

## Research Article

# Performance of Schools with Disorder of Deficit of Attention with Hyperactivity in Reading Processes: Case Study

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**Abstract**

**Objective:** The objective of this study is to present the performance of students with Attention Deficit Hyperactivity Disorder in the Reading processes through the presentation of five cases.

**Method:** Five male students with Attention Deficit Disorder and Hyperactivity participated in this study, with an average age of 9 years and 7 months of age, from the third to the fifth year of elementary school in a city in the interior of São Paulo. All students were submitted to the application of the Assessment of Reading Processes - PROLEC.

**Results:** Students with Attention Deficit Disorder with Hyperactivity performed poorly in the Reading Pseudowords, Grammatical Structures and Text Comprehension tests.

**Conclusion:** The students with Attention Deficit Hyperactivity Disorder in the present study performed below the expected in tests that measure performance in lexical process, semantic process and syntactic process, showing that, the attentional factor when altered, can impair the development of reading processes.

**INTRODUCTION**

Attention Deficit Hyperactivity Disorder (ADHD) is a clinical entity that, despite being an extremely current topic in the scientific community, has, in the literature, reported cases whose diagnoses were introduced since 1854, according to reports by the German physician Heinrich Hoffmann [1]. Currently, ADHD is considered the most common neuropsychiatric disorder in childhood and is included among the most prevalent chronic diseases among schoolchildren. In unreported samples, it is estimated that 3% to 6% of school-age children have ADHD [2].

ADHD refers to a neurobiological dysfunction, which manifests itself as a result of genetic factors, but with important environmental influences. It is characterized by attention deficit, hyperactivity, and impulsivity. Clinical manifestations can appear in the combined form of symptoms; in the way that attention deficit predominates; or in which hyperactivity-impulsivity predominates [3].

Students with ADHD have changes in the set of executive functions and include goal setting, programming, initiation, control, interference inhibition, fluency, speed, temporal organization, sequencing, comparison, classification, and

categorization, which are associated with the systems cortical and subcortical frontal lobes [4-6].

Due to these changes, these students have difficulty in learning metalinguistic skills and phonological aspects of language, compromising later acquisitions, such as the acquisition of reading and writing, which results in later learning difficulties [7,8].

In order to carry out activities such as reading isolated words or text, refined visual processing of the graphic signs is necessary to carry out a textual scan to identify the constituent parts of the word, and it is necessary to consider that this visual processing is related to the linguistic processing of reading, which performs the word identification through the phonological decoding process. Such a process allows the conversion of graphic signs into phonological representations. Children who have attentional or information processing failures will find it difficult to trigger refined visual processing, which will compromise the phonological access required for reading and writing an alphabetical system [9,10].

Thus, this study was carried out based on the hypothesis that students with ADHD may present impaired performance

in decoding skills at the level of words, phrases, text, thus compromising the ability to understand the reading.

## OBJECTIVE

The objective of this study is to present the performance of students with Attention Deficit Hyperactivity Disorder in the Reading processes through the presentation of five cases.

## MATERIALS AND METHODS

This study was carried out after approval by the Research Ethics Committee of Universidade Estadual Paulista "Júlio de Mesquita Filho" (UNESP), under number 5873.1316.6.00005406.

Five students with Attention Deficit Disorder and Hyperactivity participated in this study, without co-occurrence with other neurodevelopmental disorders, male, with a mean age of 9 years and 7 months of age, from the third to the fifth year of elementary school in a city in São Paulo.

All students underwent the application of the Assessment of Reading Processes - PROLEC 11 individually in a 50-minute session. This evaluation consists of four blocks distributed for the evaluation of four reading processes, as described below:

- 1st Process: letter identification - composed of two tests designed to measure the students' ability to identify the letters and their respective sounds. The sound and letter identification test aim to verify the student's ability to name the letters and the sound that represents them. The proof of equal and different with regard to words and pseudowords aims to verify the student's ability to identify, discriminate and recognize real and invented words as being equal/different.
- 2nd Process: lexical processes; composed of four tests with the purpose of proving the functioning of the two-word recognition routes and their subprocesses. In the lexical decision test, the student must recognize only real words in a list of real and invented words regardless of whether he is able to read them or not. In the word reading tests, reading pseudowords and reading words and pseudowords, the objective is to compare the development of word recognition routes, and the student should perform the reading of real words and invented words, and in the first test, it was measured the student's ability to read real words and, in the second, ability to read invented words of different syllabic complexities, divided into CCV, VC, CVC, CVV, CCVC, and CVVC. In the third test, the objective is to analyze the degree of development that the student has achieved with the use of phonological and lexical routes for reading. For this, words and pseudowords belonging to six categories were used: short high-frequency words, long high-frequency words, short low-frequency words, long low-frequency words, short pseudowords and long pseudowords.
- 3rd Process: syntactic processes; composed of two tests. In the grammatical structures test, the student's ability to process different types of grammatical structures is verified and the difficulty that can be produced when using different syntactic structures is verified, namely:

active voice, passive voice and focused complement. In the test of punctuation marks, the student's ability to use punctuation marks in a short text is observed.

- 4th Process: semantic processes; composed of two tests. In the sentence comprehension test, the objective is to assess whether the student is able to extract the meaning of simple sentences. In the Text Comprehension test, the objective is to investigate whether the student is able to extract the meaning and integrate it with their knowledge.

For this study, the short version was used, composed of a test of each of the four evaluated processes, which are: Equal-Different, Pseudoword Reading, Grammatical Structures and Text comprehension.

The analysis of the results was performed using the JT Method, which provides for a comparative analysis between scores in order to decide whether the differences between them represent reliable changes and whether they are clinically relevant.

The analysis of the results of the cases in this study was carried out using the JT Method, therefore, it implies two complementary processes: (a) calculation of the reliability of the changes occurred between scores, described in terms of a Reliable Change Index (BMI); and (b) analysis of the clinical significance of these changes. Based on quantitative indicators, these two processes can be graphically represented [11,12].

## RESULTS

In the graphs below, we will present the performance of students with Attention Deficit Hyperactivity Disorder in the Equal-different tests, Reading Pseudowords, Grammatical Structures, and Text comprehension (Graph 1).

As shown in Graph 1, none of the students diagnosed with Attention Deficit Disorder and Hyperactivity performed less than expected in the Equal Test - Different from PROLEC.

As shown in Graph 2, a student with a diagnosis of Attention Deficit Hyperactivity Disorder performed below the expected in the PROLEC Pseudoword Reading Test

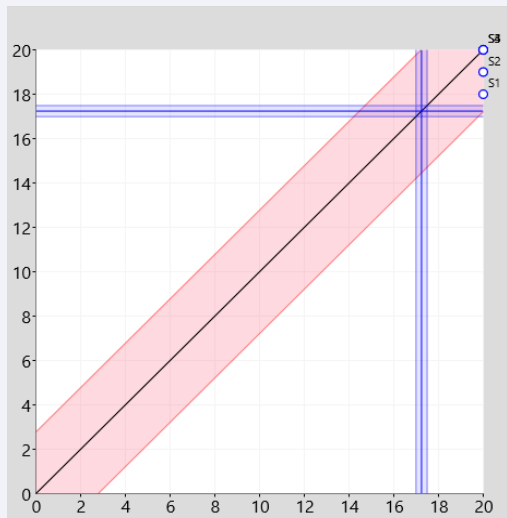
As shown in Graph 3, three students with a Diagnosis of Attention Deficit and Hyperactivity Disorder underperformed in the PROLEC's Grammatical Structures Test.

As shown in Graph 4, two students diagnosed with Attention Deficit Disorder and Hyperactivity performed below expectations in the PROLEC Text Comprehension Test.

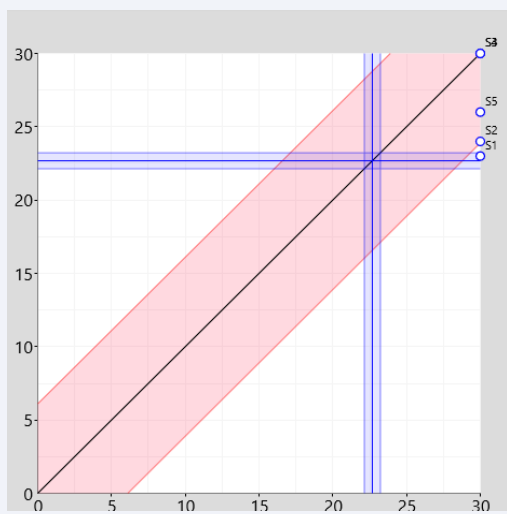
## DISCUSSION

According to the results obtained in this study, it is possible to verify that the students with Attention Deficit Disorder and Hyperactivity performed below the expected in the tests that measure the performance in the lexical process, semantic process, and syntactic process. This finding corroborates a study [13], that stated that students with ADHD had difficulty in carrying out the lexical process tests and in the syntactic and semantic processes tests.

In this study, it can be seen that students with ADHD had lower performance in tests related to lexical, syntactic and semantic



**Graph 1:** Characterization of the performance of subjects with Attention Deficit Hyperactivity Disorder in the PROLEC Equal-Different Test  
 Subtitle: The vertical line: after the intervention, the horizontal line: pre-intervention



**Graph 2:** Characterization of the performance of subjects with Attention Deficit Hyperactivity Disorder in the PROLEC Pseudoword Reading Test  
 Subtitle: The vertical line: after the intervention the horizontal line: pre-intervention

processes. This performance can be explained by the fact that the attentional process is fundamental for the effectiveness of learning since attention is the initial and essential condition for cognitive functions in their entirety, particularly for the learning and memorization process [14].

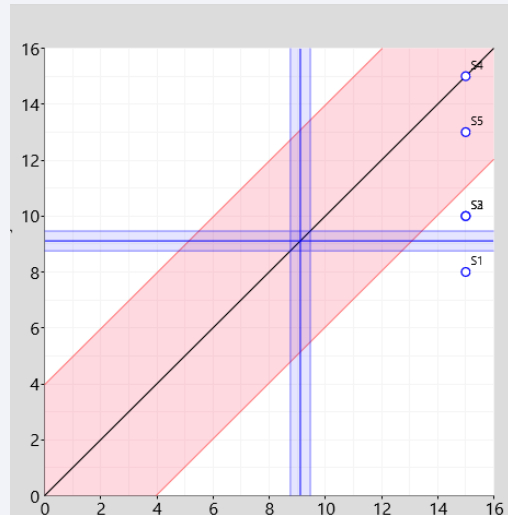
Students who have attentional difficulties or to process information also have difficulty in refining visual processing, compromising the phonological access that is required at the time of reading and writing [15-18].

Thus, this study showed that the attentional factor, when

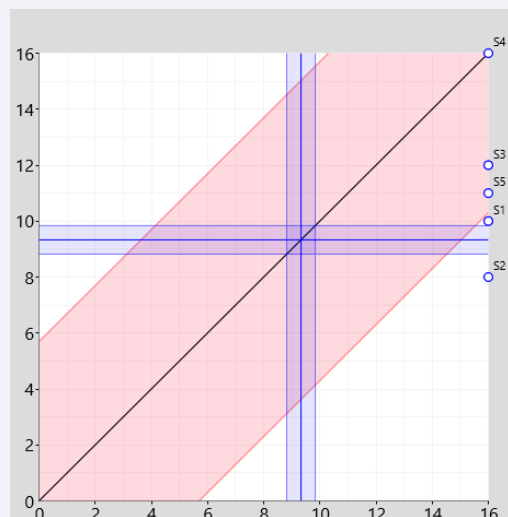
altered, impairs the acquisition of the necessary skills for the development of reading, compromising access to the meaning of the words comprehension of the text read, as described by Silva, Cunha and Capellini [19-23].

**CONCLUSION**

The students with Attention Deficit Disorder and Hyperactivity in the present study performed less than expected in tests that measure performance in the lexical process, semantic process and syntactic process, thus showing that when



**Graph 3:** Characterization of the performance of subjects with Attention Deficit Hyperactivity Disorder in the PROLEC Grammatical Structures Test.  
 Subtitle: The vertical line: after the intervention the horizontal line: pre-intervention



**Graph 4:** Characterization of the performance of subjects with Attention Deficit Hyperactivity Disorder in the PROLEC Text Comprehension Test  
 Subtitle: The vertical line: after the intervention the horizontal line: pre-intervention

the attention factor when altered, impairs the development of processes of reading. Thus, the changes present in the students in this study were not due to a primary deficit, but were due to a phenomenon secondary to inattention that directly interfered in their performance in the reading processes.

## SUPPORT

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