

Students with Autism Spectrum Disorder who used Fast ForWord[®] Products Show Improved Language and Listening Skills

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ABSTRACT

Purpose: This study investigated the effects of the Fast ForWord products on the language skills of students with autism spectrum disorder who used the products within a school or clinic setting. **Study Design:** The design of this study was a case study using nationally normed assessments. **Participants:** Study participants were students diagnosed with autism spectrum disorder (ASD). **Materials & Implementation:** Before and after using the Fast ForWord products, students were assessed with the Clinical Evaluation of Language Fundamentals-Third Edition (CELF-3), the Test of Language Development (TOLD), and/or the Goldman-Fristoe-Woodcock Test of Auditory Discrimination (GFW). **Results:** Overall, students with ASD demonstrated significant gains in language ability following use of the Fast ForWord products, with substantial gains observed on both the receptive and expressive portions of the CELF and TOLD. Those students evaluated with the GFW also showed significant improvement in auditory discrimination, with average scores moving from the 6th percentile to the 27th percentile on the Quiet subtest and from the 5th percentile to the 31st percentile on the Noise subtest.

Keywords: observational study, autism spectrum disorder (ASD), Fast ForWord Language, Fast ForWord Language to Reading, Clinical Evaluation of Language Fundamentals-Third Edition (CELF-3), Test of Language Development (TOLD), Goldman-Fristoe-Woodcock Test of Auditory Discrimination (GFW).

INTRODUCTION

University-based research studies have reported the development of a computer software product that provides an optimal learning environment for building the memory, attention, processing and sequencing skills critical for language development and reading success (Merzenich et al., 1996; Tallal et al., 1996). This prototype of the Fast ForWord Language software showed that an optimal learning environment and focus on early reading and cognitive skills resulted in dramatic improvements in the auditory processing and language skills of school children who had specific language impairments (Merzenich et al, 1996; Tallal et al., 1996) or were experiencing academic reading failure (Miller et al., 1999).

Students with autism spectrum disorder (ASD) often struggle with auditory processing issues and delayed language development, but they can respond positively to neuroscience-based

interventions that guides cortical plasticity to change the brain in adaptive ways (Burns, 2003).

Early studies with the ASD population have been promising. In one study, a group of 29 students with ASD¹ improved by approximately one standard deviation in both receptive and expressive language skills, following Fast ForWord use (Merzenich et al., 1999).

The current study sought to replicate these findings with a larger group of students with ASD, and to evaluate outcomes on additional measures. Commercially available computer-based products (Fast ForWord Language and ForWord Language to Reading) were used to

¹ Different diagnostic categories were in use at the time of the Merzenich et al study, and at the time data was collected for the current study. In both of these studies, all participants had diagnoses that would now fall under the category of autism spectrum disorder, as described in the Diagnostic and Statistical Manual, Version 5 (American Psychiatric Association, 2013).

evaluate the effectiveness of an optimal learning environment and focus on early reading and cognitive skills for improving the language skills of students diagnosed with ASD.

METHODS

Participants

One hundred and twenty-eight students with autism spectrum disorder (ASD) had their language abilities evaluated with the Clinical Evaluation of Language Fundamentals-Third Edition (CELF-3) or the Test of Language Development (TOLD). Some of the students also had their auditory processing skills evaluated using the Goldman-Fristoe-Woodcock Test of Auditory Discrimination (GFW). School or clinic personnel administered the assessments and reported scores for analysis.

Implementation

Educators and clinicians were trained in current and established neuroscience findings on how phonemic awareness and the acoustic properties of speech impact rapid development of language and reading skills; the scientific background validating the efficacy of the products; methods for assessment of potential candidates; the

selection of appropriate evaluation measures; effective implementation techniques; approaches for using reports to monitor student performance; and techniques for measuring the gains students have achieved after they have finished using Fast ForWord products.

Materials

The Fast ForWord products are computer-based products that combine an optimal learning environment with a focus on early reading and cognitive skills. Each product includes several exercises designed to build cognitive skills critical for all learning, such as attention and memory. These exercises simultaneously develop academic skills critical for language development and reading, such as English language conventions, phonemic awareness, vocabulary, and comprehension.

Some of the primary skills developed by these products are outlined in Table 1. More detailed descriptions of the exercises and learning modes within each product can be found online at <http://www.scientificlearning.com/exercises>.

Primary Skills	Listening Accuracy & Auditory Sequencing	Auditory Word Recognition	English Language Conventions	Following Directions	Listening Comprehension	Phonological Skills / Phonemic Awareness	Phonics / Word Analysis	Vocabulary
Product Name								
Fast ForWord Language	•	•	•	•		•		•
Fast ForWord Language to Reading	•		•	•	•	•	•	•

Table 1: The Fast ForWord products work on numerous cognitive and early reading skills. The primary skills focused on by each product are noted in the table.

Assessments

Before and after Fast ForWord participation, students were assessed with the Clinical Evaluation of Language Fundamentals-Third Edition (CELF-3), the Test of Language Development (TOLD), and/or the Goldman-Fristoe-Woodcock Test of Auditory Discrimination (GFW).

Clinical Evaluation of Language Fundamentals-Third Edition (CELF-3):

The CELF-3 is a comprehensive language test widely used to measure a child’s ability to understand words and sentences, follow directions, recall and formulate sentences, and understand relationships between words.

Test of Language Development (TOLD):

The TOLD is a comprehensive test of children’s language skills, including listening, organizing, speaking, semantics, and syntax.

Goldman-Fristoe-Woodcock Test of Auditory Discrimination (GFW): The GFW is a screening measure of speech sound discrimination ability in quiet and noisy situations. The student listens to words recorded with or without background noise and identified each word by pointing to a picture. Similar sounding words such as lake, make, rake, and wake are presented as foils.

Analysis

Scores were reported in terms of standard scores for the Clinical Evaluation of Language Fundamentals-Third Edition (CELF-3), the Test of Language Development (TOLD), and/or the Goldman-Fristoe-Woodcock Test of Auditory Discrimination (GFW). Age equivalents were also reported for the CELF-3 and the TOLD. Standard scores were analyzed using a p-value of less than 0.05 as the criterion for identifying statistical significance.

RESULTS

Assessment Results

The language skills of 128 students with ASD were evaluated using the CELF-3 or the TOLD. After using the Fast ForWord products, the students demonstrated significant improvements in their overall language skills, gaining an average of 0.8 standard deviations, as shown in Figure 1.

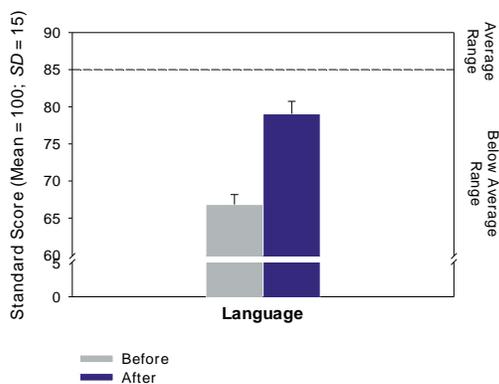


Figure 1. Students with ASD significantly improved their language skills after Fast ForWord use. Results from 128 students are shown.

On average, the students overall language scores moved from the 1st to the 7th percentile.

In addition, the 94 students who had subscale scores for expressive and receptive language demonstrated significant improvements on both subscales. As shown in Figure 2, average scores in receptive language improved by 1.0 standard deviation, moving from the 1st to the 10th percentile. Average scores in expressive language improved by 0.7 standard deviations, moving from the 1st to the 5th percentile.

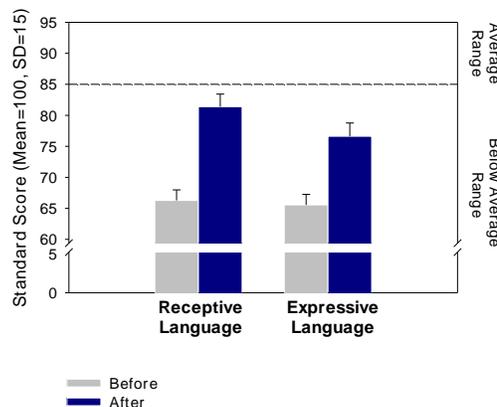


Figure 2. Students with ASD improved in both expressive and receptive language. Results from 94 students are shown

The auditory discrimination skills of 47 students with ASD were evaluated with the GFW. After using the Fast ForWord products, the students demonstrated significant auditory discrimination gains, as shown in Figure 3.

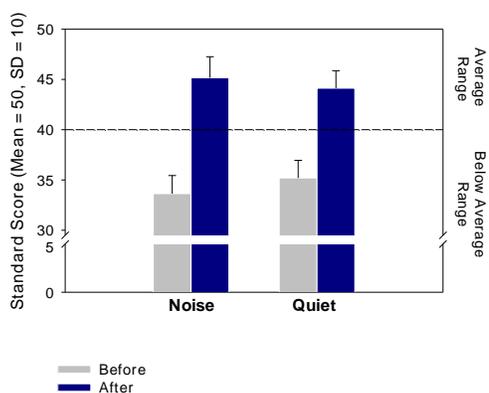


Figure 3. Following Fast ForWord participation, students with ASD reached the average range of auditory discrimination in both noisy and quiet settings. Results from 47 students are shown.

Group averages on both subtests moved from below the average range to within the average range. On the Noise subtest, the students improved by an average of 1.2 standard deviations, moving from the 5th to the 31st percentile. On the Quiet subtest, they improved by 0.9 standard deviations, moving from the 6th to the 27th percentile.

CONCLUSION

Language and listening skills are critical for all students, impacting their ability to benefit from instruction, follow directions, participate in class discussions, and develop into productive members of society. Strong language skills also provide a critical foundation for literacy.

The results found in this study are consistent with those reported by Merzenich et al (1999). Collectively, these findings demonstrate that the optimal learning environment provided by the Fast ForWord products can help students with autism spectrum disorder to improve their language and listening skills.

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Note: The study reported here was one of two studies originally reported in a 2007 publication. The two were combined on the basis of a shared diagnostic category that is now obsolete. To reflect current diagnostic categories and terminology, the studies have been separated into two updated reports.

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Scientific Learning Corporation. (2007). Improved Language Skills by Students with Developmental Delays who used Fast ForWord® Products, MAPS for Learning: Educator Reports, 11(12): 1-5.

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