

FUNCTIONAL HEARING LOSS - A PROGRAMMED TEXT.

An Independent project work presented to  
University of Mysore, Mysore in partial ful-  
fillment of the requirements for the Pre-degree  
Master of Science in Speech and Hearing.

M A Y 1982

DEDICATION

TO HER

Who inspired me to work without  
speaking a single word.

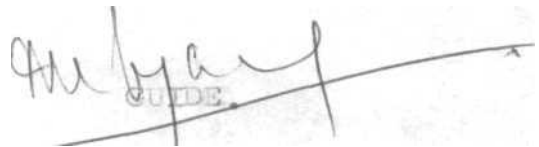
**CERTIFICATE**

THIS IS TO CERTIFY THAT

the Independent Project entitled - "

FUNCTIONAL HEARING LOSS - A Programmed Text"

has been prepared under my supervision and guidance.

A handwritten signature in dark ink, appearing to read 'M.N. Vyasa Murthy', is written over a horizontal line. The signature is cursive and somewhat stylized.

**M.N.Vyasa Murthy,  
Lecturer in Audiology,  
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**CERTIFICATE**

THIS IS TO CERTIFY THAT

the Independent Project entitled " FUNCTIONAL HEARING LOSS"-  
a Programmed Text is the bonafide work done in part  
fulfillment for First Year M.Sc Speech and Hearing  
by the,Register-No.

  
DIRECTOR

All India Institute of  
Speech and Hearing,  
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## **DECLARATION**

This independent Project is the result of my own work undertaken under the guidance of mr.m.N.Vyasamurthy, Lecturer in Audiology- All India Institute of Speech and Hearing, Mysore.

This has not been submitted earlier at any University for any diploma or Degree.

Mysore:

Dated :

Reg.ro. 7

## **ACKNOWLEDGEMENTS**

The AuThor acknowledges his hearty thanks to his Guide Mr.M.N.Vyasmurthy for his kind advise and sincere supervision in the preparation of this Text as well as for his permission to pub ish his tests the information of which was provided to the author when the author was a student in the Under-graduate classes in All India Institute of Speech and Hearing

The author also acknowledges his thanks to Dr.Ratna, Director, All India Institute of Speech and Hearing , Dr.Nikam, Professor and Head of the Department of Audiology for the inspiration got from them and Mr.C.S.Venkatesh for the help got from him

This programmed Text is intended to be a preview not a review mainly for the beginner in the subject who might encounter difficulties in the text. This would help them understand the concepts and also check how much they have learned

From each chapter the student acquires beginning acquaintance with some key terms and concepts as a result the student can read the texts with greater understanding.

AUTHOR

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## Chapter-1 Terminology.

Functional means Organic Pathologies if present are undetectable.

In a functional condition no \_\_\_\_\_ is found to account for the symptoms.

When no organic Pathology can account for the symptoms the condition is called \_\_\_\_\_

Another meaning assigned to the word functional loss is when normal functioning is impaired without any structural damage.

Functional can also mean that there is impaired function of the organ without any structural deviation.

If the organ does not function normally in the Absence of any structural involvement then it may be said to be \_\_\_\_\_

The condition can also be said functional when there is impaired function in the presence of normal \_\_\_\_\_

But in functional hearing loss we do get evidences suggesting normal hearing structures as well as function. A person is said to have functional hearing loss when he is not willing to or not able to reveal the true threshold

If some one conceals his true threshold for financial gain he may be said to have \_\_\_\_\_

When the functional hearing impairment is due to some unconscious motives; the person is not \_\_\_\_\_ to reveal his true threshold.

Organic Pathology;  
Functional;  
Functional;  
Structures;  
Functional hearing loss;

Functional hearing impairment is when the person is either not \_\_\_\_\_ to or not \_\_\_\_\_ to reveal his true threshold. This conscious or sub-conscious unwillingness to admit his complete hearing environment is because it might be imposing a serious threat to the person's psychological stability.

Functional hearing loss can manifest itself when there is a threat to the persons \_\_\_\_\_. Behind the unwillingness to admit the hearing there may be conscious or unconscious motives which are triggered off due to the presence of a

\_\_\_\_\_ to the psychological stability of the person. After an accident the person can develop functional hearing loss due to poor counselling where he strongly believes that he can \_\_\_\_\_ not \_\_\_\_\_ hear.

\_\_\_\_\_ can convert a temporary impairment into a functional hearing impairment.

Emotional instability is a common factor found in most of the functional hearing loss cases. For this reason functional hearing loss is called as psychogenic by some people by which they mean originated in Psyche or mind.

The presence of emotional factors in the precipitation and perpetuation of functional hearing loss has led to the use of the word \_\_\_\_\_

\_\_\_\_\_ are commonly found to be the precipitating and/or perpetuating factors in functional hearing loss.

7. Willing
8. Able
9. Psychological stability
10. Threat
11. Poor Counselling
12. Psychogenic
13. Emotional Factors

The substitution of the word psychogenic for functional hearing loss is because- in many instances \_\_\_\_\_ are found to account for the presence of a functional hearing loss.

Some authors preserve the term psychogenic for a functional hearing loss driven by an unconscious drive.

When there is a unconscious drive behind the functional hearing loss it can also be called as \_\_\_\_\_

Psychogenic hearing loss can mean a functional hearing loss driven by an \_\_\_\_\_

The intensional pretence of a hearing loss is called as melingering hearing loss by some authors. Hence if a case pretends to have hearing loss for financial gain he can be said to be \_\_\_\_\_

Melingering means \_\_\_\_\_ stimulation of a hearing loss

There are many words which mean the same as functional hearing loss. They are simulated hearing loss, feigned hearing loss, faked or exaggerated hearing loss, non organic hearing loss, pseudohypacusis etc. All these words are synonyms of functional hearing loss.

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14. Emotional Factors.

15. Psychogenic Hearing Loss.

16. Unconscious drive.

17. Melingering

18. Intensional

**SELF-QUIZ-(one or more answers may be correct)**

I. Functional Hearing loss means:

- (a) the hearing function is impaired.
- (b) the damaged function can not be brought back to normal state.
- (c) no organic factor found to account for the hearing loss or the magnitude of the loss.
- (d) a hearing loss exists in spite of a normal peripheral hearing mechanism

II. When a person is exhibiting a hearing loss for Financial gain we can call it

- (a) Psychogenic deafness
- (b) Conscious deafness
- (c) hysterical deafness
- (d) Melingering deafness.

III. A condition is seffesed to as Psychogenic deafness when:

- (a) it originates in the person's psyche
- (b) it is a psychotic disorder
- (c) a unconscious drive motivates the person to exhibit a hearing loss
- (d) it is genetically transmitted psychotic condition.

IV. Pseudo hypacusis is:

- (a) an autonym for non organic hearing loss.
- (b) a synonym for functional hearing loss
- (c) a distortion of disacusis
- (d) a hysterical condition.

**Answers:**

- (1)-(C), (2)-(D); (3)-(C); (4)-(B)

### Chapter-11: Incidence.

This has been found in all age groups and in both the sexes. In all the \_\_\_\_\_ and \_\_\_\_\_ groups functional hearing loss is seen.

The incidence varies with different population . So the incidence of functional hearing loss is not \_\_\_\_\_

The misleading numericals given by different authors is because of the criteria adopted by them to consider a case functional such as discrepancy among the different audiometre test result only, some consider the behavioural manifestations too and some take into account the results of electrophysiological tests also.

The \_\_\_\_\_ for considering a case functional is one of the important determinant in getting confusing incidence rate Not only the criteria but also the population taken for the study is important as the incidence is not \_\_\_\_\_.

The \_\_\_\_\_ adopted and \_\_\_\_\_ taken for study are the two main determinants of the figures of incidence given by different authors.

Among the adults it has been found to be more in men than women while in children it is reverse. In children there is high incidence of functional hearing loss in \_\_\_\_\_ while among the adults it is more common in \_\_\_\_\_

The incidence among civil population is continuously increasing with continuing upsurge in compensation claims for hearing impairment.

Age;

Sex;

Universal;

Criteria; Universal;

Criteria; Population;

Girls; men;

Self Quiz:(One or more answers may be correct).

- I. The incidence of functional hearing loss is not .  
universal as \_\_\_\_\_
- (a)it is not found in both the sexes.
  - (b)it varies with different population
  - (c)not found universally
  - (d)no studies have confirmed this.
- II.We don't have a confirmed numerical data about the  
incidence of functional hearing loss because\_\_\_\_\_
- (a)different authors have adopted different criteria  
to consider a case functional thereby coming up with  
widely differing data.
  - (b)no systematic survey has been done in this regard.
  - (c)there is no established standard
  - (d)the incidence keeps on changing.
- III. The incidence of functional hearing loss among the  
civil population is continually increasing because of\_\_
- (a)Increasing population leading to poor economic  
condition.
  - (b) Increase in hysterical problems
  - (c)Continuing upsurge in compensation claims for hearing  
impairment.
  - (d)Increase in deaf population.

Answers:

(1)-(b); (2)-(a); (3)-(c);

Chapter-III:Causes of Functional Hearing Loss:

When the patient is not revealing his true threshold he is said to have functional hearing impairment.

When the admitted thresholds are not the\_\_\_\_\_ the person is said to possess functional hearing loss.

The concealing of the fact may be because of many reasons- faulty testing procedure such as poor instruction or poor motivation on the part of subject can result in elevated thresholds

\_\_\_\_\_of the subject or poor\_\_\_\_\_can result in misleading results.

The examiner may get wrong thresholds due to faulty testing procedures such as\_\_\_\_\_

The person may be physically or emotionally incapable of giving appropriate responses.

The\_\_\_\_\_and\_\_\_\_\_conditions of the patient may not help him give appropriate responses. The person may really believe that he has hearing loss. This he might develop after a trauma supplemented by improper counselling.

Improper\_\_\_\_\_can turn a temporary hearing loss to functional hearing loss. After trauma which temporarily causes some hearing impairment the person can develop functional hearing loss due to\_\_\_\_\_.

True thresholds -

Poor motivation;

Instruction

Poor instruction

Physical; emotional

Counselling;

Improper

counselling;

The most plausible hypothesis of functional hearing loss is that \_\_\_\_\_ the person is either consciously or unconsciously attempting to shut off all or a portion of his hearing environment because what he hears imposes a serious threat to his psychological stability Or that the person gains something directly such as a child who gains attention or an accident victim who gains financial reward or something indirectly.

The cause of functional hearing loss can be a \_\_\_\_\_ or \_\_\_\_\_ shutting off of the hearing environment which imposes a serious threat to the \_\_\_\_\_

The person may also show such a problem because he \_\_\_\_\_ something directly or indirectly.

So functional hearing loss can be a defence mechanism for the \_\_\_\_\_ or may be triggered by some direct or indirect

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Conscious; Unconscious;

Psychological Stability;

gains;

Psychological stability;

gains;



**SELF QUIZ:(One or ,ore answers may be correct)**

- I. Functional hearing loss may result from
- (a)Poor nutrition
  - (b)Poor motivation of subject,
  - (c)Poor instructions and faulty testing procedures
  - (d)Poor health conditions of the patient;
- II. A temporary hearing loss may turn to functional hearing loss due to\_\_\_\_\_.
- (a)Improper care and treatment
  - (b)Improper Counselling;
  - (c)Recurrent attacks causing severe hearing impairment
  - (d)none of the above
- III The functional hearing loss can be conscious or unconscious shutting off of the hearing enviornment. because\_\_\_\_\_
- (a)he gains something directly or indirectly
  - (b)he wants to control others
  - (c)What he hears imposes a serious threat to his Psychological stability;
  - (d)he has no use of hearing.

**Answers:**

1 - (b, c,)

2 - (b)

3 - (a,c)

Chapter-IVWhen to Suspect.

Sources of referral are important in suspecting a case having functional hearing loss.

When a case comes from, the legal authorities for hearing check up we should suspect\_\_\_\_\_.

Compensation may be one of the reasons which brings the case to the clinician for hearing check up. Some industrial workers might come feigning a hearing loss to get \_\_\_\_\_

Some people come to get a disability certificate to gain some financial assistance. When a such a person comes we should always suspect the possibilities of functional hearing loss.

\_\_\_\_\_ is one of the important reasons which brings the person to the clinician with a functional hearing problem. Usually people from a low income group come feigning a hearing loss for \_\_\_\_\_.

We should suspect functional hearing loss in a person coming from a very low socioeconomic strata and who was under a \_\_\_\_\_ for a considerable time resort to escape mechanisms like functional hearing impairment.

A great Psychological stress supplemented by a poor economic condition sometimes compels a person to feign a hearing loss.

Functional hearing loss.

Compensation

Financial gain

Financial assistance.

Psychological stress.

Functional hearing loss can be suspected in emotionally disturbed children. Due to the great psychological stress at home or at school or as a attention seeking mechanism, the child might resort to a functional hearing loss.

\_\_\_\_\_ children might resort to functional hearing loss.

For seeking the \_\_\_\_\_ of other the child might feigh a hearing loss.

Due to the unbearable \_\_\_\_\_ at home or at school the child might feigh a hearing loss.

In some hysterical cases we see loss of vision, loss of movement of limbs , loss of voice, so also loss of hearing which is functional.

Functional hearing loss can also be \_\_\_\_\_ where. we may also find other hysterical symptoms such as loss of vision or loss of voice

Loss of \_\_\_\_\_ can also be hysterical like loss of vision or loss of voice.

Emotionally disturbed

Attention

Psychological stress

Hysterical

hearing.

**SELF QUIZ**

(one or more answers may be correct.)

- I. Persons referred by the legal authorities have to be suspected to have functional hearing loss because
- (a) none of them have any hearing loss
  - (b) In most of them the hearing function is impaired
  - (c) most of them have come for a compensation claim.
  - (d) It is important from a legal point of view.
- II. Persons from a low socio-economic strata often come with a functional hearing loss because
- (a) they want some financial assistance
  - (b) In this group functional hearing loss is more prevalent.
  - (c) Poor economic conditions facilitate the development of functional hearing loss
  - (d) of the great socio-economic stress
- III. Emotionally disturbed children resort to a functional hearing loss because \_\_\_\_\_
- (a) Emotional disturbances are the precipitating factors for functional hearing loss.
  - (b) of the great psychological stress at home or at school
  - (c) they want to draw the attention of others.
  - (d) they don't want to hear when emotionally disturbed.

**Answers:**

(1)-(c); (2)-(a) ; (3)-(b , c.)

## Chapter-V

### Behavioural Observation

They have no difficulty in an informal situation but have problems in a formal test situation.

The functional hearing loss patients show an inconsistency in their hearing difficulty i.e., they have no difficulty in hearing in an \_\_\_\_\_ situation but complain of hearing loss in a \_\_\_\_\_ situation. The patient responds to questions asked over telephone and yet reports difficulty if asked about the use of it.

The patient reports \_\_\_\_\_ about the use of telephone, if asked; though he responds to the questions asked over telephone .

Unlike the eagerness shown to communicate by a person who develops hearing loss later in life the functional hearing loss patient shows no interest in getting any visual cue, sometimes he may exaggerate.

The person who develops hearing loss later in life shows an eagerness to communicate but a functional hearing loss patient either shows no interest in getting any \_\_\_\_\_ or shows \_\_\_\_\_.

Exaggerated attempts to hear or exaggerated staring is often shown by a \_\_\_\_\_

Exaggerated attempts to hear such as cupping the hand

informal;

test;

difficulty

visual cues;

exaggerated attempts

functional hearing loss;

behind the ear, extraordinary ability to lip read etc, are shown by the subject to impress the examiner.

The subject to impress the examiner. The subject either shows \_\_\_\_\_ eagerness to hear and exaggerated ability to lip read or acts stubborn not willing to admit any visual cues, forcing the examiner to write.

The subject may act \_\_\_\_\_ and force the examiner to write

The subject speaks in an excessively loud voice and keeps on asking to speak louder.

Usually the subject speaks \_\_\_\_\_ and continually keeps on demanding the examiner to \_\_\_\_\_

He asks for inappropriate repetition of words. The subject asks the examiner to \_\_\_\_\_ the words and speak \_\_\_\_\_

There is obvious nervousness- profuse sweating, tremors and fidgeting are seen.

The symptoms of anxiety such as profuse \_\_\_\_\_ & \_\_\_\_\_ are seen in functional loss cases.

The \_\_\_\_\_ such sweating and tremor may be observed in the subject.

He is either reluctant and passive or over anxious.

The functional hearing loss subject shows wither and \_\_\_\_\_ or over anxiousness.

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exaggerated;

stubborn;

louder;

speak louder;

repeat; louder

sweating; tremors; fidgeting;

reluctancy; passivity;

Being afraid of scrutiny he lowers his eyes, When he meets the gaze of the examiner.

The functional hearing loss subject does not meet the gaze of the examiner being afraid of the \_\_\_\_\_

These people seem to be badly oriented in space.

These people show a disorientation in \_\_\_\_\_. They exhibit themselves having a poor memory. Frequently they forget the answers to the questions, they don't try to keep up an appointment.

They try to show a poor \_\_\_\_\_.

Remarks such as "I can get along fine when I can read your lips", "my ears ring so much that I can't bear the tones", "I don't do well on these tests" etc. by the subjects are common.

The functional hearing loss subject remarks about his health or about his other disabilities and tries to get \_\_\_\_\_ from the examiner

Information given in the case history does not tally with behavioural observation or the findings of the tests. He might report injuries which indicate middle ear pathology and yet otological examination reveals no middle ear pathology.

Scrutinity;

Space;

Memory ;

Sympathy;

Discrepancy in information provided in the case history and \_\_\_\_\_ is common.

The behaviour of the case does not go in accordance with the hearing loss that is the melody of speech and precise consonant articulation is not deteriorated unlike a true hearing loss case.

The \_\_\_\_\_ of speech and \_\_\_\_\_ precise \_\_\_\_\_ of speech is affected in true organic hearing loss but not in a functional hearing subject.

The deterioration of speech is not seen in a \_\_\_\_\_ subject unlike the \_\_\_\_\_ patient.

A subject with true hearing loss turns his good ear towards the sound source whereas the person pretending a unilateral deafness mimics a bilateral deafness.

The person having true hearing loss in an ear tries to turn his head \_\_\_\_\_ the sounds. Whereas the functional hearing loss subject mimics a \_\_\_\_\_

If a hearing aid is given to these people either they don't benefit at all or claim exaggerated benefit.

Sometimes exaggerated \_\_\_\_\_ from a hearing aid is described by the functional hearing loss subject.

These people either the \_\_\_\_\_ from a hearing aid or claim \_\_\_\_\_

Sometimes they lack the knowledge of hearing aid. If they are given an aid they, seem to be \_\_\_\_\_ of the use of hearing aid

Test findings;	functional hearing loss;
Normal Melody;	organic hearing loss
Consonant articulation;	towards; bilateral deafness;
benefits; don't benefit; excessive benefit;	unaware;



**SELF QUIZ**

(One or more answers may be correct)

- I. The functional hearing loss shows behaviour unlike the person who develops hearing loss later in life that is \_\_\_\_\_
- (a) He gets too depressed
  - (b) He does not show any eagerness to communicate
  - (c) He is unaffected by the loss
  - (d) He looks shy and withdrawn.
- II. Anxiety symptoms may be present in a functional hearing loss patient; they may be \_\_\_\_\_
- (a) Stuttered speech or dysphania
  - (b) fainting spells
  - (c) sweating, tremors, fidgeting
  - (d) none of the above
- III. The functional hearing loss may show disorientation of \_\_\_\_\_
- (a) Space;
  - (b) Time
  - (c) Person
  - (d) all of the above.

**Answers:**

I- (b), II - (c); III - (a);

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## Chapter-VI

### Behaviour during Conventional Audiometry

The subject is hesitant, restraint or responds with some delay.

The functional hearing loss subject is \_\_\_\_\_ and responds with sore \_\_\_\_\_ while doing the audiometric testing.

The subject gives a slow, deliberate and thoughtful response - after the presentation of the tone we may see a slight flickening of the finger.

The responses of the subject are \_\_\_\_\_ & \_\_\_\_\_.

We may see slight \_\_\_\_\_ of the finger after the presentation of the cone.

He may manifest anxiety symptoms such as perspiration.

-Perspiration etc. which are \_\_\_\_\_ symptoms may be manifested by the subject during audiometric testing.

Anxiety symptoms such as \_\_\_\_\_ can be manifested by the subject during audiometric testing.

Sometimes the subject is found wincing with pain but he does not admit hearing.

To very loud sounds the subject is found \_\_\_\_\_ with pain

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Hesitant; delay;  
slow, deliberate; thoughtful  
flickening; anxiety;  
perspiration; wincing;

The subject sometimes \_\_\_\_\_ with pain to loud sounds but still he does not admit.

whole doing audiometry the patient seems to be totally engrossed in listening task and avoids looking at the examiner

Being scared of the scrutinity the subject does not look at the examiner and seems \_\_\_\_\_ in the listening task during the testing.

While doing the audiometric testing the patient seems to be completely engrossed in listening test and \_\_\_\_\_ looking at the examiner.

There is inconsistency of responses The subject responds to the tones \_\_\_\_\_

Hence there is not only intra test discrepancy but also inter test discrepancy.

Due to the inconsistency of response there is not only \_\_\_\_\_ discrepancy but also \_\_\_\_\_ discrepancy.

There is variation in pure tone and speech test results.

The SRT and PTA do not tally (the discrepancy is more than  $\pm 6$  dB).

SRT - PTA \_\_\_\_\_ is obvious in functional hearing loss subjects.

Winces ;  
Engrossed ;  
Avoids  
Inccnsistantly;  
Intra test; Inter test;  
Discrepancy;

The subject exhibits ability to understand conversation at hearing levels below SRT. He answers questions but does not repeat spondaic words at the same level.

The subject understands conversation at levels where he does not admit hear the\_\_\_\_\_

The subject does not repeat the spondecs but answers questions at the\_\_\_\_\_level.

The repeated SRT measurements vary greatly

On repeated SRT measurements we find\_\_\_\_\_results.

Sometimes he substitutes words that have little likeliness with the words presented

The subject substitutes words that have little\_\_\_\_\_with the spondees presented.

Half word responses for the spondees arenot uncommon.

The subject sometimes repeats only\_\_\_\_\_of the spondee

There may be complete absense of hearing with normal vertibular response;

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Spondees;

same;

varying;

Likeliness;

Half;

The subject might not admit any hearing in both ears but the vestibular responses may be \_\_\_\_\_

Normal vestibular responses may be seen in the face of complete absence of hearing in both ears.

In monaural hearing losses usually we get a shadow for the curve because of the cross hearing, but it is absent in the functional loss patients.

The shadow curve that is normally expected of a monaural hearing loss subject is \_\_\_\_\_ in a functional hearing loss patient.

The audiograms in some cases is saucer shaped.

\_\_\_\_\_ shaped audiograms are obtained some cases.

The Bone conduction thresholds are many a time poorer than air conduction threshold

The bone conduction thresholds are found to be \_\_\_\_\_ than air conduction thresholds.

The subjects acts like a patient with rapid tone decay but can be distinguished from the patient with true tone decay by presentation of pulsed tones.

---

normal;  
absent;  
saucer;  
poorer;

When the subject is tested using ascending method he does not level off and acts like a patient with \_\_\_\_\_

This patient can be distinguished from the true case of rapid tone decay by presentation of \_\_\_\_\_

Where the true case of tone decay responds but not the functional hearing loss

There is no consistency of error

\_\_\_\_\_ of error is not there in the functional hearing subject.

---

Rapid tone decay;  
Fulsed tone  
Consistency-

**SELF QUIZ**

(One or more answers may be correct)

- I. The functional hearing loss subject is\_\_\_\_\_
- (a) often moody in responding;
  - (b) hyper active in the testing enviornment;
  - (c) hesitant, restraint & responds with sore delay
  - (d) very shy and hesitant in the test enviornment;
- II. The subject manifests anxiety symptoms such as
- (a)hyperactivity; restlessness;iistlessness
  - (b)fainting spells
  - (c) increased pulse rate; very high B.P., abnormal breating pattern;
  - (d) Perspiration, slight tremor of limbs, slightly increased pulse.
- III The results of audioretric testings show:
- (a)Intra test inconsistency;
  - (b) Inter test inconsistency
  - (c) Inconsistency of error
  - (d)All of the above type of error
- 

**Answers:** I -(c) II- (d) III - (d)

- IV. The response in speech audiometry is that
- (a)The subject gives a stable though very high SRT
  - (b)On repeated testing we find varying thresholds
  - (c)He repeats part of the spondee
  - (d)does not repeat the words though at the same level he answers questions;
- V. The audiogramic configuration of the functional hearing loss is\_\_\_\_\_
- (a) always flat?
  - (b)always steep high frequency hearing loss
  - (c) sometimes saucer shaped.
  - (d)always complete absence of any hearing.

**Answers:**

- I- (c) ;
- II- (d) ;
- III- (d) ;
- IV- (b,c,d) ;
- V- (c)



Testing

The preliminary examination for the functional hearing loss is his behavioural observation itself. Next comes some simple techniques of testing using our common sense.

The \_\_\_\_\_ is the first step in the examination of the functional patient. The use of \_\_\_\_\_ for the detection of the functional loss patient comes next.

Here the main aim is to find out whether really the person has any hearing loss or not.

The aim of behavioural observation of the patient and using some simple tricks with him is to just find out whether \_\_\_\_\_

Some simple methods without any instrument that can be adopted for detecting the functional loss patient may include \_\_\_\_\_ questioning in a low voice during \_\_\_\_\_ speaking C a cigarette between lips, speaking softly while out of the patients field of vision, and softly spoken instruction while laryngeal examination.

Controlling the \_\_\_\_\_ of the spoken voice can be a useful test in detecting the functional loss patient.

Unexpected commands such as a rapid command to "stand up there is fire" "watchout there is a snake" would elicit a reflexive action.

---

Behavioural observation;  
Common sense;  
he really has any hearing loss;  
colour testing;  
loudness

Commands that would elicit a \_\_\_\_\_ can also be used to detect functional hearing loss.

Fourmier used to say the following way for the patient, when functional loss is suspected \_\_\_\_\_ hand me a knife and hold his head steady I am going to perforate his ear drum, if that does not succeed that won't do any harm since he is deaf already. At the worst it may cause meningitis but that after all is rare

Some tests using tuning fork or other such simple instruments were developed by different authors.

**Weber test**: Developed by Weber. Good for unilateral hearing loss cases.

The vibrating tuning fork when placed on the forehead of a patient the sound is heard in the center of head ; but if there is conductive loss in one ear the sound is lateralised to that ear if the other ear has neural loss or normal hearing.

Functionality is detected by a response that the patient says he hears in better ear when a vibrating tuning fork is placed on the forehead of the patient with poorer ear canal occluded.

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Reflexive action;

The weber test is good for \_\_\_\_\_ cases.

To detect functionality a vibrating tuning fork is placed on the forehead of the patient with the occlusion of \_\_\_\_\_

The response that confirms functionality is that the subject says he hears in \_\_\_\_\_

**Rinne test:** Rinne developed the tuning fork test to diagnose the conductive or S.N. type of hearing impairment. Here the vibrating tuning fork is held near the pinna and placed on mastoid. Based on whether the patient hears through bone conduction better or through air conduction it is diagnosed as conductive or S.N. hearing loss or normal hearing.

Rinne test compares the patient's hearing of a tuning fork sound by \_\_\_\_\_ and \_\_\_\_\_

If the sound is heard better through a.c. than through B.C. it is either \_\_\_\_\_ or \_\_\_\_\_ and if the tone is heard through B.C. better than A.C. it is

**Callahan's test:** This is good for unil., losses. A stethoscope with two tubes of unequal length are inserted into the two ears. A bell is rung where sound reaches the

\_\_\_\_\_  
Unilateral functional hearing loss;

poorer ear canal  
better ear;  
air conduction; bone conduction;  
S.N.hearing loss normal;  
Conductive hearing loss.

bad ear first and then the good ear. If the bad ear is having functional hearing loss the sound in good ear gets masked and functionality is detected by a response that the patient does not hear anything.

In Callahan's test a stethoscope with two tubes of \_\_\_\_\_ length are used.

When the bell is rang the sound reaches the \_\_\_\_\_ first as the tube going to the affected ear is shorter.

If the affected ear has functional hearing loss the sound reaching the good ear with some time delay gets \_\_\_\_\_

Functionality is detected by a response that the subject says "\_\_\_\_\_"

Becker's test: This again is good for unil., losses. Here one rubber tube with two ear pieces at the both end is used. A vibrating tuning fork is applied to the middle of the tubing- if both ears are normal the sound will be heard in both ears equally. And as the fork is moved towards

---

Unequal;  
 affected ear  
 masked;  
 He does not hear anything.

the affected ear it will be heard in affected ear  
 but at this point the subject denies any hearing if it  
 is a case of functional hearing loss and it is further  
 confirmed by pinching off the tube going to affected  
 ear which elicits a response of hesitation before  
 shifting to good ear or the subject continues to say  
 that he does not hear.

Becker's test includes the use of rubber tube with  
 \_\_\_\_\_ at both ends.

If a vibrating tuning fork is applied to the middle of  
 the tube the tone should be heard in \_\_\_\_\_ if  
 both ears are good. As the fork is moved nearer to  
 one ear the sound is likely to be heard in \_\_\_\_\_

If we move the tuning fork nearer to the affected ear  
 the subject \_\_\_\_\_ if that ear has functional  
 hearing impairment.

The further confirmation is done by \_\_\_\_\_  
 which elicits a response that either the patient  
 hesitates before shifting to other ear or continues  
 his no response.

---

Two ear pieces;  
 both the ears;

that ear.

denies any hearing;

Pinching off the tube going to bad ear'

Erhard's test:

This test also is for unilateral loss cases. The subject is asked to count the clicks of the pocket watch which is kept near the good ear and then near the bad ear. If the patient says he can't hear when the watch is near the bad ear he must be malingering because he can hear the clicks from one foot distance via good ear.

Erhard's test uses a \_\_\_\_\_ counting technique

The subject counts \_\_\_\_\_ when the watch is near the \_\_\_\_\_ and then when the watch is near the \_\_\_\_\_

Functionality is suspected when the subject says \_\_\_\_\_ because he should be able to hear the sound via good ear from one foot distance.

**Mac Farlam's Test:** \_\_\_\_\_ He gives a modification of the Weber test. The vibrating tuning fork is placed on the forehead; soon after he says he no longer hears the tone the bad ear canal is occluded denial of hearing would indicate functionality

Mac Farlam's modification of the Weber test is that after the subject says he no longer hears the tone \_\_\_\_\_. Functionality is suspected by a response that the subject continues to

---

Click;

the clicks;

good ear;

bad ear;

he can't hear when the watch is kept near the bad ear  
occlude \_\_\_\_\_ the \_\_\_\_\_ ear \_\_\_\_\_ canal.  
deny of hearing anything.

**Priest's test:**

Priest used a modification of classical stenger test.

A 30 inch rubber tube is used to measure the distance at which the subject hear the s.u.id of a tuning fork placed over tube and then the other end of the tube is connected to he bad ear. If the subject is hearing in bad ear and does not want to admit he will wait till the sound is heard in good ear again. This would result in considerable shortening of the tube.

Priest's test uses a modification of \_\_\_\_\_

Using a \_\_\_\_\_ it is measured at what distance the subject can hear, when the tube is connected to bad ear the subject denies of hearing anything if \_\_\_\_\_ which result in \_\_\_\_\_ of the distance at which the subject responds in good ear.

**Marx test:**

Marx used a simple technique of placing the Baraney's buzzer on good ear of the unil., loss cases and ask if he can hear. True cases can not understand the question but functional loss case may say No.

Stenger test;

30 inch rubber tube;

he does not want to admit hearing in poor  
considerable shortening;

**SELF QUIZ**

(31)

(one or more answers may be correct.)

- I. All these tests described here can be used to detect:
- (a) Unil., hearing losses only
  - (b) Unil., functional hearing losses only
  - (c) Both bil., and unil., hearing losses.
  - (d) All of the above.
- II. The tests described here all use some techniques of \_\_\_\_\_
- (a) Distraction to detect the functional hearing loss
  - (b) Confusion to find the presence of functional hearing loss
  - (c) Conditioning principles
  - (d) none of the above.

**Answers:**

I- (b), ;

II - (a), (b);

---



Chapter-VIII

Puretone Testing.

The simple pure tone tests that are used to assess the degree of hearing impairment is not enough to detect the functional patient. Many authors have suggested modification of the conventional methods

(1) Kerr suggests ascending-descending method to evaluate the functional patient.

..... start at 90 dB or the maximum output of the audiometer and then keep on decreasing in 10 dB steps till he stops responding.

\_\_\_\_\_ Then keep increasing in 5 dB steps till he again responds

Usually the discrepancy in these two thresholds will be 25 to 30 dB.

As the \_\_\_\_\_ is not enough some authors suggested some modification of it while doing puretone testing. Ascending-descending method uses testing the threshold starting from highest intensity and decreasing in \_\_\_\_\_ till the subject does not hear the tone.

---

Conventional method

10 dB steps

The next step is to start at an \_\_\_\_\_ level and go up by 5 dB steps till the subject responds again. The difference between the 2 thresholds is usually as much as \_\_\_\_\_

(2) Nilo and Sander use another modification. They increase the intensity by 2 or 2-1/2 dB steps.

Keep on asking if hears the tone and if he says no keep reminding that he will hear them soon.

Nillo and Sander suggest the increase of intensity by \_\_\_\_\_

In this method subject is continuously asked about the \_\_\_\_\_ of the tone and is reminded that \_\_\_\_\_ if he says no.

3. Frank used a Yes-No technique This Yes-No method is especially good with children

4. Wood used reduced decision time for detecting functional loss patients.

Frank used \_\_\_\_\_ method which is especially good with \_\_\_\_\_

Wood used \_\_\_\_\_

---

inaudible;

25 to 30 dB

2 or 2-1/2 dBs

audibility

he will hear them soon

Yes-No

reduced decision time

5. Thompson and Denon used the occlusion effect to detect unilateral functional hearing loss patients.

\_\_\_\_\_place the b.c. vibrator in better ear mastoid and close the ear canal of poorer ear..

\_\_\_\_\_The sound is expected to be heard in poorer ear.

But as the subject does not want to admit he may not respond.

Thompson and Denom used\_\_\_\_\_for the detection of functional patient.

When the poorer ear canal is occluded with the vibrator placed on, the better ear mastoid the tone is expected to be heard in\_\_\_\_\_. The patient does not respond because he does not want to\_\_\_\_\_.

6. The Eye Blink response testing

The eye blink response to loud sound is a part of the startle reaction which can be used to detect these functional patients who don't admit any threshold at all. In normals the eye blink response access by 90 to 100 dB disappears completely by 60 dB The eye blink which occurs with a latency of 35 to 40 in.sec. can be recorded using oscilloscopes which is fed by a crystal

---

Occlusion effect  
poorer ear  
admit the tone in poorer ear

placed over the eye lid which picks up the movement of the eye lid, using clicks of high intensity.

However this test also cannot determine the threshold of the subject.

Eye blink response testing is mainly useful for these who\_\_\_\_\_

The eye blink occurs at about\_\_\_\_\_in normals.

The latency of eye blink is about\_\_\_\_\_m.sec.

The response can be recorded using oociloxgas fed by placed \_\_\_\_\_ over by eye lids.

The stimulus usually used for the purpose are\_\_\_\_\_ of high intensity.

7. Miller et. al. describe 3 different methods to detect functional loss.

Method-1: The tone is presented 10 dB above the patients admitted threshold and he is asked to keep raising his hand as long as the tone is audible. The tone is attended in 10 dB steps. Find the level where the subject reports that he no morehears the tone Again instruct the subject and start at the level where the subject reported that he did not hear the tone; and find a different threshold if the subject starts responding again

---

don't admit any threshold at all

90 to 100 dB

35 to 40

crystals

clicks

Killer's first method includes initial presentation of a tone at-

The tone is attended by \_\_\_\_\_ till the subject no more hears the tone.

Restarting of the test is at the level where \_\_\_\_\_

**Second Method:**

Instruct the subject to judge the loudness of a series of puretones presented to him. He has to respond by saying either louder, same or softer.

The subject is presented with one second tone bursts so that the child does not get enough time for making a decision.

First tone is presented at 10 dB above the suspected threshold and the second tone at either higher or lower levels.

By changing the intensity of the first tone organic thresholds are explored.

The second method uses \_\_\_\_\_ for exploring the organic thresholds.

The stimulus used here are the \_\_\_\_\_

Initial presentation of the first tone is at \_\_\_\_\_

against which a second tone presented at a higher or lower

---

10 dB SL.

the subject reported that he cannot hear anymore.

loudness judgement

1 second tone bursts.

10 dB SL

level is compared .

Exploration of the organic thresholds is by \_\_\_\_\_

**3rd Method:** Ask the subject to say yes whenever he heard' the sound and say no whenever he does not hear. The subject may keep saying no whenever he does not want to admit the sound.

The instruction in the 3rd method is that " \_\_\_\_\_

Functionality is suspected when \_\_\_\_\_

8. Rapid Random loudness judgement:

This is an outgrowth of Fowler's ABLB test, but both the purpose and method are different

**Principle:** Confuse the non-cooperative patient.

The test is good for both unilateral and Bilateral functional hearing loss cases.

The subject is presented with two tones of same frequency and is asked to make loudness judgement of the second tone with respect to the former. The ear and the level of the tone is very quickly changed which confuses the functional patient a lot. He starts giving, judgements about the tones which he had denied hearing.

---

changing the intensity of the first tone  
say yes when he hears the sound & say no when  
the sound is not heard  
the subject keeps on saying no whenever the sound is  
presented.

RRLJ is an outgrowth of \_\_\_\_\_

The principle of RRLJ isto \_\_\_\_\_

This test can be used for \_\_\_\_\_

**9. Vyasmurthy's method for detecting unit functional hearing loss:**

---

**Principle:** He describes two methods:

Bilateral presentation of same stimulus (both frequency and intensity) results in a lower threshold by 6 dB

**Instruction to the patient:** I am going to present tone in better ear for 2 to 3 second immediately followed by another tone for 2 to 3 second. You have to match the loudness of the second tone with the first one. You have to indicate whether the second tone was louder, softer or same.

The patient is indicated when the first tone is presented and when the second.

**Procedure:** Present the tone to better ear at 35 dB SL for 2 to 3 sec and then binaurally.

The patient either says the 2nd tone is louder, softer or same. If the former two then it is a unilateral functional hearing losse case. But if he says same the interpretation becomes difficult.

---

Fowler's ABLB test

Confuse the patient.

both unit as well as bilateral functional hearing loss patient

**2nd Method:**

**Principle:** At threshold level binaural presentation of same stimulus tone causes an 3 dB gain.

**Procedure:** Present the tone 3 dB below the threshold; the patient may not respond. Then present same tone bilaterally- if the case responds it is unilateral functional hearing loss

**The Limitations:** In first method if the patient says the loudness is same it becomes difficult to interpret. In second method if the test is negative we can't ruleout functional hearing loss.

The principle behind Vyasmurthy's 1st method is

---

The order of presentation of stimulus is \_\_\_\_\_

The patient is instructed to report \_\_\_\_\_

Limitation of this method is that \_\_\_\_\_

Functionality is suspected if the patient reports \_\_\_\_\_

---

at supra threshold level there is 6 dB gain if same stimulus tone is presented binaturally

present the good ear with a 35 dB SL tone for 2 to 3 second followed by binatural presentation of same tone.

which of the two tones is louder

if the patient says both the tones are equally loud the interpretation becomes difficult.

that the second tone is either louder or softer



The second method is based on the principle that

The limitation of the test is that if the test is negative we can't rule out functional hearing loss.

#### 10 . The Stenger Test:

Gives by stenger can be used with unilateral and assymetrical bilateral functional loss cases. This test can approximate the threshold.

**Principles:** When two tones of same frequency but different intensity the louder tone will be perceived.

**Procedure:** Present a tone of some frequency at 10 dB above the admitted threshold. The poorer ear is presented with a 0dBAL tone. The patient might respond to the better ear if he does so increase the 'tone in poorer ear by 5 dB and continue increasing the tone by 5 dB steps till either the patient stops responding or respond. in the poorer ear. This is called contralateral interference level which is within 20 dB of the poorer ear threshold.

---

at -hreshold level there is 3 dB gain if the same tone is presented binaurally.

**Factors affecting stenger test:**

(1) Diracusis: Diracusis can invalidate this test  
To overcome this either use narrowband noise or speech  
as the stimuli for stenger test.

(2) Recruitment: It can be misleading but a rate  
phenomenon to occur in unilateral losses but in bilateral  
losses they deserve a major consideration

(3) Intensity relation between ears: The larger the  
interaural intensity difference, the greater is the  
validity of the test.

(4) Other factors such as frequencies to be tested, ear  
pathologies, contralateralization to be considered.

The stenger test is mainly useful in \_\_\_\_\_  
functional patients.

The principle of this test is that \_\_\_\_\_

The contralateral inferences level is usually within \_\_\_\_\_  
of the poorer ear threshold.

\_\_\_\_\_ & \_\_\_\_\_ are some of the  
factors that can affect the test.

---

Unilateral

if 2 tones of same frequency are presented the louder  
one will be perceived

20 dB

Diracusis, Recruitment; intensity relations between the  
ears;

**11. Fusion inferred threshold Test:**

Fusion inferred threshold Test is based on the stenger principle that is when 2 tone of same frequency are presented the louder tone is perceived.

Klass had reported that a tone 5 dB below threshold can affect the lateralization of a reference tone in the other ear.

**Instruction:** You are going to hear a tone in your (reference) ear. After some time the tone may go up the head or to the other ear. Inform the location of the tone.

**Procedure:** One ear is kept as reference ear (usually the better ear in unilateral hearing loss cases or asymmetrical losses). A tone is presented at 5 dB SL to the reference ear and the level in the other ear is slowly increased from inaudibility to audibility, The level where the patient lateralises to either the center of the head or the other ear is taken as the F.I.T threshold which is 5 dB better than the threshold obtained by orthodox methods.

The F.I.T. test is based on the \_\_\_\_\_ principle. Klass's report is that a tone presented at 5 dB below

---

Stenger

(42)

the threshold of one ear can affect \_\_\_\_\_ of a reference tone in the other ear.

The subject is instructed to inform about the \_\_\_\_\_ of the tone.

The tone presented to reference ear is at \_\_\_\_\_ and the tone in poorer ear is \_\_\_\_\_

The F.I.T threshold is the level where the patient \_\_\_\_\_

### **Tone in noise test:**

This test is an outgrowth of Doerfler-Steward test. It has been proved that while noise of 30 dBSDL have negligible masking effects - above this level there is a linear correlation.

Principle: A non-organic case has some loudness criterion of the stimulus as his reference for admitting or denying its presence which he actually hears all the time.

Theoretically this loudness yardstick is disrupted by simultaneous presentation of a noise with the signal.

Procedure:

- (1) Obtain the A.C threshold (T1)
- (2) Increase the intensity by 5 dB(T1+5 dB)
- (3) Introduce noise at T1+15 dB level into test ear
- (4) After the introduction of the noise the tone is interrupted and T2 N is obtained.

---

the lateralization  
location  
5-dB above the threshold  
varied from inaudibility to audibility  
lateralises the tone to the center or the other ear

None organic loss cases show a great T1-T2N difference

**Precaution:**

- (1) The listeners should not be told that masking noise will be introduced
- (2) The masking noise is never introduced gradually

Tone in noise test is an outgrowth of \_\_\_\_\_

The principle of this test is that \_\_\_\_\_

**Sensorineural acuity level tests:**

Originally given by Jerger and Tillman for finding out the cochlear sensitivity. In this test the amount by which a bone conducted thermal noise shifts the air conduction threshold of a subject at a given frequency is compared to the shift produced at that frequency in the normal ears by the same noise. Presumably the subjects who show a sensory mechanism. One who exhibits less shift has a loss equal to the amount by which the shift is less than the normal shift.

**Procedure:**

- (1) Measure the pure tone a.c. threshold of the subject
- (2) place the bone vibrator on the forehead and introduce the masking noise.

---

Doerfler-Steward test.

the subject uses a lordness yardstick for admitting or denying the presence of a tone which is disrupted by the simultaneous presentation of noise.

3. Determine the a.c.threshold in the presence of the masking noise
4. Find the difference between the 2 A.C.thresholds
5. SAL is the difference between the difference of the patient and the normal difference between the masked and unmasked threshold

Functional hearing loss patients show air-sal gap in the absence of any conductive pathology

**ILLUSTRATION**

	Normal	Conductive loss	S.N.Loss
Hearing (HTL)	0	35	35
Masked threshold	40	75	40
Difference (NT-HTL)	40	40	05
Normal masked threshold (NMT)	40		40
SAL (NMT - (MT-HTL))	0	0	35

**Bekesy audiometry:** Bekesy audiometry can be employed for the detection of functional hearing loss. Patients with the functional hearing loss typically show a pattern called as Bekesy type V where the curve for the interrupted tones is worse than that for the continuous tone. This happens because the patient finds it difficult to maintain the loudness of the interrupted tones. Modifications of the conventional procedures have been suggested by different authors.

**Lengthened off time:**

Hattler suggested a modification of the duty cycle of the tone. Instead of 560 m.sec off time he made it 800 m.sec off time and 200 m.sec on time. This modification effects the tracing level of the tone for the functional patients i.e., it becomes worse, but it has little effect in organic loss cases or normals.

LOT claims to detect 95% of the functional hearing losses.

It is always recommended to take the tracings with both standard off time and lengthened functional loss is suspected. However practice and sophistication can help the patient avoid a type V Bekesy tracing.

**Bekesy ascending descending gap evaluation:**

To add greater difficulty BADGE has been developed.

In this test the patient traces his threshold in a different conditions.

1. Fixed frequency Esx±x&xsxH continuous tone the audiometric dial set at OdB level called C.A.
2. Pulsed Ascending (P.A.)
3. Continuous tone with the audiometric dial set at the maximum output of the audiometer (CD.)
4. Pulsed descending (P.D.)

Using this we can break the loudness yardstick of the patient and the functional patient can't avoid giving thresholds that are not in agreement and thus confirming functional hearing loss.

The usual type of graph that we get in Bekesy audiometer for the functional patients is a KgK<R13^XX^g!3&:\_\_\_\_\_

In type V Bekesy tracing the continuous tracing is \_\_\_\_\_ than the interrupted tone

LOT employs a modification of the \_\_\_\_\_ to detect the functional patients better

It is always better to employ tracings with both \_\_\_\_\_ and \_\_\_\_\_

The four different conditions in which the patient has

Bekesy type V; \_\_\_\_\_

Better

duty cycle

SOT LOT



to plot his threshold in BADGE are , \_\_\_\_\_  
& \_\_\_\_\_.

**Delayed auditory feedback:**

We can use this method for unilateral as well as bilateral functional hearing loss patients. Delayed auditory feedback has been found to affect rhythmic activities or speech if given at a sufficient supra threshold level. Ruhm and Cooper have used delayed auditory feedback principle with puretones. The subject is instructed to tap in a particular fashion.

The key is connected to audiometer, when he presses the key he hears the tone. In the presence of simultaneous auditory feedback he will be asked to tap the key somewhere in the middle the DAF is introduced. During this also he is asked to tap in the same fashion. It is observed that the rhythms of tapping, number of tapping are changed; there is increase in the finger pressure on the key. The effect of DAF is seen at about 5 to 15 dB SL

So we can explore the thresholds if the above mentioned changes are noticed below the admitted thresholds

A rhythmic activity if associated with an auditory sensation can be \_\_\_\_\_ if the feedback is delayed.

continuous ascending, continuous Descending;  
pulsed ascending pulsed descending  
disturbed

DAF audiometry can be used for \_\_\_\_\_

The DLF produces a change in \_\_\_\_\_

and increase in finger-finger pressure.

#### **250 Hz B.C. tone Test\***

Vyasmurthy (1980) suggests that 250 Hz B.C. tone at 50 dB HTL or higher level can be used to detect pseudo hypacusis. This test is based on the assumption that most of the subjects respond to vibration when a B.C. vibrator is producing a 250 Hz tone at 50 dB HTL, is placed over their mastoid bone. A melingerer who does not respond to any puretone (A.C. and B.C.) at maximum levels of an audiometer can be tested using the 250 Hz B.C. tone test.

**Procedure:** Condition the subject to drop a marble as a response to the sense of vibration of the 250 Hz tone when the vibrator is placed over the finger joints. After the conditioning is established the tester should place the B.C.Vibrator(with the tone on) on different body joints and make sure that the subject responds. Finally the tester places the vibrator(with the tone on) on the subjects mastoid bone. Now if the subject does not respond- functional loss may be suspected.

---

both unilateral and bilateral functional loss cases.

rhythm of tapping ; number of tapping.

The reason is obvious- the moment the vibrator is placed over the mastoid the subject hears the tone but he does not want to admit that he hears so he prefers not to respond.

interpretation becomes difficult when the subject continues to respond after the vibrator is placed over the mastoid. The tester may have to depend upon other tests to rule out functional hearing loss.

The stimulus used in this test is a 250 Hz signal at 50 dB HTL because\_\_\_\_\_

This test requires initial\_\_\_\_\_of the subject to the 250 Hz signal to respond by dropping a marble.

Functionality is suspected when the subject\_\_\_\_\_after , the vibrator is placed over the mastoid

Interpretation is difficult if the subject \_\_\_\_\_ after the vibrator is placed over the mastoid.

---

this produces a sense of vibration to which all normal subjects respond  
conditioning  
stops responding  
continues to respond

**SELF QUIZ**

(one or more answers may be correct)

I. Yes-No method was used by:

- (a) Thomprson
- (b) Frank
- (c) Wood
- (d) Nilo and Sander

IT. In normals the eye blink occurs at around\_\_\_\_\_

- (a) 50 to 60 dB
- (b) 90 to 100 dB
- (c) 120 to 130 dB
- (d) above 140 dB

III. The rapid random loudness judgement can detect the functional hearing loss by\_\_\_\_\_

- (a) making him judge the loudness of tone for which he had denied hearing.
  - (b) reducing the decision time and confusing him.
  - (c) helping the tester identify the behavioural changes
  - (d) inducing a change in bodily activities
-

- IV. The most common finding in bekesy audiometry with a functional hearing loss is \_\_\_\_\_
- (a) the continuous tracing is better than the pulsed tone initially which falls rapidly below the pulsed tracing.
  - (b) The pulsed tracing is worse than continuous tracing
  - (c) Continuous tracing is better than pulsed tracing at the high frequencies
  - (d) Continuous tracing is same as pulsed training.

**ANSWERS:**

I- b , II - b, III- ab, IV - b.

Chapter-IX  
Speech Tests.

**Doerflar-Steward Test:**

This test is based on the assumption that a patient with functional hearing loss or overlay establishes and maintained an elevated through reference to ambient or environmental noise. D.S. Test attempts to disturb this reference level by super imposition of saw tooth complex ceases at various levels of intensity.

**Procedure:**

- (1) Obtain spondee threshold by starting at 0 dB and ascending in 2 dB steps (ST1)
  - (2) Add 4 dB to ST1 (ST1 + 4 dB)
  - (3) Introduce complex noise at 0 dB; increase in 10 dB steps initially and then in 2 dB steps as patient repeats spondees when the patient no longer repeats any spondee correctly - record this level as noise interference level
  - (4) Increase the noise by 20 dB and decrease the speech level to ST1 - 10dB
  - (5) Decrease the noise in 5 dB steps with each one or two words given until the noise is completely attenuated (If the patient starts repeating the spondees
-

before the noise is completely attenuated decrease the speech intensity by 2 dB steps until the subject is no longer able to repeat the spondees. At this point again attenuate the noise and proceed as before as the patient may again start repeating the spondees) and obtain ST2.

(6) Obtain noise detection threshold (NDT) by having the patient signal when he perceives the noise. The test is said to be positive if any of the difference scores fall outside the prescribed limit.

Prescribed limit		Difference limits	
Measures	Level	A 1- D	-4 to +6 dB
ST1(A)		A - E	-7 to +15 dB
ST1+4(B)		B - C	-18 to +3 dB
NIL (C)		D - E	-148 to +15 dB
ST2 (D)		E - C	-31 to -2 dB
NOT (E)			

The D - S test aims at disturbing the \_\_\_\_\_ which the subjects sets to respond at a particular level.

In the presence of complex noises the reference level of loudness for speech is \_\_\_\_\_

The D -S - test is said to be positive when the patient's scores fall \_\_\_\_\_.

### Lombard Test:

**Principle:** When we talk we monitor our speech by our auditory feedback. When we talk in noisy environment we automatically raise our voice to hear or monitor our voice.

The case is asked to read a passage and noise is introduced through the ear phone; gradually the intensity of noise is increased. The level of noise at which the case raises his voice is noted. If the level of noise is less than the patients' admitted threshold then functional hearing loss is suspected.

However exact hearing threshold cannot be explored as different people exhibit different levels for the voice reflex to occur.

---

reference level for loudness  
disturbed;  
outside the prescribed limit;



We monitor our speech by our sense of \_\_\_\_\_

Functionality is suspected when \_\_\_\_\_

The limitation of this test is that \_\_\_\_\_.

**Story test:** This test is good for unilateral hearing loss cases. This requires a two channel audiometer with provision to shift the signal to either ear or to both. A story is read to the patient a part of which goes to good ear ; a part to bad ear and a part to both. When the patient is asked to repeat the story if he repeats the part presented to poorer ear functional hearing loss may be suspected

The story read to the patient goes to \_\_\_\_\_ or \_\_\_\_\_

Functionality is suspected when the patient repeats the part presented to \_\_\_\_\_.

audition;

~~a noise level less than the patient's admitted~~

threshold causes the voicereflex

it cannot explore the patient's threshold;

either both;

poorer ear.

**Stenger Test(Speech stenger)**

The Stenger test can be made more efficient in the detection of functional hearing loss by the use of speech stimuli.

The determination of monaural SRTs of both ear is followed by presentation of spondees at 20 dB above the SRT to better ear. Then it is shifted to binaural presentation. If the patient stops repeating at this point then functional hearing loss may be suspected but if he continues to respond then the stimulus from the good ear is withdrawn if he continues it is functional hearing loss but if he stops then it may be against hearing loss.

The spondees are presented initially to the better ear at \_\_\_\_\_

If binaural presentation causes a \_\_\_\_\_ from, the patient then functional hearing loss may be suspected.

**Delayed auditory feedback:**

This test can be used for unilateral as well as bilateral hearing loss patients. It has been observed that in the presence of DAF there is a change in the reading rate and intelligibility of speech. The test requires a

---

20 dB SL  
cessation of response

recording and reproducing unit (DAF unit)

Delay of .1 to .2 second is enough to produce the effect.

**Instruction:** You are required to read the passage several times with the ear phones on the ear.

The passage should be such that it can be read within 30 seconds.

Find the time taken by the subject to read the passage

An average reading rate of 3 trials is taken to be the base rate. The V.V.meter needle is adjusted to the loudness of the speech of the subject. In the 4th attempt DAF is introduced at 10 dBHTL then in each successive trials the level is increased in 10 dB steps till there is a significant change in the reading rate. 3 sec is said to be significant.

**Drawbacks:**

This effect however occurs at different levels for different individuals and sophistication has some effect that is they can beat the test if they can learn to avoid the auditory feedback and monitor by only the proprioception.

In the presence of DAF there is a change in \_\_\_\_\_ and \_\_\_\_\_ of speech.

to of delay is enough to cause the effect .

reading rate;  
intelligibility

1. .2 sec.

The change in reading rate of \_\_\_\_\_ or more is significant

The two drawbacks of this test are (1) the effect occurs \_\_\_\_\_ for different individuals.

(2) \_\_\_\_\_ and \_\_\_\_\_ can help the individual beat the test by avoiding the auditory feedback.

**Lip Reading Test for non-organic deafness:**

Some people say they can't hear however they show an extra-ordinary ability to lip read. For them is the lip reading test for the determination of hearing threshold.

Falconer devised this test which can be used for both unilateral as well as bilateral hearing loss patients.

This test consists of test items that cannot be comprehended by lip reading alone' but the patient does not realise this and continues to respond.

The patient with headphones from the sound treated soon watches the illuminated face of the tester and repeats

3 sec

---

at different levels

practice; sophistication

the words by taking full advantage of the clues (auditory and visual) available ) to him The hearing level is reduced in the presentation of the successive lists to explore the hearing threshold of the patient If the patient is unaware of the intent of the test he may keep on responding and thereby reveal his true organic threshold.

Lipreading test is useful for those patients \_\_\_\_\_

The lip reading test provides provision for both better detection of functional hearing loss by keeping test items that cannot be \_\_\_\_\_ by lip reading alone and by letting the tester \_\_\_\_\_ in the presentation of successive lists, thereby explore the true threshold.

who say they can't hear but possess excellent ability to lip read.

\_\_\_\_\_ -  
comprehended  
manipulate the intensity of the speech signal

SELF QUIZ

( one or more answers may be correct )

I. The docrflar-steward test is based on the principle \_\_\_\_\_ that\_\_\_\_\_

- (a) Noise disrupts the loudness yardstick of the patient.
- (b) Noise can mask the opposite ear and thereby help to find the true thresholds of the test ear
- (c) Noise scares the patient and hence he gives the correct threshold
- (d) Noise helps to perceive the spondees better.

IIIX The DAF effect is seen at \_\_\_\_\_

- (a) around 45 to 55 dBSL
- (b) 5 to 15 dBSL
- (c) 15 to 20 dB below threshold
- (d) at varying levels for different individuals

III. Lip reading test is for those patients who\_\_\_\_\_

- (a) have excellent speech reading ability
- (b) can't hear but show an extraordinary speech reading ability,"
- (c) don't have any visual impairemant
- (d) can speak and understand speech.

ANSWERS:

I - a, II - b,d. III - b.

**Chapter-X**  
**Special Tests**

The use of electrophysiological tests in the determination of auditory sensitivity is very new. These can be employed to detect the true organic thresholds of the pseudohypacusic patients.

**Acoustic impedance:** This can be used to detect both unilateral as well as bilateral functional hearing loss patients. Normal individuals exhibit a stapedial muscle reflex at around 70 dB above their thresholds. In cochlear loss cases however we get the reflex at a lesser sensation level. But pseudohypacusic patients show reflex threshold that may be below their admitted thresholds for pure tones, or it may be at 5 or 10 dB SL.

**Niemeyer and Sesterhenn's formula** for detecting the threshold sensitivity.

**Principle:** In normals the stapedial reflex threshold for white noise is 20 to 25 dB better than the reflex threshold for puretone.

The acoustic reflex threshold is related to the bandwidth- increasing the bandwidth beyond the critical bandwidth result in improved acoustic reflex threshold level. But in S.N.loss cases there isn't an improvement with an improvement in the bandwidth

Niemeyer derived the following formula to predict the threshold sensitivity from acoustic reflex thresholds.

Average hearing threshold = Average reflex thresholds for pure tones - 2.5 x average reflex thresholds for white noise.

**Baker and Lilly's formula:**

$$\text{dB HTL} = 1.11 \text{ ART BBN(SPL)} - 0.81 \text{ ART } 500 \text{ Hz (H.L.)} + \\ 0.85 \text{ ART } 1000 \text{ Hz (H.L.)} - 0.43 \text{ ART } 2000 \text{ Hz(H.L.)} + \\ 0.25 \text{ ART } 4000 \text{ Hz(H.L.)} - 64.7$$

The disadvantage with the formula is that this taken into account the reflex thresholds from 500 Hz to 4 K.Hz and often in one or more frequencies we doesn't get reflex thresholds in many patients.

**Rizo and Greenberg's formula:**

$$\text{db HTL} = (0.216 \text{ ART HPN (SPL)} - 0.078 \text{ ART } 500\text{Hz(H.L.)}) \\ \times \quad \quad \quad 2 \quad \quad \quad - \quad \quad \quad 7.515)^2$$

**Sesterhenn and Brueninger's formula:**

By preactive of reflex by high frequency sounds it is possible to elicit reflex at a lower level. The difference is about 20 to 30 dB in all normals.

The formula is  $DL1 = K \times dL2$

$dL1$  = the difference between normal acoustic reflex threshold and puretone threshold.



dL2 = the difference between the normal and pre-activated reflex thresholds.

K = 2.75 for frequencies from 125 Hz to 500 Hz

3 for 1 KHz

3.5 for 2 KHz

and 4 for 4 KHz

### Sensitivity prediction from acoustic reflex(SRAR)

Given by Jerger et al based on the principle of Niemeier and Sesterhenn

**Method:** This includes taking the measurements of the reflex thresholds for 500, 1000 and 2000 Hz pure tones, broadband noise, a high pass filtered noise, low pass - filtered noise with 2600 Hz being the cut off frequency for the high and low pass filtered noise

The formula for predicting hearing loss is

$$D = \frac{(d - f) + (a - f) + (e - f)}{3} \text{ where}$$

f = the acoustic reflex threshold in dB SPL for broadband noise

d = the averaged acoustic reflex threshold for 500, 1000 and 2000 Hz pure tones

a - the acoustic reflex threshold for 500 Hz

e - the lowest acoustic reflex threshold in dB SPL for 500, 1000 or 2000 Hz tones.

---

The difference score D if found greater than 20 it suggests normal hearing 10 to 19 suggest mild or moderate hearing loss, less than 10 suggests a severe hearing loss. Absence of reflexes for all the stimuli indicate a profound hearing loss.

The slope of the audiogram is predicted by comparing the acoustic reflex thresholds for low pass filtered noise and high pass filtered noise.

if LPFN - HPFN = -1 to -5 indicates a gradual slope, greater than -5 indicate a steep slope and 0 or positive value indicate flat configuration.

To find out the sensitivity Jerger uses the formula.  
\_\_\_\_\_.

To find the slope of the audiogram the difference between the reflex thresholds for LPFN & HPFN is considered. Absence of reflex indicates \_\_\_\_\_.

**Reflex Relaxation Index (RRI)** - Developed by Norris et al. He used pulsed tones of 500, 1000 and 2000 Hz. Acoustic reflex thresholds were determined using these stimuli followed by presentation of the tone at 10 dB above the reflex thresholds.

$$D = \frac{(d - f) + (a - f) + (e - f)}{3}$$

Profounded hearing loss.

The stimulus parameters were .

- (1) 50% duty cycle
- (2) 180 m.sec on deviation
- (3) 25 m.sec rise & decay time.

Measurements of Reflex amplitude i.e., distance between baseline and highest excursion and excursion width i.e., the distance between the apex and apogee are made

The  $R.R.I = \frac{\text{Excursion width}}{\text{reflex amplitude}} \times 100$

reflex amplitude

Normals obtain RRIS of greater than 30% and less than 30% for the S.N.Loss cases.

The formula for RRI is  $\frac{\text{excursion width}}{\text{reflex amplitude}} \times 100$

More than 30% RRI indicate normal hearing

**Electro dermal audiometry:** This test measures the auditory sensitivity by conditioning the skin responses auditory signal.

The classical conditioning paradigm is used to condition the responses that are mediated through the autonomous nervous system. The procedure involves pairing of an unconditioned stimulus (here shock) with the conditioned stimulus (tone). Ear phones are used and

one ear at a time is tested. Pick up electrodes are placed on the finger tips and the changes in the resistance of the sweat glands of the skin are measured. The shock electrodes are generally attached to the forearm.

When the shock is paired with tone mere presentation of tone would bring about the decrease of the resistance of the sweat glands thereby allowing more current flow. By measuring this current we can explore the hearing sensitivity.

Electrodermal audiometry employs \_\_\_\_\_ to predict hearing sensitivity.

Shock is paired with tone by \_\_\_\_\_

Electronic shock reduces the \_\_\_\_\_ which permits the increased flow of current

**Evoked response audiometry:**

The responses to auditory signal can be recorded using an electroencephalograph. The vertex responses are picked up by the EEG the amplitude of which depend upon the intensity of the stimuli. The responses are picked up and summed up by an averaging computer. This has made it possible to measure the thresholds for air or bone conducted sound, and this improvement approves its applicability in the detection of functional hearing loss.

---

conditioning the skin responses to auditory signal  
 conditioning  
 skin resistance

The thresholds obtained using ERA and behavioural audiometry agree within 5 dB

An electroencephalograph picks up the \_\_\_\_\_ responses in response to sound stimuli in evoked response audiometry.

Threshold measurements are possible using ERA because \_\_\_\_\_

The threshold obtained using ERA and behavioural audiometry agree within \_\_\_\_\_

### **Electro Cochleography:**

Electro cochleography records the action potentials of the auditory nerve in the cochlea, generated in response to sound stimulation. The electrode placed over the promontory picks up the Cochlear microphonics and action potentials that are generated in cochlea but the use of averaging computer helps cancel the cochlear microphonics but as the action potentials are D.C. pulses gets stored. This response also depend upon the intensity of the stimulus i.e., amplitude of the response is related to the intensity of the sound. Hence this can also be used in threshold measurement; so becomes an useful tool in the detection of functional hearing loss.

---

Vertex

the amplitude of the response depend on the intensity of the stimulus  
5 dB

The thresholds obtained in electrocochleography and the behavioural audiometry agree within 12 to 15 dB i.e., the electro cochleography thresholds are higher by 12 to 15 dB than the behavioural audiometric thresholds

The \_\_\_\_\_ to sound stimulation is picked up in in electro cochleography

Electrodes are placed over \_\_\_\_\_

As the \_\_\_\_\_ of response depends on intensity of sound it can be used in threshold determination.

### **Hypnosis:**

Sometimes the hypnosis is used as a therapeutic tool for functional hearing loss and occasionally in diagnosis. Some patients who cannot be tested normally can be tested under hypnosis. It has been used for detection of functional hearing loss.

Cochlear response \_\_\_\_\_

Prometry

Amplitude.

SELF QUIZ

(one or more answers may be correct)

- I. Niemeyer and Sesterhen's method is based upon the principle\_\_\_\_\_.
- (a) Tensor tymphan muscle reflex threshold is better than stapidial reflex threshold when stimulated with white noise
  - (b) The reflex becomes more distinct by 20 to 25 percent when stimulated with white noise than pure tones.
  - (c) Preactivation of reflex can occur when stimulated with white noise.
  - (d) Stepidiel reflex threshold is 20 to 25 dB better when stimulated with white noise than puretones in normals.
- II. The main disadvantage with Baker and Lilly's formula is that\_\_\_\_\_
- (a) it is too complex
  - (b) It takes into account reflex thresholds for all 500 Hz , 1 KHz , 2 KHz & 4. kHz tones.
  - (c) It is too much time consuming,
  - (d) cannot be used with conductive hearing loss patients.
-

III. The elcctrodermal audiometry employes

- (a) conditioning of the skin responses to the auditory stimuli
- (b) Conditioning the Autonomic nervous system to emit particular response.
- (c) Conditioning the unconscious mind of the subject to give the desired type of response,
- (d) Conditioning the sweatglands of the skin.\_\_\_\_\_

**Answers:**

- I - d,
- II - b,
- III - a.



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