LISTENING IN SPATIALIZED NOISE SENTENCES - LISN-S IN PORTUGUESE: PRELIMINARY RESULTS

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INTRODUCTION

The ability to understand speech in a noisy environment is directly related to the listener's ability to use binaural cues to differentiate the location of the sound source from the location of the noise[1].Therefore, to understand speech in a noisy environment it is necessary to focus on the voice of the person one wants to listen while simultaneously suppressing competitive sounds from different directions. This process is known as *Spatial Processing*[2]. The Listening in Spatialized Noise - Sentences (LISN-S) is a binaural interaction test, applied by a special computer software, via earphone, that produces a three-dimensional virtual auditory environment in order to evaluate the spatial processing in individuals with complaints related to the Auditory Processing Disorder[3].

OBJECTIVE

The purpose of this study is to develop a sentence database in Portuguese language to be used with the LINS-S software, including baseline normality criteria for the age group of 6 to 11. In addition to that, we will be analyzing the results obtained in normal children and will compare with those who have a history of otitis media in childhood.

METHODS

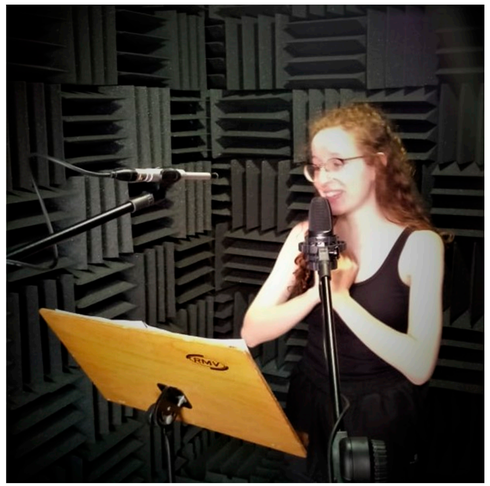
The project contains four stages:

- Develop speech material for the Portuguese-language database for LINS-S software (stage 1);
- Determine the relative intelligibility of the sentences to make adjustments in the recording and obtain equivalence of intelligibility between them (stage 2);
- Determine the normality criteria for the age group of 6 to 11 (stage 3);
- Compare the results between children without a history of otitis media and those who had the middle ear disease in childhood;

PROCEDURES

Stage 1

- 180 sentences were created by the researches and recorded by a female voice in an anechoic chamberusing an AKG C3000(actual recording) and a Behringer EMC8000 (level estimate) microphones, both connected through a RME MADIface Proaudio interface to a laptop computer equipped with Audacity.
- 3 children´s stories were also recorded by three female voices using the same setup.



Example of one of the female voice actor while recording inside the anechoic chamber. Note the AKG C3000 placed close to the voice actor and the Behringer EMC8000 placed at a distance, only to estimate the produced sound level

Control station showing a RME MADIface Pro audio interface connected to a laptop computer equipped with Audacity.

Stage 2

- The recorded sentences will be presented to 24 children aged 8 to 10 to test the relative intelligibility of the sentences;

Stage 3

- 72 children with typical development, between 6 to 11 years old, will be tested using the Portuguese version of the LISN-S software to determine the normality criteria;
- All children will be evaluated through audiological test, otoacoustic emissions and auditory brainstem response;

Stage 4

- 35 children with a history of otitis media from 6 to 11 years old will be tested using the Portuguese version of the LISN-S software

RESULTS

The stage 1 was completed and at this moment, we are selecting children from a Public School to compose the stage 2.

CONCLUSION

It is hoped that the results obtained in this research may provide support for understanding the functioning of central auditory nervous system structures involved in the binaural interaction tasks, from the cochlear nucleus to the auditory cortex in children with Portuguese as native language. Besides that, we hope to reveal the importance of studying the spatial processing, especially in children with complaints related to hearing difficulties in a noisy environment. Thus, the final target of this project is to contribute to the diagnosis and help planning rehabilitation in a more complete and efficient way.

REFERENCES

1.Moore BCJ. An Introduction to the Psychology of Hearing. San Diego: Academic Press. 1997.
2.Cameron S, Dillon H, Glyde H, Kanthan S, Kania A. Prevalence and remediation of spatial processing disorder (SPD) in Indigenous children in regional Australia. Int J Audiol. 2014; 1–10.
3.Cameron S, Dillon H, Newall P. Development and evaluation of the Listening In Spatialized Noise Test. EarHear. 2006; 27:30–42.