

Improved Reading Skills by Students in the Dallas Independent School District who used Fast ForWord® Products

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ABSTRACT

Purpose: This study investigated the effects of the Fast ForWord products on the reading skills of middle and high school students who used the products within the curriculum in a school setting. **Study Design:** The design of this study was a multiple school case study using nationally normed tests. **Participants:** Study participants were seventh through twelfth grade students attending middle and high schools in the Dallas Independent School District of Dallas, Texas. **Methods & Implementation:** Before and after participation on the Fast ForWord products, students were evaluated with the Gates-MacGinitie Reading Tests (GMRT). **Results:** Students made significant advancements in their achievement level. The greatest improvements were associated with students who completed most of the content. Average improvement for reading comprehension ranged from 12 months (for students who completed at least 65% of Fast ForWord Middle & High School) to 21 months (for students who also completed at least 65% of a Fast ForWord to Reading product.) Students receiving Special Education services, English Language Learners and General Education students all improved significantly.

Keywords: Texas, middle school, high school, urban, observational study, Fast ForWord Middle & High School, Fast ForWord Language to Reading, Fast ForWord to Reading 1, Fast ForWord to Reading 2, Fast ForWord to Reading 3, Fast ForWord to Reading 4, Gates-MacGinitie Reading Tests (GMRT).

INTRODUCTION

Numerous research studies have shown that cognitive and oral language skills are under-developed in struggling readers, limiting their academic progress (Lyon, 1996). University-based research studies reported the development of a computer software product that focused on learning and cognitive skills, and provided an optimal learning environment for building the memory, attention, processing and sequencing skills critical for 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).

The Dallas Independent School District has used an optimal learning environment with a focus on early reading and cognitive skills with a variety of students at a variety of schools, and has found that a wide range of students can be impacted by it. During the 2005 – 2006 school year, Dallas ISD was interested in continuing their evaluation of its effectiveness. They

were particularly interested in the effects on students who initially built their foundational skills in a language environment, and then continued to build them in a reading environment – especially an environment that emphasized comprehension. Therefore, this study will focus on students who completed a minimal amount of content in a language environment, and will also focus on students who completed a minimal amount of content in both a language and a reading environment.

For this study, commercially available computer-based products (Fast ForWord Middle & High School, Fast ForWord Language to Reading, Fast ForWord to Reading 1, Fast ForWord to Reading 2, Fast ForWord to Reading 3, Fast ForWord to Reading 4) were used. Fast ForWord Middle & High School and Fast ForWord Language to Reading build skills within a language environment while the Fast ForWord to Reading products build skills within a reading environment. The long-term target of the District's implementation is to improve students' achievement and reading skills across the student population. This led to the particular interest in examining impact on students who only used language products and on students who used both language and reading products.

METHODS

Participants

Dallas is the third largest city in Texas and the ninth largest in the nation. The population of approximately 1,200,000 is 51% Caucasian, 36% Hispanic and 26% African-American. Dallas is considered to be among the 100 most diverse communities in the nation.

During the 2005 – 2006 school year, the Dallas Independent School District spanned 351 square miles and 11 municipalities. More than 161,000 students were enrolled in its 217 schools. The student population was 63% Hispanic and 31% African-American. Students in the district came from homes where more than 70 different languages were spoken.

This report focuses on the 553 students from 18 middle and high schools in the Dallas ISD who used Fast ForWord products during the 2005 – 2006 school year and had test scores available from two or more test administrations. Students were evaluated with the Gates-MacGinitie Reading Tests (GMRT) before and after Fast ForWord participation. School personnel administered the assessment and reported scores for analysis.

Materials

The Fast ForWord products are computer-based products that combine an optimal learning environment with a focus on early reading and cognitive skills. The products used in this study, Fast ForWord Middle & High School, Fast ForWord Language to Reading, Fast ForWord to Reading 1, Fast ForWord to Reading 2, Fast ForWord to Reading 3, and Fast ForWord to Reading 4 include five to six exercises per product designed to build skills critical for reading and learning, such as auditory processing, memory, attention, and language comprehension. While there are differences between the products, all help develop certain critical skills as detailed in the following exercise descriptions.

Sweeps¹ and Trog Walkers²: Students hear a series of short, non-verbal tones. Each tone represents a different fragment of the frequency spectrum used in spoken language. Students are asked to differentiate between these tones. The exercises improve working memory, sound processing speed, and sequencing skills.

Streams¹: Students hear a single syllable that is repeated several times, and then interrupted by a different syllable. Students must respond when they hear a change in the syllable. This exercise improves auditory processing, develops phoneme discrimination, and increases sustained and focused attention.

IDs¹, Polar Cop², and Treasure in the Tomb²: Students hear a target phoneme, and then must identify the identical phoneme when it is presented later. These exercises improve auditory discrimination skills, increase sound processing speed, improve working memory, and help students identify a specific phoneme. *Polar Cop* also develops sound-letter correspondence skills. *Treasure in the Tomb* also develops grapheme recognition.

Matches¹ and Bug Out²: Students choose a square on a grid and hear a sound or word. Each sound or word has a match somewhere within the grid. The goal is to find each square's match and clear the grid. The *Phonic Match* exercise develops auditory word recognition and phoneme discrimination, improves working memory, and increases sound processing speed. The *Bug Out!* exercise develops skill with sound-letter correspondences as well as working memory.

Cards¹: Students see two pictures representing words that differ only by the initial or final consonant (e.g., “face” versus “vase”, or “tack” versus “tag”). When students hear one of the words, they must click the picture that matches the word. This exercise increases sound processing speed, improves auditory recognition of phonemes and words, and helps students gain an understanding of word meaning.

Stories¹ and Start-Up Stories²: Students follow increasingly complex commands, match pictures to sentences, and answer multiple-choice questions about stories that are presented aurally.

Bear Bags³ and Bear Bags: More Lunch⁴: In these exercises, the participant is asked to help Mama Bear sort words (on pieces of toast) into phoneme-based categories (in lunch bags). They develop phonemic awareness and decoding of single-syllable words. *Bear Bags* also develops understanding of alphabetic principles (phonics) and *Bear Bags: More Lunch* also develops grapheme/phoneme associations.

¹ Exercise from the Fast ForWord Middle & High School product.

² Exercise from the Fast ForWord Language to Reading product.

³ Exercise from the Fast ForWord to Reading 1 product.

⁴ Exercise from the Fast ForWord to Reading 2 product.

⁵ Exercise from the Fast ForWord to Reading 3 product

⁶ Exercise from the Fast ForWord to Reading 4 product

*Magic Rabbit*³ and *Magic Bird*⁴: These exercises combine spelling and word-building practice with spelling patterns and word families commonly studied in 1st grade for *Magic Rabbit* and in 2nd grade for *Magic Bird*. The task is designed to emphasize the relationships between words by showing how one word can be turned into another by simply changing a single letter in any position. Using a click and drag interface, the participant must either select the missing letter to complete a partially spelled word or rearrange scrambled letter tiles to spell a word. These exercises develop spelling and sensitivity to letter-sound correspondences.

*Flying Fish*³ and *Fish Frenzy*⁴: In these exercises, a fishing pelican pronounces a word. Then a series of spoken and/or written words (on fish) fly across the pond and the participant clicks on the word when it matches the pronounced word. These exercises develop decoding skills, identification of sight words, and auditory memory.

*Quail Mail*³: In *Quail Mail*, a squirrel mail carrier pulls words out of a mailbag and the participant sorts them into different categories by clicking on the appropriate mailbox. This exercise encourages flexibility during reading and automatic access to the various dimensions of vocabulary.

*Bedtime Beasties*³ and *Leaping Lizards*⁴: These exercises use the “cloze task,” in which a written and aurally presented sentence has a word missing. The participant must select the correct word to complete the sentence from four choices. Vocabulary skills and sentence comprehension are developed in these exercises.

*Buzz Fly*³ and *Dog Bone*⁴: In these exercises, the participant listens to a passage and answers comprehension questions relating to each passage. The questions are aurally presented and written, and the response choices are presented as pictures. Responses are presented as words or short phrases in *Dog Bone*. These exercises develop listening comprehension and working memory skills as measured by performance on multiple choice questions.

*Ant Antics*⁴: The participant will be presented with a picture and then asked to pick one of the four alternatives that best describes an aspect of that picture. This exercise improves vocabulary skills and sentence comprehension.

*Scrap Cat*⁴: In *Scrap Cat*, a series of words is visually presented and participants are asked to sort each word into the correct semantic, phonological, syntactic, or morphological category. For this exercise only, the

participant can click a button to hear any word and see it defined. This exercise develops decoding, vocabulary, and word recognition skills.

*Canine Crew*⁵: In *Canine Crew* multiple words are presented together in a grid and participants are asked to find pairs that match on the basis of the current criterion. This criterion shifts from words that rhyme, to synonyms, to antonyms, to homophones, as the participant progresses. This exercise develops vocabulary, decoding, and automatic word recognition.

*Chicken Dog*⁵: Participants hear a word and see it partially spelled. They must complete the word by filling in the missing letter or letter group. Five options are always provided, including options that represent common visual and phonological errors. This exercise develops basic spelling patterns, letter-sound correspondences, and decoding.

*Twisted Pictures*⁵: Participants are presented with a variety of pictures and asked to select the sentence that most accurately describes each picture from among four alternatives. The descriptive sentences incorporate a wide range of syntactic structures. As the participant progresses, the sentences get longer and more difficult vocabulary is included. This exercise builds sentence comprehension by developing syntax, working memory, logical reasoning, and vocabulary.

*Book Monkeys*⁵: Participants read narrative and expository passages and answer comprehension questions about each passage. The multiple-choice questions demand that the participant use memory for literal detail, generation of inferences, or grasp of among four alternatives. This task develops paragraph comprehension, inferential and cause-and-effect reasoning, working memory, flexible reading, and vocabulary.

*Hog Hat Zone*⁵: In *Hog Hat Zone*, short passages from classic children’s literature are presented, with occasional gaps in the text where words are missing. Participants are asked to fill in each gap with the correct word from among four alternatives. The missing words are morphologically important items such as pronouns, auxiliary verbs, and words with suffixes and prefixes. This task develops paragraph comprehension, complex morphology, flexible reading, and vocabulary.

*Hoof Beat*⁶: The participant is presented with a question and four possible answers. The participant must choose the most appropriate answer. The questions relate to semantics, phonology, morphology, orthography, and syntax. The exercise encourages

flexibility during reading and automatic access to the various dimensions of vocabulary and is designed to build vocabulary by showing the participant how words function.

*Jitterbug Jukebox*⁶: The participant hears a word spoken aloud and letters appear on the keys of a jukebox. The participant must spell the word by clicking on the jukebox keys. Jitterbug Jukebox helps participants improve spelling and sensitivity to letter-sound correspondences. This exercise includes many of the 500 most commonly used words in written English including most word families found in 3rd and 4th grade content standards.

*Goat Quotes*⁶: In *Goat Quotes* four newspapers paraphrase a headline at the top of a news kiosk. The participant must select the correct paraphrase. The exercise is designed to sample the basic syntactic (i.e., grammatical) structures of spoken English generally mastered in the early elementary grades. The exercise develops logical thinking and working memory skills as well careful reading.

*Book Monkeys: Book Two*⁶: Participant reads a passage, chart, or schedule and then answers questions related to the material. This exercise develops a participants' ability to read for literal meaning, cause-and-effect relationships, and inferential comprehension. It also develops a participant's working memory as well as vocabulary skills, which are crucial for flexible, fluent reading.

*Stinky Bill's Billboard*⁶: Participants must select the word that accurately completes a sentence. In this exercise, participants improve sentence comprehension while practicing the decoding of words in realistic contexts. This exercise also helps build vocabulary and awareness of word structure.

*Lulu's Laundry Line*⁶: Short passages are presented with occasional gaps where punctuation is missing. The participant must read the words and understand the passage in order to determine the correct punctuation. The exercise develops punctuation skills as well as automaticity for decoding and sentence comprehension.

Implementation

Educators 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 for participation; the selection of appropriate measures for testing and evaluation;

effective implementation techniques; approaches for using Progress Tracker reports to monitor student performance; and techniques for measuring the gains students have achieved after they have finished using Fast ForWord products.

Students started on the Language products (Fast ForWord Middle & High School followed by Fast ForWord Language to Reading). Following completion of Fast ForWord Language to Reading, many students progressed to the Fast ForWord to Reading products. Teachers used the most current scores on the Gates-MacGinitie Reading Tests to assign students to the appropriate Reading product. Students reading below a third grade level were assigned to Fast ForWord to Reading 1, while students reading above a third grade level were assigned to Fast ForWord to Reading 3.

Assessments

Before Fast ForWord participation, students were evaluated with the Gates-MacGinitie Reading Tests. For most students, this occurred in the fall of 2005; some schools first administered the test in early 2006. Toward the end of Fast ForWord participation, students were given a posttest.

Gates-MacGinitie Reading Tests (GMRT): The Gates-MacGinitie Reading Tests are used to assess a student's decoding, vocabulary, and passage comprehension skills. The assessment has two components, independently evaluating reading vocabulary and comprehension.

In the Vocabulary subtest, the student selects the proper meaning of a written word. In the Comprehension subtest, the student must read passages of progressively increasing difficulty. This subtest measures a student's understanding of complex written material.

Analysis

Scores were reported in terms of raw scores, grade equivalents and normal curve equivalents (NCE). NCEs are the most appropriate units to use for statistical analyses; grade equivalents are useful for descriptive purposes. Scores were analyzed using a repeated measures multivariate analysis of variance (MANOVA) and paired t tests. All analyses used a p-value of less than 0.05 as the criterion for identifying statistical significance.

RESULTS

Participation Level

Research conducted by Scientific Learning shows a relationship between product use and the benefits of the product. Product use is composed of content completed, days of use, and adherence to the chosen protocol (participation level and attendance level). During the 2005 – 2006 school year, the Dallas Independent School District chose to use the 48-

minute Fast ForWord Middle & High School protocol, the 50-minute Fast ForWord Language to Reading protocol, and the 48-minute Fast ForWord to Reading 1, Fast ForWord to Reading 2, Fast ForWord to Reading 3 and Fast ForWord to Reading 4 protocols. These protocols call for students to use the products for 48 or 50 minutes a day, five days per week for

eight to twelve weeks. Almost all students started with the Fast ForWord Middle & High School product and most went on to use the Fast ForWord Language to Reading product. Detailed product use is shown in Table 1.

	Number of Students	Days Participated	Number of Calendar Days	Percent Complete	Participation Level	Attendance Level
Fast ForWord Middle & High School	513	40	100	64%	82%	57%
Fast ForWord Language to Reading	347	37	86	58%	85%	61%
Fast ForWord to Reading 1	52	17	33	57%	86%	72%
Fast ForWord to Reading 2	68	24	49	56%	89%	68%
Fast ForWord to Reading 3	111	29	56	49%	78%	69%
Fast ForWord to Reading 4	36	22	41	52%	78%	73%
Total Product Use	553	72	170	59%	83%	61%

Table 1. Usage data showing the number of students who used each Fast ForWord product along with group averages for the number of days participated, the number of calendar days between start and finish, the percentage of product completed, the participation level and the attendance level. Note: Most students used multiple products.

Assessment Results

Gates-MacGintie Reading Tests (GMRT): Four hundred forty-three students had both Vocabulary and Comprehension subtest scores available for analysis. A MANOVA was performed to analyze the results. Significant main effects of test and of time were present, along with a significant test by time interaction. These results indicate that significant improvements were made overall and that there was a significant difference between the two subtests (Table 2). Post-hoc t tests revealed that students made significant gains on the Comprehension subtest, with average scores increasing from 21 to 24 (Table 3). Because of the difference between the two tests, and the number of students who had results from only one test, further analyses were performed individually on the Vocabulary and Comprehension scores.

MANOVA	F
Test	19.93*
Time	6.78*
Test * Time	5.74*

Table 2. Comprehension results were significantly different than Vocabulary results. * $p < 0.05$

Of particular interest were the students who had successfully used the products between the two assessments – those who had completed at least 65% of the content. There were 219 students with results from Vocabulary tests and 275 students with results from Comprehension tests who had also completed at least 65% of the content on Fast ForWord Middle & High School (Table 4). A small portion of them had also completed at least 65% on a Fast ForWord to Reading product. These results included 23 students with Vocabulary tests and 55 with Comprehension tests (Table 5).

	n	Before		After		t-statistic
		Mean	SE	Mean	SE	
Vocabulary	443	19.6	.71	20.2	.72	1.6
Comprehension	443	20.9	.80	23.6	.78	7.1*

Table 3. Students who had both Vocabulary and Comprehension scores available for analysis made significant gains on the Comprehension subtest. * $p < 0.05$

	n	Before		After		t-statistic
		Mean	SE	Mean	SE	
Vocabulary	219	22.4	1.0	23.9	1.1	-.96
Comprehension	275	20.0	1.1	27.5	1.0	-3.17*

Table 4. Students who completed at least 65% of the Fast ForWord Middle & High School product made significant gains in comprehension. * $p < 0.05$

	n	Before		After		t-statistic
		Mean	SE	Mean	SE	
Vocabulary	23	24.9	3.4	28.0	3.1	-1.8
Comprehension	55	16.1	2.0	28.5	2.2	-6.2*

Table 5. Students who completed at least 65% of the Fast ForWord Middle & High School product AND 65% of a reading product made significant gains on the Comprehension subtest. * $p < 0.05$

Grade equivalents were reported along with NCE's and are useful for descriptive purposes. Students in this study were performing well below grade level and were struggling to achieve in the areas of reading and reading comprehension. In the five months, on average, between pretest and posttest administration, students who completed at least 65% of the Fast ForWord Middle & High School content improved

their comprehension by an average of twelve months (Table 4, Figure 1); students who also completed 65% of one of the reading products improved their comprehension by an average of twenty-one months in the average time of six months between test dates. (Table 5, Figure 2). Given the typically slow advancement of the students in this study, this improvement is outstanding.

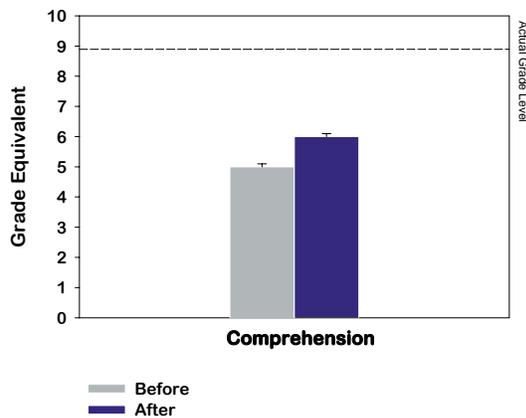


Figure 1. Students who completed at least 65% of the Fast ForWord Middle & High School product content made significant gains in comprehension, with skills improving by twelve months in five months time. Results from 275 students are shown.

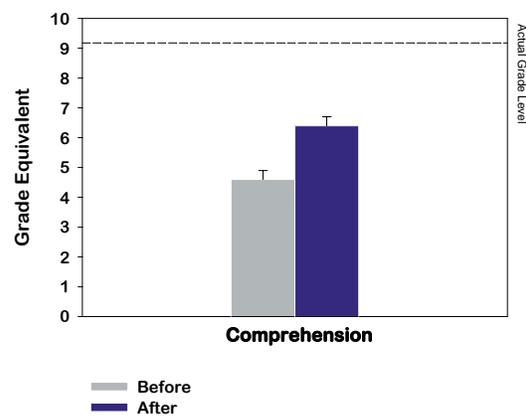


Figure 2. Fifty-five students completed 65% of Fast ForWord Middle & High School and 65% of a reading product. The students gained twenty-one months in comprehension skills in six months time.

There is particular interest in the students who had progressed through Fast ForWord to Reading 4. Of the students who completed at least 65% of Fast ForWord Middle & High School, a small group of ten students also completed 65% of the Fast ForWord to Reading 4 product. Because of the small number of students, caution must be taken in generalizing the results to the entire population. Table 6 shows that the Comprehension gains achieved by these students were quite impressive with the group moving from the 20th percentile to the 45th percentile.

	n	Before		After	
		Mean	SE	Mean	SE
Vocabulary	5	40.4	6.9	41.0	7.2
Comprehension	10	32.1	19.1	46.9	3.5

Table 6. Results from a small group of students who completed at least 65% of Fast ForWord Middle & High School AND Fast ForWord to Reading 4.

Educational demographic information was reported for 470 of the students with Comprehension scores. Students were identified as receiving services for Special Education, English Language Learners, or General Education students. Two hundred fifty-seven of these students completed at least 65% of the Fast

ForWord Middle & High School product. On average, students in these three groups were eighth graders with the average enrollment ranging from the last quarter of 8th grade (for English Language Learners and students receiving services for Special Education) to the start of 9th grade (for students in the

general education track.) Students in all groups made significant improvements in reading comprehension. Special Education students improved from a score of 14 to 20, a gain of almost 11 months. English Language Learners achieved a gain of 14 months, with scores advancing from 23 to 32. Students in General Education also gained more than 12 months in comprehension skills, with scores improving from 27 to 35 (Table 7, Figure 3).

Thirty-eight students receiving Special Education services completed at least 65% of the Fast ForWord Middle & High School product as well as at least 65% of a reading product. Comprehension scores for these students improved significantly, from 18 to 27, an impressive gain of more than 15 months (Table 8).

	n	Before		After		t-statistic
		Mean	SE	Mean	SE	
Special Education	117	13.6	1.2	20.4	1.4	-4.9*
English Language Learners	45	22.9	1.9	31.9	1.9	-5.0*
General Education	95	27.4	2.1	35.3	1.6	-3.4*

Table 7. Students from different demographic groups who completed at least 65% of the content on a language product made significant gains on the Comprehension subtest. * $p < 0.05$

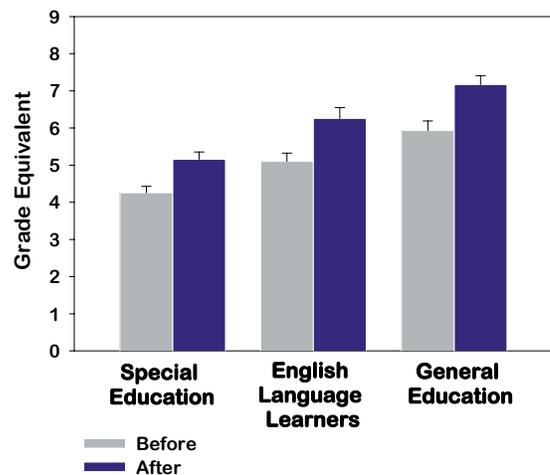


Figure 3. Students from three demographic groups made significant gains on the Comprehension subtest following completion of at least 65% of the content in Fast ForWord Middle & High School.

	n	Before		After		t-statistic
		Mean	SE	Mean	SE	
Comprehension	38	18.2	2.7	27.5	02.6	-4.1

Table 8. Significant gains were achieved by students who were receiving services for Special Education and who completed at least 65% of the content in both a language product and a reading product.

DISCUSSION

During the 2005 – 2006 school year, middle and high school students in the Dallas Independent School District used the Fast ForWord products. Students who completed at least 65% of the content in a language environment made significant gains in reading comprehension, improving grade equivalent scores by an average of 12 months in the five months between pre and posttests. Additional completion of at least 65% of the content in a reading environment resulted in even greater improvements, with gains reaching twenty-one months in an average of six months time between assessments. For this population of underachieving students, these results represent substantial gains. Most of them were more than three years behind grade level and had not been improving skills by 12 months each year. These findings demonstrate that, within the Dallas Independent School District, an optimal learning

environment coupled with a focus on cognitive and early reading skills can help struggling students attain a higher level of reading achievement.

CONCLUSION

Language and reading skills are critical for all students, impacting their ability to benefit from instruction, follow instructions, and participate in class discussions. Strong linguistic skills also provide a critical foundation for building reading and writing skills. After Fast ForWord use, students in the Dallas Independent School District made significant gains in their reading skills, improving by as much as 21 months in comprehension skills. General Education students and those students receiving Special Education services achieved significant gains on a follow-up test administered at the end of the school year. The results suggest that using the Fast ForWord products strengthened the students' foundational

skills and helped them benefit more from the classroom curriculum

Notes:

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