	
Trend	4.08	6.89	0.59	.565	0.01
Level A1 to B1	84.07	36.98	2.27	.022*	0.10
Level B1 to A2	-81.40	36.98	-2.20	.025*	0.10
Level A2 to B2	87.53	36.98	2.37	.019*	0.11

Finally, anecdotal reports by the classroom teacher and informal feedback from Aaron suggested that the intervention was very well received by and enjoyable for the student. The participant appeared very proud of his achievements, as he told his teacher and the interventionist about his accomplishments after each session in the B-phases.

Discussion

The purpose of this study was to evaluate the effects of a simple motivational intervention on the reading performance of an 11-year-old boy with learning difficulties within an ABAB design. Results suggest that the participant responded very well to the treatment. Whenever he was informed about his high score from a previous A-phase, encouraged to beat his peak, and awarded tokens for reaching his goal, his reading fluency increased. All overlap effects sizes mirrored the visual analysis. Every index indicated that the intervention was very helpful. The statistical significance results from a regression analysis confirmed that the differences between the phases were substantial. In addition, the participant spoke very positively about the treatment.

The findings from a small single-case analysis with only one student cannot be generalized and applied to the larger population. More research is needed to confirm and further explain the findings of this study. Other limitations pertain to the fact that we did not systematically collect any data on the treatment fidelity and social validity. The nature of our approach was so simple that it was very unlikely that the interventionist committed any noteworthy mistakes. However, it would not have hurt to observe her during a couple of session and check whether she really had considered all vital elements of the training. We captured some social validity data from the student, but this was done rather informally. Using a short interview guide and audiotaping the responses would have produced even more reliable data. The interventionist counted the number of words twice, but such an approach cannot pass for a means to estimate interrater agreement (because there was only one rater). However, it can be assumed that a second person would have not come up with different results. Counting the number of words is surely a relatively reliable procedure, especially if it is done twice with identical results.

Despite these limitations, the findings from this study are promising. Reading fluency is a critical component of the larger proficiency and greater literacy necessary for success in school, everyday life, and the workplace. Failing to develop a sufficient skill level in this area is highly problematic. Without adequate reading fluency, students will not be able to understand text. As mentioned above, a learner of Aaron's age needs to read 100 to 150 words per minute (or between 500 and 750 words within five minutes) to have a solid foundation for comprehension (see Rasinski & Padak, 2005). On average, our participant scored around 600 words per minute during A-phases (574.00 and 609.33) and around 700 words per minute during B-phases (674.40 and 713.20). What does not seem much could be crucial for successfully managing the shift from learning to read to reading to learn. A lot of serious academic problems could be prevented by using motivational techniques that help students get used to reading at an age-appropriate speed.

An intervention such as the one evaluated in this study shows promise in encouraging and increasing reading fluency in struggling students. The efficiency and efficiacy of this approach, paired with its ease of implementation, offers promise in its incorporation into the daily routine of educators to support students with fluency and motivational challenges.

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