Complex versus Standard Fittings: Part 2

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Learning Objectives

- Describe the concept of Exception Discovery and how it can lead to alternative treatment strategies.

- Explain how fitting to remaining hearing as opposed to hearing loss may improve slope, rising and irregular audiograms.

- Explain which factors other than audibility may affect the response to amplification for patient with atypical audiogram shapes.
Why?

Exception Discovery

“Young men know the rules . . . Old men know the exceptions”

Oliver Wendell Holmes
Three Types of Audiograms:

Assumptions when fitting hearing aids:

- Prescriptive, not Adaptive
- Restore Audibility
- Correct for Threshold Loss
- Measurable Hearing is Useable Hearing
- Make the Full Range of Inputs Fit
- The More Bandwidth the Better

- All Speech is Valuable*
- Targets are the Sweet Spot
- Fine Tuning is a Movement Away from Optimal
- Fit to Intelligibility, Fine Tune to Satisfy Sound Quality
- Both Ears Contribute (Equally)
- Two Monaural Fittings
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![Graph showing dB SPL, UCL, HTL, and Frequency (Hz)]
Sensorineural Hearing Loss:
Loss of Hair Cell Function

Intact cochlea

Damaged cochlea

Picture credit: House Ear Institute, Los Angeles

Three Types of Audiograms:

[Graphs showing different types of audiograms]

OTICON Audiology
Ski-slope Losses: Key Research Findings

- Beyond moderate SNHL in HF, improved audibility may not always improve speech understanding.
- At times, attempts at full audibility may decrease speech understanding.

Skinner (1980)
Skinner (1980)
Dead Zones?

Goals of Ski Fitting

- Who is the patient?
Goals of Ski Fitting

- Who is the patient?
- ...
- Maintain comfort
- Maintain acceptable sound quality in quiet
  - no dramatic frequency responses
  - vented fitting
- Modest audibility enhancement
  - focused on transition region
  - will be appreciated in quiet
  - may be quite helpful in noise
10/26/17

Frequency

250 500 1000 2000 4000 8000

dB HL

Speech Importance Function

Relative Importance

200 500 1000 2000 3000 5000

Liquids
Affricate Bursts
Plosive Bursts
Fricatives
Nasality
Vowels: F3
Glides
F2 Transitions
Vowels: F1
Voicing & Suprasegmentals
Vowels: F2
Voicing & Suprasegmentals

- Vowels: F1
- Glides
- Nasality
- Vowels: F3
- Liquids
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- F2 Transitions
- Plosive Bursts
- Affricate Bursts
- Nasality
- Glides
- Vowels: F1
- Voice & Suprasegmentals

Relative Importance

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Audiological view

- Normal speech
Two Sound Sources

Frequency Lowering?
Advanced Signal Processing?

Three Types of Audiograms:
Voicing & Suprasegmentals

Vowels: F1
Glides
Nasality
F2 Transitions
Vowels: F2
Vowels: F3
Plosive Bursts
Affricate Bursts
Fricatives
Nasality
Glatdes
F2 Transitions
Voicing & Suprasegmentals

Relative Importance


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

Schum & Collins, 1992
Average Intelligibility Ratings

Schum & Collins, 1992

High Frequency Consonant Discrimination Scores

Schum & Collins, 1992
How should the frequency response be set?

Adjustments?

- HF region (>2 kHz): at least 10-15 dB Insertion Gain
- LF & Mids Region (<2 kHz): no more than 15-20 dB Insertion Gain (likely less)
Fine Tuning?

Advanced Signal Processing?
Three Types of Audiograms:

1. **HTL**
2. **MCL**
3. **UCL**

**OTICON Audiology**
NAL-NL2 Modification

Insertion Gain
Advanced Signal Processing?

Residual Capabilities

Aided signal viewed in relation to remaining auditory abilities
Exception Discovery

When do you let go of the “rules”?

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