SOUNDS OMISSION IN CHILDREN WITH PHONOLOGICAL DISORDER ACCORDING TO AGE AND SEVERITY DISORDER

Omissão de segmentos em crianças com desvio fonológico de acordo com a faixa etária e a gravidade do desvio

Débora Durigon da Silva[1], Letícia Arruda Nóro[2], Fernanda Marafiga Wiethan[3], Aline Berticelli[4], Helena Bolli Mota[5]

ABSTRACT

Purpose: verifying which sounds are omitted in the simple onset position in the general phonological system of children with speech disorder, according to the age and the speech disorder severity. **Methods:** 60 children with phonological disorder diagnosis took part in this study. All of them were aged from four to eight years and eleven months and who omitted any sound of Brazilian Portuguese in initial or medial onset position, with 40% or more of the repair strategy in the phonological system. The data were submitted to statistical analysis through Binomial Test of comparison between two proportions, with $p < 0,05$. **Results:** there was prevalence of omission of liquid consonants. Regarding to the disorder severity, in the mild disorder and mild-moderate disorder only the liquids were omitted, in the moderate-severe disorder liquids and fricatives were omitted and in severe disorder, there were omissions of all consonants of Brazilian Portuguese. According to the age, there were more omissions in the following ages: four to four years and eleven months and five to five years and eleven months. **Conclusion:** the sound omission in simple onset position was prevalent to the liquids and in the more severe disorders. Moreover, there was a trend that younger children presented more omissions.

KEYWORDS: Speech; Speech Disorders; Child; Child Language; Language Development

(1) Universidade Federal de Santa Maria – UFSM - Santa Maria, RS, Brazil.

(2) Universidade Federal de Santa Maria – UFSM - Santa Maria, RS, Brazil.

(3) Program of Human Communication Disorders from Universidade Federal de Santa Maria – UFSM, Santa Maria, RS, Brazil.

(4) Universidade Federal de Santa Maria – UFSM, Santa Maria, RS, Brazil.

(5) Speech and Language Course and the Post-Graduation Program in Human Communication Disorders from Universidade Federal de Santa Maria – UFSM, Santa Maria, RS, Brazil.

Study performed at the Department of Language and Speech Studies - CELF from the Course of Speech and Language Therapy and Post-Graduation Program in Human Communication Disorders from Universidade Federal de Santa Maria – UFSM, Santa Maria, RS, Brazil.

Assistance Source: CAPES, CNPq

Conflict of interest: non-existent

INTRODUCTION

The process of phonological acquisition occurs gradually, until the moment there is the real acquisition of the phonological system. Until children are five years olf, it is expected that that system is acquired[1]. However, in some cases, that process may last longer time, until children are no more than six years old, still considered as typical, because of individual variation. In that period, children present different development phases and they use several strategies when they perceive the complex behavior of the phonological units of the system they are acquiring. There may be phonemic substitutions or even omissions/not performance of segments and also of complex syllabic structures[2].

However, for some children, the phonological information processing occurs different than it is

expected for them, with some difficulties in the acquisition of the target phonological system and/or mental organization of the language sounds[1,3,4]. Those cases are called phonological disorders (PD), which presents alterations in the typical speech development, when speech becomes, in some cases, unintelligible[5,6].

In the beginning of children's phonological acquisition, there may be substitutions, omissions and non performance of phones. These occurrences appear in cases children cannot perform certain phones by several reasons, illustrating that their knowledge of the linguistical rules is still reduced. In the moment children perceive production difficulties, of one or more phonemes, they can omit or not perform the segment, what makes their speech even more unintelligible by the listener[2,7,8].

Considering the damage in speech intelligibility caused by omission and the possible negative consequences of that alteration in the phonological awareness skills and writing acquisition, the purpose of this study is to verify in the general phonological system which phones are omitted, in the simple onset position, by children with phonological disorders, according to age group and severity of the phonological disorder.

METHODS

This study is part of two research projects in the phonological disorders area. Both were approved by the Research and Ethics Committee from Universidade Federal de Santa Maria – UFSM, numbers 052/04 and 23081.0117157/2009-63.

It was a study performed through the data basis analysis of both projects. The data basis consists of 188 subjects with diagnosis of phonological disorders, established through speech-language and complementary evaluations, with emphasis in the Children's Phonological Evaluation[9] and submitted to phonological therapy. For this study, 60 children with the established criteria were included for the research performance. The people responsible for the children authorized them to participate in the study through the signature of the Informed Consent Term.

The subjects inclusion criteria adopted to the participation in the study were the following: to present diagnosis of phonological disorders; to be aged between 4 and 8 years old and 11 months; and to omit any phone of Brazilian Portuguese in initial and/or medial position, with the use of 40% or more in their phonological system[10]. The minimal age of 4 years old was determined because it is the mark to diagnose phonological disorders, because, although the phonological system is still incomplete, it is possible to perceive if there are delays or disorders in the typical phonological acquisition, considering the researches about chronology of Brazilian Portuguese phonological acquisition. The age of 8 years old and 11 months is the maximum limit to acquire sounds. After that age, the substitutions are not considered as phonological disorders anymore and they start to be residual speech sound errors[1,11].

The considered exclusion criteria were: having received any type of speech-language therapy previous to the first evaluation of the phonological system, presence of speech-language alterations with the phonological disorder, and evident alterations in the neurological, cognitive and psychological areas.

The speech sample, obtained through the Children's Phonological Assessment (CPA)[9], was transcribed phonetically and analyzed by contrast. Then, it was reviewed by two other researchers with experience in phonetic transcription and perceptive/heard analysis.

According to the results of the contrastive analysis, it was determined the severity of the phonological disorders through the Percentage of Consonants Correct – Revised (PCC-R)[12] which does not consider the distortions produced by subjects in the count of phonological errors and it is based on the classification of the Percentage of Consonants Correct (PCC)[13]. According to the PCC, the severity of the phonological disorder can be classified as: Mild (MD), Mild-moderate (MMD), Moderate-severe (MSD) and Severe (SD). The PCC is calculated after the division of the consonants which are correctly produced, by the total number of produced consonants (correct+incorrect). So, the authors decided that the MD presents PCC between 86% and 100%, the MMD presents PCC between 66 and 85%, the MSD presents PCC between 51 and 65% and the SD presents PCC lower than 50%.

The object analyzed in this research were the prevalence of omitted phones and the amount of omission by sound classes and its relations with the severity of the phonological disorder and with the age group.

The studied data were submitted to statistical analysis through the Binomial testing to compare proportions with the program Bioestat 5.3. The significance level selected to the statistical tests was 5% ($p<0.05$).

RESULTS

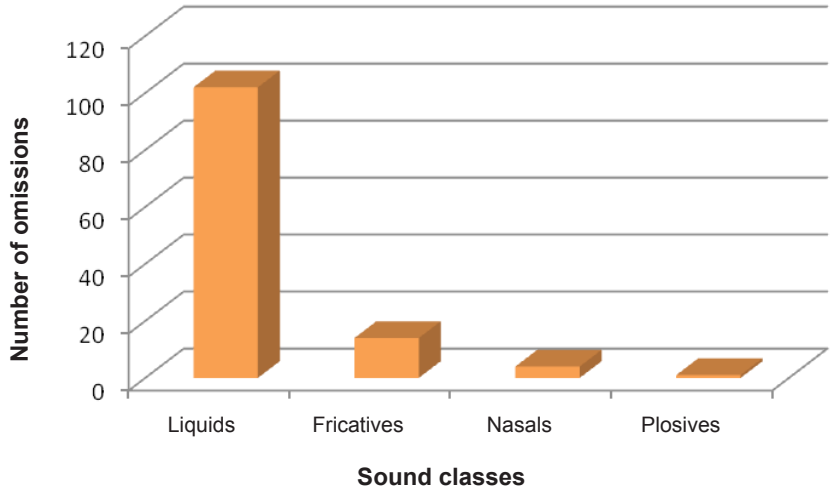
Table 1 presents the number of omissions by phone. By comparing each other, it was verified higher number of omissions to the phones /R/ and /r/ in relation to /λ/, nasal, fricatives and /b/.

Figure 1 illustrates the number of omission by classes of phones. In the liquid class, it was observed higher number of omissions in relation to all the other classes, with p value 0.0001, in the comparison with the other classes. The fricatives presented more omission than nasal and plosives, with p values of 0.0157 and 0.0006, respectively.

Table 1 – Comparison of the number of omission among the phones

Phones	Number of omissions by phone	p value
/r/ x /R/	38 x 35	0.6957
/r/ x /l/	38 x 25	0.0726
/r/ x/ /λ/	38 x 4	0.0001*
/r/ x nasals	38 x 4	0.0001*
/r/ x fricatives	38 x 14	0.0003*
/r/ x /b/	38 x 1	0.0001*
/R/ x /l/	35 x 25	0.1591
/R/ x /λ/	35 x 4	0.0001*
/R/ x nasals	35 x 4	0.0001*
/R/ x fricatives	35 x 14	0.0013*
/R/ x /b/	35 x 1	0.0001*
/l/ x /λ/	25 x 4	0.0001*
/l/ x nasals	25 x 4	0.0001*
/l/ x fricatives	25 x 14	0.0628
/l/ x /b/	25 x 1	0.0001*
/λ/ x nasals	4 x 4	1.0000
/λ/ x fricatives	4 x 14	0.0157*
/λ/ x b	4 x 1	0.1768
Nasais x fricativas	4 x 14	0.0157*
Nasals x /b/	4 x 1	0.1768
Fricatives x /b/	14 x 1	0.0006*

* p values with statistical significance (p<0.05) – Statistical test: binomial



Statistical test: Binomial. Significance level: 5%.

Figure 1 – Comparison of the number of omissions among the phonemic classes

Table 2 presents the number of omissions by phone in each disorder level. As the MD as the MMD presented only liquid omission. In the first one, there was no predominance of omission of one phone by another. In the MMD, /R/ and /r/ are more omitted than /λ/. In the MSG, the phonemes /R/, /r/, /l/ and the fricatives were more omitted than /λ/ and the number of /R/ omissions overcame the fricative omissions. In the SD, the number of omissions for /R/, /r/ and fricatives was higher than the number of /λ/ and /b/ omissions; the liquid /l/ was more omitted than /λ/ and nasals.

Table 2 – Comparison of the number of omissions by phone among the phonological disorders' levels

PD severity	Phones	Número de omissões por fone	Valor de p
MD	/R/ x /r/	2 x 4	0,402
MMD	/R/ x /r/	11 x 14	0,5125
	/R/ x /λ/	11 x 2	0,0094*
	/R/ x /l/	14 x 6	0,2009
	/r/ x /λ/	14 x 2	0,0016*
	/r/ x /l/	14 x 6	0,2618
	/l/ x /λ/	6 x 2	0,1473
MSD	/R/ x /r/	15 x 14	0,8017
	/R/ x /λ/	15 x 1	0,0001*
	/R/ x /l/	15 x 9	0,1213
	/R/ x fricatives	15 x 7	0,0353*
	/r/ x /λ/	14 x 1	0,0001*
	/r/ x /l/	14 x 9	0,1927
	/r/ x fricatives	14 x 7	0,0624
	/λ/ x /l/	1 x 9	0,0059*
	/λ/ x fricativas	1 x 7	0,0233*
	/l/ x fricativas	9 x 7	0,5637
SD	/R/ x /r/	7 x 6	0,6949
	/R/ x /λ/	7 x 1	0,0108*
	/R/ x /l/	7 x 10	0,2162
	/R/ x fricatives	7x 7	1,0000
	/R/ x nasals	7 x 4	0,2337
	/R/ x /b/	7 x 1	0,0108*
	/r/ x /λ/	6 x 1	0,0271*
	/r/ x /l/	6 x 10	0,1069
	/r/ x fricativas	6 x 7	0,6949
	/r/ x Nasals	6 x 4	0,4201
	/r/ x /b/	6 x 1	0,0271*
	/λ/ x /l/	1 x 10	0,0040*
	/λ/ x fricatives	1 x 7	0,0108*
	/λ/ x Nasals	1 x 4	0,1355
	/λ/ x /b/	1 x 1	1,0000
	/l/ x fricatives	10 x 7	0,2162
	/l/ x Nasals	10 x 4	0,0183*
	/l/ x /b/	10 x 1	0,0004
	Fricatives x Nasals	7 x 4	0,2337
	Fricatives x /b/	7 x 1	0,0108*
	Nasal x /b/	4 x 1	0,1355

*p values with statistical significance (p<0.05) – Statistical test: binomial
Legend: MD: mild disorder, MMD: mild moderate disorder, MSD: moderate severe disorder, SD: severe disorder.

In Table 3, it was performed the comparison of the number of omissions among the severity of the phonological disorders, with higher number of omissions in the MMD in relation to the MD and the SD. The omissions in the MSD overcame the ones occurred in the MD and in the MMD.

Table 4 presents the comparison of the number of omissions by age groups. There was higher number of omissions in the age from 4 years old to 4 years old and 11 months in relation to the groups with 6 years old to 6 years old and 11 months, and in the group with 5 years old to 5 years old and 11 months in relation to the group of 7 years old to 7 years old and 11 months.

Table 3 – Comparison of the number of omissions among the phonological disorders' levels

PD severity	Number of children who performed omission per level	Valuede p
MD x MMD	5 X 22	0.0077*
MD X MSD	5 X 22	0.0001*
MD X SD	5 X 11	0.0001*
MMD X MSD	22 X 22	0.0001*
MMD X SD	22 X 11	0.0001*
MSD X SD	22 X 11	0.2753

*p values with statistical significance (p<0.05) – Statistical test: binomial
Legend: MD: mild disorder, MMD: mild moderate disorder, MSD: moderate severe disorder, SD: severe disorder.

Table 4 – Comparison of the number of omissions among the studied age groups

Age group	Number of children who omitted phoned per age group	Values de p
4 years x 5 years	16 x 24	0,4259
4 years x 6 years	16 x 12	0,0310*
4 years x 7 years	16 x 5	0,0125
4 years x 8 years	16 x 3	0,6730
5 years x 6 years	24 x 12	0,1085
5 years x 7 years	24 x 5	0,0415*
5 years x 8 years	24 x 3	1,0000
6 years x 7 years	12 x 5	0,4639
6 years x 8 years	12 x 3	0,3988
7 years x 8 yearsyears	5 x 3	0,1991

*p values with statistical significance (p<0.05) – Statistical test: binomial
Legend: 4 years: 4:0 – 4:11, 5 years: 5:0 – 5:11, 6 years: 6 :0 – 6:11, 7 years: 7:0 – 7:11, 8 years: 8:0 – 8:11 years.

DISCUSSION

According to some studies[14,15], the acquisition of the liquids in the phonological system is the latest process. Following the same idea, there is a research which verifies that most omissions occurred for /R, /r/ e /l/. It shows that the typical phonological development is similar to the atypical development, but it is different in relation to age, with later acquisition. Besides, omissions are not expected in children older that four years old, what illustrates improper speech pattern[1]. The difficulty to produce those phones is the cause of more omissions, because the liquid class presents the characteristic of more accurate movements to produce the phones. This class consists of more complex segments than the others, so there are more cases of repair strategies[16,17].

In a research in which the sample consisted of children with typical acquisition, the first liquid to be acquired was the lateral /l/, followed by the non lateral /R/, the lateral /λ/, and by the latest one, the non lateral /r/. It can be considered as a kind of acquisition pattern: lateral/non lateral/lateral/non lateral.

Such data does not corroborate with the findings of this research. However, similarly to this study, in the isolated comparison of the lateral liquids, it is observed higher cases of omission of the lateral liquid /l/, in relation to /λ/ [1]. It is also possible that the palatal presented low occurrence of omissions because it is not frequent in the language, and it occurs only in medial onset position.

In the comparison of the number of omissions among the phonemic classes (Figure 1), it is evident that there is more difficulty to produce liquids and fricatives, because the liquid class is the last class to be acquired in BP and, into that group, the lateral are first to be acquired. When considering the fricatives class, it also presents phones with late acquisition, and its acquisition occurs after the acquisition of plosives and nasals[17].

In the MD, it is observed lower omission occurrence when compared with the other severity levels of phonological disorder (Table 2). It is explained by a more varied phonological system, without the same need of repairs as the other atypical cases[14].

In parallel with liquid omissions, there was prevalence of fricative phones omission in relation to the others, as in the SD as in the MSD, because that sound class is characterized by phones with initial acquisition such as /f/ and /v/, as well as by phones later acquisition, such as /s/,/z/, /ʃ/, /ʒ/ [1]. In a research with the purpose of analyzing the systematic preference by one sound, it was observed the highest alterations in the fricative class, partially different from this analysis[18].

In the analysis of the different disorder severity levels (Table 3), it is perceived difference in the comparison between MSD and SD, the first with the highest number of omissions. It does not agree with studies that show higher use of repair strategies as the severity of the phonological disorder increases. It occurs, according to the authors[19,20] because the children still present their phonology under construction and they do not present accurate production of some segments[19,20].

Finally, in the analysis of the comparison of omissions by age group, it is verified higher number of omissions in the age group of 4 years old in relation to 6 years old and in the group with 5 years old, in relation to the group from 7 years old to 7 years old and 11 months. A research which investigated the phonological acquisition in a population of children with typical development verified that some subjects presented complete phonetic inventory when they were three years old, but it was observed variability among the children, what decreased as children got older[21].

With that data, it is perceived that the development of the children with atypical development is closer to the development of the children with typical development, because the age increase expresses higher stability of the phonological system, what was proved in the present study by lower occurrence of omissions.

CONCLUSION

Through this study, it was verified that the omission of phones in simple onset position occurred mostly in the liquid class. Besides, the number of omissions was higher in the two highest levels of phonological disorder. Moreover, there was tendency that older children presented higher number of omissions.

So, it is considered that the findings of this research provide extra knowledge of the procedures of clinical evaluation of children with phonological disorders, mainly because omission illustrates little or no phonological knowledge of certain sound(s) by children. In the case of the present study, it was verified that this knowledge is more difficult for the liquid class, as well as it happens in typical development. Therefore, children with typical development tend to replace sounds with difficult production by another they have already acquired. Thus, the present study can also be considered as warning for speech-language therapists not to ignore sounds' omissions, even by younger children, because they reflect little phonological knowledge, what may generate problems in the future writing acquisition.

AKNOWLEDGEMENTS

We thank CNPq and CAPES by the support conceived to the performance of this research.

RESUMO

Objetivo: verificar quais fones sofrem omissão na posição de *onset* simples no sistema fonológico geral, de crianças com desvio fonológico, de acordo com a faixa etária e a gravidade do desvio fonológico. **Métodos:** participaram deste estudo 60 sujeitos com diagnóstico de desvio fonológico e com idades entre 4 anos e 8 anos e 11 meses, que realizavam a omissão de qualquer fone do Português Brasileiro nas posições de *onset* inicial e/ou medial, com emprego de 40% ou mais da estratégia de reparo em seu sistema fonológico. Os dados foram submetidos à análise estatística por meio do teste binomial de comparação de 2 proporções, com p<0,05. **Resultados:** houve predomínio de omissão das consoantes líquidas. Em relação à gravidade do desvio, tanto no desvio fonológico leve quanto no levemente moderado ocorreu somente omissão de líquidas, no moderadamente grave, líquidas e fricativas foram omitidas e no desvio grave ocorreram omissões de todas as consoantes do Português Brasileiro. Já de acordo com a faixa etária, houve maior número de omissões nas idades de 4 anos a 4 anos e 11 meses e de 5 anos a 5 anos e 11 meses. **Conclusão:** a omissão de fones na posição de *onset* simples foi predominante para a classe das líquidas e nos desvios mais graves. Além disso, houve uma tendência de que as crianças mais jovens apresentem maior número de omissões.

DESCRITORES: Fala; Distúrbios da Fala; Criança; Linguagem Infantil; Desenvolvimento da Linguagem

REFERENCES

1. Lamprecht RR. Aquisição fonológica do Português: perfil de desenvolvimento e subsídios para terapia. Porto Alegre: Artmed; 2004.

2. Bragança LLC, Lemos SMA, Alves CRL. Caracterização da fala de crianças de 4 a 6 anos de creches públicas. Rev CEFAC. 2010;13(6):986-92.

3. 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.

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

5. Athayde ML, Carvalho Q, Mota HB. Vocabulário expressivo de crianças com diferentes níveis de gravidade de desvio fonológico. Rev CEFAC. 2009;11(2):161-8.

6. Costa VP, Albiero JK, Mota HB. Aspectos da fluência da fala em crianças com e sem desvio fonológico evolutivo. Rev CEFAC. 2011. (ahead of print).

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

8. Spindola RA, Payão LMC, Bandini HHM. Abordagem fonoaudiológica em desvios fonológicos fundamentada na hierarquia dos traços distintivos e na consciência fonológica. Rev CEFAC. 2007;9(2):180-9.

9. Yavas M, Hernandorena CLM, Lamprecht RR. Avaliação fonológica da criança: reeducação e terapia. Porto Alegre: Artes Médicas; 1991.

10. Bernhardt B. Developmental implications of nonlinear phonological theory. Clin Linguist Phon. 1992;6(4):259-81.

11. Grunwell P. The nature of phonological disability in children. London: Academic Press, 1981.

12. Shriberg LD, Austin D, Lewis BA, McSweeney JL, Wilson DL. The percentage of consoants 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 Dis. 1982;47(1):226-41.

14. Ribas LP. Aquisição das líquidas por crianças com desvio fonológico: Aquisição silábica ou segmental? Revista Letras. 2008;36:129-49.

15. Pereira AR, Henrich V, Ribas LP. Semivocalização da líquida /r/: uma explanação à luz da Fonologia Autossegmental. Revista do GELNE. 2010; (12)2:21-32.

16. Hodson BW, Paden EP. Targeting intelligible speech: A phonological approach to remediation. 2nd ed. Austin: ProEd, 1991.

17. Costa BKF, Assêncio Ferreira VJ. Análise dos processos fonológicos em crianças com queixa de distúrbio de fala. Rev CEFAC. 2002;4(1):21-4.

18. 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):766-71.

19. Ferrante C, John Van Borsel JV, Pereira MMB. Aquisição fonológica de crianças de classe sócio econômica alta. Rev CEFAC. 2008;10(2):452-60.

20. Keske-Soares M, Ceron, MI, Brancalioni, AR, Lamprecht, RR. Caracterização da preferência sistemática por um som em casos de desvio fonológico. Letras de Hoje. 2008;43(3):42-6.

21. Williams AL. Multiple oppositions: theoretical foundations for an alternative contrastive intervention approach. Am J Speech Lang Pathol. 2000;9:282-8.

Received on: March 10, 2013
Accepted on: September 09, 2013

Mailing address:
Débora Durigon da Silva
Rua Francisco Manuel, 18/104, Bairro Centro
Santa Maria – RS - Brasil
CEP: 97015-260
E-mail: deby.ds@hotmail.com