

THE IMPACT OF HEARING LOSS ON LANGUAGE AND LITERACY DEVELOPMENT IN CHILDREN

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SPEAKER CONFLICTS OF INTEREST: FINANCIAL AND NON-FINANCIAL

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An expectation of our employment as faculty members of Concordia University Wisconsin is scholarship (sharing our expertise). We receive a salary in this employment. Beyond that, there are no other financial or non-financial conflicts of interest associated with this presentation.

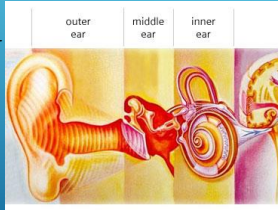
TODAY

- ▶ Review the fundamentals of hearing anatomy and hearing loss in preschool and elementary populations.
- ▶ Describe the impact of hearing loss on language and literacy development.
- ▶ Discuss considerations for children with hearing impairment to optimize learning environments and opportunities.

HOW DO WE HEAR?

▶ The ear is divided into 3 main parts:

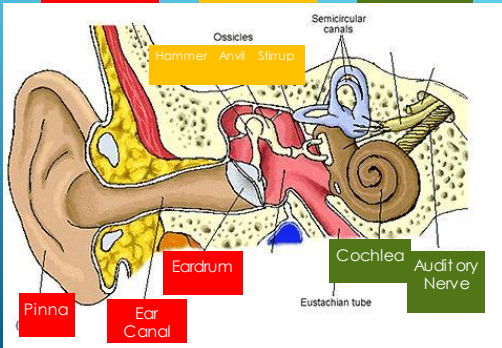
- ▶ Outer Ear
- ▶ Middle Ear
- ▶ Inner Ear



Outer Ear

Middle Ear

Inner Ear



HOW HEARING WORKS



WHEN DO WE TEST?

- ▶ New born Hearing Screening
- ▶ Screenings related to
 - ▶ Speech/language delay
 - ▶ ENT issues
 - ▶ Trauma
 - ▶ Illness
 - ▶ Parental concern
- ▶ School screenings

UNIVERSAL NEWBORN HEARING SCREENING

- ▶ Wisconsin screens 99% of all newborns
- ▶ In 2016, 121 babies were diagnosed with permanent hearing loss through Wisconsin's UNHS program
- ▶ UNHS has changed early intervention



WHAT DO WE TEST?

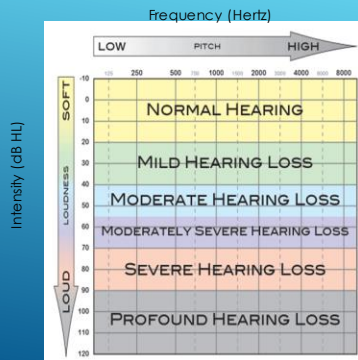
- ▶ Pure tones – aka “beeps”
 - ▶ Air conduction thresholds
 - ▶ Bone conduction thresholds
 - ▶ Individual ear v s. soundfield
- ▶ Speech testing
- ▶ Tympanometry
- ▶ OAEs

HOW DO WE TEST HEARING?

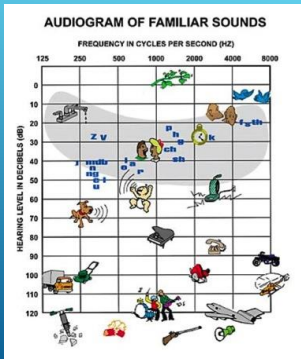


- Results are plotted on an audiogram
- Documents how loud the stimulus needs to be in order to be heard (threshold)

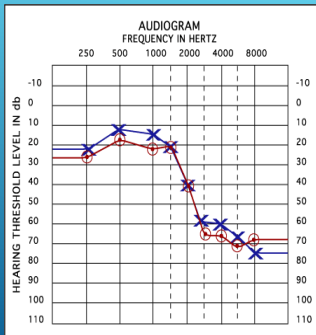
AUDIOGRAM LAYOUT



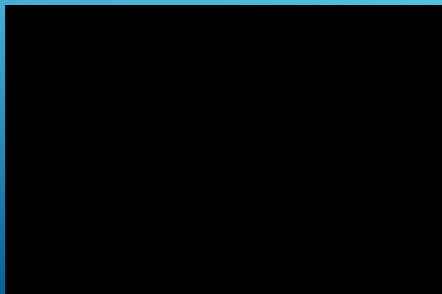
SPEECH BANANA



HEARING LOSS EXAMPLE



WHAT IS IT LIKE TO HAVE HEARING LOSS?



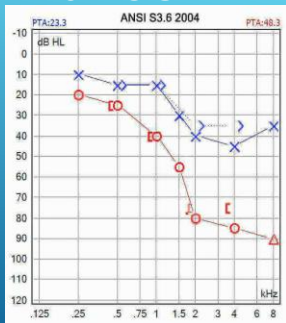
CAUSES OF HEARING LOSS

- ▶ Wax
- ▶ Ear infections
- ▶ Eardrum perforations
- ▶ Problems with the middle ear bones
- ▶ Trauma
- ▶ Syndromes
- ▶ Viral infections
- ▶ Noise exposure
- ▶ Aging
- ▶ Heredity
- ▶ Ototoxic medications

TYPES OF HEARING LOSS

- ▶ Sensorineural
- ▶ Conductive
- ▶ Mixed
- ▶ Fluctuating
- ▶ Unilateral

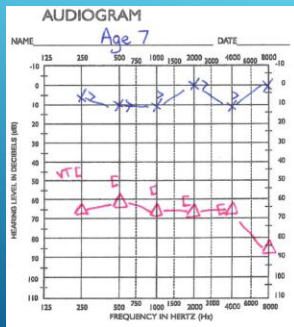
AUDIOGRAM



BILATERAL HEARING LOSS

- ▶ Prevalence of permanent childhood hearing loss varies based on criteria, but is generally estimated 1 to 3 per 1,000 children are born with a hearing loss (Center for Disease Control and Prevention, 2009).
- ▶ What does hearing loss sound like?

UNILATERAL HEARING LOSS



UNILATERAL HEARING LOSS

- Is it a problem?
- Varying opinions on effects/treatments
- Academic effects
- Right vs left
- Lack of localization
- Difficulty w ith background noise
- Speech-language effects
- Answer: it can be a problem

FLUCTUATING/TRANSIENT HEARING LOSS

- Research/Lack of causal links
- Mistaken perceptions/Behavioral problems
- Case by case basis
- Similar recs as some other types of hearing loss

EFFECTS OF HEARING LOSS

- ▶ Embarrassment, fatigue, irritability
- ▶ Tension/stress
- ▶ Avoidance of social activities
- ▶ Withdrawal from personal relationships
- ▶ Depression
- ▶ Danger to personal safety
- ▶ Social rejection by others
- ▶ Impaired memory and ability to learn new tasks
- ▶ Reduced job performance and earning power
- ▶ Diminished psychological and overall health

(Better Hearing Institute, 2009)

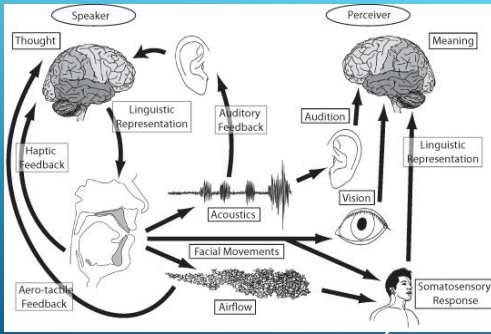
HOW DOES HEARING LOSS AFFECT CHILDREN IN SCHOOL?

- ▶ Potential Educational Impact of Hearing Loss
 - ▶ Delayed speech and language development
 - ▶ Poor attention skills
 - ▶ Difficulty following directions
 - ▶ Problems with phonemic awareness, which can result in reading delays
 - ▶ Delayed social skills
 - ▶ Difficulty hearing in noise
 - ▶ Difficulty localizing sound
 - ▶ Poor organizational skills
 - ▶ Fatigue
 - ▶ Decreased background knowledge

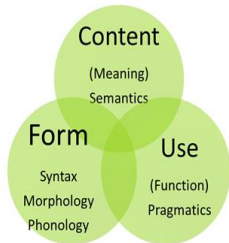
A CLOSER LOOK – LANGUAGE AND LITERACY



THE SPEECH CHAIN (DENES & PINSON (1993))



COMPONENTS OF LANGUAGE



SEMANTICS

- ▶ Vocabulary develops more slowly.
- ▶ **Concrete** words like *cat*, *jump*, *five*, and *red* are learned more easily than **abstract** words like *before*, *after*, *equal to*, and *jealous*.
- ▶ Difficulty with **function** words like *the*, *an*, *are*, *a*.
- ▶ Difficulty understanding words with **multiple meanings**.
- ▶ **Limited conceptual categories**, generally related to self.
- ▶ Vocabulary gap widens with age

PHONOLOGY

- ▶ Impact on phonology depends on configuration of the hearing loss
- ▶ May not hear their own voices when they speak
 - ▶ Difficulties with:
 - ▶ Volume
 - ▶ Pitch
 - ▶ Intelligibility
 - ▶ Stress/inflection
 - ▶ Rate
- ▶ Difficulties with phonological awareness



SYNTAX/MORPHOLOGY

- ▶ Comprehend and use **shorter and simpler** sentences than peers
- ▶ Difficulty comprehending and writing complex sentences, such as those with **relative clauses or passive voice**
- ▶ Often cannot hear **word endings such as -s or -ed** which leads to errors in:
 - ▶ Verb tense
 - ▶ Pluralization
 - ▶ Subject/verb agreement
 - ▶ Possessives



PRAGMATICS

- ▶ Difficulties with social interaction
- ▶ May have self-described feelings of isolation, exclusion, embarrassment, annoyance, confusion, and helplessness
- ▶ May refuse to participate in group activities
- ▶ May exhibit lower performance on measures of social maturity
- ▶ May have significant problems following directions



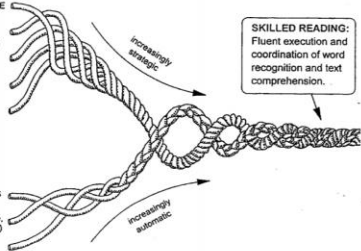


LANGUAGE COMPREHENSION

- BACKGROUND KNOWLEDGE (facts, concepts, etc.)
- VOCABULARY (breadth, precision, links, etc.)
- LANGUAGE STRUCTURES (syntax, semantics, etc.)
- VERBAL REASONING (inference, metaphor, etc.)
- LITERACY KNOWLEDGE (print concepts, genres, etc.)

WORD RECOGNITION

- PHONOLOGICAL AWARENESS (syllables, phonemes, etc.)
- DECODING (alphabetic principle, spelling-sound correspondences)
- SIGHT RECOGNITION (of familiar words)



SKILLED READING:
Fluent execution and coordination of word recognition and text comprehension.

FIGURE 8.1. Illustration of the many strands that are woven together in skilled reading.

Scarborough, H.S. (2001). Connecting early language and literacy to later reading (disabilities): Evidence, theory, and practice. In S. B. Neuman & D. K. Dickinson (Eds.), *Handbook of early literacy research* (pp. 97-110). New York: The Guilford Press.

IMPACT ON LITERACY

- Children with mild to moderate hearing losses, on average, achieve one to four grade levels lower than their peers with normal hearing, unless appropriate management occurs.
- Issues with components of language are reflected in reading and writing.



Sample Spelling Test Mild Hearing Loss

EMERGENT LITERACY

(NELP 2008; WERFEL, 2017)

- Oral Language
 - Morphosyntax
 - Vocabulary
 - Word Learning
- Phonological Processing
 - Phonological Awareness
 - Phonological Memory
- Print Knowledge
 - Relative strength

PHONOLOGICAL AWARENESS



PRACTICAL SOLUTIONS – INSTRUCTION

- Quality instruction in general
- Quality instruction for reading
- Technology
- Classroom modifications
- Communication/teaching strategies

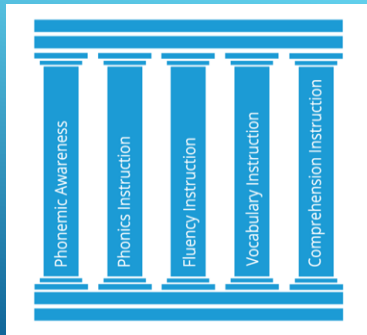
QUALITY INSTRUCTION - GENERAL

BEST PRACTICES

- Development of Higher Order Thinking Skills
- Comprehensible Communication
- Visual Supports for imagery, organization and memory
- Explicit Instruction
- Scaffolding and Mediated Learning

HOTS and COVES (Easterbrooks & Beal-Alvarez, 2004)

QUALITY INSTRUCTION - LITERACY



National Reading Panel - <https://lincs.ed.gov/publications/pdf/PRFbooklet.pdf>

TECHNOLOGY

- Hearing aids
 - BAHA
 - CROS
 - Unilateral
- FM system
 - Soundfield
 - Personal
- Understanding the purpose/function of accommodations/technology
- Daily equipment checks
- Demonstrate to all students for optimal class use

CLASSROOM MODIFICATIONS

- Preferential seating for all configurations
 - Consider noise sources
- Reduce noise levels
- Control lighting
- Provide visual supports when appropriate

COMMUNICATION/TEACHING STRATEGIES

- Set a classroom expectation for having only one speaker at a time.
- Repeat questions/comments verbatim.
- Make sure student can see any speaker's face.
- Encourage listening skills by using a "sandwich" approach.
- Teachers/service providers/families need to understand student's language history, hearing loss, and communication preferences.
