STRUCTURAL GENERALIZATION BY CHILDREN WITH SPEECH-SOUND DISORDERS UNDER DIFFERENT THERAPEUTIC APPROACHES

Generalização estrutural obtida por crianças com desvio fonológico submetidas a diferentes abordagens terapêuticas

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ABSTRACT

Purpose: to verify which group (with or without stimulation of orofacial praxis skills) presented better structural generalizations by considering the following types: Related to items not used in the treatment, to another position in the word, within a class of sounds, and to another class of sounds. **Methods:** the sample consisted of six subjects (three girls and three boys), with ages between 5:4 and 7:0 at the beginning of therapy. The subjects were divided into three groups, all received phonological therapy through the model of Minimal Pairs Maximum / Empty Set oppositions, being those of the study group treated with stimulation of face and tongue praxis skills (GFoLFa), and with exercises of tongue praxis skills (GFoL), and the control group was subjected only to phonological therapy (GFO). All were assessed before and after therapy as to the phonological system (Yavas,Hernandorena and Lamprecht, 1991); also the Orofacial Praxis Test (Berzoatti, TavanoandFabbro, 2007), and the Bucofacial Articulatory Praxis test (Hage, 2000). **Result:** the GFoLFa achieved major developments to generalizations for the four types analyzed (within a class of sounds to other positions in the word, to another class of sounds and in items not used in the treatment). The GFoL presented a substantial number of generalizations within a class of sounds; and the GFO had presented generalization to another class of sounds. **Conclusion:** the groups that received praxis intervention obtained greater generalizations; however, we suggest new studies applying this model, in order that with other samples these results can be confirmed.

KEYWORDS: Speech; Child; Speech Disorders, Speech Therapy; Generalization, Response

INTRODUCTION

Speech is a complex function[1,2] and it is acquired gradually until the phonological system is stable, in accordance with the linguistic community where the child grows up[3]. Previous studies[4,5] stated that speech is directly related to the stomatognathic system and there is an association between the perception and production of fine motor function.

When speech acquisition is delayed or impaired, it is a speech-sound disorder that is affecting a child's linguistic organization, rather than the child's speech production mechanism, and it happens when there are substitutions and deletions of speech sounds.

There are different phonological models for treating speech-sound disorders. The main goal of these therapeutic models is to make the phonological system fully functional, as well as to stimulate generalization. In addition to traditional phonological therapy, other strategies are being used to make phonological therapy quicker and promote a greater number of generalizations[6].

Generalization occurs when a sound not trained in therapy is acquired through work performed at another sound. Generalization is the extension or transfer of learning, i.e., the occurrence of treated sounds in other untreated contexts or words. Generalization can also occur within a class of

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sounds or other classes of sounds[7]. In clinical practice, generalization contributes to making therapy more efficient and faster, avoiding the need to train all incorrect sounds in all words, contexts or environments[8].

Generalization can be researched from two perspectives - one seeks to identify the structural aspects of generalization or the circumstances in which generalization occurs, whereas the other perspective examines the functional properties of generalization or how it is used by a child to change their phonological system. The second perspective takes intra-subject variables into account, e.g. linguistic maturity, cognitive functioning and children's motor skills[9].

The first type of generalization abovementioned has the following structural components: generalization to items not used in the treatment, to another position in the word; within a class of sounds, to other classes of sounds, and based on implicational relations.

In this study, some types of structural generalization were evaluated: generalization to lexical items not used in the treatment / other words (when the subject transfers the target sound that they had learned in the target word to other words that were not used in the treatment), generalization to another position in the word (when the subject learns the target sound in a position and extends it to other positions in the word); within a class of sounds (when the target sound stimulated favors the production of other sounds from the stimulated class), generalization to another class of sounds (when the target sound stimulates the production of correct sounds from other classes of sounds).

Generalization within a class of sounds and to another class of sounds is desirable in the treatment, because it contributes to global changes in a child's phonological inventory[6].

Given the above, the objective of this study was to determine which group (with or without stimulation of orofacial praxis skills) showed higher structural generalizations, considering the types mentioned previously.

METHODS

This case study is quali-quantitative and longitudinal, and it was developed in the speech laboratory of a Higher Education institution, linked to a research project, duly registered and approved by the Research Ethics Committee and Project Department of the Federal University of Santa Maria under no. 02010.0.243.000-10. All parents / guardians of the children that were subjects in this study signed a consent form to authorize both their participation in the research and the publication of results.

The subjects were six children aged between 64 and 86 months, both males and females, previously diagnosed with a speech-sound disorder by means of speech screening in a speech therapy service at a Higher Education Institution.

For acceptance as participants in the study, subjects had to meet some specific requirements: previous diagnosis of a speech-sound disorder, two sounds missing from their phonetic inventory, hearing within normal limits and no significant changes in speech-sound assessments and complementary assessments, except for phonological[10] and orofacial praxis assessments[11,12].

In order to confirm the diagnosis of speech-sound disorder and to rule out other impairments that could interfere with language development, the subjects underwent the following speech-sound assessments: anamnesis, receptive and expressive language skills, stomatognathic system, articulatory examination, auditory discrimination, simplified auditory processing, phonological awareness, orofacial praxis and phonological assessment. Moreover, all participants underwent the following additional assessments: screening of the external auditory canal and auditory screening.

After the assessments, the children were referred for therapy and were divided into three groups. One group received phonological therapy (GFo), the second group received phonological therapy and tongue praxis exercises (GFoL) and the third group, in addition to phonological therapy and tongue praxis exercises, had an intervention on orofacial praxis (GFoLFa).

The children received phonological therapy based on the Minimal Pair / Maximal Oppositions Model[13], according to changes proposed in the literature[14].

The intervention on tongue praxis skills were based on a previous study[15], while the intervention on facial praxis skills was based on the assessment of orofacial praxis skills[11,12].

The analysis of structural generalizations was based on the initial and final phonological assessments, made with a phonological assessment instrument[10], measured as follows:

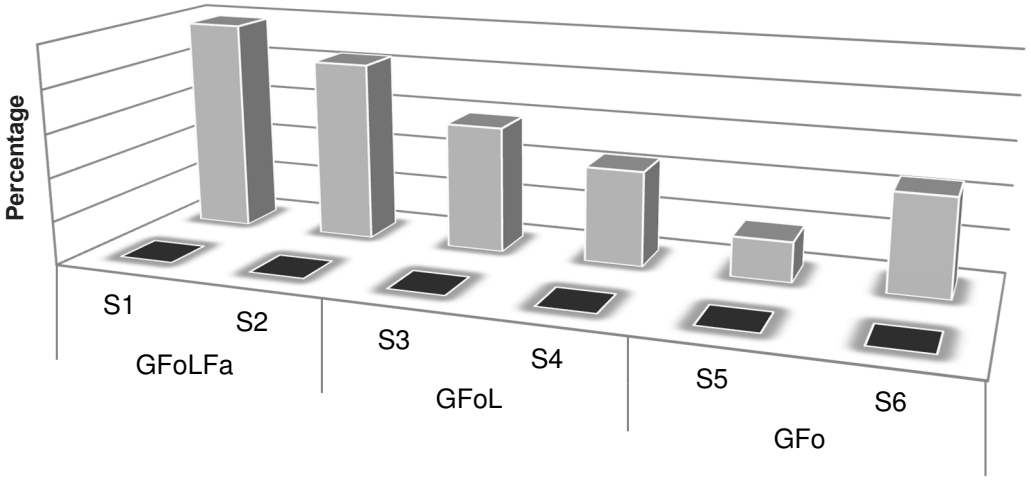
- generalization to items not used in the treatment: the development of target sounds used in the treatment was compared in the initial and final assessments (mean of comparative percentages);
- generalization to other positions in the word: all subjects were treated with target sounds in the medial onset position; thus, this generalization was obtained after checking other possible

positions of the phoneme (initial onset, medial coda and final coda). Subsequently, the mean percentage was calculated, and the initial and final assessments were compared;
- generalization within a class of sounds: development was observed for non-stimulated phonemes (belonging to the same classes that were stimulated); the mean percentage of initial and final assessments was calculated;
- generalization to another class of sounds: the mean percentage was calculated for phonemes from other classes where problems had been identified. Thus, the initial and final assessments were compared. This type of generalization was only quantified when possible (some subjects only had problems in the classes of sounds stimulated).

Most of the initial values for these generalizations were zero; this means that the child could not produce the sound in any of the possibilities, or had difficulty in other classes of sounds. The initial values were included with the objective of comparing the progress of each type of generalization.

RESULTS

Figure 1 (percentage values) illustrates the generalization to other positions in the word and syllable. All subjects were treated with target sounds in the medial onset position. Thus, this type of generalization was measured for other positions in the syllable: initial onset, medial coda and final coda.



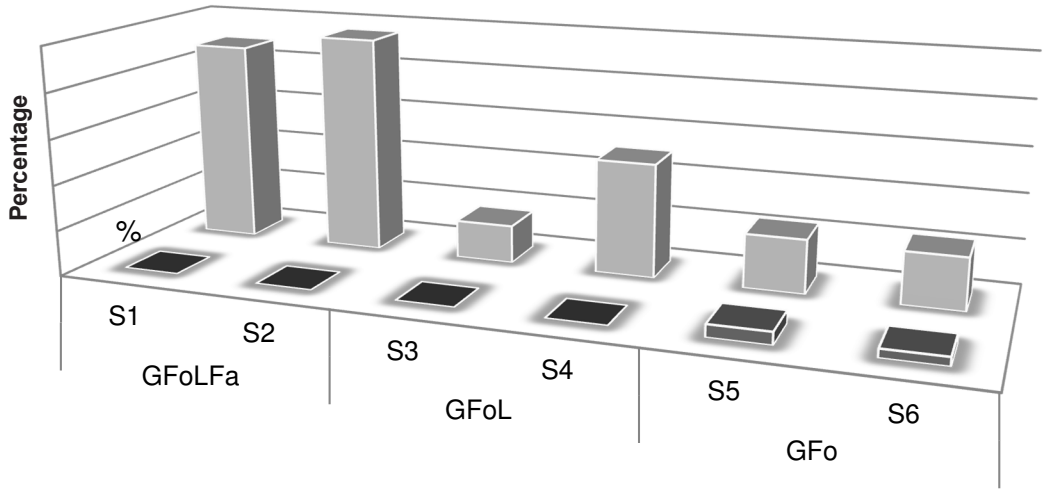
	GFoLFa		GFoL		GFo	
	S1	S2	S3	S4	S5	S6
Generalization to other positions in the word AI	0	0	0	0	0	0
Generalization to other positions in the word AF	98,03	83,13	58,33	43,75	18,4	44,82

Caption: GFoLFa: Phonological group with stimulation of facial and tongue praxis; GFoL: Phonological Group with stimulation of speech praxis; GFo: Phonological Group, IA: Initial Assessment; FA: Final Assessment.

Figure 1 - Generalizations to other positions in the word (considering the initial and final phonological assessments).

The group that had the greatest progress as for generalizations to other positions in the word was GFoLFa (Mean = 90.58%) followed by GFoL (M = 51.4%). This result shows that the groups stimulated with facial and tongue praxis generalized to other positions in the word more often than the group stimulated with phonological therapy alone (Mean = 31.61%).

Figure 2 clarifies the generalization to items not used in the treatment, when the initial and final phonological assessments are compared.



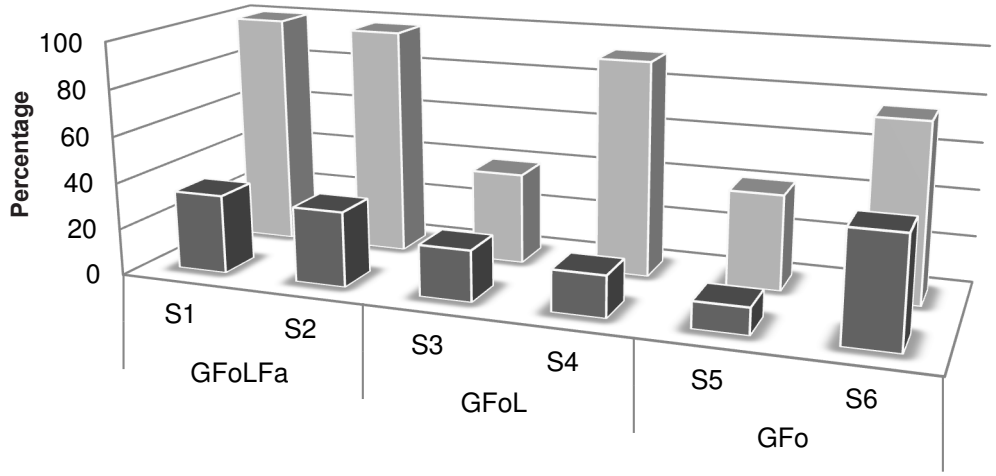
	GFoLFa		GFoL		GFo	
	S1	S2	S3	S4	S5	S6
Generalization to items not used in the treatment AI	0	0	0	0	5,55	3,84
Generalization to items not used in the treatment AF	88,63	95,67	16,66	50	23,63	22,91

Caption: GFoLFa: Phonological group with stimulation of facial and tongue praxis; GFoL: Phonological Group with stimulation of speech praxis; GFo: Phonological Group, IA: Initial Assessment; FA: Final Assessment.

Figure 2 - Generalizations to items not used in the treatment (considering the initial and final phonological assessments).

The GFoLFa group showed the highest mean for generalizations to items not used in the treatment (average = 92.15%), followed by the GFoL group (Mean = 33.33%).

Figure 3 shows generalization within a class of sounds, comparing the initial and final phonological assessments.



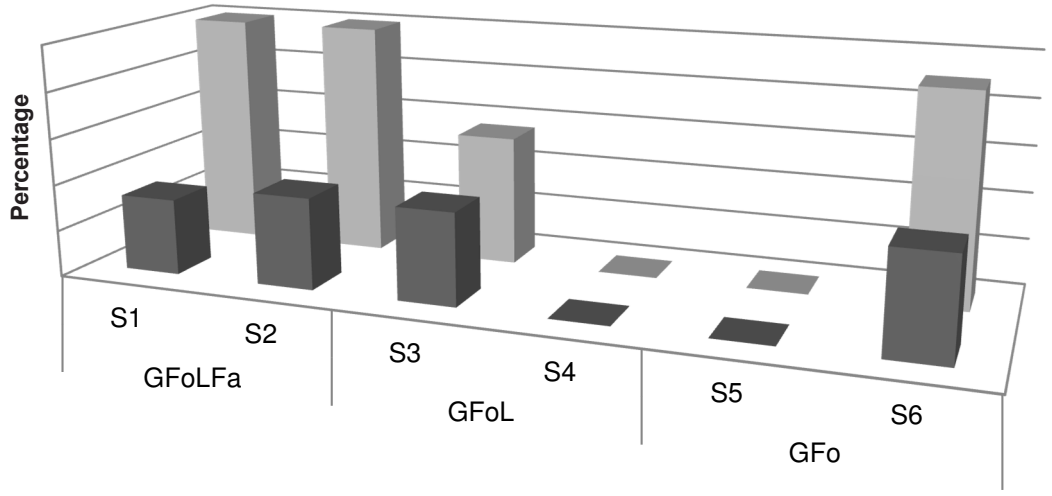
	GFoLFa		GFoL		GFo	
	S1	S2	S3	S4	S5	S6
Generalization within a class of sounds AI	33,91	32	21,97	17,91	11,53	46,69
Generalization within a class of sounds AF	100	97,72	39,25	92,06	40,83	75,89

Caption: GFoLFa: Phonological group with stimulation of facial and tongue praxis; GFoL: Phonological Group with stimulation of speech praxis; GFo: Phonological Group, IA: Initial Assessment; FA: Final Assessment.

Figure 3 - Generalizations within a class of sounds (considering the initial and final phonological assessments).

The GFoLFa group had the greatest generalizations within a class of sounds (mean = 65.54%), followed by the GFo group (generalization mean = 43.78%), and finally, the GFoL group had a mean of 42.79% for generalizations within a sound class.

Figure 4 shows generalization to another class of sounds by comparing the initial and final phonological assessments of the study subjects.



	GFoLFa		GFoL		GFo	
	S1	S2	S3	S4	S5	S6
Generalization to another class of sounds AI	32,81	39,52	39,74	0	0	43,21
Generalization to another class of sounds AF	100	100	55,75	0	0	90,05

Caption: GFoLFa: Phonological group with stimulation of facial and tongue praxis; GFoL: Phonological Group with stimulation of speech praxis; GFo: Phonological Group, IA: Initial Assessment; FA: Final Assessment.

Figure 4 - Generalizations to another class of sounds (considering the initial and final phonological assessments).

Generalization to another class of sounds was higher in the GFoLFa group, and this group acquired the classes that were absent in their phonological inventories before therapy. S4 and S5 showed no such generalization, because the only classes of sounds that had problems were those stimulated in therapy (fricatives and liquids).

DISCUSSION

At the beginning of the treatment, none of the subjects produced the target sounds stimulated during therapy in any of the possible positions (initial onset, medial coda, final coda). All target sounds used in treatment were in opposition to the phoneme /r/ in medial onset position, namely /Z/, /g/, /s/ and /k/.

A previous study[16] examined generalization to other positions in the word in 21 subjects with a mean age of 5:7 years with varying severity of speech-sound disorder. They underwent three different models of phonological therapy (Modified Cycles Model, ABAB Withdrawal and Multiple Baseline Design, and Modified Minimum Pairs - Maximum Opposition). The authors found that all models favored generalizations, but the Modified Minimum Pair - Maximum Opposition Model contemplated generalizations mainly for moderate severe disroder (MSD) and moderate light disorder (MLD), thus in agreement with the present study, whose subjects that showed the most generalizations had these disorders (S1 – MSD and S2 – MLD).

In the initial assessment, only S4 and S5 produced the target sounds (M = 4.69%). However, although the GFo group was the only one to produce the target sounds at the beginning of the treatment, it had fewer generalizations than GfoLFa, which was the group that had the most generalizations (M = 92.15%) and started to produce the target sounds in other words (items not used in the treatment). It can be assumed that this large number of generalizations occurred because this group received stimulation of orofacial praxis skills in addition to phonological stimulation; this fostered the emergence and stabilization of the target phoneme in words other than those used in the treatment.

In a study which found generalization to items not used in the treatment in 21 subjects with mean age of 5:7 years and different severity levels of phonological disorder who underwent three different models of phonological therapy (Modified Cycles Model, ABAB Withdrawal and Multiple Baseline

and Minimum Pairs - Maximum Opposition), it was found that subjects with MLD whose therapy was based on the Modified Minimum Pairs - Maximal Opposition model produced the most generalizations for items not used in the treatment. This is in agreement with this study, because S2 (with MLD) showed the highest percentage of generalization[17].

Also, this finding agrees with another study[18], where the authors analyzed changes in the phonological systems of subjects with phonological disorders undergoing therapy with the Modified Maximal Oppositions Model using the contrast or enhancement of the feature [+ voice]. The authors found that both groups (treated with contrast or enhancement) produced generalizations for items not used in the treatment.

The GFoLFa group showed the highest number of generalizations to other classes of sounds (100% for both subjects), with 100% of acquisitions in plosives and affricates. Moreover, S6 had major progress; it acquired fricatives and affricates that were absent in its phonological inventory. S4 and S5 were unable to generalize to other classes of sounds, as they had disorders in the stimulated classes only (fricatives and liquids).

In the same study described above, the authors[17] observed generalization to other classes of sounds, and reported that the ABAB model - Withdrawal and Multiple Baseline Design had the highest number of generalizations to another class of sounds in different levels of severity of phonological disorder, but they stressed that all models favored this type of generalization, which is in agreement with the present study.

CONCLUSIONS

The GFoLFa group (Phonological Group with stimulation of facial and tongue praxis) showed the highest scores in the generalizations to other positions in the word, to items not used in the treatment, within a class of sounds and to another class of sounds). This suggests that stimulation of tongue and facial praxis results in a more efficient and rapid therapy.

The results of this study may be confirmed if further research is conducted on this topic, and this therapeutic approach is applied to a larger number of subjects.

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RESUMO

Objetivo: verificar qual grupo (com ou sem estimulação das habilidades práxicas orofaciais) apresentou melhores generalizações estruturais, considerando os seguintes tipos: a itens não utilizados no tratamento; para outra posição na palavra; dentro de uma classe de sons; e para outra classe de sons. **Métodos:** a amostra foi composta por seis sujeitos (três meninas e três meninos), com idades entre 5:4 e 7:0 no início da terapia. Os sujeitos foram divididos em três grupos, recebendo terapia fonológica por meio do modelo de Pares Mínimos oposições Máximas/ *Empty Set*, sendo os do grupo estudo tratados com estimulação de habilidades práxicas de face e língua (GFoLFa), e com exercícios de habilidades práxicas de língua (GFoL), e o grupo controle submetido apenas à terapia fonológica (GFo). Todos foram avaliados pré e pós-terapia quanto ao sistema fonológico (Yavas, Hernandorena e Lamprecht, 1991); ao Teste de Praxias Orofaciais (Berzoatti, Tavano e Fabbro, 2007); e ao Teste de Praxias Articulatórias e Bucofaciais (Hage, 2000). **Resultado:** o GFoLFa obteve evoluções maiores generalizações para os quatro tipos analisados (dentro de uma classe de sons, para outras posições na palavra, para outra classe de sons e a itens não utilizados no tratamento). O GFoL apresentou importante número de generalizações dentro de uma classe de sons; e GFo apresentou generalização para outra classe de sons. **Conclusão:** os grupos que receberam intervenção práxica obtiveram maiores generalizações, porém sugerem-se novos estudos aplicando este modelo, para que possam ser confirmados esses resultados, com outras amostras.

DESCRITORES: Fala; Criança; Distúrbios da Fala; Terapia de Fala; Generalização da Resposta

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