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# Abnormal saliency in hearing impaired listeners with hearing aids

Armand Schwarz<sup>1,2</sup>, Paul Avan<sup>2</sup>, Emmanuel Ponsot<sup>1</sup>, Patrick Susini<sup>1</sup>

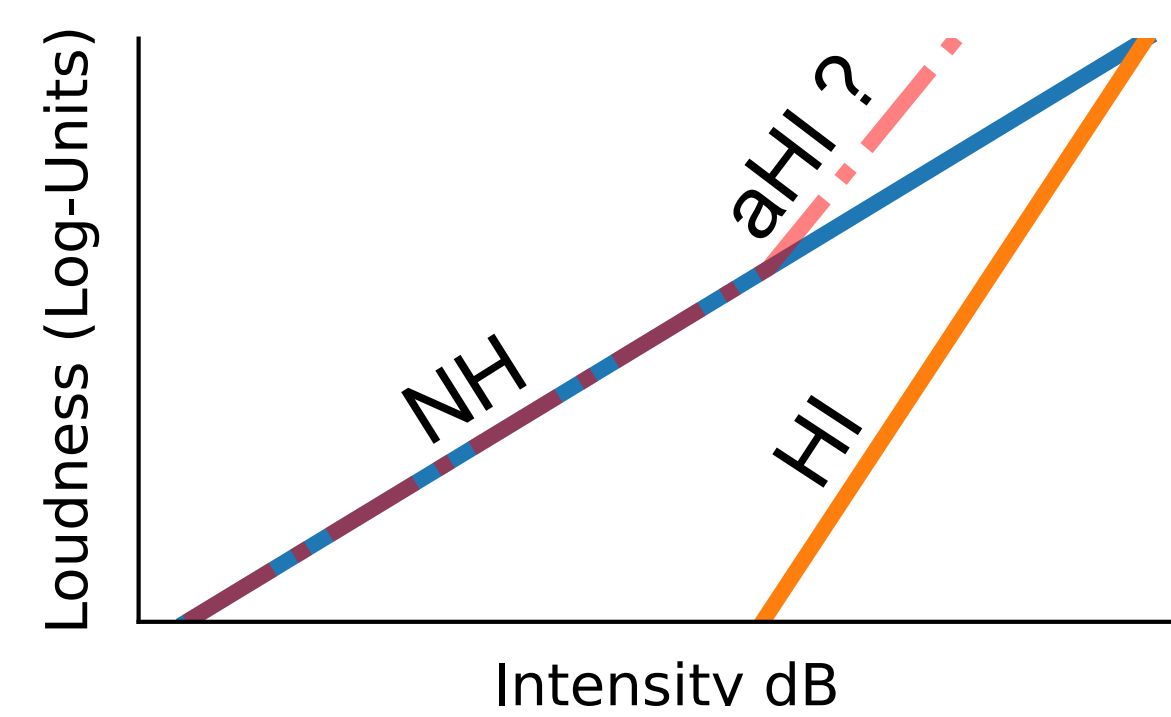
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## Introduction

- Saliency reflects the perceptual emergence of a sound in a complex acoustical scene and shapes attentional dynamics.
- Hearing impaired people with hearing aid 'often' complain about abnormal saliency in complex acoustical scenes. Why?

### 1 : loudness-driven problem ?

**Hypothesis:**  
loudness functions differ for complex sounds.



### 2 : timbre-driven problem ?

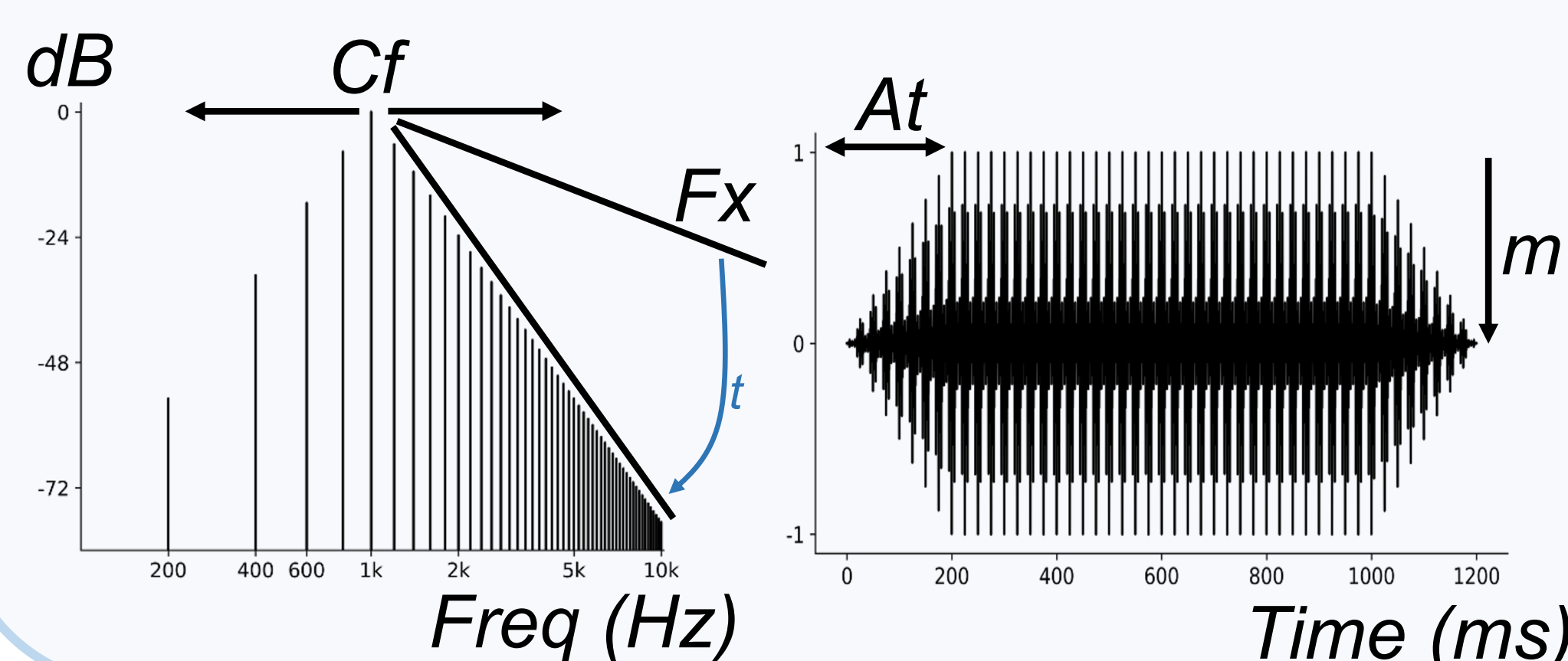
**Hypothesis:**  
The perceptual timbre space is distorted because of specific dimensions.



## Stimuli and Participants

Varies on 4 dimensions :

- Brightness (Cf)
- Roughness (m)
- Attack time (At)
- Spectral Flux (Fx)



14 complex sounds for exp1 + 1 control 1kHz pure ton  
20 complex sounds for exp2

DSL V5 settings

Hearing aid simulator

Hearing loss simulator

Symmetrical moderate presbycusis hearing loss (N3)

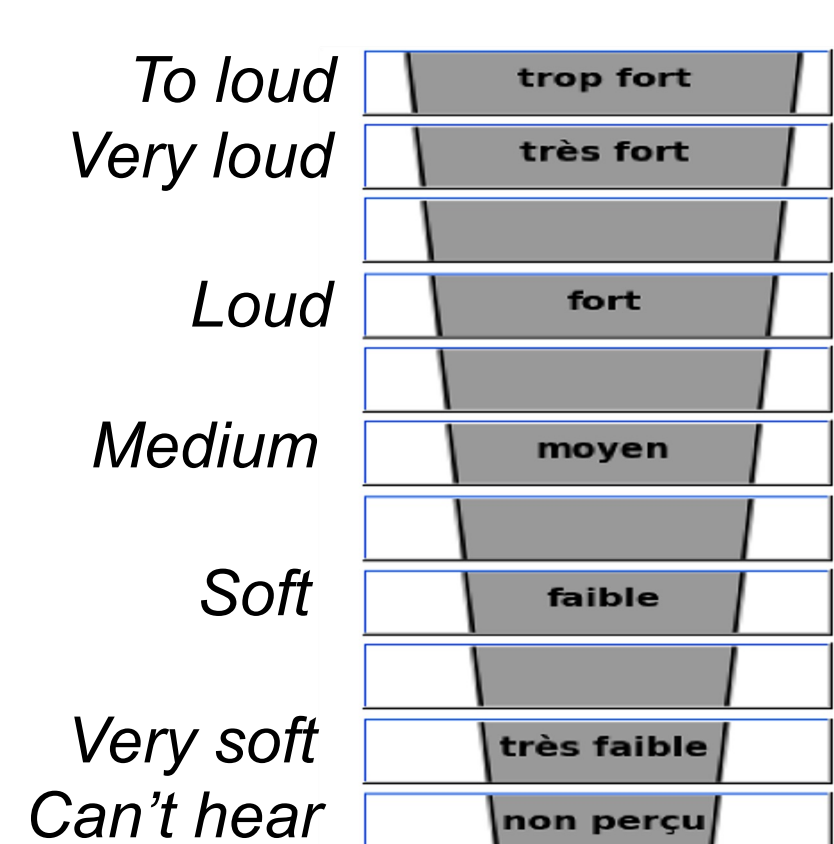
16 Normal-hearing (NH)

14 Simulated aided hearing impaired (aHI\*)

All Young and NH

## Methods

• Exp1 : Categorical Loudness Scaling.

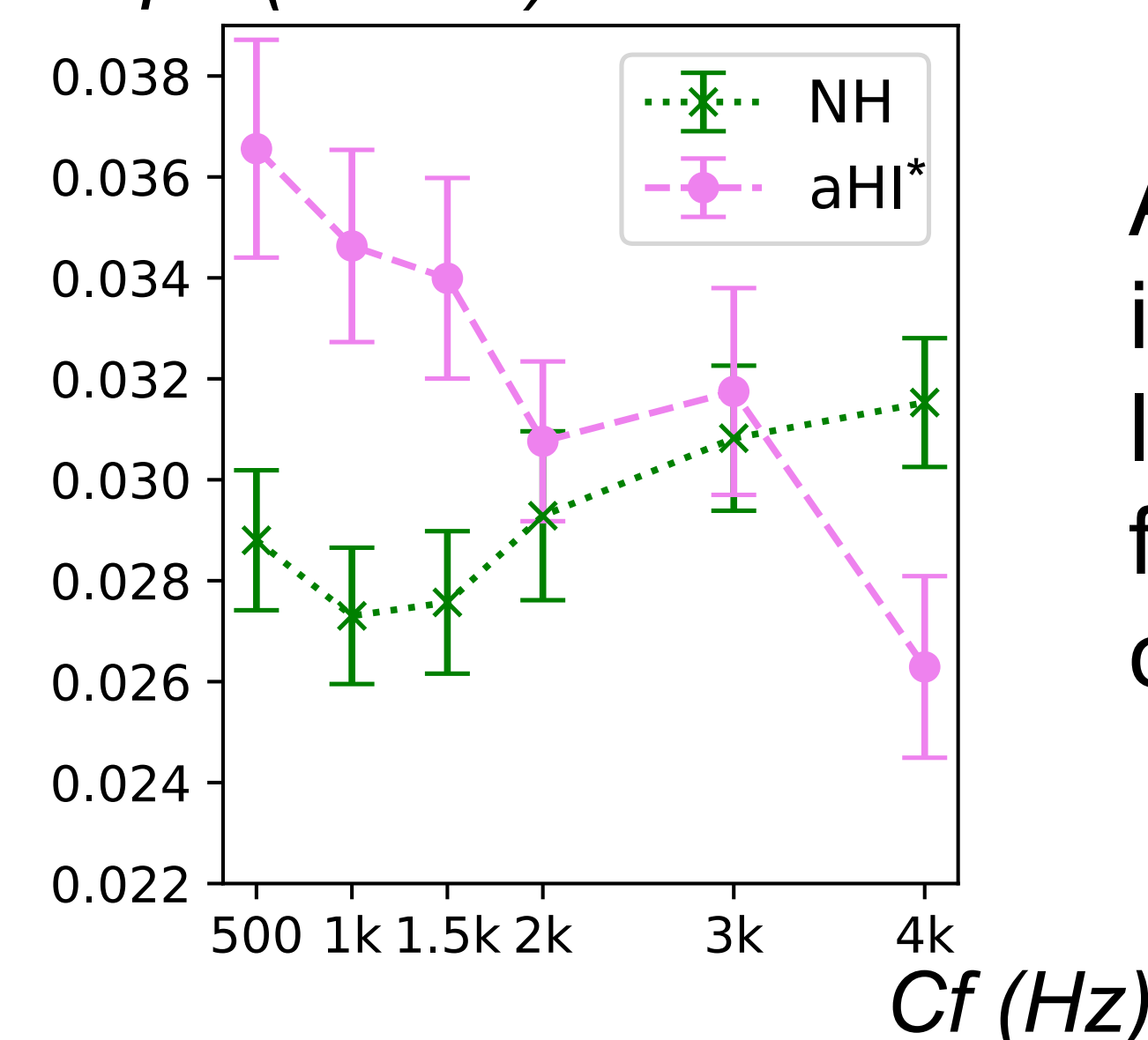


➡ Analysing the slope of the loudness functions.

## Results

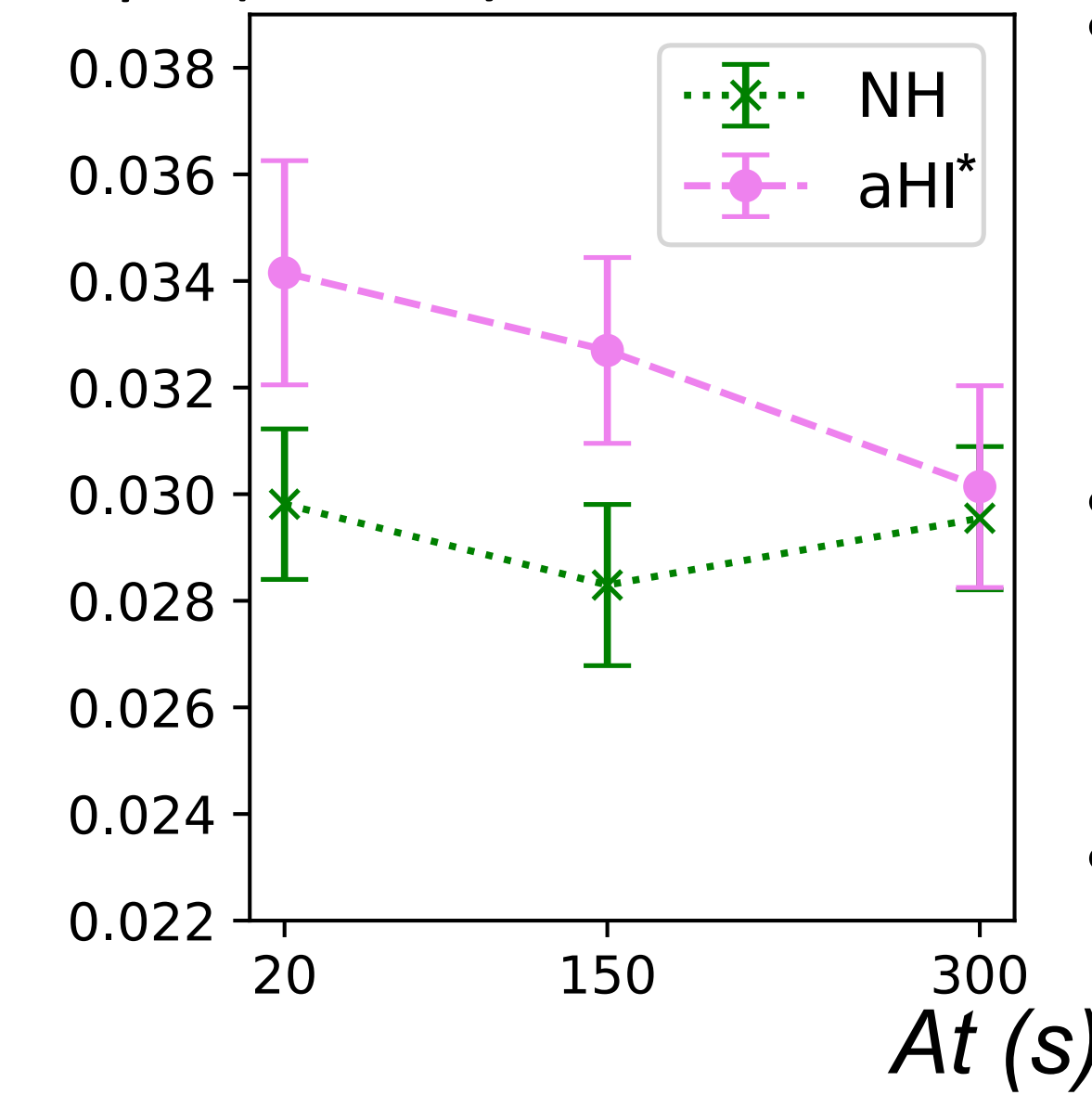
Brightness impacts in different ways the loudness functions' slope for both groups :

Mean slope (CU/db)



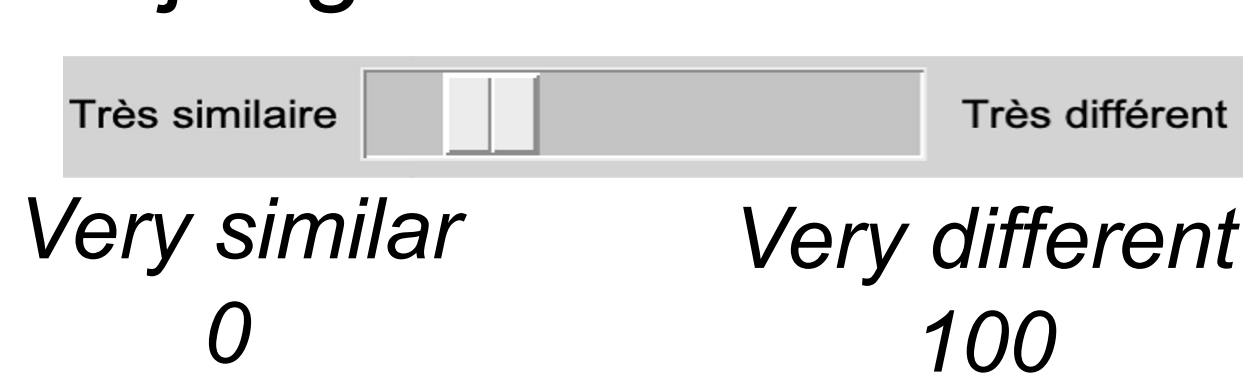
Attack time impacts the loudness functions' slope only in aHI\* :

Mean slope (CU/db)



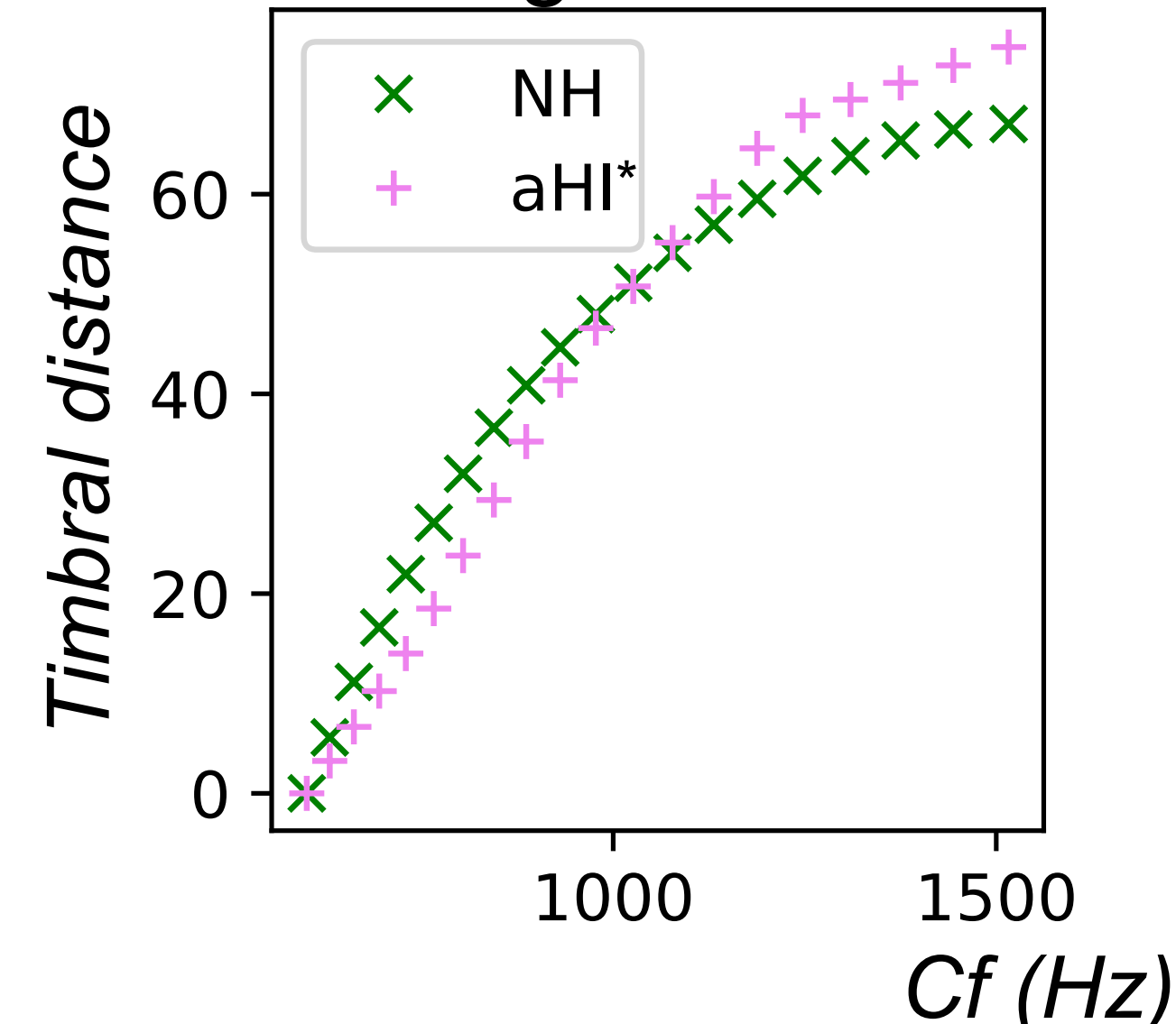
- No difference between both group for the 1kHz pure tone control sound
- No effect of the roughness
- Same effect on both groups of the spectral

• Exp2 : Dissemblance judgment.

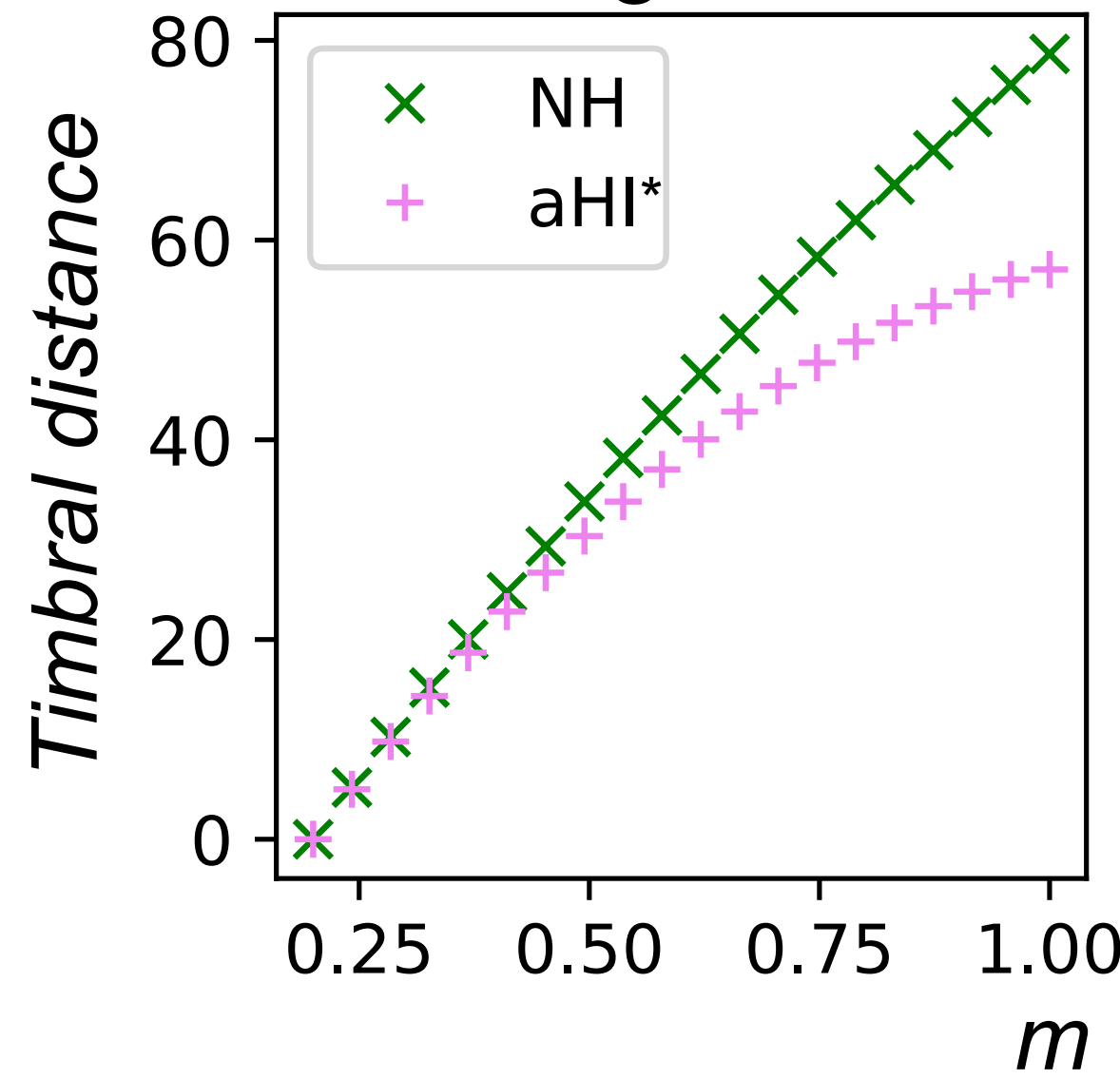


➡ Analysing with the Conscal method : Timbre psychophysical functions

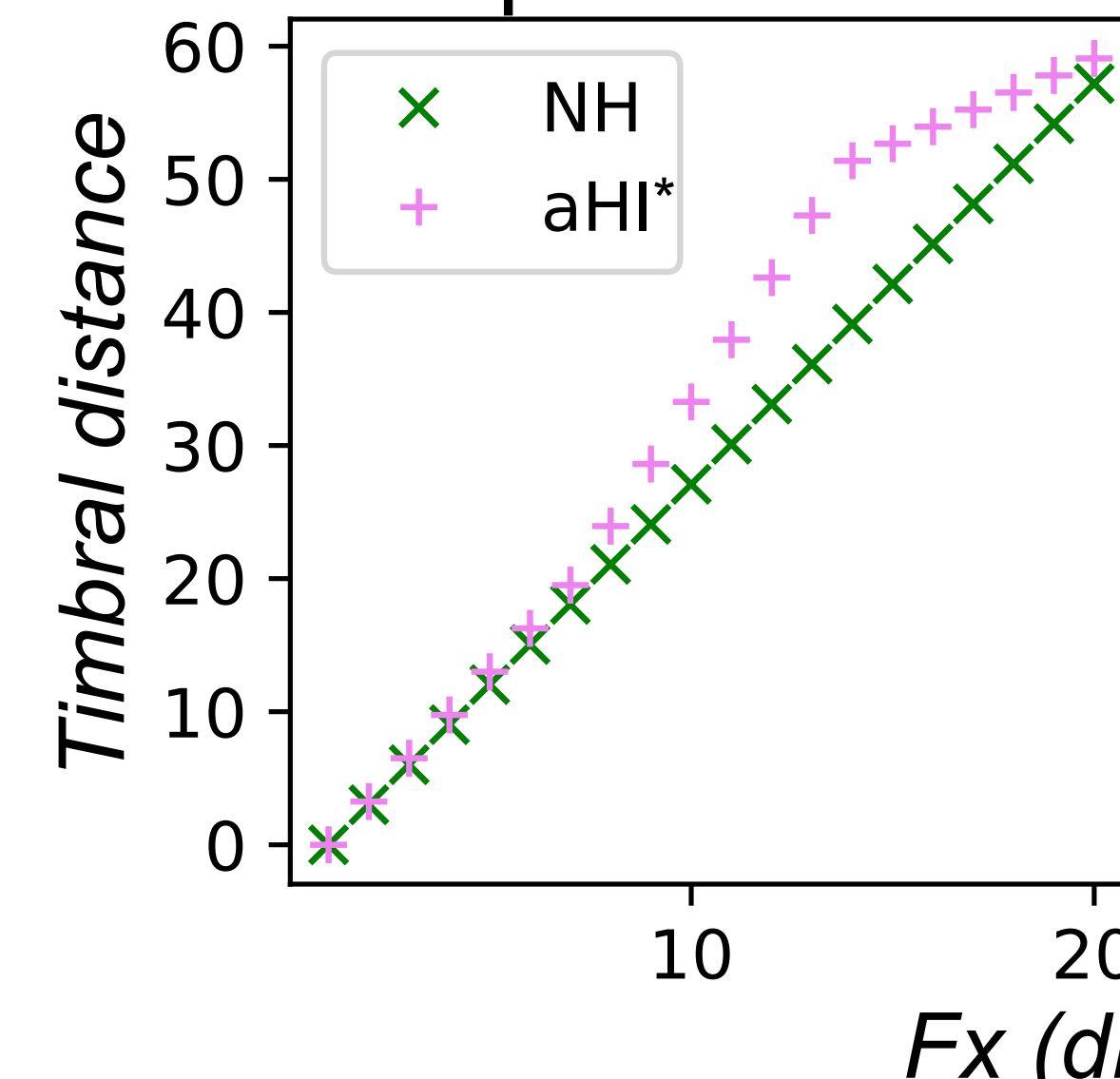
Brightness



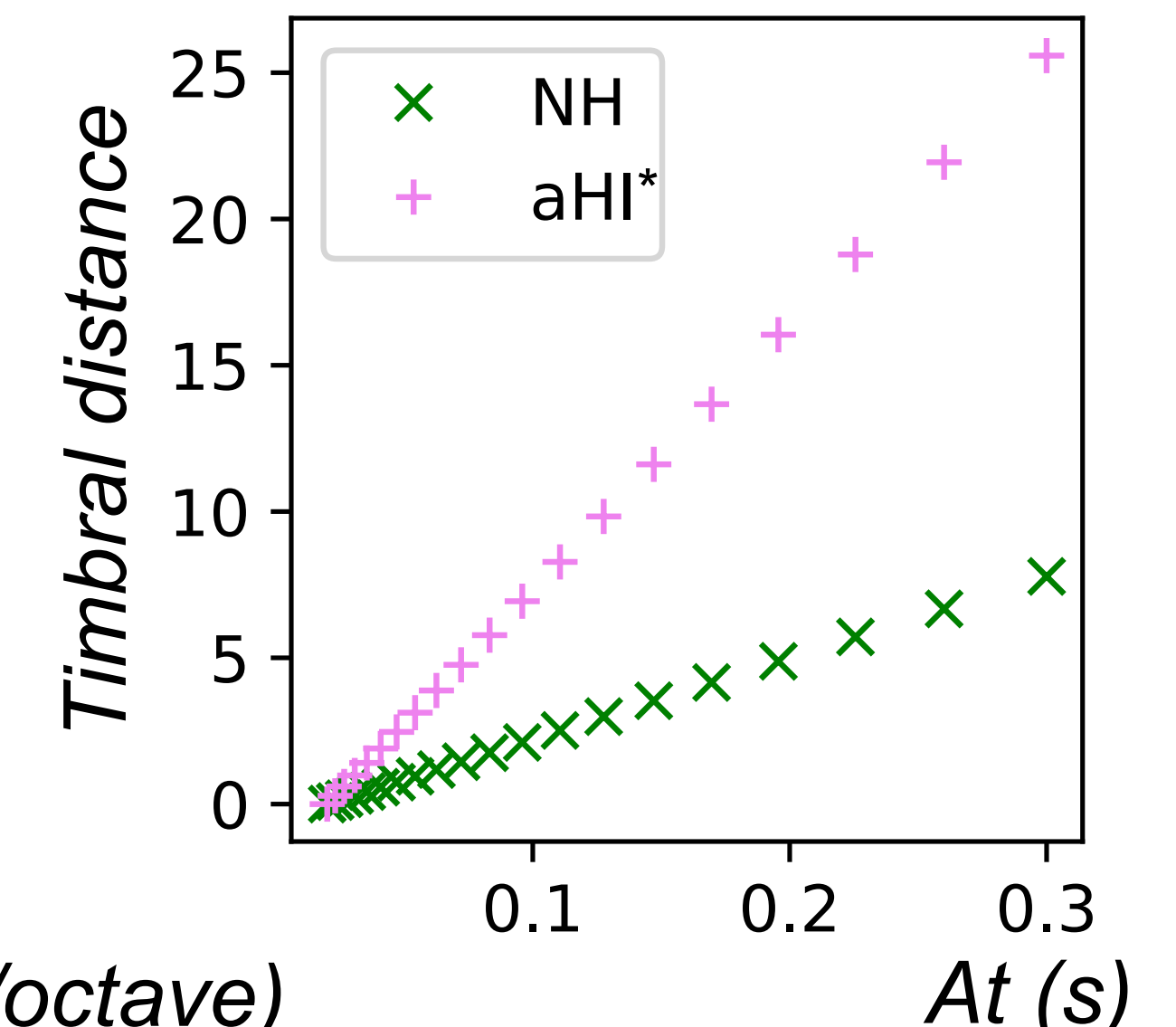
Roughness



Spectral flux



Attack time



## Discussion and Perspectives

- ➡ Attack time and brightness seem to have a different impact on the loudness function's slope on both groups.
- ➡ Timbre perception seems to be quite similar between aHI\* and NH except for the attack time and roughness perception.
- ➡ Next step :
  - Investigate real aHI.
  - Test the impact of the distortions found on the comprehension of a global complex auditory scene.

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