

PERFORMANCE COGNITIVE-LINGUISTIC AND READING OF STUDENTS WITH ATTENTION DEFICIT AND HYPERACTIVITY DISORDER

Cláudia da Silva¹, Vera Lúcia Orlandi Cunha², Simone Aparecida Capellini³

ABSTRACT

Objective: the aim of this study was to compare the cognitive-linguistic skills performance and reading of students with Attention Deficit and Hyperactivity Disorder and students without behavioral and/or learning disorders. **Methods:** the study included 20 students from 5th to 8th grade of elementary school. The students were divided into: Group I (GI): composed by 10 students with an interdisciplinary diagnosis of Attention Deficit and Hyperactivity Disorder, and Group II (GII): composed by 10 students without complaints of behavioral and/or learning disorders. The tests of metalinguistic skills and reading (PROHMELE) were used as procedure, composed of syllabic and phonemic identification, syllabic and phonemic manipulation, repetition of nonwords and reading tests. **Results:** the results showed statistically significant differences between GI and GII, demonstrating that students from GI presented superior performances when compared to the students from GII. **Conclusion:** according to the findings of this study we can conclude that the difficulties presented by students with Attention Deficit and Hyperactivity Disorder can be attributed to inattention, hyperactivity and disorganization, characteristic of this diagnosis, and not to a disorder of language of phonological basis.

Key words: learning; attention deficit and hyperactivity disorder; reading.

- 1 Doutoranda do Programa de Pós Graduação em Educação da Faculdade de Filosofia e Ciências da Universidade Estadual Paulista – FFC/UNESP-Marília – SP / Brasil.
- 2 Doutoranda do Programa de Pós Graduação em Educação da Faculdade de Filosofia e Ciências da Universidade Estadual Paulista – FFC/UNESP-Marília – SP / Brasil.
- 3 Livre Docente em Linguagem Escrita - Faculdade de Filosofia e Ciências da Universidade Estadual Paulista – FFC/UNESP-Marília – SP / Brasil. Docente do Departamento de Fonoaudiologia e do Programa de Pós-Graduação em Educação da Faculdade de Filosofia e Ciências da Universidade Estadual Paulista – FFC/UNESP-Marília – SP / Brasil.

Trabalho realizado no Centro de Estudos da Educação e Saúde – CEES/UNESP – Faculdade de Filosofia e Ciências da Universidade Estadual Paulista – Marília SP.

Correspondence to: claudiasilvafono@yahoo.com.br

Apoio: CNPq

Suggested citation: Silva C, Cunha VLO, Capellini SA. Performance cognitive-linguistic and reading of students with Attention Deficit and Hyperactivity Disorder. Journal of Human Growth and Development 2011; 21(3): 849-858.2011; 21(3): 841-848.

Manuscript submitted mar 05 2011, accepted for publication Sep 20 2011.

INTRODUCTION

The attention deficit and hyperactivity disorder (ADHD) is a common behavioral alteration, characterized by low levels of attention and concentration and high levels of psychomotor activity, inattention and impulsivity¹. Having comorbidity with learning difficulties often associated to academic, social and professional alterations. Studies show that about 80% of children with ADHD present problems in learning and/or academic performance, and that the highest risks to this population are poor academic performance and superior rates of school abandonment^{2,3}.

The main features of ADHD (inattention, impulsivity and hyperactivity) can lead to several difficulties in the school context. For, often these students show problems to sustaining attention in tasks that require concentration, organization, finalization of independent work and learning of new content².

The diagnosis of ADHD is rarely realized before school age, even though the symptoms of the disorder are present at earlier stages of pre-school, since in these cases, inattention, hyperactivity and/or impulsivity persist for several months, suggesting the diagnosis. In other cases, symptoms may arise from the moment environmental triggering becomes greater, when the skills related to executive function, such as planning, organization and persistence of the attentional focus, become even more indispensable to the performance of tasks^{2,4-6}.

The characteristics of linguistic changes more common in students with ADHD are related to academic performance: disorders of sequence and temporal organization of phonemes in speech and writing, difficulty in regulating the intensity and speed of speech, scarce language resources, lack of textual organization, problems in reading decoding, and may have omissions and substitutions of words and phonemes, with the same oc-

curing in writing with changes in the logical order of sentences, and disorganized textual production. The most affected linguistic aspects in these students are the phonological, the syntactic and pragmatic, where the difficulties to phonetic-phonological aspects and grammar are caused, probably by a difficulty in attention and inhibitory control of irrelevant stimuli, rather than by specific inability to handle the linguistic aspects^{3,6,7}.

The difficulties of attention and hyperactivity showed by students with ADHD may affect their academic performance, as the language deficit produced can interfere in the learning of the alphabetic writing system, since those underlying skills of this process, such as phonological awareness skills when altered, affect this acquisition⁸⁻¹⁰.

Thus, in classroom situation, students who have diseases which result in impairment to the development of their academic skills, such as ADHD, may feel unmotivated and uninterested because the cognitive-linguistic difficulties, which impair the comprehension of the material for reading or writing⁶.

Considering the issues presented this article aims to compare the linguistic-cognitive performance in reading of students with ADHD and students without behavioral disorders and/or learning disorders.

METHODS

This study was approved by the Ethics Committee in Research of the Faculty of Philosophy and Sciences, São Paulo State University – FFC/UNESP/Marília-SP, under protocol number 3326/2006.

Twenty students from the 5th to 8th grade of elementary public education participated in this study, being fourteen males and six females, aged between 9 and 13 years old. The students of this study were divided in two groups:

- **Group I (GI): composed by ten students with interdisciplinary diagnosis of ADHD**

The diagnosis of ADHD of such students was realized by an interdisciplinary team of the Laboratory of Investigation of Learning Disorders of the Center of Studies of Education and Health – CEES/UNESP – Marília, including speech language, neurological, neuropsychological evaluation and following the criteria proposed by DSM-IV¹¹. All students in this group made use of medication for at least six months.

- **Group II (GII): composed by ten0 students without behavioral and or learning disorder. The students of GII were paired with students of GI according to age and grade level**

These students were indicated by their teachers following the criterion of satisfactory academic performance in two consecutive bimesters (average score equal or higher to 7). From this indication, the students had previously been submitted to otorhinolaryngological, hearing and vision evaluations, and only those who showed results within normal limits participated in this study. The classification of socioeconomic status was made based in statistical study of the Socio-Economic Development Index (IDESE)¹², thus ensuring the homogeneity of the sample in terms of socioeconomic status.

As inclusion criteria were utilized the signature of the Consent Term, absence of auditory or visual complaints registered in the schools' record of students of the GII, and interdisciplinary diagnosis of ADHD to students of the GI.

The exclusion criteria were considered the absence of parent or caretaker's signature of the Consent Term and the presence of sensory, motor or cognitive impairment mentioned in the schools records.

Prior to the start of the application of the procedure, parents or caretaker of the selected students signed the Consent Term form authorizing the realization of the study, according to resolution of the National Health Counsel CNS 196/96.

As a procedure the Metalinguistic Skills and Reading Tests of the PROHME-LE¹³ were utilized. The tests applied are described below:

- **Test of syllabic and phonemic identification:** Identification of Initial Syllable (IIS), Identification of Initial Phoneme (IIP), Identification of Final Syllable (IFS), Identification of Final Phoneme (IFP), Identification of Medial Syllable (IMS), and Identification of Medial Phoneme (IMP);

- **Test of syllabic and phonemic manipulation:** Syllabic Segmentation (Syl Seg), Phonemic Segmentation (Pho Seg), Syllabic Addition (Syl Ad), Phonemic Addition (Pho Ad), Syllabic Replacement (Syl Rep), Phonemic Replacement (Pho Rep), Syllabic Subtraction (Syl Subt), Phonemic Subtraction (Pho Subt), Combination of syllables (Com Syl), Combination of phonemes (Com Pho);

- **Nonwords repeat:** monosyllabic nonwords repeat (MNR M1, MNR M2), disyllabic nonwords repeat (DNR D1, DNR D2); trisyllabic nonwords repeat (TNR T1, TNR T2); polysyllabic nonwords repeat with four syllables (PNR P4-1, PNR P4-2); polysyllabic nonwords repeat with five syllables (PNR P5-1, PNR P5-2); polysyllabic nonwords repeat with 6 syllables (PNR P6-1, PNR P6-2);

- **Reading Test:** Real words Reading where a list of isolated real words was presented (133 words); Nonwords Reading where a list of pseudo words was presented (27 nonwords).

The nonwords are understood here as a logatomo, or a syllable or a sequence of syllables that belongs to the language, but does not form any meaningful word¹⁴.

The application of metalinguistic skills tests were realized so that the stu-

dent had no visual clue of the articulation of the sounds produced by the examiner. The responses of the student were registered on the answer sheet of the PROHMELE. The student was previously instructed and trained by similar test examples to know what to do.

The reading tests were conducted aloud and recorded on a digital recorder for later reading analysis. Each student received instruction on how he should read the words lists, presented using sized 14 arial font, double space, divided into columns by word extension (monosyllabic, disyllabic, trisyllabic and polysyllabic – of 4 to 7 syllables) and nonwords (monosyllabic, disyllabic, trisyllabic). In the reading of nonwords test, it was explained that the students would read words that do not exist and that, therefore, are not part of their vocabulary.

The number of words that make up the reading of real words test and nonwords is different, because the first list was composed of words according to the rules of grapho-phonemics correspondence independent of the context and grapho-phonemics correspondence dependent of the context, while the second list only consisted of nonwords, words derived according to the rule of grapho-phonemics correspondence independent of context. All the tests in this study were analyzed according to the criteria of errors.

The characterization of the types of real words and nonwords reading errors were made based on criteria established for the Brazilian Portuguese²⁶, as described below:

- D1 – context independent grapho-phonemics matching rule regarding the regular words with univocal correspondence.
- D2 – context dependent grapho-phonemics matching rule regarding the rules applied to irregular words.
- D4 - Values of the letter "X" exclusively dependent on the mental and orthographic lexicon.

In the reading of nonwords test, only the rule D1 was considered, because its goal is to verify the univocal correspondence between letter and sound.

The students of GI were evaluated 30 minutes after the drug (methylphenidate) administration, since without the medication it was not possible to conduct the evaluation proposed in this study. Two individual sessions for assessment lasting 30 minutes each were realized. The students of GII were evaluated individually in a session in a classroom provided by the school administration, at a time predetermined by the teacher of each school.

The results were analyzed statistically with significance level of 5% (0.05) for the application of statistical tests, utilizing the software SPSS (Statistical Package for Social Sciences), version 19.0. The test utilized to statistically analysis was *Mann-Whitney Test*. The statistically significant results were marked with an asterisk (*).

RESULTS

When the *Mann-Whitney test* was applied, in order to verify possible differences between the groups in this study for the variables of interest, it was observed that, according to Table 1, there was no statistically significant difference evidence for the syllables and phonemes identification tests.

Table 2 presents data comparing the groups GI and GII in the syllables and phonemes manipulation tests, as can be seen that there was a statistically significant difference for the tests of Phonemic Segmentation, Syllable Addition, Phoneme Addition, Syllabic Substitution, Phonemic Substitution, Syllabic Combination and Phonemic Combination, indicating that the group GII showed better performance when compared to group GI.

In real words and nonwords reading tests there was statistically signi-

Table 1: Distribution of mean, standard deviation, minimum and maximum value and p-value in comparison of the performance between GI and GII in the tests of syllables and phonemes identification

Variables	Group	Mean	Standard deviation	Minimum	Maximum	p-value
IIS	I	0,40	1,27	0,00	4,00	0,317
	II	0,00	0,00	0,00	0,00	
IIP	I	0,20	0,42	0,00	1,00	0,626
	II	0,20	0,63	0,00	2,00	
IFS	I	0,10	0,32	0,00	1,00	0,503
	II	0,40	0,97	0,00	3,00	
IFP	I	1,00	1,89	0,00	5,00	0,234
	II	0,10	0,32	0,00	1,00	
IMS	I	0,60	1,27	0,00	4,00	0,068
	II	0,00	0,00	0,00	0,00	
IMP	I	1,40	1,84	0,00	5,00	0,325
	II	0,70	1,34	0,00	4,00	

Caption: IIS: identification of initial syllable; IIP: identification of initial phoneme; IFS: identification of final syllable; IFP: identification of final phoneme; IMS: identification of medial syllable; IMP: identifying of medial phoneme

Table 2: Distribution of mean, standard deviation, minimum and maximum value and p-value in comparison of the performance between GI and GII in the tests of syllables and phonemes manipulation

Variables	Group	Mean	Standard deviation	Minimum	Maximum	p-value
Seg Sil	I	0,30	0,48	0,00	1,00	> 0,999
	II	0,30	0,48	0,00	1,00	
Syl Seg	I	0,30	0,48	0,00	1,00	> 0,999
	II	0,30	0,48	0,00	1,00	
Pho Seg	I	7,60	3,98	0,00	10,00	0,004*
	II	1,50	1,27	0,00	4,00	
Syl Ad	I	2,10	3,18	0,00	10,00	0,040*
	II	0,10	0,32	0,00	1,00	
Pho Ad	I	7,30	3,89	0,00	10,00	< 0,001*
	II	0,00	0,00	0,00	0,00	
Syl Rep	I	4,70	4,72	0,00	10,00	0,005*
	II	0,10	0,32	0,00	1,00	
Pho Rep	I	6,20	4,92	0,00	10,00	0,004*
	II	0,30	0,68	0,00	2,00	
Syl Subt	I	1,60	1,78	0,00	4,00	0,199
	II	0,60	1,08	0,00	3,00	
Pho Subt	I	4,90	4,86	0,00	10,00	0,104
	II	0,80	1,14	0,00	3,00	
Com Syl	I	2,20	1,87	0,00	5,00	0,028*
	II	0,50	1,27	0,00	4,00	
Com Pho	I	7,30	4,42	0,00	10,00	0,012*
	II	1,20	1,23	0,00	4,00	

Caption: Syl Seg: syllabic segmentation; Pho Seg: phonemic segmentation, Syl Ad: syllabic addition; Pho Ad: phonemic addition, Syl Rep: syllabic replacement; Pho Rep: phonemic replacement; Syl Subt: syllabic subtraction; Pho Subt: phonemic subtraction; Com Syl: combination of syllables; Com Pho: combination of phonemes

ficant difference for words referring to the rule D1, which are the regular words, with context independent grapho-phonemic matching, according to the data of table 3.

According to table 4, there was a statistically significant difference between the groups GI and GII only to the rules D2.3 and D2.5, in the comparison of results from reading real words, for the rule

Table 3: Distribution of mean, standard deviation, minimum and maximum value and p-value in comparison of the performance between GI and GII to the rules D1 in real words and nonwords reading

Variables	Group	Mean	Standard deviation	Minimum	Maximum	p-value
D1 PR	I	8,80	14,18	0,00	45,00	0,024*
	II	0,44	0,88	0,00	2,00	
D1PP	I	3,80	4,19	0,00	14,00	0,007*
	II	0,40	0,52	0,00	1,00	

Caption: PR D1: context-independent grapho-phonemics matching rule regarding the real words; D1 PP: context-independent grapho-phonemics matching rule regarding the nonwords

D2.1 to D2.11, corresponding to irregular words, with context dependent grapho-phonemic matching. The group GII showed superior performance compared to the group GI. It is noteworthy that the rule D2.3 refers to the reading of the grapheme "s" at the end of the internal syllable and rule D2.5 refers to the reading of the grapheme "z" in the beginning of a word and beginning of the syllable.

Table 5 presents the results of reading real words for the rule D2.12 to D2.23, corresponding to irregular words, with dependent context grapho-phonemic matching in which it was observed that there was a statistically significant difference between the groups only for D2.23 rule, which refers to the rule corresponding to the reading of the grapheme "i" and "u". The group GII presented superior performance compared to the group GI.

In table 6 it was observed that there was a statistically significant difference between groups, with superior performance for the group GII in the comparison of results from reading real words for the rule D4, being this rule referent to three values assigned to the letter "x", that depend exclusively on the internalization of the orthographic mental lexicon and its relationship with phonological mental lexicon.

DISCUSSION

Our results revealed that students of the group GII had superior performance to students of the group GI, statistically significant difference in the tests of syllabic and phonemic manipulation, for phonemic segmentation, syllabic and phonemic addition, substitution and combination. These tests require for their applications, greater concentration and attention to the identification of the syllables and phonemes presented.

Recent studies^{6,10,13,15} have reported that some tasks, such as syllables and phonemes manipulation are more complex, they require the realization of two operations (store a unit in memory as a new operation is performed), and tasks of syllable and phoneme identification are considered simpler (requiring only one operation followed by a response). Thus, performance on tasks that check meta-linguistic skills may vary depending on the type of operation that is requested from the child.

Studies have investigated the semantic component of students with ADHD compared to students without learning and/or behavioral disorders by tasks of semantic organization, auditory memory and verbal fluency, and found values close to those of normal subjects. Thus,

Table 4: Distribution of mean, standard deviation, minimum and maximum value and p-value in comparison of the performance between the groups GI and GII to the rules D2.1 to d2.11 in real words reading

Variables	Group	Mean	Standard deviation	Minimum	Maximum	p-value
D2.1 PR	I	0,44	1,01	0,00	3,00	0,586
	II	0,33	1,00	0,00	3,00	
D 2.2	I	3,30	7,38	0,00	24,00	0,118
	II	0,22	0,44	0,00	1,00	
D 2.3	I	1,30	2,11	0,00	6,00	0,039*
	II	0,00	0,00	0,00	0,00	
D 2.4	I	0,22	0,44	0,00	1,00	0,634
	II	0,22	0,67	0,00	2,00	
D 2.5	I	0,70	0,95	0,00	2,00	0,039*
	II	0,00	0,00	0,00	0,00	
D 2.6.1	I	0,60	1,08	0,00	3,00	0,330
	II	0,22	0,67	0,00	2,00	
D 2.6.3	I	1,20	2,10	0,00	6,00	0,741
	II	0,78	1,39	0,00	4,00	
D 2.6.4	I	0,60	0,52	0,00	1,00	0,768
	II	0,63	0,92	0,00	2,00	
D 2.6.5	I	0,00	0,00	0,00	0,00	> 0,999
	II	0,00	0,00	0,00	0,00	
D 2.7	I	1,30	3,13	0,00	10,00	0,068
	II	0,00	0,00	0,00	0,00	
D 2.8	I	0,50	0,71	0,00	2,00	0,178
	II	0,20	0,63	0,00	2,00	
D 2.9	I	0,50	1,07	0,00	3,00	0,104
	II	0,00	0,00	0,00	0,00	
D 2.10	I	0,50	1,41	0,00	4,00	0,264
	II	0,00	0,00	0,00	0,00	
D 2.11	I	1,56	4,30	0,00	13,00	0,126
	II	0,00	0,00	0,00	0,00	

Caption: D2: context-independent grapho-phonemics matching rule regarding the real words

Table 5: Distribution of mean, standard deviation, minimum and maximum value and p-value in comparison of the performance between the groups GI and GII to the rules D2.12 to D2.23 in real words reading

Variables	Group	Mean	Standard deviation	Minimum	Maximum	p-value
D 2.12	I	0,25	0,71	0,00	2,00	0,871
	II	0,20	0,63	0,00	2,00	
D 2.13	I	2,00	4,40	0,00	14,00	0,213
	II	0,10	0,32	0,00	1,00	
D 2.14	I	0,11	0,33	0,00	1,00	> 0,999
	II	0,30	0,95	0,00	3,00	
D 2.15	I	2,20	5,94	0,00	19,00	0,234
	II	0,10	0,32	0,00	1,00	
D 2.16	I	0,33	0,71	0,00	2,00	0,563
	II	0,30	0,95	0,00	3,0	
D 2.17	I	3,60	8,70	0,00	28,00	0,101
	II	0,10	0,32	0,00	1,00	
D 2.18	I	0,25	0,71	0,00	2,00	0,717
	II	0,22	0,44	0,00	1,00	
D 2.19.1	I	0,30	0,68	0,00	2,00	0,914
	II	0,40	0,84	0,00	2,00	
D 2.19.2	I	1,00	2,65	0,00	8,00	0,458
	II	1,00	1,49	0,00	4,00	
D2.21	I	0,70	1,57	0,00	5,00	0,618
	II	0,30	0,68	0,00	2,00	
D 2.22	I	3,60	10,01	0,00	32,00	0,255
	II	0,20	0,63	0,00	2,00	
D 2.23	I	3,20	8,39	0,00	27,00	0,049*
	II	0,10	0,32	0,00	1,00	

Caption: D2: context-dependent grapho-phonemics matching rule regarding the real words

Table 6: Distribution of mean, standard deviation, minimum and maximum value and p-value in comparison of the performance between the groups GI and GII to the rules D4 in real words reading

Variables	Group	Mean	Standard deviation	Minimum	Maximum	p-value
D4	I	1,50	1,51	0,00	4,00	0,045*
	II	0,22	0,44	0,00	1,00	

Caption: D4: values of the letter "X" dependent exclusively of the mental lexicon and orthographic

they concluded that the difficulties in phonetic-phonological aspects and grammar, found in students with ADHD are caused possibly by a difficulty in attention and inhibitory control of irrelevant stimuli rather than by an inability to handle specific aspects of language^{8,9}.

The results found of the performance of students with ADHD to metalinguistic skills may have suffered interference from factors that are characteristic of the

diagnosis itself, since the inattention and hyperactivity may affect the retention of information, interfering directly in the auditory and visual processing of these students⁸⁻¹⁰.

The symptoms of the alteration of auditory processing coincide with ADHD symptoms, but symptoms of auditory processing attributed to students with ADHD, such as difficulty following instructions, sustaining attention and to captu-

re auditory information are changes identified as a secondary phenomenon to inattention and not as a primary deficit of auditory processing¹⁵.

Although attention deficit generally characterizes the two changes, there are indeed differences in the nature of inattention observed in both changes, that is, attention deficit disorder in children with ADHD is usually persistent and supramodal, while children with alterations of auditory processing has a limited change in auditory attention¹⁶.

In real words and nonwords reading tests involving rules there was statistically significant difference for the rules D1, D2.3, D2.5, D2.23 and D4.

In order to perform the decoding of words and nonwords it is necessary to involve some skills such as visual and auditory processing, the grapheme/phoneme mechanism conversion, attentional process and lexicon access and the phonological memory. The students with ADHD have alterations in areas involved with attentional demand, self-regulation, working memory and phonological awareness, owing to that the strong association found between reading incapacity and ADHD, as observed in the results of this study. However, studies suggest that this difficulty is not the result of a language disorder of phonological basis, but

a secondary consequence of problems in self-regulation and attention inherent to ADHD^{6,10}.

The reading deficits found in ADHD are due to a sequence and temporal disruption of the phonemes necessary to perform the proposed activity, for the difficulty in controlling the selection of the segment used, in this case the phoneme, associated with attentional change, leads to omission of phonemes, syllables and/or words, resulting in impaired reading¹⁷.

CONCLUSION

According to data obtained in this study, we conclude that students with ADHD have changes in their performance in activities considered more complex, such as syllabic and phonemic manipulation, showing no change in performance in simple skills, such as the syllable and phoneme identification, when their performances were compared to students without learning and/or behavioral disorders. This indicates that the difficulties presented by students with ADHD can be attributed to inattention, hyperactivity and disorganization, characteristic of the diagnosis itself, not a language disorder of phonological basis.

REFERENCES

1. American Psychiatric Association. Diagnostic and statistical manual of mental disorders (DSM-IV) (4th Ed.). Washington, DC: American Psychiatric Association; 2000.
2. DuPaul GJ, Stoner G. TDAH nas escolas. Estratégias de Avaliação e Intervenção. São Paulo: Editora M. Books do Brasil; 2007.
3. Liotti M, Pliszka SR, Higgins K, Prez III R, Semrud-Clikeman M. Evidence for specificity of ERP abnormalities during response inhibition in ADHD children: A comparison with reading disorder children without ADHD. *Brain and Cognition*. 2010; (72):228-237.
4. Zorzi JL, Ciasca SM. Análise de erros ortográficos em diferentes problemas de aprendizagem. *Revista CEFAC*. 2009; 11(3): 406-416.
5. Mangina CA, Beuzeron-Mangina H. Similarities and differences between learning abilities, "Pure" learning disabilities, "Pure" ADHD and comorbid ADHD with learning disabilities. *International Journal of Psychophysiology*. 2009; (73):170-177.

6. Pinheiro FH, Lourenceti MD, Santos LCA. Transtornos do déficit de atenção e hiperatividade: critérios diagnósticos. In: Capellini SA, Germano GD, Cunha VLO, editors. Transtornos de aprendizagem e transtornos da atenção (da Avaliação à Intervenção). São José dos Campos: Editora Pulso; 2010. p. 21-33.
7. van De Voorde S, Roeyers H, Wiersma JR. Error monitoring in children with ADHD or reading disorder: An event-related. *Biological Psychology*. 2010; (85):176-185.
8. Ygual-Fernández A, Miranda-Casas A, Cervera-Mérida JF. Dificultades en las dimensiones de forma y contenido del lenguaje en los niños con trastorno por déficit de atención con hiperactividad. *Revista de Neurologia Clínica*. 2000; (1):193-202.
9. Mulas F, Etchepareborda MC, Abad-Mas L, Díaz-Lucero A. Transtornos neuropsicológicos de los adolescentes afectados de trastorno por déficit de atención con hiperactividad. *Revista de Neurologia*. 2006; 43(1):71-81.
10. Asberg J, Dahlgren S, Sandberg AD. Basic reading skills in high-functioning Swedish children with autism spectrum disorders or attention disorder. *Research in Autism Spectrum Disorders*. 2008; (2):95-109.
11. DSM-IV™. Manual Diagnóstico e Estatístico de Transtornos Mentais. Porto Alegre: Artes Médicas; 2000.
12. Índice de Desenvolvimento Socioeconômico (IDESE). Fundação de Economia e Estatística [homepage na internet]. Porto Alegre: 2003. [acesso em ago 2010]. Disponível: http://www.fee.tche.br/sitefee/PT/content/estatisticas/pg_idese.php
13. Cunha VLO, Capellini SA. PROHMELE – Protocolo de habilidades metalingüísticas e de leitura. Rio de Janeiro: Revinter; 2009.
14. Scliar-Cabral L. Princípios do sistema alfabético do português do Brasil. São Paulo: Contexto; 2003.
15. Abdo AGR, Murphy CFB, Schochat E. Habilidades auditivas em crianças com dislexia e transtorno do déficit de atenção e hiperatividade. *Pró-Fono Revista de Atualização Científica*. 2010; 22(1): 25-30.
16. Schochat E, Scheuer CI, Andrade ER. Attention deficit hyperactivity disorder. In: Larimer, M. *Attention deficit hyperactivity disorder-Research Developments*. Nova Iorque: Nova Science Publishers, Inc.; 2005. p.31-54.
17. Silva C, Capellini SA. Eficácia do programa de remediação fonológica e leitura no distúrbio de aprendizagem. *Pró-Fono Revista de Atualização Científica*. 2010; 22(2): 131-138.