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# Disfluencies and speech rate in spontaneous production and in oral reading in people who stutter and who do not stutter

## Disfluências e velocidade de fala em produção espontânea e em leitura oral em indivíduos gagos e não gagos

Joana Cecilia Baptista Ramalho Pinto<sup>1</sup>, Ana Maria Schiefer<sup>2</sup>, Clara Regina Brandão de Ávila<sup>2</sup>

### ABSTRACT

**Purpose:** To investigate and characterize temporal parameters of speech in spontaneous situation and in oral reading in people who stutter and who do not stutter, and investigate the relation among these variables. **Methods:** Thirty participants aged between 17 and 59 years, with a minimum of 08 years of scholar education, constituted the Study Group, composed by 15 people who stutter and the Control Group with 15 people who did not stutter. Subjects on the Control and Study Group were matched by gender, age and education level. After anamnesis it was made: brief neuropsychological assessment, specific stuttering assessment and specific oral reading assessment. Disfluencies were analyzed and it was calculated speech rate on spontaneous production and oral reading. **Results:** There were more disfluencies in spontaneous speech than in text oral reading in both groups. As to speech rate, in the Control Group, pseudoword and text reading were positively correlated, and in the Study Group, all variables were positively correlated. **Conclusion:** Speech rate and disfluencies analysis characterized both groups, either in spontaneous speech and reading situations which evidenced performance profiles differentiated by speech rate, frequency and disfluency typology. Investigation showed that people who stutter present lower values of speech rate, as well as higher occurrence of disfluencies, either on spontaneous speech and oral reading, in comparison to people who do not stutter.

**Keywords:** Stuttering; Speech; Reading; Speech, Language and Hearing Sciences; Mental processes

### RESUMO

**Objetivo:** Investigar e caracterizar a velocidade de fala e as rupturas da fala em situação espontânea e em leitura oral, em indivíduos gagos e não gagos e investigar a relação entre essas variáveis. **Métodos:** Trinta participantes com idades entre 17 e 59 anos e, no mínimo, oito anos de escolaridade, constituíram o Grupo Estudo, com 15 indivíduos gagos, e o Grupo Controle, com 15 indivíduos não gagos. Os indivíduos do Grupo Controle e do Grupo Estudo foram pareados por idade, gênero e nível de escolaridade. Após anamnese, foram realizadas as seguintes avaliações: neuropsicológica breve, específica da gagueira e específicas da leitura. As disfluências foram analisadas e calculou-se a velocidade da fala espontânea e na leitura oral. **Resultados:** Ocorreram mais disfluências na fala espontânea que na leitura oral de texto, em ambos os grupos. Em relação à velocidade, no Grupo Controle, a leitura de pseudopalavras e de texto correlacionaram-se positivamente e no Grupo Estudo, todas as variáveis correlacionaram-se positivamente. **Conclusão:** A análise da velocidade e das rupturas de fala caracterizou ambos os grupos, tanto em situação de fala espontânea, quanto na leitura que evidencia perfis de desempenho diferenciados pela velocidade de fala, frequência e tipologia das rupturas. A investigação demonstra que indivíduos gagos apresentaram valores mais baixos de velocidade, assim como maior ocorrência de disfluências, tanto na fala espontânea quanto na leitura oral, em comparação com indivíduos não gagos.

**Descritores:** Gagueira; Fala; Leitura; Fonoaudiologia; Processos mentais

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## INTRODUCTION

Fluent speech can be associated to the speaking eloquence, to the ability to speak widely and with few breaks, to the language's syntactic and semantic features mastery, or even to the ability to demonstrate a creative use of the language. The term *speech fluency* has been used to indicate the ability to keep the speech flow smooth and continuous<sup>(1)</sup>, which varies from one individual to another, depending on the type of communicative situation, on the emotions involved in the act of speaking and on one's prior knowledge of the subject<sup>(2)</sup>.

While clinically evaluating the speech fluency, two parameters are usually checked: speech rate and disruptions classification, as well as identifying the frequency with which they occur.

The oral reading of texts is a procedure widely used in the clinical evaluation of stuttering and is referred to in established evaluation protocols. Reading aloud is processed by perception and verbalization of the written text, i.e., the written text is reproduced through speech<sup>(3)</sup>. The ability to read texts aloud with appropriate speed, accuracy and prosody is an important feature of the development of reading itself and represents a direct relationship with the automatic recognition of words ability<sup>(4)</sup>. The efficient reading is fluent and is achieved through the successful development of phonological representations of words, as well as the ability to process them quickly and automatically, with minimal cognitive resources while decoding. Thus, the reader can turn his/her attention to understanding<sup>(5)</sup>.

Despite the importance of reading as a procedure for assessing speech fluency, little is known about the relevant parameters for such assessment, which focuses on the automatic recognition and decoding of words, rather than understanding. The lack of information in this area is understandable, since many factors can intervene in reading fluency, such as the level of schooling of the reader, the type of text presented and its bearer, the motivation and attention focused on the text, the automatic recognition of words ability, the vocabulary used, etc. These characteristics influence any individual reading fluency. Recaptures, corrections, prolongations, repetitions of syllables and words are phenomena commonly observed in non-stuttering individuals reading, who are unprepared for reading a text that is inappropriate, for example, for his/her level of schooling. Therefore, it is necessary to obtain measurements, even if only normative, which can guide the professional who assesses speech fluency through oral reading.

The lack of information about reading as an investigation procedure may hamper speech fluency, for example, the assessment of an individual without reading fluency (low schooling) and who shows many disruptions in spontaneous speech. How to proceed? To which point is the reading difficulty considered and how to begin to identify speech difficulties?

The identification of the limits and differences of reading fluency between a stutterer and a non-stutterer, can provide

important characterization parameters on this competency. However, this analysis involves assessing and knowing *a priori* the values of speech rate and the characterization of disruptions in a spontaneous speech situation, in order to understand how both these variables behave during the reading act.

With respect to stuttering, some studies report the reduction in the number of disruptions in the speech of stuttering individuals while reading texts<sup>(6,7)</sup>, modifying the speed at which the speech would spontaneously be produced.

On the other hand, in fluent individuals, researches have shown changes in the speech rate, as observed in spontaneous and oral reading situations, which tend to stabilize in adults<sup>(8)</sup>.

Despite all these considerations, the fluency disruptions can be observed, and usually are so, in the oral reading of any reader.

Despite the clinically observed changes in speech rate of stutterers while reading, there are few studies that have characterized these changes, or even that have determined standards in regards to this.

Based on this argument, were examined in this study: the types of disruptions and the parameters of speech rate, in words per minute and syllables per minute, in spontaneous speech and oral reading situations, in order to characterize the variables; the possible differences these variables can present between spontaneous speech and oral reading situations; and the expected differences between stutterers and non-stutterers in both speaking situations. We also investigated possible correlations between the speeds observed in spontaneous speech and oral reading situations. Existing correlations may indicate paths for intervention in stuttering.

Thus, the present work's aim was to study and characterize speech rates and disfluencies in spontaneous situations and during oral reading in stutterers and non-stutterers and investigate the relationship between these variables.

## METHODS

The selection procedures for this study were initiated after the approval of the Research Ethics Committee of the Universidade Federal de São Paulo (UNIFESP), protocol n° 0386/10. All participants were informed about the study and they signed an Informed Consent Form. The research was conducted at the Outpatient Clinic for Evaluation and Speech-Language and Hearing Diagnosis of the Department of Speech-Language and Hearing Pathology of UNIFESP during the years 2010 and 2011.

For the Study Group (SG), were selected: 15 adults aged between 17 and 48 years (mean 27.33 years) with at least eight years of schooling, and a diagnosis of stuttering. For the Control Group (CG), were selected in the community, and volunteered: 15 adults without communication complaints. The individuals in the Study Group and Control Group were matched by gender, age and schooling level. All participants in both groups underwent anamnesis and speech-language and hearing assessment.

The speech-language and hearing assessment included: basic audiological evaluation; specific evaluation of stuttering with the Stuttering Severity Instrument (SSI-3)<sup>(9)</sup>; specific assessment of reading – oral reading of a text suitable for the 8<sup>th</sup> grade of Elementary School<sup>(10)</sup> – oral reading of words and pseudo-words, balanced in regards to their extension, frequency and orthographic regularity<sup>(11,12)</sup>.

A minimum of eight years of schooling was a criterion for the inclusion in the sample and had the purpose of homogenizing the reading abilities. We excluded subjects who had evidence of deafness, neurological and/or psychiatric illnesses and oral or written language deficits. For the observance of these exclusion criteria was also applied the *Instrumento de Avaliação Neuropsicológica Breve* (Brief Neuropsychological Assessment Instrument – NEUPSILIN)<sup>(13)</sup>, allowed for the use of speech therapists at the time. We applied the following evidence: time-space orientation, attention, perception, memory, arithmetic skills, oral and written language and praxis. The results allowed us to exclude, from the sample of both groups, those individuals with deficits in oral language.

For the specific assessment of stuttering, it was recorded, by means of a video camera, the spontaneous speech (average of 200 fluent syllables). The recordings were transcribed canonically and, then, the disfluencies were mapped as typical and atypical. It was adopted as a criterion for defining the degree of severity the presence of at least 3% of atypical disfluencies for establishing the diagnosis and subsequent filling of the specific stuttering protocol Stuttering Severity Instrument 3 (SSI-3)<sup>(9)</sup>. We excluded individuals with scores below 17 points in the instrument SSI-3, which is equivalent to a very slight degree of stuttering.

For the specific evaluation of reading, the following tasks were performed: oral reading of single items, composed of 38 words and 30 pseudo-words, balanced in regards to their extension, frequency, and spelling<sup>(11,12)</sup>; oral reading of a text, and according to the criteria to include individuals with at least eight years of schooling, we used the text “Os furacões”<sup>(10)</sup>, suitable for the 8<sup>th</sup> grade of Elementary School.

The speech samples, both spontaneous and read, were transcribed canonically. From this material, we selected 200 oral reading fluent syllables from a passage chosen, standardized for analysis in all subjects. After collecting, the disfluencies were mapped as typical and atypical and the specific parameters of reading fluency were analyzed.

The values of the speed and speech parameters constituted variables with normal distribution, according to the statistics of the Kolmogorov-Smirnov test. These variables were then analyzed using the Student's t-test, when comparing the Control and Experimental groups. The nonparametric hypothesis tests of Mann-Whitney and the Wilcoxon test were used to compare the groups in relation to the types of disfluencies in both spontaneous speech and oral reading, which were not normally distributed, given the differences arising from the

characteristics of each group and the nature of the studied variables. Pearson's linear correlation coefficient was calculated to quantify the linear relationships between oral text reading and spontaneous speech, word and pseudo-word reading, word and text, as well as pseudo-word and text. Such correlations were estimated for the aspects related to the spontaneous and oral reading speech rate. The level of statistical significance was established at 0.05.

## RESULTS

When comparing the types of disfluencies found in spontaneous speech and oral reading in the SG through nonparametric tests, the descriptive values of the disfluencies mapping in spontaneous speech and oral text reading, and the comparison of averages and standard deviations by disruption type in each of the tasks were observed (Table 1).

The results indicated that, in the SG, the occurrence of interjection, hesitation, revision, repetition of sentences, repetition of words, repetition of sounds, block and prolongation was greater in spontaneous speech than in oral text reading. The total of disfluencies was also higher in spontaneous speech.

In regards to the descriptive values of the disfluencies mapping in spontaneous speech and oral text reading and the comparison of averages and standard deviations by disruption type in each of the tasks in the CG, the results indicated that the occurrence of interjection, hesitation and prolongation in spontaneous speech, was greater than in the oral text reading. The total disfluencies were also higher in spontaneous speech (Table 2).

In consideration of the descriptive values of the disfluencies mapping in spontaneous speech and oral text reading of the studied groups and the comparison of averages and standard deviation by disfluency type in each of the tasks, the intergroup comparison of the types of disfluencies in spontaneous speech showed greater frequency, in the SG, in regards to the types hesitation, repetition of words (up to two), repetition of words (more than three), repetition of syllables, repetition of sounds, block and prolongation, representing significant differences between the two groups (Table 3).

In comparing the oral text reading between the studied groups, it was observed, in the SG, higher occurrence of disfluencies of the repetition of syllables, repetition of sounds and block types. The total of disruptions in the oral text reading was also higher in the SG than in the CG.

In comparing the measurements of spontaneous speech and oral reading rates, between groups, using parametric tests, the inferential results showed that, for all aspects related to the spontaneous speech and oral reading rates, the CG values were numerically greater when compared to the SG (Table 4).

Positive correlations, from moderate to strong, were observed in the SG, among all investigated variables. Thus, it was observed that, in the SG, the greater the number of words and

**Table 1.** Measures and standard deviations of disfluencies in spontaneous speech and text oral reading on SG

Variable	Type				p-value
	Speech		Reading		
	M	SD	M	SD	
Interjection	5.7	3.3	0.3	1.0	0.001*
Hesitation	4.2	2.9	0.7	1.2	0.001*
Revision	0.8	0.9	0.2	0.4	0.018*
Incomplete words	0.1	0.3	0.0	0.0	-
Repetition of sentences	1.3	1.7	0.3	0.6	0.018*
Repetition of words – up to two	1.3	1.7	1.4	2.3	0.031*
Repetition of words – more than three	2.6	1.9	0.5	1.8	0.050
Repetition of syllables	1.9	2.4	1.9	2.5	0.969
Repetition of sounds	4.2	5.2	2.5	4.9	0.046*
Block	9.4	12.0	4.7	6.9	0.004*
Prolongation	5.7	4.7	1.0	2.1	0.001*
Pause	0.1	0.3	0.0	0.0	-
Intrusion	0.3	1.3	0.1	0.5	-
Total	37.3	19.5	13.6	14.8	0.001*

\*Significative values ( $p \leq 0.05$ ) – Wilcoxon's test**Note:** M = mean; SD = standard deviation**Table 2.** Measures and respective standard deviations of disfluencies in spontaneous speech and text oral reading on CG

Variable	Type				p-value
	Speech		Reading		
	M	SD	M	SD	
Interjection	3.4	2.7	0.0	0.0	0.001*
Hesitation	2.0	1.3	0.2	0.8	0.004*
Revision	0.5	1.0	0.1	0.3	0.144
Incomplete words	0.0	0.0	0.0	0.0	-
Repetition of sentence	0.4	0.7	0.1	0.3	0.109
Repetition of words – up to two	0.5	0.6	0.2	0.4	0.237
Repetition of words – more than three	0.0	0.0	0.0	0.0	-
Repetition of syllables	0.0	0.0	0.1	0.3	-
Repetition of sounds	0.0	0.0	0.1	0.3	-
Block	0.0	0.0	0.0	0.0	-
Prolongation	1.7	1.2	0.0	0.0	0.001*
Pause	0.0	0.0	0.0	0.0	-
Intrusion	0.0	0.0	0.0	0.0	-
Total	8.4	4.8	0.7	1.4	0.001*

\*Significative values ( $p \leq 0.05$ ) – Wilcoxon's test**Note:** M = mean; SD = standard deviation

syllables per minute in the spontaneous speech, the greater the same measurement was as in the text reading. The greater the number of words and syllables read per minute in the reading of isolated words, the greater the number of pseudo-words and syllables read per minute in the pseudo-words. The same types of correlation were found when investigated between the reading of isolated words and of pseudo-words and the text

reading (Table 5).

On the other hand, the search for associations among the same variables in the CG showed moderate positive correlation only between the reading of pseudo-words and the text reading, both at the level of entire items and in the calculation of syllables per minute, i.e., in the CG, the faster the reading of pseudo-words, the faster the text reading.

**Table 3.** Measures and respective standard deviations of disfluencies in spontaneous speech and text oral reading according to the group

Variable		SG		CG		p-value
		M	SD	M	SD	
Spontaneous speech	Interjection	5.7	3.3	3.4	2.7	0.050
	Hesitation	4.2	2.9	2.0	1.3	0.016*
	Revision	0.8	0.9	0.5	1.0	0.148
	Incomplete words	0.1	0.3	0.0	0.0	0.775
	Repetition of sentence	1.3	1.7	0.4	0.7	0.106
	Repetition of words – up to two	2.6	1.9	0.5	0.6	<0.001*
	Repetition of words – more than three	1.0	0.8	0.0	0.0	0.001*
	Repetition of syllables	1.9	2.4	0.0	0.0	0.011*
	Repetition of sounds	4.2	5.2	0.0	0.0	<0.001*
	Block	9.4	12.0	0.0	0.0	<0.001*
	Prolongation	5.7	4.7	1.7	1.2	0.010*
	Pause	0.1	0.3	0.0	0.0	0.775
	Intrusion	0.3	1.3	0.0	0.0	0.775
	Total	37.3	19.5	8.4	4.8	<0.001*
Text oral reading	Interjection	0.3	1.0	0.0	0.0	0.775
	Hesitation	0.7	1.2	0.2	0.8	0.249
	Revision	0.2	0.4	0.1	0.3	0.539
	Incomplete words	0.0	0.0	0.0	0.0	1.000
	Repetition of sentence	0.3	0.6	0.1	0.3	0.539
	Repetition of words – up to two	1.4	2.3	0.2	0.4	0.137
	Repetition of words – more than three	0.5	1.8	0.0	0.0	0.539
	Repetition of syllable	1.9	2.5	0.1	0.3	0.002*
	Repetition of sounds	2.5	4.9	0.1	0.3	0.023*
	Block	4.7	6.9	0.0	0.0	0.004*
	Prolongation	1.0	2.1	0.0	0.0	0.061
	Pause	0.0	0.0	0.0	0.0	1.000
	Intrusion	0.1	0.5	0.0	0.0	0.775
	Total	13.6	14.8	0.7	1.4	<0.001*

\*Significative values ( $p \leq 0.05$ ) – Mann-Whitney's test**Note:** M = mean; SD = standard deviation; CG = control group; SG = study group**Table 4.** Summary-measures of aspects related to spontaneous speech rate and oral reading of individuals from groups control and study

		Word		Pseudo-word		Text		Spontaneous speech	
		w/min	s/min	w/min	s/min	w/min	s/min	w/min	s/min
CG	Mean	69.8	169.2	48.0	116.7	145.3	331.9	132.0	236.5
	Median	65.1	157.7	46.2	112.3	145.9	332.4	139.6	236.5
	Minimum	36.8	89.0	30.0	73.0	72.2	165.4	95.1	174.9
	Maximum	120.0	290.0	64.3	156.4	172.3	394.8	163.5	310.5
	Standard deviation	19.9	48.0	9.2	22.4	22.9	52.1	24.6	44.5
SG	Mean	51.6	123.8	37.0	89.4	86.2	192.9	95.7	166.3
	Median	57.0	131.4	38.3	101.9	95.4	218.6	108.1	183.6
	Minimum	13.6	32.9	14.4	35.0	20.6	20.6	24.3	41.1
	Maximum	87.6	212.3	62.0	151.0	128.5	292.8	138.1	286.0
	Standard deviation	22.8	55.7	13.3	34.0	33.0	83.5	36.7	66.6
	p-value	0.027*	0.024*	0.014*	0.016*	<0.001*	<0.001*	0.003*	0.002*

\*Significative values ( $p \leq 0.05$ ) – t Student Test**Note:** CG = control group; SG = study group; w/min = words per minute; s/min = syllables per minute



**Table 5.** Correlation estimates considering speech rate aspect

		CG (n=15)		SG (n=15)	
		Coefficient	p-value	Coefficient	p-value
Spontaneous speech and text reading	w/min	-0.310	0.260	0.791	<0.001*
	s/min	-0.182	0.517	0.737	0.002*
Word reading and pseudo-word reading	w/min	0.448	0.094	0.852	<0.001*
	s/min	0.448	0.094	0.86	<0.001*
Word reading and text reading	w/min	0.431	0.108	0.582	0.023*
	s/min	0.438	0.103	0.522	0.046*
Pseudo-word reading and text reading	w/min	0.700	0.004*	0.754	0.001*
	s/min	0.696	0.004*	0.760	0.001*

\*Significative values ( $p \leq 0.05$ ) – Pearson's correlation test

**Note:** CG = control group; SG = study group; w/min = words read per minute; s/min = syllables read per minute

## DISCUSSION

The two studied groups were made mainly by observing the reading capabilities, estimated by the minimum schooling of the participants. Therefore, all of them had finished, at various times, the Elementary School. The analyses showed initially that the SG had a higher frequency of all types of disfluencies in spontaneous speech as compared to the speech observed during oral text reading (Table 1). While reading, there were no pauses or incomplete words in this group. Thus, the analysis of the SG showed higher occurrence of interjections, hesitations, revisions, repetitions of sentences, words and sounds, blocks and prolongation in a spontaneous speech situation, i.e., there were more disfluencies, both typical and atypical, in spontaneous speech than in text reading of stutterers. These results confirmed the data found in the literature<sup>(14,15)</sup>. In reality, this may be because the fact that spontaneous speech requires rapid development can make it more susceptible to present disfluencies<sup>(16)</sup>.

Disfluencies of the hesitation type are not random and tend to occur before low-frequency words, unpredictable words, in situations where the speaker is confronted with multiple semantic or syntactic possibilities and other situations of uncertainty<sup>(17)</sup>, which explains why, in this study, the frequency of such disruptions was higher in spontaneous speech, even in the CG. Hesitations, pauses or false starts in spontaneous speech can be seen as a phenomenon of peripheral production, which accompanies speech and occurs randomly. They exemplify the difficulty that speakers can find on linear speech verbalization and on underlying systems of rules<sup>(18)</sup>. Therefore, individuals with deficits in oral language were excluded from the samples.

The text prosodic markings established *a priori*, can facilitate the motor planning and speech act, which may have contributed to the reduction of disfluencies in the task of text reading text on the SG<sup>(7)</sup>.

Moreover, under conditions of speech and oral reading in chorus, that is, when two or more people read the same text aloud at the same time, the reduction of stuttering tends to

be immediate, as this is a collaborative activity in which the speakers modify the time of their speech equally, in controlled readings<sup>(7,19)</sup>.

Differently, in the CG, we observed a lower incidence of the total and of the types of disfluencies, when compared to the SG (Table 3). The literature also mentions the presence of disfluencies in fluent adults, among which interjections, revisions and hesitations are more frequently observed in speech<sup>(20,21)</sup>.

In this study, as in others, it was also observed increased occurrence of interjections, hesitations and prolongations in spontaneous speech, not present in the reading. The time spent between the development and production of speech involves processes that require the performance of linguistic and motor processing<sup>(5,22-24)</sup>. Thus, as the two actions occur virtually at the same time, it is possible to conclude that additional time is necessary for speech to be produced, resulting in hesitation. The results of occurrences of hesitations in spontaneous speech in the SG concurred with the literature findings<sup>(25)</sup>.

Although the CG has presented a lower number of types of disfluency as compared to the SG, the average number of disfluency in both groups was higher than in spontaneous speech than in oral reading<sup>(7,16)</sup>.

Despite the lower frequency of occurrence of disruptions and disruptions types in the CG, it is possible to say that both groups showed the same pattern of decreasing disruptions in reading procedure.

In general, it was observed, in both groups, a decrease in the disfluencies in the reading as compared to the spontaneous speech. There is also a higher incidence of repetition events in the SG, both of typical disfluencies (up to two repetitions of words) and of atypical disfluencies (more than three repetitions of words, syllables and sounds) as well as atypical disfluencies of block and prolongation types, both in spontaneous speech and in oral reading. Such data confirm those found in the literature<sup>(26,27)</sup>.

Repetitions can be caused by a failure in the temporization of the processes involved in the speech and it is possible that they reflect in the selection of paradigmatic and syntagmatic

axes, causing difficulty in the selection of the next term and preventing the linearity of the process<sup>(25)</sup>. The greater occurrence of prolongations and blocks in the spontaneous speech of individuals who stutter can be justified by the possibility of relation between the stuttering and some difficulties in the functioning of the basal ganglia, which it is imagined to affect negatively the time required to achieve the production of speech and language. Thus, these timing misalignments might contribute to the production of prolongations<sup>(28,29)</sup>.

Nevertheless, regardless of the explanation to such results, it is important to note that in the comparison between the groups, the frequency and diversity of types of disruptions decreased in the reading of both stutterers, non-stutterers. The blocks were not present at the reading of non-stutterers and signaled a major difference found between the readings of the groups.

The results of the rate study, calculated by the number of items spoken or read per minute, as well as by the number of words and syllables per minute, were as expected, since the speech of non-stutterers (CG) presented a smaller number and duration of disfluencies than the speech of stutterers (SG). In fact, the increase in speech disfluencies led to a reduction of the speed (fewer words and, hence, of syllables per minute). These results are consistent with findings in the literature<sup>(15)</sup>. The minimum values of all variables related to spontaneous speech and oral reading rates of SG individuals are worthy of notice, having proved to be much lower than the expected. It is possible that the number and duration of disfluencies have influenced this result.

It is important to notice that, in the SG, although the values were mutually close, the mean speech rates (both calculated in words per minute and measured in syllables per minute) were higher in oral text reading than in spontaneous speech. As there was, in the evaluated sample, no individuals with complaints or history of academic difficulties or failure, the reading took place quickly, without difficulties. The definition of this criterion for inclusion in the sample may have contributed to the higher speed as compared to the observed spontaneous speech. With proficiency in oral reading tasks, there is a decrease in the frequency and duration of breaks, increasing the reading rate<sup>(3)</sup>. Similarly, although the average values of the speech rates were very close, such rates proved to be higher in spontaneous speech than in reading, in the SG.

The indication that the number of speech disruptions of stutterers should decrease when reading texts<sup>(6,7)</sup> suggests that the speech rate is, as a result, higher in this situation, which was not observed in this sample stuttering adults. The sample size may have influenced this research's results.

The result of the correlations investigated in the reading of words and texts, revealed the correlation between the decoding, regardless of the contextual and semantic support, and the automatic recognition of words. As the CG was faster in a reading situation than in a spontaneous speech one, the

pseudo-words reading alone, naturally slower, may have been related to the spontaneous speech rate, as it occurs through the phonological route.

In contrast, the search for correlations in the SG showed them to be positive, from moderate to strong, among all variables (Table 5). It is noteworthy that the greater the number of words and syllables produced per minute in the spontaneous speech, the greater it also was in the oral text reading. Likewise, the variables of oral reading in this group were positively correlated, i.e., the greater the number of words and syllables per minute in the reading of isolated words, the greater the number of whole items and syllables read per minute in the pseudo-words reading. The same types of correlations were found between reading of isolated words and of pseudo-words and the text reading.

The tasks of reading isolated words and pseudo-words allowed us to analyze appropriately the task of oral reading of the individuals, and, considering the fact that the individuals have good education, these values correlated with the text reading, which proved proficient, but with lower values as compared to the CG (stutterers showed more speech disruptions, which reduced the average rate). Therefore, the results of oral reading may have been due to the stuttering and not to any reading difficulty itself.

The homogeneity of the schooling of the participants in both groups, facilitated the interpretation of the results and allowed the comparison with the literature. However, the sample size did not allow the considerations on the standard behavior of the stutterer reader to be established, representing a limitation to this study. Furthermore, to determine such considerations, other levels of schooling, age and reading skills should be investigated.

Nevertheless, the results could set the standard of disruptions frequency decreasing, i.e., the disruptions decreased in both in stutterers and non-stutterers reading, as expected.

## CONCLUSION

The analysis of the speech rates and disruptions characterized both groups, both in a spontaneous speech situation and while reading, which showed performance profiles differentiated by speech rate, frequency and types of disruptions. The research showed that stutterers present lower rate values as well as higher occurrence of disfluencies, both in spontaneous speech and in oral reading, as compared with non-stuttering individuals.

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