


# Understanding and Treating Severe & Profound Hearing Loss



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**oticon**  
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# Who Are These Patients?



**The Nature of  
Severe and  
Profound  
Sensorineural  
Hearing Loss**

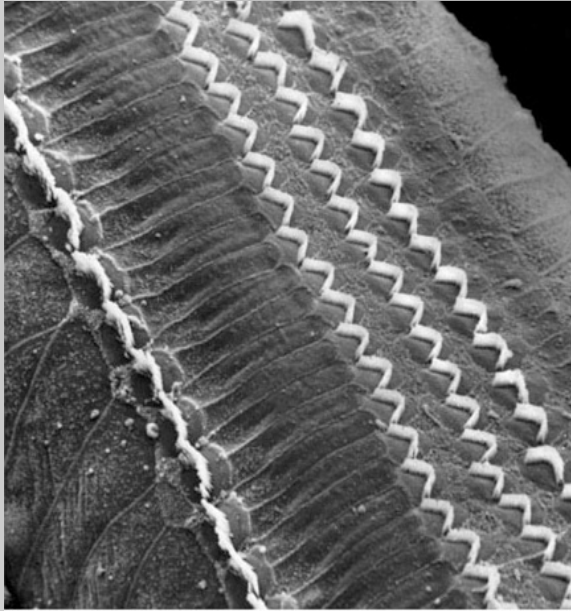
**What has changed in the peripheral auditory system?**

## Etiologies (incomplete list):

- **Congenital**
  - **Viral**
  - **Meningitis**
  - **Ototoxicity**
- **Sudden or Idiopathic**
- **Burned-out Meniere's**

# Physiological Changes

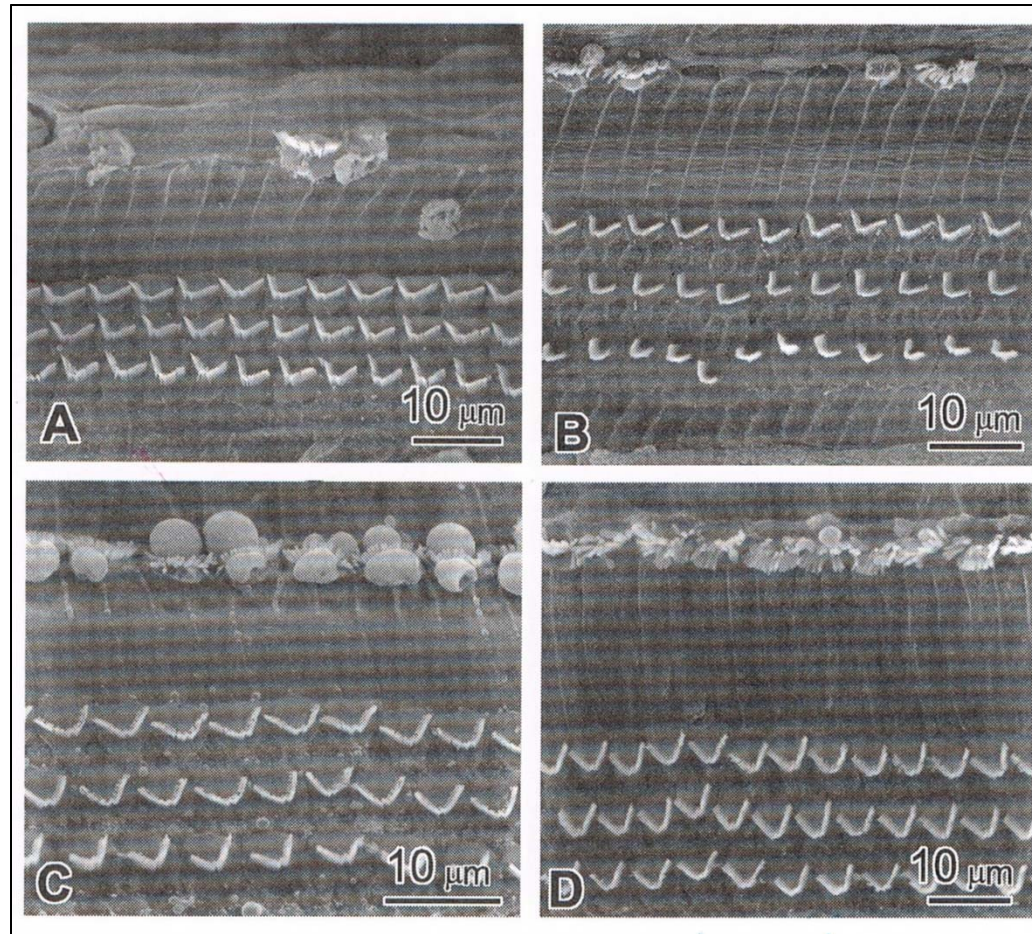
**Intact  
cochlea**



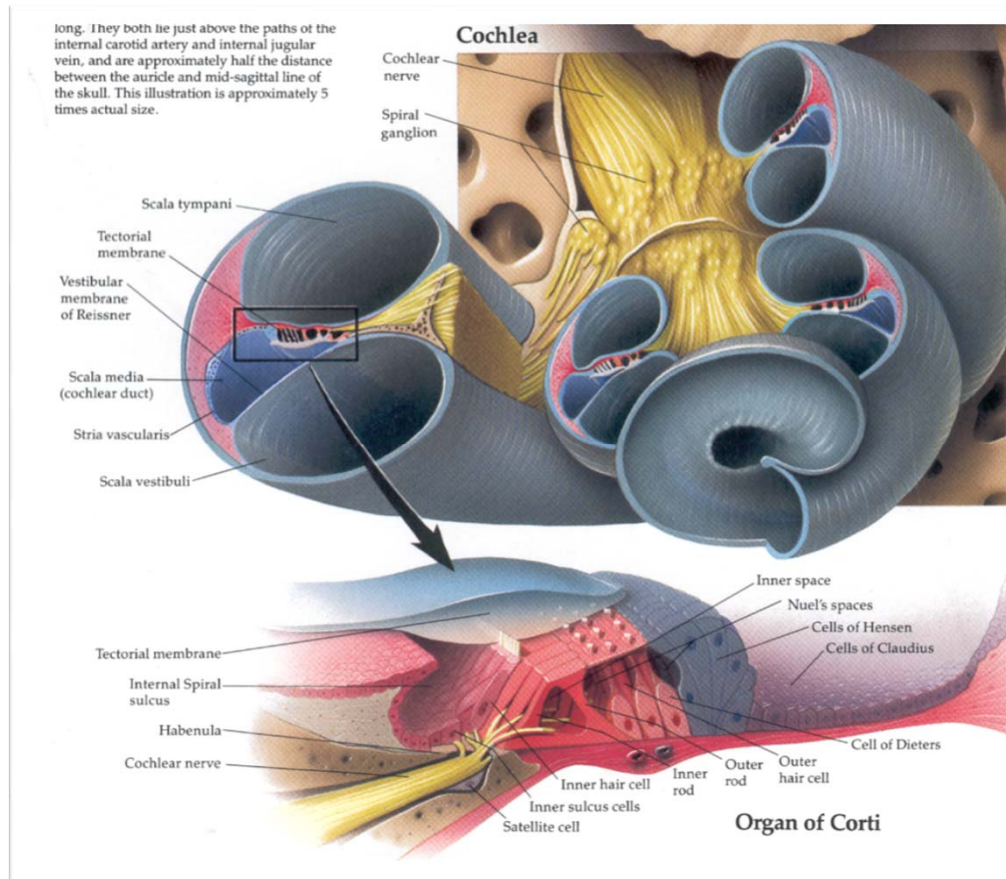
**Damaged  
cochlea**



Picture credit: House Ear Institute, Los Angeles



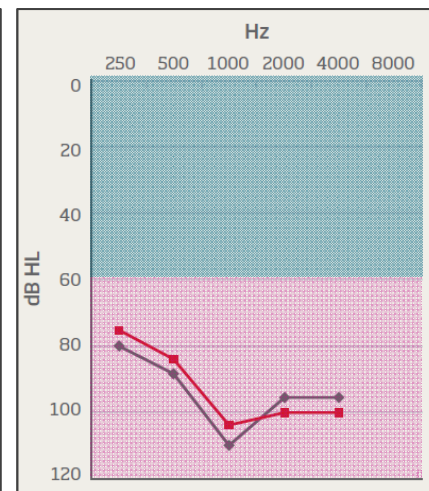
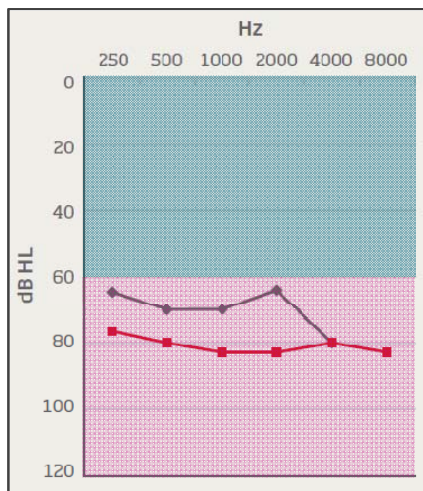
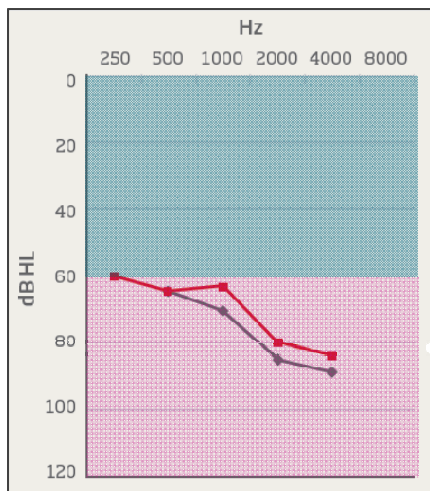
Harrison & Mount (2001)



**What else has to go right?**



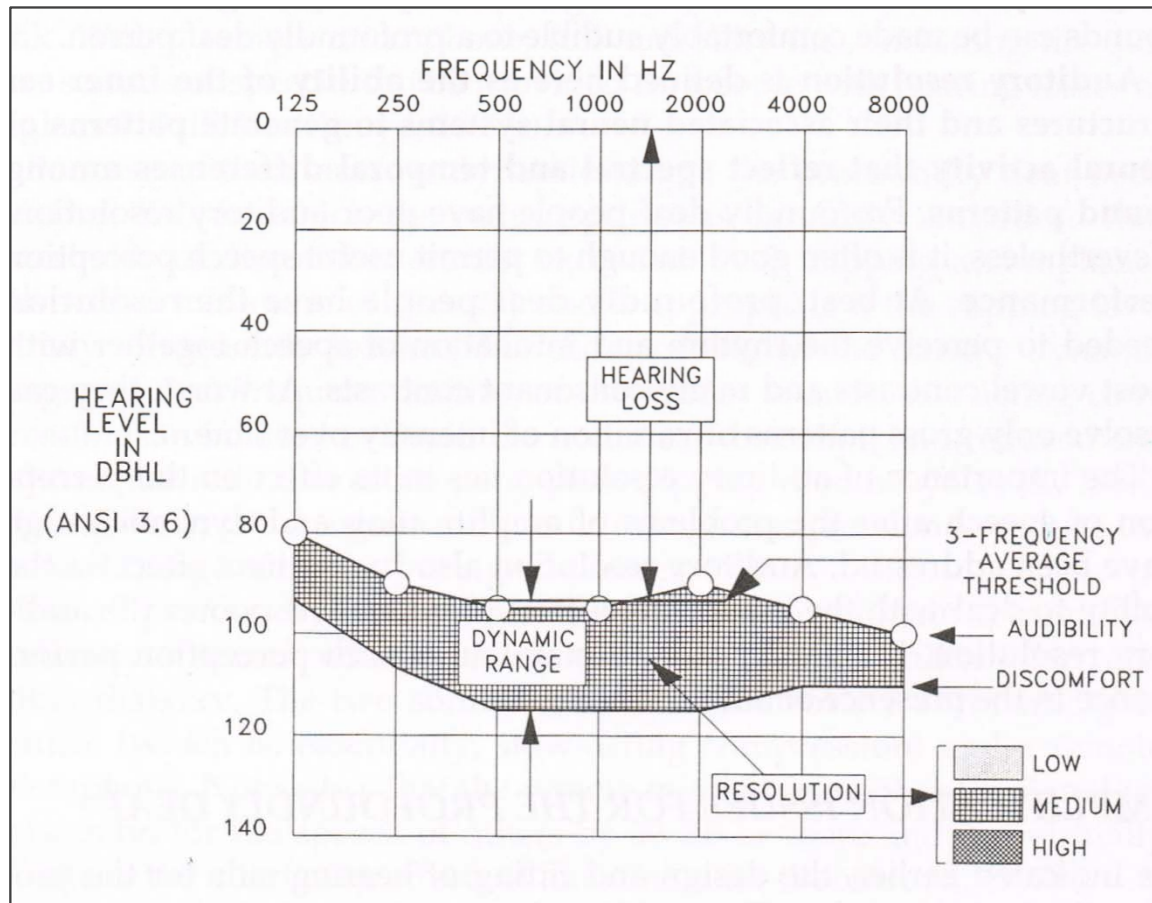
# Example Audiograms





**Variability in  
Performance**

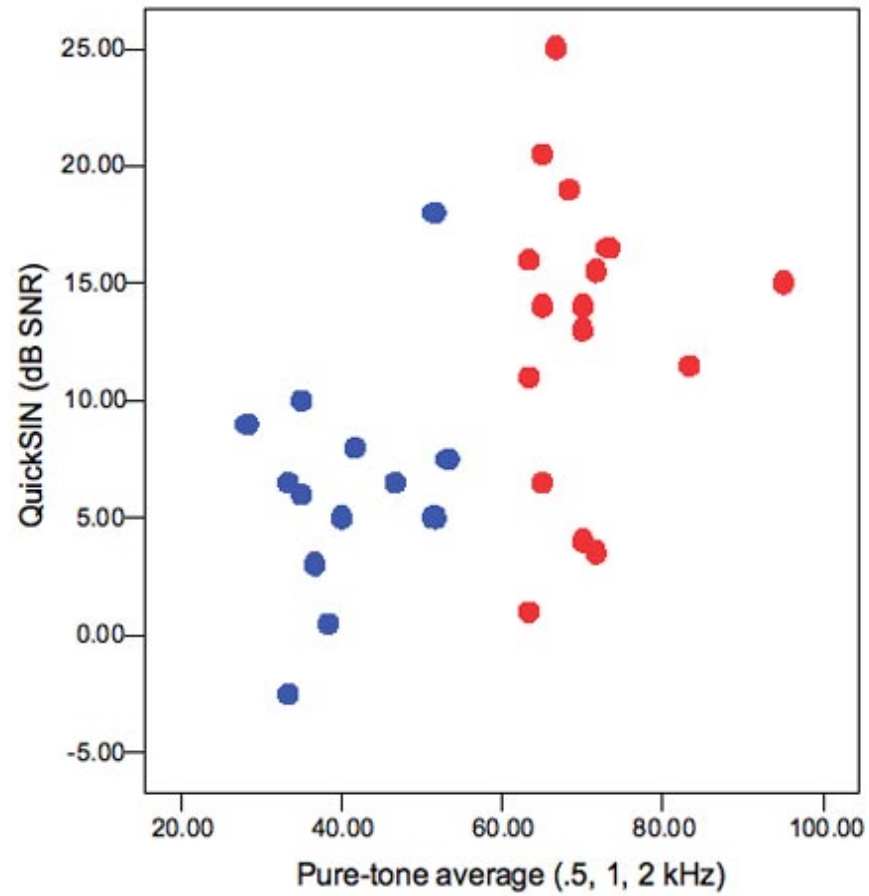
**What do physiological changes mean  
for the individual patient?**



Boothroyd (1993)

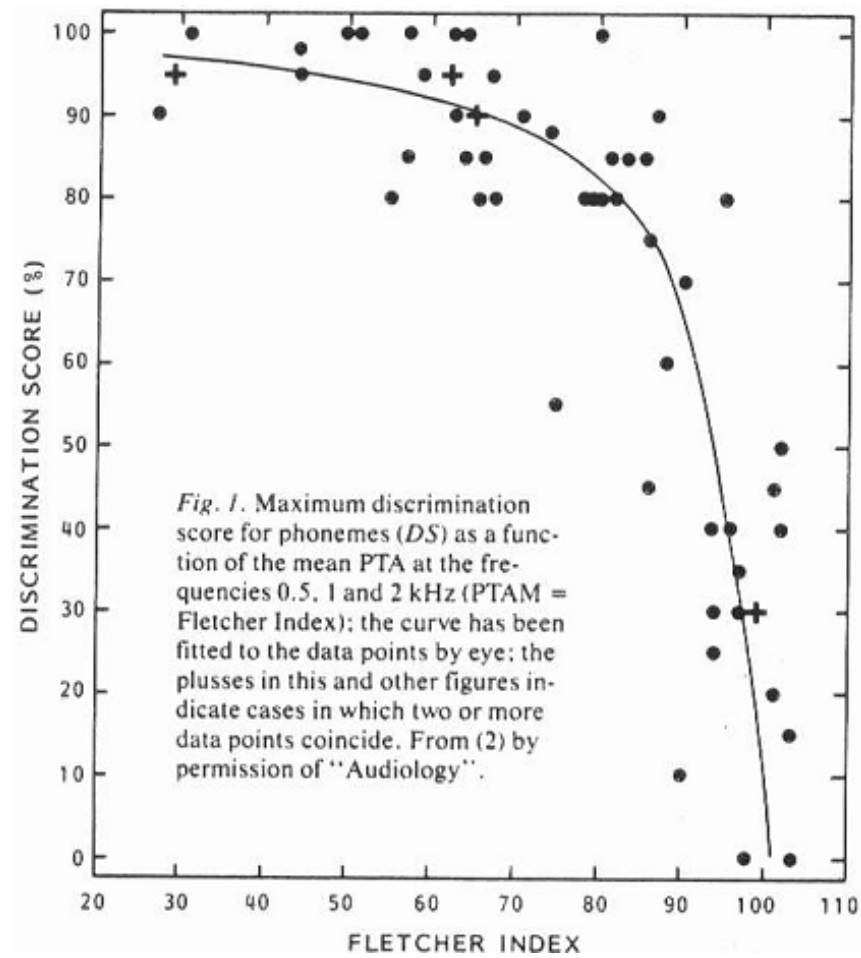
# Speech Understanding in Noise

Signal-to-noise ratio (S/N) required for 50% correct performance

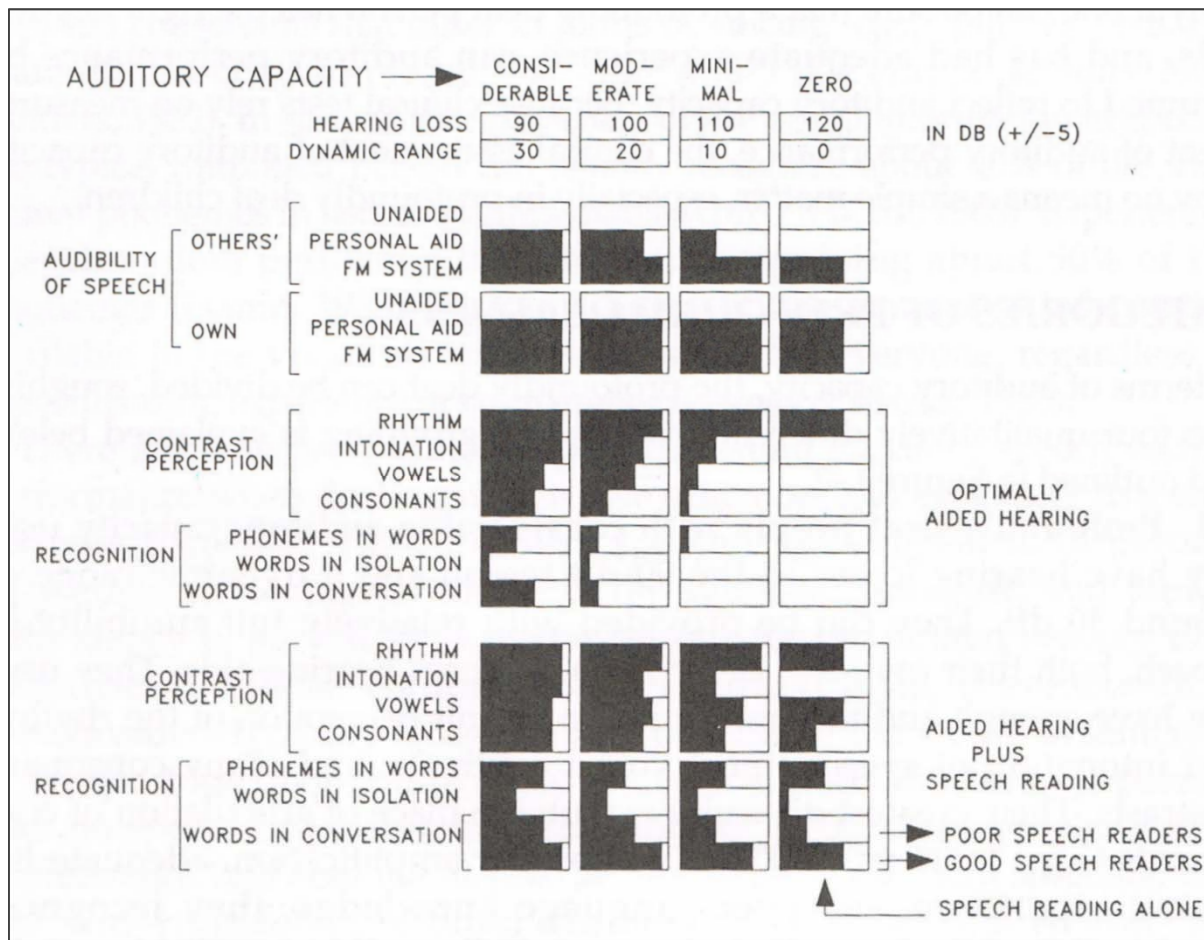


Souza (2009)

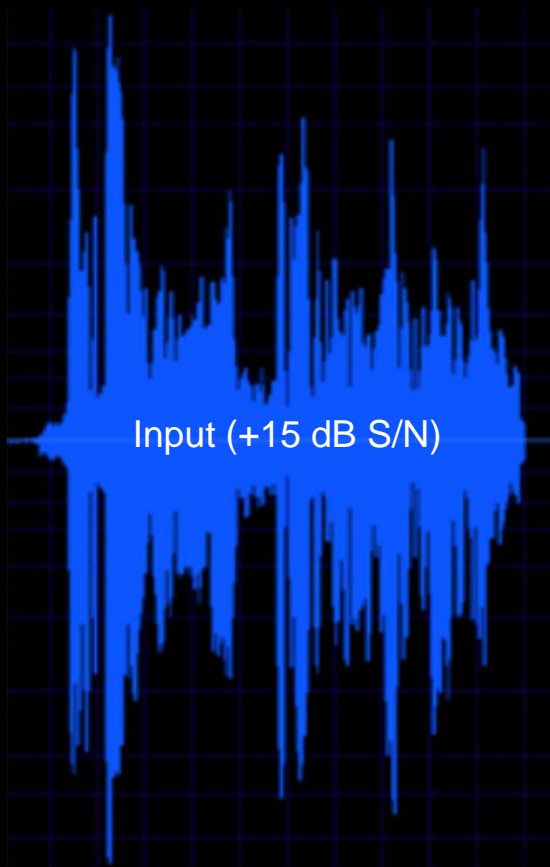
## Speech Understanding in Quiet



Lamore, Verweij & Brocaar, (1990)

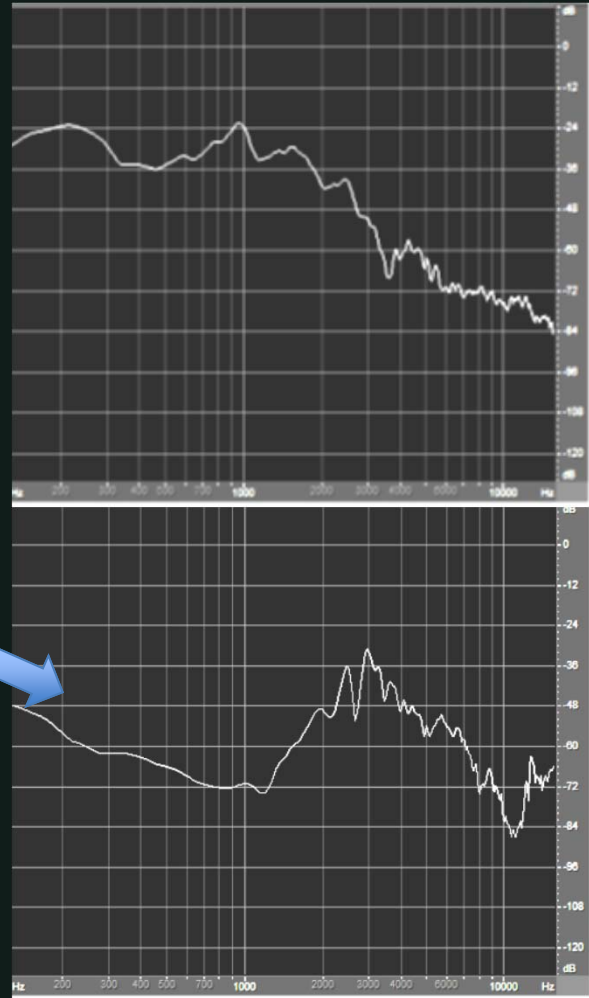
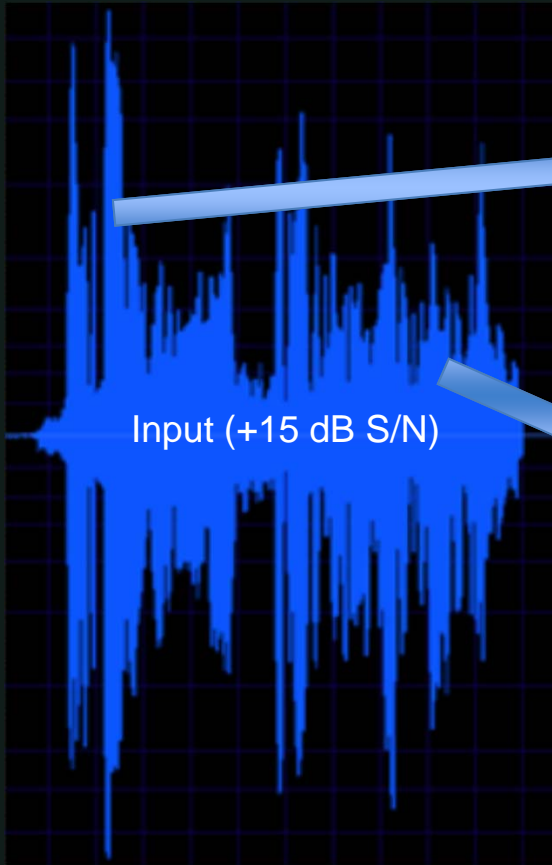


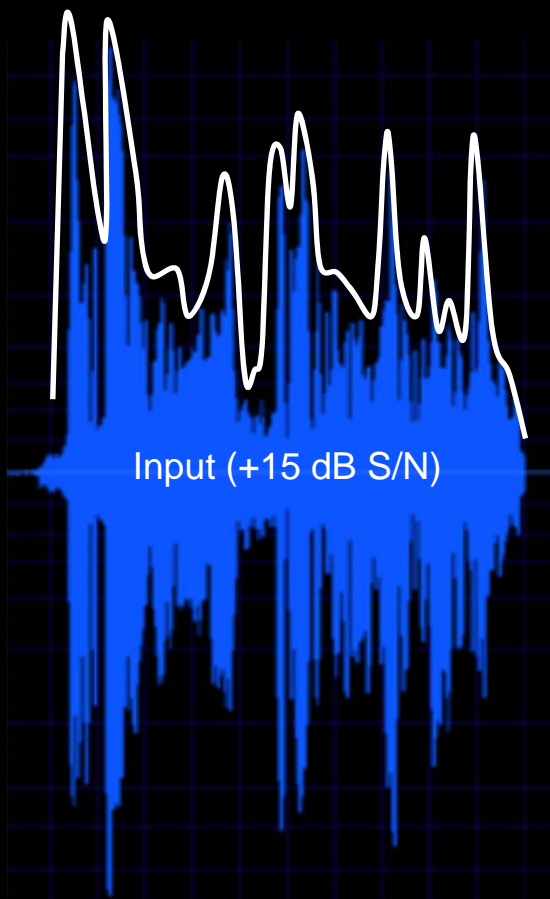
Boothroyd (1993)



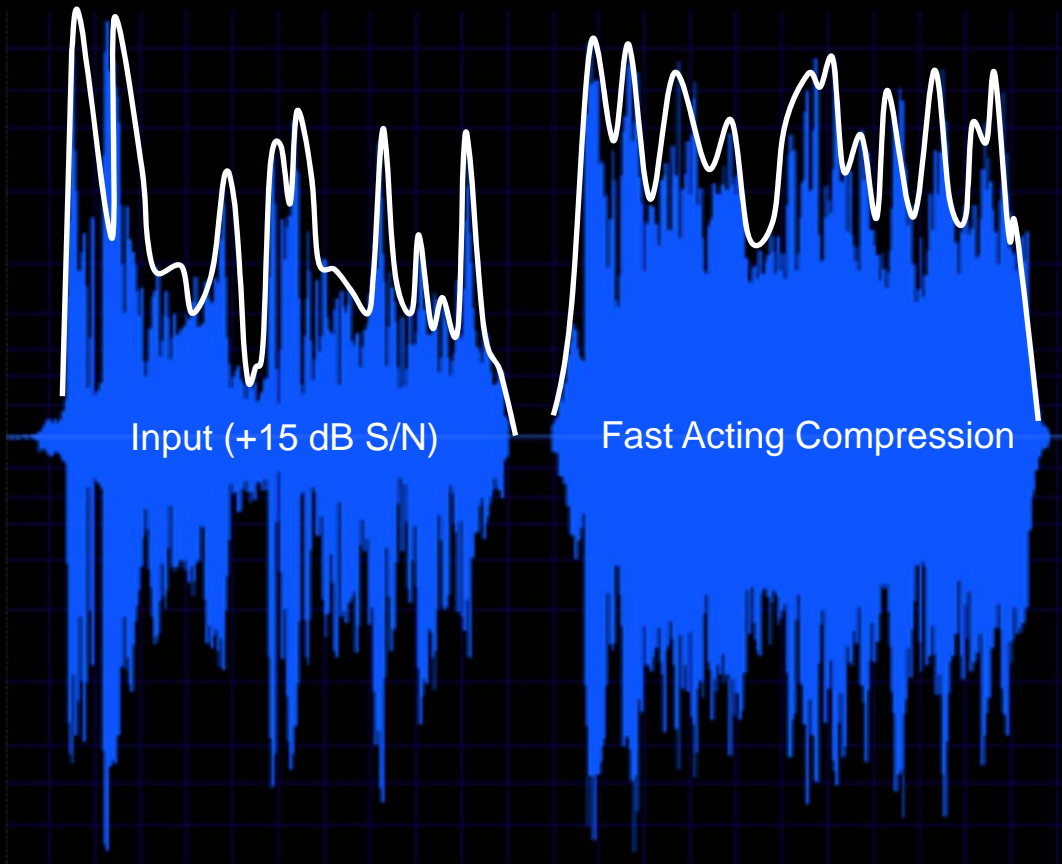
Input (+15 dB S/N)







Input (+15 dB S/N)





**The Role of  
Multi-channel,  
Nonlinear  
Amplification**

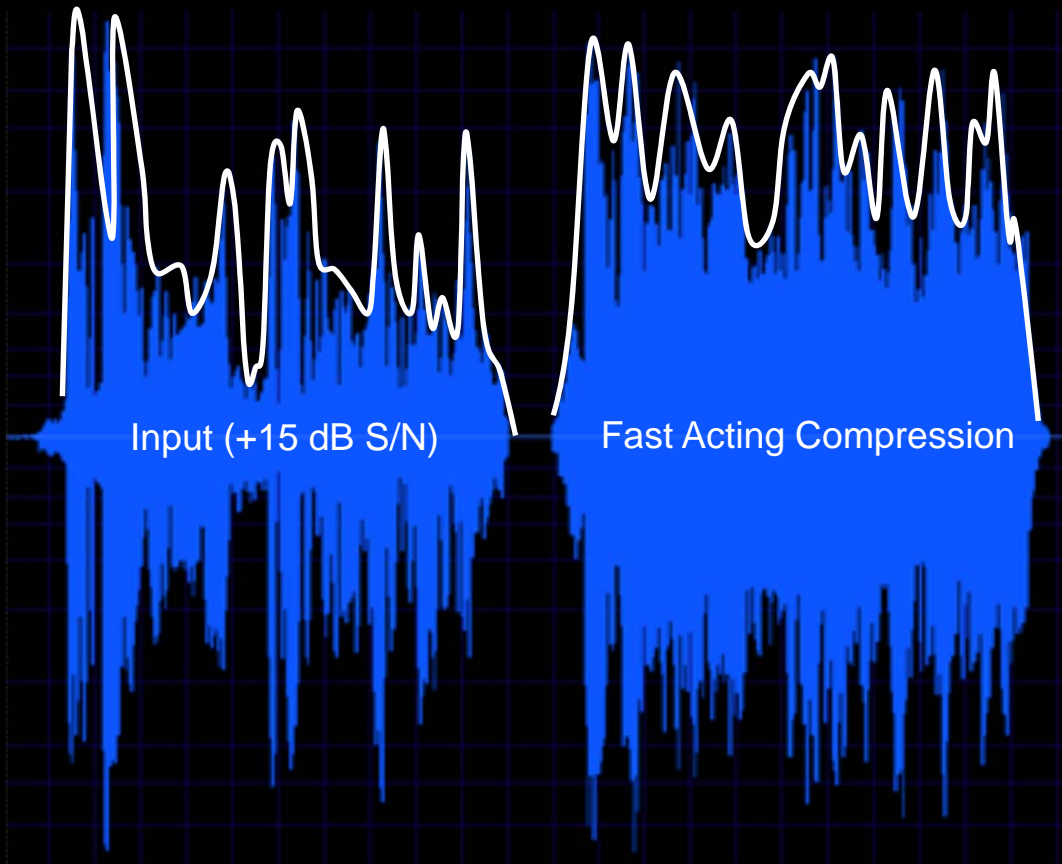
**What does it take to get the most  
out of the speech signal?**

Amplified Speech must be both:

*Audible & Useable*

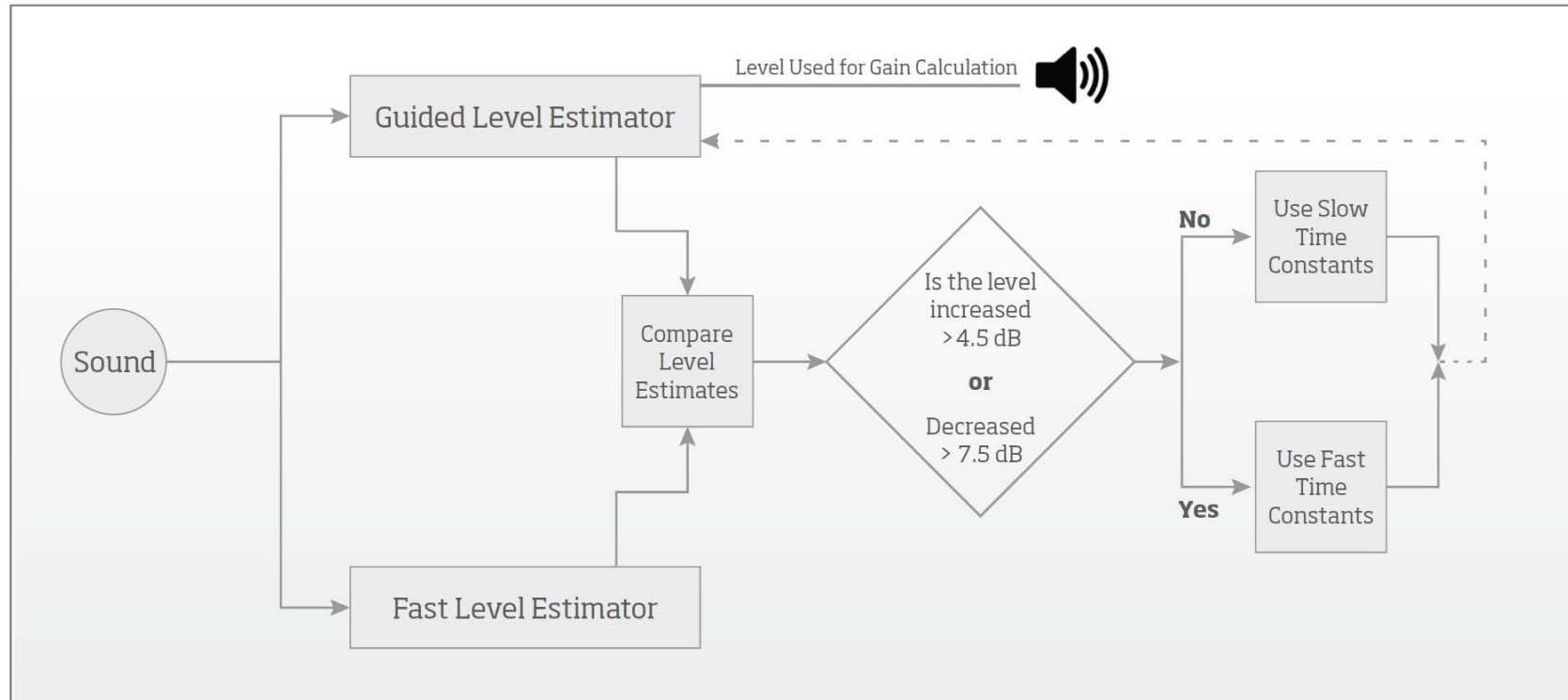
#HearEveryMoment  
through the power of Oticon

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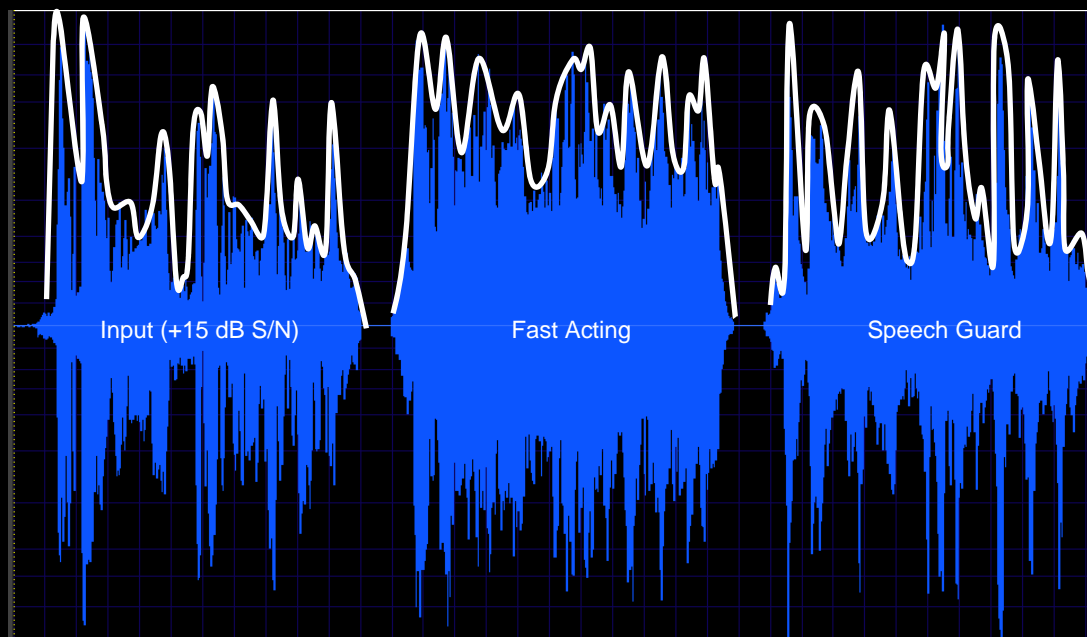
Input (+15 dB S/N)

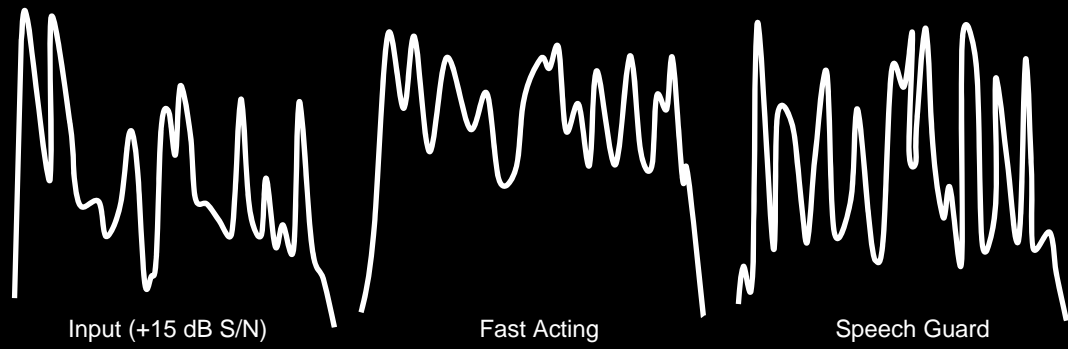
Fast Acting Compression

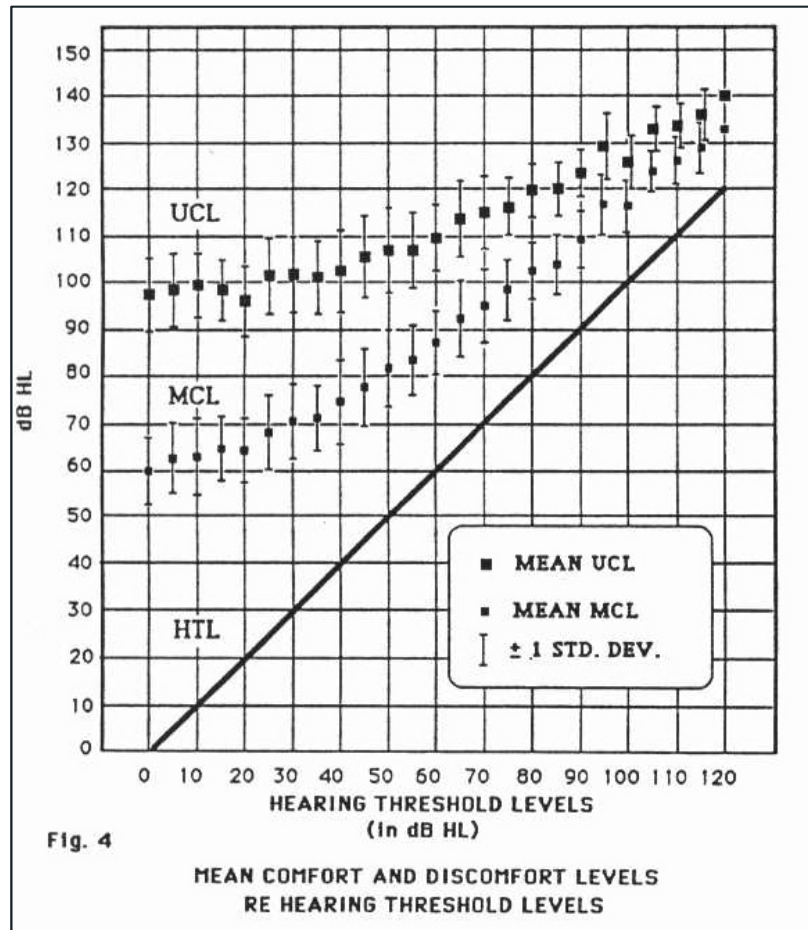


# Speech Guard E

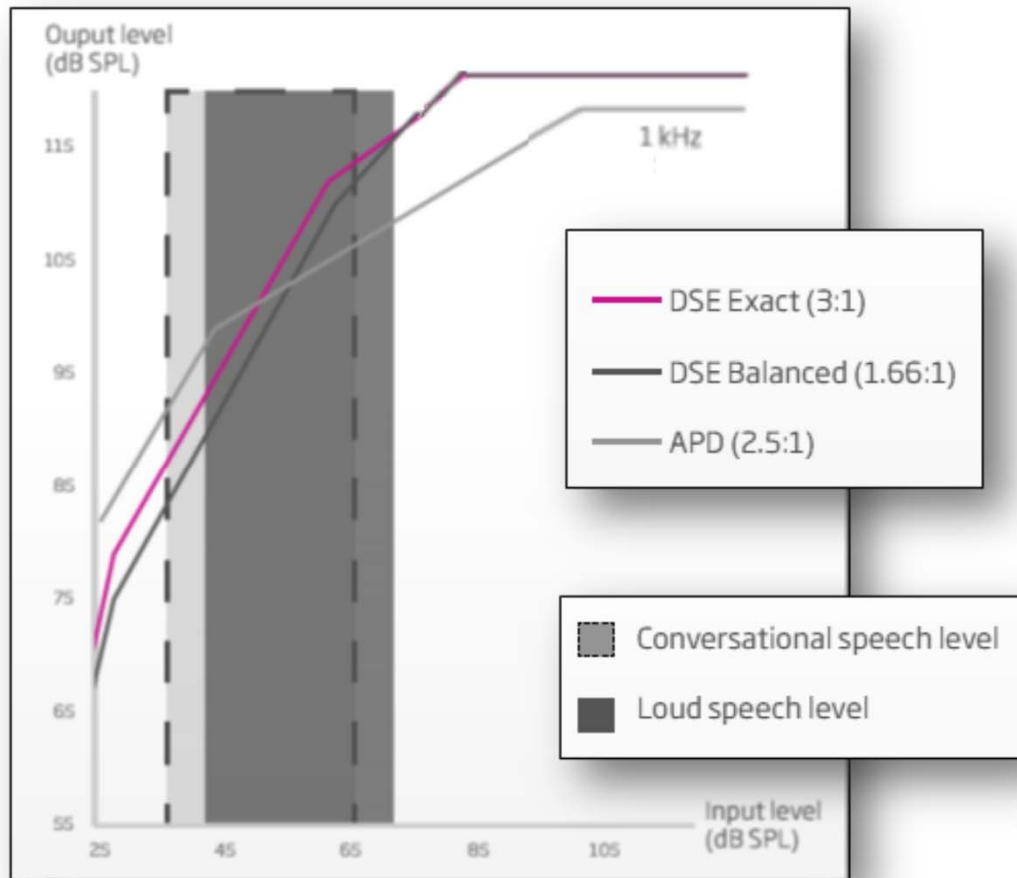









Pascoe, 1988





# The Role of Frequency Lowering

# Who, When and How?

**It's all about dead zones, right?**

Amplified Speech must be both:

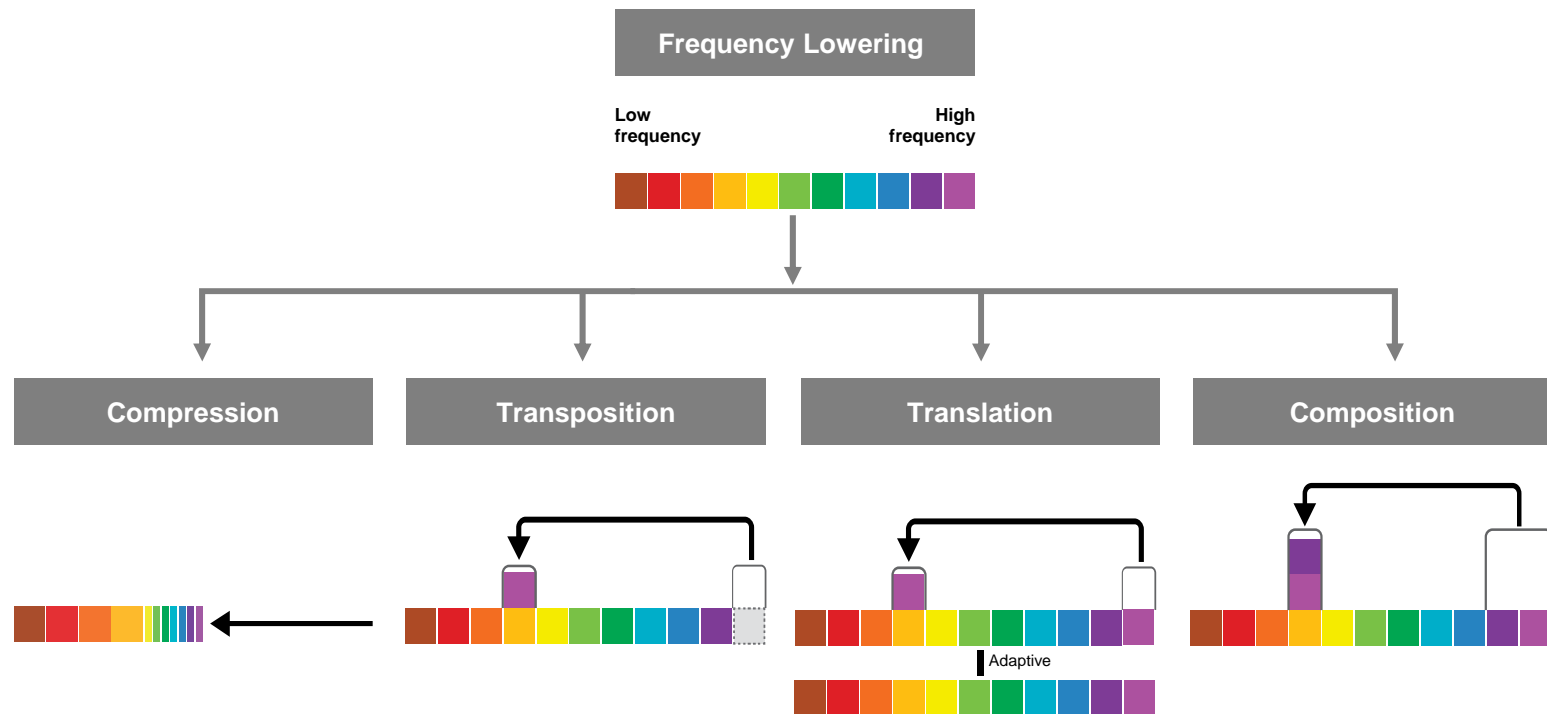
*Audible & Useable*

#HearEveryMoment  
through the power of Oticon

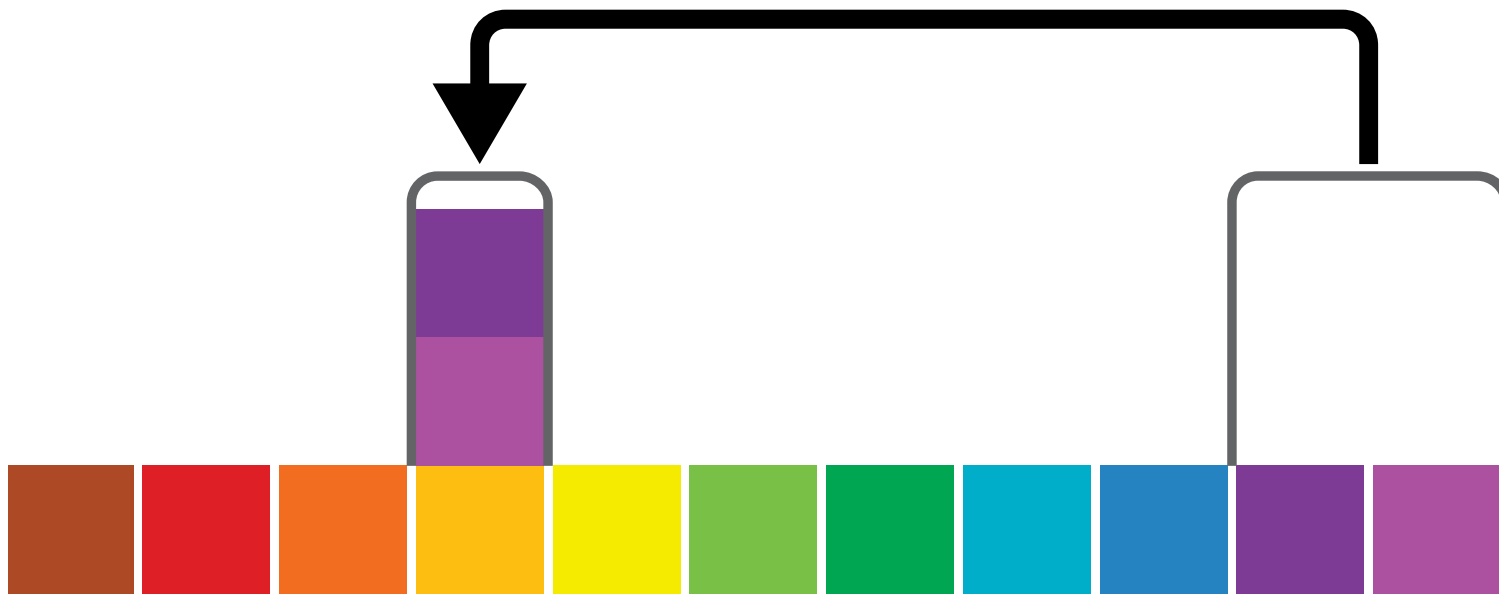
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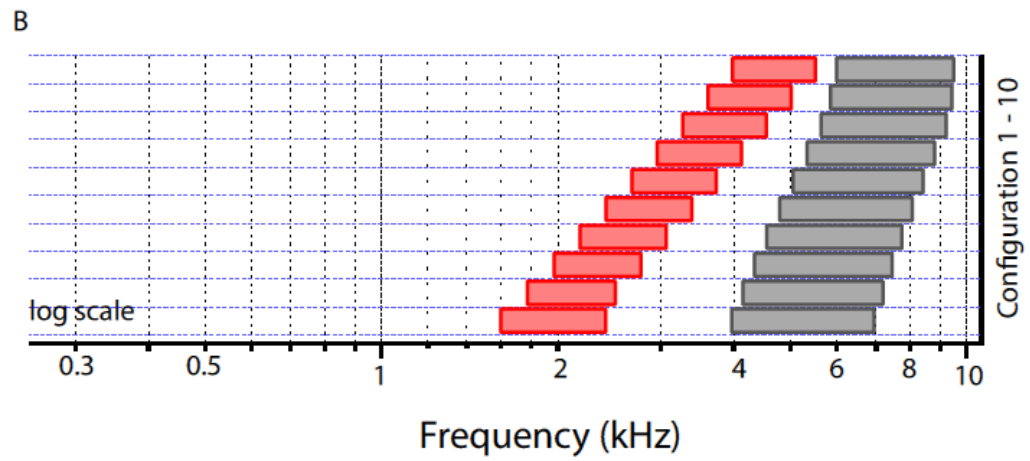
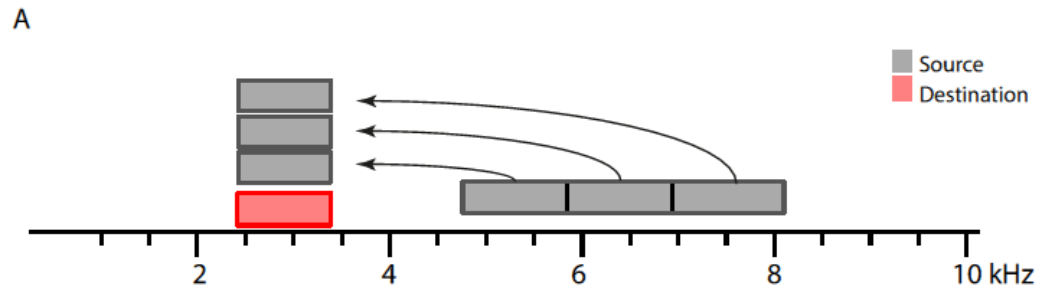


# Frequency Lowering Technologies



# Frequency Composition

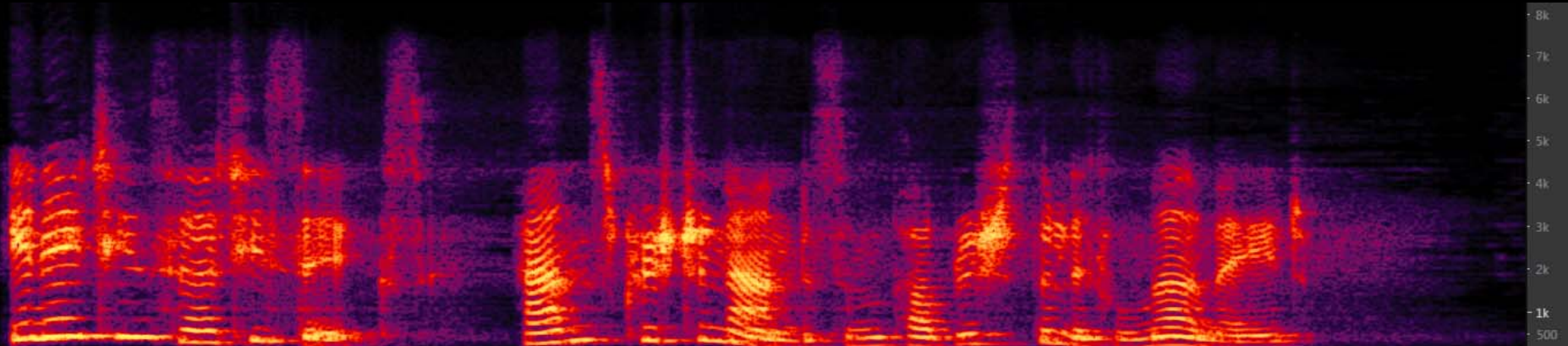




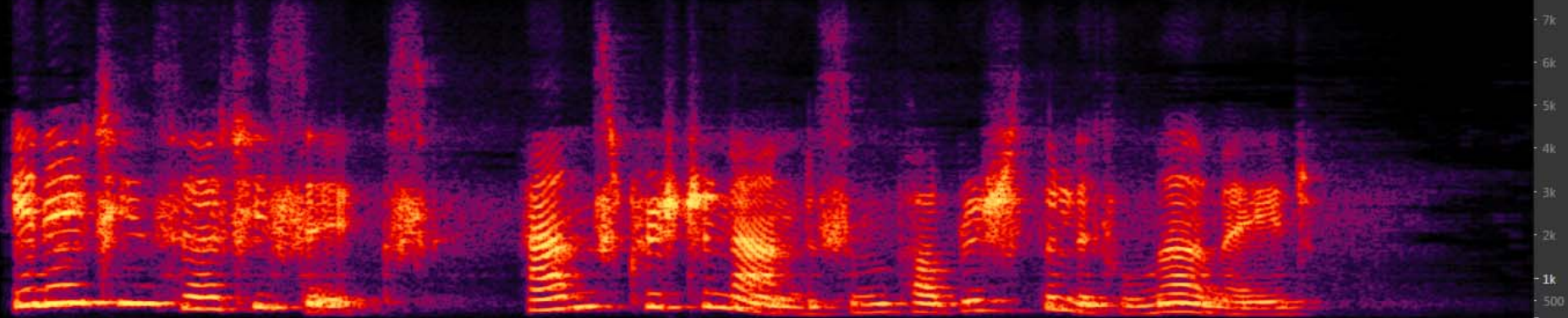
But if Dr. Simpson's office calls when I am gone, go ahead and put them through to my voicemail

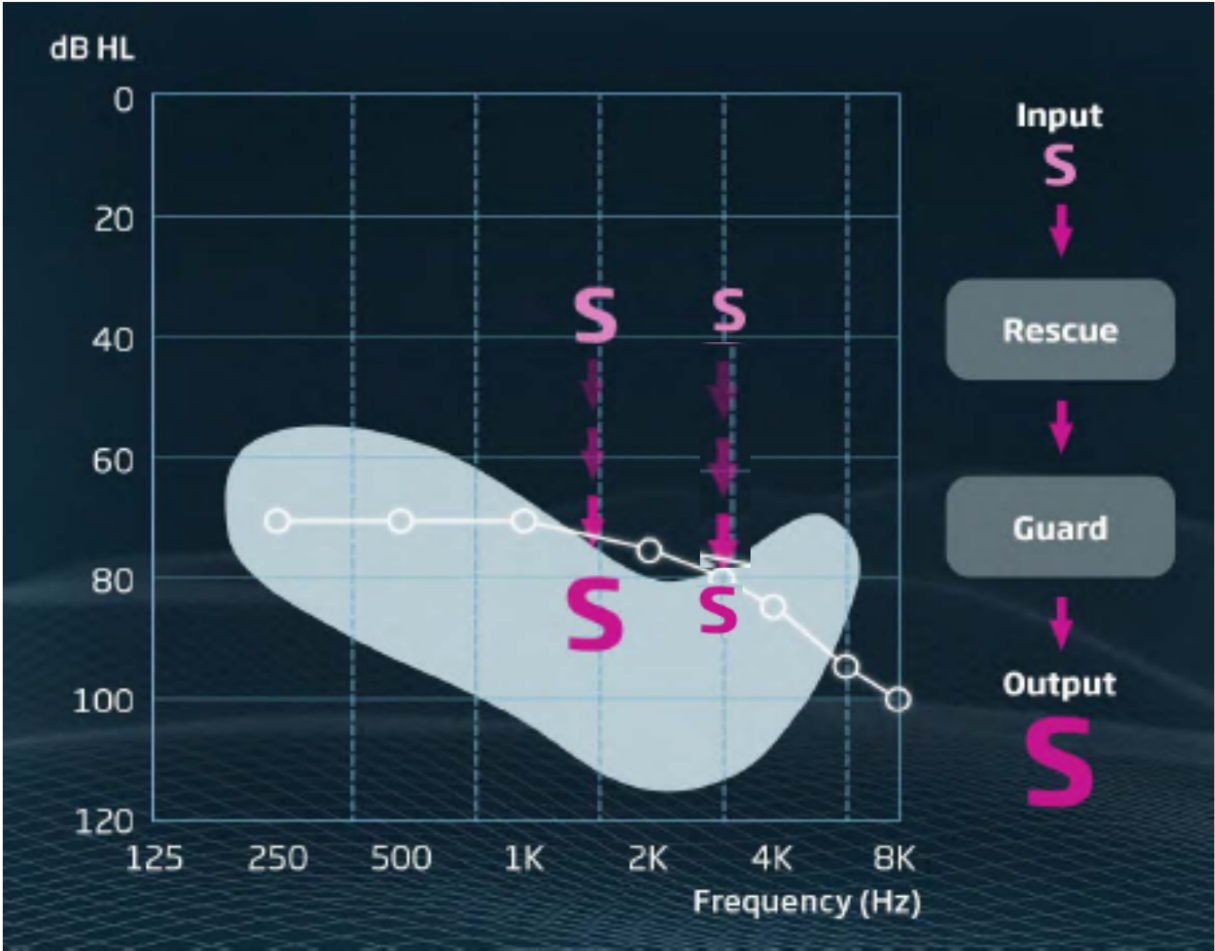


# Speech Rescue On vs Off



*In nineteen thirty six Hans Christian Andersen published the Little Mermaid*





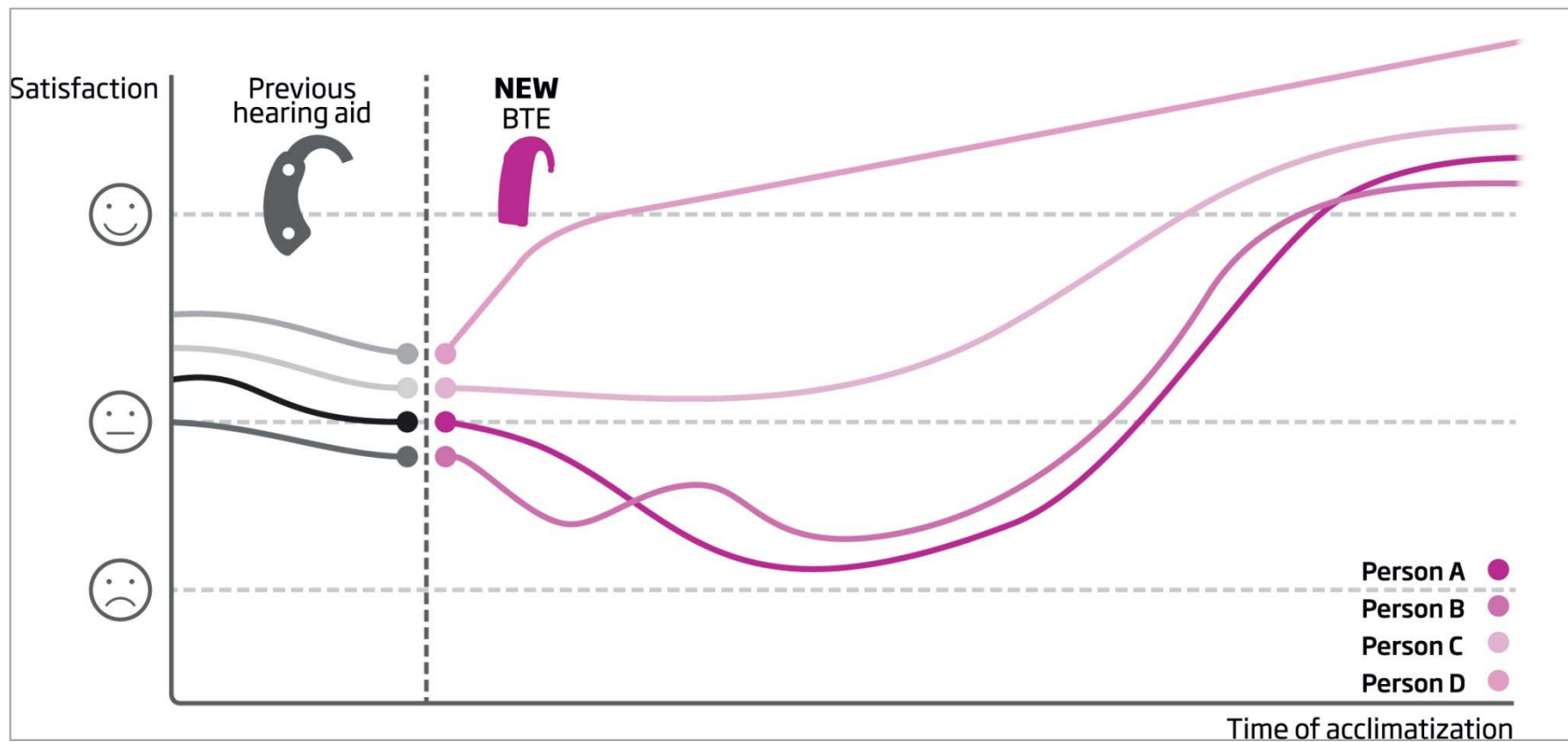
# Who, When and How?



**Transitioning  
to New  
Instruments**



**Why can this be difficult?**



## Fitting steps in Genie

### 1. Prescribe gain - Personal Profile tool

Prescribe advanced settings based on individual preferences.

- Ask the questions one by one and select the answers.
- Consider playing the sound files to hear a difference between the described scenarios.

Note: The patient should wear his/her current hearing aids when listening to the sound demos.

### 2. Set feedback limits - Feedback Manager tool

Set feedback limits and prevent static feedback.

- Analyse the feedback path by running a feedback measurement.

### 3. Adjust loudness - Overall Loudness trimmer

Adjust prescription to the individual loudness perception.

- Use Overall Loudness trimmer to adjust the prescription to the individual loudness perception.  
It changes both gain and MPO to protect speech intelligibility.

### 4. Ensure acceptance - Fine tuning of gain

Make further gain adjustment only if warranted due to lack of immediate acceptance by your patient

- Adjust the gain controls according to feedback.

Reactions to new gain rationale could be

a) "Distant sounds and own voice are softer compared to before"

Probable cause: Soft gain is reduced below 2000 Hz with DSE compared to APD prescription.

b) "Sound is generally too bright or sharp compared to before"

Probable cause: Moderate and loud gain is increased above 1500 Hz with DSE compared to APD prescription.



**Bi-Modal  
Fittings**

**What is the role of the hearing aid?**

## Bimodal Hearing Aid Fitting Guidelines

### ABSTRACT

In a bimodal fitting, one ear is stimulated acoustically with a hearing aid and the other is stimulated electrically with a cochlear implant.

To bring bimodal benefits to all children and adults with unilateral implants and aidable hearing in the contralateral ear, Oticon has implemented a bimodal fitting guide in the Genie fitting software. As developed by Carisa Reyes, Staff Audiologist at Boys Town National Research Hospital, the bimodal fitting flowchart serves as a guide to clinical audiologists as they navigate the bimodal fitting process. The goal is to provide a logic- and evidence-based method for decision-making, yet keeping in mind the constraints in everyday clinical practice.

Based on the latest knowledge on bimodal research, this paper explains the rationale, the recommended strategies, the procedures and the caveats of the bimodal fitting.

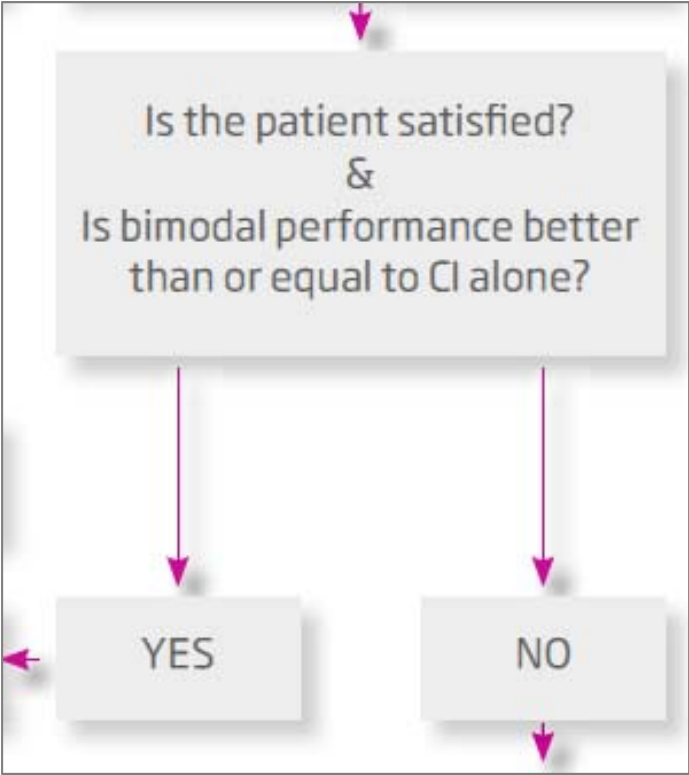
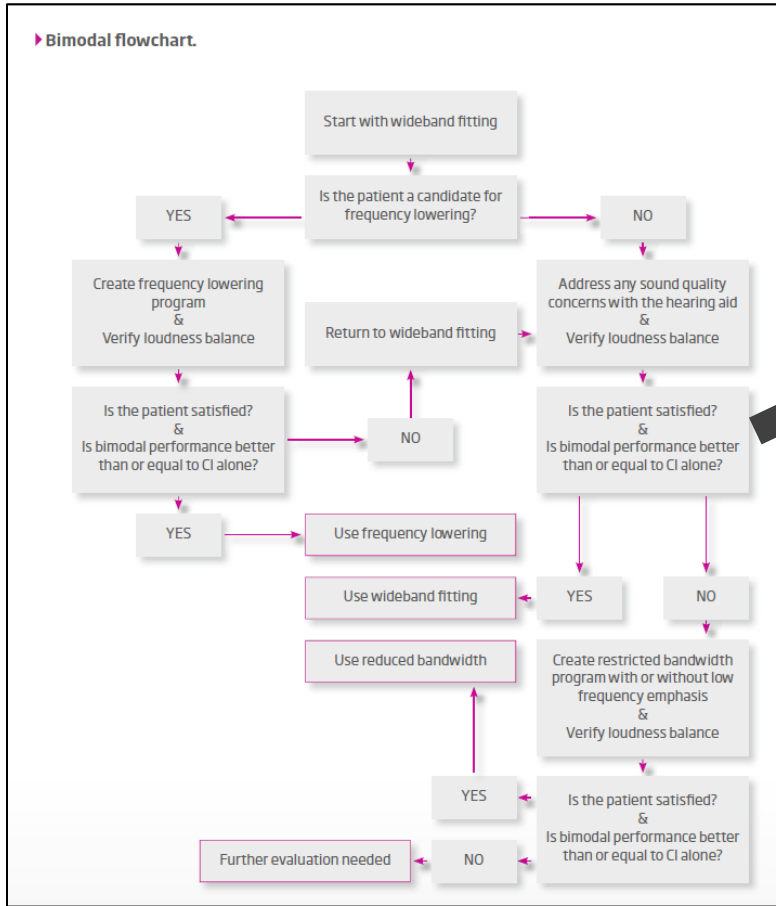
- ▶ Candidates for bimodal fitting
- ▶ When to fit the hearing aid
- ▶ How to fit the hearing aid for bimodal patients
- ▶ Bimodal flowchart
- ▶ Evaluation of benefits
- ▶ Case Studies



**BOYS TOWN**  
National Research  
Hospital

Carisa Reyes, Au.D., CCC-A,  
Staff Audiologist at Boys Town  
National Research Hospital

*The bimodal flowchart takes into account the four fitting approaches: wideband fitting, restricted bandwidth fitting, use of frequency lowering and loudness balancing. The chart is available in Genie when you fit Oticon Dynamo or SENSEL Super Power.*





**Final  
Thoughts**



# Summary

- **Damage is More Complex**
- **Poor Perceptual Abilities**
  - **Speech is a complex signal**
- **Variability**
- **Signal Processing Must Match the Needs of this Unique User Group and the Individual**
- **Experience / Opinions Matter**
  - **Transitioning**
- **HA as a Secondary Device**
  - **Bimodal Guidance**

**What does it take to get the most  
out of a patient's hearing?**

**#HearEveryMoment**  
OTICON'S #1 PRIORITY

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Understanding  
and Treating  
Severe & Profound  
Hearing Loss

#HearEveryMoment  
through the *power* of Oticon

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