FALCONER'S LIPREADING TEST !N BENGALI LANGUAGE

Registration No. 8603
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An Independnent project submitted as part fulfilment for
First year Master of Science (Speech and Hearing)
to the University of Mysore

All India institute of Speech & Hearing
MYSORE-570 006.

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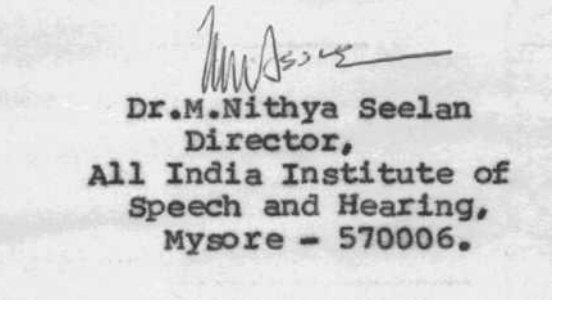
TO MY DEAREST DAUGHTER

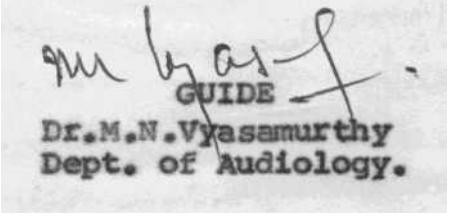
CERTIFICATE

This is to certify that the Independent Project entitled: "FALCONER'S LIP READING TEST IN BENGALI LANGUAGE", is the bonafide work in part fulfilment for the degree of Master of Science (speech and Hearing), of the student with Register Number 8603.



CERTIFICATE

This is to certify that the Independent Project entitled: "FALCONER'S LIP READING TEST IN BENGAII LANGUAGE" has been done under my supervision and guidance.



DECLARATION

This Independent Project is the result

of my own work done under the guidance of Dr.M.N.Vyasamurthy, Department of Audiology, All India Institute of speech and Hearing, Mysore, and has not bean submitted earlier at any University fox any other Diploma or Degree.

Mysore.

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LIST 0F CONTENTS

INTRODUCTION

Audiological evaluation of patient in an audiological clinic depends upon many factors of co-operation of the patient and pretending to be having hearing loss forms one of the most challenging task of an audiologist. The lack of coope-ration may be observed in both children and adults. The contributing factors to this, may be because of:

1. Patient does not understand the test.
2. Poor motivation
3. Physical or emotional involvement in responding.
4. Trying to conceal the handicapp
5. Trying to exaggerate the response
6. Due to unconscious motivation. (Chaiklin and Ventry, 1963).

Cases who exaggerate their hearing threshold* do so to an extent that they don't even respond to even at maximum intensities. Their normal conversation, however will be observed to be unaffected. This they attribute to as ability to 'lip read*. The diagnosis of such cases requires a thorough understanding of their history, both medical and social, observ-ing them' in and out' of the testing situation.

The existence and controversy over the usage of the terms makes the diagnosis More complicated. Rash of the term do not necessarily mean the same phenomenon. Some authors prefers to use the term such as functional hearing loss (Jerger, 1967)

Alberti, 1970), non-organic hearing loss (Barr, 1952), Psychogenic hearing loss (Doerfler, 1954, Martin, 1946) etc.

Whatever the implications of the terms may mean, the function of an audiologist is to evaluate true hearing thresholds. Although functional hearing loss or functional overlay is been recognized but only recently, reasonably accurate methods have been developed to identify the extent of hearing loss. "Though functional loss itself, becomes more readily identifiable, the problem posed by functional loss - diagnosis, evaluation, establishment of organic thresholds, attitude towards the patient possibility of resolution of the functional component or treatment of the patient are of increasing concern to the clinical audiologist - to the otologist and to those involved in rehabilitation of the deafned" (Kinstler, 1971).

Introduction of compensation and other facilities to the hearing handicapped, has increased the indidence of functional hearing loss cases. After World War-II, the chapter of functional hearing loss gained new importance, which may be due to (a) better recognition of the problem (b) Research and advancement of available audiological tests (c) Lack of proper audiologicai equipment and (d) probably lesser incidence of functional hearing lose.

Johnson (1956) estimated the incidence to be 11% to 45% and was more confined mare in the army. At present it is also prevalent in industrial areas and areas where hearing is measured (Chaiklin and Ventry, 1963).

Audiologically, functional hearing loss been diagnosed when (1) discripancies among interest and intratest audiological examinations cannot be explained on the basis of an organic condition, and (2) medical examinations rule out known organic conditions. The discripancies between response and absence of the pathology of the ear has been described as nonorganic, psychogenic, pseudohypocusis, malingering and other terms.

Though there are many tests at present for detection of functional hearing loss cases but the phenomenon of lip reading is been extensively by imparting minimum visual cues, or by eliminating voice and then switching to whisper or by continuing a conversation while turning away from patient (Feldman, 1967).

Falconer (1966) observing the fact that lip-reading ability depends upon residual,hearing,developed a lip reading test which contains auditory as well as visual stimuli and consists of monosyllabic homophenous words which are highly difficult to comprehendby lip reading alone. To determine the usefulness of 'Falconer's lip reading tests' Goldman (1971) administered the test to normal, organic and functional tearing loss groups and concluded positively of its reliability over determination of organic levels and its predicted SRT relating closely to standard pure tone and speech measures and its authority over prediction of functional problem with out the subject being cautioned.

Plan of the study:

It was planned to develop the test in Bengali and then testing on normal subjects (Bengali).

Need for the study:

Based on Falconer's lip reading test, Subba Rao T.A.(1981) developed and standardized this test in Kannada language. In 1982 sadia Saheer developed it in Hindi language. The test being simple, and useful, there is an urgency to develop the test for those who speak Bengali.

The lip reading test of Falconer consists of monosyllabic homopheneous words (i.e. words Which look alike but different auditorily). The test consist of both auditory and visual cues. According to Falconer,the test is effective with much smaller degree of functional hearing loss.

REVIEW OF LITERATURE

Definitions:

The term functional deafness has many synonyms, which gives rise to many controversies. Different authors defines the term in differently. However in organic deafness 'structural alteration is an important contributing cause. When this structural alteration can neither be demonstrated nor inferred, functional loss is said to be present (wood, 1957, Hopkinson).

Audiological definition of functional deafness depends on battery of tests and thorough medical examination to rule out the existence of organic involvement. Many authors cites that all the terms used such aa non-organic hearing loss, psychogenic hearing loss, psychic deafness, auditory malingering pseudonaeral hypacusis, historical deafness, pseudodeafness may not explain the same phenomenon (Williamson, 1974). Martin prefers to use the team generic terms aa the clinician do not Know whether the exaggerated auditory thresholds are due to conscious or unconscious motivation. Charmak,(1977), Hopkinson (1973) is of the opinion that pseudohypacusis is pejorative terms and Malingering, psychogenic is two specific. Martin (1978) believes the use of term pseudohypacusis given by Carhart (1971) and non-organic loss because of their specific referened to hearing loss. The term 'functional hearing loss' is preferred

More by Ventry and ChaiKlin (1962) since its neither antoaymn of organic nor synonymn of psychogenic. Martin (1978) uses the terms pseudohypacusis and nonorganic hearing loss interchangeably to explain responses obtained on hearing examination which are patients true hearing thresholds. The team 'functional hearing loss' when used as a diagnosis would infer that individual's problem has thoroughly been investigated and no organic involvement was evaluated to account for the symptoms (Landis and Bolles, 1950).

Types and causes:

Famous psychiatric quotations as goes 'Malinger cheats the doctor, the patient with functional or hysterial complaints cheats himself' since he has succeeded in convincing himself of his disease.

Goldstein criticises the psychogenic component of non—organic hearing loss. According to him, the term pseudohypacusis should be used whenever the hearing loaa or hypacusis is false, which holds good even in overlay cases. He propose two conditions essential for unequivocal diagnosis.

1. Patient consistently fails to respond during behavioural audiometry to sounds weaver than a given level but during electrophysiologic audiometry or under hypnosis or under neuro—synthesis he does respond to weaker sounds

3. The patients apparent sensitivity to sounds in daily life is as good as bat not better then would be expected from sensitivity shown by the behavioural audiometric.

Most of the time audiologists and the specialist concerned with hearing conservation, uses the term non-organic hearing loss and some of them use functional hearing loss. The word functional is often popularly used by physician and psychologists distinguish a disorder from organic condition. The term pseudohypacusis is specially coined to mean hearing loss . The non-organic problem having psychological orientation is often termed as psychogenic or hysterical deafness.

A malingerer is a person who deliberately falsifies of physical or psychological symptoms for setae specific gain. In military the slang gold brick is used to mean malingering.

Goldstein (1966) further criticizes the psychogenic component of non-organic hearing loss. According to him pseudo—hypacusis should be applied when a hearing loss is false. He proposes two criteria for a more near diagnosis.

1. The apparent sensitivity to hearing of a patient in daily life is good but not better than from the sensitivity at behavioural audiological tests.

2. Inconsistency of a patient to respond during behavioural audiometry to sounds weaker than a given level while at

electrophysiological audiometry or under neuroaynthesia or under hypnosis he responds to weaker sounds.

Davis and Silverman (1960) states that very often both organic and psychogenic deafness are involved in uncertain proportion. Thus, the word 'functional' should not be mistaken as an antonym of organic or a synonym of 'psychogenic' but as a diagnosis, where as Goldstein believe that functional loss has no organic basis.

Incidence of Functional Hearing Loss in Children:

Though many studies have been done on the subject of 'functional hearing loss in Children', but the data on incidence is limited (Bailey and Martin, 1961; Dixon and Newby* 1958* Froesehels, 1944; Cubb and Butter, 1949; Brockman and Hoveraten, 1960; Best and Feldman, 1958).

According to Chaiklin and Ventry (1963) the studies on incidence of 'functional hearing loss' is variant since it dependent on (1) order of testing (Menzel, 1960) (2) The criteria of functionality varies (3) Evaluation of patients in each setting (4) Depends on subjective evaluation and the process of identification (5) The administration of special tests is routine (Young and Gibbons, 1962).

Brockman and Hoversten (1960); Calvert et al (1961), Dixon and Newby (1959), indicated functional hearing loss

occured thrice sore often in females than in males but the underlying factor is not revealed. Felman reported its occurance more with children while Doerfler (1951) in his survey of audiology centres regarding incidence of functional hearing loss concluded that incidence of functional hearing loss in children is few or nil.

Incidence amongst adults:

Nilo and Sanders (1976) concluded that 1% of the general population had reported to have functional hearing loss and 85% - 90% of the cases referred from Military and 11-45% of the veteran administration had the problem. According to Feldman (1969) three percent of the general population may be classified under functional hearing loss. After the world war II the incidence of percentage of functional hearing loss has gone up by 11-45% (Johnson, 1956).

Indication of Functional Hearing Loss:

For diagnosis of functional hearing loaa cases or to evaluate the true organic thresholds both the non test situation and test situation are equally important. Case history plays an important role in the evaluation of functional hearing loss. 1. The source of referral, often suggests functional hearing loss (Martin, 1978; Nilo and Saunder, 1976) eg. case being referred by an attorney. (2) The general behaviour of the patient is also important in evaluation of the functional hearing

loss (Johnson et al 1957) such as exaggerated attempts to hear, ability to lip read, nervousness unusual projection of voice (3) Thorne (1960) Martin (1978); Chaiklin and Ventry (1963), Nilo and Saunders (1976); Feldman (1979); putforth the following guidelines, (1) Learning to lip read two quickly (2) Extremely anxious (3) Normal voice inflection (4) Reluctant behaviour (5) Inadequate knowledge about hearing aid and (6) Concerned about health.

according to Feldman (1969) functional hearing loss should be suspected when patient reports of sudden hearing loss or has vagues origin added to claims for financial gain.

Case History:

In cases of compensation, case history plays an important role (Martin, 1978). Whenever too many symptoms ere putforth in the case history to support his hearing loss, it generally cast suspicion about extent of his hearing loss and all the symptoms will not be of any veracity (Hopkinson, 1973). Thus Martin (1978) advocates the audiologist to take the case history. Again, the information gathered from case history sheet,may not tally with the informations obtained through other sources (Hopkinson, 1978). Patient might dramatizes his answers and may explain details of the occurence.

The following behavioural cues characteristics have been reported by many authors (Fournier, 1958; Heller, 1958; Johnson,

et al, 1956; Martin, 1978; Feldosan, 1969; Chaikiin and Ventry 1963; Wood, 1977).

1. Delay in response (2) Manifestation of anxiety symptom (3) Inconsistent response daring P.T.A. (4} Tentative response. (5) Half word responses during S.R.T. measurement (6) Displaying of exaggerated effort to hear (7) Hesistant while responding (8) Can understand conversation or spontaneous speech at a lower levels below S.R.T. (9) During discrimination testing the responses with rhyming in nature.

Chaiklin and Ventry (1963) and Martin (1978) strongly advocates that the accurence of false negative response is very expected behaviour with the functional hearing loss cases.

Radiological consideration:

Semenar, 1947 cited by Martin in 1978; Fournier,1959 suggests that a flat audiogram pattern patients is an indicative of functional hearing loss. Others suggests a saucer type of audiogram which is similar to a supralaminal equal loudness contours as a typical illustration of non organicity (Doerfler, 1951; Goetzinger and Proud, 1958 cited by Martin 1978; Carhart, 1958) which was reported by Chaiklin et al (1958) as the opine that saucer type of audiogram can also be obtained from true organic patients. Martin,1978 conclude that there is no typical configuration associated with functional hearing loss.

A functional hearing lows cases will find it difficult to maintain consistency in responses. The patient may be no loss or no more consistent than organic patient during repeated measurement of thresholds (Hopkinson, 1973).

The relationship between the air conduction and bone-conduction thresholds indicates cooperation. For eg. if air conduction thresholds are smaller than bone conduction thresholds, we can infer that patient have difficulty in making accurate loudness judgement via bone conduction. And the bone conduction thresholds may later on found to represent organic thresholds (Hopkinsoa, 1973).

Lack of laterization in unilateral hearing loss is indicative of functional hearing loss. In such cases the shadow curve may be absent or elevated beyond expected (Chairklin and Ventry, 1963, Williamson, 1969; Feldman, 1969; Martin, 1978). The coatralateral response, specially for B.C. is also an indicative of unilateral functional hearing loss (Martin, 1978, Williamson, 1969).

Speech Audiometry:

Absence of agreement between SRT and PTA is significantly good sign indication of non-organicity, which in absence of explanation of such as stoping audiogram, poor word discrimination etc (Feldman, 1967; Nilo and saunders, 1976, Martin, 1976).

Generally speech reception thresholds are expected to compare favourably with the average of pure tone thresholds obtained at 500Hz, 1000Hz and 2000Hz (Carhart, 1958; Fournir, 1950; Siegenthaler and strand, 1964; Quoted by Martin, 1958, p.280).

In a study conducted by Ventry and Chaiklin (1965) found that 33 out of 47 subjects had significantly lower speech thresholds than their pure tone average. The relationship between PTA and SRT in most pathological cases is about ±8dB. Again in 1963 Chaiklin and Ventry from their study concluded that a high percentage of about 45 to 50 percent subjects with functional hearing loss have difference in PTA and SRT more than ±15dB, and that SRT is usually lower than PTA. However, small percent of subject are able to match PTA and SRT ±9d8. But Morno et al (1977) found SRT and PTA is least frequent indicator of functional hearing loss.

Chaiklin and Ventry (1965) worked out a formula for spondee error index such that high score contrasts with low number of false positive response during pure tone testing, identfies a functional patient and such responses are also expected while testing discriminations also (Hopkinson, 1973 and 1978).

Shepherd (1965) opines that individuals with non-organic hearing loss were equally consistent with normally hearing individuals specially when reproducing pure tone thresholds

Measured at 1000Hz by identical psychophysical methods, further he also concludes that the method of 'constant stimuli' clearly differentiates subjects of normal and sensorineural from functional hearing loss subjects. By using Galvanic skin response along with threshold measurements at 1KH at different time intervals, could able to identify 66% of functional hearing loss patients. A difference of 15dB between the 1st and 4th test-retest-thresholds was considered as positive.

Keer (1975) opines that a malingerer trace a better thresholds through am ascending method and hence he modified Harris (1950) teat "the ascending and descending audiogram". According Kerr, start the higher intensity and descend at 10dB steps until no response is yielded. Then the intensity is ascended in 5dB steps until response is obtained. A discrepancy between two frequencies is around 25 to 30dB is considered to be malingerer, which is similar to Bekesy type V audiogram (functional loss cases) (since malingerer has difficulty in starting off with an inaudible stimulus).

A hundred percent success in dignosis of functional hearing loss is reported by the strict ascending method in audiometry, calculated and deliberate method of Nilo and saunders (1976). In this method speech sad pure tone are presented at smaller intervals than usual (2 to 2½ dB) and multiple signals are given at one time and patient is pressurised to respond by

reminding the patient frequently about the preeenee of stimulus and convincing him that he will be hearing them soon.

A functional heating loss cases are likely to fail to maintain consistency in response which may be due to reduced decision time (wood, et al 1977). wood et al suggests that auditory reaction time measures may be employed to determine existence of functional loss. They recommend to study auditory reaction times on a signal detection task to rule out the influence of subjects decision criteria. Frank,1976 recommends use of yes-no test for non-organic hearing loss cases.

The formal tests discussed so far fail to quantify the degree of hearing thresholds and thus development of special tests has been necessary.

stenger Test:

The aspect of functional hearing loss and its diagnosis gained new outlooks developed in post second World War(1945) period. A large number of referral from the veterans for claim of pensions etc. All the tests so developed considered the factors like ecomony of time, energy, simpleness (Pangching, 1970). According to Newby (1972) the main purpose of special teat is to confirm or reject, the impressions of patients behaviour obtained through routine testing.

Story Tests:

According to Hopkinson (1973, 1978) the main purpose of story test is to verify monoaural hearing loss and when controlled quantitative results can be obtained. The audio-mater should be double channel along with the facility of switching from one ear to another, for binaural position.

In this method the audiologist tells a part of the story which is delivered by pert to the better ear, poorer ear and both the ears, for this purpose the story should be such narrated to that each part stands alone as a separate story (Hopkinson, 1973).

Interpretation;- If the patient repeats the parts of the story delivered to the poorer ear then hearing level in that ear is at least good at the level of presentation. It is better to give a feeling of continuity in the story. The individual should not be made aware that the stimulus is being switched off from ear to ear (Hopkinson, 1973) and thus levels of presentation should not be Changed. According to Hopkinson, 1978 the test may be modified to elicit true thresholds by delivering the story at 10dB below the admtitted thresholds after which a long paluse is given. If case responds then its indicative to search for a better threshold.

The Stenger Test:-

Detail history of stenger test has been provided by Altshuler (1971). Stenger originally described his test in

Germany 1900 and 1907. Basically it calls for two matched tunningfork. Later in 1945 Priest indicated the use of audiometer as a source of sound. since then stenger test began to take quantitative form. since then many investigator advocated ita use as an easential tool ia evaluating malingerer (Taylor, 1949; Watson and Tolan, 1949). Altshuler(1971) advocates it to be the "most certainly the best in unilateral cases" and with sophistication can also be used for bilateral

Basic Principle of Stenger Test: "When two tones of same frequency are introduced simultaneously into both ears, the louder tone will be perceived (Martin, 1978).

Methods of stenger Test Presentation:- stenger test presentations are grouped, the stenger test presentations, into three classes (Altschular, 1971).

A. Qualitative and quantitatives methods:-

These tests mainly aims at screening nonorganicity (Ballentyne 1960 : Heller 1955 and cited by Altschuler, 1971, Martin, 1978) Based on the results of qualitative, quantitative tests may be imperted (O'Neill and Oyer, 1966; sataloff, 1966; Gostzinger and Proud, 1958; cited by Altachuler, 1958). The signal is presented at better ear,at near threshold level and to the poorer ear 40dB HL. If no respond ia elicited then we can infer that the tone is heard to the poorer ear. Thus quantitative methods approximate the thresholds.

B. In this category quantitative methods aad aawanding or descending signals are presented to the poster ear. However, no rationale is given far this testing. Bass and Peck (1970) compared this modes a with respect to interference level (IL). But this mode was not relevant,factor since nothing was seen for either mode to yield smaller interference level and mode. Stenger is considered to be positive when subjects do not respond to the tone in poorer actually whan he is supposed to hear. However, its suggested to use both methods to arrive at a valid estimation of thresholds.

C. In this method a 'fading tone' is used. The stimulus is good or ia suddenly or gradually (after increasing the tone in poorer ear) ia taken off. If the tone is heard then the tone is actually heard in the poorer ear. Validity of such method is questionable (Gaeth, 1956 cited by Altschuler, 1971).

Factors affecting stenger test:- (1) Intensity relationships between ears: - Stenger test to be valid, the interaural difference should be large in addition to size of the functional component in the better ear (Altashuler. 1971; Kinatler et al 1972). (2) Diplacsis:- The occurrence of diplaueusis phenomenon can invalidate the stenger test and is been suported by (Newby, 1953; Watson and Tolan, 1949). This factor, according to Chaiklin and Ventry (1963) has been over rated, as a main draw back to validate stenger test. They opines that small pitch

difference could be obscured by stenger effect, whenever a critical point is passed ragarding the perceived loudness. To counter act further on the Altschuler recommends (1971) the use of either speech stenger or narrow band signals.

(3) Recruitment:- Informations so gathered, by the administration of stenger that is often misleading. It was Menzel (1965) who mentioned recruitment as the factor that could affect stenger tests results. Though recruitment is a rare occurence in unilateral cases but enough care should be taken with those case who shows normal hearing through speech frequencies and sensorineural dip at 4KHz (Altachuler, 1971) and bilateral cases it demands more precautions.

Other consideration; The very observations that stenger is true for speech frequencies but the followings call for further study and research in this regard.

1. Below 500Hz cross over of the stimulus may take place
3. Above 2KHz, the thresholds may be suppressed or recruitment may invalidate in test results(Ventry. 1962, Haller. 1965 cited by Altschuler, 1971).
3. Ear pathology in addition to centralization occurence (Chalkin and Ventry, 1963; Goetzingar and Pround, 1958 cited by Altschuler, 1971).

Modification of stenger test:

1. speech stenger:- The basic of speech stenger test is the classical pure tone stenger test (Taylor, 1949; Johnson, et al

1936; Watson and Tolan, 1962 cited by Martin, 1978 p.297, Hopkinson, 1973). Here speech spondees are used and speech signals are used to varify monaural loss of hearing.

The tests helps in identifying a unilateral functional bearing loss case. The signal initially is given to a good ear at S to 1968 SL. The spondees from the same input source are fed to the better ear at level that elicits 100% correct response. At this stage the signal is directed to the poorer ear (assumed). Test is positive if patient stops responding or continues to response at levels significantly lower (15dB or more) than his voluntary SRT. The lowest hearing level of the tone in the bad ear producing this effect ia called the minimum contralateral interference level.

Stenger ia useful in cases where interaural difference in SRT is significant (Menzel, 1960) and existence of functional overlay for speech in poorer ear. Speech stenger tests also helps to overcome diplacusis phenomenon and beats (Martin, 1978). The procedure has been described by Newby, 1958; Goetsinger and Proud, 1958, Watson, and Tolan, 1949; Carhart, 1966.

2.Shtfting voice test:- This too is useful in detection of unilateral functional hearing loss subjects. Its Modification of speech stenger test. The stimuli (which can be instruction, questions or spondees) is shifted between the ears. The subject has to indicate theear in which he is hearing the examiner.

A case of functional hearing loss will respond inconsistently.

Davis and Goldstein (1966) found thia tests to be useful with unilateral caaaa and that Johnson (1956) and Carhart (1960) suggests ita use with the bilateral cases having slight inter-aural difference.

According to Newby (1972) its difficult to rely on this test since it put pressure on the patient thus again depends upon patients confusion (Watson, 1949). Carhart, 1960 concludes that there is disagreement whether test results approximate to true thresholds.

3. Rapid Random Loudness Judgement: (RRLJ):- This test ia more or less based on Fowler's ABLB test. This tests confuses the noncooperative subjects to elicit response for which he has previously denies its existence. Initially, patient a voluntary SRT and pure tone thresholds are obtained in each ear. Then the tones are presented alternately. He is report which of the tone is perceived as louder. The instruction that follows with each presentation of stimuli one - this is no.l and this is no.3 Which is louder?

In each rapid succession, tones skippea variously in one or more octave, varying the SL with equal time given in each ear for each pair of tones.

An evident of confusion in each ear signifies indication of functional hearing loss. Where as an organic cases will elicit consistent response. The test may be used with unilateral or bilateral cases as well.

If the method of stimulus presentations are programmed then the efficacy of this test will be increased (Nagel, 1964).

4. Fusion inferred threshold test (FIT Test):

FIT tests does not attempt at unmasking nonorganicity but tries to determine a close estimate of true thresholds with patients who are other wise difficult to evaluate.

According to Bergman (1964) as quoted by Altschuler(1971), it is the use of stenger phenomenon aim to determine "....thresholds of hearing sensitivity when standard audiometry yields uncertain results".

In this, the subjects is presented stimulus in the better ear at 10dB SL. Then the stimulus in the poorer is increased untill median plane localization occurs. Thus the true threshold of the poorer ear will be the sensitivity required for median plane localization minus 10 dB SL.

5. Using automatic Audiometry:

It was Reger et al (1963) Who suggested the use of automatic Bekesy type audiometer for the stenger (Watson and Voots 1964; Altschuler (1971). It was modified by watson and VOots

(1964). Patient was asked to trace the poorer ear thresholds using a stenger variable attenuator, after having establishing better ear thresholds. The test is reported to have high clinical applicability as the signal intensity decreases or increases as the patient operates the response knob is both the ear simultaneously.

Other modifications: Most of the method described above have little relevance to testing of Children having functional hearing loss specially with stenger test.

Altshuler(1971), tested 12 Children on the stenger test and have found its significance. Herecommends the following:

a) Use of ascending techniques in the poorer or starting at 0dBHL.
b) Tone to the goodear should not be faded away.
c) simultaneous presentation and withdrawal of pulsed tone to be utilized.
d) Tone should be presented directly and should be in 5dB steps with the pause time and stimuli time sporadically altered to avoid rhythaicity.
e) Test should initiate with the tone being presented to the good ear close to subjects thresholds to precipitate constant response. f)- The test should incorporated into the routine pure tone audiometry preceded by adequate instructions and should be accomplished quickly.

Fourier (1958) has described four methods, which allows the examiner to establish thresholds. Using Beltone 15CX

audiometer, the stenger test can be administered to equal loss cases(vyasamrthy, 1971)

Based on binaural summation and basic principle same as in stenger, Vyasamurthy (1971) has described 2 methods. Tha methods used is that difference between binauial threahold and monoaural threshold at 35dB above the subjects thresholds is 6dB and that binaural thresholds is better than monorural by 3dB at threshold level. The tones are presented moaoaurally and binaurally at 35dB SL and 7dB HL.which should be matched and indicate which tone is louder. The first and second response is indicative of functional hearing loss.

Beckesy Audiometry:

According to Ventry (1971), the use of Bekesy Audiometry in identifying individuals with functional hearing loss dates from Jerger aad Herrer*s clinical report in 1961. According to them type V Bekesy Audiogram, that ia characterized by continuous tone being traced at lower (better) hearing levels than interrupted tones for most of the frequency range. But this contradict Jerger'a other patterns (Ventry, 1971, Martin, 1978; Resnick and Burke, 1962; cited by Dieroff, 1970, Rientelman and Harford, 1967).

"The continuous tone tracing occurs at a lower SPL than the interrupted tracing by a minimum of 10dB mesured at the midpoints of the two tracings for a range of atleast

2 octaves. The break typically includes mid frequencies. Finally, the break should be complete with no overlap in tracings (no more than two excursions) sad should reach a peak on maximum separation of at least 15dB" (Rientelman and Harford, 1967; quoted by Ventry, 1971). Though Bekesy audiometry facilitates better hearing insight into listening strategies but its use is limited due to high rate of false positive and false negative (Ventry, 1971).

According to Hattler (1970), lengthened off time (LOT) is an efficient screening method for nonorganicity. This facilitates the effect of increasing the tracing level of interrupted tones for the nonorganic patients. 95% success, using this method, in the identification of functional hearing loss has been reported.

Hopkinson (1965) points the criticism against the classification of type V Bekesy is due to lack of clarity in definition that results in over interpretation of minor differences between continuous and interrupted tracing.

Recker (1971) analyzed the characteristics of the Bekesy audiogram and concludes that:

1. Bekesy audiometry is reliable tool in the detection of simulated hearing loss.
2. Type V pattern was found in 70% of the cases.
3. Consistency of presence of test-retest-difference was most reliable.

4. Saucer shaped curves and increased Bekasy excursion are not reliable indicator of simtulated hearing loss.

According to Rientelman and Carhart (1961), Mattler, (1968) the type V effect is been related to the subjects internal standard for most comfortable level and the differential effect of memory upon loudness of sustained and interrupted pure tones. Type V Bekesy classification should be done based on sweep frequency rather than fixed frequency (Rientelman and Harford, 1967; Resnick and Burke, 1962; Diesoff et al, 1970).

Advantages and Disadvantages of Bekesy Type-V:

It provides an insight into the listening strategies employed by patients with functional hearing loss. It does not involve any special technique, thus easier for clinician to identify the patient. When spondee error index (SERI) is associated along with Bekesy then it yields stronger indicator of functional hearingloss inapite of the disadvantages of false positive and false negative scores.

The disadvantage being is the call for special equipment. It fails to estimate the extent of functional overlay or organic thresholds.

Bekesy ascending descending gap evaluation (BADGE) was developed by Hood, Campbell and Halton (1964). This procedure make use of comparison of the differences between the following

100 CPS discrete frequency Bekesy tracing type (1) continuous tone with tracing began well below threshold (2) pulsed tone with the tracing began well above thresholds (3) Pulsed tone with tracing begun well below the threshold.

The nan-organic group commonly yields visible gaps between the ascending and descending tracing than do the organic group. Acording to Hood, this occurences explained "as the method destroys patients yardstick".

According to Martin (1978) LOT and BADGE appears to have certain values since the arguements on the use of Bekey audiometric technique may continue. Though type V tracing may be a suggestion but is not an end to itself.

Delayed Auditory feedback (DAF):

Ruhm and Cooper in 1964 developed this technique for diagnosis of functional hearing loss cases based the concept put forth by Lee and Black (1950, 1951). Lee and Black observed that many normal speakers experienced nonfluent speech when their speech is delayed under various conditions such as earphones. (Newby, 1972).

Gibbons and Winchester (1957) cited by Newby,(1972 p.164) used DAP as a screening test for functional hearing loss. Ruhm and Cooper in 1962 developed a procedure with DAP sad determined pure tone level within 5 to lOdB of their actual levels.

Ruhm and Cooper's DAF requires the patient to tap a rhythm eg. 1, 2, 3.... which ace heard through earphones by him at an appropriate intensity Sad frequency. A delay of 200 m.sec. is introduced which confuses the patient. The rhythm returns to normal about the thresholds, speech DAF yields SRT where as tapping technique provide pure tone audiogram.

Many investigators have reported clinical and research data on the basis of which they recommend the use of DAF in diagnosis of non-organic deafness (Gibbons and Winchester, 1957, Ruhm and Cooper, 1962 and 1964).

According to Martin (1970), Chaiklin and Ventry (1963), with DAF it is difficult to obtain true hearing thresholds and to decide the involvement of any particular ear with this test. However sophiatication the test may have (Martin, 1978). Arguements putforth in this regard are (1) use of gross method to detect involvement under DAF (2) Individual variations on the effect of DAP. Beagley (1973) cites two more disadvantages with thia procedure (a) Patient with true recruitment of loud-ness with atrue codhlear loss may result in a well Masked feed-back (b) Care should be taken to note the hearing at all other frequencies.

Speech test for evaluation of functional hearing loss:

The methods of detecting pseudohypacuaisi discussed so far deals basically with pure tone or noise. Thus it was essen-tially for to develop speech teat for the detection of functional hearing loss.

Doerfler Stewart (1946) and Doerfler Epstein (1956) developed a teat which compares speech versus noiae. Doerfler and Stewart (1945) stated that "Most listeners continue to respond even when noise is presented at level 10 to 15dB more intense than speech. The non-organic patients tend1 to stop responding even when the noise is less intense than speech.

SRT of the case is evaluated by binaural administration of stianli (speech spondees) is an ascending manner is noted as SRT_1. Then noise and speech ia simultaneously introduced. The intensity of noise is increased in 10dB steps untill the patient no longer repeats the spondees. This level is called noise interference level. The level of noise ia further increased if NIL. is not equal to SRT_1+5+20dB, at which the intensity of speech is re&aead to SRT_1 - 15dB. After this the noise level is reduced to 0dB HL. Second SRT-SRT_2- is established when the levels are reduced. Now the subject is asked to inform when he hears the noise which is called noise detection threshold.

Epstein and Hopkinson (1936), Doerfler and Epstein (1956) have given the norms as follows:

SRT_1 - SRT_2 ... -4 to +5dB

SRT_1 - NDT ... -7 to +15dB

SRT_2 - NDT ... -7 to +15dB

SRT_1 - 5-NIL ... -18 to +3dB

NDT - NIL ... -31 to -2dB

If a subject has two or more positive signs, there is interpreted as positive (+ve). one positive sign is interpreted as equivocal and 'O' signs negative (-). (Doerfler, Epstein, 1956). The test has universality of norms and helps in classification and allows aa easy communication with professionals (Hopkinson, 1978). According to Menzel (1960) test is a sensitive detector of non-organicity.

Lombard Test: Test for identification of unilateral or bilateral functional hearing loss. Its based on 'Lambard reflex' which automatic increase in speakers vocal intensity in the presence of intense noise (Chaiklin and Ventry, 1963).

The noise can be presented is better ear (Asherson, 1936; Marrison, 1955; Harbest, 1945; Gove, 1943) porrer ear (Watson and Tolan 1949) and/or to one ear and then the other ear (Heller, 1955). In bilateral cases (Watson and Tolan, 1949) noise can be applied binaurally. Hanley and Harney (1965) in their study have demonstrated difference ia vocal intensity in quiet and in presence of 50dB saw-tests noise.

Newby putsforth the following dissadvantage of this test (1) patiants are capable of monitoring their vocal intensity (2) It is still not clear as to what level of SL the reflex begins. Chaiklin and Ventry (1963) concludes that Lembard test is useful when gross changes in vocal intensity is noticed other wise test result should be carefully interpreted.

Tone-in-noise test (TIN): Ventry and ChaiKlia (1965) have questioned the efficiency of D.S. test in the detection of 6 nonorganic hearing loss cases. According to them, the test is difficult and complex ia terms of administration.

Based oa the above findings Pangching Glenn (1970) modified D.S. test. This test measures the difference between the thresholds in noise aad pure tone. The subject first threshold (T_1) is obtained ia asceading method. Then with the intensity at (T_1+5dB) wideband noise is introduced suddenly at 10dB above (T_1+5dB) level. Then second time threshold is obtained in this condition with interrupted tone. According to Pangphing (1970) the difference of 5dB ia thresholds between quiet aad in noise is indicative of organic and when this difference exceeds 10dB is indication of functional hearing loss. However this test does not provide any estimate regarding the thresholds.

Eyeblink response test:— The cochlea palpabral reflex is an involuntry eye-blink reflex to the onset of level auditory stimuli which is approximately 90-100dB SL ia normal and organic loss cases. This phenomenon was made use by Glanabos (1953). It does not help to determine absolute thresholds (Chaiklin and Ventry. 1963).

This test was used by Gallonery and Butler (1956) reported a difference of 5dB between voluntary and involuntary thresholds and insists on prolonged training needed. The eyeblink response rate after prolonged conditioning is below a desirable level for threshold determination (Lowell, 1960).

Story Test:- Chaiklin and Ventry (1963) recommended this test. Its may use is limited to unilateral functional hearing loss cases. The patient has to repeat the story which he hears through earphones. The level of presentation should be above the patients admitted level in the better ear. Parts of the story is said in either ear. Is the patient repeats the story correctly when delivered ia the poorer ear, then that level is the least threshold.

Switched speech test:– This test was given by Calearo (1957) The test consists of several meaningful short sentences recorded at an average speed of 85 words/minute. The sentences are switched back and forth between the ears at 30dB above better ear threshold with 50% of the signal going to each ear. Two switching rates are used(2-3 sec). The patient hears the message in the better ear as relatively unintelligible interrupted speech, but intelligibility increases when switching rate is increased. In functional hearing loss cases, case ia unware of the portion that is presented to the batter ear. when the subject has high intelligibility at low switching rates or unable to understand message even at high switching rate its indicative of functional hearing loss (Chaiklin and Ventry, 1963).

Yes-No-Test: This that is used with children for diagnosis of functional hearing loss. The thresholds are established by ascending and descending procedure and child has to response in terms of 'yes' or 'no'. The authenticity of the test depends

upon the child responses following the tone being presented (Miller, 1968, Miller and Rahman, 1970). The test is easy to administer and does not require any special equipment. This technique helps in diagnosis of degree and type of hearing loss (Frank Tan, 1976).

Masking Test: This test is based on the fact that existence of one to one relationship between the levels of the masking, noise and of the masked pure tone thresholds. Hood (1959) used this principle to diagnose unilateral functional hearing loss cases. when noise is raised by 20dB, the pure tone threshold is also raised by an equal amount (Shadowing effect). Chalklin and Ventry (1963) expressed doubt on this test in the diagnosis of non-organic cases.

Objective tests/Electrophysiological tests:

Galwanic Skin Response:

This test has added advantages of exploration of thresholds of non-organic deafness with high degree of validity and reliability with proper methodology. This method can determine A.C. and B.C. thresholds. Doerfler and McChune (1954), Busk (1958) and Hanley et al (1958) have reported that G.S.R thresholds are generally with in $\pm$ 5dB of the voluntary thresholds.

One of the important aspect of G.S.R. is that, it does not appear to be auditory test (Hanly et al, 1958). The test also identifies pseudohypacusis and the thresholds (Chaiklin and

Ventry, using speech measures, in electrodermal audiometry or could be very useful in identifying the nonorganic hearing loss cases (Hopkinson, 1973).

One of the limitations of this test is its use of electric stimulus and that all case cannot be conditioned. The classical condition paradigm is less effective than operant conditioning (Sheperd, 1964 quoted by Hopkinson, 1973 p.199). A person who has aquintance with the test can confound it since small movements results in the movement of stylus leading to mis interpretation.

Electrocochleography and evoked response andiometry:

(Cortical response audiometry is one of most objective avenues in determining the pseudohypacusis cases. It does not involve any shock, or patients cooperation (Martin, 1978). It is valid and objective index of auditory sensitivity (McCandles et al 1968). Voluntary pure tone thresholds and ERA thresholds are within $\pm$10dB (Alberti, 1970).

The ERA consists of computer, an electroencephalograph (EEG) an averaging computer where components of evoked response are analyzed.(50 to 300 m.sec). Hearing loss which is not evident in electrophysiologic testing but is evident at routine audiological testing is indicative of nonorganic hearing loss. However the confirmation should be informed through other tests (Cody and Townsend, 1973; Beagley, 1973).

The electrocochleaegraphy (EcoCH) measures the eight nerve potentials without artifact that are seenwith EDR or ERA. Though it is objective method but lack frequency information. However its gaining popularity in recent years (Martin). Its expensive and time requirement adds to its disadvantages (Beagley. 1973).

Acoustic impecdance measurement:(Stapedial reflex threshold):

This too, does not require any much cooperation of patient. Its been uaed in identification of nonorganic hearing loss since 1950. In normals the stapedial reflex is about 80dB above pure tone thresholds. In cases of patients with Maniers disease and positive recruitment test, a gap of 30dB between the two is axpected. But when this level is low (less than 5dB) then it should be expected as nonorganic hearing loss (Lamb and Peterson. 1967; Feldman, 1963). Many procedures have been identified to obtain hearing level (Jerger et al 1974; Keith, 1977; Hall, 1978; Rizzo and Greenberg, 1979; Popelike et al 1976, cited by Hall and Bleakney, 1981, Baker and Lilly, 1976, Jerger et al. 1978. However caution should be taken whenever conductive pathology occurs.

Modified Speech Test: This tests includes ripetition of three spondiac words in a sequence, monosyllables repetition in the lowest sensation levels and dliscriminating measures. Falconer (1956) developed the lip reading teat in English which consists of homopheneous words, presented at various levels. In this

auditory test both auditory and visual cues are made use of. He presented the list starting with +12dB above SRT. Then intensities are reduced at other presentations.

Weiss (1971), using this test of Falcons; and using other tests validated the lip reading test and indicated that "audition plays an important role in lip reading". Falconer's test predicted the SRT of the subject more accurately than other test which was used in the study.

Thus the patients who attempts at falsification of his thresholds and that his complication abilities are due to his lip reading abilities are victimised in this test and his true thresholds are predicted.

METHODOLOGY

The study involves two main phases.

1. Development of test material.
2. Testing it an normal hearing subjects.

The development of test words in Bengali was in true as suggested by Falconer (1966), who developed this test in English using monosyllabic homophenous words, to predict organic threshold. Homopheneous words are the words which looks alike on lip but sounds different.

There are relatively less number of monosyllabic words in Bengali language which are strictly homopheneous. For this reason the tests consists of polysyllabic words also.

Development of the test material:

It was aimed at preparing 4 1ists of 20 homopheneous words each. The 4 lists were divided again in 2 sets of 4 lists each. In such a way that one list contains its homopheaeous counterpart in other three lists.

Before constructing the test material care was taken to group the sounds of Bengali alphabet according to their place of articulation. While selecting the homopheneous words, the place and manner of articulation was also considered. As defined earlier, homopheneous words visually look alike but there

exists perceptual differences eg. bilabials sounds /m/ /b/ and /p/ and their aspirated sounds looks alike on lips but will be heard differently. When /m/ will be replaced, it should be replaced either by /b/ or /p/.

Likewise one of the form of a word will have its counter-part in other set. eg. /bala/ / / in list IA has it counter-part /mala/ /2nmr/ in IB, /pana/ / / in list IC and /mana/ / / in list ID. Care was taken to maintain phonemic distribution in the sets equal. Thereby maintaining equal difficulty in both sets. All the words are familiar spoken words and ar* meaningful. Totally 80 words were selected. The word* in each list is randomised in accordance with Fisher's random number tables.

Four levels for presentation were taken, with reference to the speech reception threshold (SRT) of each subject. The levels of presentation were:
1. SRT + 106B (2) SRT + 0dB (3) SRT - 10dB (4) SRT - 20dB.
The test uses both auditory and visual cues. Each list was presented at 4 different levels as follows:

Levels of presentation	Mode of presentation			
SRT + 0dB	L_1I_1	L_1I_1	L_3I_1	L_4I_1
SRT + 10dB	L_1I_2	L_2I_2	L_3I_2	L_4I_2
SRT - 10dB	L_1I_3	L_2I_3	L_3I_3	L_4I_3
SRT - 20dB	L_1I_4	L_2I_4	L_3I_4	L_4I_4

Subjects:

Normal groups:

4 Bengali subjects who are student at All India Institute of speech and Hearing, Mysore were selected for the study. The subjects were fluent in English. Their mother tongue was Bengali. Their age ranged from 20 years five months to 25 years three months with average age being 22 years eight months. All the subjects passed a screening test for their hearing at 20dB HL at frequencies from 250 to 8KHz. This normal groups were used for developing norms for the "speech reading test", All the subjects also underwent various medical and otolaryngological examinations. The subjects had normal vision. Data thus obtained were averaged. The presentation of the level of intensities and the list to the subject was as follows:

Subject: 1 - L_2I_3 L_3I_1 L_4I_3 L_1I_4

2 - L_1I_2 L_2I_4 L_4I_1 L_3I_4

3 - L_3I_3 L_1I_1 L_4I_4 L_2I_1

4 - L_2I_2 L_1I_3 L_4I_2 L_3I_2

(L - indicates lists and I - indicates intensity level)

Thus each subject was exposed the 4 presentation level and 4 lists,none of the subjects was exposed to two lists and intensities.

Instruments:

A two channel clinical audiometer with TDH-39 earphones and MX41/AR (Audiometer GSI-16) was used in this study, speech

audiometry was set on one channel was utilised. Live voice testing was carried out. The subjects responses were noted through a talk-hack system whose gain control was adjustable.

The audiometer was calibrated to the ISO (1964) specification.

Testing environments:

The testing room was sound treated and had two room situation. The testing stimulus was administered from the control room. The control room was brightly illuminated so as to facilate the subjects to lip-read during the 'lip-reading' testing. During administering the test, the test room was darkened which dramatized the lip reading aspect of the test. The glass reflection from the observation window were eliminated. The subjects and examiners head was almost in the same height.

The noise level of the testing room were with in the maximum allowable noise levels in dB SPL.

Procedure:

The testing procedures involves the following:

1. Instructions
2. Obtaining SRT without visual cues
3. Administration of the "speech reading test" with both visual and audiotyr cues.

i. Instruction fox SRT:

"You aregoing to hear words like doorstep, starlight etc... repeat thorn back loudly. Each word preceds the phrase 'say the word ...'. Whenever you are doubtful, try to guess the words' same instruction were told in Bengali language.

Instruction for lip-reading test:

"You can see the examiner's face very well clearly from the observation window, you will hear different words; as well as you can read them on examiner's lips. Use both cues and try to repeat them exactly the word given to you. Let us see how good you are at lip reading. Be alert as soon as you hear the phrase (( ) you hear the word. Instructions were made clear before the testing commenced.

Obtaining initial SRT:

Subjects were tested in a sound treated room with calibrated audiometer, using two room situation. Prior to SRT, subjects bearing thresholds were obtained using westlake and Huxley method of descending and ascending technique, since all the subjects were fluent in Engliah,Harrard adult spondee lists which is standardized to Indian population (swarnalatha, 1972) were made use of.

Having obtained the pure tone thresholds, the SRT was obtained. The testing initiated at 20dB above the pure tone

average (PTA i.e. the average of admitted thresholds at 500Hz, 1KHz and 2KHz).one word was presented at each level and the level was decreased in 10dB steps uatill no spondee word was repeated correctly. Then intensity was again increased by 5dB and at each level 4 spondee were presented. When 2 spondees were repeated correctly then level was decreased by 5dB and whenever necessary 1dB steps. This procedure continued unless 50% of the presented were repeated correctly. This level was considered to be SRT. At this level the words list were presented.

Administration of speech reading test:

The testing procedures and the administration of the speech reading test was in line as advocated by Falconer in his test of lip reading and subbarao T.A.(1981).

The steps are as follows:-

1. The patient was seated comfortably in the darkened, isolated and sound treated room. The tester sat in the control room, the testers face was illuminated. The subjects and the testers line of vision was maintained. The reflection from the obser-vation window was avoided.

2. The audiometric microphone was kept 6" away and below the chin of the tester. The subjects pick up microphone was kept near to facilitate picking up of consonants.

3. The subjects were instructed, as mentioned earlier. It was explained the test was aimed at complementing his lip-reading

ability and the affect of his hearing in lip reading.

4. The carrier phrase / / / / was said before presenting the words. This help the subjects to assume his lip to abnormal position before uttering the key words. The view mater was constantly checked to speech level.

5. After each presentations, pause was given till the patient responded. Articulation was unexaggerated. Subjects was given maximum two chances (when it was felt that subject was not attentionfor a particular word).

6. The number of words repeated correctly at each presentation level, was noted. An articulation gain function was plotted with the number of words repeated correctly at each level.

7. Two normal subjects were asked to write the words instead of repeating them (This facilitated the examiner's role of listening). Other mode of testing was same. The non-verbal testing was done after one month of initial testing to rule out practice in these subjects.

RESULTS AND DISCUSSIONS

The study was undertaken to establish a relationship between the predicted SRT and the obtained SRT in normals. Based on this study we can predict SRTs. in pseudohypacusis patients. The utility of lip reading test has been documented by Falconer (1966). According to him "The effectiveness of lip reading test for no deafness has proved its worth as a clinical tool on a number of occassions". This was further supported by Weiss's (1971). He found an excellent agreement amongst the other test measusres (A.C.threaholds, speech and Falconer's lip reading teat). However, he added that while predicting SRT as a measure of substantiating organic hearing levels, factors like sloping audiogram, poor speech discrimination should be considered.

The results were obtained by averaging the scores obtained by the four normal subjects, for the lists presented at each intensity level (i.e. SRT-20dB; SRT-10dB; SRT+OdB; and SRT+10dB); This data was used for analysis.

The average SET obtained with the normal subjects was 15dB HL (0dB HL - 19.5dB SPL for speech). The most suitable criteria for predicting SRT from the lip reading test, is the level at Which S words were repeated correctly (i.e. 50% of the total list of 10 in each set). In this study it was also observed that with increase in intensity level, there was general increase in the number of words correctly repeated.

(as evident from the table, at SRT + 10 dB; about 80% words were repeated correctly).

The difference between the sets to the performance of the subjects ia also evident from the table. There ia little or no difference. Hence the lists are equally difficult and are balanced.

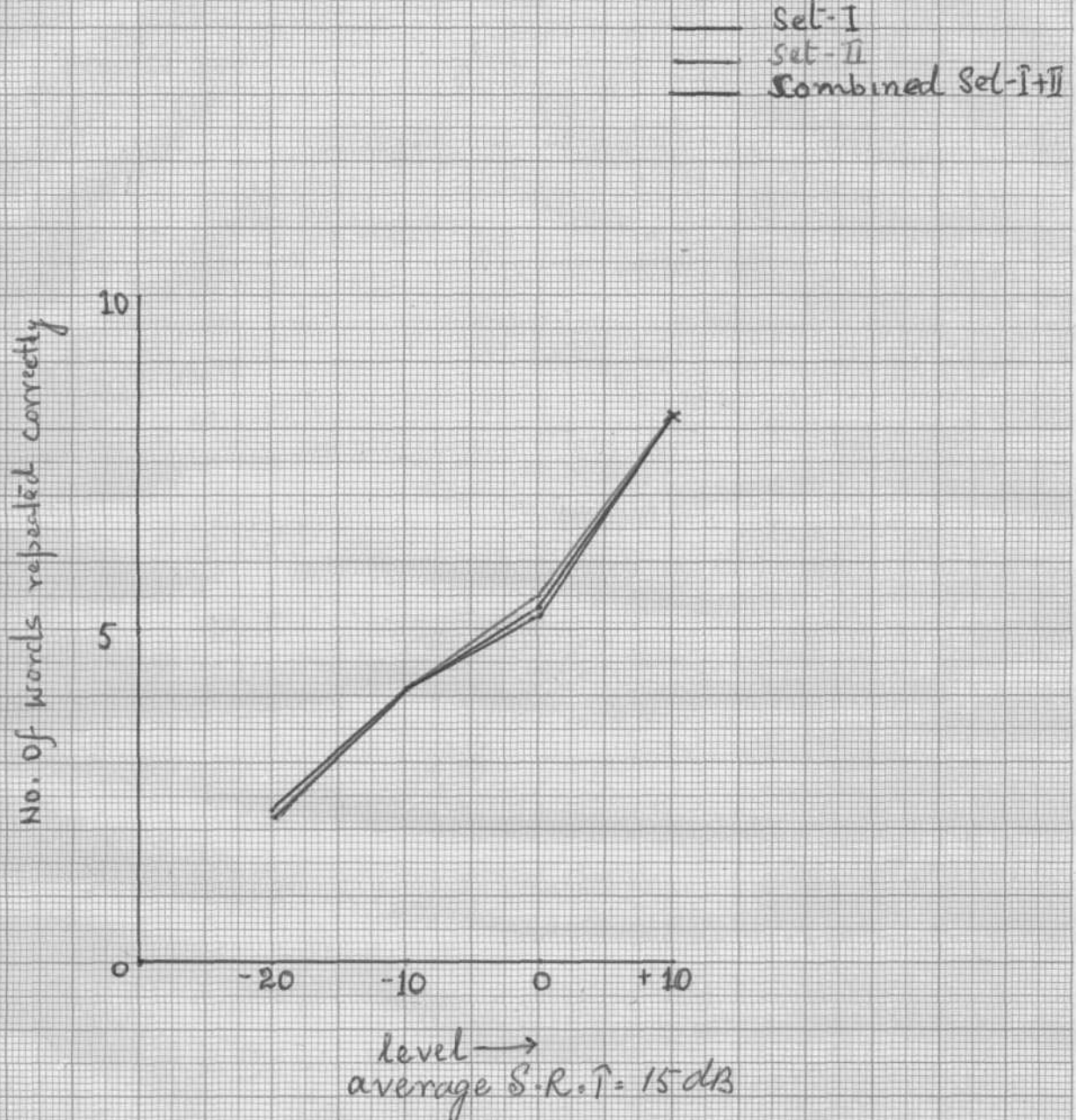
Comparing the results of this study aad the study done earlier its revealed that (1) Falconer criteria for predicting SRT was the level at which 5 words were repeated correctly. (2) Goldman (1971) too, confirmed the same criteria (3) subba-Rao (1981) criteria for prediction of SRT was 5dB below the level at which subjects repeated 10 words correctly. (4) sadia (1902) concluded, administering the test in Hindi eatablished the level at which 11 words are repeated correctly is the predicted SRT.

Further, in Falconer (1966); Goldman (1971), subba Rao (1981) Sadia (1982) observed that the increase in scores with the increase in presentation level, which was found in this study too.

Discripaacies between the higheat scores obtained at SRT: 10dB ia almoat in agreement with earlier studies. For example Sadia (1982) it was 14.36; Subba Rao (1981) 12.25, Falconer (1966) 16.1. These studies had 20 words in each sets where as this study had 10 words in each set. However, if the scores of Falconer (1966); Sadia (1982) aad this study are converted in percentage, the scores are in agreement.

Tablee showing the average scores obtained by the normal subjects, for each set-I and set-II and the combined sets.

Lists	L1		L2		L3		L4		Average		Combined
Levels	Set-I	Set-II	3et-I	Set-II		Set-II	set-I	Set-IX	Set-I	Set-II	Set-I+set-II
$-20I_4$	2.2	1.75	2.0	2.5	1.5	2.0	3.5	3.0	2.30	2.25	2.27
$-10I_1$	3.2	3.5	3.5	3.7	3.2	3.5	6.5	6.0	4.1	4.17	4.13
$0I_2$	6.7	6.0	4.2	6.5	3.0	3.2	7.0	6.5	5.22	5.55	5.38
$+10I_3$	8.5	8	6.0	8.5	7.0	7.5	9.0	8.5	8.12	8.12	8.12



Articulation/gain function for the normal group along with the Predicted SRT

The lowest scores at SRT -2dB; is also in agreement with Sadia's (1982) study. Converting her score of 5.72 into percentage score and comparing the score of percentage convection of 2.27 is almost in agreement. Baling out the variables, as examiners listening abilities, the written and oral responses of the two subject were compared. No difference existed. The graph further is indicative of use of any list. The test can be administered binarrally or monaurally (Goldman 1971 and Falconer, 1976).

Thus lip reading test can be administered in cases where unexplained audiological controversies occur. To predict the SRT in monoaural er binaural pseudohypacusis cases. IN this test case is not aware about exploration of his organic thresholds.

SUMMARY AND CONCLUSIONS

This test ia based on Falconer's (1966) lip reading test, which was used to predict SRT in pseudohypacusis cases. Subba Rao (1981) and Sadia (1982) developed the test in Indian languages, Kannada and Hindi respectively. The purpose of this study was to develop this test in Bengali language.

The tests consists of 30 sets of four homopheneous words (both monosyllables and polyayllables are used). This sets are divided into 8 list of 10 words. Thus each set consists of 10 words. Each word has its homogeaeous counterpart in other inner Hat of that form.

four normal subject were taken for the study. It was emphasized that their lip reading ability is being evaluated. Testing was done in two room, situation and room was sound treated.

Responses were noted based on four levels of presentations i.e. SRT + 10dB; SRT + 0dB; SRT-10dB and SRT - 20dB. The criteria that was developed, based on this study, to predict SRT, ia the level at which 5 words are repeated correctly. The results and the scores are shown in the table. An articulation gain function graph is plotted.

From the results (as in table) it is evident that at SRT + 0dB, 5 words were correctly repeated. Highest repetition

(about 6039 occured at SRT + 10dB. This is in agreement with the study by Sadia (1982), in her lip reading test in Hindi, since there are not Much difference between the sets, any set can be used.

1. Development of this test in all other Indian language.
2. More number of normal subject should be taken for standardization of the test.
3. The case should be studied with clinical cases to validate the study.
4. The racommended prediction for SRT is level at which 5 words are correctly repeated.
5. Whenever 5 word repetition criteria is not met, then scores nearest to 5 may be considered.

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WORD LISTS

LIST - 1 (L_1)

Set - I

bala	বালা
t̪ap	তাপ
kata	কাটা
bhaṇ̪	ভাল
kaṇ̪	কান
bxaṇ̪g	ব্যাঙ
bol	বল
Pat	পাতা
daṇ̪a	দানা
čal	চাল

Set - 2

maṇ̪	মান
maṭ̪ha	মাথা
gal	গাল
bxeg	ব্যাগ
mala	মালা
t̪ala	তালা
Pɔṇ̪	পান
chal	ছাল
ḍ̪hap	ঢাপ
kʰata	খাতা

WORD LISTS

LIST - 2 (L_2)

Set - 1		Set - 2	
1. Pan̪	পান	ban̪	বান
2. byath̪a	ব্যাথা	ḍam	ডাম
3. bænk	ব্যাঙ্ক	Jhal	ঝাল
4. Kath̪a	কাঁথা	bagh	বাঘ
5. th̪ana	থানা	mal̪a	মালা
6. Pan̪a	পানা	bon̪	বন
7. Phɔl	ফল	man̪a	মানা
8. Kal	কাল	yan	গান
9. th̪am	থাম	th̪ala	থালা
10. Jal	জল	gadh̪a	গাধা

WORD LISTS

LIST-3 (L_3)

Set-1		Set-2	
1 baba	বাবা	Jhuri	ঝুরি
2 čuri	চুরি	muri	মুরি
3 buri	বুরি	bhela	ভেলা
4 kola	কলা	mas	মাস
5. dan	দান	mapa	মাপা
6. Paka	পাকা	bhaja	ভাজা
7 bas	বাস	khani	খনি
8. maja	মাজা	than	থান
9. kali	কালি	khela	খেলা
10 bola	বলা	Phaka	ফাঁকা

WORD LISTS

LIST-4 (L_4)

Set-1

1. Pas পাস
2. Puri পুঁড়ি
3. Churi ছুঁড়ি
4. bʰaba ভাবা
5. Pola পলা
6. dʰan ধান
7. Tʃʰa পাঁচ
8. Paja পাঁজা
9. Khali খালি
10. gola গালা

Set-2

mama মামা

bas বাঁশ

Juri জুঁরি

bæla বেলা

bʰari ভারী

gʰani ঘানি

baccca বাচ্চা

tal তাল

baka বাঁকা

kena কেনা