



# INTRODUCTION TO HEARING AND VISION LOSSES

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FOR THE MONTANA DEAF-BLIND PROJECT

# AGENDA

- VISION LOSS - Types and definitions of each
  - Acuity loss discussion
  - Visual field loss discussion
  - Other types of vision loss
  - "Vision Reminders"
- HEARING LOSS - Types and definitions of each
  - Dimensions of hearing loss
  - Other considerations re: hearing loss
  - Audiogram
  - "Hearing Reminders"

# ACTION PLAN

Please record your thoughts, regarding how you *might* incorporate information from today's webinar in your family life / daily practice.

(If you participated in Webinar #1, use the same action planning sheet!)

**Thank you!**



# INTRODUCTION TO VISION LOSS

# TYPES OF VISION LOSS

## TYPES include:

- acuity loss
- field loss
- contrast sensitivity
- processing problems (CVI)
- oculomotor problems
- combination problems

# ACUITY LOSS (1 OF 5)

## VISUAL ACUITY

- Measures the ability of the eyes to focus sharply on an image
- Represents central, *not* peripheral, acuity

# ACUITY LOSS (2 OF 5)

## VISUAL ACUITY LOSS

- The decreased ability of the eyes to distinguish object details and shape (typically referred to as “how well” a person sees...)

# ACUITY LOSS (3 OF 5)

- “Totally Blind”

Does not perceive even light / dark differences

- “Light Perception Only”

Lack of functional vision, but does perceive light



# ACUITY LOSS (4 OF 5)

## ➤ “Legally Blind”

Visual acuity of 20/200 (Snellen notation) or less in the better eye with best possible correction, or a visual field that is no greater than 20 degrees

# ACUITY LOSS (5 OF 5)

- “Partial Sight”

Visual acuity from 20/200 to 20/70 (Snellen notation) with best correction

- “Low Vision”

Severe visual impairment after correction, but with increased visual functioning through the use of optical / nonoptical aids, and environmental modifications

# VISUAL FIELD LOSS

## FIELD LOSS

The reduction of space visible to the eyes when they are fixating straight ahead.


# VISUAL FIELD LOSS (con't.)

## TYPES OF FIELD LOSS

- Central
- Peripheral
- Upper / Lower
- Single “Quadrant”

- facilitating development of evaluation and repair tools for a
- conducting education and outreach
- coordinating with research and development that can affect

## How WAI is Organized

WAI is one of four working groups under the auspices of the [National Academies of Sciences, Engineering, and Medicine](#) activities  and

1. [WAI Technical Working Group](#)
  - [Public Policy and Advocacy Working Group \(PPAWG\)](#)
  - [Visual Display and User Interface Working Group \(VDUIWG\)](#)
  - [Accessibility and Usability Working Group \(AAUWG\)](#)
  - [User Experience and Usability Working Group \(UEUWG\)](#)
  - [Evaluation and Repair Tools Working Group \(ERT WG\)](#)
2. [WAI International Program Office](#)
  - [Education and Outreach Working Group \(EOWG\)](#)

EXAMPLE  
of  
Central  
Visual  
Field Loss



EXAMPLE  
of  
Peripheral  
Visual  
Field Loss



EXAMPLE  
of Upper  
Quadrants  
Visual  
Field Loss

# VISUAL CONTRAST SENSITIVITY

## CONTRAST SENSITIVITY

The ability to detect objects and people at low contrast.



# VISUAL CONTRAST SENSITIVITY (CONT.)

## FACTORS IN CONTRAST SENSITIVITY

Affected by:

- glare
- brightness / hue
- size of visual stimuli
- complexity / “clutter” of visual stimuli

# CORTICAL VISION IMPAIRMENT (CVI)

## PROCESSING PROBLEMS (CVI)

Limited and / or inconsistent “vision,” due to the brain not properly processing information sent to it from the eyes, through the optic nerves.

# CORTICAL VISION IMPAIRMENT (CONT.)

## CORTICAL VISION IMPAIRMENT (CVI)

- Problem in the visual cortex or visual pathways in the brain results in inconsistent visual performance / skills
- The anatomy of the eye, itself, is not impaired

# OCULOMOTOR VISION PROBLEMS

## OCULOMOTOR PROBLEMS

Difficulty looking at, and / or following the movement of, objects and people  
(i.e., the eyes not working together in a well-coordinated manner)

# OCULOMOTOR VISION PROBLEMS (CONT.)

## TYPES OF OCULOMOTOR PROBLEMS

- Nystagmus - involuntary, rapid movements of the eyes (usually, side to side)
- Strabismus - loss of coordinated movement of the eyes, which leads to “misalignment”

# COMBINATIONS IN VISION LOSS

Learners who experience deaf-blindness might demonstrate any of these types of vision loss:

- Acuity
- Field
- Contrast sensitivity
- CVI
- Oculomotor... in *ANY* combination.



**VISION REMINDERS...**

# VISION REMINDERS

Natural lighting is, generally,  
preferred for most learners.



# VISION REMINDERS

The TYPE of lighting an individual learner needs will vary by the child's / adolescent's specific eye condition.

# VISION REMINDERS

**“Glare is an enemy!”**

# VISION REMINDERS

**“Contrast is a friend!”**

# VISION REMINDERS

Reduce visual distractions in the learner's physical environment.

Keep complexity and clutter to a minimum.

# VISION REMINDERS

Be conscious of size (of essential elements) of visual materials.  
Consider distance, from the learner, when determining size.

# VISION REMINDERS

Even if a learner's visual system adequately *receives* environmental information, the learner might not adequately *process* the information.

# VISION REMINDERS

Attending visually can be extremely tiring for a learner who experiences significant VI.

Be conscious of stamina!



# INTRODUCTION TO HEARING LOSS



# DIMENSIONS

**PRIMARY DIMENSIONS of hearing loss include:**

- Intensity (loudness / volume) loss
- Frequency (pitch) loss

# UNILATERAL OR BILATERAL HEARING LOSS

Hearing loss is categorized as **Unilateral** or **Bilateral**

- Unilateral: “normal” hearing in one ear and a hearing loss, of any degree, in the other
- Bilateral: the hearing loss occurs in both ears (though intensity and frequency may be same or different)

# TYPES OF HEARING LOSS

## TYPES include:

- Conductive hearing loss
- Sensori-neural hearing loss
- Processing problems (CAPD)
- Combination problems

# CONDUCTIVE HEARING LOSS

Occurs when sound cannot pass through the outer ear to the inner ear effectively

- Development of the auditory canal
- Blockage, in external ear, by ear wax, fluid, or a tumor
- Otitis media (middle ear infection) is a common cause, as fluid in the middle ear prevents reliable conduction of sound

# CONDUCTIVE HEARING LOSS (con't.)

Attenuates (i.e., “weakens”) sound, because the ear drum does not move “normally” when the previously listed conditions exist

# SENSORI-NEURAL HEARING LOSS

## (1 OF 3)

- Caused by poor development of, or damage to, the inner ear (cochlea) and / or to the auditory nerve
- Chronic middle ear infections *may* cause damage to the ear and result in a sensori-neural hearing loss

# SENSORI-NEURAL HEARING LOSS

## (2 OF 3)

May also occur due to abnormalities in the auditory cortex or brainstem—which results in a condition referred to as “auditory neuropathy spectrum disorder” or “auditory dys-synchrony”

# SENSORI-NEURAL HEARING LOSS

## (3 OF 3)

- Attenuates (i.e., “weakens”) sound
- Distorts perception of sound
- A sensori-neural hearing loss is permanent



# MIXED HEARING LOSS

Term used to describe a loss that is both conductive *and* sensori-neural.

# CENTRAL AUDITORY PROCESSING DISORDER (CAPD)

- Limited and / or inconsistent “hearing,” due to a problem in the cortex or auditory pathways in the brain not properly processing auditory information.
- The anatomy of the ear (outer, middle, and inner), is not impaired.

# SIGNS OF CAPD

Difficulties with the following:

1. sound localization
2. auditory discrimination
3. ability to process quick sound sequences  
(i.e., patterns)

## SIGNS OF CAPD (con't.)

4. weakening of auditory skills in conditions w/ competing speech or background noise
5. weakening of auditory skills in conditions w/ degraded signals (e.g., poor telephone connection)

# COMBINATION PROBLEMS

Learners who experience deaf-blindness might demonstrate any of these types of hearing loss:

- unilateral OR bilateral
- Intensity AND / OR frequency
- conductive
- sensori-neural
- CAPD

# INTENSITY (LOUDNESS) LOSS

The **DEGREES** of intensity loss include:

- mild (26 - 40 dB or louder)
- mild-to-moderate (41 - 55 dB or louder)
- moderate (56 - 70 dB or louder)
- severe (71 - 90 dB or louder)
- profound (91 dB or louder)

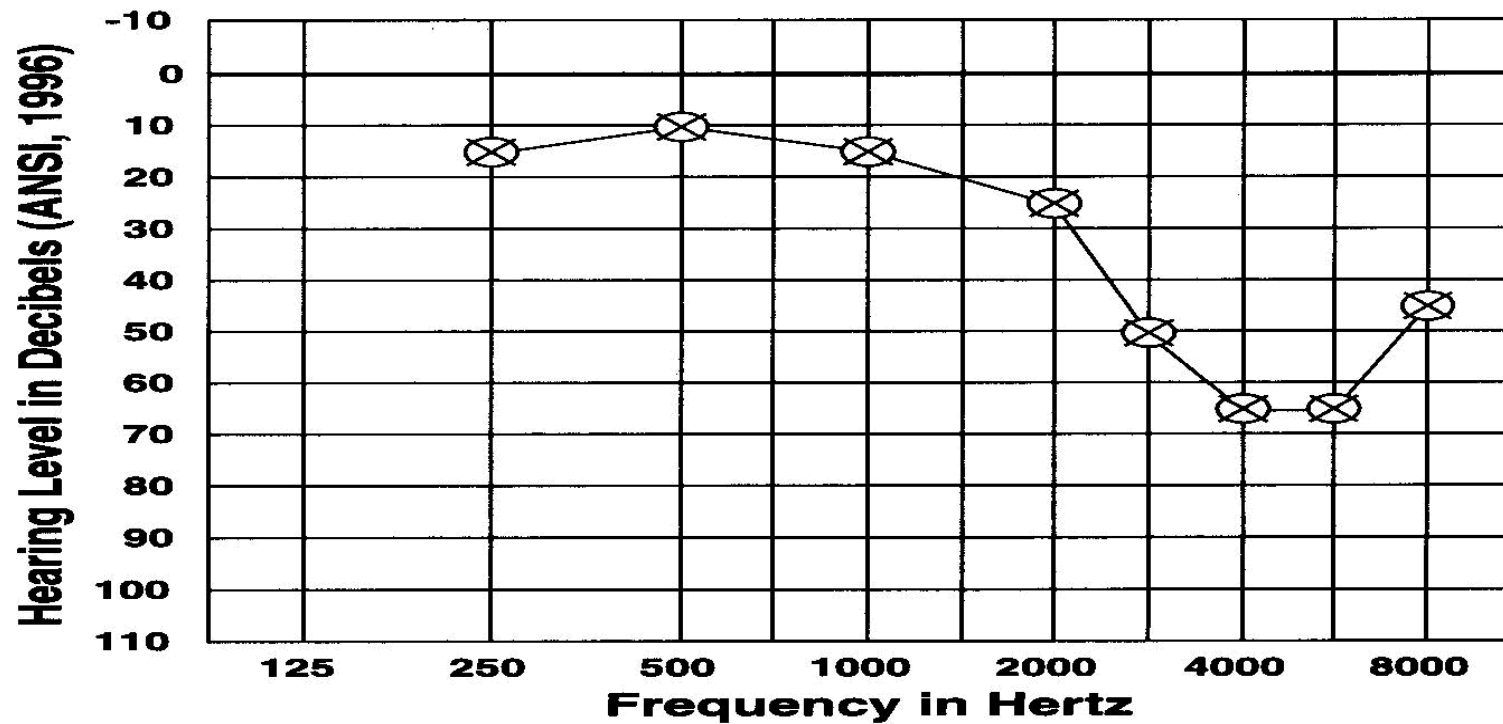
# AUDIOGRAM

An **audiogram** is a graph that *simultaneously* describes a learner's hearing sensitivity, in terms of sound intensity and frequency.

# AUDIOGRAM EXAMPLE

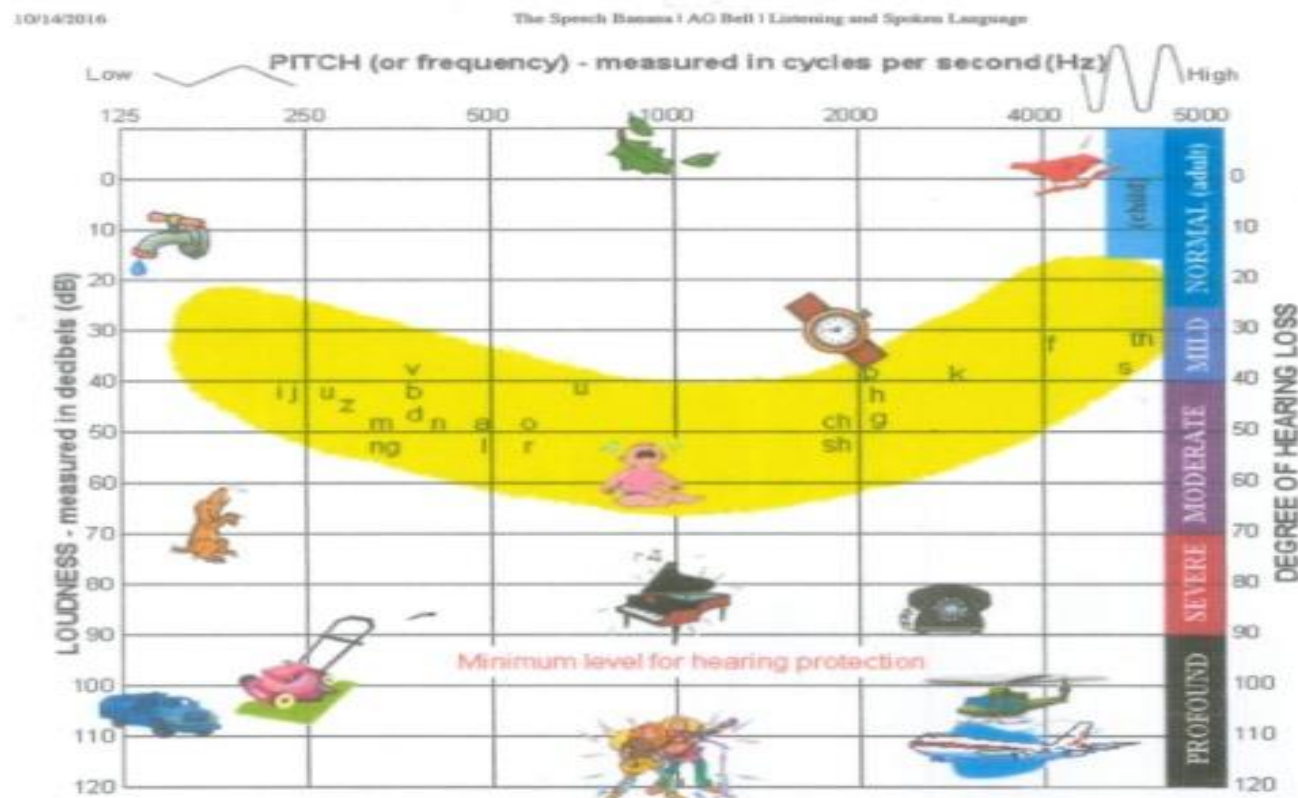
Air Conduction Threshold Symbols:

○ = right ear      ✕ = left ear





# AUDIOGRAM EXAMPLE - SPEECH BANANA



# FREQUENCY (PITCH) LOSS

Hearing ability is indicated by the point of intensity at which a learner indicates she can just barely hear a sound at a specific frequency.

# HEARING IMPAIRMENT

A learner's functional hearing abilities are also affected by:

- the presence of background noise (in the environment) **“sound-to-noise ratio”**
- the distance (of the learner) from the source of the sound



# HEARING REMINDERS...

# HEARING REMINDERS

REMEMBER—For most learners who experience significant hearing loss, there is *no difference* between foreground and background sounds.

# HEARING REMINDERS

REMEMBER!

A hearing aid amplifies ALL  
sounds!

# HEARING REMINDERS

A learner's functional hearing  
is affected by the  
**sound : noise ratio**

Reduce the amount of ambient noise  
(i.e., auditory distractions) in the  
learner's environment.

# HEARING REMINDERS

Manage the direction from which instructional auditory stimuli are presented.



# HEARING REMINDERS

Analyze and identify the characteristics of sounds with which a learner is most successful:

- ▶ types of sound sources
- ▶ loudness of sound
- ▶ frequencies of sound

Consider distance of the sound source, from the learner, when determining volume.

# HEARING REMINDERS

Assistive listening devices can help  
with reduction of “noise”  
and facilitate processing of  
meaningful “sound.”

# HEARING REMINDERS

Even if a learner's auditory system adequately *receives* environmental information, the learner might not adequately *process* the information.

# HEARING REMINDERS

Attending auditorally can be extremely tiring for a learner who experiences significant HI.

Be conscious of stamina!

# REMEMBER!

Learners who have deaf-blindness are an incredibly heterogeneous group!

# RESOURCES

## *Sensory Perspectives*

by: SKI-HI Institute  
Utah State University