Variação da fluência da fala em idosos***

Speech fluency variation in elderly

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Abstract

Background: a number of changes in the speech of normally aging adults have been described in the literature. However age-related changes in fluency have received little attention. Aim: to verify the Fluency Profile of elderlies regarding all of the different fluency parameters. Method: participants were 128 elderlies, of both genders, aged above 60 years. Speech samples of all participants were gathered. They were analyzed according to: type of speech disruption; speech rate and frequency of speech disruptions, based on the analyses of 200 fluent syllables. Participants were compared between themselves regarding the decades of life. Individuals with ages above 80 years constituted a single group. Results: statistical analysis indicated significant differences between the decades only for syllables per minute. For the group of individuals with ages above 80 years, statistical significance was observed indicating an increase in the number of speech disruptions and a decrease in speech rate. Conclusion: regarding the fluency parameters analyzed in this study, the effect of aging seems to be more expressive after the age of 80 years.

Key Words: Aged; Speech; Fluency; Methods.

Resumo

Tema: tem sido descrito na literatura a existência de mudanças na fala decorrentes do envelhecimento, entretanto, nesses estudos, as variações da fluência têm recebido pouca atenção. Objetivo: verificar o perfil da fluência da fala em idosos em diferentes parâmetros. Método: os participantes foram 128 indivíduos com idade acima de 60 anos, de ambos os gêneros. Foram obtidas amostras de fala de todos os participantes e analisadas segundo as variáveis de: tipos de rupturas; velocidade de fala e frequência de rupturas. A análise computou 200 sílabas fluentes da amostra. Resultados: a análise estatística mostrou diferenças estatisticamente significantes entre as décadas somente para a variável de sílabas por minuto. No grupo acima de 80 anos houve significância estatística indicando aumento das rupturas de fala e decréscimo da velocidade. Conclusão: o efeito da idade parece ser mais expressivo depois dos oitenta anos em relação aos parâmetros de fluência da fala analisados nesse estudo.

Palavras-Chave: Idosos; Fala; Fluência; Métodos.

Introduction

The study of influence of aging over the communication becomes important as long as the statistical data shows that the population of almost all countries (developed and in development including Brazil) are in processes of aging. That is, the proportion of the aging (from 60 years and over) is increasing progressively [1]. According to the IBGE, the estimation of elderlies in 2020 is around 28 millions and in 2040, around 52 millions.

During the processes of aging, some changes in speech occur and they are more related to its precision, fluency, vocal quality and communicative effectiveness [2]. These changes may be similar to those occurring in several diseases frequently observed in the aging. Thus, the use of normative data of the aging population for the study of speech related to other diseases is of a great importance. The cognitive, sensorial and motor demand of the speech production may be jeopardized by apparently typical processes for the age as also by a variety of diseases commonly observed with aging [2].

According to the theorist paradigm adopted here, fluency is the gentle and continuous flow of speech production [3]. Moreover, the disruptions of the speech flow, being natural or indicative of stuttering, depend on a complex neurofunctional and linguistic process that are responsible for the temporalization of sounds and for the building up of words and sentences [4-6]. The fluency or disfluency level may be measured by the following variables: typology of disruptions, speech rate and frequency of disruptions [7].

Several investigators have reported that a slowed articulatory rate is associated with older age [8-12], while the disfluencies do not seem to be vulnerable to the process of aging [8-14].

According to Pretti [15], the most salient part of the aging fluency is the disruption, mixing prosodic aspects with his own organization of discourse. As pointed by the author, the speech discontinuity is a regular phenomenon of the oral language in any age range. This discontinuity marked by disruptions may occur in the following levels: pragmatic (topic discontinuity, interference of parenthetical segments), syntactic (by the occurrence of discontinued sentences), lexical (by hesitations and truncation of terms) and phonological (by the presence of pauses).

Age-related changes in fluency have received little attention, particularly for speakers over 90 years old, have argued the need to gather information on fluency of the aging to more completely describe fluency across the lifespan [10,11,14,16]. Additional information on the aging relative to younger speakers may provide insight regarding changes in speech parameters as a function of age [12].

Thus, the aim of the present research was to be informed about the specificities of the Speech Fluency Profile (typical and atypical disfluencies, speech rate and percentage of speech discontinuity) of a group of elderlies in relation to all parameters assessed. The hypothesis of the study asserts that the age ranges studied are different in relation to the Speech Fluency Profile in all these variables.

Method

Participants in this study were 128 male and female elderlies, aged above 60 years. They were residents of the city of São Paulo (Brazil). Elderlies were compared between themselves regarding the decades of life: (a) 60-69 years (n=36); (b)70-79 years (n=48); (c) 80-89 years (n=31); (d) 90-99 years (n=13). In all groups there was a predominance of the female gender, being 69% at 60-69 years, 73% at 70-79 years, 58% at 80-89 years and 85% at 90-99 years. In general, 69.5% of the participants in the study were females.

Data gathering only began after the standard ethic procedures: Prior approval from Research Ethics Committee of the Institution (CAPPesq HCFMUSP no. 848/01) and informed consent were obtained from all participants and their respective guardians.

Criteria used for the inclusion of the participants were: absence of personal, family and/or school complaints of stuttering; absence of general health deficits; negative screening results for communication disorders (language, hearing, neurologic, cognitive, etc.). For this screening a simple protocol was used during the first interview. The inclusion criteria were based in Stuttering Severity Instrument (SSI-3) [17].

The methodology used to gather and to analyze the speech samples was that proposed in the Speech Fluency Assessment Protocol [7], that takes into consideration the following parameters: typology of speech disruption (SLD and OD), speech rate, in words and syllables per minute and total index of speech disruptions (percentage of speech discontinuity) based on the analyses of 200 fluent syllables.

The OD considers in the Speech Fluency Assessment Protocol [7] are: hesitation, interjection, revision, non-finished word, word repetition, segment repetition and phrase repetition. And the SLD are: syllable repetition, sound repetition, prolongation, blocks, pauses and intrusion of sounds or segments.

To obtain syllables per minute, the total number of expressed syllables uttered (200) by the subject

were divided by the participant's total speech time including intersentence pause time. A stopwatch was used to determine time [10]. Words per minute were obtained by calculating the total number of words uttered by the subject and dividing them by the subject's total speech time including intersentence pause time.

For the statistical analyses of the data, ANOVA was used in order to compare, differences between the decades of life for all of the studied variables. The Tukey test was used for multiple comparisons. The adopted level of significance was of 5%.

Results

Table 1 shows the mean and standard deviations, by age range, for the variables of analysis of the Speech Fluency Profile (total of typical disfluencies, total of atypical disfluencies, words per minute, syllable per minute and percentage of speech discontinuity). The ANOVA shows significant statistical differences between age ranges only for syllables per minute. The Tukey test was used for the multiple comparisons and did not show differences between age ranges.

For a better interpretation of the data, subjects were grouped in: GI - Aged (60 to 79 years) with n=84 and, GII - Aged, 80 and over, with n=44. For this grouping it was used the Medical Subject Headings (Index Medicus) proposal [18]. The mean age of the GI is 70.19 years (SD = 5.47) and of the GII is 86.43 years (SD = 5.05). The distribution between genders is the same for both groups ($X2 = 0.415$; g.l. = 1; p = 0.519). The mean age of the female participants is 75.82 years (SD = 9.78) and of the male participants is 75.67 years (SD = 8.56), not showing a significant statistical difference. Nevertheless, the Aged group represents 69.5% of the participants of this study.

As shown in Table 5.2, only for the total of SLD there was no statistical difference between both aging groups. It can be observed an increase in the rate of disruptions (total of OD and percentage of speech discontinuity) and a decrease in speech rate for words and syllables per minute.

For a better comprehension of this fact, the aging groups were compared for each of the OD and SLD that occurred in the data collected (Table 5.3). The most frequent OD is interjection, followed by hesitation. The OD that differentiates the groups is hesitation. Among the SLD, the most occurring was prolongation that did not differentiate the groups. Following is the pause being the only SLD that differentiates them.

TABLE 1. Results for the variables of the Speech Fluency Profile for each of the age ranges.

	Decades of life	mean	OD	F	p
OD	60	11,75	6,49		
	70	10,98	6,45	1,91	0,131
	80	13,58	5,9		
	90	15,39	10,54		
SLD	60	2,17	2,1		
	70	1,79	2,58	0,65	0,587
	80	2,55	2,29		
	90	2,15	2,51		
WPM	60	118,4	29,26		
	70	111,38	30,44	2,09	0,105
	80	102,92	30,10		
	90	99,67	28,14		
SPM	60	216,94	53,24		
	70	201,64	52,4	3,01	**0,033***
	80	183,61	54,56		
	90	177,34	50,53		
% SPD	60	6,96	3,72		
	70	6,27	3,7	1,96	0,123
	80	8,0	3,58		
	90	8,73	6,14		

Legend: OD, other disfluencies; SLD, stuttering like disfluencies; WPM, word per minute; SPM, syllable per minute; % SPD, percentage of speech discontinuity

TABLE 2. Results for variables of the Speech Fluency Profile for the GI and GII.

	Group	mean	DP	F	p
OD	GI	11,31	6,44	4,89	**0,029***
	GII	14,11	7,48		
SLD	GI	1,95	2,38	1,19	0,278
	GII	2,43	2,34		
WPM	GI	114,4	30,0	5,05	**0,026***
	GII	102,0	29,2		
SPM	GI	208,2	53,0	7,19	**0,008***
	GII	181,8	52,9		
% SPD	GI	6,57	3,7	5,01	**0,027***
	GII	8,22	4,42		

Legend: OD, other disfluencies; SLD, stuttering like disfluencies; WPM, word per minute; SPM, syllable per minute; % SPD, percentage of speech discontinuity.

TABLE 3. Comparison between GI and GII for each of the disfluencies.

	Group	mean	DP	F	p
hesitation	GI	2,45	2,45	10,4	**0,002***
	GII	4,11	3,3		
interjection	GI	4,31	4,12	2,12	0,148
	GII	5,50	4,89		
revision	GI	1,85	1,58	0,43	0,514
	GII	1,66	1,43		
Word repetition	GI	1,88	1,65	0,14	0,713
	GII	1,77	1,41		
non-finished word	GI	0,381	0,775	0,23	0,630
	GII	0,318	0,518		
segment repetition	GI	0,429	0,811	2,17	0,143
	GII	0,70	1,30		
syllable repetition	GI	0,25	0,557	0,18	0,676
	GII	0,295	0,632		
prolongation	GI	1,20	1,38	2,27	0,134
	GII	0,82	1,35		
pause	GI	0,40	1,20	7,88	**0,006***
	GII	1,18	1,92		

Discussion

The study conducted here had the general aim of verifying the specificities of aging for the variables analyzed in the Speech Fluency Profile of healthy elderlies. Clinically, it becomes increasingly important to understand the typical speech fluency in older people, as with the increase in life expectancy the speech pathologists are facing a greater number of aging clients. These "new" clients, mainly those over 80-85 years, present more risk of chronic diseases, hospitalization and institutionalization [19]. Thus, speech pathologists need to know the speech fluency pattern of the healthy aging to distinguish between typical and deviant processes of speech.

Ramos [20,21] states that the great part of elderlies present at least one kind of a chronic disease. Also, these elderlies can be considered healthy if compared to others with the same diseases but without their control, with sequels and associate disabilities. According to the author, autonomy is what is in risk with oldness, that is, the capacity of determining and executing their own tasks. In this context, communication is an important tool for the autonomy of elderlies. It consists of another reason that speech pathologists and other medical professionals need to pay attention about the characteristics of communication of healthy and non-healthy elderlies.

The statistical analysis of the age ranges, comparing each of the decades of elderlies did not differentiate them in relation to rate of speech

disruptions (total of typical disfluencies, total of atypical disfluencies and percentage of speech discontinuity). Concerning the speech rate, it is observed a decrease along the decades not only for words per minute but also for syllables per minute. However, only the fluctuation of syllables per minute showed statistical differences although the statistical test used did not find in which decade(s) this difference occurred. So, it is observed regarding the transmission of information that the healthy elderlies did not differentiate along the decades of life. Difference observed for rate of articulation may be related to oral conditions as bad adaptation of dental prosthesis or as an evidence that aging is more expressive in the motor control of speech compared to others motor processes as walking. Deviation of other aspects of fluency is more subtle during the decades of life.

Comparison between Aged and Aged, 80 and over showed significant statistical differences for all variables analyzed of the Speech Fluency Profile, except for the total of atypical disfluencies. It is worth to mention that the mean of this variable is very low, indicating that the fluent elderlies present a speech marked by the occurrence of disruptions indicating stuttering. This significant variation between groups may be justified by the size of the sample as the grouping almost doubled the size of the sample and the tendency observed along the decades (increasing of the disruptions rate and decreasing of the speech rate) appears significantly as the beginning and the end of the aging process are compared.

Both groups of elderlies were compared regarding the typical and atypical typologies of great occurrence. In general, the typology of great occurrence was interjection, corroborating with two previous studies, among others, with elderlies [10] and adults [22] fluent participants. As shown in the results the only disfluencies that differentiate the groups are hesitation and pause. Summarizing, in relation to the typologies of disruptions there is an increase in the use of hesitation (short pauses) and pauses during the discursive tasks with aging. It is worth to mention that a pilot study about the occurrence of pausing in the speech of elderlies regarding its occurrence and its duration [23] showed these results: as the age increases more elderlies disrupt speech because of hesitation and/or pause; there is an increase in the frequency of hesitation and/or pause; and, there is an increase in the percentage of the duration of pauses.

According to Pretti [15], in the speech of "old elderlies" (over 80 years) the excess of pauses determine a rhythm constructed by jerks in which short segments are pronounced quickly loosing their strength in the end and the voice become unintelligible, giving the listener the impression of tiredness. For the author, the disfluencies transmit the feeling of insecurity, which seems to be the most characteristic mark of the speech of "old elderlies". Pauses occur in uncommon places of the utterances due to hesitations caused by failures of memory and the uncertainty of what to say and how to say. Moreover, according to the author, with the advance of age pauses tend to increase meanwhile the duration of articulation tends to decrease, indicating that in old age not only the motor aspects but also the cognitive aspects of the speech behavior become weakened.

The main importance of the present study is related to the number of participants, allowing more representative results that reflect on more reliable aspects of the fluency of the aging population, serving as typical pattern for the diagnosis and control of the effectiveness of treatments. In general, studies with fluent elderlies [10-14] do not show differences between groups of elderlies regarding disfluencies and frequency of disruption, however, it is worth to consider that in those studies the number of participants assessed is very low, ranging from 1 to 20 (M=9.6; SD=5.9). Leeper and Culatta [16] studied 78 elderlies divided in four age ranges and compared them to 20 adults, finding an increase in the total of disfluencies, a decrease in the speech rate of the older participants in reading tasks and no variation in spontaneous speech. Difference found in the present study is probably due to the size of sample (84 elderlies versus 44 elderlies over 80 years). When the age ranges were compared, that is, smaller groups of participants, no difference was found corroborating with findings of the precious researches.

Another importance of the present research is related to the language. Studies about speech fluency of elderlies reflect only the reality of the speakers of English. It is still common within the Speech Pathology field the importation of standardized tests of other languages without a previous matching for the Brazilian Portuguese (BP) that may jeopardize the diagnosis. A study conducted by Andrade and Juste [24], in which a severity test of American stuttering is applied in children speakers of BP, showed that the test reflects pathology for the BP. So, studies that use reference values for fluent speakers of each language are of a great importance to a correct diagnosis.

Conclusions

The way that the present study was conducted, the hypothesis was not confirmed. According to the results, although there was a tendency of a decrease in the speech rate and an increase in the disruptions rates along the decades, this variation is not statistic significant. Considering the grouping of elderilies in Aged and Aged, 80 and over it is observed that the process of aging is more expressive for the last group, showing an increase in the disruption rates and a decrease in the speech rate.

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