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Alliteration and rhyme skills in children with specific language impairment

Habilidades de aliteração e rima em crianças com distúrbio específico de linguagem

ABSTRACT

Purpose: this study investigated and compared the performance of school-aged children with specific language impairment (SLI) and their peers typically developing language in alliteration and rhyme tests. The study also aimed to evaluate the influence of semantic and phonological distractors on both tests. **Methods:** twelve school-aged children with SLI (study group - SG) and 48 peers typically developing language (control group - CG) aged 7 to 9 years. All of them were on 2nd or 3rd grade and presented hearing thresholds within normal limits and appropriate nonverbal intellectual performance. The experimental assessment consisted in alliteration and rhyme tests with semantic and/or phonological distractors. **Results:** intragroup analysis showed that both groups presented lower performance in rhyme than alliteration activities (CG $p < .001$; SG $p = .011$). Intergroup analyses revealed that the SG had a poorer performance in both tasks in comparison to the CG (alliteration $p = .001$; rhyme $p = .009$). The error analysis pointed out that in alliteration, the SG opted more frequently for semantic ($p = .004$) and other distractors ($p < .001$) than the CG, whereas in rhyme tests, they opted more frequently for phonological ($p = .048$) and other distractors ($p = .031$). **Conclusion:** the SG presented difficulty in alliteration and rhyme tasks, indicating poorer performance than their peers without language impairment. School-aged children with SLI attested that they analyze phonological awareness stimuli in a more general way, leading them to overlook relevant segmental aspects. These data reinforce the need for early intervention of these abilities in this population.

RESUMO

Objetivo: investigar e comparar o desempenho de escolares com distúrbio específico de linguagem (DEL) e em desenvolvimento típico de linguagem em atividades de identificação de aliteração e rima e verificar, em ambas as tarefas, a influência dos distratores semânticos e fonológicos. **Método:** participaram do estudo 12 escolares previamente diagnosticados com DEL (GP) e 48 escolares em desenvolvimento típico (GC) com idade entre 7 anos e 9 anos e 11 meses. Todos cursavam o 2º ou 3º ano do ensino fundamental I e apresentavam audição e inteligência não verbal preservadas. Como medidas experimentais, foram utilizados testes padronizados de identificação de aliteração e rima, com presença de distratores semânticos e/ou fonológicos. **Resultados:** a análise intragrupo demonstrou que ambos os grupos apresentaram desempenho inferior em rima do que em aliteração (GC $p < 0,001$; GP $p = 0,011$). A análise intergrupos indicou que o desempenho do GP foi inferior ao do GC em ambas as tarefas (aliteração $p = 0,001$; rima $p = 0,009$). A análise dos erros indicou que na aliteração, em comparação ao GC, os escolares do GP utilizaram mais distratores semânticos ($p = 0,004$) e outros ($p < 0,001$), enquanto na rima utilizaram mais distratores fonológicos ($p = 0,048$) e outros ($p = 0,031$). **Conclusão:** o GP apresentou dificuldade em tarefas de aliteração e rima, demonstrando estar aquém dos seus pares sem alteração de linguagem. Estes escolares demonstraram analisar os estímulos apresentados nas tarefas de consciência fonológica de forma mais global, o que os fez desprezar aspectos segmentais importantes. Estes dados reforçam a necessidade da inclusão precoce destas habilidades no processo terapêutico da população com DEL.

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INTRODUCTION

When children begin the literacy acquisition process, they are expected to demonstrate a minimum mastery of oral language skills. When they are able to deal with language for the communicative function, it is assumed that they are also able to use it for a metalinguistic function, i.e. use it to reflect on the own language⁽¹⁾.

By learning the basics of an alphabetic system, as is the case of Brazilian Portuguese, the child should be educated to perceive that speech is composed of units that can be segmented and manipulated. This process requires the combination of skills such as phonological awareness and phonological short-term memory, as well as a formal education on the relationship between phonemes and graphemes^(2,3).

Phonological awareness, a component of the phonological processing, is related to the ability of reflecting and handling segments of speech. Mastery of this skill is achieved gradually; it starts with superficial sensitivity and advances towards a deeper one. In other words, there is an initial perception of largest segments of speech - words and syllables - and then of the smaller segments of speech: the phonemes. From this perspective, the results of research studies reporting the better performance of children in syllabic than in phonemic awareness activities are understandable^(1,4).

Alliteration and rhyme skills, which are syllabic awareness components, are constantly practiced in school environments, optimizing the contact of children with them⁽⁵⁾. Alliteration is worked before rhyme, as the literacy process includes a strenuous relationship between words with the same beginning, starting with a certain letter, with the letter of the child's name, colleagues, among other stimulations. In turn, rhyming activities are carried out in the school environment since pre-school stages, but implicitly - using songs, rhymic stories and so forth. Explicit activities involving rhymes are only initiated subsequently to alliteration⁽⁶⁾. Thus, some studies show that alliteration activities are carried out more easily than rhyme activities^(7,8).

While children are exposed to different linguistic situations - whether in the family and/or school environments - they increase their skills over different aspects of words, such as semantic aspects. Thus, they gradually tend to pay attention to further word features such as phonological traits. Studies show that children change the strategies they use to organize their lexicon and this can influence the way they solve phonological awareness activities^(9,10).

Initially, they pay more attention to stimuli in a general manner, taking into account all aspects of the word and not just its phonology. This leads them to opt for semantic distractors, when they are present in the evaluation process⁽¹¹⁾. To the extent the vocabulary is expanded, children reach a certain mastery over semantic skills and, at the same time, improve their skills with written language and with the phoneme-grapheme relationship. This makes them able to pay attention specifically to other aspects of words such as phonology, allowing a more segmental analysis of items and increasing the tendency to opt for phonological distractors⁽¹⁰⁾. Thus, although they continue

perceiving all characteristics of the words, they are able to expand or specify their analysis according to the task demand^(5,12).

Children diagnosed with specific language impairment (SLI) have significant changes in the acquisition and development of language. They present, among other clinical manifestations, difficulty in acquiring new words, delay in working memory and in short-term phonological memory, common and idiosyncratic phonological processes, simplified and little varied grammatical structure and unusual ordering of words^(3,13-15).

The intrinsic relationship between oral and written language leads us to understand that the multiple changes in the spoken language of children with SLI, including the phonological representation, make them more likely to show changes in phonological processing and in reading and writing skills^(7,16,17).

Thus, the present study aimed to investigate and compare the performance of school-aged children with specific language impairment (SLI) to the performance of peers typically developing language in alliteration and rhyme identification activities and verify the influence of semantic and phonological distractors in both tasks.

METHODS

This project was approved by the Research Ethics Committee of the institution where the study was developed under number 330/13. Parents or guardians signed the Informed Consent form and the school-aged children signed a Consent Agreement.

The sample consisted of 60 individuals, 12 with SLI (SG - study group) and 48 undergoing normal language development (CG - control group) aged between 7 years and 9 years and 11 months. All children were enrolled in the 2nd and 3rd grade of elementary school in state schools in the west of the city of São Paulo and were undergoing the literacy process.

As school-aged children without complaint and/or diagnosis of oral and/or written language disorders may present great variability of performance in early school years⁽¹⁸⁾, the proportion of 1: 4 (SG: CG) individuals was adopted. Thus, for every student with SLI, there were four school-aged children without language change.

The inclusion criteria for the SG were: having Portuguese as native language; nonverbal intelligence compatible with normality; intelligible speech production; confirmed diagnosis of SLI and be undergoing speech therapy.

It is noteworthy that, to be considered a situation of SLI, the child must have presented, at the time of the diagnostic evaluation, results below expectations in at least two of the following standardized language tests: expressive vocabulary⁽¹⁹⁾, phonology⁽²⁰⁾, pragmatics⁽²¹⁾ and mean length of the utterance⁽²²⁾, respecting the exclusion criteria: absence of neurological, nonverbal intellectual, mental and/or sensory impairment⁽¹³⁾.

School-aged children with SLI were undergoing therapy in this institution for at least six months, with the average time of three years. Whereas children manifest SLI in early stages of language acquisition, being enrolled in speech therapy is an essential condition for them to develop the minimal metaphonological skills covered in this study. The individuals

who had most recently started the therapy consisted precisely in younger individuals that spent time in the queue to receive treatment due to complaints of oral language.

In the case of the CG, the inclusion criteria were: having Portuguese as native language; hearing thresholds and non-verbal intelligence compatible with normality; receptive vocabulary⁽²³⁾ compatible with expectations for schooling and lack of productive phonological processes⁽²⁰⁾.

Therefore, the selection of these subjects involved hearing screening; the application of the Raven's test of nonverbal intelligence quotient⁽²⁴⁾ by a qualified psychologist; assessment of the receptive vocabulary through the vocabulary test using figures (TVFUSP)⁽²³⁾ and assessment of phonology through tasks of imitation and nomination of the ABFW⁽²⁰⁾.

Thus, 88 individuals were initially screened to make up the CG, but 40 (45.4%) were excluded for the following reasons: 21 (52.5%) failed in the hearing screening, 18 (45.0%) failed in the language screening and 1 (2.5%) failed in the nonverbal IQ test. All who failed at some stage were referred for further evaluation in the public service.

Data collection took place at the site of speech therapy in the case of the SG, and in the case of the CG, at the state school where children studied, which is located in the west side of the city of São Paulo. Each student was evaluated individually and in a previously prepared room.

To meet the objectives of the study, the equal alliteration and equal rhyme identification subtests of the visual phonological sensitivity test were used⁽²⁵⁾.

Each subtest involves the presentation of 15 items, with the first three items consisting in examples, in order to ensure the understanding of the child. Each item is composed of four stimuli, namely: the target, the correct answer and two distractors. The distractor stimuli may have semantic or phonological nature, or may still be neutral. The semantic distractors are characterized by the inclusion of a word semantically related to the target, but that is not the correct answer. The phonological distractors work differently for the subtests: in the alliteration subtest, the distractor stimulus is a word that rhymes with the target stimulus (e.g., to the target "key" (chave), the phonological distractor is "ship" (nave)), while in the rhyme subtest, the distractor is an alliteration with the target stimulus (e.g., to the target "knife" (faca), the phonological distractor is "fairy" (fada)). In both subtests, there are items either with semantic or phonological distractors, but there are also items with both kinds of distractors (semantic-phonological) simultaneously and items with neutral distractors only.

The individual's performance is based on the number of correct answers in each subtest. Each answer corresponding to the correct item was scored 1 point and each answer corresponding to a distractor got no score. The maximum score for each subtest was 12 points. The type of distractor selected was recorded for analysis of the type of error.

Subtests were applied in a *laptop* using the E-prime *software* in order to make the activity more dynamic and to reduce the effects of loss of focus. In order to ensure the clarity and

quality of the visual stimuli presented, it was necessary to redraw the test figures according to the model standardized by the test, because only then the digital file became compatible with the requirements of *software* in question. Similarly, the instructions for each item were digitally recorded by a native speaker of Brazilian Portuguese within an acoustically controlled environment. Such procedures allowed standardization in the presentation of the stimuli, while optimizing the record of the performance of individuals.

During application, all school-aged children started the session identifying the equal alliteration, and then the equal rhyme. The presentation of visual stimuli occurred concurrently with the presentation of auditory stimuli. For example, the following images appeared on the computer screen: cake (bolo), cap (bone), door (porta) and bell (sino). At the same time, the following digital order was heard by the child through headphones: "What word begins like cake (bolo): cap (boné), door (porta), bell (sino)?" or: "What word ends like wine (vinho): knife (faca), tennis (tênis), nest (ninho)?"

It is noteworthy that the alliteration and rhyme subtests were not sequentially applied to avoid confusing the children's answers, as these tasks are similar in nature. These tasks were intercalated with two language activities that are not related to the theme of this study.

After collecting data, the total number of correct answers was used to compare the groups in each task. As there were two subtests with the same maximum score, it was not necessary to transform data. Besides the correct answers, errors were quantified and classified into: error by semantic distractor, error by phonological distractor and others (in cases when the child opted for the neutral distractor).

Data were statistically analyzed in the SPSS *software* version 22. Median and interquartile range were used for describing data. The nonparametric Mann-Whitney test was used to compare groups, and the nonparametric Wilcoxon test was used to compare the performance within each group in different tasks. The significance level adopted was 5% and significant results were marked with an asterisk.

RESULTS

The intragroup analysis revealed that school-aged children of both groups, CG ($p < 0.001$) and SG ($p = 0.001$), performed better in alliteration than in rhyme tasks (Figure 1).

The SG had lower performance in alliteration ($p = 0.001$) and rhyme ($p = 0.009$) tasks when compared to the CG (Table 1).

When comparing the groups with respect to the type of errors, it was observed that, in the alliteration task, SG committed more errors of the semantic ($p = 0.004$) and other ($p < 0.001$) types, but no difference in relation to phonological errors was seen ($p = 0.163$), as shown in Table 2.

As for the rhyming task, the SG made more errors of the phonological ($p = 0.048$) and other ($p = 0.031$) types, but there was no difference in relation to semantic errors ($p = 0.367$), as shown in Table 3.

Table 1. Comparison of the performance of the studied groups in alliteration and rhyme tasks

PST	Group	n	Median	Interquartile range		U	Z	p
Alliteration	Control	48	12.0	11.0	12.0	132.5	-3.228	0.001*
	Study	12	8.5	6.5	12.0			
Rhyme	Control	48	9.0	7.0	10.0	147.0	-2.629	0.009*
	Study	12	5.5	4.0	8.0			

* significant difference $p < 0.05$ - Nonparametric Mann-Whitney test

Caption: PSF - phonological sensitivity test, n - number of individuals, U - Mann-Whitney test value, Z - z-score, p - level of statistical significance

Table 2. Comparison between groups regarding the type of error in the alliteration task

Alliteration	Group	n	Median	Interquartile range		U	Z	p
Semantic error	Control	48	0.0	0.0	0.0	175.5	-2.898	0.004*
	Study	12	0.5	0.0	1.8			
Phonological error	Control	48	0.0	0.0	0.0	243.5	-1.395	0.163
	Study	12	0.0	0.0	0.8			
Other errors	Control	48	0.0	0.0	0.0	121.0	-3.894	<0.001*
	Study	12	2.0	0.0	2.8			

* significant difference $p < 0.05$ - Nonparametric Mann-Whitney test

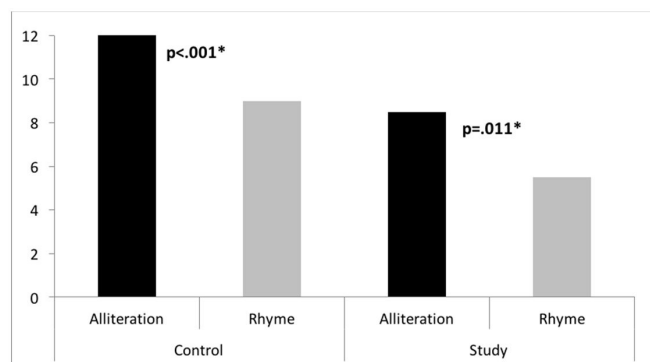
Caption: n - number of individuals, U - Mann-Whitney test value, Z - z-score, p - level of statistical significance

Table 3. Comparison between groups regarding the type of error in the rhyme task

Rhyme	Group	n	Median	Interquartile range		U	Z	p
Semantic error	Control	48	1.0	0.0	1.0	243.0	-0.901	0.367
	Study	12	1.0	0.0	2.0			
Phonological error	Control	48	2.0	1.0	3.0	183.5	-1.980	0.048*
	Study	12	3.5	1.3	4.0			
Other errors	Control	48	1.0	0.0	1.0	178.5	-2.162	0.031*
	Study	12	2.0	0.0	3.0			

* significant difference $p < 0.05$ - Nonparametric Mann-Whitney test

Caption: n - number of individuals, U - Mann-Whitney test value, Z - z-score, p - level of statistical significance



* significant difference $p < 0.05$ - Nonparametric Wilcoxon test

Figure 1. Comparisons of the performance of each group in alliteration and rhyme tasks

DISCUSSION

The objectives of the present study were to evaluate the performance of school-aged children with specific language impairment (SLI) and their peers typically developing language in alliteration and rhyming activities, featuring the performance of each group in the tests and then comparing the performance between groups taking into account the influence of semantic and phonological distractors.

The data surveyed shows that the SG had significantly lower performance in alliteration and rhyme activities when compared to CG, and these results corroborate the findings of other studies^(7,26).

This shows that children with SLI who attend the 2nd or 3rd grade of elementary school I still have significant difficulty in dealing with syllabic phonological awareness tasks, which are considered relatively simple^(1,4). For them, the perception that words are composed of smaller units that can be segmented and manipulated is not yet fully established and this may have an impact on the development of other syllabic and phonemic awareness skills, as well as reading and writing skills^(1,27).

The findings of this study showed that both groups had superior performance in the alliteration activity than in rhyme, which is in line with the findings of other studies^(6,28).

Besides the fact that processing rhyming activities is a gradually acquired and improved skill, this also requires the segmentation of the target word, the detection of its final segment and the retention of this information in memory. Then, it is necessary to conduct a similar analysis with every word in the proposed activity and accumulate this information in memory until a final segment equal to the target stimulus is found. In turn, in the alliteration task, the demand is lessened, since the analysis of the whole word is not necessary, but only attention and retention of initial segments⁽⁹⁾.

Thus, when we think of the period of acquisition and the demand of the processing of alliteration and rhyme activities, we can understand why the latter are more complex than the former^(5,9,29).

Regarding distractors, it was observed that, in the alliteration, the SG made more errors related to semantic than phonological distractors.

The preference for semantic distractors can be explained by the fact that the phonological distractor in the alliteration task is a rhyme (e.g., for the target item “key” (chave), the phonological distractor is “ship” (nave)), which requires a more segmental analysis to be identified in addition to requiring phonological retention and manipulation of the word segments until the final syllable^(9,29).

This study showed that the SG had lower performance in the rhyme activity than in alliteration. It is, therefore, understandable that this group did not opt for phonological distractors, which were rhymes.

Furthermore, children with SLI have impaired memory^(3,30) and usually perform a more general analysis of the word, not paying attention to the segments in detail, which may have contributed for their frequent ignorance of phonological distractors⁽¹¹⁾.

The preference for semantic distractors can also be justified by the fact that school-aged children with SLI are already undergoing speech therapy. This may have facilitated the relationship between the target stimulus and the semantic distractor, since the test words are relatively simple and possibly already present in their vocabulary.

In the assessment of rhyme, children with SLI made a greater number of errors in relation to phonological distractors than the semantic ones, noting that the phonological distractor in the rhyme test consists in alliteration, as for example, to the target item “knife” (faca), the distractor phonological is “fairy” (fada).

This data shows that individuals with SLI understood the task demand that required a more phonological analysis of the items, since there was lower incidence of semantic errors. However, they were not able to handle the most complex level required by the rhyming task, then opting for phonological distractors, which were simpler, i.e., alliterations.

All the difficulties experienced by these individuals and considered in this and in other studies underscore the need for implementation and dissemination of diagnostic programs and early intervention. This way, the changes in the individuals can be addressed by trained professionals as soon as they appear.

The intervention geared at written language in SLI should occur concurrently to the approach of orality^(16,17) and phonological processing aspects, including those represented in this research - alliteration and rhyme - should also receive attention in the therapeutic space.

As oral language issues in SLI are usually pervasive and persistent, it is not appropriate to wait until they are completely overcome for only then addressing the stimulation of phonological processing, reading and writing skills. Thus, these individuals would benefit from early intervention in both language modes, as they run the risk to present difficulties in the literacy process as a result of impaired oral language.

It is worth noting that this study has limitations related to its implementation, the main one being the number of SG individuals. The initial plan was that the SG had 20 individuals, which was the number of school-aged children assisted in the laboratory and who met the inclusion criteria. However, some individuals abandoned the treatment while others were dismissed for lack of assiduous attendance, and as the service works through spontaneous demand, there were no further children meeting the criteria of this research.

Another limitation that must be mentioned concerns the fact that the individuals were undergoing speech therapy. However, considering that SLI is manifested in oral language during the preschool period, it is not desirable that children reach the school period without intervention. Furthermore, it would be interesting to check the performance of school-aged children with SLI in preschool age regarding these same skills.

In short, the quantitative and qualitative data presented in this research contributes to better understand the performance of school-aged children with SLI in phonological processing and writing skills. It also increases the information on the theme in national science, which has little research studies in contrast to the international context.

CONCLUSION

Student with SLI had poorer performance than their peers in alliteration and rhyming tasks, which shows the discrepancy in phonological processing skills between school-aged children with SLI and those without language change.

Furthermore, children with SLI carried out a more general analysis of stimuli, overlooking relevant aspects to the task that could have been carried out through a more analytical processing of information.

Thus, it is important that phonological awareness skills, including relatively simple and syllabic skills such as alliteration and rhyme, be addressed concurrently with oral language in the therapeutic process of cases of SLI.

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REFERENCES

1. Cunha VLO, Capellini SA. Análise psicolinguística e cognitivo-linguística das provas de habilidades metalinguísticas e leitura realizadas em escolares de 2a a 5a série. *Rev CEFAC*. 2010;12(5):772-83. <http://dx.doi.org/10.1590/S1516-18462010005000017>.
2. Capellini SA, Conrado TLBC. Desempenho de escolares com e sem dificuldades de aprendizagem de ensino particular em habilidade fonológica, nomeação rápida, leitura e escrita. *Rev CEFAC*. 2009;11(2):183-93. <http://dx.doi.org/10.1590/S1516-18462009005000002>.
3. Burke HL, Coody JA. Nonword repetition errors of children with and without specific language impairments (SLI). *Int J Lang Commun Disord*. 2015;50(3):337-46. PMID:25556549. <http://dx.doi.org/10.1111/1460-6984.12136>.

4. Capellini SA, Pinheiro FH. Development and implementation of metaphonological skills and reading assessment and intervention programs. *Procedia Soc Behav Sci*. 2015;174:1650-8. <http://dx.doi.org/10.1016/j.sbspro.2015.01.817>.
5. Wagensveld B, van Alphen P, Segers E, Verhoeven L. The nature of rhyme processing in preliterate children. *Br J Educ Psychol*. 2012;82(4):672-89. PMID:23025398. <http://dx.doi.org/10.1111/j.2044-8279.2011.02055.x>.
6. Costa RCC, Souza TNU, De Ávila CRB. Sensibilidade fonológica para rima e aliteração em pré-escolares com transtorno fonológico. *J Soc Bras Fonoaudiol*. 2011;23(2):129-34. PMID:21829928. <http://dx.doi.org/10.1590/S2179-64912011000200009>.
7. Nicolielo AP, Hage SRV. Relações entre processamento fonológico e linguagem escrita nos sujeitos com distúrbio específico de linguagem. *Rev CEFAC*. 2011;13(4):636-44. <http://dx.doi.org/10.1590/S1516-18462011005000086>.
8. Aguilar-Mediavilla E, Buil-Legaz L, Pérez-Castelló JA, Rigo-Carratalá E, Adrover-Roig D. Early preschool processing abilities predict subsequent reading outcomes in bilingual Spanish-Catalan children with Specific Language Impairment (SLI). *J Commun Disord*. 2014;50:19-35. PMID:24767985. <http://dx.doi.org/10.1016/j.jcomdis.2014.03.003>.
9. Wagensveld B, Segers E, van Alphen P, Verhoeven L. The role of lexical representations and phonological overlap in rhyme judgments of beginning, intermediate and advanced readers. *Learn Individ Differ*. 2013;23:64-71. <http://dx.doi.org/10.1016/j.lindif.2012.09.007>.
10. Carroll JM, Snowling MJ. The effects of global similarity between stimuli on children's judgment of rime and alliteration. *Appl Psycholinguist*. 2001;22(3):327-42. <http://dx.doi.org/10.1017/S0142716401003034>.
11. Hulme C, Muter V, Snowling M. Segmentation does predict early progress in learning to read better than rhyme: a reply to Bryant. *J Exp Child Psychol*. 1998;71(1):39-44. PMID:9742184. <http://dx.doi.org/10.1006/jecp.1998.2456>.
12. Kircher T, Nagels A, Kirner-Veselinovic A, Krach S. Neural correlates of rhyming vs. lexical and semantic fluency. *Brain Res*. 2011;1391:71-80. PMID:21447325. <http://dx.doi.org/10.1016/j.brainres.2011.03.054>.
13. Befi-Lopes DM, Pereira AC, Bento AC. Representação fonológica em crianças com Distúrbio Específico de Linguagem. *Pro Fono*. 2010;22(3):305-10. PMID:21103723. <http://dx.doi.org/10.1590/S0104-56872010000300025>.
14. Gonzalez DO, Cáceres AM, Bento-Gaz ACP, Befi-Lopes DM. The complexity of narrative interferes in the use of conjunctions in children with specific language impairment. *J Soc Bras Fonoaudiol*. 2012;24(1):152-6. PMID:22832683. <http://dx.doi.org/10.1590/S2179-64912012000200011>.
15. Gândara JP, Befi-lobes DM. Tendências da aquisição lexical em crianças em desenvolvimento normal e crianças com Alterações Específicas no Desenvolvimento da Linguagem. *Rev Soc Bras Fonoaudiol*. 2010;15(2):297-304. <http://dx.doi.org/10.1590/S1516-80342010000200024>.
16. Cordewener KA, Bosman AM, Verhoeven L. Characteristics of early spelling of children with Specific Language Impairment. *J Commun Disord*. 2012;45(3):212-22. PMID:22336389. <http://dx.doi.org/10.1016/j.jcomdis.2012.01.003>.
17. Cordewener KA, Verhoeven L, Bosman AM. Improving spelling performance and spelling consciousness. *J Exp Educ*. 2015;48-74. <http://dx.doi.org/101080/002209732014963213>.
18. Raskind WH, Peter B, Richards T, Eckert MM, Berninger VW. The genetics of reading disabilities: from phenotypes to candidate genes. *Front Psychol*. 2013;3:1-20. PMID:23308072. <http://dx.doi.org/10.3389/fpsyg.2012.00601>.
19. Befi-lobes DM. Vocabulário. In: Andrade CRF, Befi-Lopes DM, Fernandes FDM, Wertzner HF, editors. *ABFW: teste de linguagem infantil nas áreas de fonologia, vocabulário, fluência e pragmática*. 2. ed. Barueri: Pró-Fono, p. 33-50.
20. Wertzner HF. Fonologia. In: Andrade CRF, Befi-Lopes DM, Fernandes FDM, Wertzner HF. *ABFW – teste de linguagem infantil: nas áreas de fonologia, vocabulário, fluência e pragmática*. Barueri: Pró-Fono; 2004. cap. 1.
21. Fernandes FDM. Pragmática. In: Andrade CRF, Befi-Lopes DM, Fernandes FDM, Wertzner HF, editors. *ABFW: teste de linguagem infantil nas áreas de fonologia, vocabulário, fluência e pragmática*. 2. ed. Barueri: Pró-Fono; 2004. p. 83-97.
22. Araujo K. Desempenho gramatical de criança em desenvolvimento normal e com Distúrbio Específico de Linguagem [tese]. São Paulo (SP): Universidade de São Paulo; 2007. 322 p.
23. Capovilla FC. *Teste de vocabulário por figuras TVFUSP*. São Paulo: Editora Memnon edições científicas; 2011.
24. Raven JC, Court JH, Raven J. *Matrizes progressivas coloridas de Raven*. São Paulo: Casa do Psicólogo; 1988.
25. Herrero SF. *Perfil das crianças pré-escolares e escolares no teste de sensibilidade fonológica [dissertação]*. São Paulo (SP): Universidade de São Paulo; 2001. 124 p.
26. Vandewalle E, Boets B, Ghesquière P, Zink I. Development of phonological processing skills in children with specific language impairment with and without literacy delay a 3-year longitudinal study. *J Speech Lang Hear Res*. 2012;55(4):1053-67. PMID:22232409. [http://dx.doi.org/10.1044/1092-4388\(2011/10-0308\)](http://dx.doi.org/10.1044/1092-4388(2011/10-0308)).
27. Pinheiro FH. *Elaboração de procedimento avaliativo-terapêutico computadorizado para escolares com dificuldades de aprendizagem [tese]*. Marília (SP): Universidade Estadual Paulista; 2014. 205 p.
28. Lipourli E. Orthographic effects in auditory rhyme decisions in children. *Procedia Soc Behav Sci*. 2014;116:5143-51. <http://dx.doi.org/10.1016/j.sbspro.2014.01.1089>.
29. Wagensveld B, van Alphen P, Segers E, Hagoort P, Verhoeven L. The neural correlates of rhyme awareness in preliterate and literate children. *Clin Neurophysiol*. 2013;124(7):1336-45. PMID:23523114. <http://dx.doi.org/10.1016/j.clinph.2013.01.022>.
30. Tattersall PJ, Nelson NW, Tyler AA. Associations among nonword repetition and phonemic and vocabulary awareness: Implications for intervention. *Child Lang Teach Ther*. 2015;31(2):159-71. <http://dx.doi.org/10.1177/0265659014554719>.

Author contributions

PRP conducted the collection and tabulation of data and the necessary literature survey; AMCA performed the statistical analysis and assisted in the interpretation of the data; DMBL was responsible for guidance, review and final adjustment of the article.