Original Article

Artigo Original

Speechreading as a communication mediator

Leitura da fala como mediadora da comunicação

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Keywords

Lipreading
Communication
Speech perception
Visual perception
Hearing loss
Deafness

ABSTRACT

Purposes: To compare the speechreading between individuals with hearing impairment and with normal hearing levels to verify the factors that influence the speechreading among hearing impaired patients. **Methods:** Forty individuals with severe-to-profound hearing loss aged between 13 and 70 years old (study group) and 21 hearing individuals aged between 17 and 63 years old (control group) were evaluated. As a research instrument, anamnesis was used to characterize the groups; three speechreading instruments, presenting stimuli via a mute video, with a female speaker; and a vocabulary test, to verify their influence on speechreading. A descriptive and analytical statistics (ANOVA test and Pearson's correlation), adopting a significance level of 0.05 (5%). **Results:** A better performance was observed in the group with hearing impairment in speechreading tests than in the group with hearing individuals. By analyzing the group with hearing loss, there was a mean difference between tests ($p<0.001$), which also showed correlation between them. Individuals with pre-lingual hearing loss and those who underwent therapy for speechreading had a better performance for most speechreading instruments. The variables gender and schooling showed no influence on speechreading. **Conclusion:** Individuals with hearing impairment had better performance on speechreading tasks in comparison to people with normal hearing. Furthermore, it was found that the ability to perform speechread might be influenced by the vocabulary, period of installation of the hearing loss, and speechreading therapy.

Descritores

Leitura labial
Comunicação
Percepção da fala
Percepção visual
Perda auditiva
Surdez

RESUMO

Objetivos: Comparar a habilidade de leitura da fala entre indivíduos com deficiência auditiva e ouvintes e verificar os fatores que podem influenciá-la nos deficientes auditivos. **Métodos:** Foram avaliados 40 indivíduos com perda auditiva de grau severo a profundo e idade entre 13 e 70 anos (grupo em estudo) e 21 ouvintes com idade entre 17 e 63 anos (grupo controle). Como instrumentos de pesquisa, utilizaram-se anamnese, para caracterizar os grupos; três instrumentos de leitura da fala, apresentando-se estímulos por meio de vídeo, sem som, com uma locutora feminina; e um teste de vocabulário, para verificar a sua influência sobre a leitura da fala. Realizou-se estatística descritiva e analítica (Teste ANOVA e Correlação de Pearson), adotando-se o nível de significância de 0,05 (5%). **Resultados:** Observou-se melhor desempenho do grupo com deficiência auditiva nos testes de leitura da fala do que ouvintes. Analisando somente o grupo com deficiência auditiva, verificou-se diferença de desempenho entre os testes ($p<0,001$) e estes apresentaram correlação entre si. Apresentaram melhor desempenho para a maioria dos instrumentos de leitura da fala os indivíduos com deficiência auditiva pré-lingual e os que realizaram terapia de leitura da fala. As variáveis sexo e anos de estudo não indicaram influência na leitura da fala. **Conclusão:** Indivíduos com deficiência auditiva apresentam melhor desempenho em tarefas de leitura da fala em comparação com ouvintes. Além disso, verificou-se que a capacidade de realizar a leitura da fala pode ser influenciada pelo vocabulário, época de instalação da deficiência auditiva e realização da terapia de leitura da fala.

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INTRODUCTION

Hearing impairment affects one of the noblest functions of the human being, which is communication. Because of the difficulties faced by individuals with this change, speechreading (SR) is a strategy used in order to help with recognizing the spoken message, thus providing an effective communication[1,2].

In this study, the term SR was adopted to name the ability to recognize speech visually, which considers not only the joint movement during speech as a recognition tool, but also the careful observation of the speaker and the associate behaviors, such as intonation, facial expression, and body movements, thus leading to the recognition of the exposed content[3]. In specialized literature, there are also the terms lipreading (LR) and orofacial reading (OR)[2,4].

All of the individuals use SR. Those who hear use it but they do not realize it, since they only use it in situations when the hearing sign is difficult to be recognized[5,6]. In mild or moderate hearing impairment (HI), when it is still possible to benefit from the existing residual hearing, and with the use of hearing aids, SR becomes complementary to hearing information[1,7]. In the case of severe or profound HI, the use of sight to recognize speech is essential[6,7]. Due to its constant use in daily life, it is believed that individuals with HI present with better SR skills in comparison to hearing patients[6,8,9].

The use of SR is important during the process to adapt to the hearing aid or the cochlear implant (CI), because by integrating hearing and visual cues, the individuals are allowed to extract the speech-related information more easily[9].

Most studies on SR are international, and there are not many studies about the characteristics that influence this skill. Considering the peculiarities of each language, Brazilian studies are required in order to explore this subject among Brazilian Portuguese (BP) speakers.

Therefore, the objective of this study was to compare the SR skill among individuals with HI and those with no impairment. Besides, we aim at verifying factors that influence SR among people with HI.

METHODS

This study was analyzed and approved by the Research Ethics Committee of *Universidade Federal de São Paulo* (UNIFESP), n. 1355/11, on October 27, 2011.

Individuals aged more than 18 years old agreed to participate in the research and signed the informed consent. In the case of minor patients, the party in charge also signed the informed consent.

Participants

Studied group

In this group, there were 40 individuals who met the following inclusion criteria: having severe (61 to 80 dBNA) to profound (81 dBNA or more) symmetric and bilateral sensorineural HI in the better year, considering the mean of frequencies 500, 1,000, 2,000, and 4,000 in the better year, according to the World Health Organization criteria[10]; communicating orally; native language should be BP; having at least two years of schooling in a regular school; and being aged between 12 and 70 years old at the time of data collection. The use of LIBRAS was not required to compose the sample.

Individuals with the following criteria were excluded: having another evident impairment that could affect the development of language and/or speech, such as neurological or psychiatric disorders; having severe visual changes, among which are glaucoma and/or subvision; and the non-use of corrective lenses during evaluation in cases of mild visual alterations such as myopia, astigmatism, hypermetropia, and presbyopia.

Control group

Twenty-one individuals participated in this group, who met the following inclusion criteria: normal hearing (up to 25 dBNA) in both ears, considering the mean of frequencies 500, 1,000, 2,000, and 4,000 in the better year, according to the World Health Organization criterion[10]; having BP as the native language; having at least two schooling years in a regular school; and being aged between 12 and 70 years old at the time of data collection. The same exclusion criteria used for the studied group were used here.

Research instruments

Anamnesis

For the sample characterization and selection, the sample characterization form[11] was applied. Besides the questions that were already present in this anamnesis, we added a reference to the performance of SR therapy.

This anamnesis was fulfilled by interviewing each individual and checking medical records. When the patient could not understand the question orally, strategies to facilitate communication were adopted, such as repetition and/or graphic support.

Receptive hearing vocabulary

Vocabulary is an important item for receiving and processing verbal information; therefore, with the objective to measure the influence of receptive hearing vocabulary on SR skills, the picture vocabulary test USP was used (TVfusp - 92º)[12].The test consists of a test notebook with 92 slides and four pictures on each of them. The individual selects one picture that corresponds to the work pronounced by the evaluator. In order to make sure the patient was able to properly identify each pronounced word, he repeated it before pointing at the image. The responses of each patient were written down on a registration sheet for further analysis. With the objective of facilitating the analysis in this research, only the percentage of correct answers was chosen.

Evaluating the speechreading skill

In order to standardize the presentation of all of the tests, stimuli were previously recorded in video and presented by a female speaker who was unknown by the participants, whose native language is Portuguese. During the recording, she was asked to pronounce the stimulus naturally, without changing the articulation and/or speech velocity.

The recording was made in a Sony camera, Cyber-Shot Model, with 7.2 megapixels, and edited in the software Windows Movie Maker. The evaluation was individual and performed in a bright room. Videos were presented to the participants on a computer with a 14 inch screen, and the participant was sitting in front of it from a distance of 50 cm.

All of the stimuli were presented to the participants with no sound, so that there was only SR, without the hearing cue. Each of them was presented only one.

The tests used to assess SR skills are described as follows:

- Speech recognition in a closed set: the SR test[3] was used in a closed set, in which the individual has options of answer. It is composed of three parts:

Part I – Eight daily questions referring to the personal identification and the family environment of each individual. In this part, the patient was advised to answer the questions made by the speaker to the evaluator.
Part II – Composed of 44 sentences represented by pictures drawn on 12 x 12 cm cards, with similar grammar structures presented in 11 sets of five, four, or three sentences each. In this part, the patient pointed at the picture on the slide that corresponded to what the speaker said.
Part III – Composed of 30 words, also represented by pictures drown on 12 x 12 cm cards, divided into six sets of five words each. The same procedure used in the previous item was used in this case.

The patient's responses were classified as "correct," "wrong," and "item with no response," according to the criteria proposed by the authors of the instrument. With the objective of facilitating the comparison with other tests, it was chosen to consider only the percentage of correct answers.

- Recognition of sentences in an open set: with the objective of assessing the SR skill for daily sentences, in an open set, in which the individual has no response options, the lists of sentences were used – Center of Hearing Research (CPA), USP Bauru[13].

This test is composed of 11 lists, each of them with 10 sentences, accounting for 50 words/segments. For this evaluation, the lists four to seven were randomly selected.

In the evaluation, each sentence was fully shown to the patient. After presenting the stimulus, the person should repeat all of the words/segments he or she was able to recognize.

At the end, the percentage of the speech recognition index was obtained by counting the segments repeated correctly and multiplying them by two, as proposed by the instrument.

- Recognizing a story: with the objective of assessing the SR skill for a story, the text "The bet" was used[14].

Before the video was presented, the evaluator said the name of the story and, afterward, asked if the individual was aware of the meaning of the term "bet." When the person showed no knowledge of it, the evaluator explained its meaning. After that, the person was told that the speaker would tell a full story by video and, at the end, the task was to retell what had been understood.

In order to compute the answer, the five main ideas of the story were scored. This score was applied both for the spontaneous retelling of the patient and for the questions asked after it. The answers of each patient, the retelling, and the questions were written down separately in a test registration sheet for further analysis.

The SR skill for the story was measured by means of the percentage of correct answers.

Data were analyzed based on the statistical softwares Statistical Package for the Social Sciences (SPSS), version 17.0, and the Minitab, version 16.

Sample characterization was performed by means of relative frequencies (percentage). For the comparative statistical analysis between the studied and the control group and the comparison between the four tests and also the results of the tests with possible factors that influence SR, the ANOVA test was used. The correlation degree between these tests used Pearson's correlation, and the 0.05 significance level was adopted (5%), with a 95% interval.

RESULTS

The age of the analyzed participants ranged from 13 to 70 years old, with a mean age of 43.10±16.35 years old and a median of 44 years old. As to the age of the participants in the control group, it ranged from 17 to 63 years old, with a mean age of 39.60±11.77 years old and a median of 37 years old. The comparison of mean age, by means of the ANOVA test, showed there was no difference between groups (p=0.391).

The main data referring to the characterization of the studied and the control group are presented in Chart 1.

By comparing the average performance of the groups in SR tests, people with HI presented better performance in comparison to those with no impairment (Figure 1).

By analyzing the group with HI, tests presented differences between the average performance of individuals (Figure 2).

There was a positive correlation between the vocabulary test and the SR tests (Table 1), as well as between SR tests and the variables "period of installation of HI" and "SR therapy" (Tables 2 and 3).

There was no correlation between the performances in SR tests and the variables "gender" and "schooling years" (Tables 4 and 5).

DISCUSSION

This study showed that people with HI presented better SR skills in comparison with people with no impairment, which corroborates previous studies[6,8,9,15,16] and disagrees with the findings of one research[17]. This finding can be explained by the daily use of this skill in the life of a person with HI, which is developed to compensate for the existing HI. It provides effective communication and, consequently, it improves the self-esteem and the social interactions of these individuals[2,5,18-20]. People who hear can also use SR, but they only do so in situations in which speech recognition and/or comprehension is damaged by the presence of noise, complex content and

vocabulary, or language and regional accent that is different from the one of the listener[21-23].

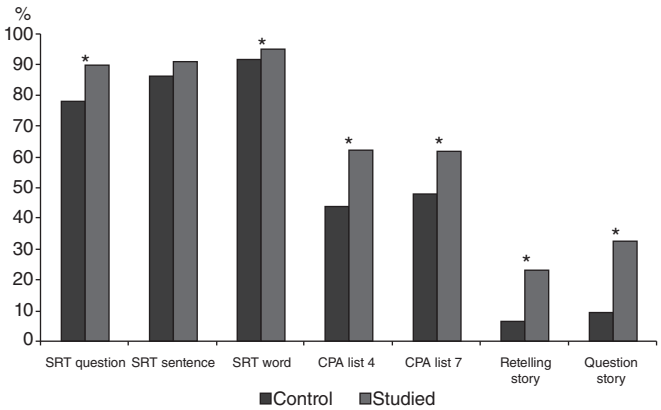
In literature, it was possible to observe the existence of interindividual variability as to the ability to SR, which was also observed in this study[15,16,24], which can be explained because SR is a result of a complex interaction between innate perception and cognitive skills with experiences from the environment. Therefore, the individual can develop it more or less[6].

When the performance in SR tests in the group with HI was analyzed, the decreasing performance of patients according to the increased complexity of tests was observed. This finding suggests that more language resources are required

Chart 1. Characterization data of the studied and the control group

Variables			n	%
Studied Group	Gender	Male	20	50.0
		Female	20	50.0
	Schooling years	Up to 4 years	4	10.0
		From 5 to 8 years	8	20.0
		From 9 to 11 years	13	32.5
		From 12 to 16 years	13	32.5
		16 years or more	2	5.0
	Level of hearing loss	Profound	31	77.5
		Severe	9	22.5
	Etiology of hearing loss	F/C	7	17.5
		Mumps	3	7.5
		Genetic HI	15	37.5
		Meningitis	8	20.0
		Otosclerosis	3	7.5
		Others	4	10.0
	Time of installation of the hearing impairment	Prelingual	5	12.5
		Postlingual	35	87.5
	Use of hearing ai dor cochlear implant	No	8	20.0
		Yes	32	80.0
	Used device	Hearing aid	15	37.5
		Cochlear implant	17	42.5
	Performance of speechreading therapy	No	23	57.5
		Yes	17	42.5
Control Group	Gender	Male	9	42.9
		Female	12	57.1
	Schooling years	Up to 4 years	0	0.0
		From 5 to 8 years	1	4.8
		From 9 to 11 years	11	52.4
		From 12 to 16 years	9	42.9
		16 years or more	0	0.0

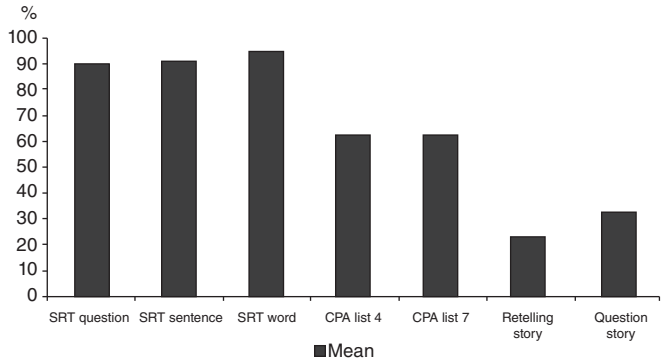
Caption: F/C = for clarification; HI = hearing impairment



*Statistically significant values (p≤0.05) – analysis of variance test (ANOVA)

Caption: SRT = speechreading test; CPA = lists of sentences – Center of Hearing Research

Figure 1. Average performance of groups in speechreading tests



Analysis of variance tests (ANOVA) with repeated measures – difference between the average performances of people with hearing impairment (p<0.001)

Caption: SRT = speechreading test; CPA = lists of sentences – Center of Hearing Research

Figure 2. Performance of the studied group in speechreading tests

Table 1. Level of correlation between tests

HI		TVfusp	SRT question	SRT sentence	SRT word	CPA list 4	CPA list 7	Retelling story
SRT question	Correlation (%)	1.6						
	p-value	0.923						
SRT sentence	Correlation (%)	36.8	58.0					
	p-value	0.020*	0.000*					
SRT word	Correlation (%)	38.0	38.3	73.2				
	p-value	0.016*	0.015*	0.000*				
CPA list 4	Correlation (%)	26.2	51.1	56.2	50.6			
	p-value	0.103	0.001*	0.000*	0.001*			
CPA list 7	Correlation (%)	46.8	48.9	61.5	58.9	83.6		
	p-value	0.002*	0.001*	0.000*	0.000*	0.000*		
Retelling story	Correlation (%)	18.9	27.3	32.4	35.4	59.2	54.5	
	p-value	0.243	0.089	0.042*	0.025*	0.000*	0.000*	
History Question	Correlation (%)	20.8	32.0	43.9	39.8	65.4	63.4	89.2
	p-value	0.199	0.044*	0.005*	0.011*	0.000*	0.000*	0.000*

*Statistically significant value (p≤0.05) – Pearson's correlation test

Caption: HI = hearing impairment; DA = deficiência auditiva; TVfusp = picture vocabulary test USP; SRT = speechreading test; CPA = lists of sentences – Center of Hearing Research

Table 2. Correlation between time of installation of hearing impairment and speech reading tests

Time of installation of hearing impairment		Mean	Median	Standard deviation	VC	Minimum	Maximum	n	CI	p-value
SRT question	Prelingual	100.00	100.0	0.00	0.0	100.0	100.0	5	–	0.056
	Postlingual	88.93	87.5	12.42	0.1	50.0	100.0	35	4.11	
SRT sentence	Prelingual	99.08	100.0	1.26	0.0	97.7	100.0	5	1.10	0.023*
	Postlingual	90.59	90.9	7.93	0.1	70.5	100.0	35	2.63	
SRT word	Prelingual	98.68	100.0	1.81	0.0	96.7	100.0	5	1.58	0.163
	Postlingual	95.15	96.7	5.45	0.1	80.0	100.0	35	1.80	
CPA list 4	Prelingual	86.00	90.0	7.48	0.1	76.0	92.0	5	6.56	0.009*
	Postlingual	59.26	58.0	21.23	0.4	8.0	92.0	35	7.03	
CPA list 7	Prelingual	85.20	88.0	11.37	0.1	66.0	96.0	5	9.96	0.013*
	Postlingual	59.14	56.0	21.66	0.4	12.0	96.0	35	7.18	
Retelling story	Prelingual	48.00	40.0	17.89	0.4	40.0	80.0	5	15.68	0.034*
	Postlingual	20.00	0.0	27.44	1.4	0.0	100.0	35	9.09	
Question story	Prelingual	56.00	40.0	21.91	0.4	40.0	80.0	5	19.20	0.065
	Postlingual	29.71	20.0	29.65	1.0	0.0	100.0	35	9.82	

*Statistically significant value (p≤0.05) – analysis of variance test (ANOVA)

Caption: VC = variation coefficient; CI = confidence interval; SRT = speechreading test; CPA = lists of sentences – Center of Hearing Research

Table 3. Correlation between therapy and speechreading tests

Performance of speechreading therapy		Mean	Median	Standard deviation	VC	Minimum	Maximum	n	CI	p-value
SRT question	No	89.67	100.0	13.93	0.2	50.0	100.0	23	5.69	0.705
	Yes	91.18	87.5	9.65	0.1	75.0	100.0	17	4.59	
SRT sentence	No	89.53	88.6	8.59	0.1	70.5	100.0	23	3.51	0.048*
	Yes	94.52	95.5	6.08	0.1	79.5	100.0	17	2.89	
SRT word	No	93.93	96.7	6.00	0.1	80.0	100.0	23	2.45	0.017*
	Yes	97.85	100.0	2.87	0.0	90.0	100.0	17	1.36	
CPA list 4	No	57.65	54.0	23.50	0.4	8.0	92.0	23	9.60	0.097
	Yes	69.29	72.0	18.04	0.3	26.0	92.0	17	8.58	
CPA list 7	No	57.91	54.0	23.75	0.4	12.0	96.0	23	9.71	0.141
	Yes	68.47	64.0	19.27	0.3	28.0	96.0	17	9.16	
Retelling story	No	21.74	20.0	23.29	1.1	0.0	80.0	23	9.52	0.648
	Yes	25.88	20.0	33.74	1.3	0.0	100.0	17	16.04	
Question story	No	30.43	20.0	28.20	0.9	0.0	80.0	23	11.52	0.535
	Yes	36.47	40.0	32.58	0.9	0.0	100.0	17	15.49	

*Statistically significant value (p≤0.05) – analysis of variance test (ANOVA)

Caption: VC = variation coefficient; CI = confidence interval; SRT = speechreading test; CPA = lists of sentences – Center of Hearing Research

Table 4. Correlation between gender and speechreading tests

Gender		Mean	Median	Standard deviation	VC	Minimum	Maximum	n	CI	p-value
SRT question	Female	90.00	87.5	11.18	0.1	62.5	100.0	20	4.90	0.873
	Male	90.63	100.0	13.37	0.1	50.0	100.0	20	5.86	
SRT sentence	Female	91.26	93.2	7.26	0.1	75.0	100.0	20	3.18	0.762
	Male	92.04	94.3	8.74	0.1	70.5	100.0	20	3.83	
SRT word	Female	96.18	96.7	4.22	0.0	86.7	100.0	20	1.85	0.488
	Male	95.01	96.7	6.17	0.1	80.0	100.0	20	2.70	
CPA list 4	Female	67.10	71.0	20.39	0.3	32.0	92.0	20	8.94	0.197
	Male	58.10	60.0	22.91	0.4	8.0	92.0	20	10.04	
CPA list 7	Female	68.80	72.0	21.26	0.3	34.0	96.0	20	9.32	0.069
	Male	56.00	56.0	22.02	0.4	12.0	96.0	20	9.65	
Retelling story	Female	25.00	10.0	33.01	1.3	0.0	100.0	20	14.47	0.738
	Male	22.00	20.0	22.38	1.0	0.0	80.0	20	9.81	
Question story	Female	37.00	30.0	33.26	0.9	0.0	100.0	20	14.58	0.404
	Male	29.00	30.0	26.34	0.9	0.0	80.0	20	11.54	

Analysis of variance test (ANOVA)

Caption: VC = variation coefficient; CI = confidence interval; SRT = speechreading test; CPA = lists of sentences – Center of Hearing Research

Table 5. Correlation between schooling years and speechreading tests

Schooling years		Mean	Median	Standard deviation	VC	Minimum	Maximum	n	CI	p-value
SRT question SRT sentence SRT word	Up to 4	90.63	93.8	11.97	0.1	75.0	100.0	4	11.73	0.889
	From 5 to 8	90.63	100.0	14.56	0.2	62.5	100.0	8	10.09	
	From 9 to 11	92.31	100.0	9.60	0.1	75.0	100.0	13	5.22	
	From 12 to 16	87.50	87.5	14.43	0.2	50.0	100.0	13	7.85	
	17 or more	93.75	93.8	8.84	0.1	87.5	100.0	2	12.25	
CPA list 4 CPA list 7	Up to 4	87.48	88.6	5.74	0.1	79.5	93.2	4	5.63	0.121
	From 5 to 8	86.10	85.3	7.42	0.1	75.0	100.0	8	5.14	
	From 9 to 11	93.52	95.5	6.29	0.1	79.5	100.0	13	3.42	
	From 12 to 16	94.06	97.7	9.06	0.1	70.5	100.0	13	4.92	
	17 or more	94.30	94.3	8.06	0.1	88.6	100.0	2	11.17	
Retelling story Question story SRT question	Up to 4	89.18	90.0	6.88	0.1	80.0	96.7	4	6.75	0.103
	From 5 to 8	95.00	95.0	4.72	0.0	90.0	100.0	8	3.27	
	From 9 to 11	96.68	96.7	4.08	0.0	86.7	100.0	13	2.22	
	From 12 to 16	96.94	100.0	5.52	0.1	80.0	100.0	13	3.00	
	17 or more	95.00	95.0	2.40	0.0	93.3	96.7	2	3.33	
SRT sentence SRT word	Up to 4	53.50	48.0	21.44	0.4	36.0	82.0	4	21.01	0.458
	From 5 to 8	54.50	46.0	21.75	0.4	32.0	88.0	8	15.07	
	From 9 to 11	70.15	70.0	19.14	0.3	40.0	92.0	13	10.40	
	From 12 to 16	61.38	64.0	25.49	0.4	8.0	90.0	13	13.85	
	17 or more	72.00	72.0	2.83	0.0	70.0	74.0	2	3.92	
CPA list 4 CPA list 7 Retelling story	Up to 4	44.00	38.0	20.85	0.5	26.0	74.0	4	20.43	0.124
	From 5 to 8	50.50	46.0	19.27	0.4	34.0	92.0	8	13.35	
	From 9 to 11	69.69	64.0	16.22	0.2	44.0	90.0	13	8.82	
	From 12 to 16	67.38	74.0	26.76	0.4	12.0	96.0	13	14.55	
	17 or more	67.00	67.0	15.56	0.2	56.0	78.0	2	21.56	
Question story SRT question	Up to 4	15.00	0.0	30.00	2.0	0.0	60.0	4	29.40	0.696
	From 5 to 8	20.00	10.0	33.81	1.7	0.0	100.0	8	23.43	
	From 9 to 11	32.31	20.0	32.19	1.0	0.0	100.0	13	17.50	
	From 12 to 16	21.54	40.0	20.75	1.0	0.0	40.0	13	11.28	
	17 or more	10.00	10.0	14.14	1.4	0.0	20.0	2	19.60	
SRT sentence	Up to 4	20.00	0.0	40.00	2.0	0.0	80.0	4	39.20	0.186
	From 5 to 8	22.50	20.0	32.84	1.5	0.0	100.0	8	22.76	
	From 9 to 11	49.23	40.0	26.60	0.5	20.0	100.0	13	14.46	
	From 12 to 16	29.23	40.0	25.32	0.9	0.0	60.0	13	13.76	
	17 or more	20.00	20.0	28.28	1.4	0.0	40.0	2	39.20	

Analysis of variance test (ANOVA)

Caption: VC = variation coefficient; CI = confidence interval; SRT = speechreading test; CPA = lists of sentences – Center of Hearing Research

to conduct more complex tasks, thus leading to the possibility of understanding the context. One example of increased complexity can be observed in the test of sentence recognition, which not only required the identification of words, but also superior psycholinguistic processes, such as syntax and semantics, as well as perceptive processes, like phonetics and phonological[6,25]. Even more correct answers are seen in tasks of the closed set test, which demonstrates that the context is constituted as a facilitator for the perception of speech by means of SR. Activities carried out in an open set are more difficult because the individual is not aware of what will be said, and therefore, enlightening the person about the subject of conversation gives him or her the opportunity to predict the content of what is being transmitted, which facilitates speech recognition[4]. Besides, the existing correlation between tests showed there is dependency between them, since one becomes a predictor for the success of the following step.

If the person has lexical resources that can turn into functional vocabulary, this person will access the word that was partially perceived more easily[8,26,27], which was confirmed by the positive correlation between the vocabulary and the speech tests.

The period of installation of the HI influences the performance of SR tests. Individuals with prelingual HI present SR dependency from an early age to acquire and develop language, which continues throughout life[6].

The impact of SR therapy over the SR skill, observed in the closed set test, is in accordance with the findings in a previous study, in which small changes in the performance of participants in the study after a short period of practice are observed. This reflects the positive impact of therapy to improve SR skills[16]. It is important that SR therapy be included before and after the adaptation to the hearing aid or CI, so that it is possible to take the most of hearing and visual information, especially in unfavorable situations, thus enabling the individual to keep an effective communication and social interactions[1,7,20,28].

With regard to the "gender" variable, the absence of differences in SR skills between men and women in this study corroborates previous studies conducted with people with and without HI[6,29].

The findings related to the absence of influence of schooling years on SR are against the mentioned hypothesis, since the larger the lexical repertoire of a person, the easier it is to recognize speech[26,27]. Other factors may have contributed with these results, such as the type of school (private or public, regular, or special school), the sample size, and even the assessment materials used in the study.

The study presents limitations concerning the sample size, especially in the control group, which was caused by the number of refusals to participate. Another limitation concerns the lack of comparison with other levels of HI, which does not allow obtaining more knowledge about SR among people with HI.

This article intends to contribute with the work of professionals together with patients with HI in order to amplify the comprehension of this communication mediator, which is so important and present in the lives of individuals, and also to develop functional communication, which will allow them to not be apart from the social interactions, therefore providing better quality of life.

CONCLUSION

After analyzing and discussing the results obtained in this research, it was possible to conclude that individuals with HI presented better SR performance in comparison with individuals with no impairment. Besides, it was observed that the ability to SR was influenced by vocabulary, time of installation of HI, and SR therapy.

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