

Redução de sílaba em fala espontânea nas alterações específicas de linguagem***

Syllable deletion in spontaneous speech of children with specific language impairment

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Abstract

Background: syllable deletion (SD) frequently occurs in Specific Language Impairment and can indicate a deviant factor in the phonologic acquisition process of these subjects. Aim: to verify the occurrence of SD in the spontaneous speech of children with SLI and to verify the influence of word extension and syllable stress in this process. Methods: participants were 27 children with SLI, aged between 3:0 and 5:11 years, in a weekly speech treatment, who presented 50% of correct answers in specific phonology assessment tasks or who presented speech intelligibility within levels that allowed assessment through spontaneous speech. Speech samples were obtained during a play interaction situation between the researcher and the child and through speech elicited by the presentation of a picture. The occurrence of SD was analyzed considering the following parameters: extension of the produced words, preference for stressed or unstressed syllables, position of the syllable within the word where SD occurred. Results: there was a preference for the production of dissyllabic words ($X^2 = 72,49$; $p < 0,001$); the occurrence of SD was significantly higher in polysyllabic words ($X^2 = 11,22$; $p < 0,004$) and on initial syllables ($X^2 = 34,99$; $p < 0,001$). Unstressed syllables were more often reduced ($Z = -5,79$, $p < 0,001$). Conclusion: the preference for the production of dissyllabic words reassures the difficulty of these children with complex syllabic structures and, in part, explains their spontaneous speech unintelligibility. The predominance of unstressed syllable deletion indicates the preference for producing the nucleus of words, where emphasis is given to the stressed syllable during language expression.

Key Words: Child; Language; Evaluation.

Resumo

Tema: a redução de sílaba (RS) ocorre frequentemente nas Alterações Específicas de Linguagem (AEL), podendo indicar um fator desviante no processo de aquisição fonológica destes sujeitos. Objetivo: verificar a ocorrência de RS na fala espontânea de crianças com AEL e a influência dos fatores extensão das palavras e tonicidade para sua ocorrência. Método: foram sujeitos 27 crianças com AEL, com idades entre 3:0 e 5:11 anos, em tratamento fonoaudiológico semanal, que apresentaram 50% de acertos em provas específicas de fonologia realizadas ou que apresentaram inteligibilidade de fala passível de análise pela fala espontânea. As amostras de fala foram obtidas a partir de interação lúdica com a pesquisadora e pelo discurso eliciado por figuras. A ocorrência de RS foi analisada considerando-se: extensão das palavras produzidas, preferência por sílabas tônicas ou átonas e posição das sílabas nas palavras em que ocorreu RS. Resultados: houve predomínio na produção de palavras dissílabas ($X^2 = 72,49$; $p < 0,001$), a ocorrência de redução de sílaba foi significativamente maior nas palavras polissílabas ($X^2 = 11,22$; $p < 0,004$) e as sílabas iniciais foram mais reduzidas ($X^2 = 34,99$; $p < 0,001$). As sílabas átonas foram reduzidas com maior frequência ($Z = -5,79$; $p < 0,001$). Conclusão: a preferência pela produção de palavras dissílabas confirma a dificuldade dos sujeitos com estruturas silábicas complexas e justifica parte de sua ininteligibilidade em fala espontânea. A predominância da redução de sílabas átonas indica a preferência pela produção do núcleo das palavras, em que a ênfase é dada na sílaba tônica durante a expressão da linguagem.

Palavras-Chave: Criança; Linguagem; Avaliação.

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Introduction

Specific Language Impairment (SLI) is significantly frequent among cases in which language development is disrupted, and phonology is usually one of the most impaired subsystems 1-4.

Word segmentation plays an important role on phonological acquisition and emerges from the perception of phoneme's acoustic characteristics, including aspects of metrical phonology such as syllabic stress patterns and syllable position in words 5-7.

Syllable reduction 8 or deletion 9 (SD), described by the exclusion of one or more syllables during word production, is considered a typical phonological process that occurs in normal language development and is also frequent in SLI. During typical development, SD is more frequent in atonic syllables and is influenced by word length 10,11.

The occurrence of SD in the course of typical development is higher in medial position and, in cases of language impairments, can take place in more than one syllable in a single word. This fact reflects a deviant process of phonological acquisition and must be taken into account by speech and language pathologists during differential diagnosis of SLI.

Therefore, the aims of this study were to verify SD in spontaneous speech of children with SLI and to test the influence of word length and syllable stress on its occurrence.

Method

This research was developed in the laboratory of Language Development and its Impairments of the Department of Physiotherapy, Communication Science & Disorders, and Occupational Therapy of the Faculty of Medical Sciences of the University of São Paulo. The content of this study as well as the Consent Forms to be signed by parents were approved by the Ethics Committee from the HC-FMUSP (number of protocol: 535/06). This research was granted by the "Fundação de Amparo à Pesquisa de São Paulo - FAPESP under the process 2006/61458-0).

Twenty seven children participated on this study. Participants were evaluated in the laboratory of Language Development and its Impairments of the Speech and Language course of the Faculty of Medical Sciences of the University of São Paulo, or were attending a weekly speech-language

therapy in the same laboratory when this study was carried out. Inclusion criteria were:

- . parental (or caregivers') consent for their kids to enroll in this research;
- . meeting diagnostic criteria for SLI, which includes poor performance in standardized language assessments 15 in the absence of: hearing impairment, focal brain damage or acquired neurological dysfunction, speech motor deficits, pervasive developmental disorders or syndromes 13,14. For diagnostic purposes, different language assessments were used: ABFW 16, Test of Production and Comprehension of Preposition 17, Adjective Comprehension Test 18 and Receptive Vocabulary 19;
- . age range between 3;0 and 5;11 years, from both genders (23 boys and 4 girls), and performance under expected in at least three language assessments, besides showing phonological deficits 8;
- . performing at least half of the phonological tasks (naming and imitation) of the ABFW phonological assessment 16;
- . showing verbal production enough to enable speech analysis in discourse and pragmatic tests²⁰. These speech samples were used for phonological analysis in spontaneous speech. Children whose speech production prevented phonological transcription (because of unintelligibility) were not included in this study, as our aim was to describe phonological aspects of children's first analyzable spontaneous speech.

For the purposes of this study, we used:

- . One digital recorder (USB input) for recording children's productions in the naming and imitation tasks of the phonological test;
- . One lapel microphone linked to the digital recorder;
- . Toys for interacting with children in order to collect spontaneous speech sample (Pragmatic Test 20);
- . Pictures for eliciting discourse production (the picture of a birthday party 21 or the picture from the ABFW 16. From both situations, the speech sample with the highest number of intelligible words was used for speech analysis);
- . One digital camera. In the majority of the cases, transcribing spontaneous speech needed the observation of the situation, that is, of the communicative context, because speech unintelligibility can influence listener's comprehension;
- . One notebook with Pentium-IV processor.

After participant's recruitment, data were collected as following:

All children that met inclusion criteria were previously evaluated on phonological abilities (naming and imitation tasks 8) in a child-directed situation, in a familiar therapy room. Aiming to avoid children's fatigue, tasks were administered in different days (the interval between sessions ranged from seven to fifteen days). Half of the children performed the imitation task in the first session, while half of the group performed the naming task first. Phonological assessment prior to data collection was carried out in order to assure that children's speech would be analyzable, given that speech unintelligibility of some children with SLI does not enable phonological transcription.

After administering these tasks, all subjects who managed to perform at least 50% of each task were recorded (in another session) in both an interactional context with the examiner (as advised by Fernandes) and a conversational context supported by pictures (discourse), in order to collect spontaneous speech samples. Phonological analyses were employed according to the following criteria:

- . occurrence of SD in words (as described by Wertzner 8), taking into account stress features of the reduced syllables;
- . syllable position in which deletion mainly occurred.

After data collection and transcription, results were computed according to the proposed criteria. Data were statistically analyzed considering the aims of this study.

Results

Statistical analyses were carried out with non parametric tests: Friedman, McNemar e Wilcoxon. Significance level was defined as $p=.05$. Significant differences are emphasized in bold.

Table 1 illustrates the occurrence of words according to its length (number of syllables). Chi-square showed a higher number of dissyllabic than trisyllabic and polysyllabic words in children's speech samples ($X^2 = 72,49$; $p < 0,001^*$), regardless of the procedure used to collect data.

In order to test for possible length effects in SD, we computed the proportion of reductions according to word length, given that children produced more dissyllabic and fewer polysyllabic words, with statistical significance.

Table 2 shows that SD was influenced by word length, as its occurrence was higher in polysyllabic than in trisyllabic and dissyllabic words. Chi-square revealed that this difference was statistically significant.

Regarding the word position in which SD occurred, results indicated a predominance of initial syllable reduction compared to medial and final syllables ($X^2 = 34,99$; $p < 0,001^*$). Descriptive statistics illustrate this pattern (SD in initial syllable: mean = 2,15; median = 1,5; Standard Deviation = 2,34; minimum = 0; maximum = 9).

Finally, Table 3 reveals the occurrence of SD concerning syllable stress pattern. Atonic syllables were more susceptible to SD than stressed syllables, regardless of its position in words (initial, medial or final).

TABLE 1. Descriptive statistics of the overall number of words according to word length

	mean	median	SD	Minimum	Maximum
Dissyllable	14,50	10,50	14,33	0	58,00
Trisyllable	7,37	5,00	5,72	0	21,00
Polysyllable	1,48	1,00	1,66	0	6,00

TABLE 2. Occurrence of SD according to word length

	Median	Median rank	X ₂	p-value
Dissyllable	0	1,61		
Trisyllable	0,46	1,98	11,22	0,004* (di<tri<poly)
Polysyllable	0,50	2,41		

TABLE 3. Occurrence of SD according to syllable stress pattern

	Mean	Median	SD	Minimum	Maximum
Stress	0,04	0	0,19	0	1,00
Atonic	3,43	3,00	3,46	0	15,00
	Z=-5,79; p-value<0,001*				

Discussion

The results of this study raised important considerations regarding phonological development in children with SLI.

The phonological process of SD is described as the omission of one or more syllables of a word. It is expected that children in initial stages of phonological acquisition and development commit SD approximately up to 2;6 years of age 8.

The occurrence of SD interferes on speech intelligibility of children with SLI and can be associated

to impaired (or absent) abilities to segment words into syllables, to perceive acoustic and prosodic features of words, to organize phoneme inventory and to produce language, in general. Besides that, SD can be influenced by word length 5-7,22.

The results of this study showed that children produced a higher number of dissyllabic words in spontaneous speech than trisyllabic and polysyllabic words (dissyllable>trisyllable>polysyllable). This

finding is opposed to Galea's 23 results, in which typically developing children from 2;1 to 3;0 years of age produced more polysyllabic words in spontaneous speech. The current findings might indicate that SLI children that participated in this study have immature phonological system, given that they performed poorly than their younger normally developing peers.

Regarding the occurrence of SD according to syllable position, results indicated a higher number of syllable reduction in the beginning of words compared to the incidence of SD in medial and final syllables. In typical language development, medial syllables are usually more vulnerable to SD, which suggests a deviant pattern of phonological acquisition and development in children with SLI 12.

The results also indicated that SLI children were inclined to reduce predominantly atonic syllables of words. This finding corroborates scientific evidence showing similar results in other languages such as English, Catalan, French and Italian 12, 13,24,25. Besides that, the strict relation with the trochaic pattern of syllable distribution in words, as occurs in the Brazilian Portuguese, can influence the reduction of atonic syllables 13. There is also evidence suggesting that SD in atonic syllables can be considered one of the hallmarks of SLI 25.

Children with SLI usually show great difficulties in producing non-final atonic syllables. This difficulty might deal to grammatical impairments since some words, such as articles and prepositions, are usually monosyllabic atonic words, being vulnerable to omission and consequently impairing speech intelligibility 13,25.

The predominance of production of stressed syllables can be explained on the basis of metrical phonology. This pattern might be due to the increase of acoustic salience in stressed syllables (in relation to the atonic ones), facilitating phoneme perception and organization to further production in words 5-7,24.

Typically developing children can perceive and differentiate features related to syllabic stress and word length at around the first year of age 26. Children with SLI usually present perceptual deficits that affect phonological manipulation in working memory, leading to comprehension and expressive impairments related

to phonology and syntax. Therefore, as showed by this study, SLI children presented greater difficulty to segment words into syllables and to recognize prosodic and phonological features in order to organize them in expressive language 3,26.

Word length and syllabic stress can be intimately related to semantic and phonological performance of children with SLI 26.

Therefore, we understand that the development of phonological abilities is important to other language subsystems development. Besides that, complex tasks related to the acquisition of concepts and to the elaboration of ideas require higher and more complex phonological abilities.

Conclusion

The findings of this study indicated that children with SLI produced more disyllabic words in spontaneous speech, differently from typical development, in which there is a majority of polysyllabic words. This vocabulary limitation can be caused by semantic deficits (proper from language impairments) as well as by phonological impairments related to the phonological representation of the lexical item, which impairs expressive language, as discussed in literature.

Besides that, it was possible to verify that SD was influenced by word length, since the occurrence of SD in polysyllabic words was higher than in trisyllables and disyllables.

The results regarding SD and its relation with both syllable stress and position are in line with the literature. The fact that children from this study reduced mainly atonic and initial syllables suggests that both features might be possible hallmarks of SLI (as pointed out by the literature), affecting speech unintelligibility.

These phonological difficulties might influence overall language development, affecting one or more subsystems. For this reason, it is important to assess and understand each of those subsystems separately, considering the role played by phonological development in language comprehension and expression.

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