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The Effects of Reading Racetracks on the Sight Word Recognition of Four Elementary School Students with Learning Difficulties

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Abstract

Many children with different kinds of learning problems struggle with reading. To help them combat their challenges, easy-to-implement interventions are needed. Reading racetracks have proven to be effective tools to increase sight word fluency in students with disabilities. The purpose of this single-case study was to evaluate this technique, for the first time, in a context outside of the United States. Four elementary school children with various learning difficulties received nine to twelve individual intervention sessions from one of two graduate students. The results indicated that reading fluency of 30 common two-syllable German words rose remarkably in all four participants. Even though the treatment was a little less effective for one female student, diagnosed with intellectual/developmental delays, than for the other three students, performance gains were still noteworthy. This study provides further evidence that reading racetracks are an effective practice to build fluency in children with disabilities.

Keywords: Reading Fluency, Learning Problems, Single-Case Study, Reading Racetracks

Introduction

Reading is certainly one of the most important skills a child must acquire during the early years of schooling. It provides the groundwork for a productive life. Research indicates that students who read well have a high probability of achieving success in school and later, in the work force (Aaron, Joshi, & Quatroche, 2008; Slavin, Madden, Dolan, Wasik, Ross, & Smith, 1994). By contrast, those who fail to acquire adequate reading skills face an increased likelihood of dropping out (Hernandez, 2011), unemployment (National Research Council and National Academy of Education, 2011), and overall low income (Snyder, de Brey, & Dillow, 2016).

The ultimate goal of reading is to construct meaning from written content. According to the theory of automatic word processing (LaBerge & Samuels, 1974; Logan, 1988), word recognition automaticity is indispensable for reading fluency, which in turn is a key foundation for text comprehension (Miller & Schwanenflugel, 2006; Paige, 2011). If individuals must invest too much of their cognitive resources in executing their phonological skills and consequently demonstrate slowed oral language processing speed, their opportunities to focus on meaning are highly limited (Ardoin, Morena, Binder, & Foster, 2013; Swain, Leader-Janssen, & Conley, 2013). Thus, to be able to extract meaning from print, one must first acquire the skill of decoding words quickly, accurately, and effortlessly (Lee & Yoon, 2017).

Unfortunately, a great many students do not exhibit adequate phonological competency and sufficient language processing speed. In Germany, where this study took place, 12.5% of children and adolescents do not even meet the minimum standard for reading in terms of grade-level (Stanat, Schipolowski, Rojsk, Weieich, & Haag, 2017). If such problems are not remedied during the first two to three years of elementary education, they usually remain until adulthood (Zentall, 2014). Hence, it is absolutely crucial to offer children who face reading difficulties well-grounded interventions that facilitate their acquisition of adequate fluency skills. This will reduce the cognitive overload that usually impedes their ability to understand a textual message (Vaughn & Bos, 2018).

Among the most common interventions aimed at fostering reading fluency are repeated reading, passage preview, systematic error correction, tutoring, and peer-reading activities (Fuchs & Fuchs, 2005; Lee & Yoon, 2015). All of these approaches are characterized by intense iteration. They include many common elements of effective teaching procedures: modeling, multiple exposures to vocabulary, repeated practice with active student responding, and frequent feedback. According to the comprehensive meta-analysis by Suggate (2016), approaches that focus on children's ability to read accurately and at an appropriate rate yield a medium average effect size (d= 0.47).

When trying to compel students to actively participate in treatments that are easily perceived as monotonous and dull, motivating them to learn presents a great challenge. One promising way to successfully overcome this hurdle is to incorporate a playful dimension into the concept of the training exercise. According to Lämsä, Hämäläinen, Aro, Koskimaa, and Ayram (2018), educational games have the potential to lift the drudgery of drilling the students and can inject an element of fun into otherwise tedious training sessions.

Among the most commonly used alternatives are so-called racetracks (Rinaldi & McLaughlin, 1996; Rinaldi, Sells, & McLaughlin, 1997). A racetrack is a game board, designed to look like a Formula 1 circuit, with a predetermined number of blank cells (see Figure 1). It has mostly been used to teach children math facts (e. g. Lund, McLaughlin, & Neyman, 2012; Skarr, Zielinski, Ruwe, Sharp, Williams, & McLaughlin, 2014), read sight words (e. g. Crowley, McLaughlin, & Kahn, 2013; Davenport, Konrad, & Alber-Morgan, 2018), or spell vocabulary (e. g. Arkoosh, Weber, & McLaughlin, 2009; Verdiun, McLaughlin, & Derby, 2012).

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Table 1. *Study Descriptives for Nine Single-Case Analyses on the Effects of Reading Racetracks*

Authors/years	Design	N	Age	Disability	PND
Alexander, McLaughlin, & Derby (2008)	MBD	4	8-9	MR, FAE, ASD, LD	98.33%
Crowley, McLaughlin, & Kahn (2013)	MBD	2	7	ASD	98.89%
Erbey, McLaughlin, Derby, & Everson (2011)	MBRD	3	7-11	LD, ADHD	83.04%
Green, McLaughlin, Derby, & Lee (2010)	MBRD	2	12	BD, LD, PI	91.67%
Hopewell, McLaughlin & Derby (2011)	MBD	2	7-8	BD	76.67%
Hyde, McLauglin, & Everson (2009)	Reversal	2	5th and 6th grade	LD, MR	100%
Kaufman, McLaughlin, Derby, & Waco (2011)	MBD & Reversal	3	7-9	ADHD, LD	69.45%
Mc Grath, McLaughlin, & Derby (2012)	Reversal	3	7-8	LD; OHI	81.11%
Rinaldi, Sells, & McLaughlin (1997)	MBD	10	8-11	LD, MR, ADHD, FAE, OHI	98.77%

Note. MBD= multiple baseline design; MBRD= multiple baseline reversal design; Reversal= reversal design, PND= percentage of non-overlapping data; MR= mental retardation; FAE= fetal alcohol effects; ASD= autism spectrum disorder; LD= learning disability; ADHD= attention deficit hyperactivity disorder; BD= behavioral disorders; P= orthopedically impaired with severe scoliosis; OHI= Other health impairment

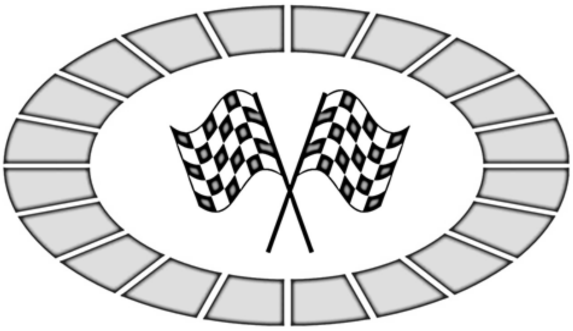

Figure 1. An example of a reading racetrack playing field

When playing a racetrack game with students, a teacher or tutor creates lists with math facts or words, writes them on cards, turns them upside down, and puts one on each cell. The specific math facts or words chosen depend on the individual needs of a particular learner. To play the game, a student rolls a die and moves a matchbox racecar forward, in accordance with the number of eyes on the die (it is irrelevant from which field the students start). When the piece stops on a certain card, the teacher or tutor turns it over. In the case of a reading racetrack, the learner is presented with a word and asked to read it. If she or he struggles, scaffolded assistance and corrective feedback are provided. Subsequently, the card is replaced on the field, front side down, and the game continues (Davenport, Konrad, & Alber-Morgan, 2018; Hopewell, McLaughlin, & Derby, 2011).

A computer-based search in the databases Academic Search Complete, E-Journals, ERIC, PsycINFO, Scopus, and TOC Premier for academic papers containing the words "reading racetracks" in their titles resulted in nine hits. The studies were published between 1997 and 2013 and are listed in Table 1.

All of these publications describe single-case experiments with children with special needs, mostly with learning disabled students. The effects of the intervention are in the medium to large effects size range (with PNDs varying between 69.45 and 100%), which squares with the findings of the aforementioned meta-analysis by Suggate (2016). Although the body of existing publications already seems to provide a solid basis for the consideration of reading racetracks as a well-proven and tested technique for fostering reading fluency among at-risk children, the current state of the art does not meet the necessary requirements. All studies in Table 1 stem from research conducted by Tim F. McLaughlin and his team at Gonzaga University. The Council of Exceptional Children's widely accepted standards, regarding the potential contributions of single-subject analyses to establishing a treatment as evidence-based, stipulate: "... the studies are conducted by at least three different researchers across at least three different geographical locations" (Horner, Carr, Halle, McGee, Odom, & Wolery, 2005, p. 176). Thus, the purpose of this study was to evaluate the effects of a reading racetrack game on the word recognition automaticity of four elementary students with learning problems in an environment different from the one in which previous experiments have been conducted.

Method

Participants and Setting

Four elementary school students participated in this investigation: Amelie, Bianca, Collin, and Dario (all names changed for anonymity). They all attended an inclusive grade school in a little district town in the western part of Germany. None of them had an immigrant background and all four students grew up with German as their mother tongue. To be eligible for the study, the children had to score in the bottom 5% of a standardized reading assessment instrument, the Salzburg Reading and Writing Test (SLRT-II; Moll & Landerl, 2014). Three teachers referred 20 students from grades 2, 3, and 4 to me, because they had the impression that all of them struggled heavily with reading. I conducted the SLRT-II to assess these children and identified the abovementioned learners who – according to the test – were unable to fluently read pseudo and real words alike. Their rank never exceeded the 3rd percentile. All four students recognized every letter of the alphabet and were able to blend them together. However, they did not know many sight words and read extremely slowly.

Amelie was 9 years old and attending fourth grade at the time of the experiment. About two years ago, she was diagnosed with intellectual/developmental delays. According to her main teacher, Amelie became frustrated very easily; it was difficult to motivate her. Bianca was 7 years old and attending second grade when she participated in this study. She was diagnosed with a learning disability and demonstrated signs of a language delay. Bianca had an especially hard time comprehending language. In addition, she had psychomotor problems. According to her main teacher, Bianca enjoyed going to school, despite these challenges. Meeting her friends there was very important to her. Collin was also 7 years old and Bianca's classmate. He was diagnosed with a learning disability, but also exhibited signs of oppositional defiant disorder; he had obvious difficulties with reading, as well as with writing. Dario was also 7 years of age and attending second grade at the time of the experiment (though he was in a different class than Bianca and Collin). He had a learning disability and a speech disorder, particularly evident in the areas of phonology, semantics, and language comprehension. According to his main teacher, Dario's motivation to participate in classroom activities varied very much and he had serious difficulty concentrating.

Materials

Two graduate students created a DIN-A-3 racetrack field that looked similar to the one depicted in Figure 1 and consisted of 30 cells. For each cell, one card was prepared, with one word printed on it. The words were the 30 most commonly used two-syllable words in the German language, taken from a list published by the University of Leipzig (https://wortschatz.uni-leipzig.de/de). In addition, a stop watch and a die were provided. Last, a line diagram was prepared to plot the progress of the participants.

Design and Measures

I applied a multiple baseline design (AB) to evaluate the effectiveness of the intervention The experiment spanned three weeks with five daily measurements per school week. I staggered the starting points of the treatment with baseline probes varying between three and six. The allocation of the participants, to the different constellations, happened by chance to enhance the internal validity of the study. Automaticity is normally associated with and measured by a reader's speed or rate of reading (Paige, Rasinski, Magpuri-Lavell, & Smith, 2014). At the end of each baseline or treatment session, one of the previously mentioned graduate students took the cards from the racetrack game, shuffled them, and presented the participants with one word at a time. If she or he was able to read it, the next card was shown. In case a child made a mistake, she or he was quickly corrected and asked to repeat the word. After 1 minute, one of the university student thanked the participant and escorted her or him back to the classroom.

Procedures

Each of the two college students took one participant out of the classroom during the second period of each day to take her or him to a large resource room of the school, which was equipped with plenty of seats and tables, as well as with a great variety of training programs and learning materials. The college students seated the children as far apart as possible and always tried to keep their voices down to avoid distracting the second participant or any other child working in the room. After 20 minutes, Amelie, Bianca, Collin, and Dario were escorted back to their classrooms. Subsequently, the college students retrieved the other two children, who had stayed with their teachers until that point. Which of the four participants went first and which ones went second, on a given day, varied constantly.

Under baseline conditions, Amelie, Bianca, Collin, and Dario worked on simple math problems for 15 minutes. Afterward, performance probes were administered. During training sessions, the participants were presented with the line diagram showing them how well they had done on previous days. Subsequently, the racetrack game was played. The children rolled the die and moved the matchbox racecar to the respective field. Then, one of the college students picked up the card that the car landed on, turned it over, and asked the participants to read it out loud. In case they made a mistake, they were corrected, and urged to read the word again. As in the case of a baseline session, the lesson ended with a measurement of the children's performance.

Treatment Fidelity and Social Validity

I conducted three 45-minute training sessions to teach the two college students how to effectively deliver the intervention. In addition, I provided them with a 12-item checklist that included all the features that had to be observed while the treatment was undertaken (the list can be obtained from me upon request). During the experiment, the college students stayed in daily contact with me via email to ensure that the study was being conducted as intended. To enhance the social validity of the experiment, I requested the opinions of Amelie, Bianca, Collin, and Dario on the racetrack game, using a feedback sheet depicted in Figure 2. I read the questions to the students and took notes on their answers.

	Yes	A little bit	No
Did you like playing the racetrack game?			
Did the game help you to better read the words on the cards?			
Do you think you can now read better in general?			
Do you like reading now more than before?			
Did you like getting feedback on how well you did?			
Would you like to continue playing the racetrack game?			
Would you recommend the racetrack to other kids?			
Is there anything else you would like to tell me?			

Figure 2. A social validity feedback sheet

Results

All calculations were done using the MultiSCED web application developed by Cools, Declercq, Beretvas, Moeyaert, Ferron, and Van den Noorgate (2018). Figure 3 illustrates the results for the number of words read correctly, within a minute, for each student.

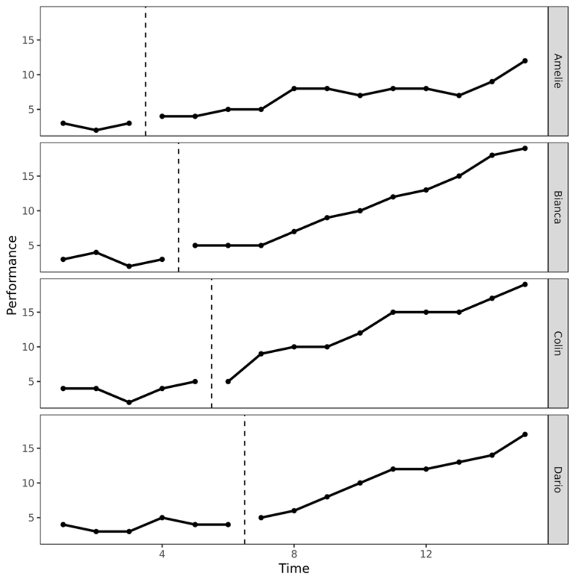

Figure 3. The effects of reading racetracks on the reading fluency of the four participants

Table 2 presents the raw scores of descriptive data across conditions.

All participants demonstrated only very moderate trends under baseline conditions. Their absolute values never exceeded 0.20. Further, the baselines showed rather low variability coefficients (*SD/M* x 100) of 21.72, 27.33, 28.95, and 19.58. At the onset of the intervention, every student improved slowly, but continuously, over time. With one exception (Amelie's seventh intervention probe), no later score fell below a previous one. Although the increased output was evident for all four children, Bianca, Collin, and

Table 2. *Descriptive Scores for Words Read Correctly for Each Participant*

		Baseline	Intervention
Amelie	N (Probes)	3	12
	Raw Scores	3; 2; 3;	4; 4; 5; 5; 8; 8; 7; 8; 8; 7; 9; 12;
	M	2.67	7.08
	SD	0.58	2.31
	Range	2-3	4-12
	Trend	0.00w	0.56
Bianca	N (Probes)	4	11
	Raw Scores	3;4;2;3;	5; 5; 5; 7; 9; 10; 12; 13; 15; 18; 19;
	M	3.00	10.73
	SD	0.82	5.12
	Range	2-4	5-19
	Trend	-0.20	1.52
Collin	N (Probes)	5	10
	Raw Scores	4; 4; 2; 4; 5;	5; 9; 10; 10; 12; 15; 15; 15; 17; 19;
	M	3.80	12.70
	SD	1.10	4.24
	Range	2-5	5-19
	Trend	0.20	1.36
Dario	N (Probes)	6	9
	Raw Scores	4; 3; 3; 5; 4; 4;	5; 6; 8; 10; 12; 12; 13; 14; 17;
	M	3.83	10.78
	SD	0.75	3.90
	Range	3-5	5-17
	Trend	0.14	1.40

Dario clearly demonstrated the most impressive enhancements. Amelie also obviously benefited from the intervention, but her performance curve was not as steep as those of the other three participants.

Table 3 presents the results for some of the most common effect size measures used in single-case research to quantify the magnitude of the improvements: percentage of non-overlapping data (PND), percentage of all non-overlapping data (PAND), improved rate difference (IRD), percentage of data exceeding the median (PEM), percentage of data exceeding the median trend (PEM-T), mean baseline difference (MBD) and (Alresheed, Hott, & Bano, 2013)

Table 3. *Effect Sizes for Words Read Correctly for Each Participant*

	PND	*PAND*	*IRD*	*PEM*	*PEM-T*	*MBD*
Amelie	100	100	1.00	100	100	165.17
Bianca	100	100	1.00	100	100	257.67
Collin	100	93.33	0.90	100	100	234.21
Dario	100	93.33	0.89	100	100	181.46

In all cases, the dimension of the effect sizes was quite impressive, most of the time reaching the maximum value of 100 (or 1.00, respectively). MBD is the only index in Table 2 not quantifying overlap. It represents the percentage of performance increase. As can be seen, Bianca and Collin benefited the most from the intervention, followed by Dario. By contrast, Amelie showed a considerably lower improvement rate, although her mean increase, of about 165%, was still remarkable.

As a supplement, we analyzed the data using inferential statistics. It is becoming a common standard in single-subject research to rely on more than mere visual inspection and effect size measures when drawing inferences from case studies. Multilevel modeling (see Van den Noortgate & Onghena, 2008) was conducted to determine the statistical significance of the intervention effects at the individual level (level 1) and across all four participants (level 2). The level 1 analysis was based on this equation:

$$y_i = \beta_0 + \beta_1 Time_i + \beta_2 Treatment_i + \beta_3 (Treatment \times Time)_i + e_i$$

In it, y_i represents the outcome score (in this case, the number of words read correctly within a minute) at measurement i. It is regressed on an intercept, a time variable ($Time_i$) indicating the session number, and a dummy coded variable ($Treatment_i$) to specify which phase it is referring to ("0" stands for the baseline, "1" stands for the intervention). Because we assumed that the time trend in the treatment is different from the time trend in the baseline, we allowed time and treatment to interact: thus, β_0 represents the estimated outcome score at the first point of the intervention, using the baseline regression line; β_1 represents the trend during baseline; β_2 represents the immediate treatment effect of the intervention on the intercept (level); and β_3 represents the intervention effects on the time trend (slope). Finally, e_i indicates a residual (i.e., the error term). Table 4 depicts the results of the level 1 analysis.

The results displayed in Table 4 indicate that – had the baseline continued – the students would have achieved scores of 2.67 (Amelie), 2.50 (Bianca), 4.40 (Collin), and 4.33 (Dario) at the first measurement of their intervention phase. In addition, the indices suggest that their performance would have increased (or decreased) by 0.00 (Amelie), -0.20 (Bianca), 0.20 (Collin), and 0.14 (Dario) words per minute at each probe. Even though the actual outcome gains were higher than those predicted, there was no sudden boost in words read per minute. The scores increased by 1.32 (Amelie), 0.64 (Bianca), 2.16 (Collin), and 0.84 (Dario), from the last baseline to the first intervention measurement. None of these enhancements were statistically significant. However, the interaction between treatment and time came to fall below a significance level of .01 in three out of four cases. Only Amelia's intervention effect on trend failed to reach statistical significance. That is to say that the slope of the performance curve was meaningfully steeper for Bianca, Collin, and Dario during the treatment than it was during the baseline.

To carry out the level 2 analysis, we aggregated the four single cases into one by allowing the participant-specific coefficients β_0 and β_1 to vary across students (represented by the index "j"), using this equation:

Table 4. *Level 1 Analysis for Each Participant*

	Estimate	*SE*	*t*	*p (one-tailed)*
		Amelie		
Baseline level	2.67	1.74	1.53	.077
Trend level	0.00	0.81	0.00	.500
Immediate treatment effect	1.32	1.85	0.72	.245
Treatment effect on trend	0.56	0.81	0.69	.251
		Bianca		
Baseline level	2.50	1.19	2.10	.030*
Trend level	-0.20	0.44	-0.46	.328
Immediate treatment effect	0.64	1.31	0.48	.319
Treatment effect on trend	1.72	0.45	3.86	.002**
		Collin		
Baseline level	4.40	1.14	3.85	.002**
Trend level	0.20	0.35	0.58	.287
Immediate treatment effect	2.16	1.31	1.65	.064
Treatment effect on trend	1.16	0.37	3.19	.005**
		Dario		
Baseline level	4.33	0.71	6.09	>.001***
Trend level	0.14	0.18	0.78	.226
Immediate treatment effect	0.84	0.85	0.99	.172
Treatment effect on trend	1.26	0.21	6.05	>.001***

* significant at the .05 level, ** significant at the .01 level, *** significant at the .001 level

$$y_{ij}=\beta_{0j}+\beta_{1j}Time_{ij}+\beta_{2j}Treatment_{ij}+\beta_{3j}(Treatment\ x\ Time)_{ij}+e_{ij}$$

$$\begin{cases}\beta_{0j}=\gamma_{00}+\upsilon_{0j}\\ \beta_{1j}=\gamma_{10}+\upsilon_{1j}\\ \beta_{2j}=\gamma_{20}+\upsilon_{2j}\\ \beta_{3j}=\gamma_{30}+\upsilon_{3j}\end{cases}$$

The terms β_{0j}, β_{1j}, β_{2j}, and β_{3j} denote the particular sums of a fixed effect y and a random subject-specific effect υ. Thus, y stands for the overall averages – either for the mean baseline level (y_{00}), the mean trend during baseline (y_{10}), the mean immediate treatment effect of the intervention on the intercept (y_{20}), or the mean intervention effects on the time trend (y_{30}). Table 5 presents the results of the level 2 analysis.

Table 5. *Level 2 Analysis Across All Four Participants*

	Estimate	*SE*	*t*	*p (one-tailed)*
Baseline level	3.44	0.69	5.00	.007**
Trend level	0.02	0.17	0.10	.461
Immediate treatment effect	1.28	0.62	2.06	.038*
Treatment effect on trend	1.19	0.27	4.43	.031*

* significant at the .05 level, ** significant at the .01 level

As the findings indicate, the start of the baseline was significantly different from zero. That said, there was no noteworthy baseline trend. However, other than in the level 1 analysis for the immediate treatment effects, the respective overall averages were ultimately significant. The same was true for the differences in slope between the baseline and intervention phases. Thus, with a probability of error below 5%, the disparities between the gradients of the regression lines in phases A and B cannot be attributed to chance.

Bianca, Collin, and Dario stated that they enjoyed the racetrack game; Amelie liked it a little bit. All participants were under the impression that the training helped them improve at reading the words on the cards and to become better readers in general. However, only Dario remarked that he liked reading now more than he did before. Amelie negated the question; Bianca and Collin stated that they liked reading a little bit better now. Bianca, Collin, and Dario expressly stated that they were fond of the feedback, would be happy to continue with the racetracks, and would recommend the game to other children. Amelie was more critical, indicating that she would neither continue the game, nor suggest it to other students; but she enjoyed receiving the feedback, at least a little bit. None of the participants came up with any remarks that they wanted to add, to supplement what they were asked.

Discussion

This study examined the effects of a reading racetrack game on the word recognition automaticity of four elementary school students with various special needs (learning disabilities, intellectual/developmental delays, speech difficulties, psychomotor problems, oppositional defiant disorders). The results indicated that the treatment can be considered a promising way of supporting learners with diverse challenges to build sight words and improve their reading fluency. All four participants demonstrated remarkable enhancement in their performance. The mean number of words they read during baseline conditions was less than four in every case. As the MBDs indicated, average performance improved by 165.17% for Amelie, 257.67% for Bianca, 234.21% for Collin, and 181.46% for Dario. With the exception of Amelie, the data of all participants demonstrated a slope effect that could not be attributed to coincidence, with an error margin of 1%. However, a level 2 analysis yielded significant trends and slope effects. Overall, the results from the social validity questionnaire reflected a high degree of acceptance of the intervention. Only Amelie commented rather critically on the training. She was the participant with the most severe intellectual limitations and reaped fewer benefits from the treatment than the rest of the group did. There was no way of preventing the children from talking to each other and noticing their improvements, relative to those of the other students. Being the oldest participant and catching on more slowly than the rest of the group was certainly not conducive to making Amelie feel motivated and excited about the intervention.

In any case, overall, the findings of this study were consistent with those from previous studies regarding the effects of reading racetracks on the sight word recognition of students with disabilities (Alexander, McLaughlin, & Derby, 2008; Crowley, McLaughlin, & Kahn, 2013; Erbey, McLaughlin, Derby, & Everson, 2011; Green, McLaughlin, Derby, & Lee, 2010; Hopewell, McLaughlin, & Derby, 2011; Hyde, McLaughlin, & Everson, 2009; Kaufman, McLaughlin, & Derby, 2011; McGrath, McLaughlin, Derby, & Bucknell, 2012; Rinaldi, Sells, & McLaughlin, 1997). It therefore adds to the body of knowledge on this relatively simple and easy-to-implement approach.

However, there were some limitations to this study. First, the number of participants was too small to allow for generalization beyond the context of this experiment. That being said, this single-subject analysis must not be seen in isolation from the already existing empirical basis in support of a causal relationship between racetrack interventions and increased reading performance. One central purpose of this research was to address the Council of Exceptional Children's claim that case studies on a given topic should be conducted in different geographical locations. However, the findings of this experiment must still be regarded as embedded within the wider context of existing investigations. Another limitation pertains to the fact that I did not collect any follow-up data. Upcoming school holidays made it impossible to continue with the performance measurement, although it certainly would have been beneficial to record some information on the stability of the treatment effects. Finally, using the line diagrams as a way to provide transparent feedback surely helped to keep the participants motivated. However, there is no way to determine the extent to which the increases in achievement were due to the racetrack game or due to the provision of graphical information that showed the children how well they did in previous probes.

On the whole, this single-case analysis provides practitioners with additional arguments supporting the use of the intervention on which this experiment focused, to increase sight word fluency among their students with disabilities. I was able to document a study, not conducted by the working group of Tim F. McLaughlin at Gonzaga University, with results comparable to those presented by McLaughlin and his team. Reading racetracks are a very cost-effective treatment that can easily be implemented into the everyday routine at a given school. Moreover, the content of teaching can be adapted to an individual's learning needs, without difficulty, by changing the words on the cards. Reading racetracks are such a simple technique that one does not even need a teacher to make good use of it. Interns, college student apprentices, parents, or even fellow classmates can function as interventionists. It remains to be seen whether reading racetracks will become more popular in schools, as a mode of effectively increasing sight word fluency in struggling learners, especially those with disabilities, who too frequently fail to receive the individualized care and attention they need.

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