CHARACTERIZATION OF UNCOMMON REPAIR STRATEGIES USED BY A GROUP OF CHILDREN WITH PHONOLOGICAL DISORDERS

Caracterização das estratégias de reparo incomuns utilizadas por um grupo de crianças com desvio fonológico

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ABSTRACT

Purpose: to verify and identify the use of uncommon repair strategies in children with phonological disorders, relating the use of those to age and gender variables to linguistic variables such as degree of deviation, syllable structure, classification of the sounds and the position of the word. **Methods:** the data are taken from a database of the Department of Language and Speech studies of the Federal University of Santa Maria. We selected the data according to these criteria: diagnosis of phonological disorder, ages from 4:0 to 7:11, and the ones who were allowed to participate by signing the consent form. The results obtained at the first phonological assessment of the child were analyzed. **Results:** there were significant differences in the use of the uncommon repair strategies in our sample, as well as the relationship between the use of those strategies and age, mainly between the ages from 5:0 to 5:11, and the degree of deviation with more occurrences in the moderate-severe disorder. It was also obtained a significant relation between the classes of sounds, with predominant use of the fricatives. An occurrence of the unusual repair strategies in onset position was observed, being the consonant-vowel the only structure found. **Conclusion:** it was found that the unusual repair strategies are not widely used by children with phonological disorders. In addition, it was found a significant relationship between the use of repair strategies and unusual variables, such as age, grade of phonological disorders and classes of sounds.

KEYWORDS: Language Development; Speech; Speech Disorders; Speech Therapy

INTRODUCTION

During the phonological acquisition, children should learn the sounds that are used in their language and the way they are organized[1]. The process of acquisition and phonological development occurs gradually, until there is the establishment of the phonological system, according to the linguistic community that the child is inserted. However, there is no consensus in the literature regarding the age at which the child must master of this system. Some authors[2,3] believe that the end of phonological acquisition can vary from four to six years. Although it is possible to identify general trends in the acquisition, individual variations can be observed among infants, both in segmental, as in the prosodic area[3].

In relation to the order of acquisition of consonant segments, the plosive and nasal are the first ones to be established, followed by fricatives and, finally, the liquids[3]. For the syllabic structure, there is an order of acquisition "V" e "CV", "CVV", "CVC", "CCV", in which V represents a vowel and C a consonant[4,5].

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Concerning the acquisition of the position in the syllable and in the word, the order is primarily medial *onset* (initial of syllable inside the word), followed by the final coda (final of syllable final of word), initial *onset* (initial of syllable initial of word) and medial coda (final syllable in the word) [5]..

But for some children the phonological acquisition does not occur as expected. These children have phonological disorder (PD), which is characterized by an abnormal production of sounds and inappropriate use of phonological rules of the language[6]. The speech disorders in phonological level affect the organization of linguistic sounds, in a way that they are not used contrastively, ie, there is difficulty in mental organization, the establishment of the target language and inadequacy to oral information that is received. Then, the speech production becomes often incomprehensible to the listener [7,8]. At the PD detectable causal problems are not observed, such as general learning difficulties, intellectual deficit, neuromotor disorders, psychiatric disorders and/or environmental factors[6].

Another characteristic of PD is the presence of repair strategies, which ones can also be observed in typical phonological development, but with chronologic differences, once in children with PD, these strategies persist for a longer time. Such strategies are resources used by children, in attempting to adapt their phonological system in relation to the adult target system. These resources are used in place of the segment and/or syllable structure that children do not know yet or do not have acquired[3,9].

The repair strategies constitute a valid and reliable instrument for analysis, being able to describe the phonological development, both typical and atypical, thus allowing a clear and simple comparison among phonology with deviations, the normal acquisition and the target of adult speech[10].

There has been some studies examining the repair strategies present in typical phonological development of Brazilian Portuguese (hereinafter BP)[3,9,10]. These studies have shown some common strategies during normal development. However, children with PD can present other kinds of strategies not found in normal phonological acquisition, named non-common repair strategies (NRS). The NRS that is used by children with PD were little discussed in researches and there is no consensus among authors about this topic.

Considering the explanations, the aim of this study is to characterize and to analyze the use of NRS for children with PD in a way to correlate their use with the age and gender as variables; and with the degree of deviation, syllable structure, sound class and position in the word, as linguistic variables.

METHODS

This research is classified as explanatory, transversional, and the data were analyzed quantitatively.

It was analyzed the data from the assessment records of subjects who followed the following inclusion criteria: having a diagnosis of PD; being between 4:0 and 7:11. In this study it was not analyzed the data from subjects who received speech therapy before; who had general learning difficulties, intellectual deficits, neuromotor disorders, psychiatric disorders and/or otological problems.

For the research it was analyzed the results of the first phonological assessment of child (PAC)[10] being observed the occurrence of NRS. It was defined as children who used the NRS, only those ones who used these strategies with a percentage of less or more than 40%, this percentage was adopted taking into account the acquisition of phonemes of the phonological system[11]. Once there is no agreement in the literature among authors in relation to the NRS, the identification of these ones was made by exclusion of the strategies that are considered common. To this end, it was took into account the repair strategies mentioned in the book *"Aquisição Fonológica do Português – perfil de desenvolvimento e subsídios para terapia"*[3] (Figure 1).

Through the contrastive analysis, it was identified the NRS, as well as the percentage of occurrences, considering only those ones with a percentage of less or more than 40%. Based on the phonetic transcription, it was selected words that had such strategies. It was analyzed the following aspects: syllabic structure, it would be CV, CVC, or CCV; position in the word in which occurred the strategy, in IO, MO, MC or FC; the class sound, if plosive, nasal, fricative or liquid, and finally, it was analyzed the NRS with the highest number of occurrence.

The PD was classified based on the Percentage of Consonants Correct Revised (PCC-R) [12], which does not consider the distortions produced by the subject and it is based on the Percentage of Consonants Correct (PCC) [13]. The PCC-R is calculated by dividing the number of consonants that are produced correctly by total number of produced consonants. Finally, it is multiplied the value obtained by 100 and then it is classified the PD in mild deviation (MD) (86-100%), mild-moderate deviation (MMD) (66-85%), moderately-severe deviation (MSD) (51-65%); and serious deviation (SD), when the PCC-R is equal to or less than 50%.

In addition, it was analyzed the incidence of NRS in terms of gender and age.

Of the 193 children who make part of the analyzed database, 178 followed the inclusion criteria. The sex, age, degree of phonological, position in word

Repair Strategies that were used in the acquisition of plosives, according to Fronza (1998):
- Deletions; - Dissonorizations (/g/→[k], /b/→[p], /d/→[t]); - Sonorizations (/p/→[b], /k/→[g]); - Anteriorizations (/k, g/→ [t, d] ou [p, b]).
Repair Strategies that were used in the acquisition of nasals, according to Rangel (1998b):
- Involving the soant trait (/m/→[b]); - Alteration of trait [labial] to [coronal] (/m/→[n]); - Substitution of /ɲ/ → [ʒ]; - Deletions.
Repair Strategies that were used in the process of acquisition of /f/ and /v/, according to Oliveira (2004):
- Omission of the segment; - Omission of syllable; - Substitutions of the value of the trait [sonour] (/f/→[v], /v/→[f]); - Substitutions of value of trait [continuous] (/f/→[p], /v/→[b]); - Substitutions of point (/f/→[s]); - Substitution for semi-vowal (/f/→[w], /v/→[w]).
Repair Strategies that were used in the process of acquisition of /s/, /z/, /ʃ/ and /ʒ/, according to Savio (2001) e Oliveira (2002):
- Omission of the segment; - Omission of syllable; - Substitution of the value of the trait [anterior] (/s/→[ʃ], /z/→[ʒ], /ʃ/→[s], /ʒ/→[z]); - Substitution of the value of the trait [sonour] (/s/→[z], /z/→[ʃ], /ʃ/→[ʒ], /ʒ/→[ʃ]); - Substitution of the value of the trait [continuous] (/s/→[t], /z/→[d], /ʃ/→[k], /ʒ/→[d]); - Substitution of point (/ʃ/→[f], /ʒ/→[v]).
Repair Strategies in the acquisition of the lateral liquid /l/, according to Azambuja (1998):
- Deletions of the segment and of the syllable; - Semi-vocalization (/l/→[j, w]); - Substitution (/l/→[n], /l/→[r]).
Repair Strategies in the acquisition of the liquid /ʎ/, according to Azambuja (1998):
- Deletions. - Substitution (/ʎ/→[l], /ʎ/→[lj], /ʎ/-> [r], /ʎ/ -> [rj]); - Semi-vocalization (/ʎ/→ [j]);
Repair Strategies in the acquisition of the non-lateral liquid /R/, according to Oliveira (2004):
- Deletions ; - Substitution for [l]; - Substitution for plosives ([k, g, t, d]); - Semi-vocalization ([j, w]).
Repair Strategies in the acquisition of the non-lateral liquid /r/, according to Oliveira (2004):
- Deletions ; - Substitution for [l]; - Semi-vocalization ([j, w]).

Figure 1 – Repair Strategies that are used in the phonological acquisition which are referred in the book "Aquisição Fonológica do Português – perfil de desenvolvimento e subsídios para terapia"

and syllable structure variables were analyzed only in children who underwent NRS (n = 42). Ten of these were aged between 4:0 and 4:11, 19 were aged between 5:0 to 5:11, ten between 6:0 and 6:11 and three between 7:0 and 7:11. In relation to the gravity of the PD, four presented MD, fourteen presented MMD, seventeen presented MSD and seven presented SD.

The study data were collected through a survey in the database of an ongoing research project conducted at the Department of Studies in Language and Speech (CELF), Universidade Federal de Santa Maria (UFSM), all subjects have a signed consent form (CF) allowing the data to conduct research.

It was duly approved and registered by the Ethics Committee (EC) of UFSM under the number 052/2004.

After making the collection and selection, the data were tabled and analyzed statistically where possible, if not; it was only carried out a descriptive analysis. It was used the nonparametric statistical

test of Chi-Square, with significance level set at 5% ($p < 0.05$).

RESULTS

In the studied sample, it was possible to verify statistical significance ($p = 0.001$) in relation to the use or not of NRS, being that the majority of the subjects (76.40%) diagnosed with PD did not use the strategies (Table 1).

Table 2 shows the relation between the use of NRS and gender, with no statistically significant difference ($p = 0.217$). However, it was observed that the majority (59.52%) of infants who have used the NRS is male.

Table 1 – Use of Non-Common Strategies

	Frequency	Porcentage	Value of p
Used NRS	42	23,69%	0,0001*
Not used NRS	136	76,40%	

Descriptor: NRS = Non-Common Repair Strategies; Statistic Test: Chi-Square Test, with level of significance set at 5% ($p<0.05$). The asterisk indicates the value of p with statistically significance.

Regarding age, there was a statistically significant difference ($p = 0.006$) in the comparison in relation to the use of NRS in the four analyzed groups. Being that the variation of 5:0 – 5:11 was the largest number of children (45.24%) who underwent such strategies, and the smallest number (7.14%) in the variation of 7:0 – 7:11.

Table 2 – Use of non-common repair strategies in relation to the gender

Gender	Frequency	Porcentage	Value of p
F	17	40,48%	0,2170
M	25	59,52%	

Descriptor: F=female; M=male; Statistic Test: Chi-Square Test, with level of significance set at 5% ($p<0.05$).

In relation to the level of PD, it was observed a statistical significance ($p = 0.015$) in the comparison of the four degrees to the number of children who used the NRS. The largest number of occurrences of such strategies was the MSD (40.48%) followed by MMD (33.33%).

Table 5 shows the use of the NRS in the different classes of sounds. It was found these strategies in

Table 3 – Comparison between the use of non-common repair strategies and age groups

Age groups	Frequency	Porcentage	Value of p
4:0 - 4:11	10	23,81%	0,0065*
5:0 - 5:11	19	45,24%	
6:0 - 6:11	10	23,81%	
7:0 - 7:11	3	7,14%	

Statistic Test: Chi-Square Test, With level of significance set at 5% ($p<0.05$). The asterisk indicates the value of p with statistically significance.

all classes of sounds, however there was a prevalence of use in the class of fricatives (53.26%), with statistical significance (p = 0.0001).

In the class of plosives occurred the NRS of posteriorization, glottalization, fricatization and substitution of /d/ e /t/ à [ts]. In the class of nasals occurred only the NRS of substitution of /n/à[l]. In fricatives occurred posteriorization, plosivization, glottalization, semi-vocalization, anteriorization, africation and substitution of /f/, /v/, /s/, /z/, /ʃ/, /ʒ/ à [R] and of /ʃ/ à [ts]. Some repair strategies used by children in the study are considered common, however the substitution made is not expected, so these cases were considered non-common.

Table 4 – Use of Non-Common Repair Strategies in relation to the levels of phonological disorder

Level of PD	Frequency	Porcentage	Value of p
MD	4	9,52%	0,0156*
MMD	14	33,33%	
MSD	17	40,48%	
SD	7	16,67%	

Descriptor: PD=phonological disorder; MD=mild disorder; MMD=mild-moderate disorder; MSD=moderate-severe disorder; SD=severe disorder. Statistic Test: Chi-Square Test, with level of significance set at 5% (p<0.05). The asterisk indicates the value of p with statistically significance.

In this study, it was used NRS in 831 words, which were analyzed descriptively. Whereas the word position, it was observed the occurrence of the NRS only in IO and MO, with a frequency of 353 (42.47%) in IO and 488 (57.53%) in MO. Concerning the syllabic structure, it was observed the use of NRS only in the CV structure.

Figure 2 shows all the substitutions that were found in the study, being the substitution of /ʃ/ à [t] the most occurred one, followed by the substitution of /k/ à [t].

Table 5 – Use of Non-Common Repair Strategies in relation to the classes of sounds

Class of Sounds	Frequency	Porcentage	Value of p
Plosives	34	36,96%	0,0001*
Nasals	1	1,09%	
Fricatives	49	53,26%	
Liquids	8	8,70%	

Statistic Test: Chi-Square Test, with level of significance set at 5% (p<0.05). The asterisk indicates the value of p with statistically significance.

PLOSIVES			NASALS			FRICATIVES			LIQUIDS		
Sub.	**Oc.**	**Ex.**	**Sub.**	**Oc.**	**Ex.**	**Sub.**	**Oc.**	**Ex.**	**Sub.**	**Oc.**	**Ex.**
/p/ -> [k]	1	papel -> [ka'kew]	/n/ -> [l]	1	banana -> [ba'lala]	/f/-> [ʃ]	2	café -> [ka' ʃ Se]	/r/ -> [z]	1	barata -> [ba'zata]
/p/ -> [?]	1	roupa -> ['Ro?a]				/f/ -> [R]	1	sofá -> [so'Ra]	/r/ -> [d]	1	chícara -> ['Sikada]
/b/ -> [g]	1	banco -> ['gãnku]				/f/ -> [t]	3	fogo -> ['togu]	/R/ -> [ʒ]	1	Relógio -> [ʒ e'roSu]
/b/ -> [?]	2	banho -> ['?aNu]				/f/ -> [k]	1	fogo -> ['kogu]	/R/--> [f]	1	carro--> ['kafu]
/t/ -> [?]	1	tinta -> ['?in?a]				/f/ -> [?]	1	faz -> ['?as]	/l/ -> [d]	1	bola -> ['boda]
/t/ ->[k]	8	porta -> ['porka]				/v/ -> [ʃ]	2	vou -> [ʃ So]	/l/ -> [z]	1	lápis -> ['zapis]
/t/ -> [ts]	1	sapatu -> [sa'patsu]				/v/ -> [R]	1	chuva -> ['SuRa]	/L/ ->[z]	1	toalha -> [tu'aza]
/d/ -> [?]	1	deu -> ['?ew]				/v/ -> [y]	1	chuva -> [' ʃ Suya]	/L/ ->[d]	1	martelo -> [mar'tedo]
/d/ ->[g]	7	dado -> ['gagu]				/v/ -> [d]	1	uva -> ['uda]			
/d/-> [k]	1	dois-->['kois]				/v/-> [t]	1	vaso--> ['taso]			
/d/ ->[ts]	1	nada -> ['natsa]				/v/-> [p]	1	ovo--> ['opu]			
/k/ -> [f]	1	cano -> ['fãnu]				/s/-> [k]	3	sei -> ['kej]			
/k/ -> [?]	4	cama--->['?ama]				/s/ -> [f]	1	sol -> ['fow]			
/g/ -> [v]	1	igual -> [i'vaw]				/s/-> [R]	3	urso--> ['uRo]			
/g/ -> [?]	3	guri -> [?u'i]				/z/ -> [g]	2	piso -> ['pigu]			
						/z/ -> [v]	1	mesa -> ['meva]			
						/z/-> [t]	1	zebra--->['tepa]			
						/z/-> [R]	1	azul--->['aRuw]			
						/ʃ/ -> [t]	10	cachorro -> [ka'tolu]			
						/ʃ/-> [ts]	1	chuva -> ['tsuva]			
						/ʃ/->[tʃ]	2	xícara -> ['t ʃ Sikala]			
						/ʃ/-> [R]	2	chão--->[' Rãw]			
						/ʒ/-> [t]	1	jarra--->[ta'RA]			
						/ʒ/-> [k]	2	janela -> [ka'nela]			
						/ʒ/→ [g]	1	gelado -> [ge'agu]			
						/ʒ/-> [y]	1	janela -> [ya'nela]			
						/ʒ/-> [d]	1	feijão--->[fe'dãw]			
						/ʒ/→ [R]	1	pijama--->[pi'Rama]			

Descriptor 2: Sub.= substitution, Oc.= occurence, Ex.=exemple.

Figure 2 – Non-Common Substitutions found in the studied sample

DISCUSSION

A great difference between the typical and atypical development is the existence of NRS, which are rarely observed during the normal acquisition[3]. The present study investigated the use of such strategies in children with PD and shown to be significant to the relation of the use or not of NRS, being prevalent the non-use in the studied group.

With regard to gender, in this study was not significant the use of NRS by one gender or other, however, it could be observed that the number of male children has been increased when compared to women. It is observed in studies on language disorders that boys have a high prevalence of such problems, once the construction of speech occurs with more difficulty in females[12,14,15]. There are few studies[16] in which there is superiority in performance of boys in relation to aspects of language, when compared to girls. This fact can be explained by the anatomy and physiology of the central nervous system, since differences were observed between the genders by neuroimaging studies, which showed that women use both hemispheres to process language differently from the opposite sex, to achieve the same task, it seemed to use specific areas of the dominant hemisphere[17],, and other evidence as the fact that women in the areas of Broca and Wernicke, related to speech, are bigger[18].

The typical phonological development of BP is almost complete around the ages of 4 and 5 years old being that the moment that age of the children increases, there is also an increase in the correct production of phonemes, reaching a peak of percentage that represents the stabilization of the use [16,19]. A study of the used repair strategies in the class of liquids for children with PD did not observe differences in the use of strategies in relation to age variable[20]. Differently from the present study, considering the NRS, in which this relation was significant, being found more children making use of non-common strategies in the variation of 5:0-5:11.

Children with PD, being in older age groups, are more able to produce sounds similar to the ones produced by adults, which translates into a greater number and frequency of repair strategies in their elocutions[21]. However, in the variation of 7:0-7:11, the highest in the study, the number of children who used the NRS was reduced when compared to other groups, not agreeing with the previous statement and confirmed that with advancing age occurs improves production of phonemes.

In a study[9], which analyzed the relation between the repair strategies used by a group of children with PD and its severity, it was found that the greater the severity of phonological disorder is, the more used are the repair strategies. The initial hypothesis of this study and the severity of PD was that repair strategies were used in more severe cases, in which there is severe impairment in the phonological system. However, this fact was not confirmed with predominance in the MSD, followed by MMD.

In relation to the different classes of sounds, some authors[22,23] verified that some classes are more likely to change than others, and they believe that this fact reflects the complexity of each class. The classes of fricatives[24] and liquids[19] and seem to be those ones in which children have more difficulties, once they are equivalent to the integration of, at least, two later traits of acquisition: [+cont] and [+aprox].

In the present study, it was investigated the use of NRS in the different classes of sounds, and it was found that the fricatives were most affected by these strategies, with statistical significance. No studies were found in the literature analyzing the NRS in all classes of sounds, however, some studies[25,26] considering the repair strategies in general, show that the class of liquid sounds is the most affected by the repair strategies, differing from the results of this study in relation to the non-common strategies.

One study[20] examined the occurrence of repair strategies in liquid consonants, and it found little use of NRS in this class of sounds. Another study[21] has focused on the deviant acquisition of the non-lateral liquids, and it also found little occurrence of non-common strategies.

Considering the position in the word, in the present study it was found NRS only in initial *onset* and medial *onset*, as can be observed in the results. This may be related to the number of consonants that can occupy the position of *onset*, compared with the number of consonants that occupy the coda position. In BP, 16 consonants can occupy the position of syllabic *onset*, or at the beginning of the first syllable word and 19 on syllable inside the word *onset*. On the other hand, in coda, i.e., at the end of the syllable, only the /s/, /r/, /w/ and /N/ occupy this position[27].

Considering these results and the limited literature about the subject of this study, it is suggested the development of new research in order to contribute to the clinical practice of the speech therapist. This feature can help in diagnosis, differentiating the typical development of atypical, in treatment planning, providing evidence for the prognosis.

CONCLUSION

It was verified that the NRS is little used by children with PD. As regards the identification

variables, it was found that age may be related to the use of NRS in this group. Considering the linguistic variables, a relation was found between the use of NRS and the degree of PD and the classes of sounds. The position in the word is found use of strategies only in the position of *onset*, being the syllabic structure of VC the only one found in the study.

Once there is little research on this topic, it is suggested to carry out further studies to confirm these results and that discuss other aspects.

RESUMO

Objetivo: caracterizar e analisar o uso das estratégias de reparo incomuns por crianças com desvio fonológico e relacionar a sua utilização com as variáveis faixa etária e sexo; e com as variáveis linguísticas grau do desvio, estrutura silábica, classe de sons e posição na palavra. **Métodos:** os dados são provenientes do banco de dados do Centro de Estudos de Linguagem e Fala da Universidade Federal de Santa Maria, todos os sujeitos apresentam Termo de Consentimento Livre e Esclarecido autorizando o uso dos dados em pesquisas. Foram selecionados os dados de 178 sujeitos que apresentaram diagnóstico de desvio fonológico e idade entre 4:0-7:11. Foram analisados os resultados da primeira avaliação fonológica da criança. **Resultados**: houve significância estatística na relação entre a utilização ou não de estratégias de reparo incomuns na amostra estudada, predominando a não utilização. Foi significante a relação entre a utilização de tais estratégias e a faixa etária, com predomínio na faixa de 5:0-5:11, e o grau do desvio, com maior ocorrência no desvio moderadamente-grave. A relação entre as classes de sons também foi significante, predominando a classe das fricativas. Observou-se ocorrência de estratégias de reparo incomuns apenas na posição de *onset,* sendo a estrutura consoante vogal a única encontrada no estudo. **Conclusão:** verificou-se que as estratégias de reparo incomuns são pouco utilizadas por crianças com desvio fonológico. Além disso, encontrou-se relação significante entre a utilização de estratégias de reparo incomuns e as variáveis faixa etária, grau do desvio fonológico e classes de sons.

DESCRITORES: Desenvolvimento da Linguagem; Fala; Distúrbios da Fala; Fonoterapia

REFERENCES

1. Pereira LF, Mota HB. Tratamento fonológico baseado nos contrastes de oposições máximas. Pró-Fono. 2002;14(2):165-74.

2. Vieira MG, Mota HB, Keske-Soares M. Relação entre idade, grau de severidade do desvio fonológico e consciência fonológica. Rev Soc Bras Fonoaudiol. 2004; 9(3):144-50.

3. Lamprecht RR. (Org.). Aquisição fonológica do português: perfil de desenvolvimento e subsídios para terapia. Porto Alegre: Artmed; 2004.

4. Lamprecht RR. A aquisição da fonologia do português na faixa etária dos 2:9 – 5:5. Letras de Hoje. 1993;28(2):99-106.

5. Keske-Soares M, Blanco APF, Mota HB. O desvio fonológico caracterizado por índices de substituição e omissão. Rev Soc Bras Fonoaudiol. 2004;9(1):10-8.

6. Wertzner HF, Amaro L, Galea DES. Phonological performance measured by speech severity indices compared with correlated factors. São Paulo Med J. 2007;125(6):309-14.

7. Grunwell P. The Nature of phonological disability in children. London: Academic Press; 1981.

8. Mota HB, Keske-Soares M, Bagetti T, Ceron MI, Melo Filha MGC. Análise comparativa da eficiência de três diferentes modelos de terapia fonológica. Pró-Fono R. Atual. Cient. 2007;19(1):67-74.

9. Ghisleni MRL, Keske-Soares M, Mezzomo CL. O uso das estratégias de reparo, considerando a gravidade do desvio fonológico evolutivo. Rev. CEFAC. 2010;12(5):766-77.

10. Yavas M, Hernandorena, CLM, Lamprecht RR. Avaliação fonológica da criança: reeducação e terapia. Porto Alegre: Artes Médicas, 2001.

11. Bernhardt B. The application of nonlinear phonological theory to intervention with one phonologically disorders child. Clinical Linguistics & Phonetics. 1992;6:23-45.

12. Shriberg LD, Austin D, Lewis BA, Mcsweeny JL, Wilson DL. The percentage of consonants correct

(PCC) metric: extensions and reliability data. J Speech Lang Hear Res. 1997;40(4):708-22.

13. Shriberg LD, Kwiatkowski J. Phonological disorders I: a diagnostic classification system. J Speech Hear Disord. 1982;47(3):226-41.

14. Lima BPS, Guimarães JATL, Rocha MCG. Características epidemiológicas das alterações de linguagem em um centro fonoaudiológico do primeiro setor. Rev Soc Bras Fonoaudiol. 2008;13(4):376-80.

15. Mezzomo CL, Mota HB, Dias RF, Giacchini V. Fatores relevantes para a coda lexical e morfológica no português brasileiro. Rev CEFAC. 2010;12(3):412-20.

16. Athayde ML, Baesso JS, Dias RF, Giacchini V, Mezzomo CL. O papel das variáveis extralinguísticas idade e sexo no desenvolvimento da coda silábica. Rev Soc Bras Fonoaudiol. 2009;14(3):293-9.

17. Vallet RE. Fatores neuropsicológicos críticos. In: Vallet RE. Dislexia: uma bordagem neuropsicológica para a educação de crianças com graves desordens de leitura. São Paulo: Manole;1990. p. 11-7.

18. Knaus TA, Bollich AM, Corey DM, Lemen LC, Foundas AL. Sex-linked ifferences in the anatomy of the perisylvian language cortex: a volumetric MRI study of gray matter volumes. Neuropsychology. 2004;18(4):738- 47.

19. Mezzomo CL, Ribas LP. Sobre a aquisição das líquidas. In: Lamprecht RR (org.). Aquisição fonológica do português: perfil de desenvolvimento e subsídios para terapia. Porto Alegre: Artmed; 2004. p. 95-112.

20. Wiethan FM, Melo RM, Mota HB. Consoantes líquidas: ocorrência de estratégias de reparo em diferentes faixas etárias e gravidades do desvio fonológico. Rev CEFAC. 2010;13(4):607-16.

21. Vidor D. Aquisição das líquidas não-laterais por crianças com desvios fonológicos evolutivos: descrição, análise e comparação com o desenvolvimento normal. Letras de Hoje. 2001;36(3):715-20.

22. Lamprecht RR. Perfil da aquisição normal da fonologia do Português. Descrição longitudinal de 12 crianças: 2:9 a 5:5 [tese]. Porto Alegre (RS): Pontifícia Universidade Católica do Rio Grande do Sul; 1990.

23. Savio CB. Aquisição das fricativas /s/ e /z/ do Português Brasileiro. Letras de Hoje. 2001;36(2):721-7.

24. Oliveira CC, Mezzomo CL, Freitas GCM, Lamprecht, RR. Cronologia da aquisição dos segmentos e das estruturas silábicas. In: Lamprecht RR (org). Aquisição fonológica do português: perfil de desenvolvimento e subsídios para terapia. Porto Alegre: Artmed;2004. p.167-76.

25. Wertzner H, Pagan-Neves l, Castro MM. Análise acústica e índice de estimulabilidade nos sons líquidos do Português Brasileiro. Rev CEFAC. 2007;9(3): 339-50.

26. Patah LK, Takiushi N. Prevalência das alterações fonológicas e uso dos processos fonológicos em escolares aos 7 anos. Rev CEFAC. 2008;10(2):158-67.

27. Galea DES, Wertzner H. Comparação entre onset e coda silábica durante a aquisição Fonológica. Rev Soc Bras Fonoaudiol. 2010;15(1):103-7.

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