Noise Attenuation Measurements

1 Purpose

The purpose of this experience is to determine the SNR needed to understand speech in a noisy office environnement.

1.1 AAU num list

Item	Description	AAU-no.
¡¡¡¡¡¡ HEAD 1	4 Genelec speakers	TBD
2	1 pair of headset	TBD
3	Soundcard RME	TBD
4	Computer	NaN
¿¿¿¿¿¿¿ origin/master 5	Headphone amplifer	TBA

Table 1: Table over equipment used in test
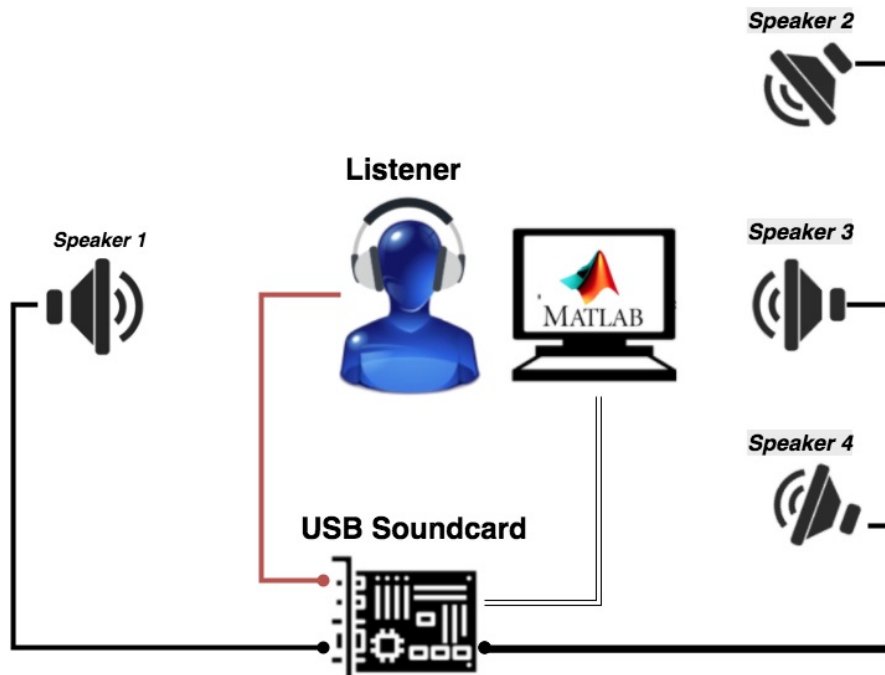
1.2 Diagram

Figure 1: Waveforms of voices and unvoices sounds

1.3 Settings/Description

Our setting aims at reproducing an office sound field. We choosed to reproduce the sound field with 4 speakers. The idea is to reproduce a real life situation in an office that's why speech and office background noise will be played on the speaker. The listener who stands in front of

speakers will also receive a speech sounds in the headset. This set up emulates a call in a noisy office.

The listener will have control over a matlab script that control the background noise. His role will be to find the noise ratio needed in order to: 1) fully understand the speech 2) not be disturbed by the noise (i.e confort ratio)

1.4 Picture

2 Procedure

1. We will play on the speakers office environnement sounds and speech.

2. The listener will put the headphones on.

3. We will play in the headphones the file "speech1"

4. The listener will then adjust the sound level on the speakers thank to a keyboard operating a matlab script. The listener will then stop adjusting the level when he reachs a level of "non disturbance"

5. The listener will then adjust the sound level on the speakers thank to a keyboard operating a matlab script. The listener will then stop adjusting the level when he reachs a level of "non disturbance" "Speech understanding"

6. We note the two attenuation levels for the given recording

7. We change the file being played in the headphone and repeat the experience from 3.

The test will be carried out at the following gain settings. Gain 1 corresponds to a SPL of LALA of the noice sources at the listeners position. (Calibrated at slider-gain 1)

Gain	Attenuation from max noise SPL [dB]
1	0
0.891	-1
0.794	-2
0.708	-3
0.631	-4
0.562	-5
0.501	-6
0.447	-7
0.398	-8
0.355	-9
0.316	-10
0.282	-11
0.251	-12
0.224	-13
0.200	-14
0.178	-15
0.158	-16
0.141	-17
0.126	-18
0.112	-19
0.100	-20
0.089	-21
0.079	-22
0.071	-23
0.063	-24
0.056	-25
0.050	-26
0.045	-27
0.040	-28
0.035	-29
0.032	-30
0.028	-31
0.025	-32
0.022	-33
0.020	-34
0.018	-35
0.016	-36
0.014	-37
0.013	-38
0.011	-39
0.001	-40

¿¿¿¿¿¿¿ origin/master

3   Data Extraction

Results will be extracted manualy from Matlab to excel in order to analyse it

4   Analysis

Compute statistics in Excel in order to find the overall attenuation needed by the system to be efficient.

5   Error Sources

- While our main error source might be human, we want to minimise the way we interact with him in order to not misslead him.

- Audio sample level mesurement.

6   Conclusion

Appendix A

For each test the following table will be filled

experiment number	Gain audiable wanted signal	Gain noise sources not disturbing
1		
2		
3		