

Using the UWO PedAMP for Outcome Evaluation: Case Studies

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Intervention for Childhood Hearing Loss

- Access to early intervention is key
- One component is access to sound through the use of hearing aids
- Supports the development of language and literacy skills
- Improves functional auditory capacity and participation in hearing- and communication-specific situations

Provision of Hearing Aids

- Suitable technology and evidence-based hearing aid fitting protocols support accurate and safe hearing aid fittings for the pediatric population
 - American Academy of Audiology, 2003
 - Australian Protocol; King, 2010
 - British Columbia Early Hearing Program, 2006
 - Modernizing Children's Hearing Aid Services, 2005
 - Ontario Protocol; Bagatto, Scollie, Hyde & Seewald, 2010



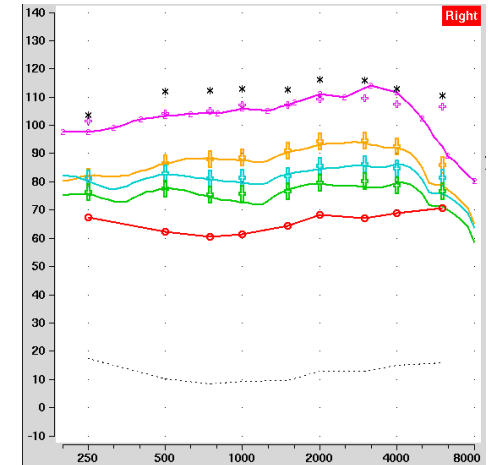
**AUDIOMETRIC
ASSESSMENT**



**ELECTROACOUSTIC
PRESCRIPTION**



**HEARING AID
VERIFICATION**



**EVALUATION OF
AUDITORY
PERFORMANCE**

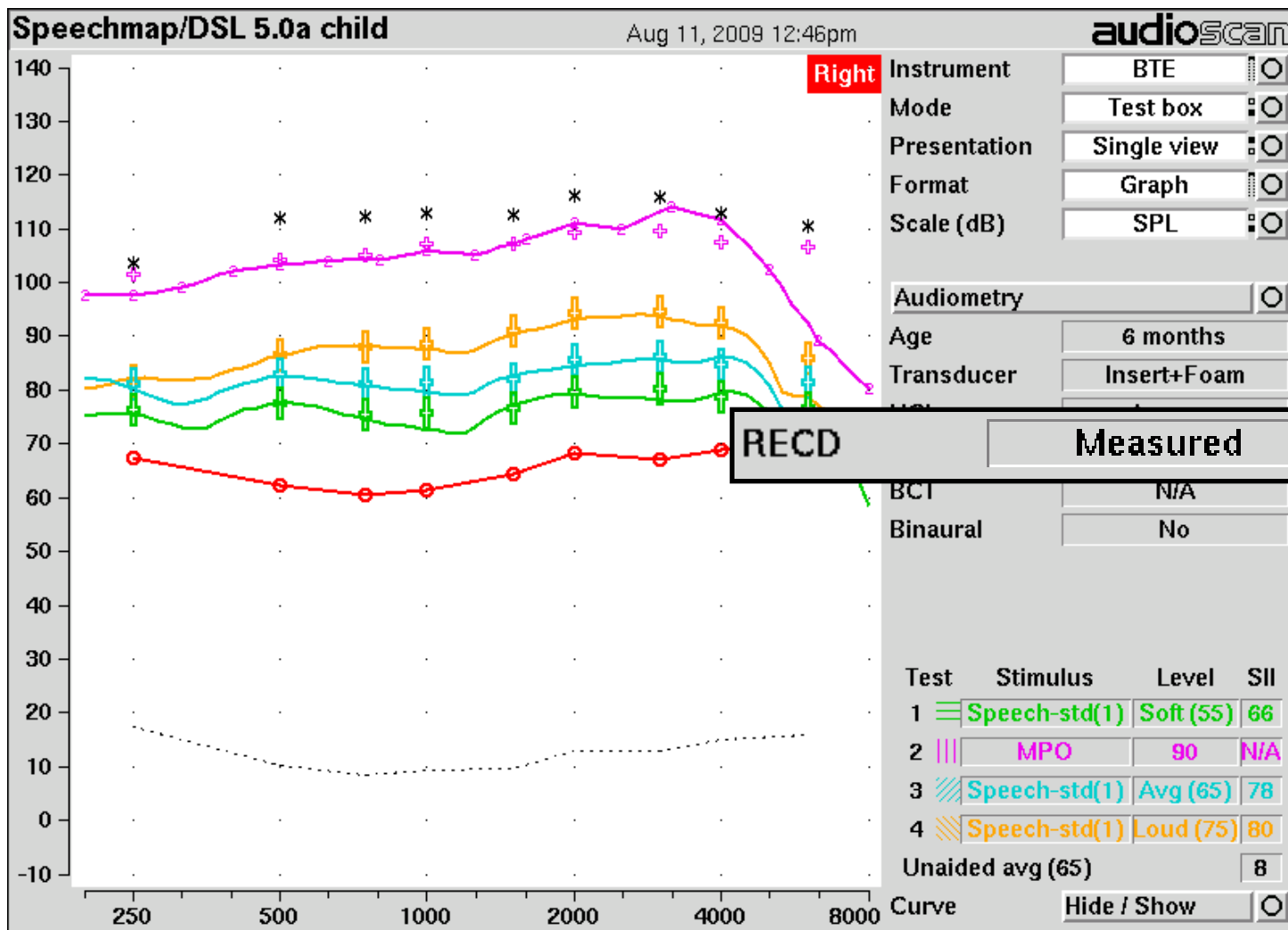
Purpose of the UWO PedAMP

- Intended to be used with children with permanent childhood hearing impairment (PCHI) from *birth to 6 years who may or may not wear hearing aids*
- Consists of several outcome evaluation tools that aim to measure *auditory-related outcomes* in infants and young children including the following dimensions:
 - Subjective assessment of early auditory development
 - Subjective ratings of auditory performance in daily life

Contents of the UWO PedAMP

- Ontario Infant Hearing Program (OIHP) Amplification Benefit Questionnaire
- Hearing Aid Fitting Summary
- Aided Speech Intelligibility Index (SII) Normative Values
- LittleARS Auditory Questionnaire (Tsiakpini et al, 2004)
- Parent's Evaluation of Aural/Oral Performance of Children (PEACH) (Ching & Hill, 2005)

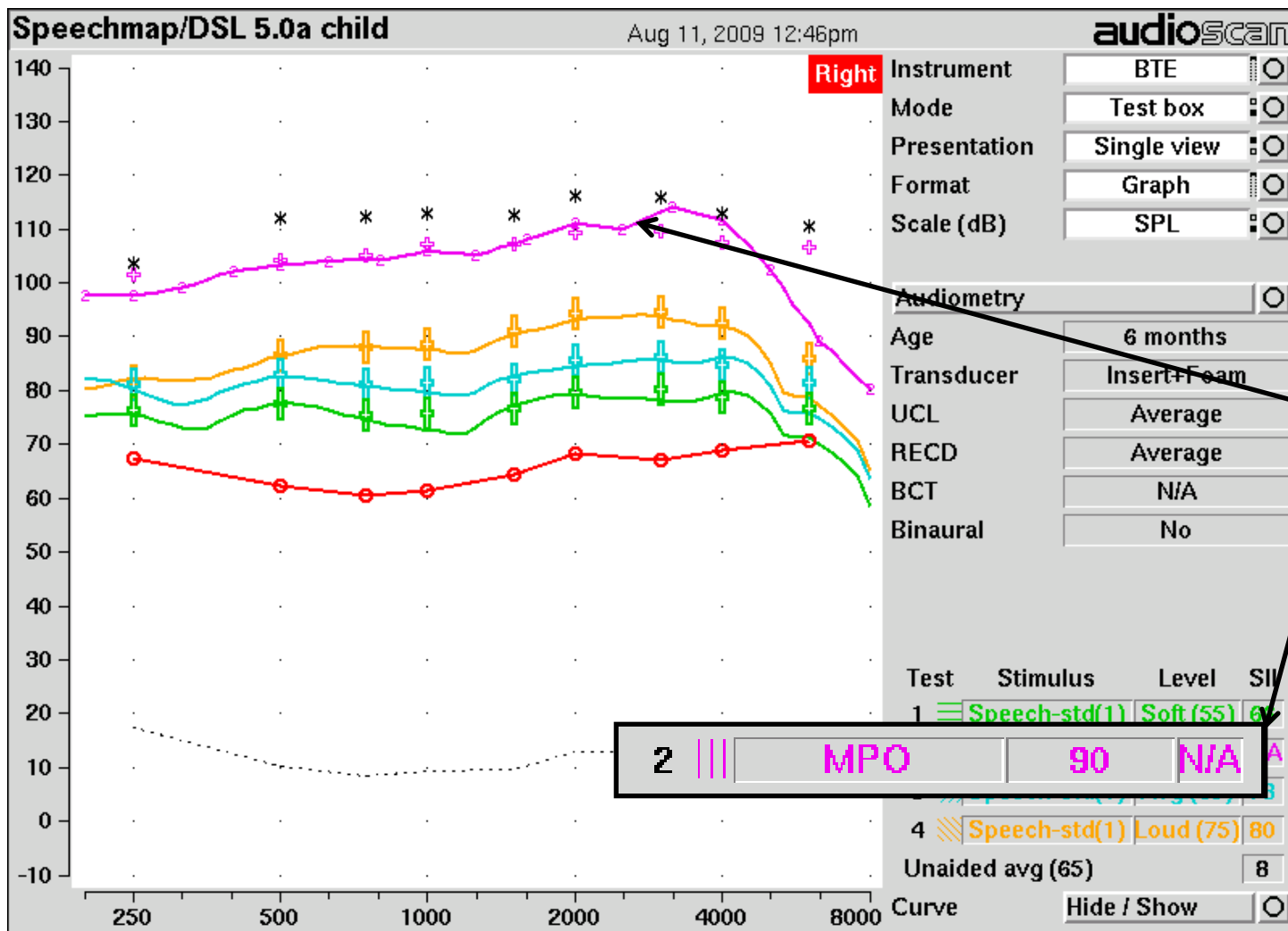
RECD and MPO



RECD

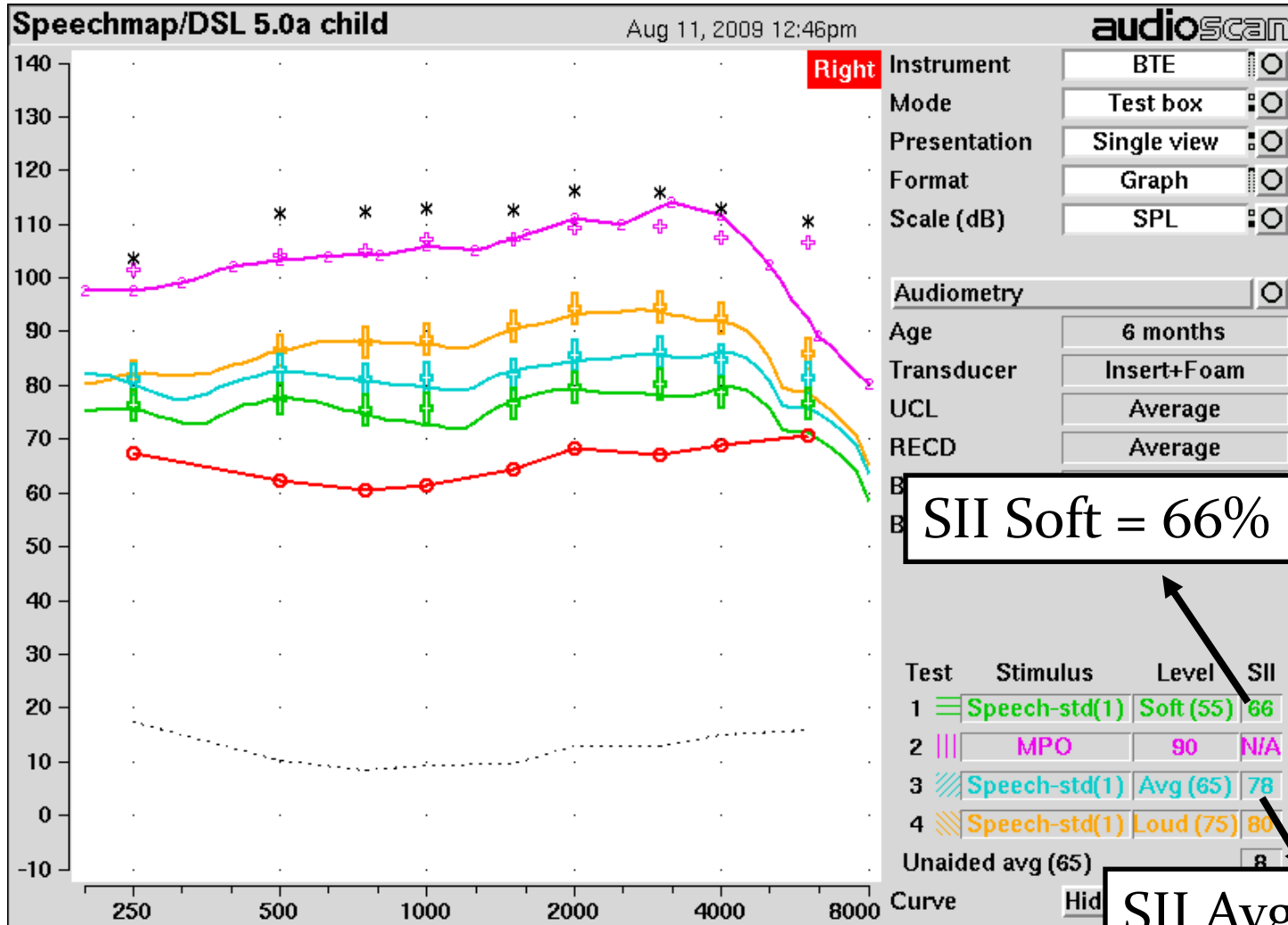
RECD Measured

RECD and MPO



*MPO
verified?
Yes/No*

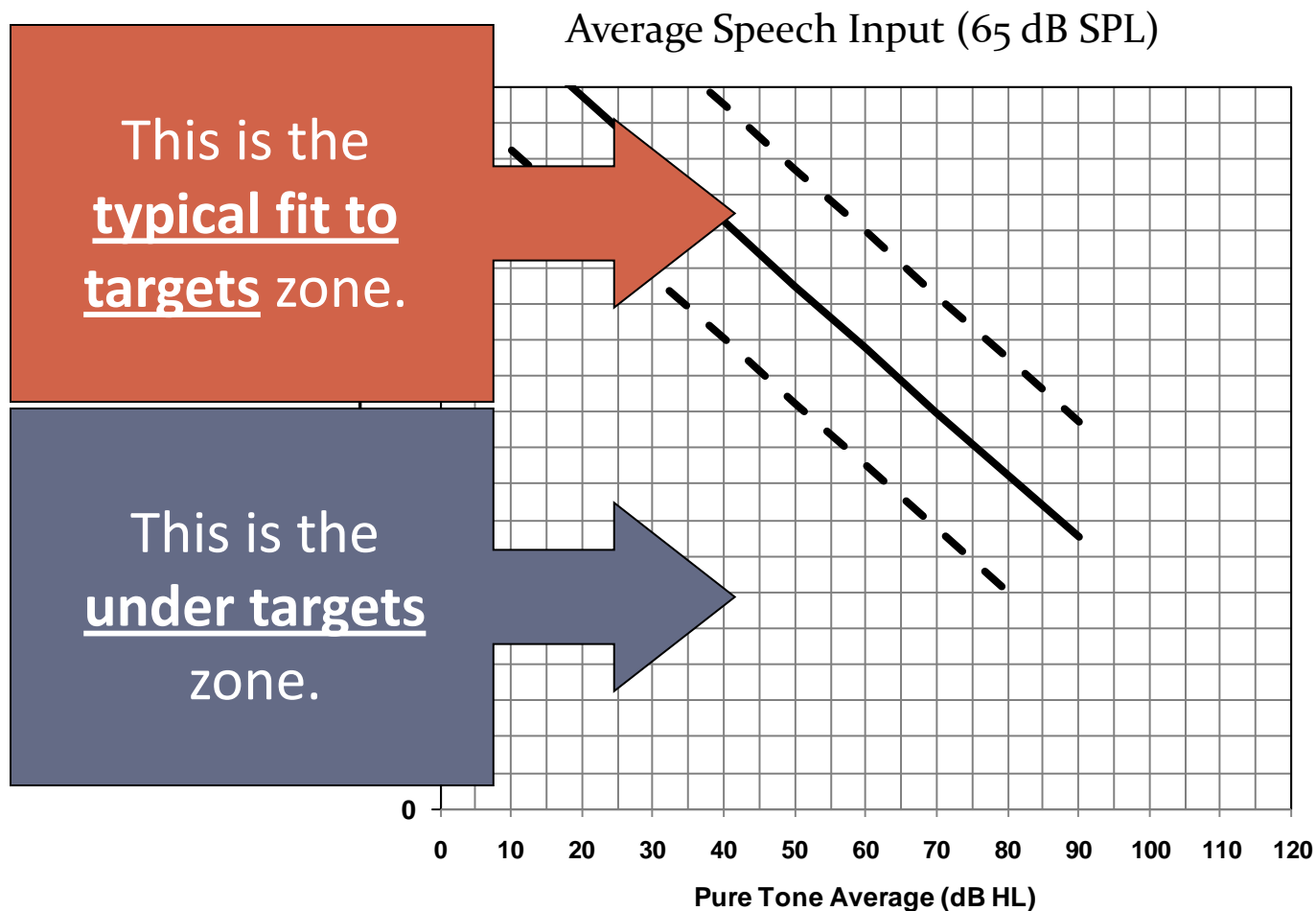
Speech Intelligibility Index (SII)



SII Soft = 66%

SII Avg = 78%

Using the SII Normative Data



Recommended Fit-to-target Criteria

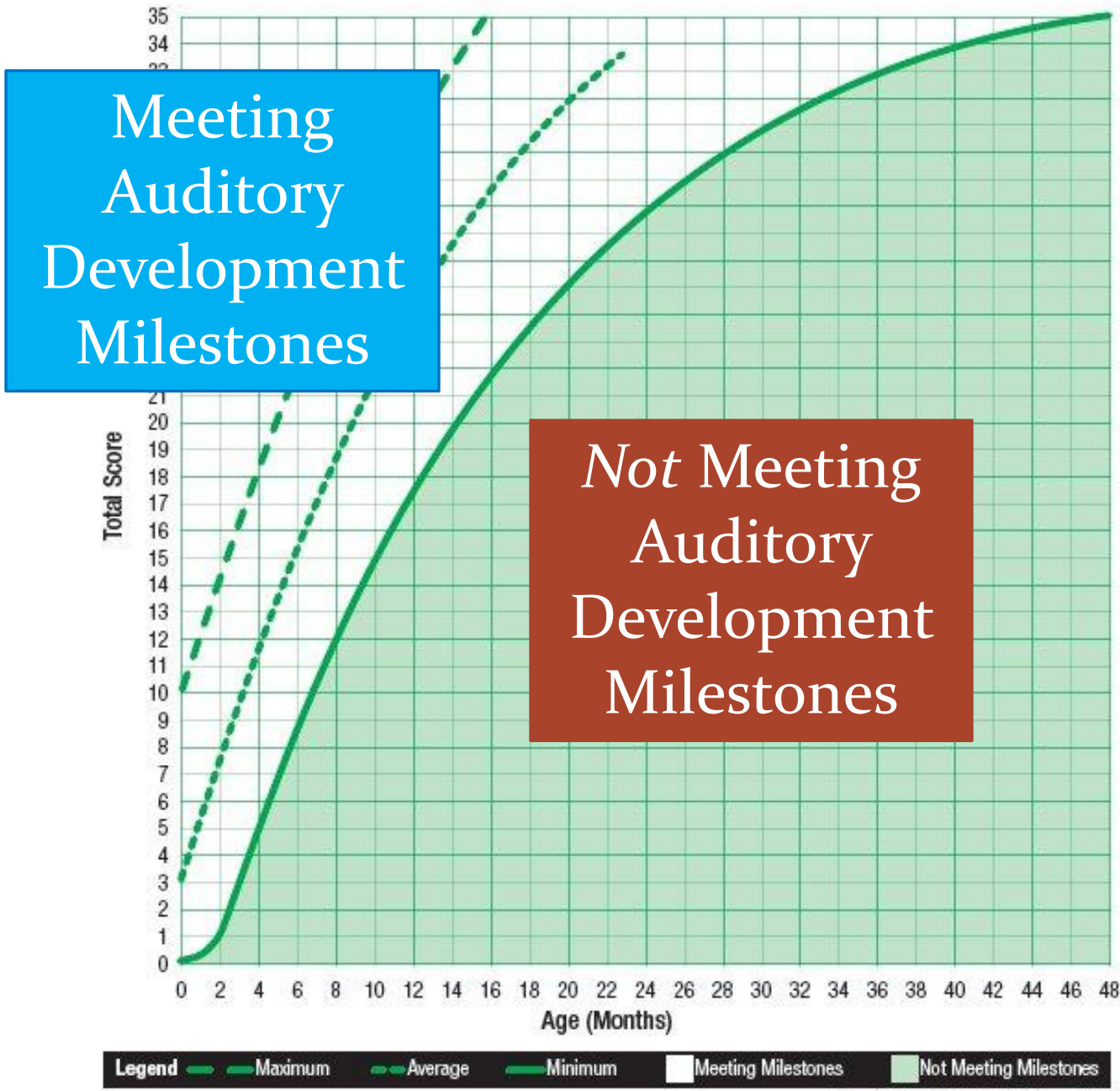
For losses ≤ 70 dB PTA:

- 5 dB from 250 – 2000 Hz
- 5 to 7 dB at 4000 Hz

For losses >70 dB PTA:

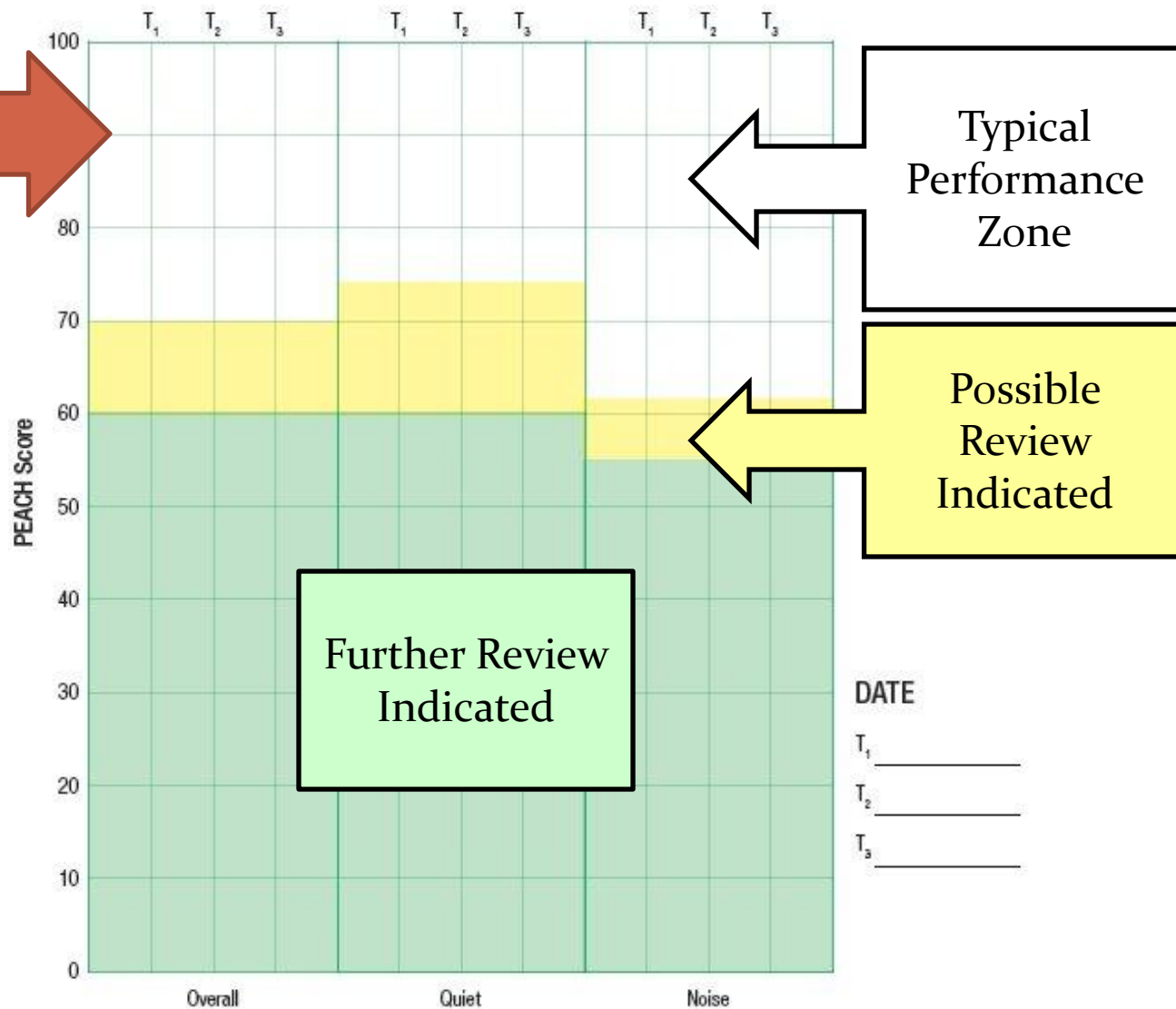
- insufficient data
- recognize inherent limitations of this fitting

LittleEARS Score Sheet (Adapted from MED-EL)



PEACH Score Sheet

Normal hearing children perform here (90%) by 3 YRS (Ching & Hill, 2005).



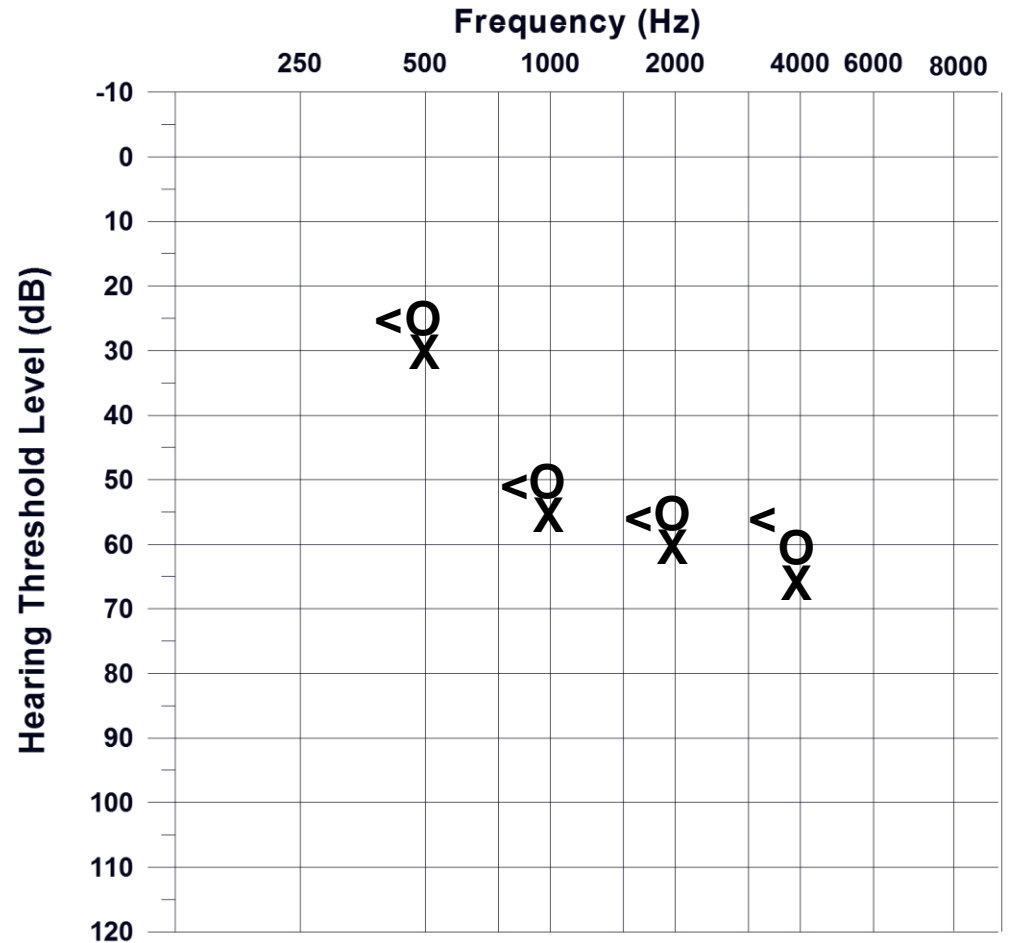
Legend Typical Performance Possible Review Indicated Further Review Indicated

Case Example 1



Case History

- Born full term without complications and no family history of PCHI
- Identified at 4 months of age
- PTA right = 43.3 dB HL
PTA left = 46.6 dB HL
- Fitted with hearing aids at 5 months of age

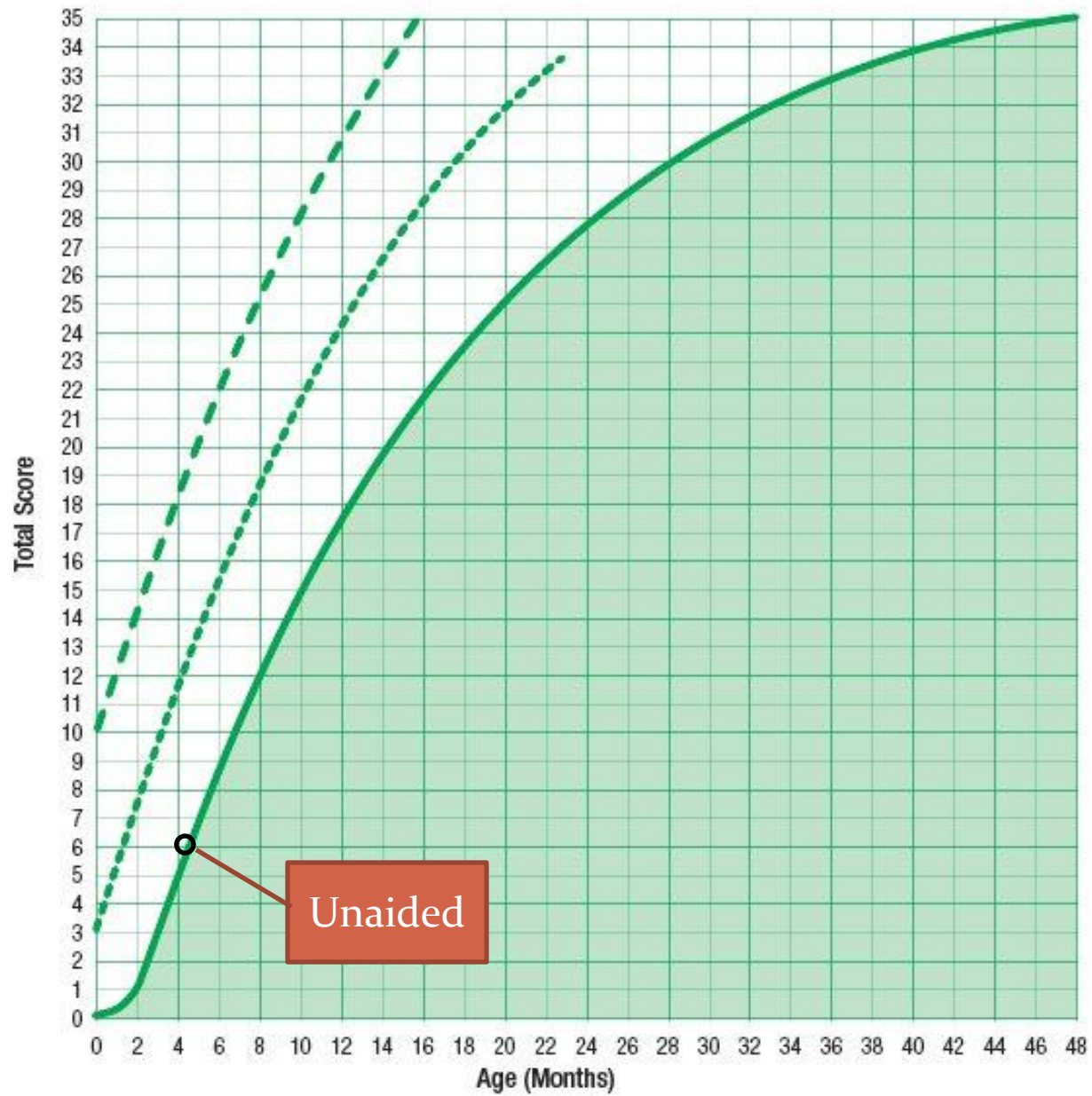


Outcomes Obtained

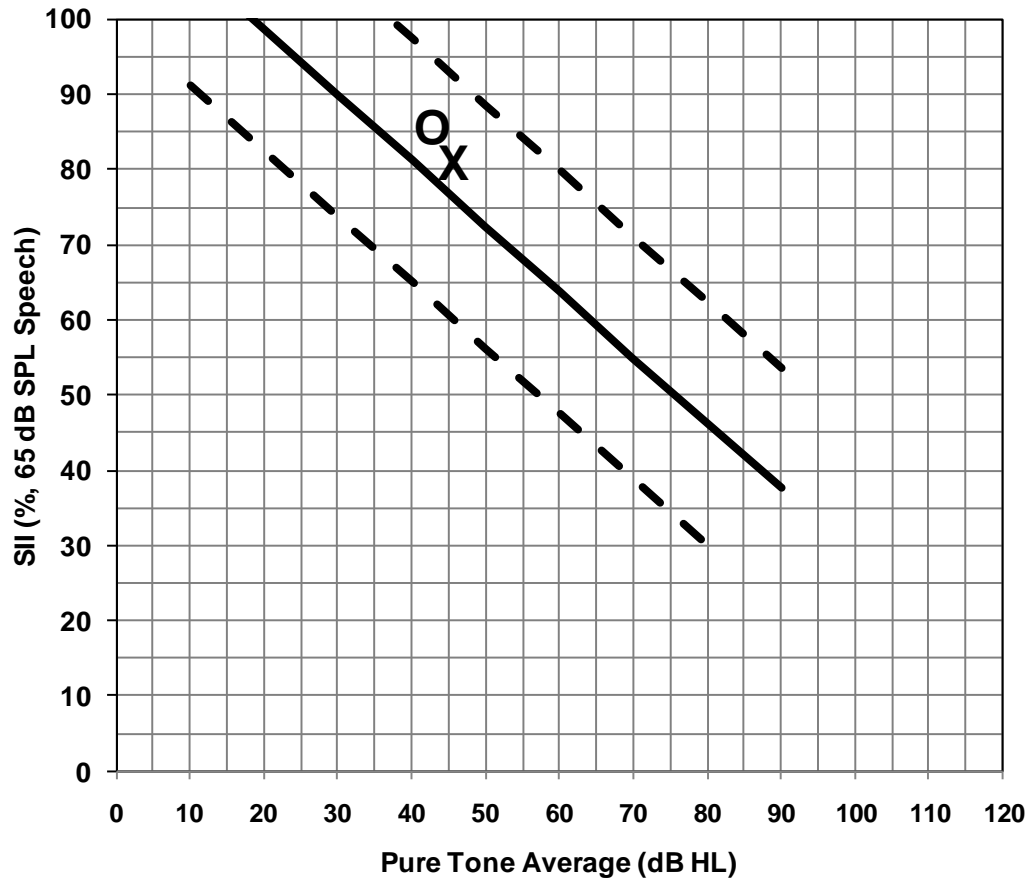
Appointment Type (Aided)

	Initial Assessment	Prefitting	Initial Fitting	30 Day Recheck	3 month Recheck	6 month Recheck	Yearly Rechecks	Event Driven
Hearing Aid Fitting Details	×	×	✓	×	✓	✓	✓	✓
IHP Hearing Aid Benefit	×	×	×	×	✓	✓	✓	✓
LittleEARS	✓ Establish Unaided Baseline: Administer at one of these appointments			✓ If score ≥ 27 , stop LittleEARS, use PEACH.	✓ If score ≥ 27 , stop LittleEARS, use PEACH.	✓ If score ≥ 27 , stop LittleEARS, use PEACH.	✓ If score ≥ 27 , stop LittleEARS, use PEACH.	✓
PEACH	×	×	×	↓	↓	↓	↓	✓

Outcome Evaluation Tool

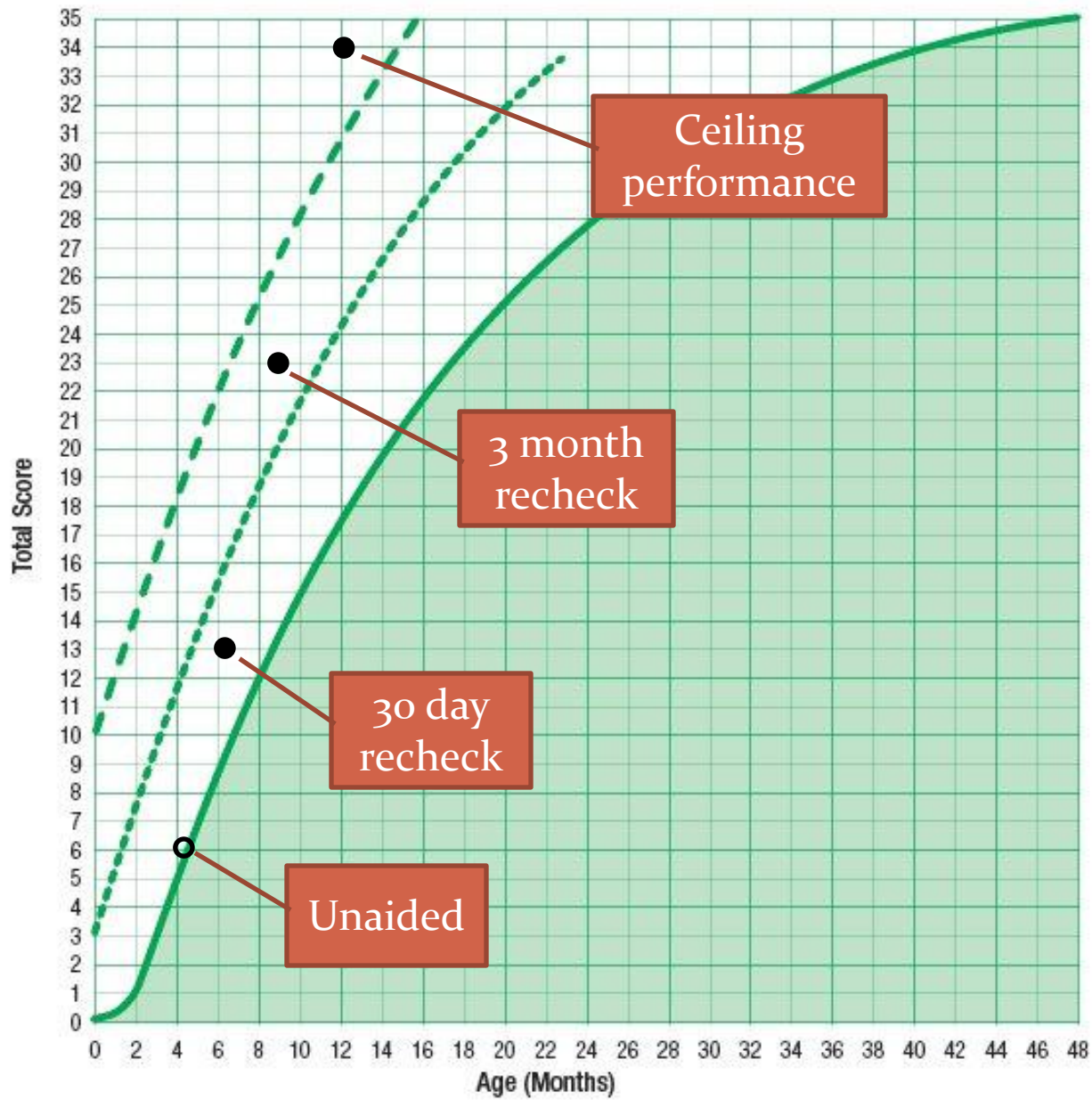


SII Values: Average Speech



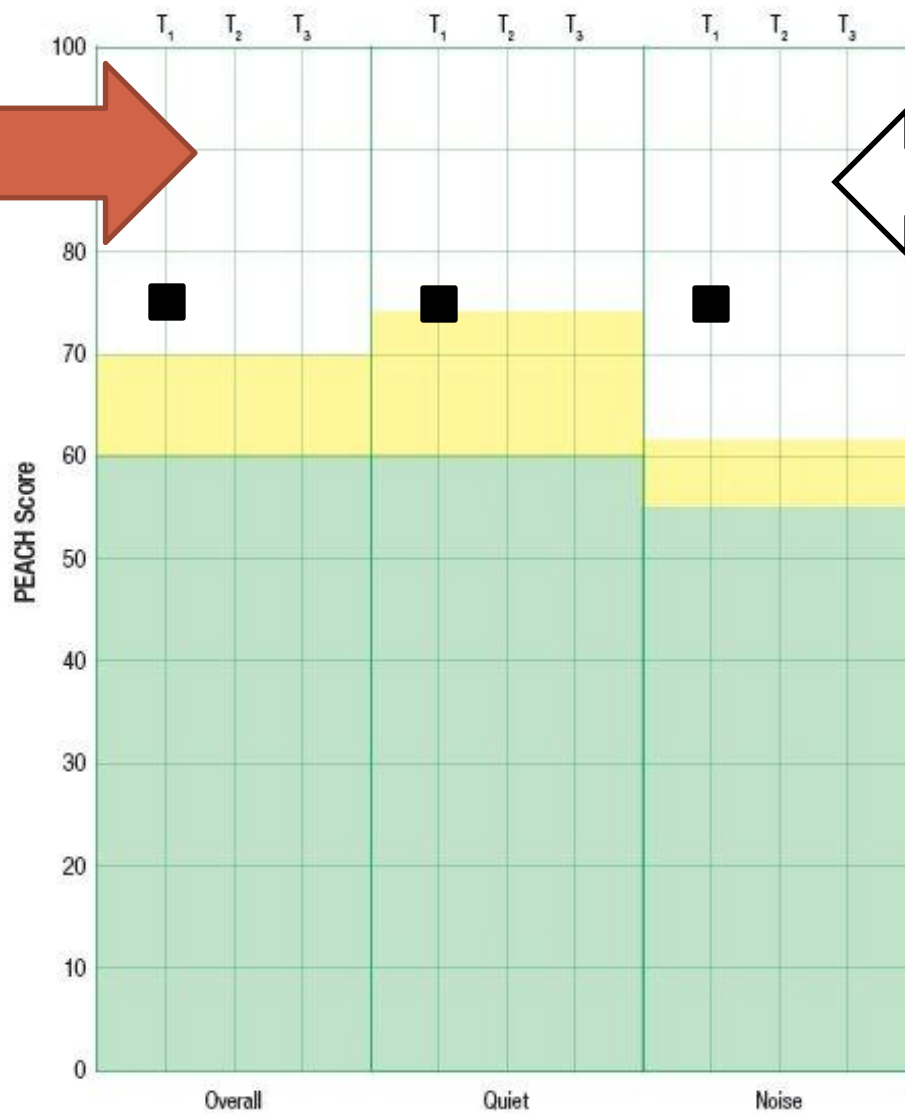
Right = 86%
PTA = 43.3 dB HL

Left = 82%
PTA = 46.6 dB HL



Legend — Maximum - - - Average — Minimum Meeting Milestones Not Meeting Milestones

Normal hearing children perform here (90%) by 3 YRS (Ching & Hill, 2005).



Typical Performance Zone

DATE
T₁ 15 months
T₂ _____
T₃ _____

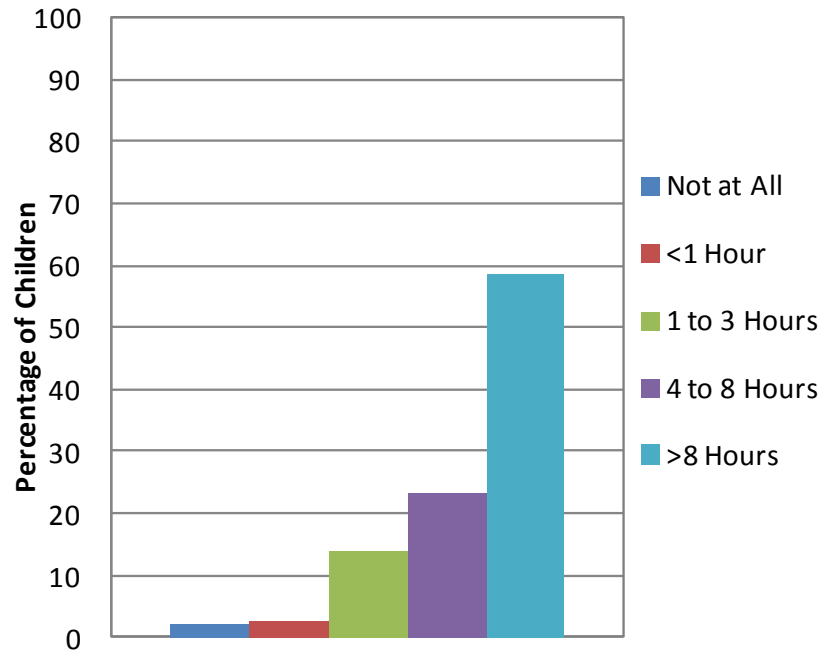
Legend Typical Performance Possible Review Indicated Further Review Indicated

OIHP Amplification Benefit Questionnaire: Case 1

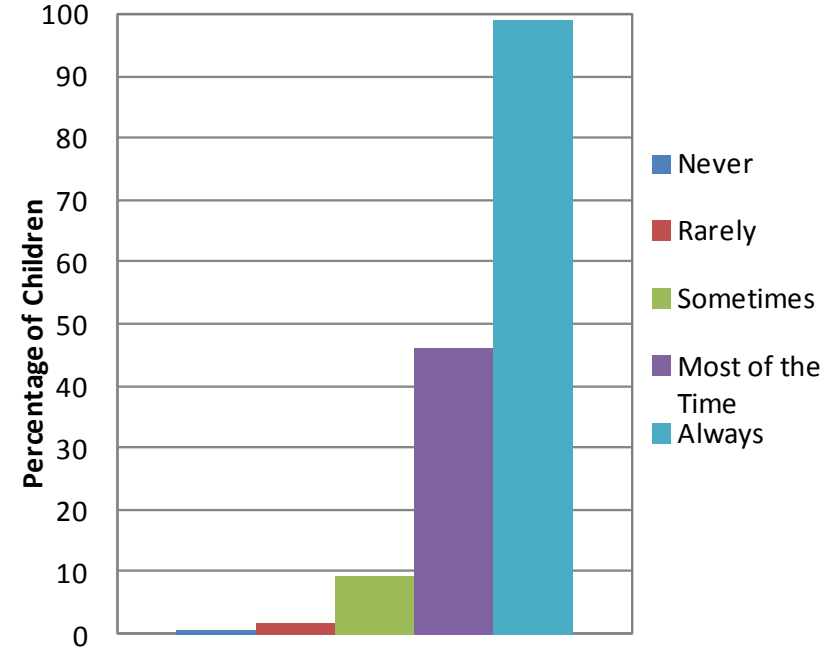
- For first 6 months of hearing aid use, caregiver reported 4-8 hours of hearing aid use per day
 - Increased to >8 hours per day by 9 months usage
- Child 'Always' responded to average level sounds

Study Results: N = 105

Daily Hours of Device Use



Response to Average Level Sounds

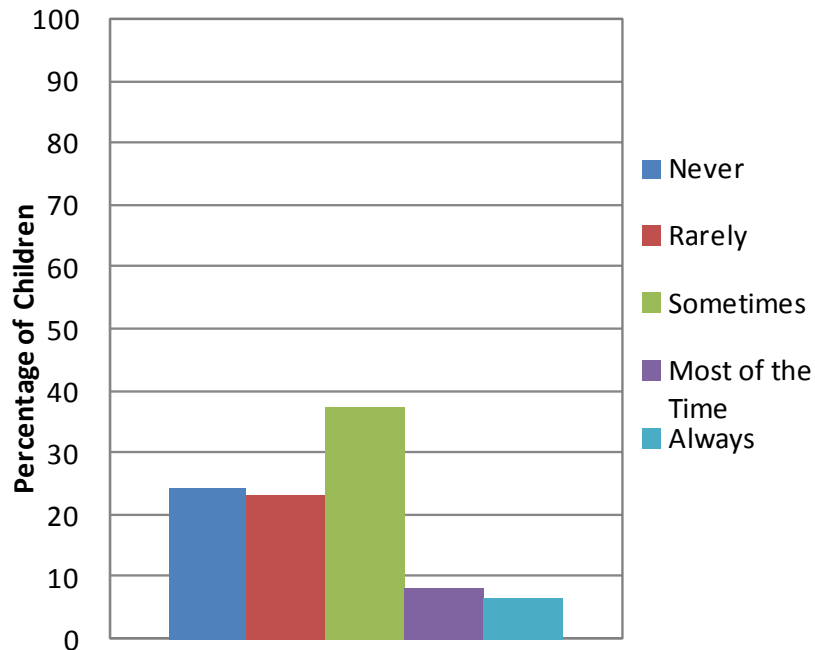


OIHP Amplification Benefit Questionnaire: Case 1

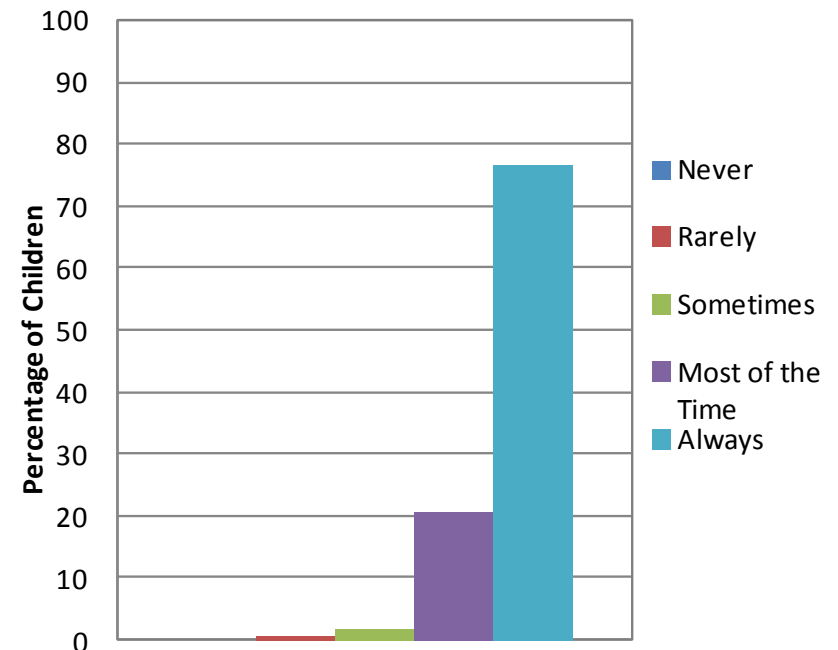
- Wearing the hearing aids, the child 'Never' showed discomfort to loud level sounds
- Parent 'Always Satisfied' with hearing aid services that have been provided

IHP HA Benefit Results: N = 105

Discomfort to Loud Sounds



Satisfaction with Hearing Aid Services



Case Example 1: Summary

- Meeting auditory development milestones for his age with hearing aids (LittleEARS)
- SII values indicate typical audibility for his degree of hearing loss
- Displaying appropriate auditory performance with hearing aids (PEACH); monitor improvement with age
- Parent reported good daily hearing aid use which increased over time; reported good responses to sound and satisfied with services provided

Case Example 1: Summary

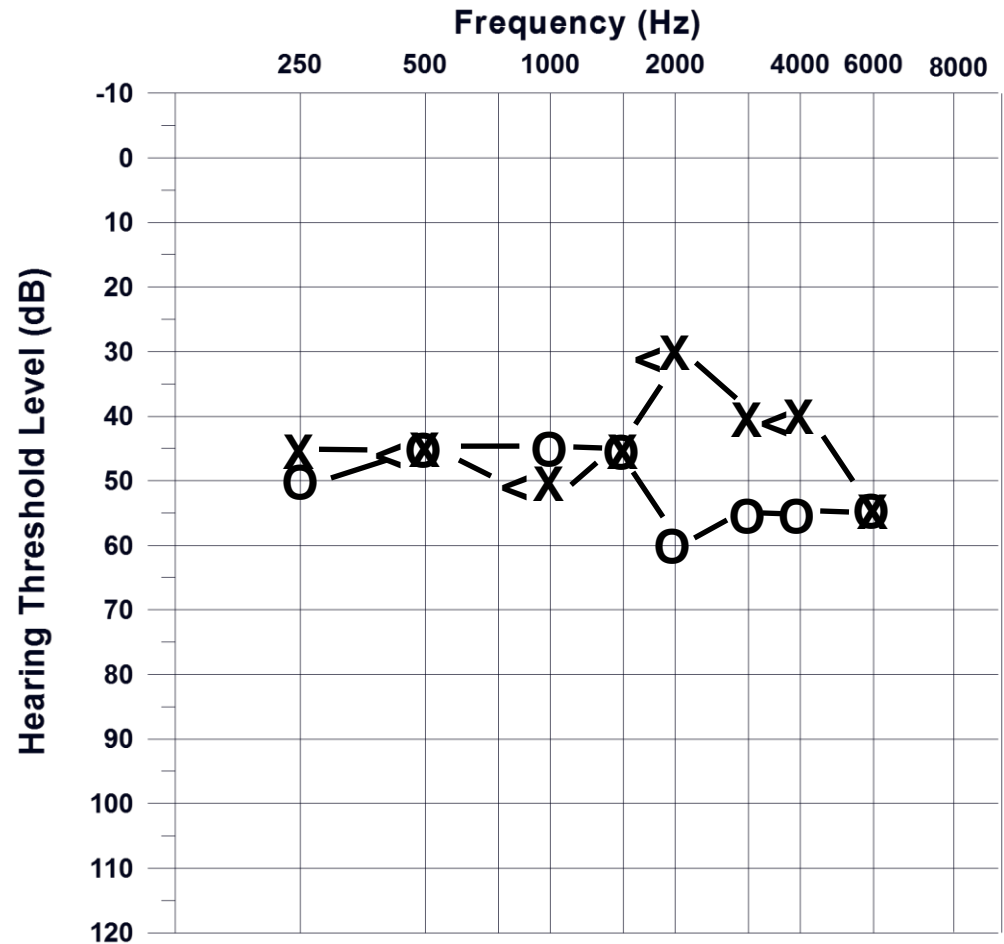
- Child was less than 2 years of age at time of PEACH administration
 - May be showing an age effect and scores may improve as he gets older
- Supports the recommendation to administer the PEACH after the child has reached a ceiling score on the LittleEARS *and* is at least 2 years of age
 - Interpret with caution due to developmental level

Case Example 2



Case History

- Born full term without complications and no family history of PCHI
- Referred on hearing screening at birth; parents did not follow-up
 - Identified at 4 years of age (complex factor)
- PTA right = 51.3 dB HL
- PTA left = 41.3 dB HL
- Fitted with hearing aids immediately (4 years of age)



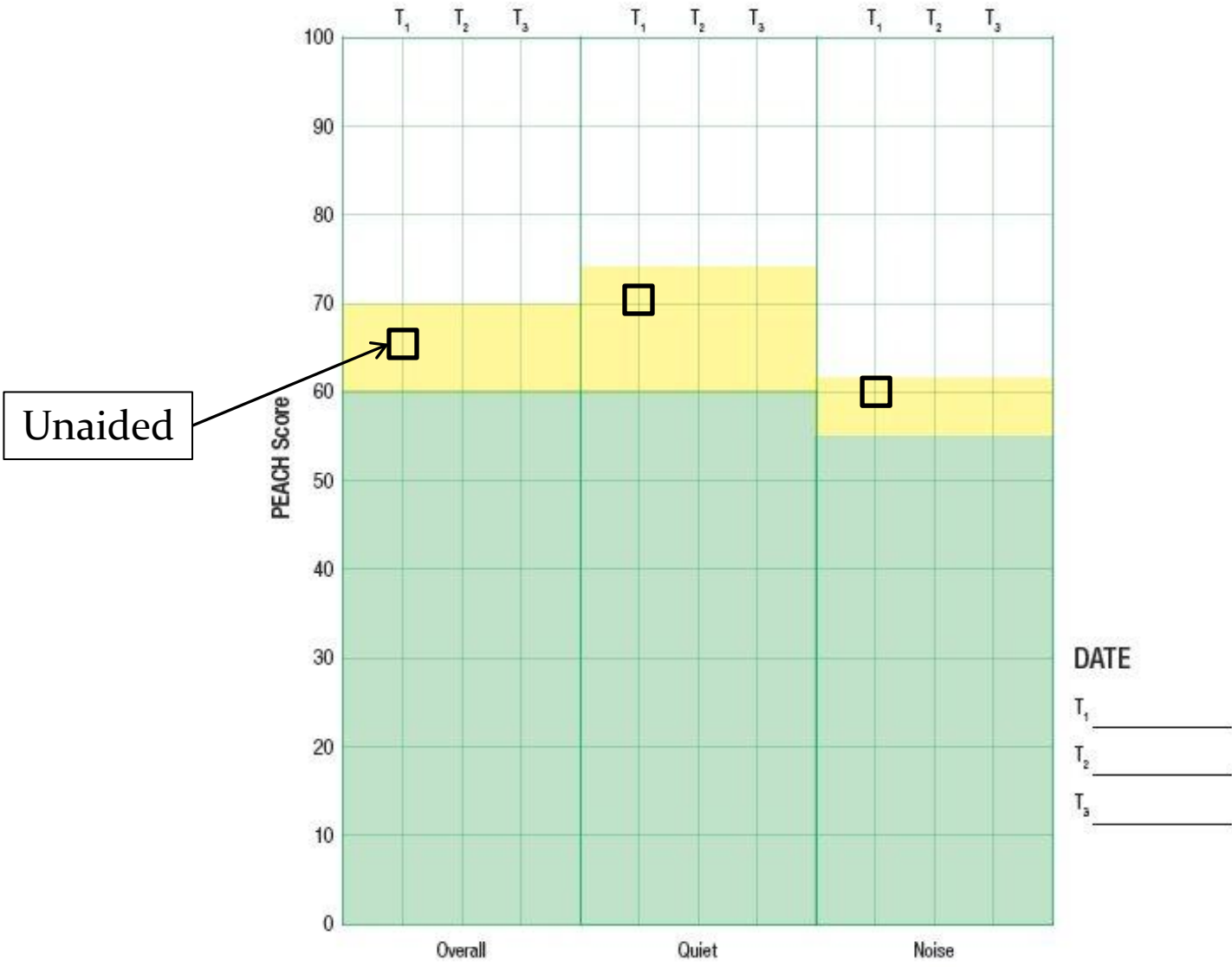
Outcomes Obtained

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PEACH	×	×	✓	↓	↓	↓	↓	✓

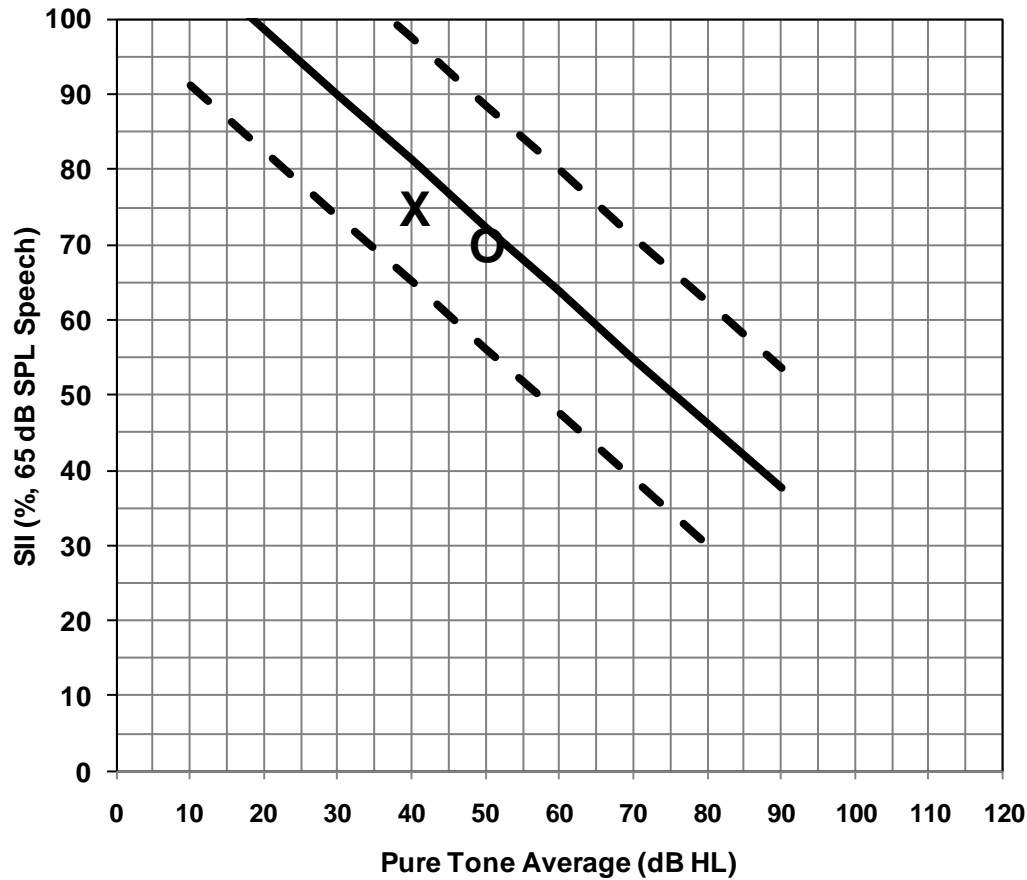
Outcome Evaluation Tool

PEACH Scores



Legend Typical Performance Possible Review Indicated Further Review Indicated

SII Values: Average Speech



Right = 70%
PTA = 51.3 dB HL

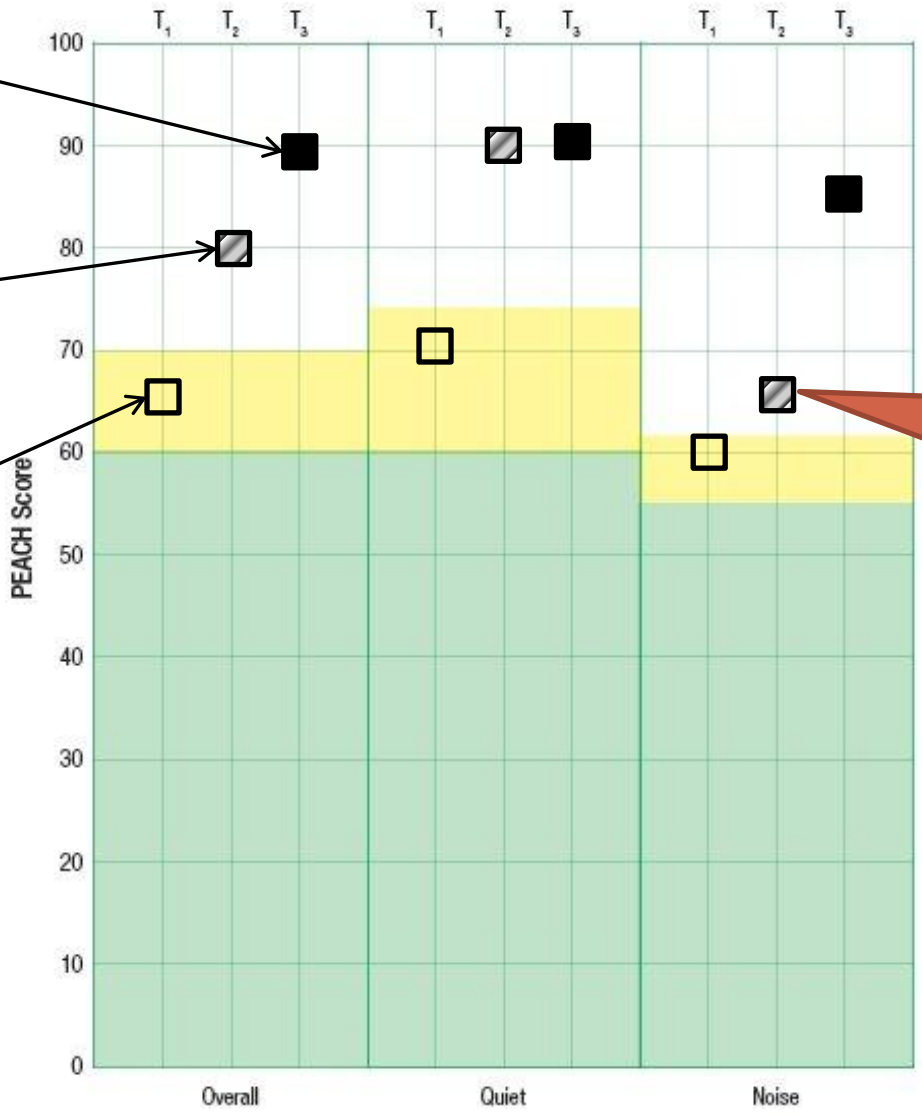
Left = 75%
PTA = 41.3 dB HL

PEACH Scores

Aided for 5 months

Aided for 2 months

Unaided



Light noise program applied (omnidirectional)

DATE
 T₁ _____
 T₂ _____
 T₃ _____

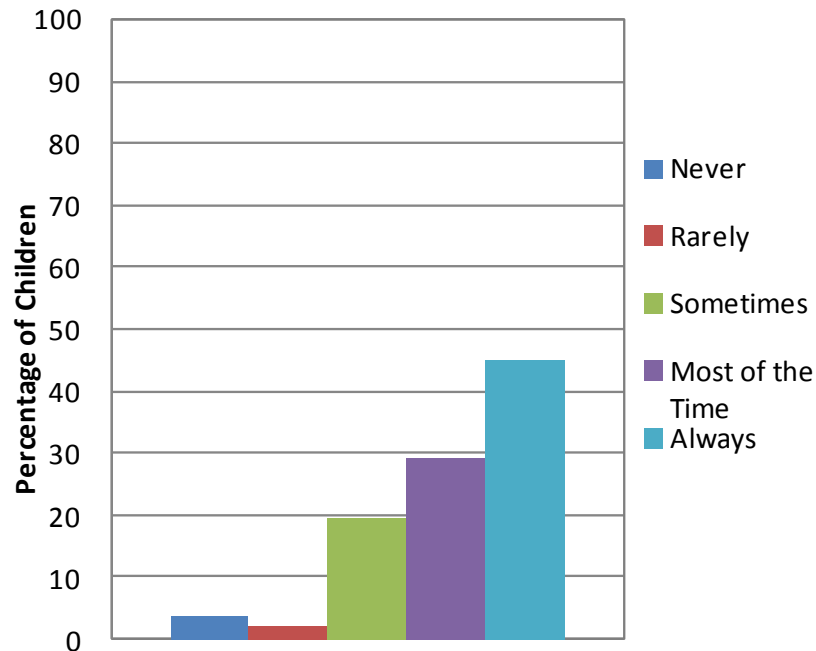
Legend □ Typical Performance ■ Possible Review Indicated ■ Further Review Indicated

OIHP Amplification Benefit Questionnaire: Case 2

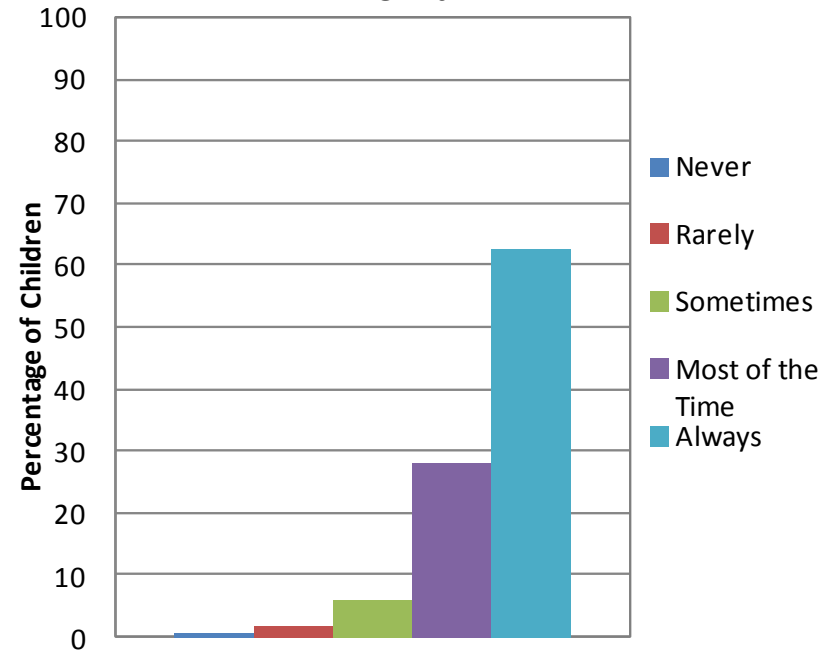
- Parent reported >8 hours of hearing aid use per day
- Child willingly accepts the hearing aids 'Most of the Time'
- 'Always' checks the device before putting the hearing aid on the child
- The hearing aids are 'Always' worth the effort

IHP HA Benefit Results: N = 105

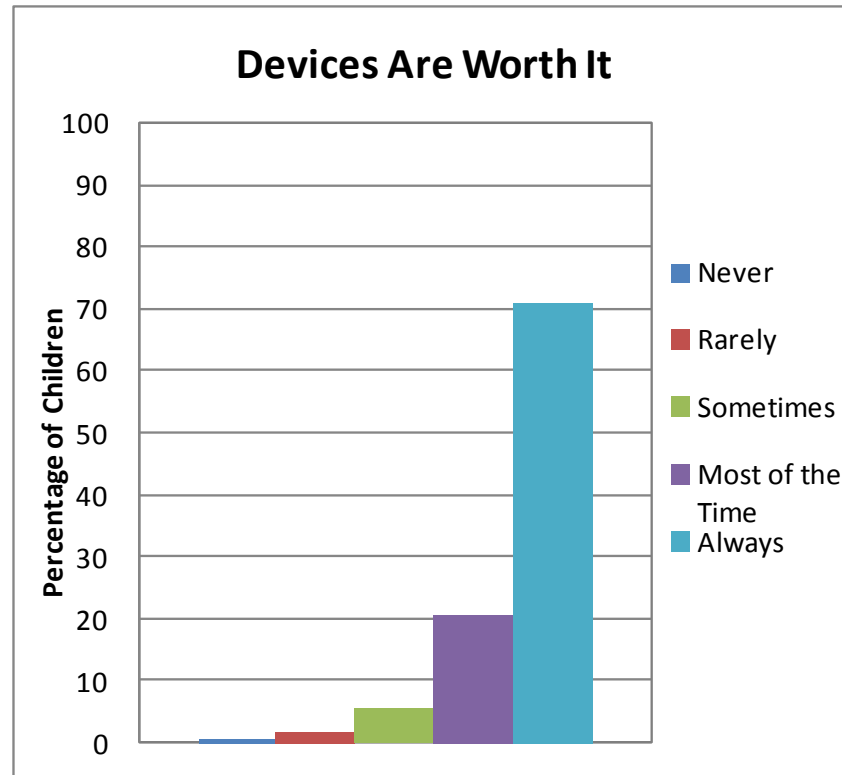
Child's Acceptance of Device



Troubleshoot Device Prior to Putting on Child



IHP HA Benefit Results: N = 105



Case Example 2: Summary

- Initially, not displaying typical auditory performance (PEACH); unaided condition
- SII values indicate typical audibility for her degree of hearing loss
- With hearing aid use, displaying appropriate auditory performance with hearing aids (PEACH)
- Reported child wears hearing aids all waking hours; Parent satisfied with services and comfortable troubleshooting device

Case Example 2: Summary

- PEACH is sensitive to auditory performance in the unaided and aided conditions
 - Shows progression in scores with more experience with aids
- Although child had late intervention, initiating intervention that followed an evidence-based protocol improved child's auditory performance compared to when intervention was not provided



Conclusions

Clinical Need:

Pediatric audiologists who fit young infants with hearing aids need tools to measure the impact of the hearing aid on the child's auditory development

Program Need:

Early Hearing Detection and Intervention (EHDI) programs need tools to assess the overall quality of the program

Summary

- With these case studies, positive outcomes with intervention were documented by systematically tracking the child's auditory development and performance over time
- This was supported by clinical process outcomes describing the details of the hearing aid fitting
- Hearing aid services were assessed by the parent to track program quality

Outcome Evaluation: Benefits

- May foster parental engagement which may increase involvement for some families
- Provides a systematic and evidence-based way of tracking the impact of the hearing aid fitting
 - Completes the hearing aid fitting process
- Tracks overall program outcomes as well as describes patterns that affect children in the program



Thank you...

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www.dslio.com

