Original Article

Artigo Original

Occurrence of the repair strategy of stopping: relationship with phonological disorder severity and affected phonemes

Emprego da estratégia de reparo de plosivização: relação com a gravidade do desvio fonológico e fonemas acometidos

Vanessa Pires Costa[1]
Fabieli Thaís Backes[2]
Silvana Pereira Pegoraro[2]
Fernanda Marafiga Wiethan[3]
Roberta Michelon Melo[3]
Helena Bolli Mota[4]

Keywords

Speech, language and hearing sciences
Child development
Language development
Speech disorders
Speech therapy

ABSTRACT

Purpose: To analyze the occurrence of the repair strategy of stopping in the different severities of phonological disorder, and to verify the phonemes most affected by this strategy. **Methods:** Participants were 33 children, 14 female and 19 male, aged between 4 and 8 years. All children used the repair strategy of stopping for at least one phoneme or allophone, with percentage equal to or greater than 40%. Data were selected from the first speech assessment, before starting intervention, and phonological disorder severity was determined by the Percentage of Consonants Correct – Revised. The number of children who used the repair strategy of stopping was accounted, analyzing the phonological disorder severity and the phonemes most affected by this strategy. Data were statistically analyzed. **Results:** The use of the repair strategy of stopping was more observed for the degrees moderate-severe and severe, with 42.86% of occurrence in each one. No difference was found in the comparison between the types of phonemes and allophones affected in the sample: /s/, /ʃ/, /f/ and /z/, /ʒ/, /v/, [tʃ] and [dʒ], /ɲ/ and /n/. **Conclusion:** The stopping repair strategy is more frequent in the most severe degrees of phonological disorder. This strategy is used similarly by children with phonological disorders, with regards to the affected phonemes.

Descritores

Fonoaudiologia
Desenvolvimento infantil
Desenvolvimento da linguagem
Distúrbios da fala
Fonoterapia

RESUMO

Objetivo: Analisar a ocorrência da estratégia de reparo de plosivização nas diferentes gravidades do desvio fonológico e verificar os fonemas mais acometidos por esta estratégia. **Métodos:** Participaram 33 crianças, sendo 14 do gênero feminino e 19 do gênero masculino, com idades entre 4 e 8 anos. Todas as crianças empregavam a estratégia de reparo de plosivização para pelo menos um fonema ou alofone, utilizando-a com percentual igual ou superior a 40%. Os dados foram extraídos das primeiras avaliações fonológicas das crianças, pré-intervenção, e a gravidade do desvio fonológico foi determinada por meio do Cálculo do Percentual de Consoantes Corretas – Revisado. Contabilizou-se o número de crianças que utilizavam a estratégia de reparo de plosivização, observando-se a gravidade do desvio fonológico e os diferentes fonemas acometidos por tal estratégia. Os dados foram submetidos à análise estatística. **Resultados:** O uso da estratégia de reparo de plosivização foi mais observado para os graus de desvio moderadamente-grave e grave com 42,86% de ocorrência para cada um. Não houve diferença na comparação entre os tipos de fonemas e alofones acometidos: /s/, /ʃ/, /f/ e /z/, /ʒ/, /v/, [tʃ] e [dʒ], /ɲ/ e /n/. **Conclusão:** A aplicação da estratégia de reparo de plosivização é mais frequente nos graus mais acentuados de desvio fonológico. Esta estratégia é empregada de forma semelhante, no que se refere aos fonemas acometidos, pelas crianças com desvio fonológico.

Correspondence address:
Vanessa Costa
R. Tuiuti 1741/202, Santa Maria (RS), Brasil, CEP: 97015-663.
E-mail: vanepcosta@hotmail.com

Received: 5/21/2011

Accepted: 12/8/2011

Study conducted at the Center of Language and Speech Studies (CLSS) of the Undergraduate Program in Speech-Language Pathology and Audiology and Graduate Program in Human Communication Disorders, Universidade Federal de Santa Maria – UFSM – Santa Maria (RS), Brazil.
Grants: CNPq (Scientific Initiation Program - PIBIC/UFSM) and CAPES.
Conflict of interests: None

(1) Graduate Program (Masters degree) in Human Communication Disorders, Universidade Federal de Santa Maria – UFSM – Santa Maria (RS), Brazil.
(2) Undergraduate Program in Speech-Language Pathology and Audiology, Universidade Federal de Santa Maria – UFSM – Santa Maria (RS), Brazil.
(3) Graduate Program (Doctorate degree) in Human Communication Disorders, Universidade Federal de Santa Maria – UFSM – Santa Maria (RS), Brazil.
(4) Undergraduate Program in Speech-Language Pathology and Audiology and Graduate Program in Human Communication Disorders, Universidade Federal de Santa Maria – UFSM – Santa Maria (RS), Brazil.

INTRODUCTION

The typical development of the child's phonological system, which occurs from birth to approximately five years old, is gradual and nonlinear[1,2]. Since 1980 this topic has been the target of studies on normal and deviant phonological acquisition. These discussions have contributed to the knowledge of normal and deviant standards in the child's phonological development, thus helping the diagnosis of phonological disorder (PD)[3].

Because it is a complex process, phonological acquisition is subject to alterations. These alterations, which comprise substitutions and/or omissions of sounds, are called repair strategies. When these strategies are not overcome until the children are four years old, they may be considered to have PD[1], which is characterized by speech problems, as well as trouble organizing the sounds of the language. Thus, we consider the children use inappropriate sounds in their speech when compared to their community adult's system[1].

Therefore, children use repair strategies in the speech production to handle the segment and/or syllable structure complexity that have not learned or mastered yet. As the children grow and mature, the resources they use also change, since their phonological system becomes more similar to the linguist pattern of the language. This way, the repair strategies may be observed in both the standard and nonstandard development, though there are chronological differences, which last longer in the PD[1,4].

For the therapist be aware when a specific repair strategy must be overcome, he/she should know the order of segment acquisition in Brazilian Portuguese (BP). Because our aim here is to study the strategy of stopping, we decided to present the order of the plosive phonemes acquisition, as well as the order of the fricatives, which are known as the most affected by it.

The plosive and nasals consonants are the first consonantal segments of BP to be acquired by the children with typical phonological development, before he/she is two years old. The plosives (/p/, /b/, /t/, /d/, /k/ and /g/) are acquired between 1 year and 6 months and 1 year and 8 months[1]. So, they are often used by the children to replace the more complex segments like the fricatives, which have phonemes of initial acquisition like /f/ and /v/ (acquired when the child is about 1 year and 9 months) and phonemes of late acquisition, such as /s/, /z/, /ʃ/ e /ʒ/[1] (acquired when the child is about 2 years and 6 months)[1,5,6], not just in the BP, but in German and English as well.

One of the most common strategies observed in the speech of children with PD is the stopping, that is, the substitution of fricatives, affricates, glides, liquids and nasals for plosives. The fricative phonemes and the affricate allophones are more affected by this strategy[7,8]. One study found out children with serious PD have higher probability of using the repair strategy of stopping[4].

Since we did not find in the literature many studies about the repair strategy of stopping, its use is often observed in children with PD, and it contributes to an unintelligible speech, this study aimed to analyze its occurrence in the different phonological disorder severities, and check which sounds are more affected by this strategy. So, we hope this research may contribute to the linguistic and phonological studies, so that it can help in everyday clinic practice by characterizing the phonological system of children with PD.

METHODS

The data for this study came from a project, which was approved by the Research Ethics Committee of the Universidade Federal de Santa Maria (UFSM), under number 052/04. The parents or the ones legally responsible for the children with PD signed the Free and Informed Consent Term.

The criteria of inclusion were: being between 4 years and 8 years and 11 months old; presenting the diagnosis of PD, which was obtained after phonological and complementary assessments; using the repair strategy of stopping for at least one phoneme or allophone, with a percentage equal to or greater than 40%[9]. The following exclusion criteria were considered: having had any kind of phonological therapy prior to the first assessment of their phonological system; presenting other types of phonological problems; presenting evident neurological, cognitive and psychological problems.

The speech data were selected from the first speech evaluation, which was conducted by means of the Phonological Assessment of Child Speech (PACS)[8]. It is emphasized that the evaluation was performed before the beginning of phonological therapy. Thus, it was determined the number of children that used the repair strategy of stopping, to observe which phonemes were affected by it, as well as to determine the phonological disorder severity through the Percentage of Consonants Correct-Revised (PCC-R)[10]. Only the substitutions and omissions were considered errors, being the distortions not counted. The PCC-R is based on the calculus of the Percentage of Correct Consonants (PCC)[11], which divides the number of correct consonants by the overall number of consonants produced (correct and incorrect). The result is multiplied by 100, and then, the PD is classified in severe disorder (SD) (PPC-R lower than 50%), moderate-severe disorder (MSD) (PCC-R between 51% and 65%), mild-moderate disorder (MMD) (PCC-R between 66% and 85%) and mild disorder (MD) (PCC-R between 86% and 100%).

From the 188 children, whose data were available for this study, 33 were selected: 14 females and 19 males, who matched the inclusion and exclusion criteria; 15 of them were between 4 years and 4 years and 11 months old; nine were between 5 years and 5 years and 11 months old; four were between 6 years and 6 years and 11 months old; three were between 7 years and 7 years and 11 months old; and two were between 8 years and 8 years and 11 months old. Concerning the PD, two of the children had MD, ten had MMD, 15 had MSD and six had SD. Most of them were students from de kindergarten to the second grade of public elementary state and city schools. All the children lived in the same city and had a similar economic status (they belonged basically to the C, D and E Brazilian social classes), according to the profile provided by the Clinic-School where the study was conducted.

The data were statistically analyzed, and the Chi-square test was used to compare the occurrence of repair strategy of

stopping, the variables regarding the kinds of phonemes affected and the severity groups of PD. Whenever necessary (less than five children), Fisher's Exact test was used with a level of significance of 5% ($p<0.05$).

RESULTS

The results showed the occurrence of repair strategy of stopping in different severities of PD (Table 1), i.e., there was a higher percentage for MSD and SD.

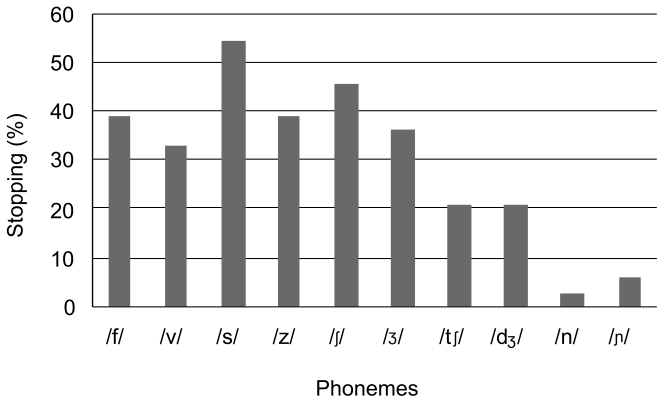
Table 1. Use of stopping strategy in different phonological disorder severities

Stopping		Severity of the phonological disorder			
		MD	MMD	MSD	SD
Do not use the strategy	n	58	69	20	8
	%	96.67*	87.34*	57.14	57.14
Use the strategy	n	2	10	15	6
	%	3.33	12.66	42.86*	42.86*
p-value		<0.001			

* Significant values ($p<0.05$) – Chi-square test

Note: MD = mild disorder; MMD = mild-moderate disorder; MSD = moderate-severe disorder; SD = severe disorder

Although the use of repair strategy of stopping for the types of phonemes and allophones affected, in the descending order was: /s/, /ʃ/, /f/ and /z/, /ʒ/, /v/, [tʃ] and [dʒ], /ɲ/ and /n/, there was not statistical significance (Figure 1).



Fisher's Exact Test ($p<0.05$)

Figure 1. Occurrence of repair strategy of stopping, according to the types of phonemes and affected allophones

DISCUSSION

According to the outcome of the study, there was a difference between the degrees of PD for the percentage of occurrence of the repair strategy of stopping, with greater frequency for the MSD and SD, which are the higher degrees of PD. This result shows that there is influence of the severity of PD in the use of the repair strategy of stopping.

These data were similar to those of a study[4] that analyzed the different severities of PD in which the authors pointed out the children with SD show higher probability of using strategies of stopping and backing. Another study on the repair strategies used for the fricative phonemes showed greater occurrence of stopping in the two most advanced levels of PD: MSD and SD, respectively[12].

This study showed no difference between the phonemes affected by the strategy of stopping, whereas other studies[13-15] pointed out the fricatives and affricates are the more affected sounds. In another research, the authors discovered the repair strategy of stopping was used for all the fricative phonemes[12].

Other authors[16] identified the occurrence of fricative stopping in only 1,12% of the children who had used repair strategies. We highlight the numbers of the children in the sample was bigger than in our study and the variable related to the severity of PD the children had was not analyzed.

In a study[17] about the typical acquisition of these segments, the author tried to prove the devoiced phonemes were the first ones to be acquired, followed by the voiced. As the results were contradictory, she concluded the phonemes [-voice] are more difficult to be produced than the [+voice], especially in the group of fricatives. This idea differs from the outcomes of our study, for there was no statistical significance towards this aspect. In another study on the repair strategies for the fricatives, there was a higher use of stopping for the devoiced phonemes[12].

Concerning the phoneme /s/, a study[13] found out great percentage of substitution of the phoneme /s/ for the /t/, i.e. the substitution of the fricative for the plosive. In this study, there was no statistical significance.

Due to the hierarchy of complexity between the distinctive features, we expected the phonemes /ʃ/ e /ʒ/ to be more affected, since they have higher levels of complexity than the other phonemes that were assessed. However, the data from this study showed greater use of the strategy of stopping for the phonemes s/, /ʃ/ and /f/ respectively, being the /ʃ/ in a higher level of complexity[17-19]. We can infer from these data that the stability of the [+continuous] feature in the children's phonological system would be more difficult due to the occurrence of the [-voice] feature.

We can affirm that the results from this study cannot be applied to all children who use the strategy of stopping; neither can it be applied to the other repair strategies. Nonetheless, the data used in the study may contribute to the understanding of this ordinary phonological alteration (which impairs the intelligibility of children's speech), especially by the therapists who should be able to confidently select the target-sounds for therapy.

CONCLUSION

The goals initially proposed were reached, since we could conclude that there is a relationship between the use of the repair strategy of stopping and the different degrees of PD, that is, the higher the PD is, the greater use of stopping.

On the other hand, there was no significant difference in the comparison of the occurrence of the strategy of stopping between the affected phonemes. Thus, we conclude that the repair strategy of stopping occurs similarly between the phonemes.

REFERENCES

1. Lamprecht RR, organizador. Aquisição fonológica do português. Perfil de desenvolvimento e subsídios para terapia. Porto Alegre: Artmed; 2004.
2. Keske-Soares M, Pagliarin KC, Ceron MI. Terapia fonológica considerando as variáveis linguísticas. Rev Soc Bras Fonoaudiol. 2009;14(2):261-6.
3. Wiethan FM, Mota HB. Propostas terapêuticas para os desvios fonológicos: diferentes soluções para o mesmo problema. Rev CEFAC. 2011;13(3):541-51.
4. Ghisleni MR, 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.
5. Ullrich A, Stemberger JP, Bernhardt BM. Variability in a German-speaking child as viewed from a constraint-based nonlinear phonology perspective. Asian Pacific J Speech Lang Hear. 2008;11(4):221-37.
6. McIntosh B, Dodd BJ. Two-year-olds' phonological acquisition: normative data. Int J Speech Lang Pathol. 2008;10(6):460-9.
7. Wertzner HF, Consorti T. Processos fonológicos detectados em crianças de sete a oito anos. Pró-Fono. 2004;16(3):275-82.
8. Yavas M, Hernandorena CL, Lamprecht RR. Avaliação fonológica da criança: reeducação e terapia. Porto Alegre: Artes Médicas; 1991.
9. Bernhardt B. The application of nonlinear phonological theory to intervention with one phonologically disorders child. Clin Linguist Phon. 1992;6(4):283-316.
10. 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.
11. Shriberg LD, Kwiatkowski J. Phonological disorders I: a diagnostic classification system. J Speech Hear Disord. 1982;47(3):226-41.
12. Wiethan FM, Mota HB. Emprego de estratégias de reparo para os fonemas fricativos no desvio fonológico. Rev Soc Bras Fonoaudiol. 2012;17(1):28-33.
13. Ferrante C, Van Borsel J, Pereira MM. Aquisição fonológica de crianças de classe sócio econômica alta. Rev CEFAC. 2008;10(4):452-60.
14. Toreti G, Ribas LP. Aquisição fonológica: descrição longitudinal dos dados de fala de uma criança com desenvolvimento típico. Letrônica. 2010;1(3):42.
15. Spíndola RA, Payão LM, Bandini HH. Abordagem fonoaudiológica em desvios fonológicos fundamentada na hierarquia dos traços distintivos e na consciência fonológica. Rev CEFAC. 2007;9(2):180-9.
16. Patah LK, Takiuchi N. Prevalência das alterações fonológicas e uso dos processos fonológicos. Rev CEFAC. 2008;10(2):158-67**.**
17. Mota HB. Aquisição segmental do português: um modelo implicacional de complexidade de traços. Letras de Hoje. 1997;32(4):23-47.
18. Stokes SF, Klee T, Carson CP, Carson D. A phonemic implicational feature hierarchy of phonological contrasts for English-speaking children. J Speech Lang Hear Res. 2005;48(4):817-33.
19. Gierut J. Phonological complexity and language learnability. Am J Speech Lang Pathol. 2007;16(1):6-17.