

# THE DIFFERENTIAL EFFECTS OF DIRECT INSTRUCTION FLASHCARDS AND READING RACETRACKS ON SIGHT WORD ACCURACY FOR THREE ELEMENTARY STUDENTS WITH LEARNING DISABILITIES

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## ABSTRACT

*The purpose of this study was to determine the effectiveness of Direct Instruction (DI) flashcards and reading racetrack procedures to improve sight word skills. The participants were three elementary students with learning disabilities enrolled in a special education resource room. A multiple baseline design across participants and sets of first-grade sight words was employed to evaluate the efficacy of DI flashcards and reading racetracks. Two of our three participants quickly improved their sight words skills during the intervention. One student made less progress in learning sight his words. The reasons that some of our participants did not improve was due to poor school attendance and effect of high stakes testing in general education. However, our participants enjoyed the procedures and looked forward to working on their sight words each session.*

**Keywords:** elementary students with disabilities, 1<sup>st</sup> grade sight words, DI flashcards, reading racetracks,

## INTRODUCTION

Reading and writing are crucial skills taught in schools today. Individuals build upon these skills throughout their education, allowing them to become literate and knowledgeable of information. Illiteracy is a problem in America. Seven million Americans are illiterate. The National Assessment of Adult Literacy 2003 (NAAL, 2008) reported that 27 million individuals are unable to read to complete a job application and 30 million cannot read a sentence (NAAL, 2008). The lowest level of literacy in the United States is 25%. Reading is an important skill that needs to be taught from an early age and cannot be ignored. Without the ability to read it is difficult to succeed in many aspects of life such as completing school and applying for jobs (Adams, 1990). Often beginning in kindergarten, but clearly by first grade and continuing through third grade, reading is the number one academic focus in the classroom (Cunningham & Stanovich, 1997b; National Reading Panel, 2000). It is important to have a child start learning to read early so that they can build up their reading skills for more challenging tasks and assignments in the future (Cunningham & Stanovich, 1997a). The best predictor of success in school is if children can read when they enter school. Children who read well have a very high probability of being successful at school and later life (Cunningham & Stanovich, 1997b; National Reading Panel, 2010; Lloyd, 1978; Rinaldi, Sells, & McLaughlin, 1997).

Teaching reading becomes an even greater issue when teaching children with learning disabilities. Nearly 2.5 million students are receiving special education services for learning disabilities in the U.S. (NCLD, 2001). Of this population, first authors have found that 90% of children with learning

disabilities are referred for special education services because of reading issues (Heward, 2010). These include, a gap between one's expected and actual levels of achievement, difficulties with social-emotional skills and behavior, and struggles with language, motor coordination, and social skills, and low motivation and self-esteem problems. Evidence-based instruction can help students with LD, especially in reading, because the majority of students with learning disabilities struggle in this curricular area (Lerner & Johns, 2011).

Common procedures typically employed for teaching sight-words are basal reading programs or whole language approaches (Marchand-Martella, Slocum, & Martella, 2004). These procedures include learning in different ways, such as practicing verbal spelling of sight-words, reading words from flashcards, inventive spelling, writing sight-words out on paper or white boards, looking up words in a dictionary and leaving a child to practice sight-words independently (J. Vacca, R. Vacca, Gove, Burkey Lenhart, & McKeon, 2011). Unfortunately, most of these approaches for teaching reading to students with learning disabilities have not been effective (Carnine, Silbert, Kame'enui, & Tarver, 2009; Heward, 2010; Lerner & Johns, 2011).

One classroom academic intervention procedure that has been used to teach sight-words is Direct Instruction (DI) flashcards. DI Flashcards are a method of presenting and teaching sight words to an individual student. Each set of DI flashcards consists of 10 to 15 sight words. If the child vocalizes a word correctly when presented the flash card, this card is placed at the back of the stack and the next word is presented. If an error occurs, the teacher and student engage in a model, lead, test error correction procedure. First, the teacher models correct pronunciation the word, next, the child and teacher say the correct answer to the sight word, and finally, the student is required to say the correct answer when presented the error card. The error card is placed only a couple of cards back and the teacher continues to place this card in that manner until the error is said correctly three consecutive times (Silbert, Carnine, & Stein, 1981). These procedures have been effective to teach sight-words to a wide range of students ranging from general education students (Standish, McLaughlin & Neyman, in press) to students with a wide range of disabilities such as severe behavior disorders (Brasch, Williams, & McLaughlin, 2007; Treacy, McLaughlin, Derby, & Schletter, 2012), intellectual disabilities (Ruwe, McLaughlin, Derby, & Johnson, 2011) or in a fun and interesting way. DI flashcards have also been shown to be an effective procedure to teach children who are performing below grade level in reading (Kaufman, McLaughlin, Derby, & Waco, 2011; Romjue, McLaughlin, & Derby, 2011; Ruwe et al., 2011; Tan & Nicholson, 1997). DI Flashcards can be used for teaching both sight words and other basic skills such as math facts (Beveridge, Weber, & McLaughlin, 2006; Erbey et al., 2011; Treacy et al., 2012). Employing DI flashcards in the classroom has been shown to be an effective intervention to teach children a wide range of basic skills (Hayter, Scott, McLaughlin, & Weber, 2005; Herberg, McLaughlin, Derby, & Williams, 2011).

In conjunction with DI Flashcards, reading racetrack procedures can assist in promoting fluency of sight words (McLaughlin, Weber, Derby, Hyde, Violette, Barton et al., 2011; Rinaldi & McLaughlin, 1996; Rinaldi, et al., 1997). A reading racetrack procedure consists of 28 spaces around a "racetrack." Sight words are placed in the spaces around an oval track. These words are placed on the track in random order and no two words that sound or look alike are placed next to one another (McLaughlin et al., 2011). The child is required to read the sight-words correctly and to progress as quickly as possible around the track. If the child incorrectly identifies a word, the teacher corrects error using the model, lead, and test procedure employed with DI flashcards. After the child has read all the sight-words completely around the track, he or she is then challenged to beat the previous time or number of words correctly identified (McLaughlin et al., 2011; Rinaldi et al., 1997). This challenge is timed and the student has 1-minute in which to read the sight words from the track. The implementation of RR along with DI flashcards promotes fluency and understanding of sight words using a game like format (Erbey, McLaughlin, Derby, & Everson, 2011; Falk, Band, & McLaughlin, 2003; Printz, McLaughlin, & Band, 2006; Rinaldi et al., 1997; Shahtout, McLaughlin, Derby, & Arenez, in press).

The first purpose of this study was to employ the DI flashcard and reading racetrack procedures to increase the accuracy, fluency, and understanding of 1<sup>st</sup> grade sight words with three elementary students with learning disabilities. Another purpose was to replicate and extend prior research of DI

Flashcards (Ruwe, McLaughlin, Derby, & Johnson, 2011; Treacy, McLaughlin, Weber, Schlettert, 2012), and to extend our other work employing both DI flashcards and reading racetracks (Falk et al., 2003; Kaufman et al., 2011; Printz et al., 2006; Rinaldi & McLaughlin, 1996; Rinaldi et al., 1997; Romjue et al., 2011; Shahtout et al., in press Travis et al., 2012). Such a replication (Barlow, Nock, & Hersen, 2008; Kazdin, 2010) would add to the confidence for employing such academic procedures in the classroom setting.

## METHOD

### Participants and Setting

The participants were two third-grade students and one fourth-grade student. These students received special education services in a resource room within a public elementary school in the Pacific Northwest. The classroom teacher recommended these students for the study due to their low performance in reading. Participant 1 was a 9-year-old, fourth grade male diagnosed with a specific learning disability in the areas of reading and written expression. His IEP goals included the academic areas of reading and writing. He had been referred to special education by a family member during third grade. His overall IQ was 102, but his performance in reading and writing was of great concern. The formal assessment the *Woodcock Johnson III Tests of Achievement* (Woodcock, McGrew, & Mather, 2001) was conducted. The test results showed that in broad reading he scored a 1 grade 4<sup>th</sup> month. For written language he scored at the 1<sup>st</sup> grade 8<sup>th</sup> month. He scored at the 4<sup>th</sup> grade 6<sup>th</sup> month in broad math. Overall, he was two years below his same age peers.

Participant 2 is an 8-year-old-male diagnosed with learning disabilities. He was referred to special education by a family member during first grade. His overall IQ was 96. His IEP goals included writing and math. He did not have an IEP goal in the area of reading, but the classroom teacher recommended working with him on reading due to his low performance.

Participant 3 was a 9-year-old female diagnosed with a specific learning disability. She moved into the school district this past fall. She had been referred to special education by her second-grade teacher in another school district. Her overall IQ was overall a 77. Her IEP goals were in the areas of reading, writing, math, and communication.

The setting was a special education resource room classroom in the Pacific Northwest. The resource room served 25 students using both a pull out and full inclusion model. At any given time there was a maximum of seven students in the classroom. There were also additional adults in the classroom providing speech and language and special tutoring in another part of the room.

### Materials

The materials needed in this study were 3 by 5 notecards, a reading racetrack sheet, observation sheets, and a timer. Each participant had his or her own set of notecards containing first grade sight words. The notecards were organized into three sets of ten notecards each, containing thirty notecards in all. Each notecard had a different handwritten sight word written in black ink by the first author. The reading racetrack sheet was used as an intervention technique paired with each set of sight words. The first author wrote, in black ink, the ten sight words on the racetrack depending on the set being intervened upon. Observations sheets were created by the first authors and used to collect data as well as observe generalization by the participants. The timer was used by the first author to time the participants for one minute as they read aloud. They were to read as many sight words correctly as possible for one minute going around the racetrack.

### Dependent Variables

The first dependent variable for this study is the number of sight words correctly read. Correct sight words were identified by the first vocalization of a sight word within 3s when the word presented by the first author. The second dependent variable was the number of errors. Errors were determined by vocalization of a sight word after three seconds of initially seeing the word. An incorrect vocalization

was saying the wrong words. The third dependent variable was the number of sight words read per minute. This was calculated by the number of words correctly read words over the number of total words read in one minute.

### Data Collection and Interobserver Agreement

Data were collected at the end of each 6 to 11 minute session. This varied depending on how quickly the participants took to reading the sight words on the flashcards and reading racetrack. The first author had individualized data collection sheets for each of the three participants. After each session the first author would mark the total amount of flashcards correctly and incorrectly vocalized by using number between 0-10 for each of the three sets of ten flashcards. This data recording occurred automatically after the participant read the flashcards. The first author also had individualized data collection sheets for the reading racetrack intervention. After the participants read the 28 sight words on the track from the specific set being intervened on, the first author would mark the correct and incorrect number of sight words, 0-28, vocalized within 1 minute.

### Experimental Design and Conditions

The study used a multiple baseline design (Kazdin, 2010) across participants and sets of sight words used to test the efficiency of DI flashcards and reading racetracks. For Participants 1, 2, and 3 baseline was conducted during the two initial sessions of the study. This was then followed by intervention which lasted 15 sessions for Participant 1, 17 sessions for Participant 2, and 19 sessions for Participant 3.

### Procedures

The procedure throughout the study remained constant across all sets. A pretest was given to each participant followed by baseline then intervention. Baseline and intervention took place one to three times a week depending on the availability of the Participants. The first author worked one-on-one with all Participants during their individual sessions. During each individual session with the Participants the first author went in the order of the following steps starting with Set 1: baseline of sets completed were assessed, the current set of sight words on DI flashcards were taught, and a reading racetrack timing which had the corresponding set of sight words on the track. The first author did not move onto a new set of sight words until the Participants mastered 90-100% accuracy of current words across two sessions. Immediately after each session the first author recorded data on the Participants data collection sheets. When each Participant completed a set of sight words with 90-100% accuracy they were given a reward for their hard work, this consisted of half of a gram cracker or fruit rope. If Participants were continuing to work on a set, the session was completed with the first author providing verbal praise for their hard efforts.

Baseline. During baseline, the first author presented 30 cards divided into three sets containing 10 cards each. On each card was a handwritten sight word. Participant 1s, 2, and 3 were presented all 30 cards in the resource room. During baseline, the first author asked the participant to identify all 30 sight words. The first author presented all 30 cards by saying the following instructional cue before the participants read the words: "I want you to read these words for me. If you know the word say it and if you don't know the word say 'pass' or 'I don't know'. Do your best!" No praise was given to each participant during baseline. If the participant correctly identified the word, the first author placed the card in a pile for correctly identified words. If the participant incorrectly identified the word, it was placed in a separate pile and scored as an error. All participants were thanked for their participation at the end of each session. At the end of each baseline session the first author calculated the number of correct words the participants and divided this total by 30 leading to each participant's percent correct.

DI Flashcards and reading racetracks. During each session, the first author used one set of 10 flashcards with the Participants. The first author told the Participants that she would help them learn the words. The first author presented the flashcards individually. If the Participants vocalized the sight word correctly within 3s, she moved the card to the back of the deck. If the Participants vocalized the

word incorrectly or not within 3 seconds, the first author would say “This word is after,” “what word?” The participant would then respond “after”. The first author then placed the card three cards behind from the front of the deck. This increased the participants understanding and fluency of the word. The first author continued this procedure three times before placing the card at the back of the deck (Glover, McLaughlin, Derby, & Gower 2010). At the end of each lesson the first author immediately recorded the amount of correct and incorrect sight words vocalized between 0-10.

Reading racetracks were then used to promote fluency and sustain understanding of the sight words from the set of DI flashcards previously taught. The first author told the participants to begin at the starting line and read the sight words correctly and clearly within 1 minute. The first author set the timer for 1 minute and told the Participants they could begin reading. If the Participants incorrectly vocalized the word, the first author would correct them by saying “That word is after”. The Participants would then say the correct pronunciation of the word and continuing reading the sight words on the racetrack. This procedure continued until they read to the finish line within 1 minute. The first author would immediately record the amount of sight words correctly and incorrectly vocalized out of 0-28. During both DI Flashcard and Reading Racetrack procedures, verbal praise was given to the Participants for their achievements.

### Reliability of Measurement

During intervention interobserver agreement was conducted across all sets. Interobserver occurred when another observer joined the intervention of a specific set. The first author and the classroom IA conducted the interobserver agreement. There was a specific instance where one of the first authors professors was an interobserver for one session. The observer would independently record their observations of sight words correctly and incorrectly vocalized on DI flashcards and reading racetrack on specific interobserver data collection sheets for each of the three participants. The first author marked tallies for each sight word correctly observed during baseline, DI flashcards, and reading racetrack for both her and the classroom IA. Interobserver agreement was conducted 6 of the 15 (40 %) sessions for Participant 1, 8 of the 17 (47%) sessions for Participant 2, and 6 of the 19 (32%) sessions for Participant 3. Interobserver agreement was calculated by dividing the number of agreements by the total number of agreements and disagreements and multiplying that number by 100. The mean Interobserver agreement for Participant 1 for DI Flashcards was 100% and Reading Racetracks was 100%. The mean Interobserver agreement for Participant 2 for DI Flashcards was 97.1 % and Reading Racetracks was 100%. The mean Interobserver agreement for Participant 3 for DI Flashcards was 91.3% and Reading Racetracks was 94.5%.

## RESULTS

### Participant 1

Participant 1 was able to correctly state 33 of the 56 (58%) 1<sup>st</sup> grade sight words on the pretest. The correct number of sight words vocalized during baseline and intervention of DI Flashcards are presented in Figure 1. During baseline of Set 1, his mean performance was 6 out of just 10 words correct. His performance increased to a mean of 7.2 (range 4 to 10) during the intervention of DI Flashcards. Participant 1 showed mastery of sight words taught in Set 1 over two sessions. During baseline for Set 2, his overall mean was 7.3 (range 6 to 9). During the DI flashcard phase, his mean slightly decreased to 6.8 (range 6 to 8). Participant 1 failed to show mastery of the sight words taught in Set 2. During baseline of Set 3, his mean was 5.9 out of 10 (range 4 to 7). Since the Participant 1 did not master Set 2, no intervention took place for Set 3.

The use of reading racetracks during intervention was used to promote fluency and understanding of sight words following the intervention of DI Flashcards during each session of intervention across all sets. The correct number of sight words vocalized during reading racetracks can be seen in Figure 1.2 for Participant 1. During the flashcard intervention for Set 1, his mean was 23.4 out of 28, (range 10-28). Participant 1 showed mastery of sight words in Set 1 in just one session. During intervention of Set 2, his mean increased to 25.5 (range 23 to 28 words). Participant 1 did not master Set 2 words



using DI flash cards there was not reading racetrack data for Set 3. A posttest was given at the end of the study. This indicated that Participant 1 knew slightly more sight words. He knew 35 of the 56 (62%) sight words.

### Participant 2

Participant 2 knew 32 of the 56 (57%) 1<sup>st</sup> grade sight words on the pretest. The correct amount of sight words vocalized during baseline and intervention of DI Flashcards is shown in Figure 2.1. During baseline of Set 1, his mean was 6.0. This increased to a mean of 8.4 (range 6-10 words) during the intervention of DI Flashcards. Participant 2 showed mastery of sight words taught in Set 1 in just two sessions. During baseline of Set 2, the mean number of sight words was 6.7 out of 10 (range 4 to 8 words). During DI flashcards, this mean increased to 8.0 (range 7 to 10). Participant 2 showed mastery of sight words taught in Set 2 over three sessions. During baseline of Set 3, his mean was 7.6 out of 10, (range 6 to 9 sight words). During the DI flashcard intervention his performance increased ( $M = 9$ ; range 8 to 10). Participant 2 showed mastery of sight words taught in Set 3 over one session.

The correct amount of sight words correctly read during reading racetracks is shown in Figure 2.2 for Participant 2. During reading racetracks of Set 1, his mean was 25.9, (range 22 to 28 words). Participant 2 showed mastery of sight words in Set 1 in only three sessions. His performance for Set 2 was high ( $M = 28$ ). Participant 2 showed mastery of sight words in Set 2 over seven sessions. During our intervention with Set 3, his mean was 27.5, (range 27 to 28 words per minute). Participant 2 showed mastery of sight words in Set 3 over one session. The posttest was given at the end of the study revealed that Participant 2 increased the number of sight words he could state. He knew 45 of the 56 (80%) sight words.

### Participant 3

Participant 3 knew 13 of the 56 (23%) 1<sup>st</sup> grade sight words on the pretest. The correct number of sight words vocalized during baseline and intervention of DI Flashcards are shown in Figure 3.1. During baseline for Set 1, her mean was 5 out of 10. This increased to a mean of 7.3 (range 4 to 10) when DI Flashcards were employed. Participant 3 showed mastery of sight words taught in Set 1 over two sessions. During baseline of Set 2, her mean was 5.2 (range 2 to 7). During the use of DI flashcards, her mean declined ( $M = 4.3$ ; range 1-7). Participant 3 did not display mastery of the sight words taught in Set 2. During baseline of Set 3, her mean was 2.9 out of 10, (range 2 to 8). Since Participant 3 did not master the words in Set 2 during DI flashcards, no intervention took place with Set 3. The correct amount of sight words read during reading racetracks is shown in Figure 3.2. During intervention of Set 1, her mean was 20.9 out of 28, (range 6 to 28). Participant 3 showed mastery of sight words in Set 1 in just one session. During intervention for Set 2 her overall mean was 20 correct sight words per minute. However, since our participant did not master Set 2, no reading racetrack intervention with Set 3 words took place. On the posttest given at the end of the study, found that Participant 3 increased the number of sight words she could say. On the posttest she knew 24 of the 56 (42%) sight words which was an increase over her performance on the pretest.

## DISCUSSION

The results from the study indicate that the intervention of DI Flashcards and RR were effective some of our participants. The differential effects of employing DI flashcards have been reported elsewhere (Ruwe et al., 2011). However, over time our participants gradually mastered more and more of their sight words. Some of the largest gains we observed were when reading racetracks and their one minute timing were employed.

Participant 1 was self-conscious and aware when he did not know or vocalize a sight word correctly. As a result, he would slowly stop responding by taking longer and longer to vocalize words. Other behavior such as playing with his hair, rubbing his eyes, and at times not reading the word. However, when Participant 1 began the DI flashcard intervention, the first author assisted him in reading the words. This lead to his telling the classroom teacher that he enjoyed the DI flashcards and reading

racetracks. He also liked reading his sight words faster than the first author. This appeared to promote fluency and understanding of the words that we observed when the reading racetrack was employed. Overall, DI Flashcards with reading racetracks was effective for Participant 1 to learn and read his sight words. By the end of the study Participant 1 was able to recognize all the sight words in Set 1. Due to missing a significant amount of school towards the end of data collection, he was able to only learn a few words from Set 2. The first author continued taking baseline on Set 3 when intervening on Set 1 and part of Set 2. Overall, Participant 1 enjoyed the intervention, but more time was clearly needed for mastery to occur.

Participant 2 also enjoyed the reading of sight words even though he was timid at times. He was conscious about doing well and worked hard to learn the sight words. Participant 2 mastered all three sets of sight words by the end of the study. Over time, Participant 2 steadily learned Set 1, which continued into Set 2. He had a decrease in performance due to high stakes testing in general education. This allowed him to miss several sessions. However, he did master Set 2 and continued to Set 3. Participant 1 enjoyed reading of sight words through the intervention, enabling him to continue learning words at the next grade level.

Participant 3 also enjoyed reading sight words even though she was the lowest performing of our three participants. She was enthusiastic to read DI flashcards and to read around her reading racetrack. As the study continued, she became aware of her ability to vocalize many words correctly even if she did not know a sight word at first. DI Flashcards and reading racetracks were an effective tool for Participant 3 to learn and read her sight words. Participant 3 slowly and steadily improved with Set 1 words. However, she struggled with words in both Sets 2 and 3. Overall, Participant 3 greatly benefited from the intervention and should continue the intervention in order to read and promote fluency with her sight words.

The present research was practical. The cost of the materials used in the study was inexpensive. The researcher only paid for flashcards, markers, and printer ink to print off the data collection sheets and reading racetrack sheets. DI flashcards were able to be quickly and effectively implemented in a resource room setting. Our participants were given individualized, one-on-one instruction by the first author. The first author was also fortunate to have flexible general education classroom teachers who permitted their students to participate in the research.

Since these procedures are straight-forward to implement, teachers could employ these procedures in their general education classrooms. Older students or siblings may also use this procedure to teach other students needing extra help. Parents could use this strategy at home with their children who need the extra practice in reading sight words.

There were limitations to this study. The first and major limitation was that data collection could not occur each day. Unfortunately, a majority of the time both Participants 1 and 3 were absent from school. This did not permit the consistent implementation of the procedures. Also, at other times, the first author was unable to bring the participants due to a special class activity, trimester testing, or schedule conflicts in either the resource room or general education classroom. The second limitation was reliability of measurement was not gathered for each session. It was recorded sporadically depending upon the availability of the other adults in the room. Often they were working with other students. The final limitation was the requirement of one to one instruction. Our procedures required an adult working one-on-one with a specific student. This would not be ideal in a general education classroom where a large number of students required assistance and instruction. Our procedures may well be able to be adapted to such classroom settings if the teacher employed higher performing students to assist students in their class by working one-on-one with them using this procedure. If a child's parents are very busy, an older sibling could be taught the strategy and help their younger siblings practice their sight words at home. In future research, having a specific schedule to work with individual students would allow for the collection of data to be continuous and stable. In our previous research (Kaufman et al., 2011; Romjue et al., 2011; Ruwe et al., 2011; Travis et al., 2012; Treacy et al., 2012) this has taken place. In the present research high stakes testing and chronic student absences clearly affected our outcomes. When we have employed students with good

attendance (Brasch et al., 2007; Falk et al., 2003; Kaufman et al., 2011; Printz et al., 2006) our outcomes have been more impressive. Unfortunately, many students with poor attendance are the students that need our assistance the most.

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Figure 1.1 The number of correct sight words for Participant 1 with DI flashcards.

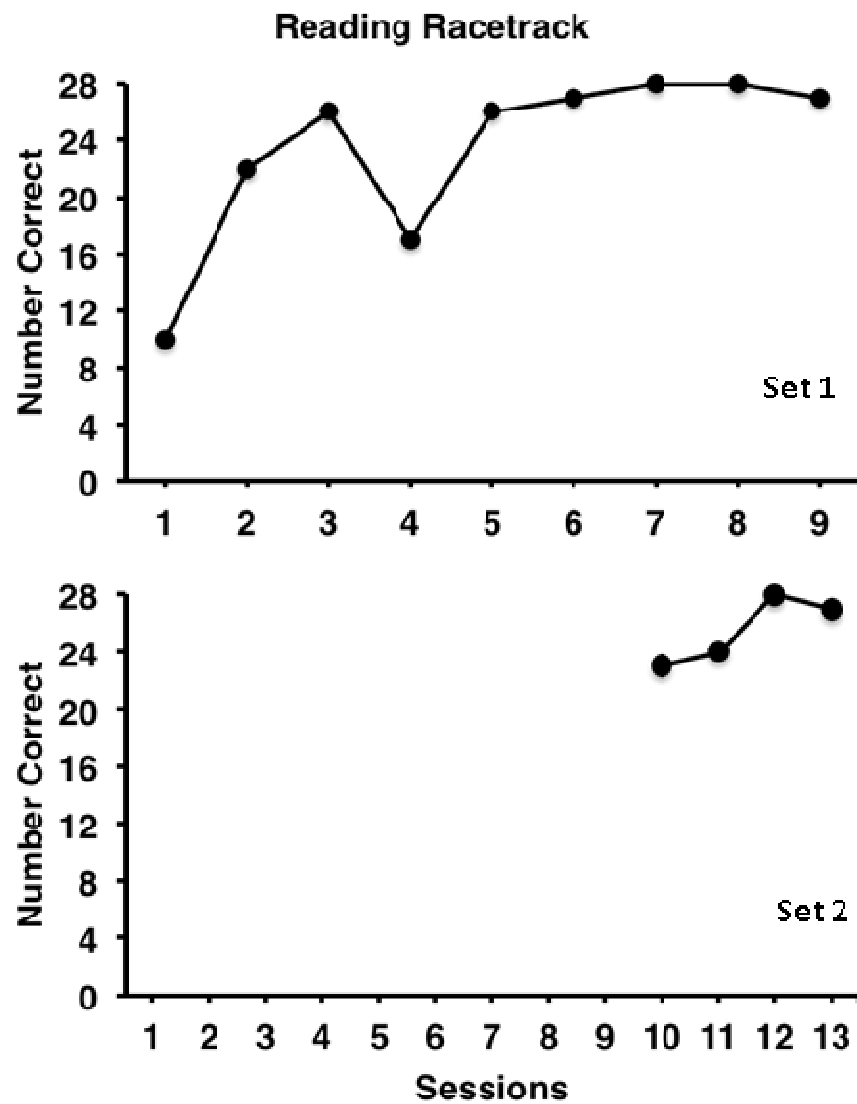


Figure 1.2. The number of correct sight words per minute for Participant 1 from the reading racetrack.

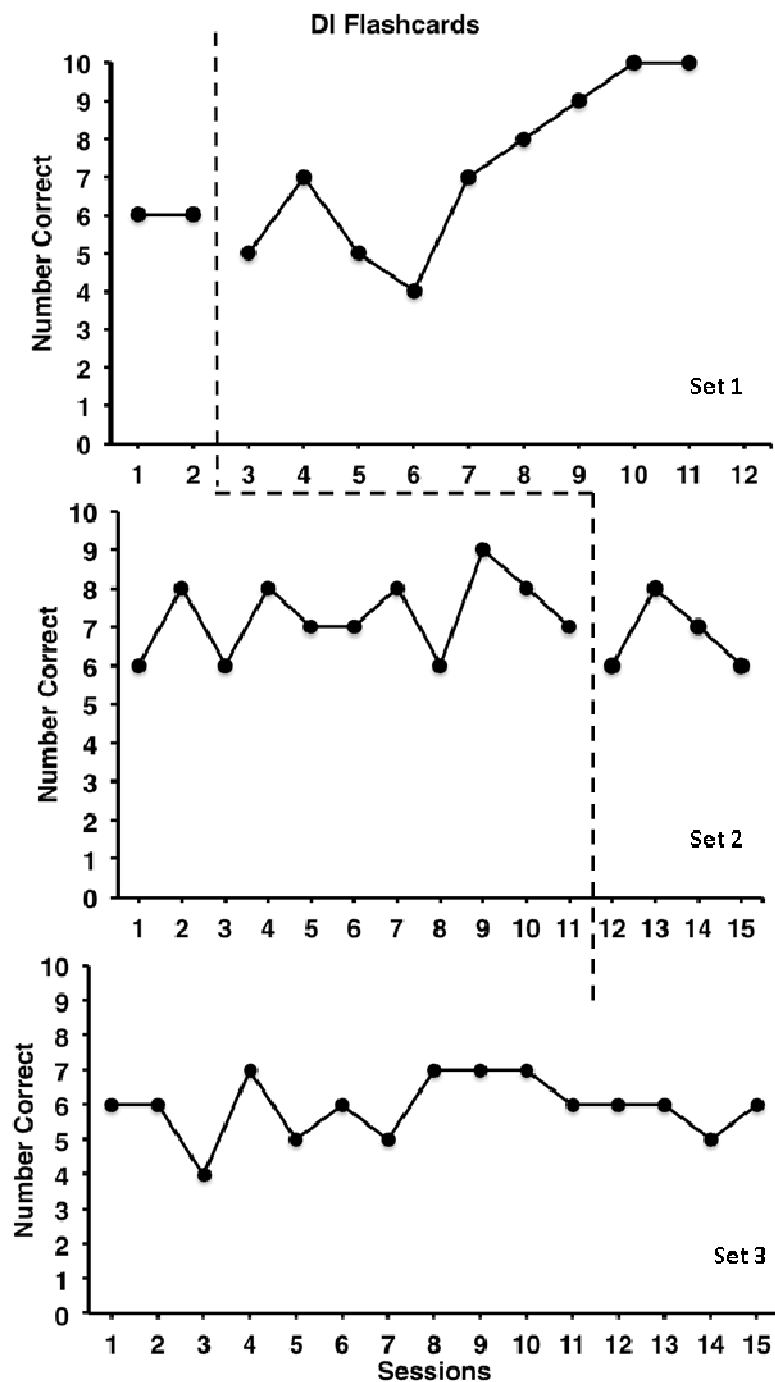


Figure 2.1. The number of correct sight words for Participant 2 with DI flashcards.

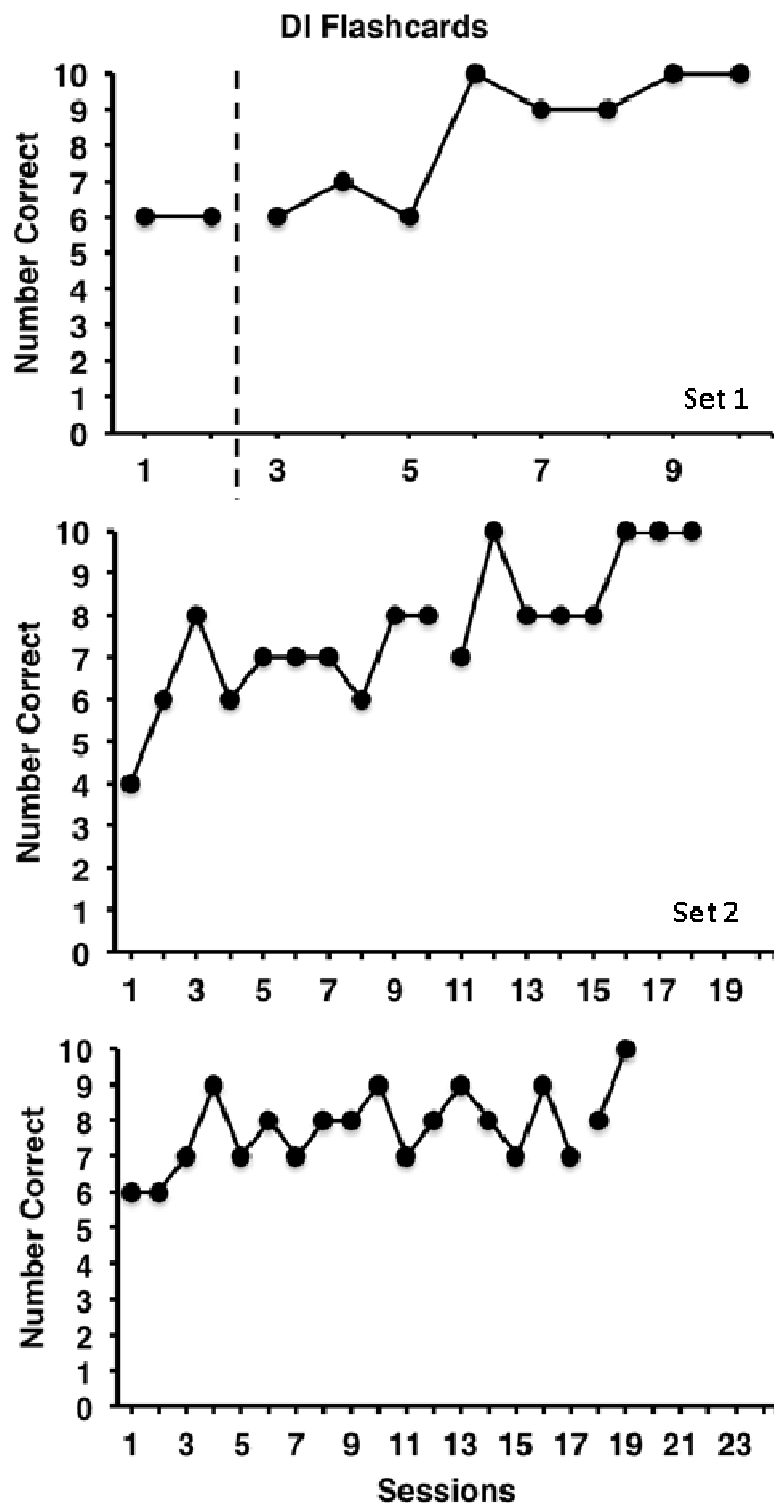




Figure 3.1. The number of correct sight words for Participant 3 with DI flashcards.

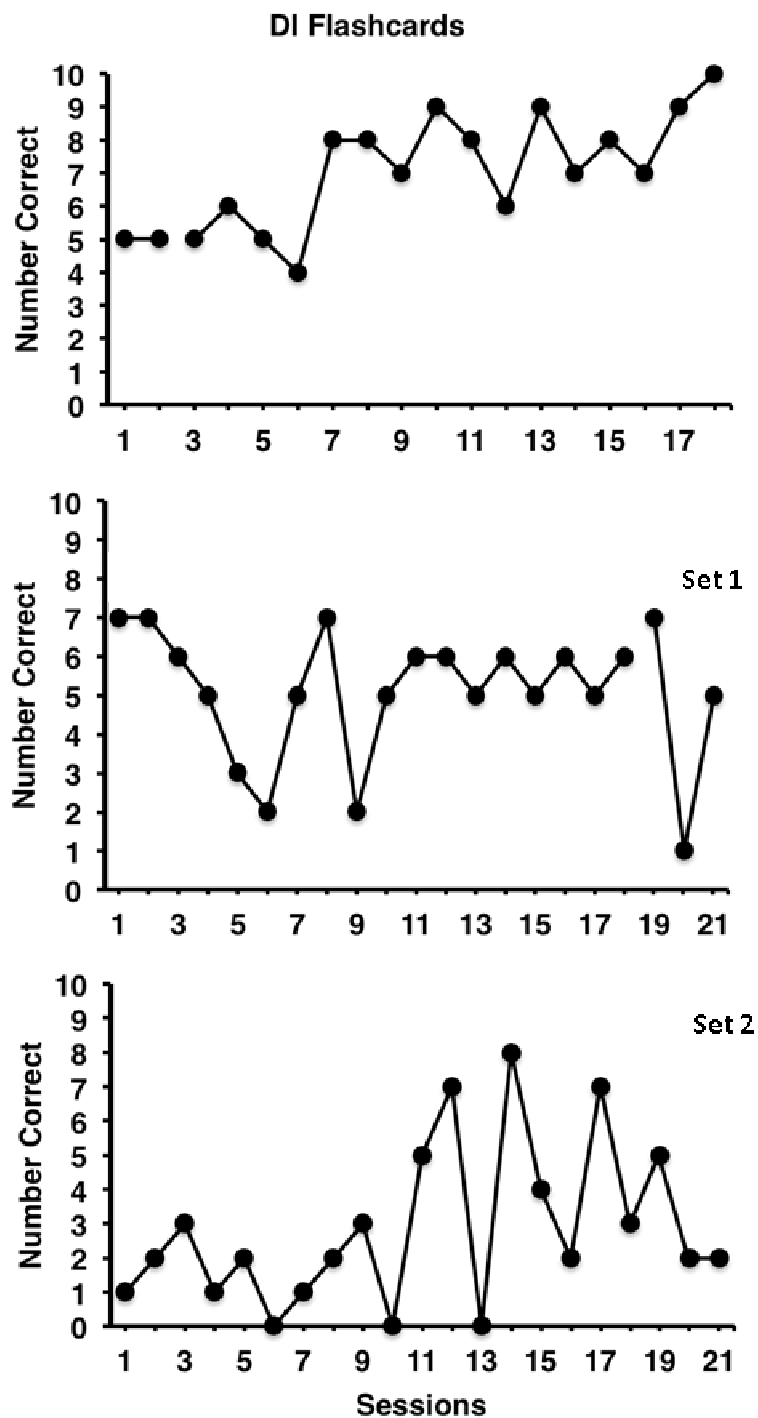


Figure 3.3. The number of correct sight words per minute for Participant 3 from the reading racetrack.

