



Tipologia das rupturas de fala e classes gramaticais em crianças gagas e fluentes***

Typology of speech disruptions and grammatical classes in stuttering and fluent children

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Abstract

Background: developmental stuttering is a pathology which begins during childhood, during the phase of language acquisition and development and is characterized as being chronic. Aim: to verify the influence of typology and grammatical classes on the occurrence of speech disruptions of stuttering and fluent children. Method: participants of this study were 80 children, with ages between 4.0 and 11.11 years, residents in the city of São Paulo. Participants were divided in two groups: GI (research group) was composed by 40 children (29 male and 11 female) with the diagnosis of stuttering, and with no other associated communication, neurologic and cognitive deficits; GII (control group) was composed by 40 fluent children, paired by age and gender with the participants of GI. Results: the data indicate that the groups do not differ regarding the occurrence of typical disfluencies. Less typical disfluencies occurred predominantly for GI. As for the grammatical class, speech disruptions were more frequent in function words for both groups. Conclusion: these results indicate that the analyses of speech disruptions, in terms of typology and grammatical classes, bring several information that are necessary for the assessment and diagnosis of childhood stuttering. This analysis points the differences and similarities between stuttering and fluent children.

Key Words: Speech, Language and Hearing Sciences; Fluency; Stuttering; Speech; Childhood.

Resumo

Tema: a gagueira de desenvolvimento é aquela cujo surgimento se dá na infância, durante a fase de aquisição e desenvolvimento da linguagem, e que se caracteriza como uma desordem crônica. Objetivo: verificar a influência da tipologia e classe gramatical na ocorrência de rupturas na fala de crianças gagas e fluentes. Método: Participaram desse estudo 80 crianças, com idades entre 4.0 a 11.11 anos, residentes no município de São Paulo e Grande São Paulo. Os participantes foram divididos em dois grupos: GI (grupo de pesquisa) foi composto por 40 crianças, (29 do sexo masculino e 11 do sexo feminino) com diagnóstico de gagueira, sem qualquer outro déficit comunicativo, neurológico e cognitivo associado; GII (grupo controle) foi composto por 40 crianças fluentes, pareadas por idade e sexo aos participantes de GI. Resultados: os dados indicaram que os grupos não se diferenciaram quanto à ocorrência de rupturas comuns. As rupturas gagas ocorreram predominantemente para GI. Em relação à classe gramatical, as rupturas foram mais frequentes nas palavras funcionais, para ambos os grupos. Conclusão: Esses resultados mostram que a análise das rupturas da fala, tanto em termos de tipologia quanto em termos gramaticais trazem um grande número de informações necessárias para a avaliação e diagnóstico da gagueira infantil, uma vez que aponta diferenças e semelhanças entre crianças gagas e fluentes.

Palavras-Chave: Fonoaudiologia; Fluência; Gagueira; Fala; Infância.

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Introduction

According to Andrade (2003), disruptions are the most obvious feature of stuttering and have been used as a parameter to describe, define and measure the severity of this disorder. Since disruptions are also found in fluent individual's speech there is often difficulty in distinguishing normal disruptions from those that may be suggestive of stuttering.

Andrade (2003, 2004) suggests that disruptions of speech flow can be differentiated according to their typology, that is, some disruptions are common to all speakers and fundamentally reflect linguistic uncertainty and imprecision, or else, they intend to improve the message's comprehension. These disruptions may be considered typical (hesitations; interjections; revisions; un-finished words; word, phrase or segment repetition). According to the author there are some disruptions that, although can seldom occur to every speaker, are suggestive of a greater speech processing impairment. These disruptions are classified as atypical disruptions (sound and syllable disruptions, blocking, sound and segment intrusions and long pauses).

As Andrade, Pereira (2003) also stresses that there are several types of disruptions that can be present in people's speech and that their type and frequency of occurrence are the factors that will differentiate a fluent speaker from a stutter speaker and, in their case, point to the severity of the disorder.

Since the beginning of the 20th century studies suggest that the occurrence of discourse disruptions is associated to various aspects of language formulation.

Au-Yeung et al. (2003) suggest that there is an influence of the grammatical classes of words on the occurrence of speech disruptions. In their study they used a definition of grammatical classes dividing them in content word and functional words.

Content words (or open class words) present lexical meaning and are words to which, in principle, there can always be attached new creations (Rosa, 2003). These words are nouns, adjectives, verbs and adverbs. These words have a fundamental role in semantic information transmission.

According to Rosa (2003), traditional studies direct too much attention towards content words. They are in larger number in languages (including Portuguese), carry meaning and generate new

words. Syntax studies, however, have shown the importance of another type of words: the functional ones.

Functional words (or words of closed class) present grammatical mean, they are indices of grammatical properties that provide differences between languages. These words are articles, prepositions, conjunctions and pronouns. These words have mainly syntactical functions, acting as connecting elements between phrases and have low semantic load on their own (Grela et al., 2004).

In their study Au-Yeung et al. (2003) suggest that disruptions in functional words happen mostly when they precede content words in the speech of fluent and stuttering children. Results confirm the hypothesis proposed to the study, that disruptions in functional words are used as a delaying tactic when the next content word is not ready to execution.

In a prior study, Howell et al. (1999) researched the changes in occurrence of disruptions in functional words to content words in stuttering speakers and in fluent speakers with increasing age. Results indicated that fluent as well as stuttering children presented a larger number of disruptions in functional words. A differentiation between groups can be observed with age increase. Fluent speakers continue using the delaying tactic in content word production, presenting disruptions in functional words with increasing age. The stuttering group seems to abandon this delaying tactic and, from adolescence on, start presenting a larger number of disruptions in content words.

In studies published in 2002 and 2003 Dayalu et al. researched the occurrence of speech disruptions related to word class in adults' speech and the results show that the number of disruptions in content words was significantly larger than in functional words, and the same results were obtained by Pereira (2003) to Portuguese adolescents and adult speakers.

According to Bloodstein (2001) children tend to present a larger number of disruptions in functional words, specially articles, pronouns and conjunctions because these words frequently initiate phrases.

Mansur and Radanovic (2004) point out that, functional words are examples of expressions that can be contained on an "automatic package" (inserted in the phrase already in the final phase of motor processing), while content words are subjected to a more refined (cognitive) elaboration





and with larger possibilities to undergo circumstantial modifications.

Owens (1996) mentions that functional words are produced latter than content words and that functional words tend to be omitted from the first speech segments produced by the child. According to the author, the lexical growth is slow until the 18th month of life and that in this period the child's lexicon is formed of about 50 words. These words refer predominantly to object names (nouns). From that moment on the child starts a faster acquisition process. The acquisition of substantives decreases and there is a growth in the acquisition of verbs and functional words (mostly articles and pronouns).

Araujo (2003) in her study of 60 Portuguese speaking children with ages between 2.0 and 4.11 years suggests that verbs are the most occurring words followed by nouns and pronouns. Grammatical classes as articles, prepositions and conjunctions were also used by the children but with a lesser number when compared with the classes of verbs, nouns and pronouns.

Based on the presented literature this study has the following objectives: a) to classify, quantify and compare the disruption typology presented on the speech of fluent and stuttering children; b) to verify if the different grammatical classes interfere with the occurrence of stuttering and fluent speech disruptions.

The research hypotheses tested to answer to the proposed objectives were:

- 1 - Referring to the disruption occurrence, the groups will differentiate themselves about the frequency and typology of the presented disruptions, and the stuttering children will present a larger number of disruptions when compared to the group of fluent children.
- 2 - Referring to the word classes, both groups will present more disruptions in functional words than in content words.
- 3 - The distribution of common disruptions and stuttering disruptions between content and functional words will be equivalent to both groups.

Method

Selection and assessment processes followed the appropriate ethical procedures: Approval by the institution's ethical committee (CAPPesq HCFMUSP n° 045/04) and signature of the consent form by each participant child's parent.

Participants

Participated in this research 80 children between 4.0 and 11.11 years of both genders (58 male and 22 female) enrolled in public education residing in the city of Sao Paulo whose parents agreed, by signing the consent form, with the realization of the proposed research procedures.

The participants of this study were divided in two groups:

The research group (GI) had 40 children (29 male and 11 female) with diagnosis of stuttering, without any other communicative, neurological or cognitive associated deficit. The diagnosis of stuttering was determining according to the evaluation criteria adopted in the Speech Pathology Research Laboratory in Fluency and Speech Motor Processing (LIF-FPMF).

The inclusion criteria to GI were:

1. Present fluency profile outside the age reference values (Andrade, 2004).
2. Receive at least 11 points (equivalent of at least "mild" severity) on the Stuttering Severity Instrument - 3 (SSI-3 - Riley, 1994).

All children of this group received speech therapy on the mentioned laboratory (LIF-FPMF) during the years of 2001 to 2005.

The control group (GII) had 40 children paired to the research group according to age and gender and without stuttering complaints or any other communicative, neurological or cognitive associated deficit according to information provided by the parents.

Inclusion criteria to GII were:

- a) Present fluency profile within the age reference values (Andrade, 2004).
- b) Receive a total of 10 points (equivalent of "very mild" severity) on the SSI-3

Material

To record the speech samples were used a Panasonic NVRJ-28 camera, and an audio recorder (Casio TP-6 brand) as a safety measure to ensure the speech transcription quality, cassette tapes (TDK A-60) and video tapes (JVC TC-30).

The speech samples were collected and analyzed about disruptions typology according to the Fluency Profile Protocol (Andrade, 2004 and to the Stuttering Severity Instrument - SSI (Riley, 1994), to determine the stuttering severity on GI.





Procedure

1. Speech sample gathering: to obtain speech samples it was adopted the methodology proposed by Andrade (2004). A picture was presented to the participants and the following order was given: "Please, look at this picture and tell me everything you want about it". The discourse was interrupted only with questions and/or comments if there was need to further the discourse to obtain 200 fluent syllables (number of fluent syllables necessary to the sample analysis). The time estimated to each sample gathering was of at least five minutes.

2. Assessing the speech samples: after obtaining the participants' speech sample, they were transcribed and characterized according to the disruption typology and their grammatical categorization. A confiability analysis was considered necessary due to the great variation of information and results produced by the above mentioned analysis. To evaluate the fidegnity of analyzes, a within-judges validation of compatibility was performed, resulting on an agreeing index of 96% to judge 1 and 92% to judge 2.

2. A. Disruption typology characterization: disruptions were analyzed and classified according to the Fluency Profile Protocol (Andrade, 2004) and divided as: typical disruptions - hesitations, interjections, revisions, un-finished words, segments and phrases repetition; atypical disruptions - syllable and sound repetition, prolonging, pauses and intrusions.

2. B. Disruption grammatical class characterization
The totality of samples (including disruptions) were classified referring to their grammatical class (nouns, article, adjective, numeral, pronoun, verb, adverb, preposition, conjunction and interjection) according to the Normative Grammar proposed by Lima (2002).

After this classification the disruptions were divided in content words (nouns, adjectives, verbs, adverbs and numerals) and functional words (articles, prepositions, conjunctions, pronouns and interventions), according to the criteria adopted by Howell et al. (1999) and Shapiro and Caramazza (2002).

To characterize each disruption as to their grammatical class and guaranty the fidedignity of this characterization the Houaiss (2003) dictionary was used as reference.

To this analysis not all disruptions presented by the groups were considered because some disruptions as hesitation, incomplete words,

pauses and intrusions are non-classifiable as to their grammatical class.

Statistical analysis

To the statistical analysis of data, parametric tests were used (t-paired test; t-independent test; analysis of variance (ANOVA) and Turkey test) and also non-parametric tests (Friedman test; Mann-Whitney test) with significance level of 5%.

Results

According to the research hypothesis tested the speech samples were analyzed and the results are presented on the tables that follow.

Table 1 shows that to GI the distribution of the number of typical and atypical disruptions has an even distribution to GI, not presenting any significant difference. In GII it can be observed that the number of typical disruptions was approximately ten times as big as the number of atypical disruptions and this is a significant difference.

Comparing both groups it can be observed that they didn't differ statistically about the number of typical disruptions. In what refers to the atypical disruptions there was statistically significant difference between groups and the GI presented a number of atypical disruptions approximately 13 times as big as the number presented by GII.

Table 2 presents the results referring to the occurrence of typical disruptions in the participants' speech, distributed by their typology. To GI the average occurrence of typical typologies was statistically different, with hesitation and word repetition as the most frequent typologies, showing no difference between them, but displaying a significant difference with the other typical disruptions.

In what refers to GII the average distribution of the typologies of typical disruptions was also statistically different and hesitation was the most frequent typology (different from the other typical typologies).

Both groups presented smaller average occurrence of the un-finish word typology and didn't present the phrase repetition typology.

To compare both groups each typology was analyzed separately. Results indicate that the groups didn't differentiate themselves statistically according to the number of disruptions as interjection, revision, un-finish word and phrase repetition. The occurrence of the hesitation typology was larger to GII and the difference to





GI was statistically significant. The typologies word repetition and segment repetition also differentiated the groups statistically, with larger occurrence to GI.

Table 3 presents the results referring to the occurrence of atypical disruptions in the participants' speech distributed according to their typologies. It can be observed that to GI the average number of occurrences of the atypical disruptions was statistically different and syllable repetition, blocking and prolonging were the most frequent typologies, without differences between them but with significant differences to the other atypical disruptions. The atypical disruptions with smaller average occurrences were pauses and intrusions.

To GII the mean of typical distribution occurrence was also statistically different, with prolonging and pauses as the most frequent typologies, without differences between them but with significant differences to the other atypical typologies. The typology with smallest occurrence average was the sound repetition. The typologies blocking and intrusion were not observed on the samples of this group of children.

Comparing the groups by the separate analysis of each typology it can be observed that the pause typology didn't differentiate the groups statistically. The typologies of sound repetition, syllable repetition and prolonging were more frequent in GI and this difference was statistically significant. The typologies blocking and intrusion were not compared numerically because they were not observed on the speech samples of GII.

Table 4 shows that GI as well as GII presented more content words than functional words in their speech samples and that this difference was statistically significant.

The Table also shows that in the speech samples analyzed the number of content words of GI was not statistically different from the number of content words of GII. The same result was observed to the functional words, that is, the number of functional words of GI samples wasn't statistically different from that of GII.

Table 5 presents the total number, average, standard deviation and mean of speech disruptions of the speech samples of which it was possible to analyzed the grammatical classes of functional and content words according to the described criteria.

Although the speech samples presented a larger number of content words to both groups (Table 4), Table 5 points out that the speech disruptions were more frequent in functional words to both groups also. In GI as well as in GII, the larger disruption number in functional words had statistically significant difference to content words.

When analyzing quantities on both groups, GI presented a larger number of disruptions either in content or in functional words when compared to GII.

Table 6 presents the results referring to the occurrence of content words disruptions, distributed about their grammatical classes. Discarding the numerical differences between groups it can be observed to GI as well as to GII, verb was the grammatical class with most disruptions (statistically different from other grammatical classes).

Table 7 presents the results about the occurrence of functional words disruptions, distributed according to their grammatical classes. Discarding again the numerical differences between groups the results indicate that articles was the grammatical class with most disruptions to both groups (with statistical differences from other grammatical classes).

Table 8 shows that, to both groups the typical disruptions were more frequent in functional words than in content words and this difference was statistically significant.

On Table 9 it can be observed that, to both groups the atypical disruptions presented even distribution between content and functional words, that is, there was no statistically significant prevalence of disruptions in either group of words.



TABLE 1. Within and between groups comparison of common and stuttering disruptions

	Common				Stuttering				P-value	
	Total	Average	SD	Mean	Total	Average	SD	Mean	T- test	Mann-Whitney
GI	627	15,67	9,63	12,00	648	16,20	13,06	13,50	P=0,75	P=0,74
GII	520	13,00	6,13	13,00	49	1,22	1,18	1,00	P<0,001*	P<0,001*
P-value	P=0,143				P<0,001*					
T - test	P=0,380				P<0,001*					
Mann-Whitney					P<0,001*					

Legend: SD – standard deviation

TABLE 2. Common disruptios – distribution within and between groups

	Hesitation		Interjection		Revision		Un-finish word		Word repetition		Segment repetition		P-value	
	A	SD	A	SD	A	SD	A	SD	A	SD	A	SD	T- test	Mann Whitney
GI	4,67	4,16	0,97	1,42	1,57	1,58	0,30	0,56	6,60	6,00	1,55	1,58	<0,001*	<0,001*
GII	6,32	4,00	1,45	2,26	1,25	1,48	0,47	0,87	2,87	2,55	0,62	0,80	<0,001*	<0,001*
P-value	0,075*		0,265		0,346		0,292		0,001*		0,002*			
T- test	0,033*		0,530		0,309		0,440		0,001*		0,007*			
Mann Whitney														

Legend: A – average; SD – Standard deviation

TABLE 3. Stuttering disruptions – within and between groups distribution

	Sound repetition		Syllable repetition		Blocking		Prolonging		Pause		Intrusion		P-value	
	A	SD	A	SD	A	SD	A	SD	A	SD	A	SD	T- test	Mann Whitney
GI	1,22	1,68	4,15	4,80	4,52	5,58	4,60	6,19	0,85	1,96	0,85	3,61		
GII	0,02	0,15	0,27	0,55	0	0	0,42	0,78	0,50	0,81	0	0		
P-value	<0,001*		<0,001*		STATISTICAL ANALYSIS IMPOSSIBLE FOR LACK OF DATA TO GII		<0,001*		0,304		STATISTICAL ANALYSIS IMPOSSIBLE FOR LACK OF DATA TO GII			
T- test	<0,001*		<0,001*				<0,001*		0,761					
Mann Whitney														

Legend: A – average; SD – Standard deviation

TABLE 4. Distribution of the total number of words of the sample according to the type of words.

	Content				Functional				P-value	
	Total	Average	SD	Mean	Total	Average	SD	Mean	T- test	Mann-Whitney
GI	2831	70,78	5,60	71,00	1773	44,33	7,51	45,00	<0,001*	<0,001*
GII	2826	70,65	7,67	71,50	1748	43,70	10,9	44,00	<0,001*	<0,001*
P-value										
T- test	0,934				0,766					
Mann-Whitney	0,931				0,512					

Legend: SDP – Standard deviation.



TABLE 5. Distribution of the number of stuttering disruptions: content and functional words.

	Content				Functional				P-value	
	Total	Average	SD	Mean	Total	Average	SD	Mean	T-test	Mann-Whitney
GI	491	12,23	9,56	9,00	630	15,8	11,9	12,50	p=0,007*	P=0,077*
GII	91	2,00	1,88	2,00	216	5,73	1,88	5,00	p<0,001*	p<0,001*
P-value										
T-test	p<0,001*				p<0,001*					
Mann-Whitney	p<0,001*				p<0,001*					

Legend: SD – Standard deviation.

TABLE 6. Distribution of content words disruptions according to their grammatical classes.

	Nouns		Adjective		Verb		Adverb		Numeral		P-value	
	A	SD	A	SD	A	SD	A	SD	A	SD	ANOVA	Friedman
GI	3,57	4,67	0,17	0,38	6,37	4,41	2,05	2,82	0,05	0,22	<0,001*	<0,001*
GII	0,62	0,83	0	0	1,05	1,46	0,25	0,66	0,07	0,26	<0,001*	<0,001*

Legend: A – average; SD – standard deviation.

TABLE 7. Distribution of functional words disruptions according to their grammatical classes.

	Pronoun		Preposition		Conjunction		Article		Interjection		P-value	
	A	SD	A	SD	A	SD	A	SD	A	SD	ANOVA	Friedman
GI	3,30	2,84	2,92	3,62	2,95	3,90	5,62	5,71	0,97	1,42	<0,001*	<0,001*
GII	0,75	1,19	0,67	0,85	0,97	1,67	1,90	1,49	1,42	2,27	<0,001*	<0,001*

Legend: A – average; SD – standard deviation.

TABLE 8. Distribution of typical disruptions: content and functional words.

	Typical disruptions										P-value	
	Content				Functional							
	Total	Average	SD	Mean	Total	Average	SD	Mean	T-test	Mann-Whitney		
GI	146	3,65	2,82	3,00	371	9,28	7,34	7,50	p<0,001*	p<0,001*		
GII	77	1,93	1,80	2,00	201	6,30	4,03	6,00	p<0,001*	<0,001*		

Legend: SD – Standard deviation.

TABLE 9. Distribution of atypical disruptions: content and functional words.

	Atypical Disruptions										P-value	
	Content				Functional							
	Total	Average	SD	Mean	Total	Average	SD	Mean	T-test	Mann-Whitney		
GI	345	8,62	8,63	6,00	259	6,48	6,70	4,00	P=0,090	P=0,084		
GII	14	0,35	0,57	0,00	15	0,37	0,74	0,00	P=0,860	P=0,814		

Legend: SD – Standard deviation.





Discussion

Hypothesis 1: confirmed

The presented results have shown that the groups are different as to the total number of disruptions and that the group of stuttering children presented twice the number of disruptions presented by the group of fluent children.

When analyzing of the distribution of disruptions in can be observed that the groups behaved on different ways. To the stuttering children there was an even distribution of atypical and typical disruptions. To the fluent children there was a significant predominance of the number of typical disruptions when compared to the atypical disruptions.

Although atypical disruptions are one of the most important parameters to the diagnoses of stuttering (Andrade, 2003, Yairi, 1999, 2001) it can be observed that they are also present in the speech of fluent children. What differentiate the groups is the frequency with which these disruptions occur on these children's speech (Yairi, 1999). On a research with 200 fluent Portuguese speaking children, Andrade (2003) points out that in none of the studied ages the number of stuttering disruptions on the speech samples was larger than five occurrences.

About the number of typical disruptions, results indicate that there was no difference between the groups. The differentiation between groups was determined by the number of atypical disruptions (approximately 13 times of big to stuttering children). These findings agree with Ambrose and Yairi (1999) once they observed that the difference between groups was not statistically significant on the OD (other disfluencies) typology and that it was the SLD (stuttering-like disfluencies) typology, larger to stuttering children that differentiated the groups.

Although groups didn't present statistically significant differences on the total number of typical disruptions it can be observed a difference on the distribution of the typologies these disruptions.

Among the typical disruptions, word repetition and hesitation were the most frequent to stuttering children. According to Anderson and Conture (2005), of the typologies not indicative of stuttering, word repetition was the most frequent typology, in their study of 20 English speaking children.

To fluent children hesitation was the most frequent typical typology. In Yairi's study (1999) the typologies hesitation and interjection were the most frequent to stuttering as well as to fluent children. According to Carlo and Watson (2003), that studied

fluent Spanish speaking children, the most frequent typical disruptions were word repetition, revisions and hesitations.

Separately analyzing each typology the results show that the number of occurrence of the typologies revision, un-finish words and interjection didn't present statistically significant differences between the groups of stuttering and fluent children.

Word repetition and segment repetition were the typologies that statistically differentiated the groups, occurring more frequently on the group of stuttering children. Another typical typology that statistically differentiated the groups was hesitation, but it was more frequent in the group of fluent children.

On the international literature some authors propose a clear distinction between monosyllable word repetition and the other, classifying the first as a typology characteristic of stuttering.

Yairi (2001), answering to a criticism by Wingate, defends the position that monosyllable words repetition should be considered as a atypical disruption. According to the author the speech is not separated in syllables and word because there is co-articulation between them. This way, there is no difference between the repetition of the monosyllabic word (ex: a a a boat) and the repetition of the syllable (ex: aaabout) because the co-articulation break occurs either way. In his study (Yairi, 1999) the group of stuttering children presented a statistically significant larger amount of monosyllable words repetition when compared with the group of fluent children.

One consideration that can be made about this theory is that it refers to all the monosyllabic words but its justifications and examples seem to refer always to articles which are not the only monosyllabic word either in English or in the other languages.

The most modern theories about stuttering agree that the occurrence of speech disruptions is due to a temporal imbalance, an asynchrony between speech-involved processing (Perkins et al., 1991; Andrade, 2002; Howell, 2004).

The theory proposed by Postma and Kolk (1993) is based on the notion that difficulties on phonological coding and on the ability to built and retrieve the phonological plan may result in speech disruptions. According to this theory people that stutter seem to present a delay on phonological code processing, increasing the chance of failing on the target phoneme selection. The speech flow disruptions would be a consequence of the tentative to repair these mistakes.





According to Levelt (1989) on a general way the functioning of phonetic coding up till its execution is a consequence of the gap filling of pre-existing structures, by contents that are processed in each level: phonetic, phonological, syntactic and semantic.

According to Saussure's structuralistic theory (1969) the relation between linguistic elements can be determined in two different domains, the selection axis (paradigmatic) and the combinatory axis (syntagmatic). The paradigm is not any association between signs by sound or sense, but a series of linguistic elements that can figure in the same point of the utterance if the sense is other. On the other side, in the syntagm there is not the random combination of any elements; the combination in syntagm follows a system-defined patterns. This way, for example, an article and a substantive can be combined and, in this case the article must always precede the substantive.

The structuralistic theory places linearity as one of the essential features of the linguistic sign, where each sign has a determined position on the syntagmatic level what excludes, for example, the production of two phonemes in the same time unit. Commutation is the operation that works both axes.

This way, a timing failure on the speech involved processing may reflect the selection of paradigmatic and syntagmatic axes interfering with the selection of the subsequent term, not allowing the system's linearity and eventually causing term repetitions, that is, speech disruptions.

The repetition of words and segments presented more frequently by stuttering children break a larger speech segment, the syntagm (nominal or verbal) what can mean that the individual presents a difficulty to initiate and maintains a whole syntactic structure (Bloodstein, 2001).

Fluent children in this study presented a significantly larger number of disruptions by hesitations when compared to stuttering children. Thinking of the pragmatic/syntagmatic relation discussed above, the hesitations behave differently when compared to the repetition of words and segments. Hesitations do not cause the repetition of syntagmatic elements and this way, to not break the syntagm. The occurrence of hesitations may be understood as an additional time necessary to the temporal adjustment of paradigmatic and syntagmatic axes.

Results point out to group differences on the stuttering typology:

To stuttering children the most frequent typologies were syllable repetition, blocking and prolonging, with no significant difference between

them. The same result was found by Anderson and Conture (2005). According to Yairi (1999) the most frequent disruption was the repetition of monosyllabic words, considered by this author as a atypical disruption, as discussed before. The less frequent atypical typologies were pause and intrusion.

In relation to fluent children, the most frequent atypical typologies were prolonging and pause. In the Carlo and Watson's study (2003) prolonging was the most frequent disruption. The less frequent typology was sound repetition. The blocking and intrusion typologies were not observed on the analyzed samples of this group of children.

Comparing both groups by the separate analysis of each typology it can be observed that sound repetition and prolonging typologies were more frequent on stuttering children and this difference is statistically different.

It was not possible to compare the blocking and intrusion typologies because fluent children didn't present these disruptions.

The only stuttering typology that didn't show statistically relevant difference between groups was the pause. In this case other issues must be investigated, as the place and duration of pauses, in order to verify possible differences on the occurrence of this typology in fluent and stuttering children.

Hypothesis 2: confirmed.

The results obtained in this study show that although speech samples presented a larger number of content words the speech disruptions occurred in larger number on functional words to both groups. This result agree with findings frequently highlighted in the international literature (Bloodstein, 2001; Howell et al., 1999; Au-Yeung et al., 2003; Dworzynski et al., 2003, Graham et al., 2004, Natke et al., 2004).

According to Au-Yeung et al. (2003) the functional word repetition happens when they precede content words in the speech of either fluent or stuttering children because functional word disruptions are used as a delaying tactic when the subsequent content word is not ready to execution.

According to Howell et al. (1999) only content words are real words in the phonological sense and functional words work as affixes to content words. This way, when the speaker presents successive disruptions on functional words he is actually restarting the sentence and delaying the production of the following content word and thus increasing the processing time.





Analyzing the occurrence of disruptions on each grammatical class individually it was observed a behavior very similar of fluent and stuttering children because both groups presented predominance of disruptions on the grammatical classes of verbs (content words) and articles (functional words).

In relation to the grammatical class of verbs the large occurrence of disruptions may be explained by the fact that it is a very complex and dynamic grammatical class. The complexity of verbs is observed morphological as well as syntactically. Verbs are latter acquired, are harder to process because they present a large meaning variation. Besides, they produce greater comprehension difficulties when compared to substantives. Verb processing is more complex than substantive processing due to the great flexing variability and greater amount of information (grammatical and thematic) represented by verbs (Bi et al 2005; Goldberg e Golfarb, 2005; Honincthun e Pillon, 2005).

In relation to articles, besides the low frequency of this grammatical class in Portuguese (Rosa, 2003) the expressive number of disruptions can have been influenced by two motives. The first motive would be that in Portuguese there is a high frequency of articles initiating phrases (Rosa, 2003). To Bloodstein (2001) children tend to present a larger number of disruptions in functional words, especially articles, pronouns and conjunctions because these words frequently initiate phrases. On the beginning of the sentence the utterance planning is still not complete and the speakers may modify the initial planning during speech leading to a greater demand on the linguistic system and thus allowing the occurrence of disruptions (Karniol, 1995). According to Pereira (2003) the initial words of a phrase are more apt to be stuttered than other words showing a larger difficulty to start a verbal utterance. It doesn't mean that disruption in the middle or end of a phrase can not occur, but they are less frequent.

The second motive, as mentioned before, would be that the disruptions in functional words, especially in articles, may have the purpose to delay the folloing content word until it is ready to production (Howell et al., 1999; Au-Yeung et al., 2003). The predominance of disruptions on the grammatical class of article is widely displayed in the literature (Bloodstein, 2001; Au-Yeung et al., 2003; Dworzynski et al., 2003, Graham et al., 2004, Natke et al., 2004).

Hypothesis 3: partially confirmed.

The cross analysis of the occurrence of typical and atypical disruptions according to the grammatical class (content and functional words) leded to an interesting data. According to the results obtained it was observed that the typical disruptions occurred more frequently (twice as much) in functional words. To the atypical disruptions the occurrence of content and functional words was the same, without predominance of either type of words.

According to Andrade (2004) the typical disruptions are more related to the linguistic processing. According to the author the excessive amount of typical disruptions can be an indication that the linguistic system exceeded its word-finding or sentence construction capacity to generate socially appropriated utterances through phonologically correct syllable sequencing and to generate complex phonological combinations (Andrade, 2002).

This way, the results suggest that the grammatical aspect represented by the distinctions between content and functional words seam to somehow influence the typical disruptions occurrence since it was observed a significant amount of this kind of functional word disruption.

Atypical disruptions, on their turn, seam not to be influenced by grammatical class the same way common disruptions are since the distribution of content and functional words was the same, not presenting statistically significant differences.

This result suggest that the grammatical aspect represented by the distinction between content and functional words seams not to influence directly on the occurrence of atypical disruptions, more related to the motor aspects involved in speech.

Any situation that demands motor abilities processing that exceed its physiological capacity will lead to an increase in the number of this kind of disruption (stuttering). The motor demand means any occurrence that produces fast and delicate movement of facial structures needed to fluent, more difficult, speech (Andrade, 2002).

It is important to highlight that this research hypothesis is new, since it wasn't found similar studies in the reviewed literature, making it impossible to compare the data obtained.





Conclusion

These results show that the analysis of the speech disruptions either in terms of typology or in grammatical terms bring a great amount of information necessary to the assessment and diagnosis of childhood stuttering since it points to differences and similarities between fluent and stuttering children, identifying aspects not associated to the inherent aspects of childhood language development.

References

- AMBROSE, N. G.; YAIRI, E. Normative data for early childhood stuttering. *J. Lang. Hear. Res.*, v. 42, p. 895-909, 1999.
- ANDERSON, J. D.; CONTURE, E. G. Language abilities of children who stutter: a preliminary study. *J. Fluenc. Dis.*, v. 25, p. 269-290, 2005.
- ANDRADE, C. R. F. História natural da gagueira - estudo III: vocabulário, fonologia e pragmática. *Pró-fono R. Atual. Cient.*, Barueri (SP), v. 14, n. 3, p. 371-382, 2002.
- ANDRADE, C. R. F. Gagueira Infantil. In: ANDRADE, C. R. F.; MARCONDES, E. (Orgs). *Fonoaudiologia em Pediatria*. São Paulo: Sarvier, 2003. p. 61-69.
- ANDRADE, C. R. F. Fluência. In: ANDRADE, C. R. F.; BÉFI-LOPES, D. M.; WERTZNER, H. F.; FERNANDES, F. D. M. *ABFW - teste de linguagem infantil: nas áreas de fonologia, vocabulário, fluência e pragmática*. 2. ed. Barueri (SP): Pró-Fono, 2004. cap. 3, p. 71-94.
- ARAÚJO, K. *Aspectos do desempenho gramatical de crianças pré-escolares em desenvolvimento normal de linguagem*. 2003. 223 f. Dissertação (Mestrado em Semiótica e Linguística Geral) - Faculdade de Filosofia, Letras e Ciências Humanas, Universidade de São Paulo, São Paulo.
- AU-YEUNG, J.; GOMEZ, I. V.; HOWELL, P. Exchange of disfluency with age from function words to content words in Spanish speakers who stutter. *J. Speech Lang. Hear. Res.*, v. 46, p. 754-766, 2003.
- BI, Y.; HAN, Z.; SHU, H.; CARAMAZZA, A. Are verbs like inanimate objects? *Brain Lang.*, v. 95, p. 28-29, 2005.
- BLOODSTEIN, O. Incipient and developed stuttering as two distinct disorders: resolving a dilemma. *J. Fluenc. Dis.*, v. 26, p. 67-73, 2001.
- CARLO, E. J.; WATSON, J. B. Disfluencies of 3 - and 5 - years old Spanish-speaking children. *J. Fluenc. Dis.*, v. 28, p. 37-53, 2003.
- DAYALU, V. N.; KALINOWSKI, J.; STUART, A.; HOLBERT, D.; RASTATTER, M. P. Stuttering frequency on content and function words in adults who stutter: a concept revised. *J. Speech Lang. Hear. Res.*, v. 45, p. 871-878, 2002.
- DAYALU, V. N.; KALINOWSKI, J.; STUART, A. Interpreting differences in stuttering frequency on content and function words: a reply to Wingate (2003). *J. Speech Lang. Hear. Res.*, v. 46, p. 1471-1472, 2003.
- DWORZYNSKI, K.; HOWELL, P.; NATKE, U. Predicting stuttering from linguistics factors for German speakers in two age groups. *J. Fluenc. Dis.*, v. 28, p. 95-113, 2003.
- GOLDBERG, E.; GOLDFARB, R. Grammatical category ambiguity in aphasia. *Brain Lang.*, v. 95, p. 293-303, 2005.
- GRAHAM, C. G.; CONTURE, E. G.; CAMARATA, S. M. Childhood stuttering on function and content words. In: ASHA CONVENTION, 2004. *On-line proceedings of Asha Convention*, 2004. Disponível em URL: <<http://convention.asha.org/handouts.cfm>>. Acesso em: 29 nov. 2004.
- GRELA, B.; RASHITI, L.; SOARES, M. Dative prepositions in children with specific language impairment. *Applied Psycholing.*, v. 25, p. 467-480, 2004.
- HONINCTHUN, P.; PILLON, A. Why verbs could be more demanding of executive resources than nouns: insight from a case study of a fv-FTD patient. *Brain Lang.*, v. 95, p. 36-37, 2005.
- HOUAISS, A. *Minidicionário Houaiss da Língua Portuguesa*. Rio de Janeiro: Objetiva, 2003.
- HOWELL, P. Assessment of some contemporary theories of stuttering that applied to spontaneous speech. *Contemp. Issues Commun. Sci. Dis.*, v. 39, p. 122-139, 2004.
- HOWELL, P.; AU-YEUNG, J.; SACKIN, S. Exchange of stuttering from function words to content words with age. *J. Speech Lang. Hear. Res.*, v. 42, p. 345-354, 1999.





KARNIOL, R. Stuttering, language and cognition: a review and model of stuttering as suprasegmental sentence plan alignment (SPA). *Psychol. Bull.*, v. 117, n. 1, p. 104-124, 1995.

LEVELT, W. J. M. *Speaking: from intention to articulation*. Cambridge (MA): MIT Press, 1989.

LIMA, C. H. R. *Gramática normativa da língua portuguesa*. 42. ed. Rio de Janeiro: José Olympio, 2002.

MANSUR, L. L.; RADANOVIC, M. *Neurolingüística: princípios para a prática clínica*. São Paulo: EI - Edições Inteligentes, 2004.

NATKE, U.; SANDRIESER, P.; ARK, M.; PIETROWSKY, R.; KALVERAM, K. T. Linguistic stress, within-word position, and grammatical class in relation to early childhood stuttering. *J. Fluenc. Dis.*, v. 29, p. 109-122, 2004.

OWENS, R. E. *Language development*. 4. ed. Needham Height: Allyn & Bacon, 1996.

PEREIRA, M. M. B. *Análise lingüística da gagueira*. São Paulo: AM3 Artes, 2003.

PERKINS, W. H.; KENT, R. D.; CURLEE, R. F. A theory of neuropsycholinguistic function in stuttering. *J. Speech Hear. Res.*, v. 34, p. 734-752, 1991.

POSTMA, A.; KOLK, H. The covert repair hypothesis: prearticulatory repair processes in normal and stuttered disfluencies. *J. Speech Hear. Res.*, v. 36, p. 472-487, 1993.

RILEY, G. D. *A Stuttering Severity Instrument for children and adults*. Austin: Pro-Ed, 1994.

ROSA, M. C. Classes de palavras, tipos de significado e questões relacionadas. In: ROSA, M. C. *Introdução à Morfologia*. São Paulo: Contexto, 2003. p. 91-114.

SAUSSURE, F. *Curso de lingüística geral*. São Paulo: Cultrix, 1969.

SHAPIRO, K.; CARAMAZZA, A. The role and neural representation of grammatical class. *J. Neuroling.*, v. 15, p. 159-170, 2002. special issue.

WEBER-FOX, C.; NEVILLE, H. Sensitive periods differentiate processing of open - and closed - class words: an ERP study of bilinguals. *J. Speech Lang. Hear. Res.*, v. 44, p. 1338-1353, 2001.

YAIRI, E.; WATKINS, R.; AMBROSE, N.; PADEN, E. Letters to the Editor. *J. Speech Lang. Hear. Res.*, v. 44, p. 585-597, 2001.

