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Original Article

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Proposal for implementing the Sentence Recognition Index in individuals with hearing disorders

Proposta de aplicação do Índice Percentual de Reconhecimento de Sentenças em indivíduos com distúrbio de audição

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ABSTRACT

Purpose: To present and describe a new strategy and protocol for obtaining the Sentences Recognition Indexes (SRI), using the Lists of Phrases in Portuguese test (LPP), considering words in the analysis of responses; to analyze and compare the results using the previous and the new strategies by checking their applicability and suitability. **Methods:** To consider each word of the sentence, words were classified according to their importance: functional and content words, assigning them, respectively, two and one points. SRI were obtained in 33 normal hearing adults, and results were compared using the two strategies. **Results:** A new protocol was established. Each point corresponds to the following percentages in each list: 1B, 1.11%; 2B, 1.13%; 3B, 1.17%; 4B, 1.16%; 5B, 1.20%; and 6B, 1.11%. The median SRI obtained through usual and new strategies were, respectively, for the list 1B: 60 and 82.57%; 2B: 70 and 80.79%; 3B: 50 and 76.60%; 4B: 70 and 82.60%; 5B: 50 and 77.20%; and 6B: 60 and 82.14%. A significant difference was found when these strategies were compared. **Conclusion:** New strategy and protocol for evaluating the SRI were developed using the LPP test, considering each word of the sentence. When comparing the responses it was noticed that when considering each word in the sentence it is possible to scale, more detailed and less variability, the actual ability to recognize speech of each individual, the new strategy and protocol developed confirmed its applicability and suitability to assess Sentence Recognition Indexes in Quiet in individuals with hearing disorders in a specific listening condition.

Descritores

Audiologia
Audiometria da Fala
Percepção da Fala
Percepção Auditiva
Perda Auditiva

RESUMO

Objetivos: Apresentar e descrever uma nova estratégia e protocolo para obtenção do Índice Percentual de Reconhecimento de Sentenças (IPRS), utilizando o teste Listas de Sentenças em Português, considerando palavras na análise das respostas; analisar e comparar os resultados usando a estratégia anterior e a nova, verificando sua aplicabilidade e adequação. **Métodos:** Para considerar cada palavra da sentença, estas foram classificadas de acordo com sua importância: palavras de conteúdo e funcionais, atribuindo-as, respectivamente, dois e um pontos. IPRS foram obtidos em 33 adultos normo-ouvintes e os resultados foram comparados utilizando as duas estratégias. **Resultados:** Foi construído novo protocolo. Cada ponto correspondeu à seguinte porcentagem, em cada lista: 1B, 1,11%; 2B, 1,13%; 3B, 1,17%; 4B, 1,16%; 5B, 1,20% e 6B, 1,11%. As medianas dos IPRS obtidas através das estratégias usual e nova foram, respectivamente, para a lista 1B: 60 e 82,57%; 2B: 70 e 80,79%; 3B: 50 e 76,60%; 4B: 70 e 82,60%, 5B: 50 e 77,20%, 6B: 60 e 82,14%. Ao comparar as estratégias, foi encontrada diferença significante. **Conclusão:** Nova estratégia e protocolo de avaliação do IPRS foram desenvolvidos, utilizando o teste Listas de Sentenças em Português, considerando cada palavra da frase. Ao comparar as respostas, foi evidenciado que ao considerar cada palavra da frase é possível dimensionar, de forma mais detalhada e com menos variabilidade, a real capacidade de reconhecer a fala de cada indivíduo. A nova estratégia e o protocolo desenvolvidos confirmaram sua aplicabilidade e adequação para avaliar o IPRS dos indivíduos com distúrbios de audição, em uma condição de escuta específica.

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INTRODUCTION

Audiometry with speech stimuli is a tool that allows the audiologist to confirm pure tone thresholds and provides important information about the conditions of each individual when facing communication situations.

The use of speech tests in clinical practice has been a well-established practice since the 19th century. These tests can be applied by different strategies and materials, such as syllables, words, and sentences without meaning, along with the usual mono-, di-, tri-, and polysyllabic words[1-3].

With speech stimuli, sensitivity and acuity measures can be obtained. Sensitivity measures are research thresholds, often called speech reception threshold (SRT) and voice detection threshold, whereas the acuity measures are suprathresholds, often called Percentage Speech Recognition Index (SRI). With the threshold measures, the psychometric point at which a certain percentage of correct recognition happens is defined, usually 50%[1] at hearing level (dBHL), whereas SRI identifies the percentage of maximum recognition possible[3], and so one can get two fundamental points of the “logoaudiometric curve”.

Among materials cited, the use of sentences in hearing evaluation has not been widespread in clinical practice yet, although there are numerous literature quotes addressing their importance[1,4]. These authors suggested wider use of sentences because sentences provide a more realistic condition compared to that of daily communication, which reinforces their importance and encourages their use in day-to-day practice.

However, when using sentences in evaluation of an individual, the way the results of both thresholds and indexes are interpreted becomes more complex because, unlike when words are used, it is difficult to determine whether the responses are result of the overall perception of a sentence or only some keywords that function as clues to the recognition of the whole sentence[1].

Thus, sentences are usually used in audiological evaluation with objectives other than those of the basic audiological assessment, noting that it is often used in individuals with very clear complaints of hearing disorders or in patients who have hearing loss confirmed and will start the speech therapy process. Therefore, the strategy is chosen to display and quantify its difficulty so that after the intervention chosen for each case (usually fitting or rehabilitation therapy) the benefit to patient can be verified in the same test condition.

With this in mind, in the case of SRI, the recognition of the entire sentence would be considered a response; so, would the individuals not recognize one word or all words in the sentence, they would still score 10% error or hit, resulting in a more fundamental analysis of what the individual is able to recognize in a conversation. Therefore, by considering it the result of total sentence perception, the individuals’ performance was believed not to be adequately quantified, as the other words he or she understood correctly would not be considered[5-8].

For example, in a sentence with five or six words, if the patient could not recognize any word, or had he or she not been able to recognize only one word, it would still be considered a 10% error. However, in the analysis of hearing conditions of this patient, considering all words makes a difference because when the person is not able to recognize the whole sentence or only one word in it, these represent different conditions and indicate more accurately the capacity of communication of this individual in a daily communication situation.

Considering the above with respect to assessment of individuals with complaint of hearing disorders and following the lead of studies being conducted on different forms of application, using sentences as a study tool[9], in the search for more appropriate strategies to each objective and population, this research aimed to present and describe a new strategy and protocol for SRI to be applied to individuals with hearing disorders, using the Lists of Phrases in Portuguese test (LPP), in which all the words are considered for the analysis of responses; to obtain SRI in normal hearing individuals, to analyze and compare the results using the old and the new strategies, and to verify their applicability and suitability.

METHOD

This study was conducted at *Núcleo de Seleção e Adaptação de Próteses Auditivas (NUSEAPA) do Serviço de Atendimento Fonoaudiológico (SAF)*, from a higher education institution. It was approved by the Research Ethics Committee and is part of the project entitled “Recognition of sentences with different speech speeds”, registered in the Projects Office of the Health Sciences Center from the University, under no. 029,457.

Characterization of the original instrument

The material giving rise to the new proposal is the LPP test[10], consisting of a list of 25 sentences and 7 other lists with 10 sentences and a noise with speech spectrum.

The sentences of the test had the following characteristics: short, familiar, and easily repeated; content appropriate for adults; representations of daily life conversations, without slangs or idioms, avoiding stereotyped or automated structures; low levels of abstraction; affirmative sentences, with simple clauses formed by up to seven words; no proper nouns; group of sentences phonetically balanced to reflect distribution of sound groups and syllabic types of the spoken language[11].

All the sentences are different, but the lists are similar as to the phonetic content and the structure of sentences, so there can be equivalence in performance from one individual to another as to different lists[9,12]. Studies have also shown variability and reliability[13,14].

Research of Sentence Recognition Index

Old strategy

The strategy previously used to study SRI was to set the intensity of the presentation speech[5-8,10,15-20] and present, at the same intensity, all sentences from a list, considering as correct answer, all sentences repeated correctly and as incorrect answer, a whole word or phrase incorrectly repeated[16]. Thus, each error or score corresponded to 10%, respectively, for each list is composed of 10 sentences.

Presentation of the new strategy proposal

The form previously presented was believed not to adequately quantify patient's performance, so a study was initiated on the most appropriate way to assess sentence recognition considering each word presented.

To do so, based on the literature, the classification of words was used as a criterion: content and functional. Content words have lexical meaning; play a fundamental role; semantic information transmission; and are divided into nouns, adjectives, verbs, adverbs, and numerals[21].

In turn, function words have only grammatical meaning[21], serving as phrasal connection elements, with low semantic load when isolated[22,23]: articles, prepositions, conjunctions, pronouns, and interjections.

Then, we chose to punctuate the words of each list according to their importance for the understanding of the whole message. To each function word, one point was assigned and to every content word, two points. Greater weight was attributed to content words, for they provide the message with more meaning.

However, a further adjustment was needed because even the lists having shown equivalent results[12] and phrases having similar phonetics[9] are composed of different numbers of words in each sentence, ranging from four to seven words, besides the variation in number of content and function words.

Each list had a number of points ranging from 83 to 90, which required adjustment of score by converting it to percentage to obtain equivalent values per list and to compare the results obtained from different lists. Then, for each list, a percentage value corresponding to each point in the list was calculated.

For example, in the case of a list that scored 90 points, we divided the 100% value by 90 points to reach the percentage for each point, resulting in 1.11% per point in the list.

After performing the calculation for each list, a protocol with all data was organized and is herein presented in the Results section.

Application and analysis of the new strategy proposal

The new protocol was applied in adults assisted at the audiology service of the institution, after being invited to participate in this survey by personal contact. By agreeing with the procedures required by the research, subjects signed the informed consent and were clarified as to the purpose and procedures of the study, as well as about data and informants confidentiality.

Subjects inclusion criteria were the following: older than 18 years old; at least complete high school, monolingual, speakers of Brazilian Portuguese; normal audiometric thresholds; absence of neurological, psychological, and apparent oral or cognitive anatomic changes that could interfere in verbal fluency and articulatory precision; absence of cerumen or other alterations to the external auditory canal; and ability to change the test answers.

Before evaluations, an interview was conducted to collect personal data, information about hearing complaints, ear problems, daily life habits, occupation, and educational level of the subjects of the sample.

Then, subjects underwent a basic audiological assessment, with visual inspection of the external auditory canal, pure-tone air-conduction audiometry at 250 to 8,000 Hz and bone conduction at 500 to 4,000 Hz, research of SRT and SRI. These evaluations were performed using a two-channel digital audiometer (model Affinity AC440; Interacoustics), and earphones (TDH-39P; Telephonics).

Proceeding with the audiological assessment, the LPP test was applied[10]. The lists of sentences were presented using a CD player (model 4149; Toshiba), coupled to the audiometer. The test was presented to subjects by earphone, in the ear corresponding to their hemispheric laterality.

Before the test application itself, training was conducted using the 7B list to familiarize the subjects with the test. Then, the first measurement obtained was the sentence recognition threshold in quiet (SRTQ), intensity necessary for the individual to recognize around 50% of the stimuli presented using the 1A list.

The technique for sentence presentation in SRTQ was based on the strategy called sequential, adaptive, or ascending-descending[24]. When patients answered the sentence correctly, the intensity of presentation of the next stimulus would decrease. When the answer was incorrect, the intensity of stimulus presentation would increase. Answers were only considered correct when the individual would repeat the whole sentence presented, without any error or omission.

The intervals used until the first change in the type of response, that is, when the subject did not answer correctly a sentence, were of 4 dB; later on the intervals of stimuli were 2 dB until the end of the list. Mean of values was calculated from the level of presentation with the first change in type of response to the value of presentation of the last sentence in the list.

Thus, after calculating the intensity found in SRTQ for each individual, it was maintained fixed[20], and the Sentence Recognition Indexes in Quiet (SRIQ) were then obtained using the lists 1B, 2B, 3B, 4B, 5B, and 6B.

To justify the strategy described, it is important to note that the objective of obtaining the SRIQ in this study was not the same as the SRI for monosyllabic words, used in basic audiological assessment, "indicating the percentage of correct answers in a specific speech material at an intensity that allows the best possible performance of a particular individual". In this case, the aim was not to find the level at which the person has the best performance, but evaluating SRI in a particular hearing condition that could reproduce the difficulties reported by the patient so, after the intervention, the same hearing condition could be used and the result checked, in percentage, precisely dimensioning the effect of the intervention on their communication.

During test application, individuals' responses were recorded in a protocol that allowed analysis of indexes considering the two forms mentioned: any errors or omissions in the repetition of the whole sentence being considered whole sentence error (method used for index score so far); and only word(s) omitted or repeated incorrectly being considered errors (new method proposed in this study). Thus, for each list two indexes were calculated.

After indexes calculation regarding the two forms described, the descriptive and statistical analyses were performed, being reported data non-normality by the Shapiro-Wilk test. Then, test results were compared using the Mann–Whitney test for independent groups.

RESULTS

We evaluated 33 subjects, 22 men and 11 women, with a mean age of 29.21 years (ranging from 19 to 48 years).

Initially, Chart 1 shows the distribution of words in the lists, according to classification of content or function words, and respective scores and percentages.

Figure 1 presents the protocol developed for the application of SRI by words.

Table 1 shows means and medians of scores by sentence and word of each list, along with the coefficients of variation and the comparative analysis between both ways of calculating SRI, based on the evaluation of individuals.

DISCUSSION

Development of new protocol

The use of sentences to evaluate individuals with hearing disorders has become increasingly important because it provides a more realistic condition of everyday communication. However, results interpretation becomes more complex, for the performance can be measured in different ways. As mentioned before, it is difficult to determine whether individuals' responses are a result of the overall perception of the sentence or if only perception of keywords contribute to its full recognition.

The literature reports different ways of interpreting individuals' performance in relation to speech recognition indexes(5-8,15-19,25,26). The LPP had been applied with the strategy that considered as correct answer only the full recognition of a sentence(20,27). However, this form of analysis is believed to have failed to consider important information when the individual was not able to recognize only one word in the sentence(4).

Several attempts were made before adopting this strategy, such as grouping of words or even disregard of function words. However, as each word has a specific function in a sentence, they were quantified separately, with different score weights. Thus, based on the literature, we came to the conclusion that function words, usually with less phonetic information (because they are shorter), and fewer in the language (for articles, prepositions, conjunctions, pronouns, and interjections are limited in Portuguese), only with syntactic function, were more easily recognized when compared to content words, which are more variable and unpredictable in the language(28).

The idea of considering all words in sentences, therefore, seemed to be a more accurate way to identify patients' difficulties or abilities. Assigning different score values to words, based on the importance of each of them in sentences, also classifying them as content and function words, is believed to be an appropriate way to represent the rate of correct answers or errors corresponding to actual hearing conditions of each subject without ignoring any information.

It was assumed that information processing occurs in parallel (not in series), that is, the perception of the sentence occurs as a whole, but the subject relies on its composing parts for full understanding. One can therefore phonetically identify a word while building the syntactic structure(29).

Chart 1. Distribution of content and function words, total scores, and percentages in each list

List	Number of content words	Number of function words	Total score	Percentage per point
1B	37	16	90	1.11
2B	37	14	88	1.13
3B	35	15	85	1.17
4B	35	16	86	1.16
5B	34	15	83	1.20
6B	35	20	90	1.11

Finally, we also found that, although we have lists of equivalent sentences, they are all different. The resulting scores of function and content words were therefore different, and the number of points scored in different lists ranged from 83 points in the shorter list to 90 points on the longest, as presented in Chart 1.

Thus, it was necessary to calculate the corresponding percentages of each word in each list. The percentage of each score point was 1.20 and 1.11%, respectively, as to the lists mentioned. This strategy allowed, with the sum of the percentages per score point of each list, to reach 100% per list, so the comparison of results between lists was made possible.

Application of new proposal

When applying SRI, based on data shown in Table 1, which were obtained from normal hearing individuals and calculated using both the strategies described, we could verify that both the mean and the median values found in scores per word were always higher than those found in scores per sentences in all lists, with significant differences between them.

On the basis of our findings, we can infer that the new strategy of answer analysis may identify more accurately the ability of subjects to recognize sentences, and it provides more information about their difficulties.

In turn, the strategy of score per sentence failed to consider important words recognized by the individual because when the patient would miss only one word, the rest of the sentence would be disregarded, often overestimating errors. Missing a word or the whole sentence, therefore, resulted in the same percentage error, that is, 10%, for each sentence list composed of 10 sentences. These results suggest that considering only errors rather than the whole sentence leads us to specifically identify the patient's ability to recognize parts of a sentence, making it possible to project their ability to understand speech in real situations more accurately.

It shows that in scoring per words, one can obtain more detailed information about the hearing conditions of a subject, also gathering important data for the planning of strategies to be adopted with each patient based on audiological evaluation.

Coefficients of variation were also important findings, ranging less in word scores, which suggests that such answers

Nome:____

Data de nascimento:___/___/_____ Idade:____a Examinador:______________________

LISTA 1B	Data:	SP ( ) CP ( )
Medida:	Velocidade:	CL ( ) Fone ( )
Intensidade: Fala: dB	Ruído: dB	
1. O avião já está atrasado.	1 2 1 2 2	( )
2. O preço da roupa não subiu.	1 2 1 2 2 2	( )
3. O jantar da sua mãe estava bom.	1 2 1 1 2 2 2	( )
4. Esqueci de ir ao banco.	2 1 2 1 2	( )
5. Ganhei um carro azul lindo.	2 2 2 2 2	( )
6. Ela não está com muita pressa.	1 2 2 1 2 2	( )
7. Avisei seu filho agora.	2 1 2 2	( )
8. Tem que esperar na fila.	2 1 2 1 2	( )
9. Elas foram almoçar mais tarde.	1 2 2 2 2	( )
10. Não pude chegar na hora.	2 2 2 1 2	( )
90 PONTOS	1 PONTO = 1,11 %	RESULTADO = %

LISTA 2B	Data:	SP ( ) CP ( )
Medida:	Velocidade:	CL ( ) Fone ( )
Intensidade: Fala: dB	Ruído: dB	
1. Acabei de passar um cafezinho.	2 1 2 2 2	( )
2. A bolsa está dentro do carro.	1 2 2 2 1 2	( )
3. Hoje não é meu dia de folga.	2 2 2 1 2 1 2	( )
4. Encontrei seu irmão na rua.	2 1 2 1 2	( )
5. Elas viajaram de avião.	1 2 1 2	( )
6. Seu trabalho estará pronto amanhã.	1 2 2 2 2	( )
7. Ainda não está na hora.	2 2 2 1 2	( )
8. Parece que agora vai chover.	2 1 2 2 2	( )
9. Esqueci de comprar os pães.	2 1 2 1 2	( )
10. Ouvi uma música linda.	2 2 2 2	( )
88 PONTOS	1 PONTO = 1,13 %	RESULTADO = %

LISTA 3B	Data:	SP ( ) CP ( )
Medida:	Velocidade:	CL ( ) Fone ( )
Intensidade: Fala: dB	Ruído: dB	
1. Ela acabou de bater o carro.	1 2 1 2 1 2	( )
2. É perigoso andar nessa rua.	2 2 2 1 2	( )
3. Não posso dizer nada.	2 2 2 2	( )
4. A chuva foi muito forte.	1 2 2 2 2	( )
5. Os preços subiram na segunda.	1 2 2 1 2	( )
6. Esqueci de levar a bolsa.	2 1 2 1 2	( )
7. Os pães estavam quentes.	1 2 2 2	( )
8. Elas já alugaram uma casa na praia.	1 2 2 2 2 1 2	( )
9. Meu irmão viajou de manhã.	1 2 2 1 2	( )
10. Não encontrei meu filho.	2 2 1 2	( )
85 PONTOS	1 PONTO = 1,17 %	RESULTADO = %

LISTA 4B	Data:	SP ( ) CP ( )
Medida:	Velocidade:	CL ( ) Fone ( )
Intensidade: Fala: dB	Ruído: dB	
1. Sua mãe pôs o carro na garagem.	1 2 2 1 2 1 2	( )
2. O aluno quer assistir o filme.	1 2 2 2 1 2	( )
3. Ainda não pensei no que fazer.	2 2 2 1 1 2	( )
4. Essa estrada é perigosa.	1 2 2 2	( )
5. Não paguei a conta do bar.	2 2 1 2 1 2	( )
6. Meu filho está ouvindo música.	1 2 2 2 2	( )
7. A chuva inundou a rua.	1 2 2 1 2	( )
8. Amanhã não posso almoçar.	2 2 2 2	( )
9. Ela viaja em dezembro.	1 2 1 2	( )
10. Você teve muita sorte.	1 2 2 2	( )
86 PONTOS	1 PONTO = 1,16 %	RESULTADO = %

LISTA 5B	Data:	SP ( ) CP ( )
Medida:	Velocidade:	CL ( ) Fone ( )
Intensidade: Fala: dB	Ruído: dB	
1. Depois a gente conversa.	2 1 2 2	( )
2. Ela acabou de servir o almoço.	1 2 1 2 1 2	( )
3. Esta carta chegou ontem.	1 2 2 2	( )
4. Preciso terminar o meu trabalho.	2 2 1 1 2	( )
5. Não posso esquecer da mala.	2 2 2 1 2	( )
6. A rua estava muito escura.	1 2 2 2 2	( )
7. A data do exame foi adiada.	1 2 1 2 2 2	( )
8. Elas alugaram um carro no verão.	1 2 2 2 1 2	( )
9. Minha viagem foi ótima.	1 2 2 2	( )
10. Eles foram comprar pães.	1 2 2 2	( )
83 PONTOS	1 PONTO = 1,20 %	RESULTADO = %

LISTA 6B	Data:	SP ( ) CP ( )
Medida:	Velocidade:	CL ( ) Fone ( )
Intensidade: Fala: dB	Ruído: dB	
1. Vou viajar as nove da manhã.	2 2 1 2 1 2	( )
2. Meu irmão bateu o carro ontem.	1 2 2 1 2 2	( )
3. Prometi a ele não contar o segredo.	2 1 1 2 2 1 2	( )
4. Cheguei atrasada na aula.	2 2 1 2	( )
5. Esta rua é perigosa.	1 2 1 2	( )
6. Esqueci da bolsa na sua mesa.	2 1 2 1 1 2	( )
7. Ela comprou os últimos pães.	1 2 1 2 2	( )
8. A casa de campo já foi alugada.	1 2 1 2 2 2 2	( )
9. Os preços não devem subir.	1 2 2 2 2	( )
10. Não falei com sua filha.	2 2 1 1 2	( )
90 PONTOS	1 PONTO = 1,11 %	RESULTADO = %

Figure 1. Protocol developed for application of Sentence Recognition Index and analysis per word

Table 1. Mean and median values, coefficients of variation, and comparative analysis of scores of percentage rates for sentence recognition by sentence and by word of each list

List	Sentence or word	Mean (%)	Median (%)	Coefficients of variation	p-value
1B	S	56.97	60.00	31.49	0.000001*
	W	81.48	82.57	23.05	
2B	S	61.82	70.00	35.59	0.002120*
	W	78.84	80.79	16.93	
3B	S	48.18	50.00	39.33	0.000001*
	W	75.27	76.60	17.00	
4B	S	66.06	70.00	25.35	0.000338*
	W	80.43	82.60	14.43	
5B	S	53.64	50.00	49.07	0.000147*
	W	75.69	77.20	20.81	
6B	S	57.88	60.00	36.33	0.000010*
	W	78.77	82.14	17.51	

*Significant ($p \leq 0.05$)

Caption: S = analysis per sentence (old strategy); W = analysis per word (new proposal)

may be more reliable, as the variability is used to compare the accuracy in different experiments. In this case, the coefficient of variation was lower in the analysis by word, which shows a more uniform performance of subjects.

The literature reports that the strategy of score calculation in tests using sentences is not standardized, once it is possible to determine the subjects' answers by considering the whole sentence repeated correctly[16,18,19], one target-word[25], groups of keywords[15,16,30], or by computing each word composing the sentence[5-8,18]. As there is no consensus on the best strategy to calculate scores, it could be good to keep a written copy of the subjects' answers to develop a new score protocol, once the answers could be analyzed by different strategies and the errors of each subject could be verified[4].

The analysis strategy may provide important information when the purpose is to assess subjects using hearing aids, changes in processing, before or after therapeutic intervention, because when he or she omits or mistakes a word, one can consider that he or she lost only a piece of information, not the whole context. For example, if the subject hears the sentence "Your mother put the car in the garage" and mistakes or omits the word "garage," one will not consider that he or she recognized the subject of the sentence and its action, but could not identify the last word, if the whole sentence is considered incorrect.

It is believed that through with new proposal, we could have a more detailed analysis of what the individual was able to recognize. There are better ways of getting data that are closer to the patient' actual hearing conditions because the fact that the individual did not repeat the whole sentence correctly does not mean he or she was not able to understand the whole message, but only a part it. However, based on syntactic contextual information, he or she is able to rescue the sense of speech, as the parallel processing model postulates[29].

CONCLUSIONS

On the basis of our study, we concluded that:

- A new strategy and protocol for SRI evaluation were developed using the LPP test, which considers each word of the sentence.
- When comparing responses of individuals with normal hearing using the old strategy and the new proposal, we found that by considering each word of the sentence it is possible to measure in more details and with less variability the actual ability of subjects to recognize speech in the test condition chosen.
- The new strategy and protocol confirmed their applicability and appropriateness to evaluate the SRI of individuals with hearing disorders, in a specific hearing condition.

**MJC, the author of the LPP test, conceived the new application method and performed results interpretations, discussion, and conclusions; SNS participated in the conception of the new application method, applied the test, performed statistical analysis, and helped in results interpretation, discussion, and conclusions; AHL applied the test and helped in discussion; CLM helped conceiving the new application method, held the theoretical background related to strategies used to score words, and helped in discussion and conclusions.*

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