



**REFERRAL AND  
DIAGNOSTIC EVALUATION  
OF HEARING ACUITY**

**BHPI**

hearing for all 2024

Better Hearing Philippines Inc.

# How To Get Started?

1. Testing must be done in an acoustically treated environment far from all the environmental noises yet still have adequate ventilation.
2. Audiometer and headphones/bone vibrator should meet calibration standards. Before the testing, examiner must listen to the headphone to check if it is functioning well.

# How To Get Started?

3. Proper case history must be obtained. At this stage, rapport must be established and patient's communicative behavior must be observed.
4. Physical examination of the ear canal must be done.

# How To Get Started?

5. Patient must be instructed properly.

“ You are going to hear a series of tones, first in one ear and then in the other. When you hear a tone, no matter how high or low pitch, and no matter how loud or soft, please signal that you’ve heard it. Raise your hand if you heard the tone and put it down as the tone ceases.

Remember to signal every time you hear a tone, even the faintest tone that you’ll hear. Are there any questions?”

# How To Get Started?

6. Response strategy can vary.
7. Be careful with the placement of the earphones.
8. Normally, examiner should start testing the better ear or the ear more sensitive to sounds

# How To Get Started?

9. Patient should be seated in the position that he/she will not be able to see the examiner to avoid visual cues.

10. Initial signal presentation levels should be at clearly heard level.

# How To Get Started?

11. We have two methods of presentation, first is the air conduction audiometry. The other is through bone conduction/vibration.

# **Degree of Hearing Loss**

**Degree of Hearing loss is expressed in decibels (dB) based on pure tone average of 500, 1000, and 2000 Hertz.**

# Degree of Hearing Loss

## Normal Hearing Level

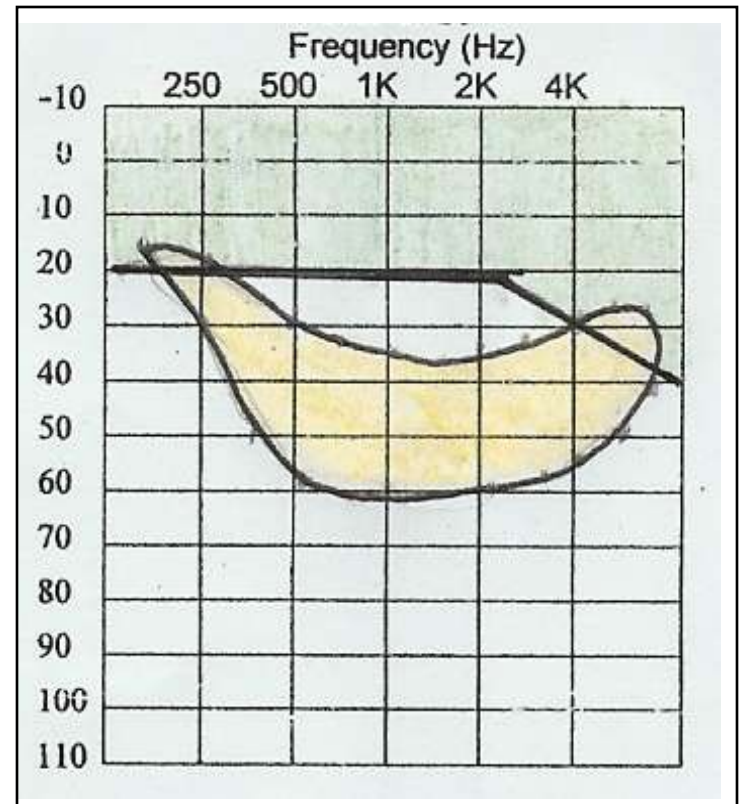
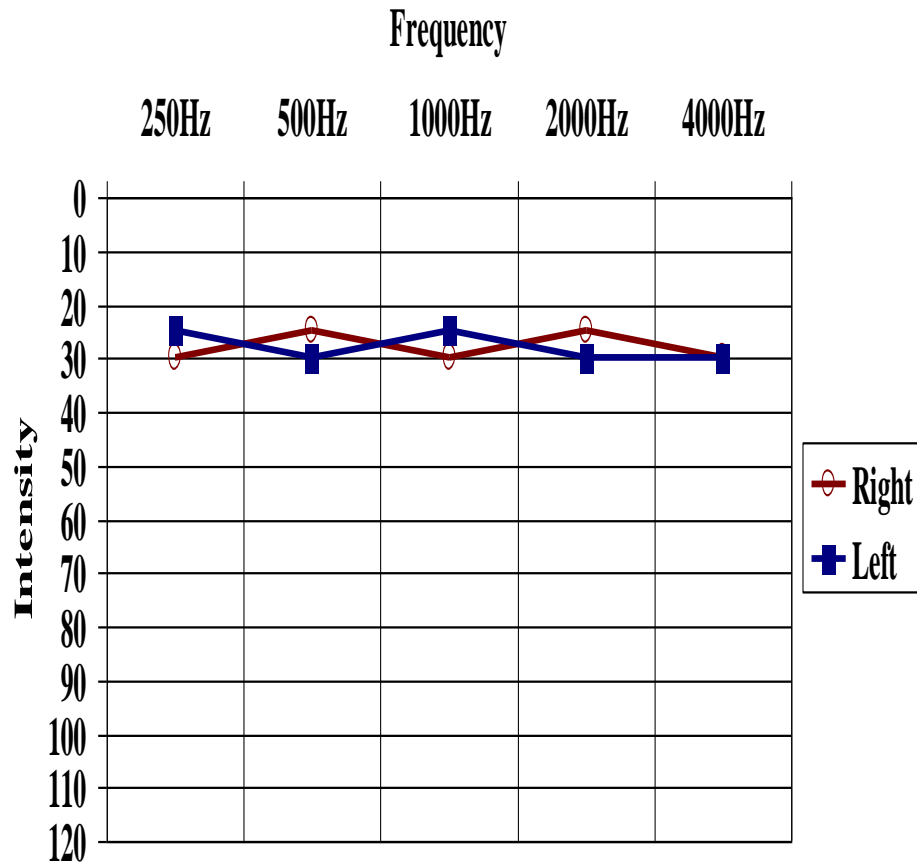
- 0-25dB
- Can hear all sounds

# Degree of Hearing Loss

## Mild Hearing Loss

- 26-40dB
- Will miss consonants. At 30 dB can miss 25-40% of speech signal. Degree of difficulty depends on noise level, distance from speaker, and configuration of the hearing loss. Will benefit from hearing aid

# Degree of Hearing Loss

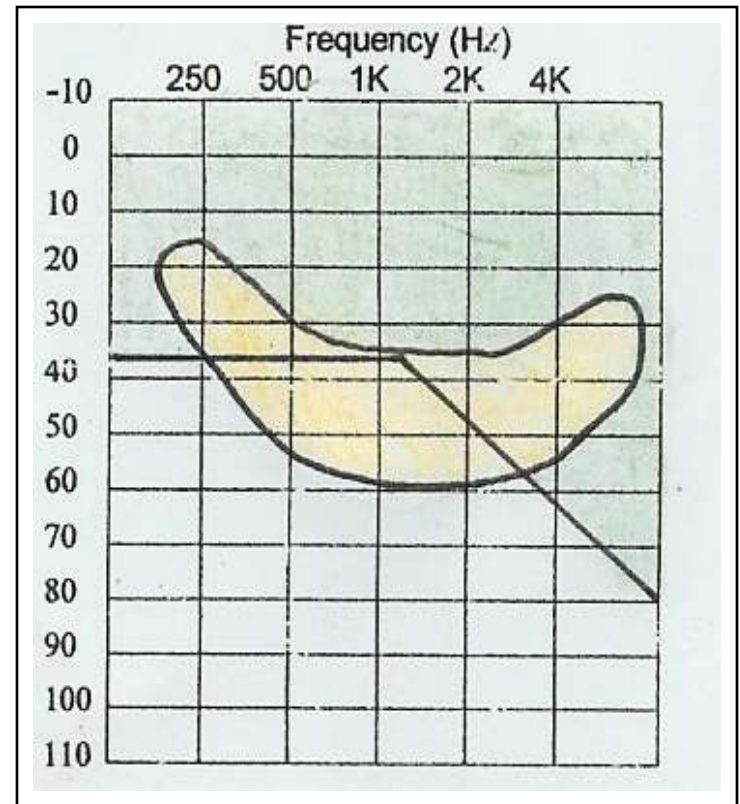
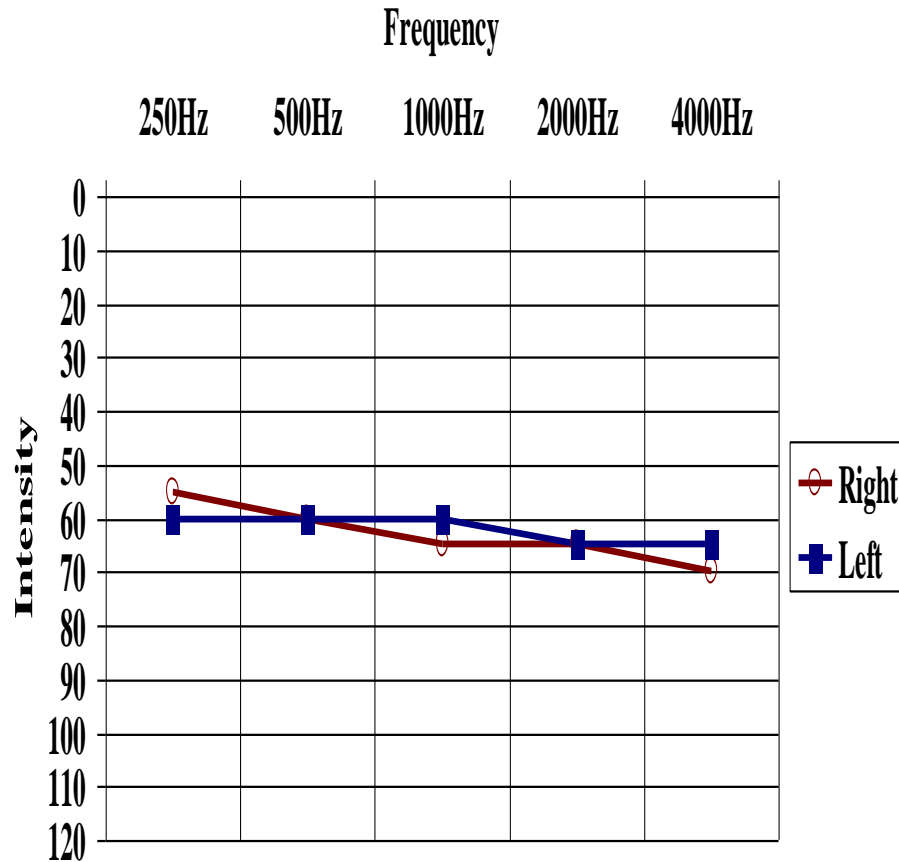


# Degree of Hearing Loss

## Moderate Hearing Loss

- 41- 60dB
- Can understand face-to-face conversation at a distance of 3-5 feet if structure and vocabulary is controlled. May miss 50-75% of a spoken message if the pure tone average is 40 dB. Will benefit from hearing aid.

# Degree of Hearing Loss

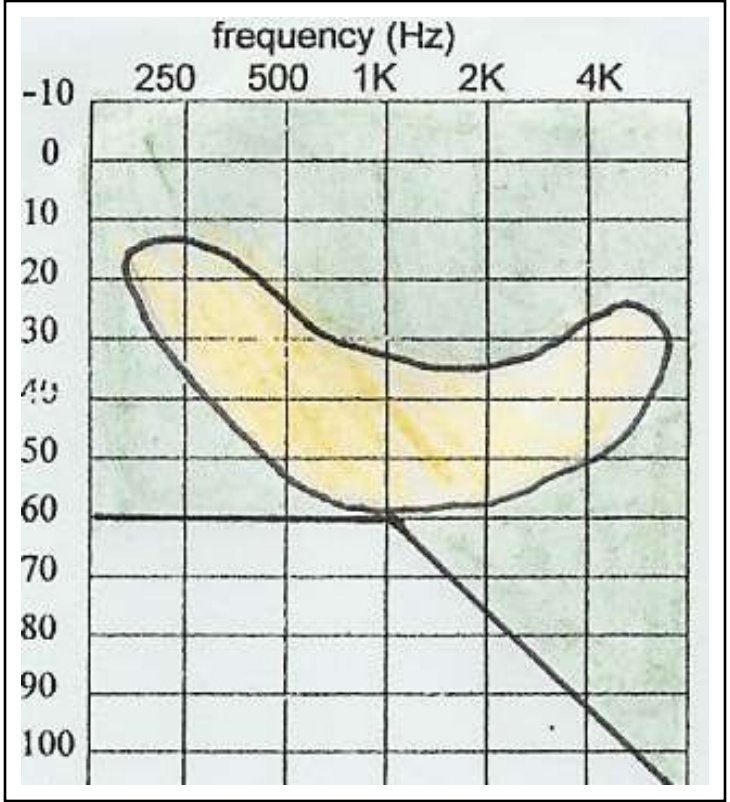
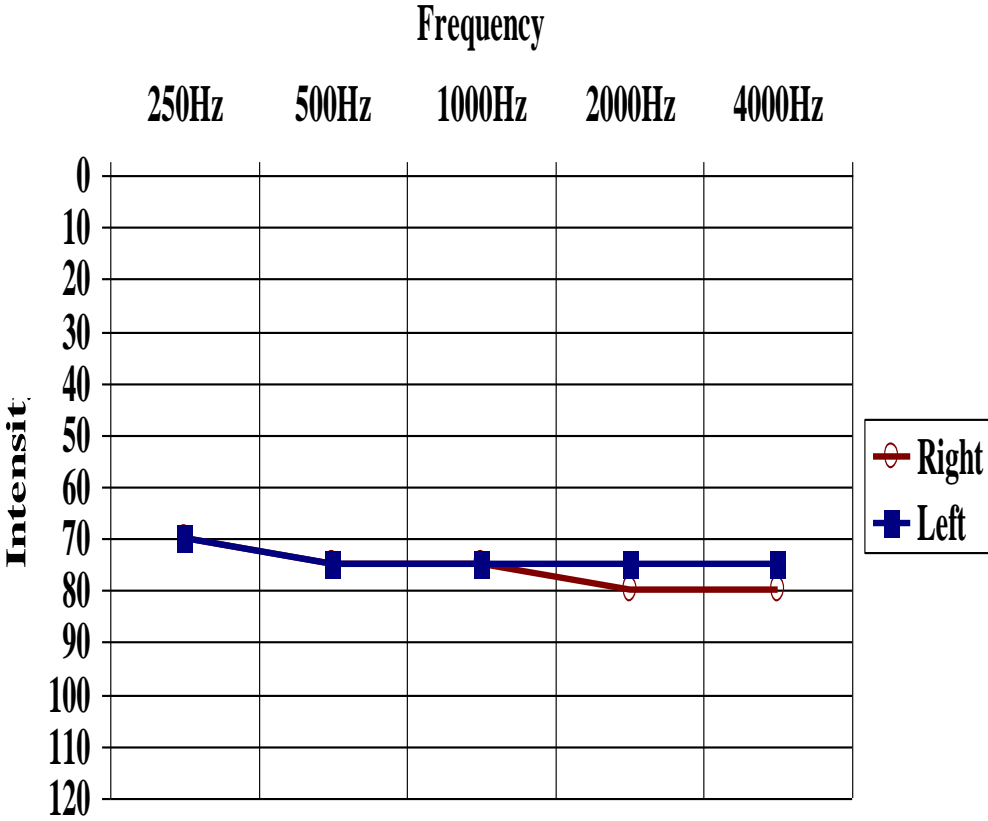


# Relationship of Degree of HL to Everyday Functioning

## Severe loss

- 61-80dB
- May miss most or all of the message even if talking face-to-face. Will have great difficulty conversing in a group. Will benefit from hearing aid.

# Severe Hearing Loss

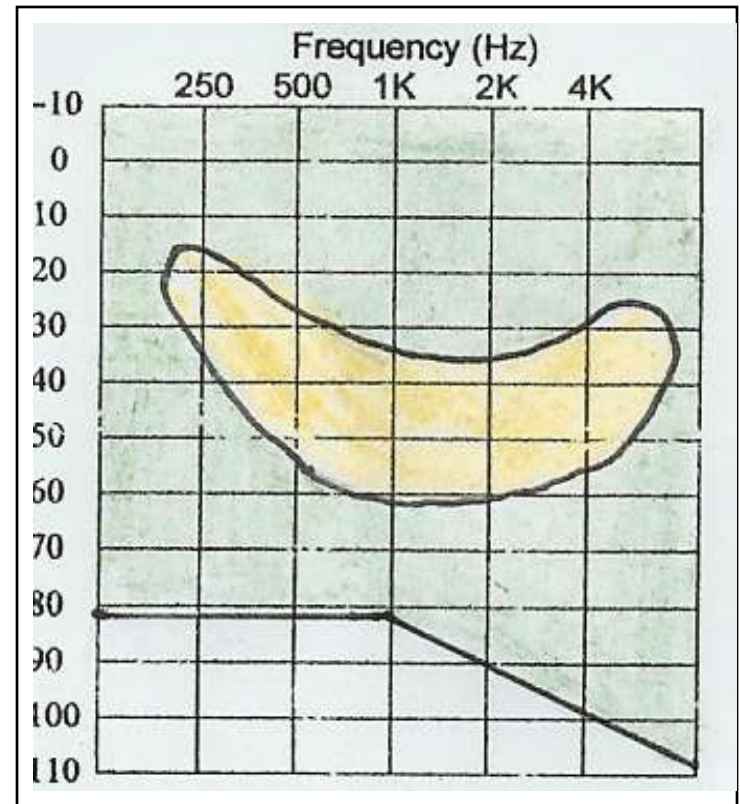
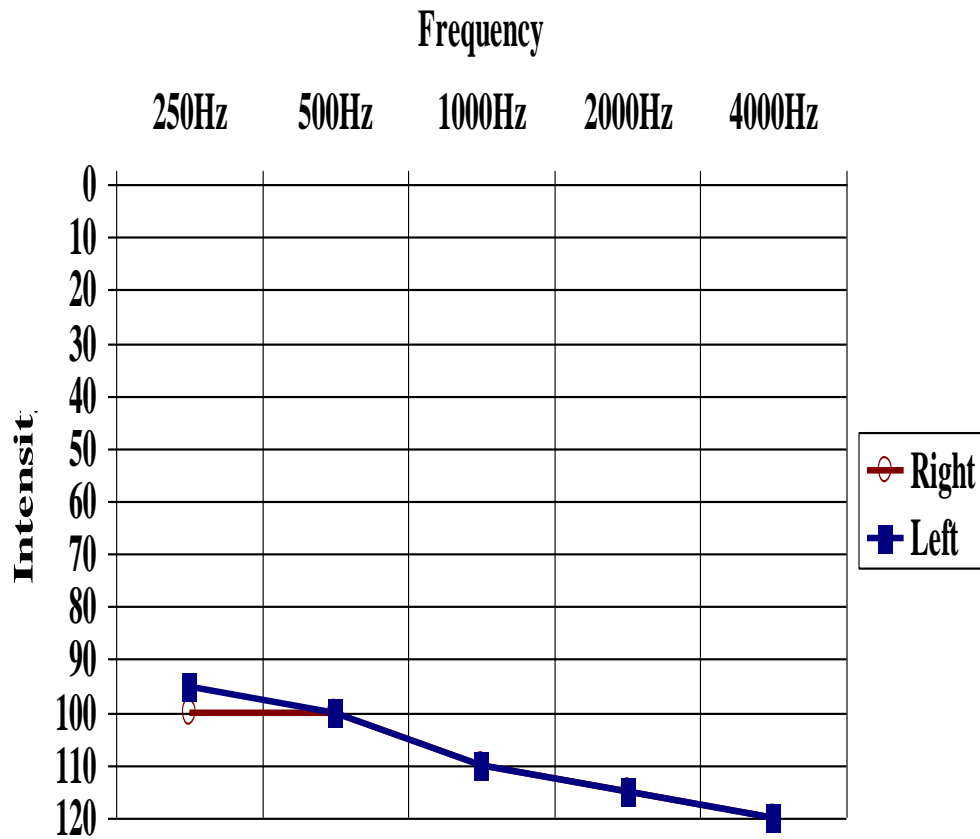


# Relationship of Degree of HL to Everyday Functioning

## Profound loss

- 81dB or greater
- May not be able to detect the presence of even loud sound without amplification. May perceive vibratory aspects of sound. Will rely on vision communication. Will benefit from cochlear implant.

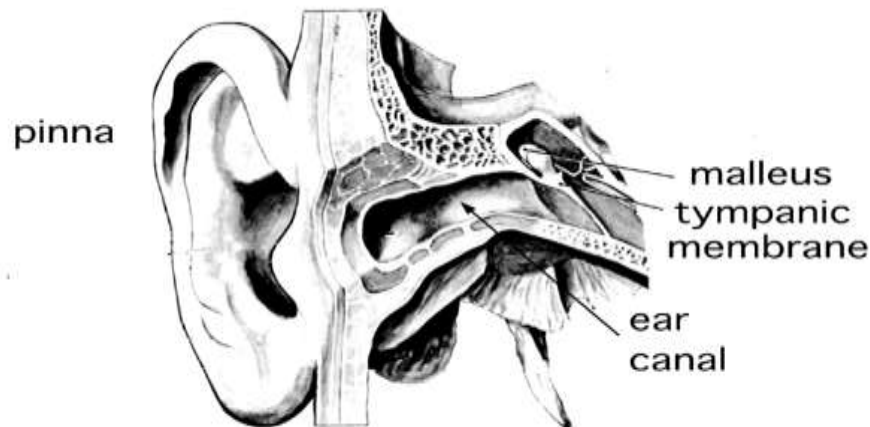
# Profound Hearing Loss



# Types of Hearing Loss

## Conductive Hearing Loss

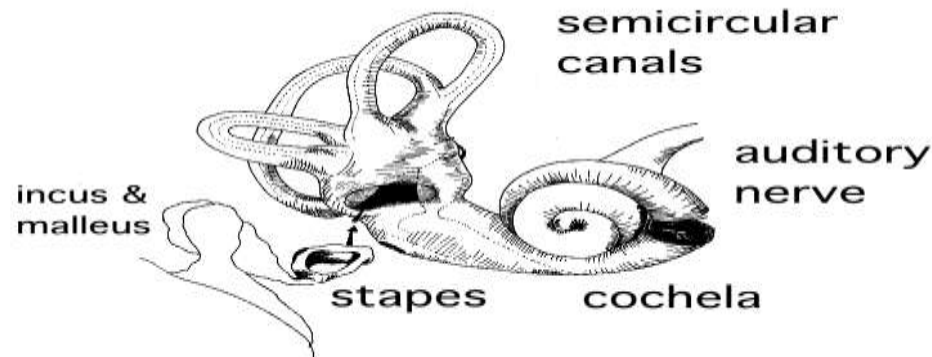
- A temporary or permanent hearing loss typically due to abnormal conditions of the external and/or middle ear



# Types of Hearing Loss

## Sensorineural Hearing Loss

- Typically a permanent hearing loss due to disease, trauma, or inherited conditions affecting the nerve cells in the cochlea, the inner ear, or the eight cranial nerve



# **Types of Hearing Loss**

## **Mixed Hearing Loss**

- Combination of both the conductive and sensorineural components.

## **Central Auditory Processing Disorder**

- Condition where the brain has difficulty processing auditory signals that are heard.

# Interpretation

- The frequency or pitch of the sound is referred to in Hertz (Hz)
- The intensity or loudness of the sound is measured in decibels (dB)
- The responses are recorded on a chart called an *audiogram* that provides a graph of intensity levels for each frequency tested

# Interpretation

- Air conduction test results indicate hearing losses that are either conductive or sensorineural
- Bone conduction test results reflect only the sensorineural component

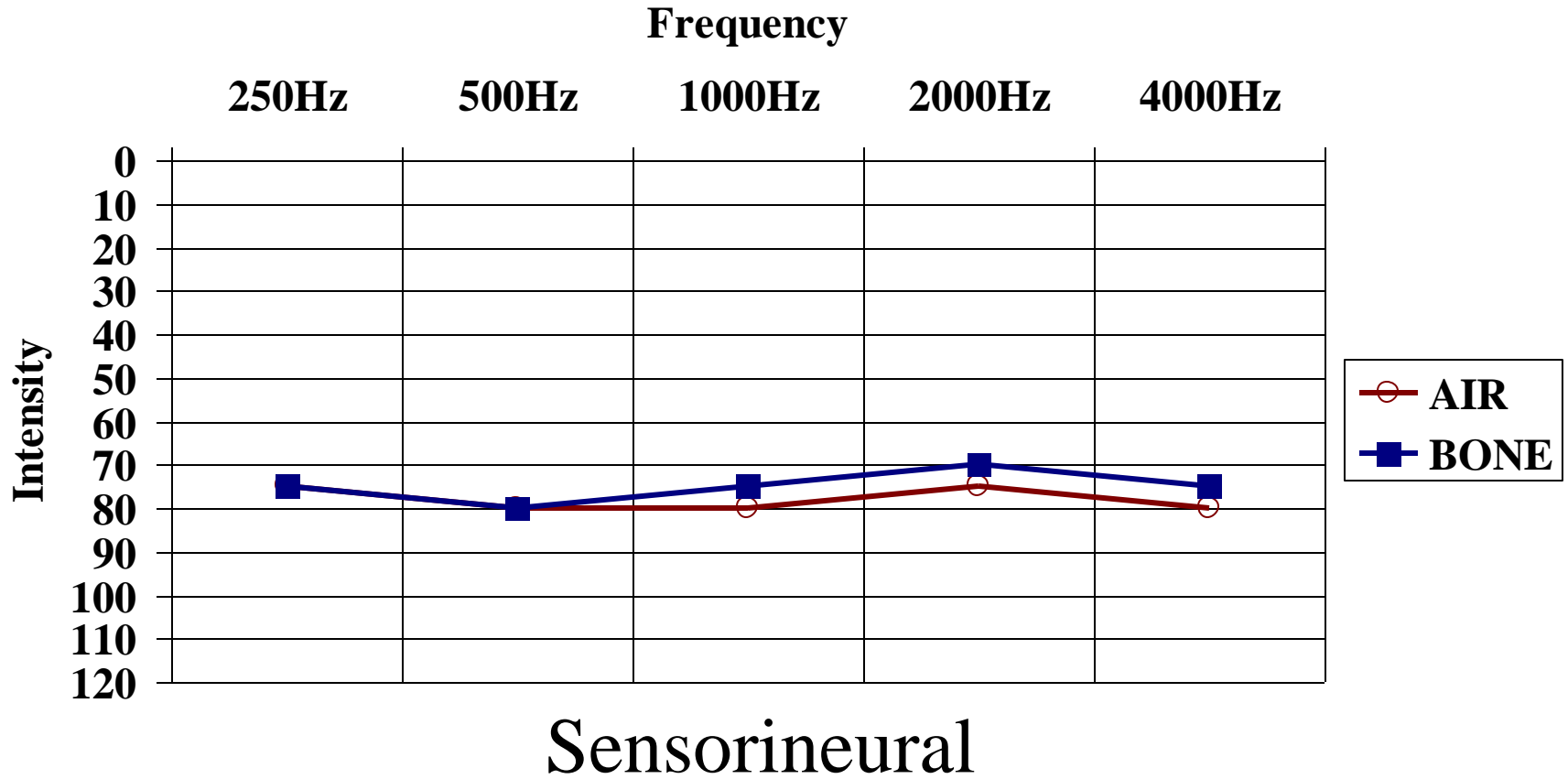
# Interpretation

- By comparing air conduction and bone conduction test results, the audiologist can determine whether there is a hearing loss due to a problem in the outer or middle ear

# Interpretation

- If air and bone conduction thresholds are the same, the loss is sensorineural. If there is a difference between air and bone thresholds (an air-bone gap), the loss is conductive or mixed

# Interpretation



# Interpretation

Frequency

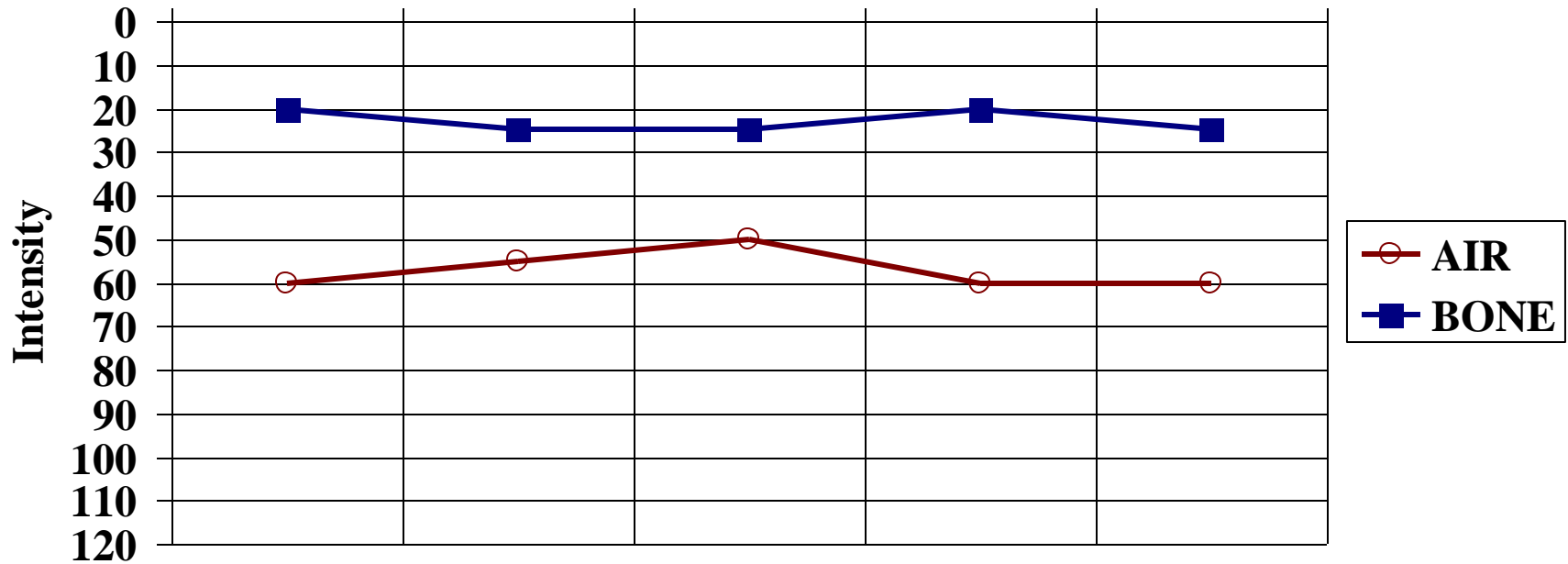
250Hz

500Hz

1000Hz

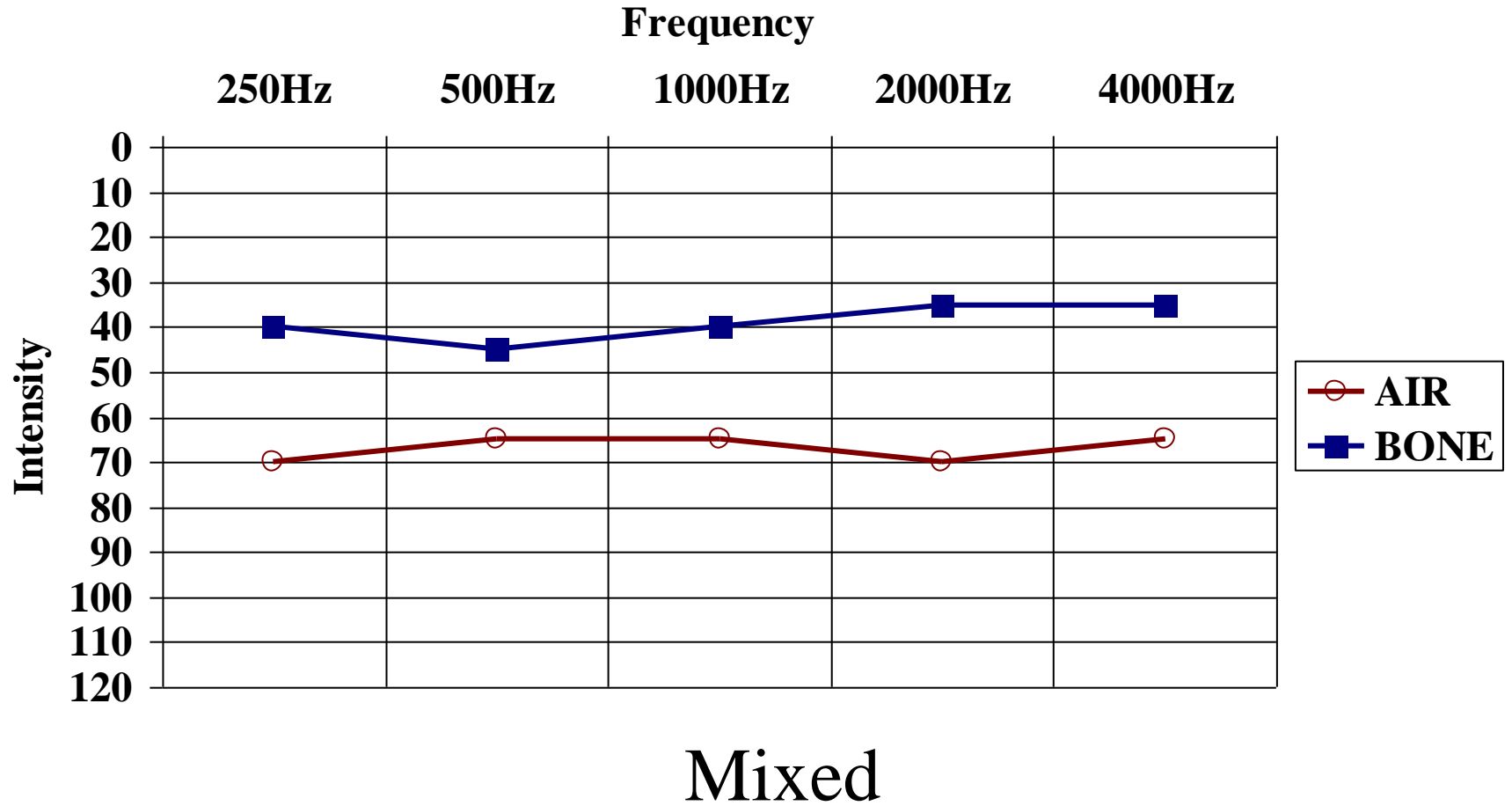
2000Hz

4000Hz



Conductive

# Interpretation



	Air Conduction	Bone Conduction	AC- BC (Air Bone gap)
Conductive	> 25 dB ➤ Abnormal	< or = 25 dB normal	
Sensorineural	> 25 dB > abnormal	> 25 dB Abnormal	< 10dB
Mixed	> 25 dB Abnormal	>25 dB Abnormal	= or > 10 dB

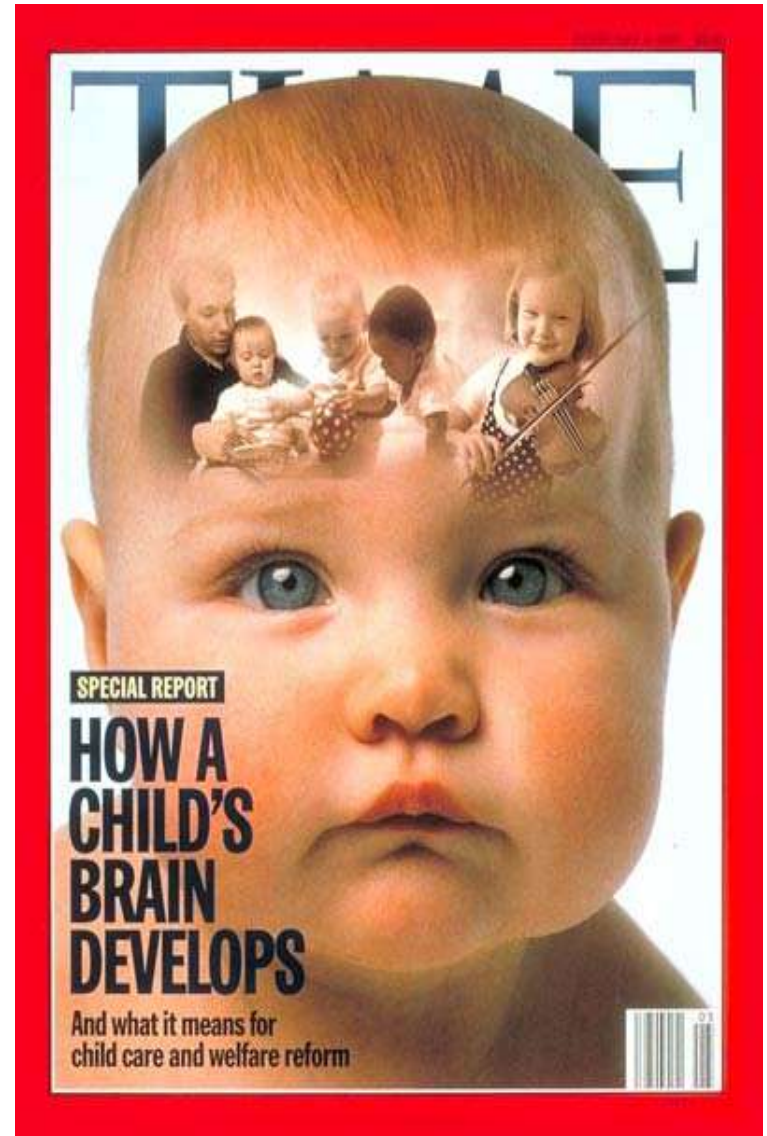
# **PEDIATRIC ASSESSMENT**

Better Hearing Philippines Inc.



## Birth to 7 years

- Critical years for child development especially for speech and language
- Plasticity Theory



## Birth to 3 months

Newborns can **localize a sound** to their right or left side shortly after being born and will turn their head or look in the direction of a sound. This works best with loud noises when your baby is awake and alert, but they should also be able to hear soft sounds.



# Auditory Milestones

## 3 to 6 months

- Awakens to sounds or speech
- Turns towards interesting sounds



# Auditory Milestones

## 6 to 10 months

- Child should be able to respond to his/her own name, telephone ringing, someone's voice, even when not loud
- Child should be able to make babbling sounds, even when alone



# Auditory Milestones

## 10 to 15 months

- Child should be able to play with own voice, enjoying the sound and feel of it
- Child should be able to imitate simple words and sounds; may use a few single words meaningfully

# Auditory Milestones

## 15 to 18 months

- Child should be able to follow simple directions, such as "give me the ball" without being shown
- Child should be able to point to some body parts when asked

# Auditory Milestones

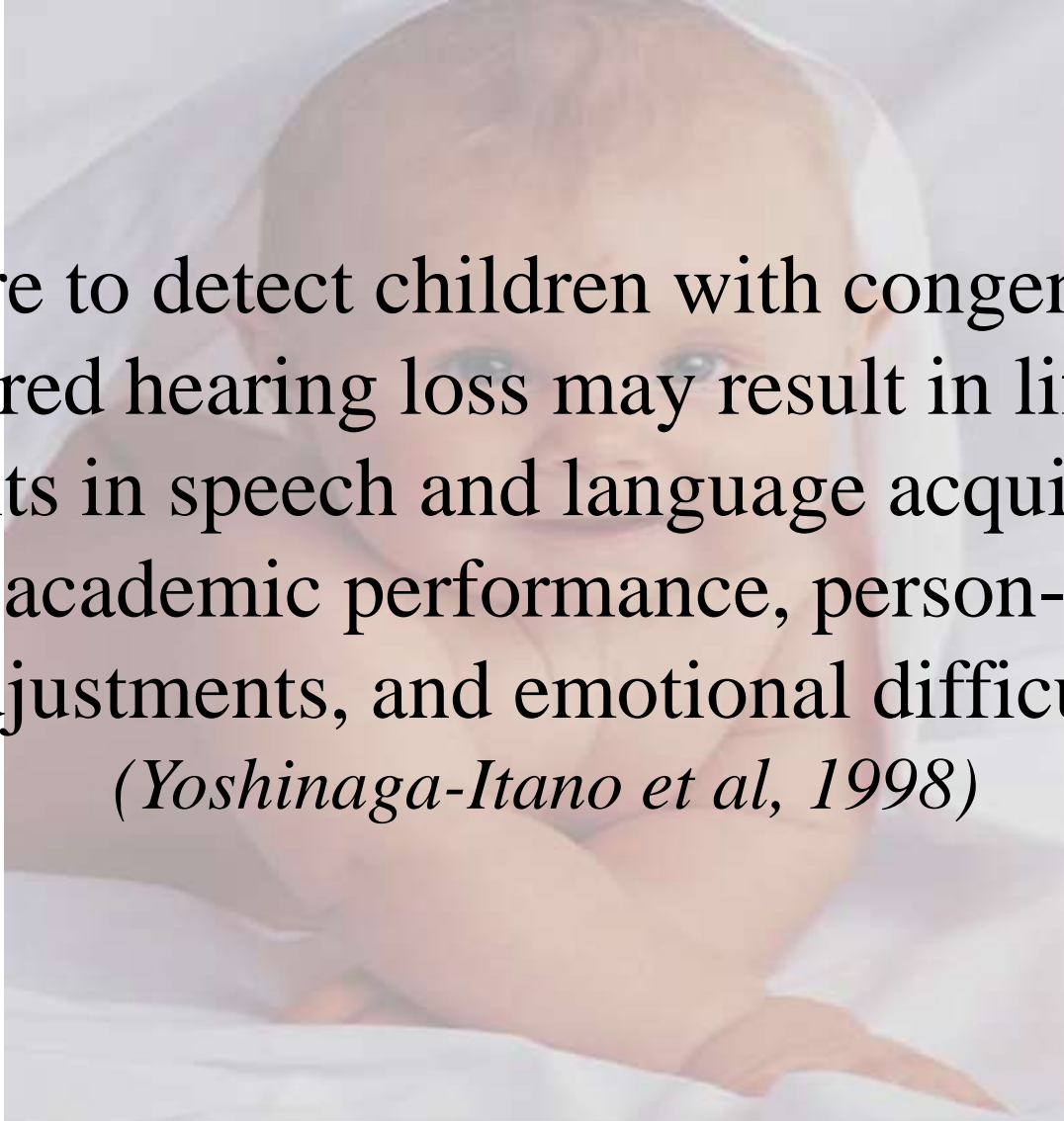
## 18 to 24 months

- Child should be able to enjoy being read to
- Child should be able to point to pictures when asked

# Auditory Milestones

## 24 to 36 months

- Child should be able to follow two-step commands, such as "get your shoes and come here"
- Child should be able to understand many action words (run, jump)



Failure to detect children with congenital or acquired hearing loss may result in lifelong deficits in speech and language acquisition, poor academic performance, person-social maladjustments, and emotional difficulties."

*(Yoshinaga-Itano et al, 1998)*

# Audiometric Tests



# **Pediatric Assessment**

## **Behavioral Observation Audiometry (BOA)**

Birth to 6 months

- Requires two clinician (1 distracts and observes; 1 present the stimulus)
- Toys, noisemakers or phonemes representative of different frequencies may be used

# Behavioral Observation Audiometry (BOA)

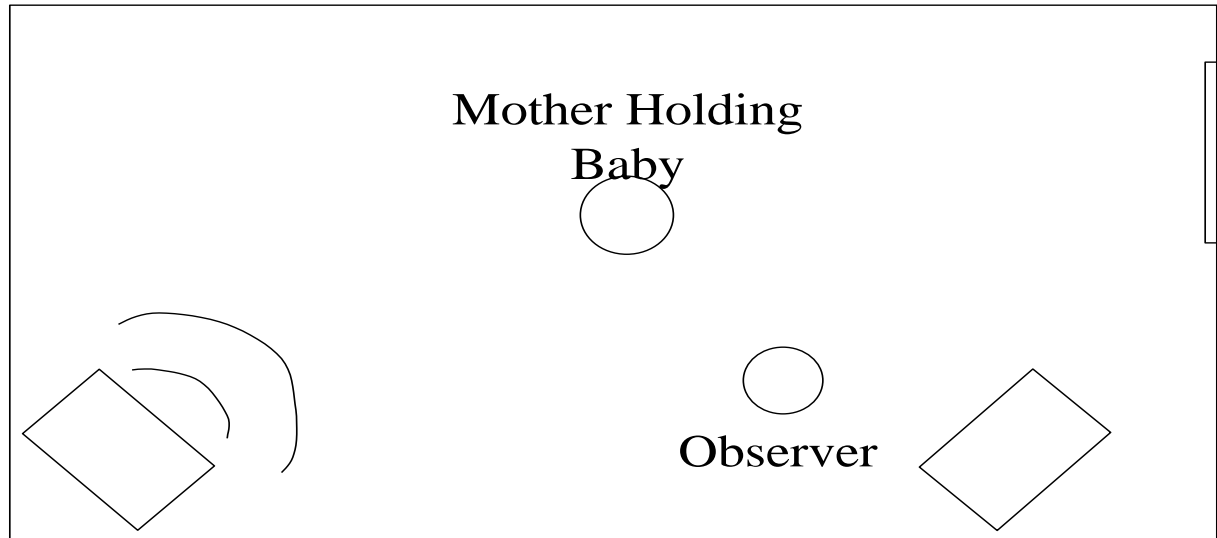
- Responses from small children may vary from *voluntary acknowledgement* of a signal to *involuntary movement* of the body, or from an overt cry of surprise to a slight change in vocalization
- Responses may also be totally *unobservable*, except for some change in the electrophysiological system of the child.

# **Behavioral Observation Audiometry (BOA)**

Some expected behavioral responses

- Startle reflex
- Auropalpebral reflex/Eye-blink Reflex
- Eye movements
- Head movements

# Behavioral Observation Audiometry (BOA)



# Visual Reinforcement Observation Audiometry (VROA)

6 months to 2 years

- In this test, two examiners are again needed.

- Every time the child

hears the tone and localize,

a visual reinforcement like puppets will be visible



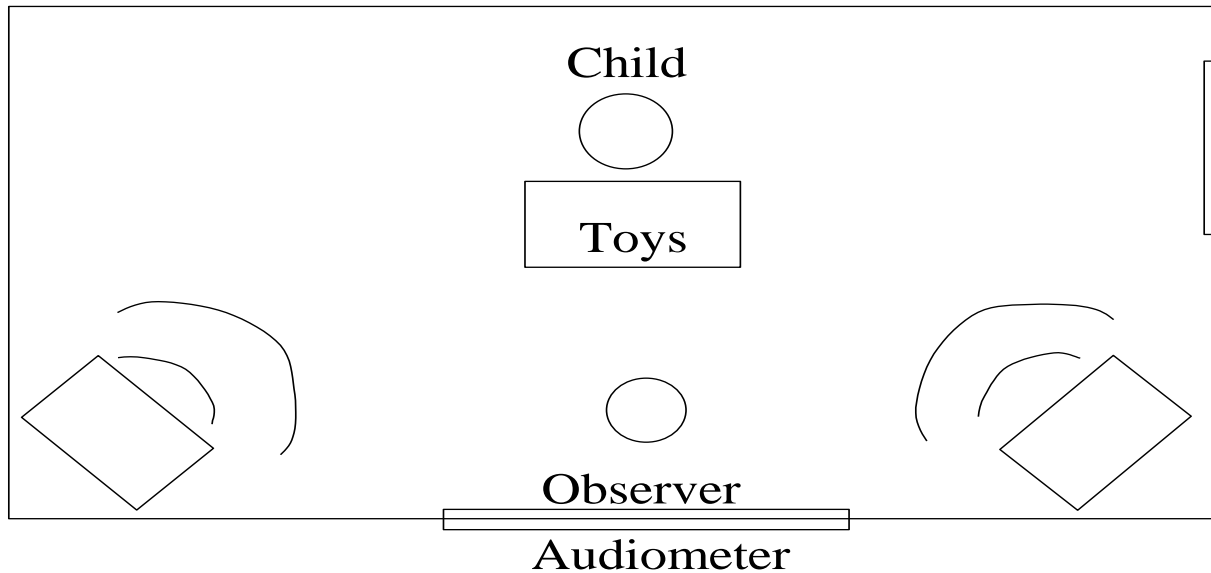
# Visual Reinforcement Observation Audiometry (VROA)

Some observable responses

- Head turn toward the sound
- Head turn toward visual reinforcement
- Change in facial expression
- Cry
- Vocalize response



# Visual Reinforcement Observation Audiometry (VROA)



# **Conditioned Play Audiometry**

2 to 5 years

- In this test, child is conditioned to respond using play like response strategies like dropping a peg on a bucket or hitting the drum every time he/she hears a tone

# Conditioned Play Audiometry

Modes of responses:

- Dropping
- Hitting
- Stacking
- Throwing
- Pushing buttons
- Building



# Conditioned Play Audiometry

