STUDY OF VIBRANT REALIZATION BY DEAF SPEAKERS OF BRAZILIAN PORTUGUESE

Estudo das vibrantes em surdos falantes do português brasileiro

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ABSTRACT

Purpose: to investigate in deaf bilingual individuals, the realization of vibrants in stressed syllable-final, in stressed syllable-final or unstressed in the middle of the word, in two language contexts: carrier sentence and letter. **Methods:** five deaf bilingual respondents we selected, 4 female and 1 male with severe and / or deep bilateral sensorineural hearing loss, without neurological, cognitive and motor impairment, and two listeners, 01 female and 01 male. The corpus employed was divided into two phases, carrier sentences and letter reading both containing the same words. The recordings were made in the studio at Instituto Nacional de Educação de Surdos. For the analysis of the duration parameter of selected segments (vibrant), broadband spectrograms from the program PRAAT were extracted. Data obtained were statistically treated. **Results:** the results shown in Table 1 (realization of vibrant in final stressed syllable) and Table 2 (realization of vibrant at the end of the stressed syllable in the middle of the word) show no significant difference at the 5% level, in the time spent for the achievement of vibrant in both groups. **Conclusion:** even though data observed in both investigated groups are not statistically significant at 5%, it is noticed that there is a trend of significant difference when the descriptive level (p value) was between 0.05 and 0.10. In fact, besides the acoustic analysis, the perceptual revealed a trace of vibrant more differentiated in deaf than in the hearing individuals. The findings in this study are related in the literature.

KEYWORDS: Acoustics; Linguistics; Phonetics; Deafness

INTRODUCTION

Deafness affects speech sounds perception, since it changes the threshold of audibility and the ability to discriminate spectral and temporal aspects of the acoustic signal, at a lossin identifying the contrasts of speech, according to the degree and type of hearing loss[1].

In speakers of Brazilian Portuguese (BP), dialects can only be markedby different characteristics of the phonic productions across the territory. This phonetic - phonologicalvariation stands for the vibrants, or more generally called rhoticconsonants[2]. The rhotic consonants, also called **R**-likesounds, cannot be identified through common articulatory features, but by of other factors, such as a spelling sign used, or – with marked frequency – by the position they occupy in thethe syllabic structures of different languages[3].Accordingly, the **R**-like sounds,or rhotic consonants, are present in approximately 75% of the languages in the world,with18% of them having more than one **R-**like sound, as in the case of the BP. These sounds are alternated; phonetically the rhotic consonants form a heterogeneous group,as there are thefricative rhotics,vibrant,tap and approximants[3-5]. The vibrants in BP, for example, have a multitude of phonetic realizations, due to the existence of regional and social varieties, with multiple accomplishments.[6]

For the North American English as for the BP, the literature indicates that the last sounds to be acquired, by having a complex domainduring the speech development, are the lateral liquids and vibrant, with thevibrant alveolar[r] being acquired around 4 years old[7,8].

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With regard to deaf individuals, there are few studies about the vibrant realization.It is observed that, during theoralism stage, dificcultiesin the acquisition and fixationof these phonemes, contribute to underminethe clarity and inteligibility of these individuals' speech. These arecomplex and varied realizations that occur within the same linguistic comunity. These phonetic realizations are not always vibrants, i.e., they can be performed by constricting mode as, for example, the constrict-ingvelars voiceless[χ] andvoiced[ɣ]in the words: carro ([' k a χʊ], ['k a ɣʊ]), carta [' k aχt ɐ], e gordo ['g o ɣdʊ], commonly observed among speakers from Rio de Janeiro. This complexity justifies the difficulty of these acquisitionsby the deaf individuals during the oralism, which worsens significantly in the case of individualw with deep sensorineural hearing loss.

Hearing loss in children causes delaysin the oral acquisition and a predispositionto delays in speech and language, since it interferesin two fundamentala processes: the reception of the sounds and the ability to monitor their own speech (articulatory-acoustic*feedback*)[9,10]. The individual with hearing loss has to supplement what he/she hears with visual information (lip reading), tactileand besides all the auditory labor, he/she needs to have specific strategies for the phonoaudiological treatment. In addition, the opportunities to developtheir language skills as fully as possible, in fact, leads to social inclusion, as proposed reabilitationand/or special education, which is the foundation shownon the proposal of the bilingualism and has oral language as L2 (Portuguesein the oral and/or written form) and L1 (Brazilian Sign Language – Libras) as the main form of communication, being clear here,the democratic condition of integration to society.

In a research that investigates the speech features in 10 deaf individuals, extensions ofboth consonants and vowels are noted, in tonic and post-tonicposition, and silentintervals between one silable and anotherare longerwhen compared to those of subjects with normal hearing[11].

In a landmark study for the understanding of the vibrant variations in the territory of Rio de Janeiro,as regards to its cultured strand, the/R/phonemewas researched in four contexts: begining of the word (initial *onset*), intervocalic(medial *onset*), and the final syllable and end of the word (final coda)[12]. With regard to the latter, one should highlight the result that has been confirmed by other researches,the phenomenon of this phoneme deletion in the infinitive verbforms.Taking the*corpus*of the reser-chprovided by eight linguistic atlases, in which it is observed the realization of the rhotic consonants in the Brazilian territory, differentrealizations of the /R/ phonemein nine national states were studied, finding a great process ofdeletion, reaching 64% of the data, when in external context[2,13]. Another important finding indicates greater number of deletion of the rhotic consonant in the syllabic coda at the end of verbs, a fact that marks an important component of language[14].

We hope this research will contribute to thespeech therapyfor deaf individuals, providingopportunities for a greater knowledge of thevibrants sound in BP, in the oral mode, enriching the therapeutic strategies. The aim is to investigate in deaf bilingual individuals, the realization of vibrants in stressed syllable-final, in stressed syllable-final or unstressed in the middle of the word, in two language contexts: carrier sentence and letter.

METHODS

This descriptive analysis was based on the current"Métodos da Fonética Experimental" [Methodes of Experimental Phonetics], focusing on acoustic research, and was approved by the "Comitê de ÉticaemPesquisa"[Comiteefor Ethics in Research] at Universidade Veiga de Almeida, no. 236/10, with all participants having signed the informed consent, after the explanations of the outlined purposes.

For this study, we selected five deaf subjects and 2 listeners.The deaf informants are bilingual (L1 – Libras L2 Portuguese in the oral mode), 4 female and 1 male, aged 20-28 years old, with severe and/or deep bilateral sensorineural hearing loss, without neurological, cognitive and motor impairment. Informants listeners who constituted the control group are a female, aged 24, and a male, aged 23.

Data collection was performed at the "InstitutoNacional de Educação de Surdos-INES/RJ" [National Institute of Deaf Education]. Among the deaf subjects, four work as interpreters instructors at INES and one is a former student of the Institute faculty and currently teaches Libras at Universidade Rural do Rio de Janeiro (UFRRJ) [Rural University of Rio de Janeiro]. Of the listeners, one works as students inspector, and the other works as audio technician at INES.

A *corpus*was elaborated for participants to take on all emissions of vibrants in the final stressed syllable, in the final stressed or unstressed syllable in the middle of the word, constituting syllabic realizations of the kind CVC.The*corpus*was divided in twoactivities: reading a letter and reading 30 carrier sentences, 15 interrogativeand 15 affirmative statements. The words in the letter were the same as those in the phrases.

The activity with the carrier sentences grouped 30 figures in *Power Point*,in which the informants

completed orally the interrogative sentences, using the verb or noun corresponding to the action represented by the picture; in the affirmative sentences, the verb or the noun also corresponding to the pictures.For example:Vocêvaicantar?[Are you going to sing?],Eudigoescrever [I say write].

Of 30 words, four were chosen to be read, “prazer” [pleasure], “querer” [want] “Marta” [Martha] and “confortável” [comfortable], because they are abstract words.

The recordings were carried out in a studio at INES/RJ, the speech segments being recorded in media, with the aid of a computer Windows 7, with 8,00 GB of memory (RAM), INTEL(R)CORE I 3, *software*Adobe Soundbooth, soundboard Mackie modelo 1.202-VLZ3 12 channel and a wireless microphoneSennheiser, model EW122-p(G3). The letter was read at a glance.For the carrier sentences informants appointed the words intended as the figures were being sequentially presented using the program *Power Point*. Both collections were carried out on the same day, after all receiving the instructions regarding the necessary procedures.

The samples were subjected to acoustic analysis, using the *software* PRAAT, a tool for voice analysis developed by Paul Boersma and David Weenink[15], from the Institute of Phonetic Sciences of the Universityof Amsterdam.

The segments studied were extracted by broadband spectogram, analyzing the lenght of time for the realization of the rhotic consonant in both groups of deaf and listeners.

The descriptive analysis presented data observed in the form of table, expressed as mean, median, minimum and maximum.The Mann-Whitney test was used to examinethe difference in the duration of the realization of the rhotic consonantin stressed syllable-final (part I) and stressed syllable-final in the middle of the word (parte II) between the two groups – deaf and hearing.

The Wilcoxon signed-rank tests assessed the variation in the duration for the completion of the rhotic consonant sound in the carrier sentences to the letter. The methods applied were nonparametric, because the duration to accomplish the rhotic consonant was not distributed normally (Gaussian), due to the small sample size and rejection of the hypothesis of normality according to the Kolmogorov-Smirnov test.

The criterion to determine significance level was 5%. Statistical analysis was performed with the *software* SAS®, version 6.11 (SAS Institute, Inc., Cary, North Carolina).

RESULTS

Statistical analysis of the data provides, by means of tables, the mean, median, minimum and maximum duration No. 1 and No. 2 of the sentence and the letter, according to the group of deaf and listeners and the corresponding descriptive level *(p value)* of Mann-Whitney test. Thus, in Table 1, it was observed that there is no significant difference -between the deaf and hearing groups - (at 5%) in the duration to produce the vibrant / r / in the stressed syllable-final of each word of the sentence and letter.

Table 1 - Duration of the realization of vibrant / r / in syllable-final (Part I) by letter and word of the sentence according to the deaf and hearing groups

Word		Deaf					Listener					*p valuea*
		n	Average	Median	Min	Max	n	Average	Median	Min	Max	
MAR	sentence - N° 1	3	0,140	0,122	0,094	0,204	2	0,206	0,206	0,191	0,221	0,25
	sentence - N° 2	3	7,10	8,22	2,41	10,67	2	4,89	4,89	4,53	5,25	0,56
	letter - N° 1	5	0,215	0,151	0,072	0,554	2	0,089	0,089	0,079	0,098	0,44
	letter - N° 2	5	10,9	11,0	4,8	18,0	2	11,4	11,4	10,2	12,6	1,00
ESCREVER	sentence - N° 1	1	0,125	0,125	0,125	0,125	2	0,149	0,149	0,144	0,154	0,22
	sentence - N° 2	1	8,00	8,00	8,00	8,00	2	6,73	6,73	6,49	6,97	0,22
	letter - N° 1	1	0,169	0,169	0,169	0,169	2	0,081	0,081	0,072	0,090	0,22
	letter - N° 2	1	5,93	5,93	5,93	5,93	2	12,50	12,50	11,15	13,86	0,22
LER	sentence - N° 1	1	0,289	0,289	0,289	0,289	2	0,140	0,140	0,088	0,192	0,22
	sentence - N° 2	1	3,46	3,46	3,46	3,46	2	8,29	8,29	5,20	11,37	0,22
	letter - N° 1	3	0,095	0,077	0,066	0,143	2	0,059	0,059	0,057	0,061	**0,083**
	letter - N° 2	3	11,7	13,0	7,0	15,1	2	17,1	17,1	16,5	17,6	**0,083**
ANDAR	sentence - N° 1	2	0,143	0,143	0,142	0,144	2	0,196	0,196	0,184	0,208	0,12
	sentence - N° 2	2	6,98	6,98	6,93	7,03	2	5,13	5,13	4,81	5,45	0,12
	letter - N° 1	3	0,132	0,132	0,125	0,140	2	0,098	0,098	0,087	0,109	**0,083**
	letter - N° 2	3	7,58	7,60	7,14	8,02	2	10,35	10,35	9,18	11,52	**0,083**
DORMIR	sentence - N° 1	2	0,162	0,162	0,097	0,227	2	0,184	0,184	0,152	0,217	1
	sentence - N° 2	2	7,37	7,37	4,40	10,34	2	5,60	5,60	4,61	6,60	1
	letter - N° 1	2	0,109	0,109	0,045	0,172	2	0,122	0,122	0,116	0,129	1
	letter - N° 2	2	14,0	14,0	5,8	22,3	2	8,2	8,2	7,7	8,7	1
PRAZER	sentence - N° 1	1	0,274	0,274	0,274	0,274	2	0,154	0,154	0,081	0,227	0,22
	sentence - N° 2	1	3,65	3,65	3,65	3,65	2	8,35	8,35	4,40	12,29	0,22
	letter - N° 1	2	0,119	0,119	0,065	0,173	2	0,088	0,088	0,069	0,108	1
	letter - N° 2	2	10,5	10,5	5,8	15,3	2	11,9	11,9	9,3	14,4	1
IR	sentence - N° 1	2	0,872	0,872	0,302	1,441	2	0,185	0,185	0,152	0,218	0,12
	sentence - N° 2	2	5,13	5,13	3,32	6,94	2	5,59	5,59	4,59	6,59	1
	letter - N° 1	1	0,017	0,017	0,017	0,017	2	0,023	0,023	0,022	0,024	0,22
	letter - N° 2	1	58,7	58,7	58,7	58,7	2	44,1	44,1	42,6	45,5	0,22
VOLTAR	sentence - N° 1	2	0,131	0,131	0,060	0,202	2	0,129	0,129	0,080	0,178	1
	sentence - N° 2	2	10,8	10,8	4,9	16,6	2	9,1	9,1	5,6	12,5	1
	letter - N° 1	3	0,151	0,127	0,071	0,256	2	0,079	0,079	0,040	0,117	0,25
	letter - N° 2	3	8,65	7,89	3,90	14,17	2	16,78	16,78	8,54	25,02	0,25
DIRIGIR	sentence - N° 1	2	0,171	0,171	0,162	0,180	2	0,137	0,137	0,109	0,165	0,44
	sentence - N° 2	2	5,86	5,86	5,56	6,16	2	7,65	7,65	6,07	9,22	0,44
	letter - N° 1	2	0,063	0,063	0,063	0,063	1	0,030	0,030	0,030	0,030	0,22
	letter - N° 2	2	15,7	15,7	15,3	16,0	1	33,0	33,0	33,0	33,0	0,22
CANTAR	sentence - N° 1	2	0,698	0,698	0,170	1,225	2	0,159	0,159	0,109	0,209	0,44
	sentence - N° 2	2	7,02	7,02	5,87	8,16	2	7,00	7,00	4,78	9,22	1
	letter - N° 1	3	0,084	0,079	0,043	0,131	2	0,028	0,028	0,027	0,030	**0,083**
	letter - N° 2	3	14,7	12,6	7,6	23,8	2	35,3	35,3	33,0	37,6	**0,083**
DANÇAR	sentence - N° 1	2	0,198	0,198	0,089	0,306	2	0,136	0,136	0,123	0,149	1
	sentence - N° 2	2	7,24	7,24	3,26	11,21	2	7,63	7,63	7,14	8,11	1
	letter - N° 1	3	0,152	0,149	0,125	0,183	2	0,099	0,099	0,089	0,109	**0,083**
	letter - N° 2	3	6,73	6,71	5,48	8,01	2	10,20	10,20	9,14	11,26	**0,083**
COMER	frase - N° 1	2	0,171	0,171	0,128	0,214	2	0,066	0,066	0,022	0,111	0,12
	frase - N° 2	2	5,66	5,66	4,67	6,65	2	27,27	27,27	9,01	45,52	0,12
	letter - N° 1	2	0,116	0,116	0,116	0,116	2	0,037	0,037	0,021	0,053	**0,10**
	letter - N° 2	2	8,61	8,61	8,61	8,61	2	27,05	27,05	18,96	35,13	0,12
NADAR	frase - N° 1	3	0,134	0,147	0,104	0,151	2	0,119	0,119	0,092	0,146	0,25
	frase - N° 2	3	7,80	6,82	6,63	9,95	2	8,86	8,86	6,87	10,86	0,25
	letter - N° 1	4	0,077	0,074	0,058	0,104	2	0,018	0,018	0,014	0,022	**0,064**
	letter - N° 2	4	13,6	13,6	9,6	17,4	2	57,9	57,9	45,1	70,7	**0,064**
QUERER	frase - N° 1	1	0,164	0,164	0,164	0,164	2	0,184	0,184	0,131	0,236	1
	frase - N° 2	1	6,10	6,10	6,10	6,10	2	5,93	5,93	4,23	7,63	1
	letter - N° 1	1	0,060	0,060	0,060	0,060	1	0,011	0,011	0,011	0,011	NP
	letter - N° 2	1	16,7	16,7	16,7	16,7	1	95,4	95,4	95,4	95,4	NP
SALTAR	frase - N° 1	4	0,131	0,134	0,043	0,213	2	0,161	0,161	0,128	0,194	0,64
	frase - N° 2	4	10,6	7,2	4,7	23,2	2	6,5	6,5	5,2	7,8	0,64
	letter - N° 1	3	0,074	0,070	0,057	0,095	2	0,032	0,032	0,031	0,033	**0,083**
	letter - N° 2	3	14,1	14,4	10,5	17,5	2	31,4	31,4	30,6	32,3	**0,083**

[a] Mann-Whitney test. NP:statistical test does not process.
mín: minimun value ,max: máximum value.
Source: Research data.

There is a tendency in the deaf group to present a duration of letter no. 1 in the words**ler [read]** (*p* = 0,083), **andar [walk]**(*p* = 0,083), **cantar [sing]** (*p* = 0,083), **dançar [dance]**(*p* = 0,083), **comer [eat]**(*p* = 0,10), **nadar [walk]** (*p* = 0,064) e **saltar [jump]** (*p* = 0,083) longer than the hearing group. Also, there is a trend (statistically speaking) of significant difference when the descriptive level (p value) obtained was between**0,05 e 0,10**.

In Table 2, it is observed that there is no significant difference between the - deaf and hearing groups - (at 5%) in the duration to produce the vibrant /r/ in stressed syllable-final in the middle of the word of each sentence and letter.

Table 2 - Duration of the realization of vibrant / r / in syllable-final in the middle of the word (Part II) by letter and word of the sentence according to the deaf and hearing groups

Word		Deaf					Listener					*p valuea*
		n	Average	Median	Min	Max	n	Average	Median	Min	Max	
SORVETE	sentence - N° 1	4	0,073	0,068	0,039	0,115	2	0,070	0,070	0,039	0,101	0,81
	sentence - N° 2	4	17,26	17,49	8,68	25,37	2	17,64	17,64	9,91	25,37	0,81
	letter - N° 1	4	0,078	0,066	0,014	0,166	2	0,025	0,025	0,014	0,035	0,24
	letter - N° 2	4	25,1	10,6	6,0	73,2	2	50,7	50,7	28,2	73,2	0,24
PORTA	sentence - N° 1	5	0,093	0,088	0,061	0,122	2	0,139	0,139	0,082	0,197	0,56
	sentence - N° 2	5	11,45	11,38	8,20	16,53	2	8,65	8,65	5,07	12,23	0,56
	letter - N° 1	3	0,049	0,043	0,028	0,077	2	0,043	0,043	0,028	0,058	0,77
	letter - N° 2	3	24,16	23,43	13,07	35,99	2	26,68	26,68	17,37	35,99	0,77
QUARTO	sentence - N° 1	4	0,081	0,095	0,033	0,100	2	0,159	0,159	0,098	0,220	0,24
	sentence - N° 2	4	15,30	10,54	9,97	30,14	2	7,37	7,37	4,55	10,20	0,24
	letter - N° 1	4	0,078	0,066	0,031	0,149	2	0,045	0,045	0,031	0,059	0,48
	letter - N° 2	4	18,4	17,1	6,7	32,6	2	24,7	24,7	16,8	32,6	0,48
CADERNO	sentence - N° 1	4	0,066	0,071	0,022	0,097	2	0,086	0,086	0,049	0,122	0,48
	sentence - N° 2	4	21,55	15,63	10,27	44,67	2	14,38	14,38	8,17	20,60	0,48
	letter - N° 1	4	0,052	0,032	0,028	0,119	2	0,038	0,038	0,035	0,041	0,48
	letter - N° 2	4	26,99	31,81	8,44	35,92	2	26,59	26,59	24,15	29,02	0,48
CORTINA	sentence - N° 1	4	0,078	0,087	0,027	0,110	2	0,110	0,110	0,092	0,128	0,24
	sentence - N° 2	4	17,29	11,50	9,12	37,03	2	9,37	9,37	7,84	10,91	0,24
	letter - N° 1	4	0,067	0,066	0,044	0,093	2	0,051	0,051	0,037	0,064	0,24
	letter - N° 2	4	17,2	15,1	10,8	28,0	2	21,2	21,2	15,6	26,8	0,48
CONFOR--TÁVEL	sentence - N° 1	4	0,066	0,062	0,033	0,110	2	0,106	0,106	0,086	0,126	0,24
	sentence - N° 2	4	19,50	19,21	9,13	30,46	2	9,76	9,76	7,91	11,62	0,24
	letter - N° 1	5	0,056	0,037	0,030	0,100	2	0,059	0,059	0,037	0,081	0,85
	letter - N° 2	5	23,3	26,8	10,0	33,7	2	19,6	19,6	12,4	26,8	0,85
GORDURA	sentence - N° 1	4	0,103	0,098	0,080	0,134	2	0,120	0,120	0,105	0,134	0,48
	sentence - N° 2	4	10,18	10,39	7,44	12,48	2	8,46	8,46	7,44	9,49	0,48
	letter - N° 1	4	0,052	0,055	0,024	0,072	2	0,052	0,052	0,031	0,072	0,81
	letter - N° 2	4	23,3	18,5	13,9	42,2	2	22,9	22,9	13,9	31,8	0,81
MARTA	sentence - N° 1	5	0,218	0,130	0,065	0,600	2	0,146	0,146	0,114	0,178	0,85
	sentence - N° 2	5	10,8	8,8	5,6	16,7	2	7,2	7,2	5,6	8,8	0,56
	letter - N° 1	5	0,100	0,090	0,023	0,188	2	0,075	0,075	0,023	0,128	0,56
	letter - N° 2	5	19,68	11,13	5,33	44,31	2	26,08	26,08	7,85	44,31	0,56
ACORDAR	sentence - N° 1	3	0,064	0,069	0,051	0,073	2	0,051	0,051	0,029	0,073	0,77
	sentence - N° 2	3	15,93	14,52	13,77	19,49	2	23,99	23,99	13,77	34,20	0,77
	letter - N° 1	1	0,053	0,053	0,053	0,053	2	0,046	0,046	0,039	0,053	0,48
	letter - N° 2	1	18,9	18,9	18,9	18,9	2	22,3	22,3	18,9	25,8	0,48
CIRCO	sentence - N° 1	3	0,092	0,090	0,069	0,116	2	0,085	0,085	0,069	0,101	0,77
	sentence - N° 2	3	11,40	11,15	8,61	14,43	2	12,14	12,14	9,86	14,43	0,77
	letter - N° 1	5	0,078	0,068	0,034	0,170	2	0,051	0,051	0,033	0,068	0,56
	letter - N° 2	5	17,1	14,8	5,9	29,4	2	22,4	22,4	14,8	30,1	0,56
VERMELHO	sentence - N° 1	2	0,115	0,115	0,061	0,169	2	0,057	0,057	0,053	0,061	0,22
	sentence - N° 2	2	11,60	11,60	6,92	16,29	2	17,56	17,56	16,29	18,83	0,22
	letter - N° 1	3	0,068	0,073	0,037	0,092	2	0,030	0,030	0,022	0,037	0,14
	letter - N° 2	3	17,07	13,63	10,84	26,74	2	35,71	35,71	26,74	44,68	0,14
BARCO	sentence - N° 1	3	0,198	0,156	0,088	0,350	2	0,089	0,089	0,088	0,089	0,37
	sentence - N° 2	3	6,88	6,41	2,86	11,38	2	11,29	11,29	11,21	11,38	0,37
	letter - N° 1	4	0,076	0,064	0,031	0,145	2	0,062	0,062	0,056	0,069	0,81
	letter - N° 2	4	17,57	15,70	6,91	31,97	2	16,28	16,28	14,54	18,03	0,81

FORTALEZA	sentence - N° 1	3	0,050	0,051	0,023	0,075	2	0,049	0,049	0,046	0,051	0,77
	sentence - N° 2	3	25,32	19,73	13,29	42,93	2	20,64	20,64	19,73	21,56	0,77
	letter - N° 1	5	0,062	0,068	0,028	0,110	2	0,054	0,054	0,035	0,073	0,85
	letter - N° 2	5	20,6	14,7	9,1	35,2	2	21,0	21,0	13,7	28,3	0,85
QUARTA	sentence - N° 1	4	0,046	0,042	0,029	0,071	2	0,025	0,025	0,021	0,029	**0,10**
	sentence - N° 2	4	24,55	24,81	14,01	34,57	2	41,08	41,08	34,57	47,58	**0,10**
	letter - N° 1	5	0,072	0,061	0,025	0,178	2	0,026	0,026	0,025	0,027	0,17
	letter - N° 2	5	21,9	16,4	5,6	39,9	2	38,7	38,7	37,5	39,9	0,17
TARDE	sentence - N° 1	5	0,080	0,060	0,042	0,133	2	0,046	0,046	0,042	0,050	0,56
	sentence - N° 2	5	16,0	16,7	7,5	24,0	2	22,0	22,0	20,1	24,0	0,56
	letter - N° 1	5	0,056	0,051	0,028	0,100	2	0,055	0,055	0,051	0,060	0,85
	letter - N° 2	5	22,2	19,5	10,0	35,3	2	18,1	18,1	16,8	19,5	0,85

[a] Mann-Whitney test.
mín: mínimum value; max: máximum value.
Source: Research data.

Tables 3 and 4 provide the mean, median, minimum and maximum duration to produce the vibrant /r/ in stressed syllable-final (part I) and in stressed syllable final in the middle of the word (part II), according to the text (sentence and letter) and the corresponding descriptive level (*p* value) of the signed-rank Wilcoxon test, for the deaf and hearing groups, respectively.

It was observed that there is no significant variation (at 5%) in the duration to produce the vibrant /r/ in stressed syllable - final (part I) and in stressed syllable-final in the middle of the word (parte II) of each word of the sentence to the letter, both in the deaf group and in the group of listeners.

Table 3 – duration of the realization of the vibrant /r/ in stressed syllable-final (Part I) by word according to the sentence and the letter in the group of deaf.

Word		Deaf					Listener					*p valuea*
		n	Average	Median	Min	Max	n	Average	Median	Min	Max	
MAR	N° 1	3	0,140	0,122	0,094	0,204	3	0,278	0,207	0,072	0,554	0,75
	N° 2	3	7,10	8,22	2,41	10,67	3	12,25	13,88	4,82	18,05	0,25
ESCREVER	N° 1	1	0,125	0,125	0,125	0,125	1	0,169	0,169	0,169	0,169	1
	N° 2	1	8,0	8,0	8,0	8,0	1	5,9	5,9	5,9	5,9	1
LER	N° 1	1	0,289	0,289	0,289	0,289	1	0,143	0,143	0,143	0,143	1
	N° 2	1	3,46	3,46	3,46	3,46	1	6,98	6,98	6,98	6,98	1
ANDAR	N° 1	2	0,143	0,143	0,142	0,144	2	0,128	0,128	0,125	0,132	0,50
	N° 2	2	6,98	6,98	6,93	7,03	2	7,81	7,81	7,60	8,02	0,50
DORMIR	N° 1	1	0,227	0,227	0,227	0,227	1	0,172	0,172	0,172	0,172	1
	N° 2	1	4,40	4,40	4,40	4,40	1	5,80	5,80	5,80	5,80	1
PRAZER	N° 1	1	0,274	0,274	0,274	0,274	1	0,173	0,173	0,173	0,173	1
	N° 2	1	3,7	3,7	3,7	3,7	1	5,8	5,8	5,8	5,8	1
IR	N° 1	1	1,441	1,441	1,441	1,441	1	0,017	0,017	0,017	0,017	1
	N° 2	1	6,94	6,94	6,94	6,94	1	58,70	58,70	58,70	58,70	1
VOLTAR	N° 1	1	0,202	0,202	0,202	0,202	1	0,127	0,127	0,127	0,127	1
	N° 2	1	4,94	4,94	4,94	4,94	1	7,89	7,89	7,89	7,89	1
DIRIGIR	N° 1	2	0,171	0,171	0,162	0,180	2	0,063	0,063	0,063	0,063	0,50
	N° 2	2	5,86	5,86	5,56	6,16	2	15,66	15,66	15,33	16,00	0,50
CANTAR	N° 1	2	0,698	0,698	0,170	1,225	2	0,061	0,061	0,043	0,079	0,50
	N° 2	2	7,0	7,0	5,9	8,2	2	18,2	18,2	12,6	23,8	0,50
DANÇAR	N° 1	2	0,198	0,198	0,089	0,306	2	0,137	0,137	0,125	0,149	1
	N° 2	2	7,24	7,24	3,26	11,21	2	7,36	7,36	6,71	8,01	1
COMER	N° 1	1	0,128	0,128	0,128	0,128	1	0,116	0,116	0,116	0,116	1
	N° 2	1	6,7	6,7	6,7	6,7	1	8,6	8,6	8,6	8,6	1
NADAR	N° 1	2	0,127	0,127	0,104	0,151	2	0,074	0,074	0,072	0,075	0,50
	N° 2	2	8,29	8,29	6,63	9,95	2	13,62	13,62	13,30	13,93	0,50
QUERER	N° 1	0					0					NP
	N° 2	0					0					NP
SALTAR	N° 1	3	0,161	0,144	0,125	0,213	3	0,074	0,070	0,057	0,095	0,25
	N° 2	3	6,4	6,4	4,7	8,0	3	14,1	14,4	10,5	17,5	0,25
SORVETE	N° 1	4	0,073	0,068	0,039	0,115	4	0,078	0,066	0,014	0,166	1
	N° 2	4	17,26	17,49	8,68	25,37	4	25,09	10,58	6,03	73,16	1
PORTA	N° 1	3	0,077	0,082	0,061	0,088	3	0,049	0,043	0,028	0,077	0,50
	N° 2	3	13,38	12,23	11,38	16,53	3	24,16	23,43	13,07	35,99	0,50
QUAR-TO	N° 1	4	0,081	0,095	0,033	0,100	4	0,078	0,066	0,031	0,149	1
	N° 2	4	15,3	10,5	10,0	30,1	4	18,4	17,1	6,7	32,6	1
CADERNO	N° 1	3	0,055	0,049	0,022	0,094	3	0,060	0,035	0,028	0,119	0,75
	N° 2	3	25,31	20,60	10,67	44,67	3	24,46	29,02	8,44	35,92	0,75
CORTINA	N° 1	4	0,078	0,087	0,027	0,110	4	0,067	0,066	0,044	0,093	0,88
	N° 2	4	17,3	11,5	9,1	37,0	4	17,2	15,1	10,8	28,0	0,88
CONFORTÁVEL	N° 1	4	0,066	0,062	0,033	0,110	4	0,062	0,059	0,030	0,100	0,25
	N° 2	4	19,50	19,21	9,13	30,46	4	20,70	19,56	10,03	33,66	0,63
GORDURA	N° 1	3	0,100	0,085	0,080	0,134	3	0,061	0,064	0,047	0,072	0,25
	N° 2	3	10,56	11,75	7,44	12,48	3	16,97	15,72	13,87	21,31	0,25
MARTA	N° 1	5	0,218	0,130	0,065	0,600	5	0,100	0,090	0,023	0,188	0,44
	N° 2	5	10,82	8,80	5,60	16,66	5	19,68	11,13	5,33	44,31	0,81
ACORDAR	N° 1	1	0,073	0,073	0,073	0,073	1	0,053	0,053	0,053	0,053	1
	N° 2	1	13,77	13,77	13,77	13,77	1	18,87	18,87	18,87	18,87	1
CIRCO	N° 1	3	0,092	0,090	0,069	0,116	3	0,102	0,068	0,068	0,170	1
	N° 2	3	11,40	11,15	8,61	14,43	3	11,81	14,75	5,89	14,78	0,75
VERMELHO	N° 1	2	0,115	0,115	0,061	0,169	2	0,055	0,055	0,037	0,073	0,50
	N° 2	2	11,6	11,6	6,9	16,3	2	20,2	20,2	13,6	26,7	0,50
BARCO	N° 1	3	0,198	0,156	0,088	0,350	3	0,091	0,069	0,059	0,145	0,25
	N° 2	3	6,88	6,41	2,86	11,38	3	12,77	14,54	6,91	16,86	0,25
FORTALEZA	N° 1	3	0,050	0,051	0,023	0,075	3	0,045	0,033	0,028	0,073	1
	N° 2	3	25,3	19,7	13,3	42,9	3	26,4	30,4	13,7	35,2	1
QUARTA	N° 1	4	0,046	0,042	0,029	0,071	4	0,074	0,046	0,025	0,178	0,63
	N° 2	4	24,5	24,8	14,0	34,6	4	23,5	24,2	5,6	39,9	0,88
TARDE	N° 1	5	0,080	0,060	0,042	0,133	5	0,056	0,051	0,028	0,100	0,13
	N° 2	5	16,0	16,7	7,5	24,0	5	22,2	19,5	10,0	35,3	0,19

[a]Signed-rank Wilcoxon test. NP: statistical test does not process.
mín: mínimum value; max: máximum value.
Source: Research data.

Table 4 – Duration of the realization of vibrant / r / in syllable final (Part I) by word according to the sentence and letter in the group of listeners

Word		Deaf					Listener					*p valuea*
		n	Average	Median	Min	Max	n	Average	Median	Min	Max	
MAR	N° 1	2	0,206	0,206	0,191	0,221	2	0,089	0,089	0,079	0,098	0,50
	N° 2	2	4,89	4,89	4,53	5,25	2	11,40	11,40	10,17	12,64	0,50
ESCREVER	N° 1	2	0,149	0,149	0,144	0,154	2	0,081	0,081	0,072	0,090	0,50
	N° 2	2	6,7	6,7	6,5	7,0	2	12,5	12,5	11,1	13,9	0,50
LER	N° 1	2	0,140	0,140	0,088	0,192	2	0,059	0,059	0,057	0,061	0,50
	N° 2	2	8,29	8,29	5,20	11,37	2	17,08	17,08	16,51	17,65	0,50
ANDAR	N° 1	2	0,196	0,196	0,184	0,208	2	0,098	0,098	0,087	0,109	0,50
	N° 2	2	5,13	5,13	4,81	5,45	2	10,35	10,35	9,18	11,52	0,50
DORMIR	N° 1	2	0,184	0,184	0,152	0,217	2	0,122	0,122	0,116	0,129	0,50
	N° 2	2	5,60	5,60	4,61	6,60	2	8,20	8,20	7,75	8,66	0,50
PRAZER	N° 1	2	0,154	0,154	0,081	0,227	2	0,088	0,088	0,069	0,108	1
	N° 2	2	8,3	8,3	4,4	12,3	2	11,9	11,9	9,3	14,4	1
IR	N° 1	2	0,185	0,185	0,152	0,218	2	0,023	0,023	0,022	0,024	0,50
	N° 2	2	5,59	5,59	4,59	6,59	2	44,08	44,08	42,62	45,55	0,50
VOLTAR	N° 1	2	0,129	0,129	0,080	0,178	2	0,079	0,079	0,040	0,117	0,50
	N° 2	2	9,08	9,08	5,61	12,54	2	16,78	16,78	8,54	25,02	0,50
DIRIGIR	N° 1	1	0,109	0,109	0,109	0,109	1	0,030	0,030	0,030	0,030	1
	N° 2	1	9,22	9,22	9,22	9,22	1	32,99	32,99	32,99	32,99	1
CANTAR	N° 1	2	0,159	0,159	0,109	0,209	2	0,028	0,028	0,027	0,030	0,50
	N° 2	2	7,0	7,0	4,8	9,2	2	35,3	35,3	33,0	37,6	0,50
DANÇAR	N° 1	2	0,136	0,136	0,123	0,149	2	0,099	0,099	0,089	0,109	0,50
	N° 2	2	7,63	7,63	7,14	8,11	2	10,20	10,20	9,14	11,26	0,50
COMER	N° 1	2	0,066	0,066	0,022	0,111	2	0,037	0,037	0,021	0,053	0,50
	N° 2	2	27,3	27,3	9,0	45,5	2	27,0	27,0	19,0	35,1	1
NADAR	N° 1	2	0,119	0,119	0,092	0,146	2	0,018	0,018	0,014	0,022	0,50
	N° 2	2	8,86	8,86	6,87	10,86	2	57,91	57,91	45,10	70,72	0,50
QUERER	N° 1	1	0,236	0,236	0,236	0,236	1	0,011	0,011	0,011	0,011	1
	N° 2	1	4,2	4,2	4,2	4,2	1	95,4	95,4	95,4	95,4	1
SALTAR	N° 1	2	0,161	0,161	0,128	0,194	2	0,032	0,032	0,031	0,033	0,50
	N° 2	2	6,5	6,5	5,2	7,8	2	31,4	31,4	30,6	32,3	0,50
SORVETE	N° 1	2	0,070	0,070	0,039	0,101	2	0,025	0,025	0,014	0,035	0,50
	N° 2	2	17,64	17,64	9,91	25,37	2	50,70	50,70	28,24	73,16	0,50
PORTA	N° 1	2	0,139	0,139	0,082	0,197	2	0,043	0,043	0,028	0,058	0,50
	N° 2	2	8,65	8,65	5,07	12,23	2	26,68	26,68	17,37	35,99	0,50
QUARTO	N° 1	2	0,159	0,159	0,098	0,220	2	0,045	0,045	0,031	0,059	0,50
	N° 2	2	7,4	7,4	4,5	10,2	2	24,7	24,7	16,8	32,6	0,50
CADERNO	N° 1	2	0,086	0,086	0,049	0,122	2	0,038	0,038	0,035	0,041	0,50
	N° 2	2	14,38	14,38	8,17	20,60	2	26,59	26,59	24,15	29,02	0,50
CORTINA	N° 1	2	0,110	0,110	0,092	0,128	2	0,051	0,051	0,037	0,064	0,50
	N° 2	2	9,4	9,4	7,8	10,9	2	21,2	21,2	15,6	26,8	0,50
CONFORTÁVEL	N° 1	2	0,106	0,106	0,086	0,126	2	0,059	0,059	0,037	0,081	0,50
	N° 2	2	9,76	9,76	7,91	11,62	2	19,57	19,57	12,36	26,78	0,50
GORDURA	N° 1	2	0,120	0,120	0,105	0,134	2	0,052	0,052	0,031	0,072	0,50
	N° 2	2	8,46	8,46	7,44	9,49	2	22,85	22,85	13,87	31,83	0,50
MARTA	N° 1	2	0,146	0,146	0,114	0,178	2	0,075	0,075	0,023	0,128	0,50
	N° 2	2	7,21	7,21	5,62	8,80	2	26,08	26,08	7,85	44,31	0,50
ACORDAR	N° 1	2	0,051	0,051	0,029	0,073	2	0,046	0,046	0,039	0,053	1
	N° 2	2	23,99	23,99	13,77	34,20	2	22,35	22,35	18,87	25,82	1
CIRCO	N° 1	2	0,085	0,085	0,069	0,101	2	0,051	0,051	0,033	0,068	0,50
	N° 2	2	12,14	12,14	9,86	14,43	2	22,42	22,42	14,75	30,09	0,50
VERMELHO	N° 1	2	0,057	0,057	0,053	0,061	2	0,030	0,030	0,022	0,037	0,50
	N° 2	2	17,6	17,6	16,3	18,8	2	35,7	35,7	26,7	44,7	0,50
BARCO	N° 1	2	0,089	0,089	0,088	0,089	2	0,062	0,062	0,056	0,069	0,50
	N° 2	2	11,29	11,29	11,21	11,38	2	16,28	16,28	14,54	18,03	0,50
FORTALEZA	N° 1	2	0,049	0,049	0,046	0,051	2	0,054	0,054	0,035	0,073	1
	N° 2	2	20,6	20,6	19,7	21,6	2	21,0	21,0	13,7	28,3	1
QUARTA	N° 1	2	0,025	0,025	0,021	0,029	2	0,026	0,026	0,025	0,027	1
	N° 2	2	41,1	41,1	34,6	47,6	2	38,7	38,7	37,5	39,9	1
TARDE	N° 1	2	0,046	0,046	0,042	0,050	2	0,055	0,055	0,051	0,060	0,50
	N° 2	2	22,0	22,0	20,1	24,0	2	18,1	18,1	16,8	19,5	0,50

[a]Signed-rank Wilcoxon test.
min: mínimum value; max: máximum value.
Source: Research data.

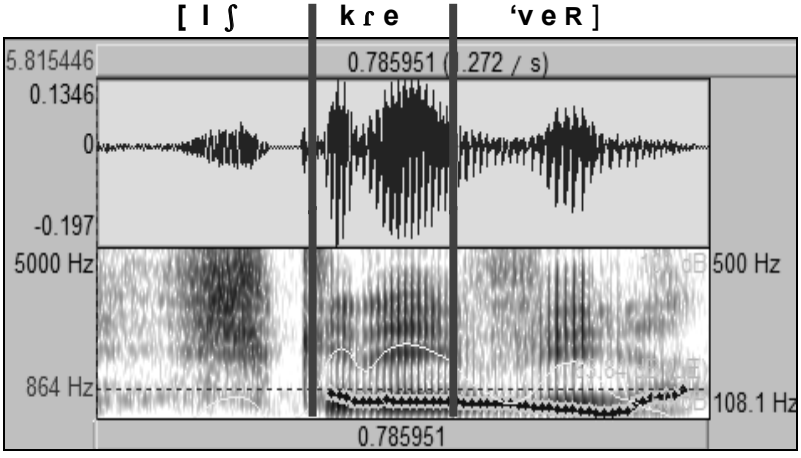
This analysis requires the lengh to produce the vibrant /r/ in the sentence and in the letter together, therefore, the number of words in some cases was reduced in comparison to the previous analysis.

DISCUSSION

This study of deaf bilingual subjects, L1 Libras and L2 Portuguese in oral form, is a contribution to the phonetc improvementof the second language of the individuals surveyed.Based on this principle, it was decided to carry out the vibrant /r/ in two different speech contexts, given the complexity of these phonetic linguistic sounds. The rhotic consonant in Brazilian Portuguese present a multitude of phonetic realizations, due to social and regional varieties, with multiple realizations[6].

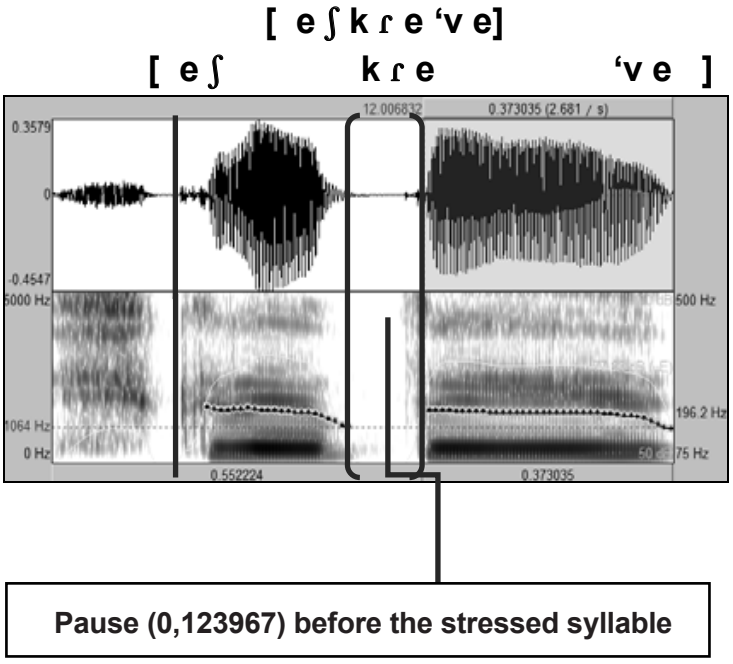
If it is complex to study the realization of the rhotic consonant in normal hearing individuals, it becomes a challenge to conduct the same study in deaf people. When analysing BP there are two concerns regarding the rhotic consonant: one is the phonological view and another concerning the sociolinguistical or dialectal mapping of its phonetic variants[16]. In the oralismdeaf, these concerns are not as evident as they have no auditory *feedback*-needed to obtain the acquisition of the speech facts of a given region.Thus, the degree of deafness entails deficit at all levels involved in the process of speech production, as the sensorimotor, the phonetic and phonological, the lexical, the syntatic, o semantic, the pragmatic and cognitive[1,17]. This way, the characteristics of the hearing loss, type of device for sound amplification, type of speech therapy and language experiencesin which the individual had access to, determine a near uniformity of the features of these speech processes[17].

Positively, this pointed generalization was observed in the analyses of the spectograms extracted from the research. A remarkable fact is the pause before the realization of the stressed syllable, which does not happen in the intonation contoursof the hearing informants [18]. The phrase “escrever” [write] of the informants 1-CF (hearing) and 1-CL (deaf) in the context of the letter, exemplifies what is said here. (Figures 1 and 2).



Informant 1 CF: listener – letter

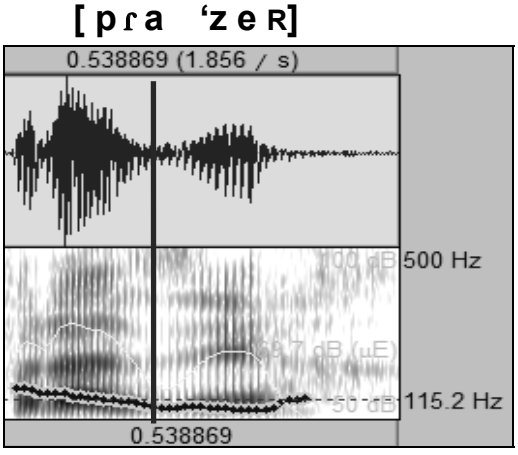
Figure 1–Acoustic signal and spectogram of the segment “escrever”



Highlighted segment: **[ve]** – duration: 0.373035(2.681/s)
Informant 1 CL: deaf - letter

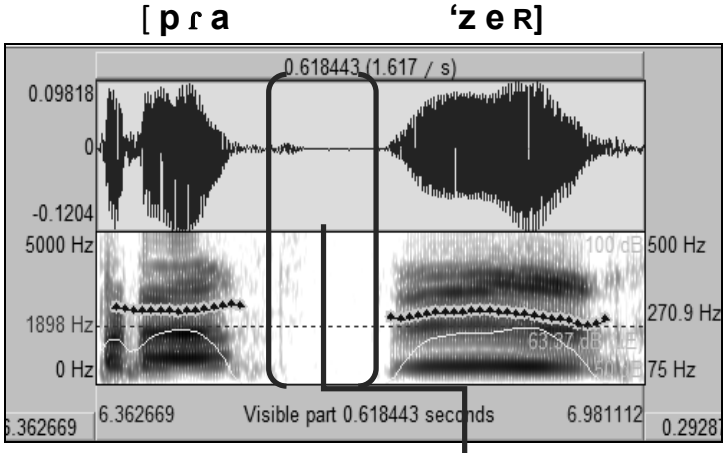
Figure 2–Acoustic signal and spectogram of the segment “escrever”

Note, also, a longer duration of the stressed syllable of the five deaf when compared to the two listeners, because the contrasting sounds that make up this syllable in the syntagmatic axis have a longer realization time and peculiar to the prosodic of the deaf[18]. It appears thata slow pattern, prolonged and distorted vowels, abnormal rhythm, excessive nasality and addition of undifferentiated neutral vowel between the contiguous consonants. Figures 3 and 4 that follow the word“prazer” [pleasure] in the context of the letter, show this difference in duration and part of the facts indicated.



Highlighted segment:**[p ɾ a ‘z e R]**- duration: 0.538869(1.856/s)
Informant 1 CF: listener - letter

Figure 3 - Acoustic signal and spectogram of the segment “prazer”



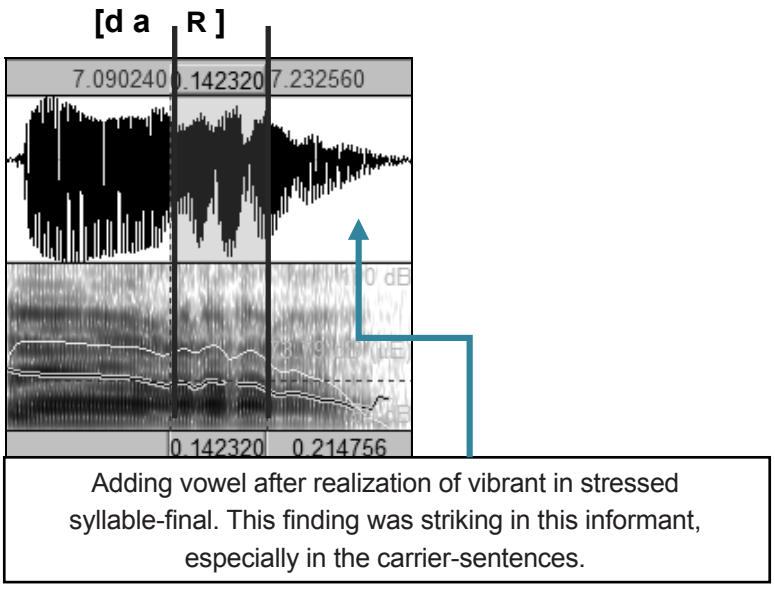
Pause (0,155609) before the stressed syllable

Slow standard, lenghthening of the vowel soundsThese facts associated with the pause that precedes the stressed syllable, show abnormal rhythm in the speech of the oralized deaf.

Highlighted segment: **[p ɾ a ‘z e R]–**duration: 0.932128(1.073/s)
Informant 3 PC: deaf - letter

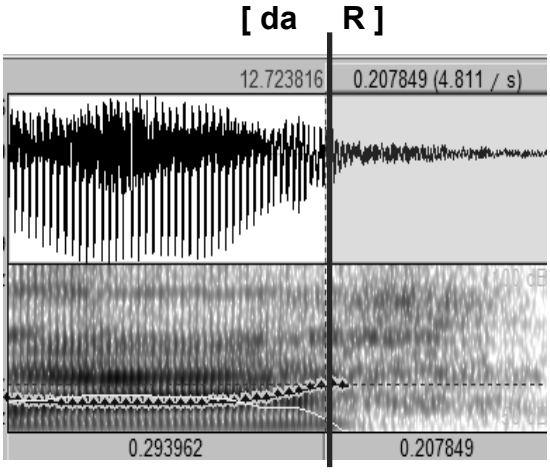
Figure 4–Acoustic signal and spectogram of the segment “prazer”

Regarding the addtition of vowel mentioned in the preceding paragraph, a similar fact is clear in the informant RS-2 (Figure 5)in both language contexts surveyed. The carrier sentence “Eudigoandar” [I say walk] shows the prolonged vowel realization(0.214756ms), which is not observed in the analysis of the same context in the informant listener 2-TB (Figure 6). Thus, the segment [‘daR] of the word“andar” [walk]is a typical sample of this finding.This same informant performs the “erre” [r sound]in consonants meeting, when it shoud appear in the final syllable in the middle of the word, for exemple, “barco” [boat]as “braco” and “porta” [door] as “prota”. These unusual realizations suggest two hypotheses:they occur due to an excessive articulatory forcemotivated by a search for greater sensitivity used for the productionof the rhotic consonant or by a phonological process of metathesis (permutation), which affects the structure of the syllable.



Informant 2 RS: deaf – carrier-sentence (vowel realization)

Figure 5 - Segment "dar" from the word "andar"



Informant 2 TB: listener–carrier - sentence

Figure 6 - Segment "dar" from the word "andar"

Another factor may be explained by the influence of the vibrant neighboring sound. These are the sounds that are contrasted to form the pre tonic-syllable of the word"dormir" [sleep]. Of the seven informants, six performed the vowel sound [o] as [u], resultingin "durmir", in an alternation of the pre tonicvowels / o / and / u /[19]. It is likely that the realization of the uvular vibrant[R], has favored the rise of the vowel.

With respect to the deletion of the rhotic consonant in the stressed syllable final of the infinitive verbs and in the word "mar", this phenomenon was only observed in deaf individuals, which is consistent with what is typically seen in the dialects of BP[12,14]. This was not observed in this study with the listeners because, they probably had greater concern for the realization of the rhotic consonants infinitives.This fact is observed in the BP in comparative studies with the European Portuguese. Referring to verbal infinitives, the researchers mentioned as favoring the phonetic zero unit[13].

The results presented in Part I, Table 1, referring to the duration of the realization of the vibrant in stressed syllable-final in the *corpus* examined,

contexts carrier-sentence and letter, show no significant difference at 5%, in the time spent for the realization of the vibrant by the five deaf and two listeners. Importantly, the two listeners who constituted the control group, valued the realization of the vibrant in the contexts studied, which is usually not observed in everyday talk, as noted previously[12]. With regard to the deaf of the current research, it did not happen; naturally, the strategies used for installing these vibrant/ rhotic sounds use visual cues, tactile and auditory, in which the therapist reveals the manner and place of articulation required, valuing greatly the duration.In general it is taught the realizations ofapical-alveolar vibrant,uvularvibrantand pharingeal, the two latter being easier to set up due to the tactile- kinesthetic feeling.Duration, therefore, is a robust parameter, since it emphasizes the phonetic strategies necessary for acquiring the vibrant/rhotic in the oral modality. In the deaf studied this achievement is remarkable.

The realizations ending in “ar” of the first conjugation infinitives are more striking in (Table 1) compared to the others. The articulatory adjustment more opened and the position more neutral of the tongue favor an increase in the vowel duration and, consequently, the vibrating/ rhotic thereafter.

Osresultadosexpostosna parte II, Tabela 2, referente à duraçãodarealização da vibrante / R/ em final de sílabatônicaemmeio de vocábulo no *corpus*investigado, contextospalavras-veículo e carta, mostramquenãoexistediferençasignificante, aonível de 5%, naduraçãodessarealização entre osgrupos de surdos e de ouvintes.

The results set out in Part II, Table 2, referring to the duration of the realization of the vibrant /r/ in stressed syllable-final in the middle of the word in the *corpus* investigated, the contexts carrier sentence and letter show no significant difference, at 5 %, in the duration of that achievement between groups of deaf and hearing. The results shown in Tables 3 and 4 show that there is no significant variation , at level of 5%, in the duration of the realization of rhotic consonant in stressed syllable-final (part I) and in stressed syllable-final in the middle of the word (part II) in bothe language contexts studied, considering the two groups – deaf and hearing.

The achievements in the syllable-final and in the middle of the word are present in deaf oralized individuals, in view of kinesthetic proprioception afforded by these sounds when you feel the anterior neck; strategy commonly used in the set up of these sounds.

The analysis of the vibrant in stressed syllable-final showed no difference in both groups, as evidenced by the results. However this does not reflect the real articulatory realization in listeners, as when referring to verbal infinitives, there is phonetic zero - deletion[13].

Other related findings constatam an absolut average duration in the production of phrases, words and vowels in deaf group compared to the hearing group[11,20].

In the data of this study, although the differences were not striking, we find a tendency by the deaf to prolong the sounds due to greater articulatory force (duration), especially in stressed syllables.

From the phonological point of view, the realization of the rhotic consonants is done in a similar way, occupying the same place in the consonantal system and syllabic structure and according to the same types of phonological rules[21], as seen in the five deaf and two listeners informants; all of them performed the rhotic consonant in syllable- final and in the middle of the word.

From the phonetic point of view, the vibrants are performed with great variation of points and modes of articulation, as in all languages of Latin origin. The similarity between the member of this class of sounds is due to more auditory and acoustic features than to articulatory characteristics, as noted in a recent study[21]. It would not be different in this study: the five deaf and the two listeners had phonic realizations almost always distinct.

CONCLUSION

Based on the achieved results and discussion, we conclude the following:

Regarding the duration of the vibrant

It is most striking in the oral modality of the deaf than the listener’s speech, probably due to the strategies used during the learning of these vibrant realizations.

The trait that features it is very striking in one of the informants (2-RS), leading to a vowel insertion (epenthesis) after performing the rhotic consonant in stressed syllable-final; as in [the syllable] “dar” in “andar” [walk] [ẽ ‘da**R**:a:].

The duration of the rhotic consonant in the end of the word in both contexts is also remarkable in the listener, while not constituting an articulatory reality in BP.

About intelligibility in both contexts

In the carrier sentence, the realization of speech segments was more markedly in the deaf than in the listener individuals. The support segment “Eudigo...” [I say...] contributed to achieving the complements (nouns and verbs) thereafter.

The realization of those words in the context of the letter was less marked, due to the distribution of

these segments on the axis of the axis of the word of the language, which requires more complexsyntatic and lexical combinations. The rhotic consonants in the end of the word were the most difficult realizations, due mainly to natural elisions observed in BP.

Regarding the marks of speech.

The pauses constituted the most significative marks between the two groups: more present in the five deaf than in the two listeners.

Listeners tookelocutory pauses expected in BP.

The oralized deaf showed pauses characteristics that prepar the realization of the subsequent segment (rhotic or constrictive realizations), for exemple, extensions of the vowel sounds.

Depending on the combination of constricting sounds [v] and [z] preceding the vowel sound [e], note there is a strong tendency to prolongation of these phonemes in deaf informants 1CL and 3PC, in the two language contexts investigated.

The stressed segment is characterized by a longer duration in oralized deaf than in listeners, although not statistically significant in this study. In the listeners the stressed syllable segment is given by the articulatory force. In general, it has shorter duration, compared to the oralized deaf.

These are the more conclusive data that fulfill the purposes of this study. Thus, other goals may be plotted on the same spectograms extracted and analyzed, given the richness of linguistic features/ phenomena studied. The types of vibrant/rhotic, the neutralizations, the intonation studies and new paradigms of speech therapy are examples of what may come from further analyzes.

RESUMO

Objetivo: investigar, no surdo bilíngue, a realização das vibrantes em final de sílaba tônica, em final de sílaba tônica ou átona em meio de vocábulo, em dois contextos linguísticos: frases-veículo e carta. **Métodos:** foram selecionados cinco informantes surdos bilíngues, sendo quatro do sexo feminino e um do masculino, portadores de perda auditiva neurossensorial bilateral severa e/ou profunda, sem comprometimento neurológico, cognitivo e motor, e dois ouvintes, sendo um do sexo feminino e um do masculino. O *corpus* utilizado foi dividido em dois momentos, leitura de frases-veículo e de carta, contendo os dois os mesmos vocábulos. As gravações foram realizadas no Instituto Nacional de Educação de Surdos-INES. Para a análise do parâmetro duração dos segmentos selecionados (vibrantes), extraíram-se espectrogramas de banda larga do programa PRAAT. Os dados obtidos foram tratados estatisticamente. **Resultados:** os resultados expostos na Tabela 1 (realização da vibrante em sílaba tônica final) e na Tabela 2 (realização da vibrante em final de sílaba tônica em meio de vocábulo) mostram que não existe diferença significante, ao nível de 5%, no tempo gasto para a realização da vibrante nos dois grupos. **Conclusão:** mesmo que os dados observados nos dois grupos investigados não sejam estatisticamente significantes ao nível de 5%, percebe-se que existe uma tendência de diferença significante quando o nível descritivo (*p valor*) ficou entre 0,05 e 0,10. De fato, além da análise acústica, a perceptiva revelou um traçado da vibrante mais diferenciado nos surdos do que no dos ouvintes. Os achados deste estudo encontram correlatos na literatura pesquisada.

DESCRITORES: Acústica; Linguística; Fonética; Surdez

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