Complex versus Standard Fittings: Part 1

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Learning Objectives

Identify the major assumptions that underpin the standard fitting approaches used in audiology.

Explain how fitting algorithms have been developed.

Describe the foundation of the residual capabilities approach to fitting amplification.

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Why?

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What is a “Standard Fitting”?

- …

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What is a "Standard Fitting"?

- Mild-to-moderate, Moderate SNHL
- Flat to Gently Sloping
- Symmetrical HTLs and WRS
- Good WRS in Quiet
- Stable
- Presbyacusis, maybe with a little NIHL

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Assumptions when fitting hearing aids:

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Assumptions when fitting hearing aids:

- Prescriptive, not Adaptive

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The Prescriptive Process

Input Data → Prescription → Fine Tuning

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Assumptions when fitting hearing aids:

- Prescriptive, not Adaptive
- Restore Audibility
- Correct for Threshold Loss

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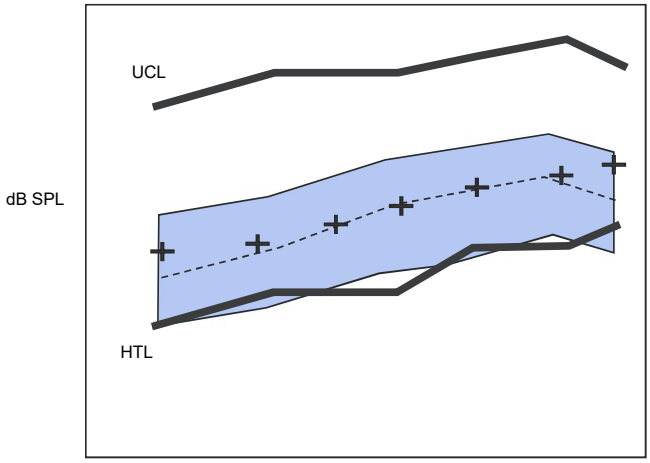

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An Example Rationale

- If HTL > 50. . .UCL = 100 + ((HTL – 50) / 2)
  - Else UCL = 100

- MCL = (UCL – HTL) / 2
- $Gain_{65}$ = MCL – 65
- CR = 100 / (UCL – HTL)
- $Gain_{50}$ & $Gain_{80}$ >>>> $Gain_{65}$ modified by the CR

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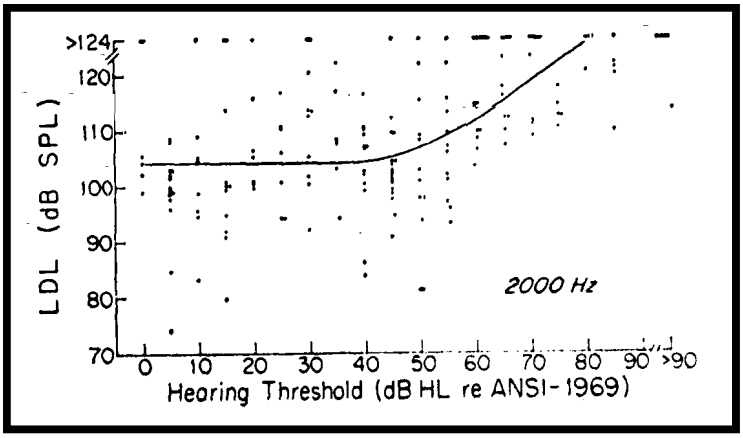

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Assumptions when fitting hearing aids:

- Prescriptive, not Adaptive
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- Measurable Hearing is Useable Hearing
- Make the Full Range of Inputs Fit
- The More Bandwidth the Better

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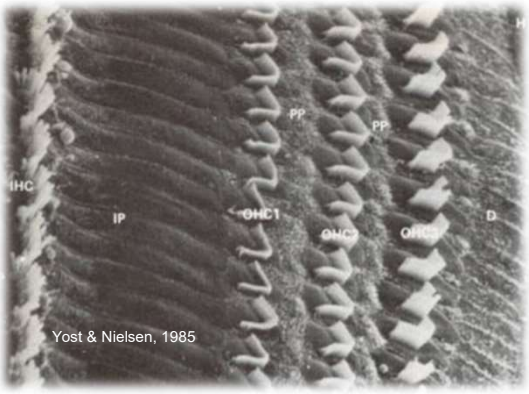
How do we describe a patient's auditory status?



- By the audiogram
- By the physiological condition of the ear

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What do we assume about SNHL?

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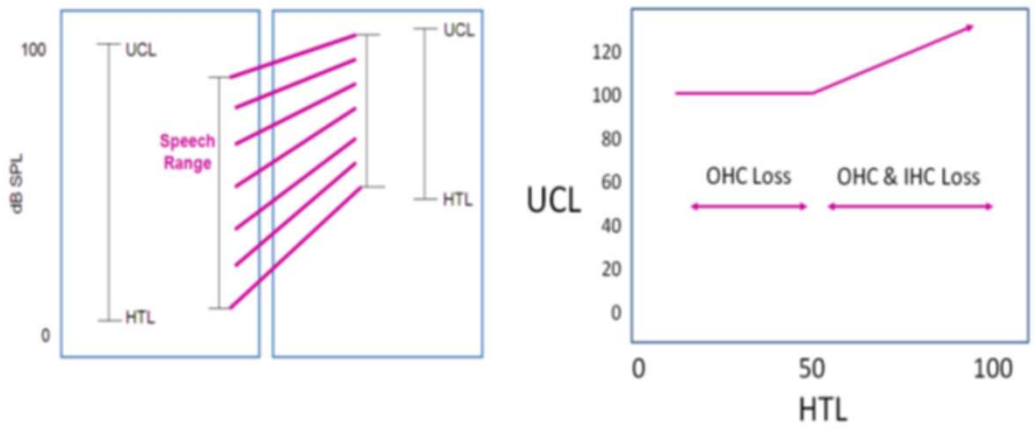

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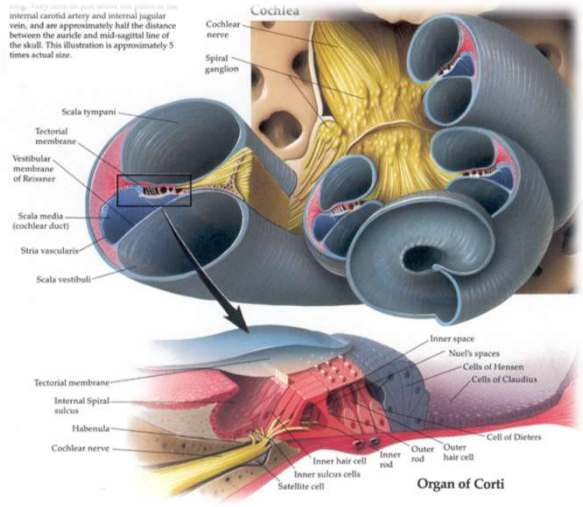

What else has to go right?

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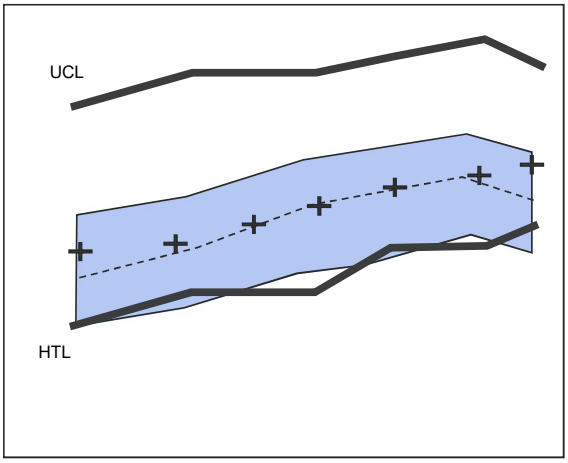
What do you see?



Frequency (Hz)

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- All Speech is Valuable*
- Targets are the Sweet Spot

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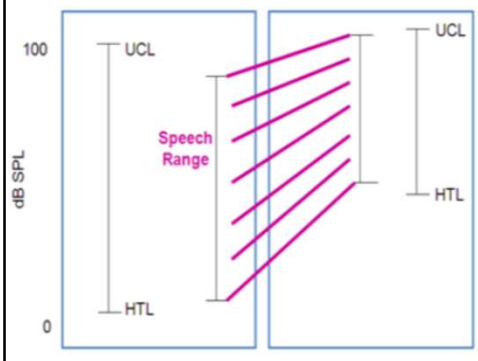

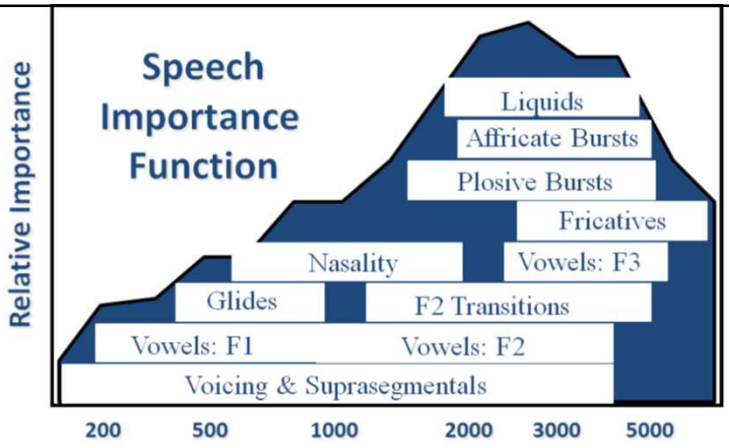

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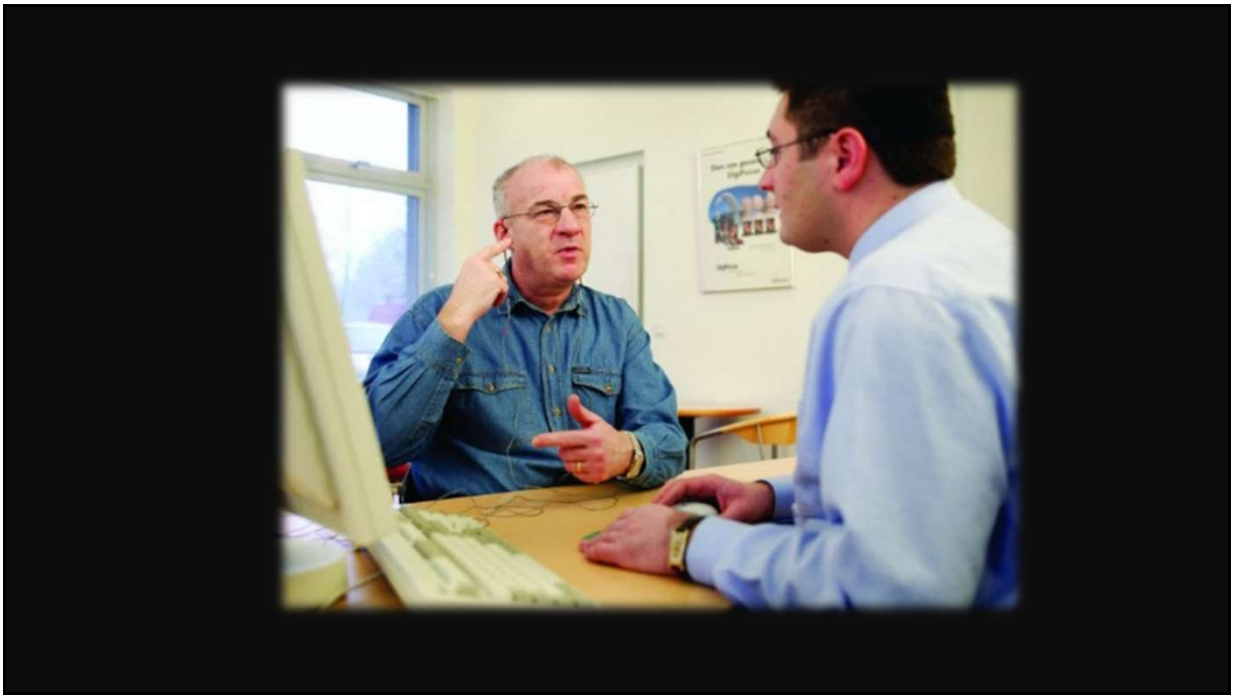
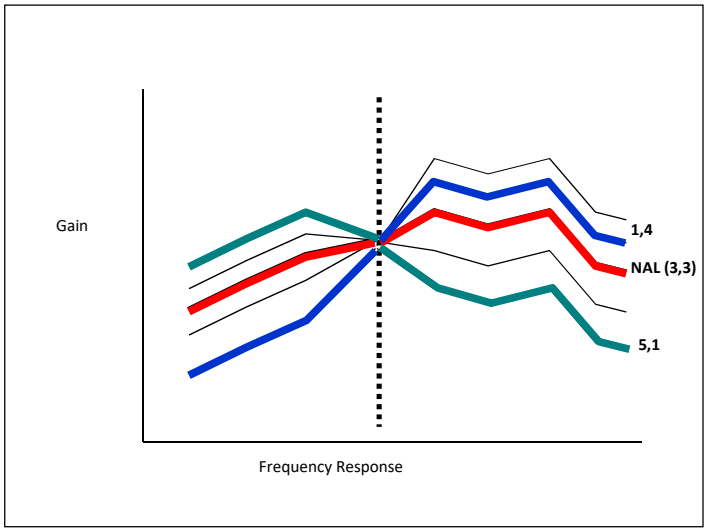


Frequency Response & Speech Understanding



(van Buuren, Festen & Plomp, 1995)

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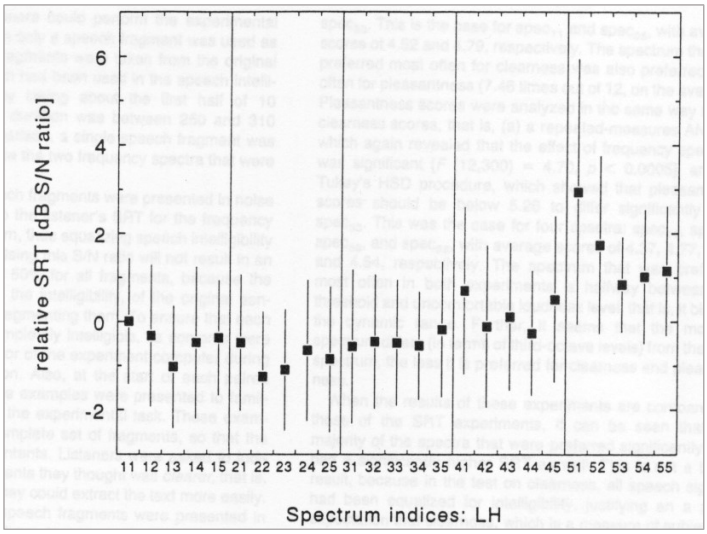
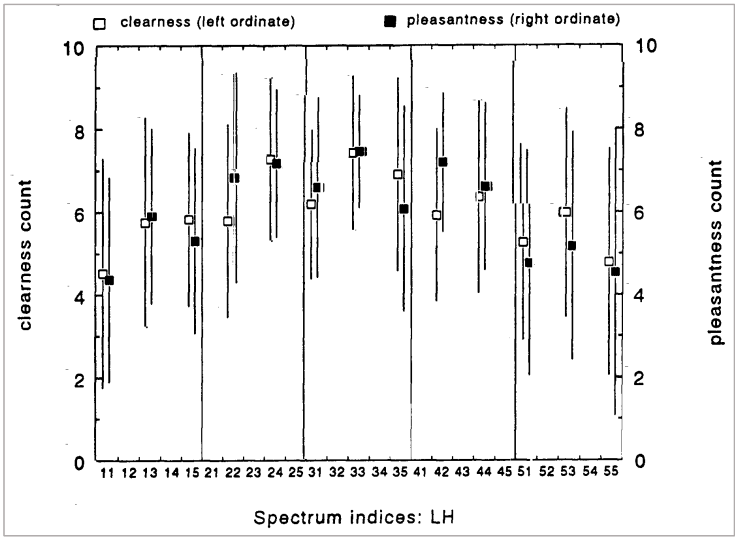


(van Buuren, Festen & Plomp, 1995)

Frequency Response & Sound Quality



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- Fit to Intelligibility, Fine Tune to Satisfy Sound Quality
- Both Ears Contribute (Equally)
- Two Monaural Fittings

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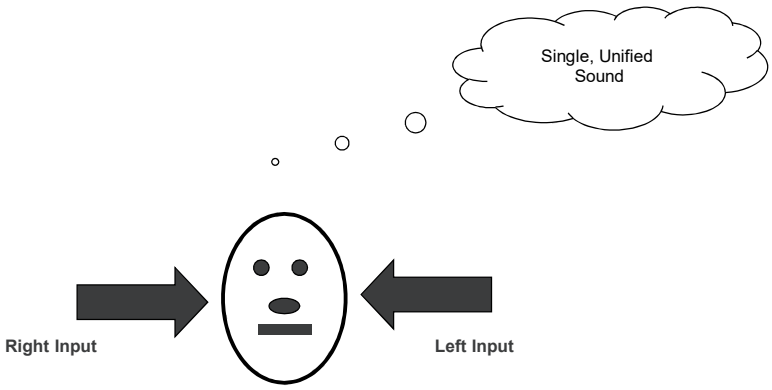
Basics of Hearing

Despite two ears, we hear one image



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When can these assumptions lead you astray?

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FIGURE 7. Probe-tube measured insertion gain attained by subject PD in December 1989.

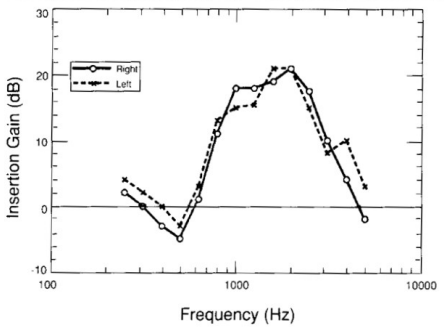

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FIGURE 7. Probe-tube measured insertion gain attained by subject PD in December 1989.

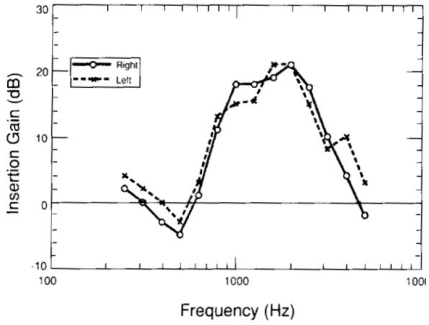
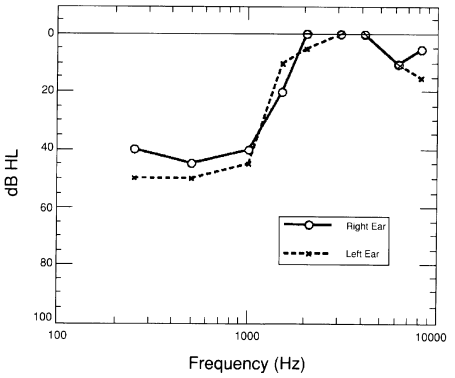


FIGURE 5. Audiogram for subject PD from Collins, Schum, Yanda, & Fryauf-Bertschy (1985).



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aaarrrrr!

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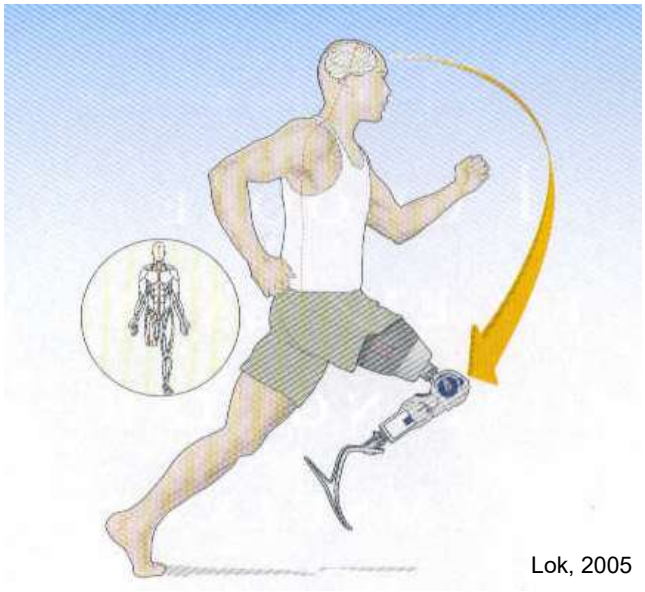

Lok, 2005

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Residual Capabilities

Aided signal viewed in relation to remaining auditory abilities

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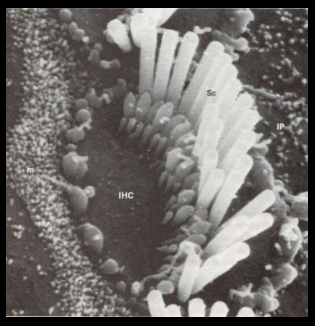
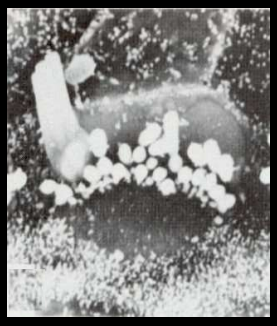
Inner Hair Cells

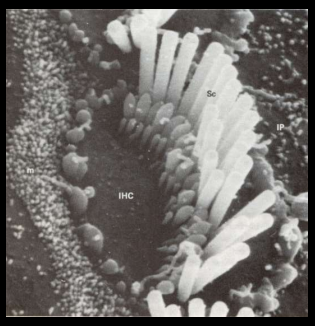


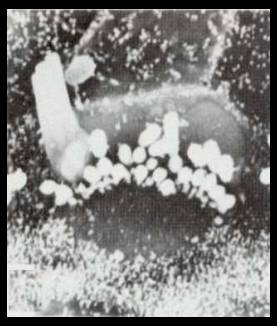


Normal Damaged Aided

Yost & Nielsen, 1985

Inner Hair Cells





Normal Damaged Aided

Yost & Nielsen, 1985

Models of Intervention

- "Hearing Loss Correction"

  compensation for threshold loss

  gain provided proportional to HTL

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Models of Intervention

- "Hearing Loss Correction"

  compensation for threshold loss

  gain provided proportional to HTL

- "Residual Capabilities"

  aided signal viewed in relation to remaining auditory abilities

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Two Keys to Fitting Amplification:

- How can they use the hearing that they have?
- What are they using their hearing to do?

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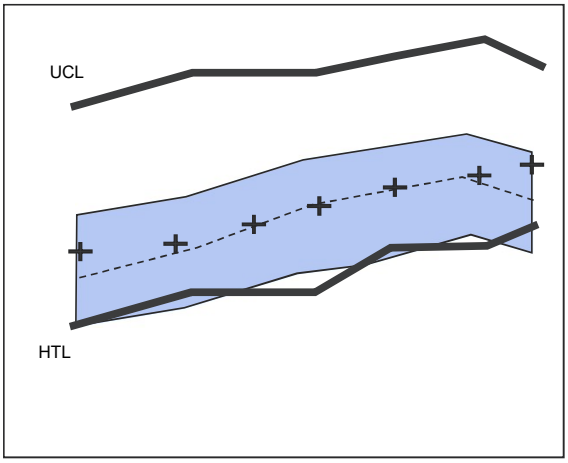
What do you see?



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Exception Discovery

"Young men know the rules . . . Old men know the exceptions"

Oliver Wendell Holmes

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