

# Pediatric Development in Speech Recognition in Continuous and Interrupted Noise



**A PRESENTATION BY: ASHLEY TIMBOE**

# The Problem



- **The most common clinical complaint for many adults & children with sensorineural hearing loss (SNHL) is difficulty understanding speech in noise.**

# The Solution



- **Historically, difficulty understanding speech in noise has been addressed by improvements in hearing aid technology.**
- **More recently, auditory training has been beneficial in improving speech understanding in noise.**

# So What Continues to be the Problem?



- Researchers and clinicians have not however come to a consensus on on which fitting method or hearing aid features are most beneficial to improving speech understanding in noise for individuals with SNHL.
- More importantly, it seems that some hearing aid fittings result in greater success than others. While some patients are pleased and perceive great benefit with their amplification after hearing aid verification, there are others who do not find the same success.

# Contributing Factors



- **There are numerous factors that can affect patient performance on speech understanding in noise.**
  - Cognitive ability
  - Temporal resolution abilities
  - Frequency resolution abilities
  - Age diagnosed with hearing loss
  - Age fit with amplification
  - Type of amplification
  - Degree of hearing loss

# Temporal Resolution



- One method with which we can take a closer look at an individual's temporal resolving abilities, is through word recognition performance in continuous and interrupted noise.
- By calculating the difference between performance in these two noise conditions, it is possible to assess an individual's release from masking abilities thus determining whether the listener is capable of taking advantage of the dips in the interrupted noise.

# Temporal Resolution Continued...



- The developmental progression of children's temporal resolving abilities continually grows reaching adult performance levels after 11 years of age
- What this suggests, is that these changes are actually a reflection of central auditory system maturation

# Study Aim



- **To determine if speech recognition performance differences exist in interrupted and continuous noise between children with and without hearing loss**

# Research Questions



1. Do children with hearing loss perform equal to normal hearing peers in interrupted and continuous noise?
2. Do children with hearing loss perform half as well as normal hearing peers in interrupted and continuous noise similar to what has been observed in adult populations?
3. Do outcome measures of benefit predict speech in noise performance in interrupted and continuous noise?

# Participants



- 10 normal hearing subjects
- 2 children with hearing loss

# Children with Hearing Loss



<b>Subject</b>	<b>Age (years)</b>	<b>Age Diagnosed (Months)</b>	<b>Age Fit With Amplification (Months)</b>	<b>Amplification Type</b>	<b>Hearing Loss</b>	<b>Cause of Hearing Loss</b>
HI1	11.6	3-4	3-6	Phonak Naida BTE	Mild-Moderate SNHL	Genetic
HI2	11.3	18	30	Phonak Extra 411 BTE	Moderate-Profound SNHL	Enlarged Vestibular Aqueduct

**Table 1.0: Mean Demographic information for hearing loss participants (HI)**

# Set-up/Procedure



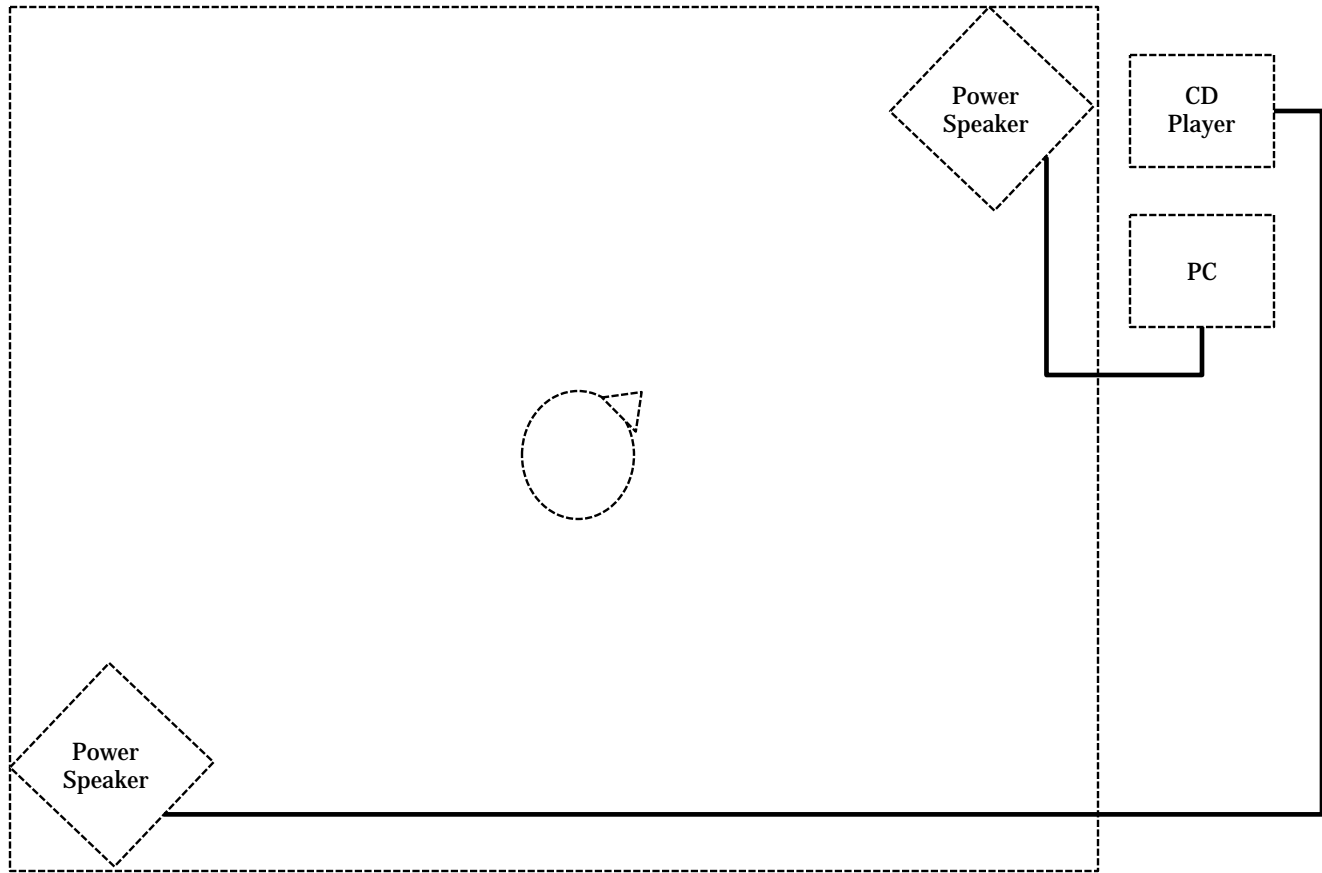
- Adequate hearing aid function verified on Fonix FP35 Hearing Aid Analyzer
- Bilateral amplification at user settings for all testing
- Speech Reception thresholds measured with automated HINT (v.7.2) in interrupted and continuous noise

# Set-up/Procedure Continued...



- A single one hour testing session was performed
- All testing performed in a double-walled sound booth and presented via soundfield power speakers

# Set-up Diagram



# Speech Stimuli



- **The automated HINT (v.2) was administered**
- **Sample Sentence: Strawberry jam is sweet**

# Noise Stimuli



- The HINT noise was modified to play the entire duration of testing for interrupted and continuous noise
- The original noise was interrupted randomly with 5 to 95 ms silent intervals for the interrupted condition

# Outcome Questionnaire



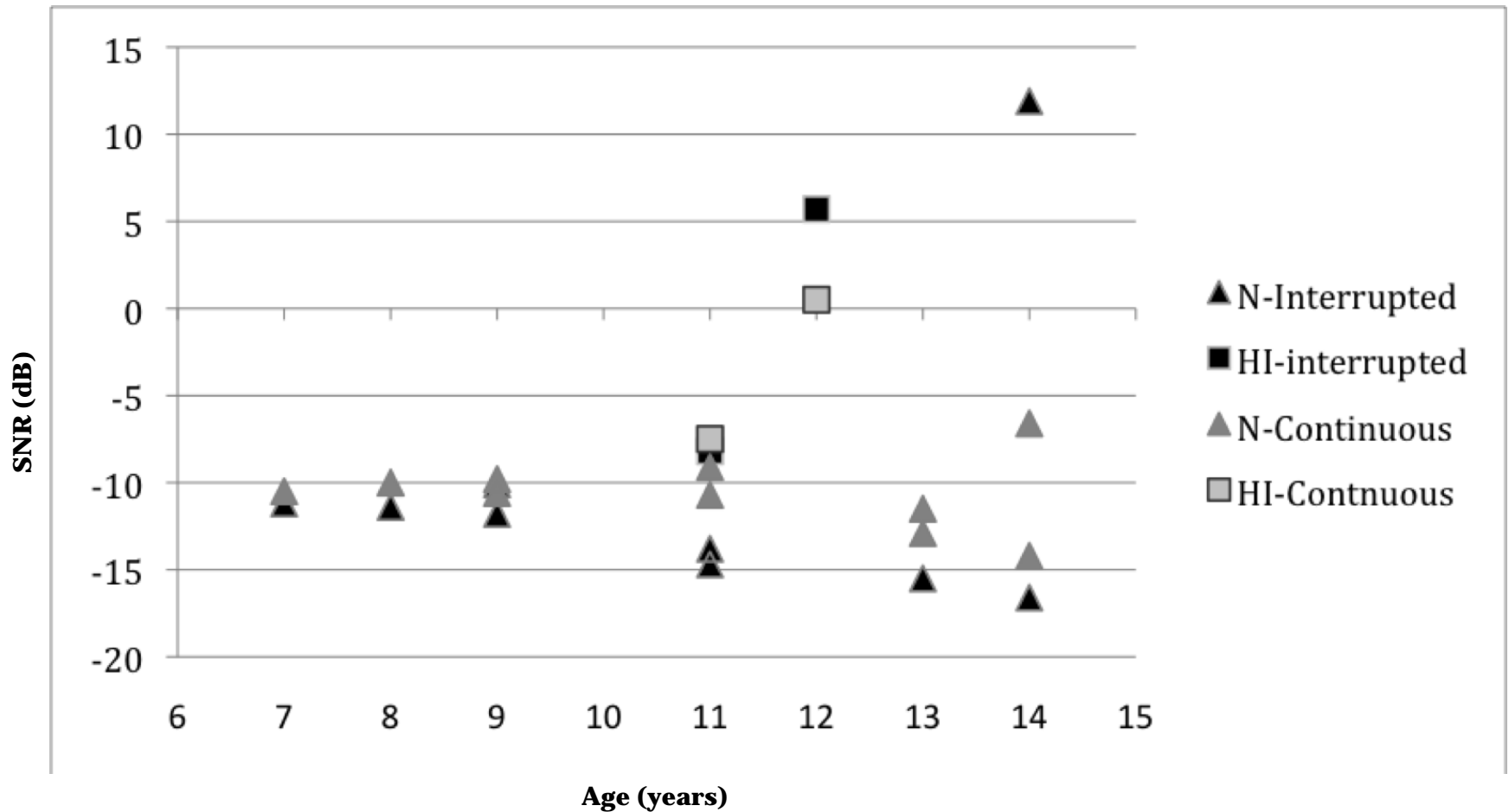
- **The Pediatric Abbreviated Profile of Hearing Aid Benefit (P-APHAB) was administered to both the child with hearing loss and their parent**
- **Percent benefit was determined by averaging subjective scores on the ease of communication, reverberation as well as background noise subscales from both the child and parent report**

# Performance Measures

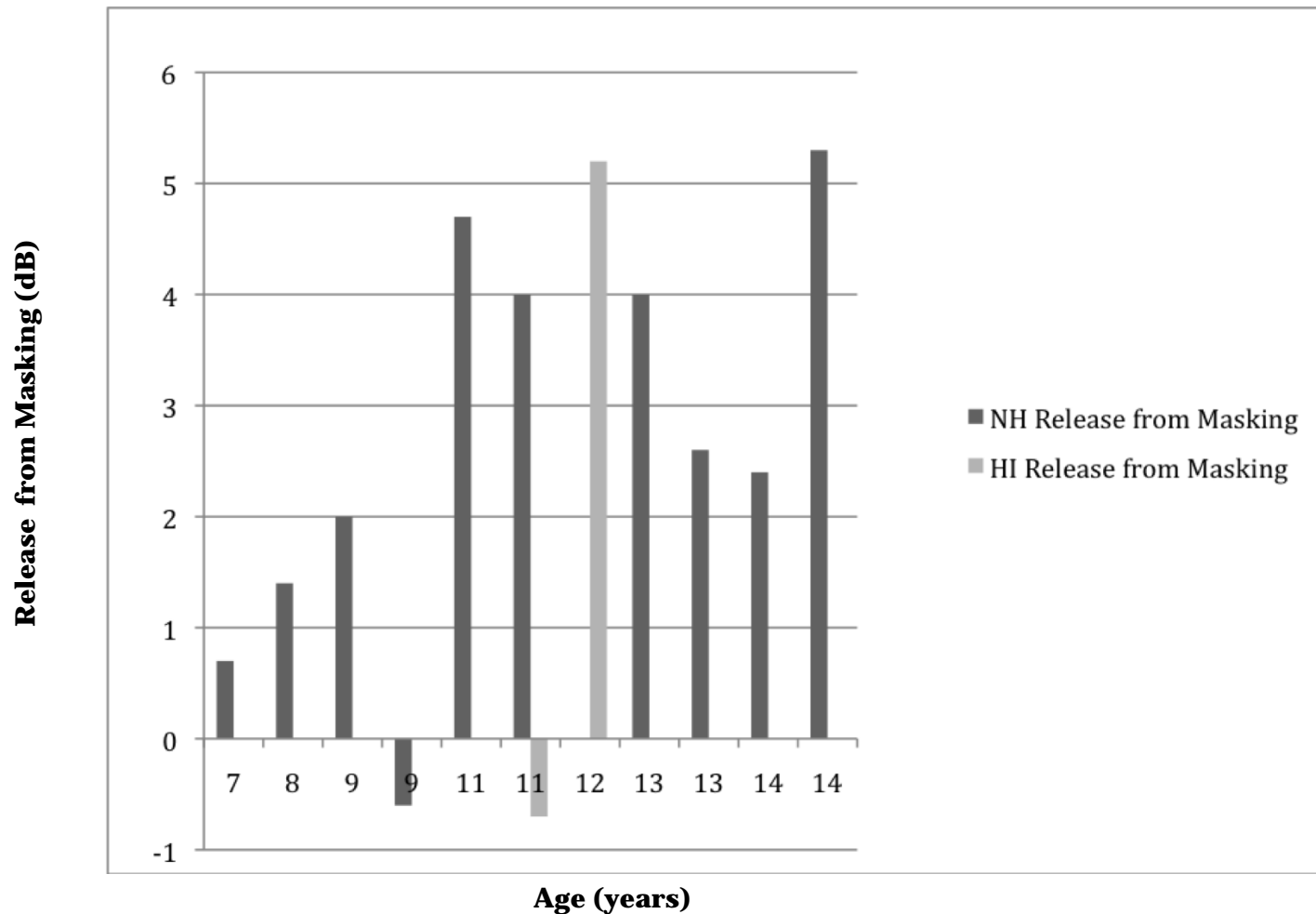


- **Aided speech recognition thresholds were measured in both interrupted and continuous noise**
- **Percent perceived benefit with amplification in noise with P-APHAB**

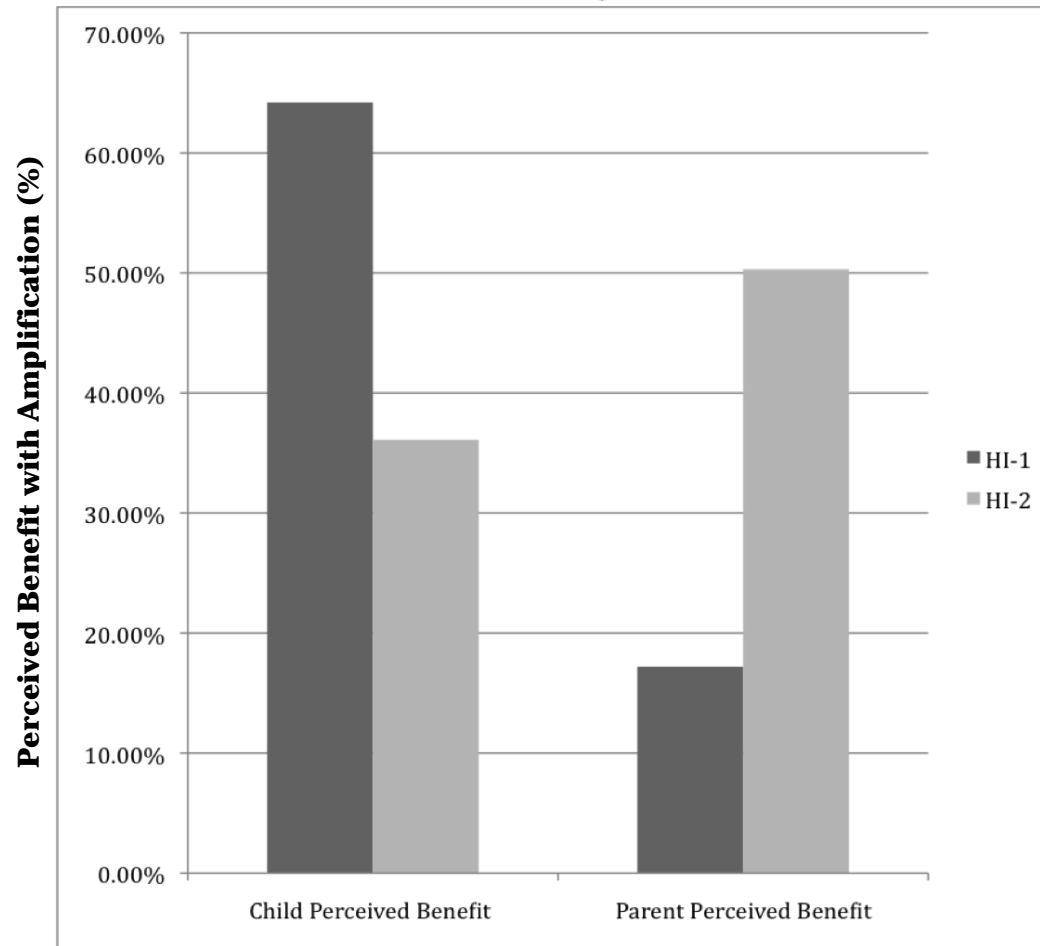
# HINT Performance Findings



# Release from Masking Performance



# P-APHAB Performance



**Child vs. Parent**

# Summary of Findings



- 1. Do children with hearing loss perform equal to their normal hearing peers in interrupted and continuous noise?

***No, children with hearing loss do not perform equal to their normal hearing peers***

# Summary of Findings



- 2. Do children with hearing loss perform half as well as their normal hearing peers in interrupted and continuous noise similar to what has been observed in adult populations?

***It is unclear, more data will need to be collected on children with hearing loss to determine the relationship between these two populations***

# Summary of Findings



- 3. Does outcome measure of benefit predict speech in noise performance in interrupted and continuous noise?

***According to our findings, there initially appears to be little relationship between perceived benefit and actual speech understanding in noise performance***

# Future Directions



- Investigate other pediatric outcome measures to determine if it is possible to predict speech in noise performance for children with hearing loss
- Further investigation of the factors relating to hearing loss in children and the effect on individual speech understanding in noise

# Acknowledgements



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# References



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