EFFECT OF TALKER DIFFERENCE ON WORD DISCRIMINATION SCORES

Reg. No.

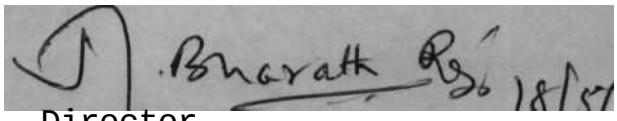
A Dissertation submitted to the University of Mysore
in part fulfilment for the degree of Master
of Science in Speech and Hearing.
May 1983

To

My beloveds

CERTIFICATE

This is to certify that the dissertation entitled "Effect of talker difference on word discrimination Scores" is the bonafide work done in part fulfilment for the degree of Master of Science (Speech and Hearing) of the student with Register No.



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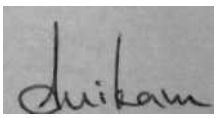
CERTIFICATE

This is to certify that this dissertation entitled "Effect of talker difference on word discrimination Scores" has been prepared under my supervision and guidance.



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DECLARATION

This dissertation entitled "Effect of talker difference on word discrimination Scores" is the result of my own study undertaken under the guidance of Dr.(Miss)Shailaja Nikam, Professor, Head of the Department of Audiology, All India institute of Speech and Hearing, and has not been submitted earlier at any University or institution for any other diploma or degree.

Mysore Register No 1

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INTRODUCTION

Human voice according to Wolf (1874)(cited in Oneil & oyer) is "the most perfect conceivable measure of hearing".

Almost all available literature on Speech Audiometry in one way or another support the above statement. Speech stimulus has been used in the evaluation of hearing ability as early as 1874 by Wolf. Several other tests like the whispered speech tests, and voice tests which make use of speech have been used by otologists for hearing evaluation. Indeed prior to the introduction of the audiometer, speech testing was probably the major assessment tool (Noble, 1978).

Speech stimuli have became an indispensable tool in clinical evaluation. They have been used to confirm the puretone thresholds. A discrepancy in the threshold of intelligibility and threshold of hearing is said to be a good indicator of functional hearing loss (Williamson 1974, Ventry, 1976).

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Chapter I

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is usually disturbed and this finding helps in differe-ntial diagnosis, (Jerger and Jerger 1971, Jerger and Hayes 1977). Speech stimuli are versatile as test stimuli, in that they can be filtered, (Bocca, and Calearo, 1963, willeford, 1969, Hodson, 1972), and time compressed (Lutewar, Welsh and Melrose 1966, Beasly, Schwinner and Rintleman 1972, Beasly, Maher and Orchick 1976, Sood 1981) to test higher order auditory functioning.

Speech materials are also used for many rehabili-tation procedure. They are used in hearing and hearing aid evaluation and selection (Orchick & Roddy 198O, Beattie & Edgerton 1976, Markides 1977).

An audiologist is mainly interested in two measures from speech audiometry. Speech Reception Threshold (SRT) and Speech Discrimination Scores (SD). Secondary measures of threshold detectability,tolerance or dis-comfort levels may also be obtained.

Speech reception threshold is a measure of speech which enables a subject to correctly repeat 50% of the speech materials presented to him. A set of two syllable words called spondees are used for this purpose.

This measure has also been called speech hearing threshold.

Since hearing threshold or speech reception threshold can be frequently calculated from puretone threshold (Fletcher 1960), the measurement of this value is not the prime purpose of speech audiometry. It is mainly used as a counter check for the pnretone average. Speech audiometry is mainly used for measuring the difficulty in speech discrimination which is associated with auditory dysfunction.

Research by Hirsh et al. (1952) and Knight and Littler (1953) have found that difficulty in speech discrimination associated with auditory dysfunction is more easily detectable with monosyllable words than with poly-syllable word lists.

The word lists used in SD testing consists of disconnected monosyllables. The vocabulary of monosyllables is enormous and their predictability is low, and they are therefore sufficiently ambiguous to elicit plausable alternatives in response when a listner has not distinguished the entire word (Noble 1981).

Of the many monosyllable word lists available, the

CID - W22 by Hirsh et al. and the NU Auditory test No.6 by Tillman and Carhart, (1966) are widely used and subjected to various analysis.

Justification for the use of the Auditory test No.6 in the present study-

The NU Auditory test No.6 has been constructed after careful analysis of the phonemic structure of English language and with the main drawbacks of the CID -W22 and NU Auditory test No.4 in mind. It has been subjected to various analysis and standard nouns are available (Tillman and carhart, 1966; Rintelman and his associates, 1974).

It has been proved to be useful clinically by Rintelman and Schumaier 1974; Sanderson - Leepa and Rintelmann 1976; orchick and Roddy 1980).

Need For The Study:-

The importance of speech audiometry in the hearing evaluation is obvious. Any psychometric test, before it is used in clinical practice has to be standardized to the population on which it is to be used, and the variables affecting the scores are to be carefully delineated.

Of the many variables, affecting speech discrimination scores is the enunciation. This variable has been studied under 2 aspects - intra and inter talker variability. Where as the data available on the intra talker variability is difference is equivocal, the variation in response to lists read by two different talker is found to be considerable , (House, et al. 1965, Kreul et al. 1969 and pernrod 1979).

It is important to see also if there exists any difference in the intelligibility of male and female talkers,; if such a difference exists then scores obtained in speech audiometry would vary between male and female talkers (palmer, 1955). Fletcher and Steinberg (1929), attributed this difference to the fact that women's voices were fainter and occupied the higher frequency ranges. Reports by Baranek, Crandall and Sacia, suggest that there is some physical differences inherent in male and female voices, which justifies that a normal ear can hear, understand and identify the two types of voices differently.

According to Coleman (1976) the degree of male or female quality in voice is a function of the frequency of laryngeal fundamental and individual vocal tract resonance characteristics.

Because of the above mentioned factors, it is important to see if there is a significant difference in the scores obtained by normal listeners on the discrimination test recorded by two different talkers - a male and a female.

It is important to study this variable - talker difference, as both male and female clinicians are involved in the assessment and diagnosis of hearing disorders, and the reliability of the test is questioned if such a difference exists.

On the other hand if no such difference is found tape recordings and disc recordings of male and female voices can be made and used interchangably in the clinic.

Statement Of the Problem:-

The study was aimed at answering the following questions:-

1. Is there any significant difference between the two talkers on the scores obtained on the NU Auditory test No.6, for any particular list at any particular level?
2. Are the discrimination scores dependent on thelevel of signal presentation?
3. Are the four lists of NU Auditory test No.6 equivalent?

Chapter II

REVIEW OF LITERATURE

REVIEW OF LITERATURE

Puretone audiometry allows for the quantification of hearing threshold level, as well asidentification of configuarational patterns. But the estimate of the practical consequences of an individual's hearing impairment, cannot be got through the conventional pure tone audiometry. since hearing is primarily a communicated sense, a valid estimate of hearing loss should utilize speech as the test stimulus (Tillman and olsen, 1973).

Speech material used by otologists of the Nineteenth century and early twentieth century consisted usually of unconnected words of variable syllable length (Noble, 1978). Nowadays, several types of speech materials are being used. For the assessement of speech discrimination scores, houseuse words, monosyllabic words and sentences both natuzal and synthetic are being used.

Campbell (1920) cited in Lehiste and Peterson (1959) used speech material consisting of nonsense syllables to test the efficiency of sound transmitting systems. It consisted of different consonants followed by the vowel /i/. The efficiency of a particular transmitting system was judged based on the responses of the listners for these nonsense syllables through that particular transmitting systewi. Nonsense syllables have been used to test speech discrimination and they have the advantage

that they are independent of the listner vocabulary (Berger, 1978), they are non-redundant (carhart, 1965) and easier to construct than meaningful material (Egan, 1946).

Campbell's lists proved to be to abstract and too difficult even for normals to discriminate (Lehiste and Peterson, 1959; carhart, 1965) and they required special training to be able to read out (Egan, 1938).

In India, Mayadevi constructed a test using monosyllabic sounds which could be used commonly with all Indians. But these sounds were almost meaningless and therefore can be considered nonsense syllables. They failed to provide all the necessary temporal parameters for perception. Moreover, as they aremeaningless, the validity of the test is questioned (Samael, 1976). individual sounds are not recommended as they tend to test the "recognizability and not the intelligibility (Lehiste and Peterson, 1959). zakrzewski et. al (1975) suggested that "recognizability" is a subcorticali phenomenon while actual discrimination is a cortical phenomenon. They, therefore, recommended the use of monosyllables that are meaningful words to nonsense syllables for discrimination testing. Lafon (1966) also recommended the use of meaningful stimuli in preference to nonsense words, as

the subject looks for meaning in the sound presented to him and to reproduce it as a known term.

Egan (1948) suggested the following criteria for the selection of words for speech audiometric evaluation:

1. The words should be monosyllables.
2. They should have equal average difficulty and equal range of difficulty.
3. They must be familiar and representing the spoken language.

Monosyllabic words have also been recommended as speech material for speech discrimination by investigators because they (1) do not need special training to be read out (Egan, 1948), (2) they are non-redundant and meaningful and therefore avoid the multiplicity of cues available to the listner which may obscure many of his inabilities to differentiate consonants and vowels (Carhart, 1965). (3) Monosyllables are sufficiently unpredictable and not as confusing as nonsense syllables. (Carhart, 1965; Nobel, 1978). (4) They are easily manipulated to represent colloquial speech (Giolas, 1975).

The earliest monosyllabic word lists were that of Fletcher et. al (1929) at the Bell telephone laboratories which they used for discrimination as related to communication over telephone.

The begining of world war II gave the main impetus to the study and use of speech discrimination tests.

The PAL PB-50 words lists (Egan, 1948) at Harvard was used extensively by Aural Rehabilitators for assessing the hearing impairment during the World War II. Twenty lists with fifty words each were developed. The words were all monosyllables and were words of communication usage.

Hirsh et. al (1952) constructed a new set of monosyllabic word lists the CID w-22 as it was seen that the PB-50 contained many unfamiliar words. They drew their new set of words from Thorndike's tabulation of 20,000 familiar words. This was done to increase the average familiarity so that the test would be suitable even for subjects with minimum education (Hirsh, et. al, 1952). These lists were extensively used in clinical practice and subjected to substantial analysis of various types. (Tillman et. al, 1963). However, it utility was questioned as it proved to be too easy for the listner and therefore did not differentiate sharply among minor defects of phoneme discrimination (Tillman, et. al, 1963; Goetzinger, 1972).

The drawbacks of the CID W-22 lists led Lehiste and Peterson (1959) to compile a new set of words with the CNC (Consonant, a vowel like nucleus and consonant) composition. They selected 1263 such words and obtained a phonemic balance with respect to those 1263 words rather than to the phonemic structure of English as a whole. There were in all 10 such lists with 50 words each. But lack of information regarding reliability and interchangeability of the 10 lists gave impetus to the development of the Auditory test No.4 by Tillman, Carhart and Wilber (1963) at the Northwestern University. The words for these lists were drawn from the 1263 CNC monosyllables and with the phonemic balance suggested by Lehiste and Peterson (1959). Two lists with 50 words each formed the N.U. Auditory test No.4.

Tillman and Carhart (1966) added two more lists to the NU Auditory test No.4 and these four lists formed the NU Auditory test No.6.

NU 6 was standardized by Rintlemann and his associates (1974) on a group of ten normal hearing subjects and the four lists were found to be equivalent.

Other tests making use of monosyllables are

1. Haskin's PBK word lists:

The words for PBK (K denoting Kindergarten) lists were drawn from the original PB-50 word lists (Egan, 1943). out of the 425 words drawn, 200 words were selected which appeared in the international kindergarten lists, Horn's list of spoken vocabulary and Thorndike's lists and were divided into 4 lists intially and then again subdivided to form 8 such lists of 25 words each. The PBK word lists as they arecalled has been mainly used with children (Goetzinger, 1972).

2. Fairbanks Rhyme test:

Fairbanks (1958) developed the Rhyme test which had fifty sets of five rhyming words which varied only with respect to the initial consonant. He used 18 consonants in the test. The listner was required to choose his response from a closed set of five rhyming words (Fairbanks, 1958). The main drawbacks like its ability to discriminate only among consonants, its restricted matrix and lack of alternate forms of the list led to its modification by House et al (1963). The modified Rhyme test (MRT) had six equivalent lists of 50 words, and the responses had to be chosen from a set of six rhyming words. It tested for discrimination of the sound in the initial and final positions. However, the criterion for the selection of the words was not very stringent either in terms of familiarity or phonetic balance.

The KSU Test:-

The Kent State university (KSU) teat of speech discrimination makes use of monosyllables embedded in sentences. The KSU employs five key words within a series of sentences (Berger, 1967, 1969). The talker reads; out a sentence employing one ofthe key words and the subjects task is to indicates which of the five Key words was spoken. The rationale behind the test was that it presumably more nearly represented the task of the listener in daily communication than that of responding to isolated words (Berger, 1969).

Berger, Keating and Rose (1971) found that the W-22 lists were more sensitive for testing auditory impairment, but the KSU test more accurately predicted how efficiently one could utilize this hearing for daily communication purpose.

Indian Studies:-

Swarnalatha (1972) attempted to standardize the English speech materials for Indian subjects. She drew 200 words from the Harvard PB lists (Egan, 1948) and 200 words from the W-22 lists (Hirsh, et. al, 1952). The subjects were asked to rate them according to familiarity of the test word as "familiar", "not familiar","Not so familiar".

In India NU 6 has been standardized by Malini (1980) and recommended for clinical use. It has been used for time compressedspeech studies by Sood (1981). The effects of age (Megalai, 1983), the effect of familiarity of the word on the scored obtained (Devraj, 1983) and the effect of the mothertongue on the perception of the words (Elizabeth, 1983) have also been demonstrated forthe N.U.6 test.

Several factors other than the lists used affect the word discrimination scores. Some of them are given below:

(a) Familiarity

The influence of word frequency on intelligibility has been a topic of considerable discussion (Egan, 1948; Howes, 1957; Rosenwig, 1957; Owens, 1961, . one reason for the revision of the Harvard PB 50 (Egan, 1948) word lists was to increase the average familiarity so as to expand its utility as relatively unfamiliar word require a minimum education level in listners whose discrimination is to be appraised and therefore limits clinical utility. (Hirsh et. al, 1952; owens, 1961, Carhart, 1965).

In speech discrimination testing, it has been found that less familiar words were more likely to be misidentified (oyer and Doudna, 1960: Savin, 1963; Schultz,

She then selected 50 words from the familiar group and compiled them into 2 lists of twently five words each. Both the lists were phonetically balanced.

This list was standardized on young normal hearing adults. As each lists was given contained 25 words each word a weightage of 4%. As only two lists were made with no equivalent forms, the problem of practice effect came into play upon repetition of the lists when many listening condition had to be explored. The equivalency of the test lists has not been statistically established to use the lists interchangably.

Mayadevi (1974) using monosyllable sounds constructed a test that could be used with all Indians. She selected twenty consonants which occured in most Indian languages, and along with a common vowel /a/ compiled a list of 20 monosyllabels with the CV combination. These words were scrambled six times and the lists were presented to normal hearing and hearing impaired subjects at 6 levels (in l0dB steps above speech reception threshold).

Among the drawbacks are the sounds are meaningless and therefore do not test 'intelligibility' but only 'recognizability' (Lehiste and Peterson 1959), the influence of native language and dialectal difference upon production

and perception of speech sounds has not been considered, which can lead to erroneous scoring. The effect of the language of carrier phase and the co-articulation effects have not been studied.

Samuel (1976) and De (1973) have constructed test lists in Tamil/Hindi and respectively. But the clinical utility of these tests have not been established and their use is restricted only to the population who speak that particular language.

Sentence Tests:-

Some researchers feel that larger speech units like sentences or some form of quantifiable discourse is more appropriate as a measure of speech discrimination at. Speaks and Jerger 1965, Giolas 1966, Berger, 1969). Several drawbacks with using monosyllabic words (Carhart 1965, Speaks and Jerger, 1965, Jerger, Speaks and Trammell 1968) and the advantages of using sentences in discrimination testing led to the development of several sentence tests. Among the major advantages of the sentence tests are that they present a more natural listening task and take advantage of the crucial parameters used in undenstanding connected speech (Hirsh et. al. 1952, Giolas 1975).

The CID sentence lists (silverman and Hirsh, 1955) was developed for clinical and research use. It was to be a representative of colloquial speech. These tests are easily administered and scored (Giolas and Duffy 1973).

Harris et al. (1961) revised the CID sentence lists in an attempt to provide a greater homogenity of sentence length while maintaining thecolloquial speech criterion. These lists were called the Revised CID sentence tests or R-CID.

Jerger, Speaks and Tramell (1968) gave the synthetic sentence identification test (SSI) to test discrimination. They were called synthetic as they were artificially created. They resemble the real sentences in that they were long enough to permit manipulation of various temporal parameters like temporal interruption and compression. But they were non-redundant unlike the 'real' sentences. The other advantages of the SSI are-

- The response is a closed set message of only 10 possible answers. Therefore, the background and familiarity do not play a part and scoring is unambiguous (Jerger, Speaks and Trammell 1968).

The PI function was quite steep and performance is related to contextual constrains of the message sets.

The strategies employed by the listeners were complex and solely related to single word recognition (speaks, Jerger and Jerger, 1965).

The PI function for the SSI - MCR and PAL PB - 50 lists for 60 hearing impaired subjects showed a direct relation to audiometric contour. In relatively flat losses, the performance of the words and sentences were similar. Discrepancy was seen between the two as the slope of the audiogram pattern increased with the SSI - MCR remaining relatively unchanged. These results led Jerger et al. to conclude to high frequency sensitivity.

The SSI has been used in research by several investigation like however other sentence tests it is not generally used in clinical practice.

Monosyllables despite their drawbacks are still the major tools for assessment of the discrimination ability.

Of the several monosyllabic lists listed above, the Auditory test No+6 has been standardized by Tillman and Carhart 1966 at the North-western University and Rintlemann and his associates, its clinical utility has been demonstrated (Rintlemann and Shumainer 1974, Sanderson-Leepa and Rintelmann 1976, orchik and Roddy 1980) and it has been used extensively in studies of perception and time compression (Beasley, Schwimmer and Rintlemann 1972).

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In speech discrimination testing, it has been found that less familiar words were more likely to be misidentified (Oyer and Doudna, 1960: Savin, 1963; Schultz,

1964; Devraj, 1983). Hirsh et. al (\952), Owens (1961) Schultz (1964) have found the W-22 lists (Hirsh et. al 1952) to be easier than the PB-5O lists (Egan, 1948). This difference has been attributed to the greater familiarity of the words and speaker intelligibility (Owens, 1961; Goetzinger, 1972). However the W-22 lists have been criticized for containing two many familiar words and they therefore contribute to the spuriously high results for testing (Schultz, 1964). The lists were proved to be too easy for most listners and therefore did not differentiate sharply among minor deficits of phoneme discrimination (Tillman, and Carhart 1960? Berger, 1971).

Cross language:

Linguistic experience of the listner play an active role in discrimination (Gat and Keith, 1978? Singh, 1966; Abramson and Lisker, 1968; Sapon and Carroll, 1967). in fact, according to sapon and Carroll (1967), the probability of a given sound in a given environment is related to the language of the subject. The direction and magnitude of the errors that occur in perception are systematically related to the language spoken by the subject.

Miyawaki (1973) found that linguistic experience significantly affects perception in the "speech mode" and not when non-speech stimuli are used.

Use of English test on non-native speakers of English have yielded poorer scores compared to the scores obtained by native speakers(Sood, 1981 & Malini, 1981? Bcnitn and Opeakc, 1968). Gat and Keith (1978) and Sinha (1981) found that discrimination scores of non-native speakers tended to be more affected by the presence of background noise than that of the native listner.

Speech audiometry in general provides a measure of the linguistic sense of that is made of what is perceived, and it is therefore important that speech hearing ability be tested using lists of words in a language that is known to the subject (Alusi et. al, 1973; Samuel, 1976).

(b) Half-list presentation:

According to Lord (1952) cited in Nobel (1978) "Practical considerations dictate that a clinical test be as short and feasible, and this in turn implies that every item retained as a part of the test should be contributing optimally to the measurement".

The realization that whole lists take more time to administer led to the list reduction. Eipern, Lynn (1962), Pesniek, H962-) and Deutsch et. al (1971) have recommended the use of half word lists.

List reduction may have the consequence that the statistical reliability of the test could be destroyed (Deutsch et. al, 1971) and may affect phonetic balancing (Grubb, 1963). But Deutsch (1971) argues that phonetic balancing is important when discrimination scores are used as a prognostic tool as it offers face validity. But the validity of the discrimination scores for differential diagnosis depends entirely upon its ability to separate cochlear from retro-cochlear involvement and not on the phonetic balancing.

Deutsch (1971) and Kryner (1971) found the 25 word lists to be essentially equivalent to the original 50 words lists and were faster to administer and less fatiguing for the patient.

(c) Test Presentation

Large differences are brought about by factors like changes in talker, in the method of reproduction of the test, characteristics of the test equipment (carhart, 1965).

Test material can be presented either by live voice mode or by recordings (either magnetic tape recording or disc recording) of the word lists. Several such pre-recorded lists are commercially available such as the Auditec of St. Louis cassette recording of the N.U. 6 and CID W-22 word list.

Langenbeck (1965) recommended that recorded word lists be used for speech discrimination testing because he felt that the tendency to articulate more clearly when the patient does not understand correctly is very great in live presentation, and therefore equivalence cannot be assumed for all the words.

According to Brandy (1966), in routine live speech discrimination test, the talker often does not attempt identical modes of presentation for each reading, and will therefore introduce more and more variability whenever he changes his mode of presentation.

(d) Speaker variablity

Talker difference (both intertalker and intra-talker) or speaker variability as a variable affecting the test scores of listener on speech discrimination testing has been a topic of controversy for a long time (palmer, 1955? Kruel et. al, 1967: Penrod, 1980). This is probably

because the variables related to speech production are very many, complicated and difficult to control unlike the relatively uncomplicated pure tone (Brandy, 1966). These variables are the vocal parameters like vocal force or intensity, pitch, duration, articulation, voice quality and the like (Fry, 1955; Peterson, and Lehiste, 1960).

According to Hirsh et. al (1952), there is no specification regarding how the physical properties of speech signal as a complex wave form should be controlled in routine tests of speech discrimination and attempts at standardization have only considered equating the lists in terms of printed symbols for words rather than in terms of complex acoustic events* that the words represent.

palmer (1955) investigated the effect of talker difference in the intelligibility of word lists. His study indicated that there was no significant difference, or the acoustic difference did not contribute importantly to the test scores.

Brandy (1966) observed a significant difference between recorded presentation (i.e., those which are equal in acoustic output) and live voice presentation

(unequal in acoustic output) by the same speaker at 10 dB above speech reception threshold. The results of his study indicated that the same speaker does not produce the same acoustic signal on successive readings of a given printed word.

Kruel, Bell and Nixon (1967) found that test difficulty changed significantly with changes in talker. But unlike Brandy (1966), they did not find any difference with re-utterance of the same test material by the same speaker.

They concluded that the selection of the speaker, did play a part in determining the level of test difficulty and that the number of errors depended significantlyon the talker. They recommend that the test should not be thought of as written lists of words but as recordings of these words.

Penrod (1980) found that the difference in scores obtained with different talker could not be attributed to any one of his three talker, but were apparent in all talkers. He concluded that the primary factor responsible for the variability did not seem to be related to the talker but rather the talker-listener interaction.

According to Hood and poole (1980) the speaker and recording technique predominantly determined the characteristics of any recorded material, more than other factors like phonetic construction, word familiarity and word environment.

Because of this difference among speakers and in the same speaker for successive readings of the same test material, pre-recording of the test material is recommended, as comparision of results among clinics and laboratories cannot be done unless speaker equivalence is demonstrated.

But recorded material have their own drawbacks. They are inflexible and therefore difficult to use with children (Postmann and Postmann, 1961). in pre-recorded material, each talker's unique characteristics are permanently built into the test. So according to carhart (1965) "There may be as much difference between one recording and another as between two live talkers".

This implies that the recorded version of the test material also be standardized to obtain results comparably across clinics and laboratories.

Review of literature therefore points out that recordings of different speakers should be compared to

See if any variability exists between them. The present research was conducted to see if such a difference existed between the magnetic tape recordings of the speakers (one male speaker and one female speaker) used in this study.

Research by O'Neill (1957), Lynn and Botham (1981) have reported that intelligibility scores for isolated words tended to be lower than when words were presented in a linguistic text.

Carrier Phrase:

A carrier phrase in speech audiometry is assumed to alert the listener for the test word and allow the announcer to monitor his voice, but the exact content of the carrier phrase is not considered important (Egan, 1944; Carhart, 1952).

However, Gladstone and Siegenthaler (1971)and Lynn and Brothman (1981) have found that better scores were obtained with the carrier phrase "you will say. . . ." than with any other carrier phrase. They attribute this difference to the vocalic /i/ at the end of the carrier phrase. According to them, the inter consonantal position of the initial consonant of the test word (i.e., between the vowel /i/ of the carrier phrase and the

vowel nucleus of the test word) provides cues for the place of articulation of the consonant.

Instructions:

Markides (1979) found that instructions given to the listner made a marked difference on the scores obtained. He used two modes of instruction - In the first mode, the children were asked to listen carefully and repeat each word and in the second mode, they were encouraged to speak whatever they heard - the word, whether meaningful or meaningless, part of the word or even single sounds.

His results indicated an improved speech discrimination by about 14% to 16% in normal children and about 21% to 23% in the hearing impaired. He concluded that when monosyllables were used, the listner needs to be instructed and encouraged to repeat every single phoneme correctly recognized.

Mode of response collection:

wrice down vs talk back : Written responses are generally favoured to verbal responses (Lovrinic et. al 1968; Tweedie, 1969). They found a difference of about 10% in the scores obtained between the two modes, with

the verbal response being scored higher than write down scores. They concluded that ". . . . . it seems probable that the tester is inclined to hear a correct than an incorrect response in questionable instances"(p.319)

Nelson and Chaiklin (1971) found that only average difference was seen between talkback and write down response results when an experienced examiner scored the talk back response in ideal acoustic conditions. Discussing these two modes of response collection, Jerger (1962) says ". . . . . under circumstances of less than ideal electronic communication system, it seems sometimes ambiguous as to whose speech discrimination is being tested, the patient's or the audiologists' (p. 319)".

However, Nelson and Chaiklin (1971) to minimise the talkback scoring bias recommended that the examiner may request his patient to repeat, spell or clarify in some manner, all talkback responses that sound even slightly ambiguous.

Scoring:

Another factor influencing speech discrimination scores of a listner relates to the various methods of scoring (Markides, 1978; MuikiJts eL. dl, 1973,

Boothroyd (1968) has reported two methods of scoring - whole word scoring method and phoneme scoring method. Phoneme scoring was found to yield 20% to 30% higher scores than whole word scoring method. Phoneme scoring also reduced the influence of language function and inter-list differences.

From the review of literature it can be seen that several factors affect the speech discrimination scores. Talker difference is one important factor that has to be studied thoroughly. The recorded versions of the same test by different talkers can also produce a significant difference in the scores obtained as suggested by several studies discussed above.

The present study aims at finding out if a talker difference exists between the recorded versions of the N.U. Auditory test No.6 by two talkers.

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Chapter III

METHODOLOGY

METHODOLOGY

The present study was aimed at finding of there was any significant effect of talker on the scores obtained on the N.U. Auditory test No.6, recorded by non-native speakers of English and presented to non-native listeners.

Test Material:

Test material in this study consisted of the English test to evaluate proficiency in English language and the speech materials i.e., the lists to determine speech reception threshold and speech discrimination scores.

A Test of English Ability:

This test was developed at the central institute of Indian and Foreign languages (CIIFL), Hyderabad. It consists of six subtests to measure the English ability of an individual (see Appendix 11. This test has been previously used on graduate and post graduate students and found useful (Malini, 1981). An arbitrary scoring system of 1 credit (or 1½ and 2 for the more difficult items) was established as the test had no scoring system. The total score was 100 points. A 50 points cut-off was arbitrarily chosen as a criterion to be included in the test.

Speech Material:

a) To determine the Speech Reception Threshold, Spondee list CID W-l (List A) was used (See Appendix II).

b) For speech discrimination testing, all the lists of N.U. Auditory test No.6(Tillman and Carhart, 1966) were used and this was the speech material under study (See Appendix III).

Both the Spondees of the CID W-l and the CMC monosyllables of the N.U. 6 were tape recorded.

Recording procedure:

The spondees and the monosyllables were tape recorded) in an anechoic room using a tape recorder (Grundig TK 745) with a stereo microphone (GD SM 331). All the recordings were done on 3¾" magnetic tape at a speed of 7½ ips.

The Speakers:

Two adult speakers - one male and one female with fundamental frequencies 110 Hz and 210Hz. respectively were used. Both were fluent speakers of English language and they were considered to be representative of Indian English speakers.

The monosyllables were recorded by both the speakers, but the spondees were recorded only by the male speaker.

Both the spondees and monosyllables were recorded with a carrier phrase "you will say ...."+ The carrier phrase was made to peak at "0" on the vu meter and the word was allowed to flow in a natual manner.

Between two spondees, a silent interval of 5 seconds was given to allow the listener to give an oral response. This interval was 8 seconds for the monosyllable lists so that a written response could be collected.

The tapes were then replayed on the tape recorder (Grundig TK 745), and its output was fed to a graphic/ level recorder (B & K type 2305). A 1000 Hz calibration tone from a Beat frequency oscillator (B & K type 1022) was recorded at the beginning of each list. The maximum deviation of any word peak was found to be within 1 to 2 dB of the calibration tone.

Instrumentation:

A two-channel clinical Audiometer (Madsen OB 7O) calibrated to ANSI (1961) specification was used to attenuate the signal. A stereo tape recorder (UHER

Logic SG 631) was used to present the speech stimuli. The tape output was given to earphones (TDH 39) set in ear cushions (MX 41/AR) through the tape input of the Audiometer. The frequency response characteristics of the earphones is shown in Appendix v.

Objective calibration (as described in Appendix iv) was done once a week.

Test Situation:

A sound treated two-room situation was used for all measurements. The noise levels of the room, measured with a sound level meter (B & K type 2209) with a condenser microphone (B & K type 4165) and an adaptor (DB 0962),was found to be within permissible limits (ANSI, 1969) (See Appendix VI).

Subjects:

The subjects chosen were forty young adults, twenty females and twenty males. All were undergraduate or post graduate students; and also had to meet the following criteria:

1. he or she should have Kannada as his/her mother-tongue.

1

2. his/her hearing thresholds be within normal limits at frequencies 250 Hz through 8000 Hz in both the ears and the air bone gap should be less than 10 dB (ANSI, 1963).

3. he/she pass the test of English ability with atleast 50% scores.

4. he/she should have given a negative history of ear infection or head injury.

Test Procedure:

Pure Tone Thresholds: pure tone thresholds were obtained by using the modified Hughson-westlake procedure as described by Carhart and Jerger (1959). If the thresholds were within the 'normal' limits, then the Speech reception threshold was found for the ear with better threshold. However, care was taken to see that there was equal representation of the left and right ear.

Speech Reception Threshold: To determine Speech Reception Threshold, the subject was first familiarised with the word list. In a face-to-face situation, the test was read to him/her with the following instructions

"you will hear a man's voice saying the words ..... (and the entire list was read to him in an alphabetical order). Before each

word you will hear the phrase 'you will say . . . . . ' and then the word will follow. You have to repeat the word that follows. If you are not sure of the word, then try to guess. Do you have any questions?"

With the audiometer intensity dial set at 30 dB HL, two spondees were presented. If both were repeated correctly, the intensity was reduced in 10 dB steps until the subject missed both the words. At this point, the intensity was raised by eight dB HL and two spondees were presented again. Upon correct repltition, the intensity was lowered by 2 dB and two more spondees were presented. This continued till the subject missed five out of 6 spondees. The lowest level at which the subject repeated both the spondees correctly minus one was taken as the Speech Reception Threshold for that ear*

Speech Discrimination Test Procedure:

The four lists of the N.U. Auditory test No.6 Form A were used for the speech discrimination test. The lists were presented at five different SLs (Ref. SRT) i.e., 8 dB SL, 16 dB SL, 24 dB SL, 32 dB SL and 40 dB SL. All the four lists were heard by all the subjects but at different sensation levels. As there were four lists and five levels, and no lists were to be repeated.

every subject did not hear at one of the sensation level. The list-level combination were randomly chosen.

The ear to be tested was chosen depending on the pure tone threshold. The better ear was always chosen. In cases of equal sensitivity, the test ear was chosen randomly. But care was taken to see that there was equal representation of the two ears, right and left.

Twenty subjects (ten male and tem female) were assigned to listen to the male talker and twenty subjects (Ten male and ten female) to the female talker.

The subject was instructed as follows

"you will now hear a man's(or woman's) voice saying a list of words. There will be four such lists with fifty words in each list.

You will hear the four lists. The loudness of the four lists will not be the same i.e., some lists will be louder, othez; softer. Before each word you will hear the phrase 'You will say.....' and the word will follow. Pay attention to the word that follows, and write it down against the serial number on the printed sheet-gien to you. Try to guess the word if you are doubtful. If you cannot guess, leave a blank or put a dash(-) mark against its serial number and go on to the next one. Do you have any questions?"

The lists were presented at the previously assigned levels. The order of list presentation were also randomized. All the four lists were presented in a single setting.

For both the spondees and the monosyllables, the tape recorder gain was so adjusted that the VU meter of the audiometer peaked at 0 for the calibration tone at the beginning of each list.

Scoring:

The data sheets were scored right or wrong and each correct word was given a credit of 2%. The total percentage was then computed for each list.

Chapter IV

RESULTS

RESULTS

The data collected were analyzed and the mean, and the standard deviation were computed for both the talkers for each list and level combination. These values are given in tables 1 and 2 respectively for male and female talkers.

EFFECT OF LEVEL:

(a) For the male talker:

Table 1 shows that though the general tendency the mean scores is to increase with increasing sensation level, this is not observed for all the four lists. Lists II and III showed a decrease in mean scores with increasing sensation level and list IV showed very little increase in mean scores with increase in sensation level from 24 dB SL to 40 dB SL (ref. SRT).

(b) For the female talker:

The scores for the female talker- showed increase with increasing sensation levels for all lists except list I where no change was observed in the mean scores when the sensation level was raised from 32 dB SL to 40 dB SL. [see Table 2]

The standard deviation however did not follow any regular pattern of increase or decrease for both talkers.

The articulation function curves for the male and female talker are shown in figure 1 and figure 2 respectively.

From fig. 1 it can be seen that there an asymptote has not been reached for Lists I, II and III. List IV shows a plateau.

The slopes of the articulation function are as follows for sensation level between 8 and 16 dB SL.

2.36%/dB for List I; 3.75%/dB for list II
1.81%/dB for List III; 2.13%/dB for List IV.

From fig. 2, it can be seen that a plateau has not been reached for any of the lists and hence there is a possibility of it increasing with further increase.in sensation level.

The slopes of the curves are 4.75%/dB List I? 0.375%/dB List II; 2.56%/dB List III; 3.25%/dB List IV, for scores between 8 and 16 dB SL.

For the female talker, the articulation performance slope was the worst for the List II.

In addition, the average of the scores of the lists at each level was computed both for male and female.

They are shown together in fig. so that a comparison of the performance curves for male and female talker can be done. It can be seen that with the increase in sensation level, the curves tend to move apart, with poorer scores for the male talker.

A three-way analysis of variance was done to see if there was any significant difference between the scores obtained by the two talkers, the equivalency of the four lists of the N.U.6, and the effect of sensation level on the scores obtained. The results of the ANOVA are shown in table 3. The F ratios indicate that

1. the effect of sensation levels is significant at the 0.01 level of significance.
2. The talker difference is significant at the 0.05 level of significance.
3. There is no significant difference among the test lists.
4. The interaction scores showed no significant values.

The above results are discussed in the following chapter.

SL (db. ref. SRT)	LIST I			LIST II			LIST III			LIST IV		
	Mean	Median	S.D.	Mean	Median	S.D.	Mean	Median	S.D.	Mean	Median	S.D.
8	41.5		21.06	28		10.58	40		23.94	41.5		14.82
16	60.5		13.20	58		2.30	54.5		9.14	58.5		18.79
24	75.5		13.40	76.5		4.43	63.5		5.25	78		6.73
32	81		4.16	66.5		16.52	85.5		8.06	78.5		6.60
40	82		5.41	79.5		9.71	82.5		9	78.5		6.60
	AF= 2.375			AF= 3 .75			AF= 1.812			AF = 2.125		

Table 1: MALE TALKER

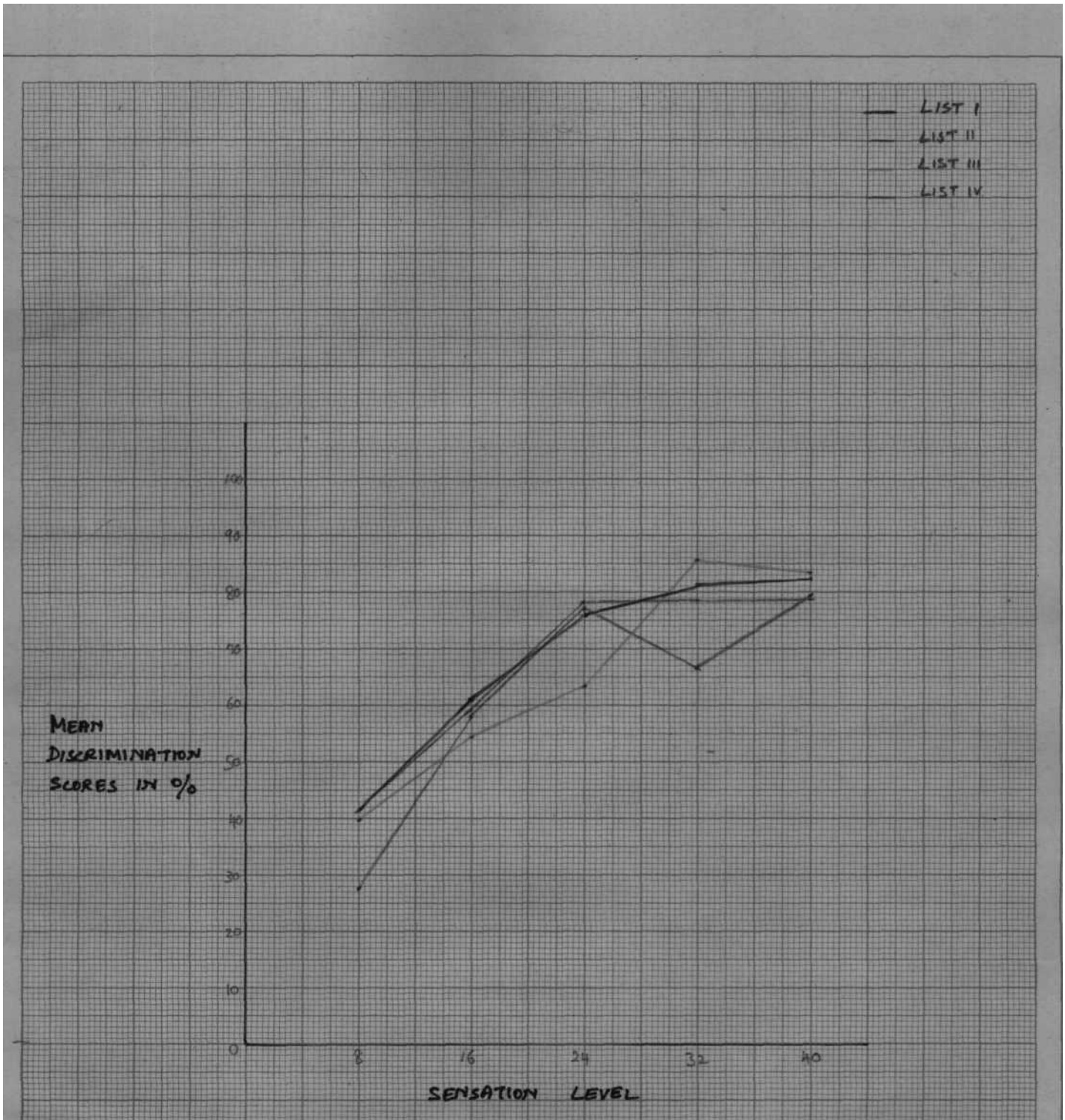
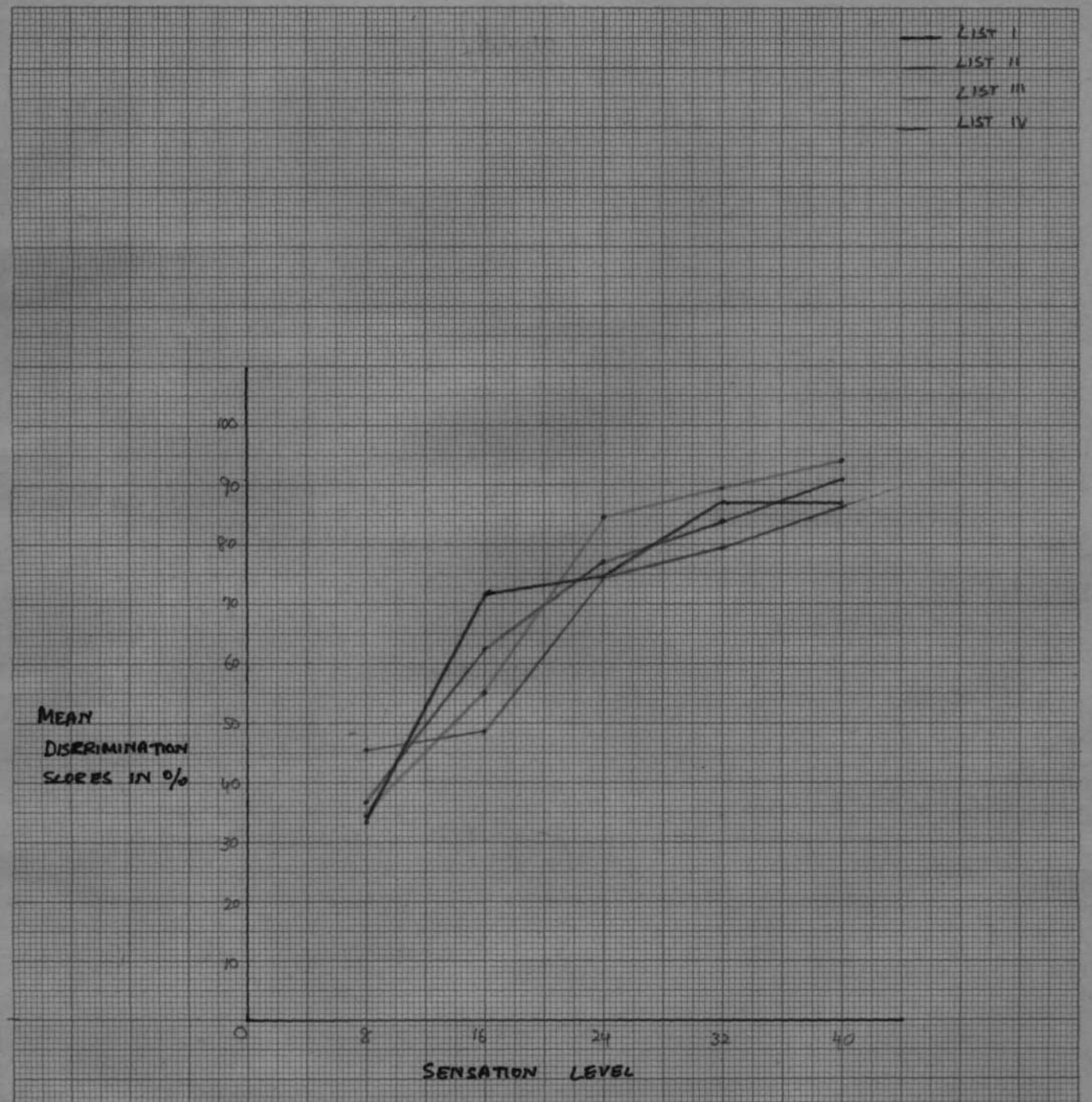


FIG. 1

ARTICULATION FUNCTION FOR THE FOUR LISTS [MALE TALKER]

SL (dB. ref. SRT)	LIST I			LIST II			LIST III			LIST IV		
	Mean	Median	S.D.	Mean	Median	S.D.	Mean	Median	S.D.	Mean	Median	S.D.
8	33.5		1.91	45.5		17.46	34.5		14.27	36.5		10.38
16	71.5		19.89	48.5		16.03	55		3.46	62.5		4.43
24	74.5		8.54	74.5		9.98	84.5		4.12	77		13.12
32	87		7.57	79.5		8*54	89.5		4.43	84		5.65
40	87		6.21	86.5		5.51	94		7.12	90.5		3.41
	AF = 4.75			AF = 0.375			AF = 2.562			AF = 3.25		

Table 2: FEMALE TALKER



ARTICULATION FUNCTION FOR THE FOUR LISTS [FEMALE TALKER]

FIG. 2.

Source of Variance	Sum of Squares	Degrees of Freedom	Variance Estimate	F Ratios	
ROWS (Lists)	623.4	3	207.8	1.855	
COLUMNS (Levels)	49211.65	4	12302.91	109.84	Significant 0.01 level
LAYERS (Talkers)	739.6	1	739.6	6.603	Significant at 0.05 level
R X C	1302.35	12	108.5	0.968	
R X L	91.4	3	30.5	0.272	
C X L	160.65	4	40.18	0.3587	
R X C X L	2411.35	12	200.95	1.7857	
WITHIN CELLS	13440	120	112		
TOTAL	67980.4	159			

Table 3 : ANALYSIS OF VARIANCE OF THE DATA

Chapter V

DISCUSSION

DISCUSSION

The results obtained in the present study were given in the previous chapter. The results will be discussed along two lines

1. The effect of level.
2. The effect of talker difference.

The results did not show any significant difference between the four lists of the N.U. Auditory test No.6.

1. The effect of sensation level:

The figs. 1 and 2 show the articulation function curves for the four lists obtained for the male and female talkers respectively. The slopes of the articulation function curves are given in table for both male and female talkers of the present study and for the Male talkers of Malini's (1981) study for comparison.

	Talker	List I	List II	List III	List IV
Present Study	(a) Male talker	2.36	3.75	1.81	2.13
	(b) Female talker	4.75	0.38	2.56	3.25
Malini (1981)	(a) Male talker	2.3	0.18	O.43	2.9

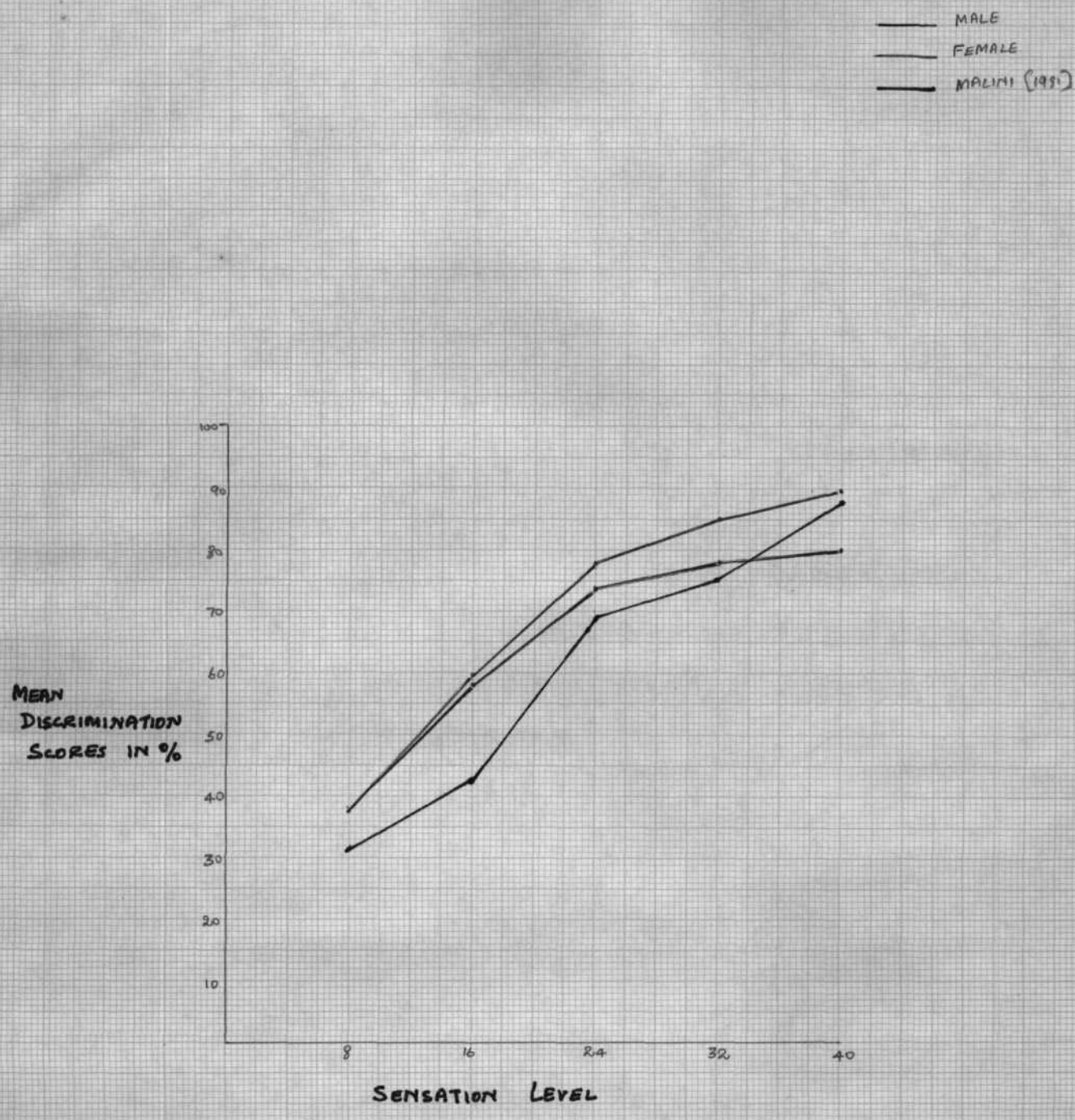

MALE
FEMALE
MALINI (1951)
MEAN DISCRIMINATION SCORES IN %
100
90
80
70
60
50
40
30
20
10
8
16
24
32
40
SENSATION LEVEL

FIG - 3

The results of the present study show better articulation function curves (steeper curves) when compared to the study by Malini (1981).

The fig. shows the average scores of the four lists for each level for both the talkers of the present study and that of Malini (1981). The curves show better performances in the present study especially at low sensation levels. This difference in the scores between the two studies could be attributed to the following causes,

- Recording environment.
- The listners used in the study.
- The instrumentation.
- Talker differences.

Recording Environment:

The lists of the present study were recorded in an Anechoic chamber. Recording for Malini's (1981) study was done in a sound treated room. Speech intelligibility decreaseswith increasing reverberation and noise (Hiber and Tillman, 1980; Curtis, 1974). In a highly reverberant room, reflected energy that is not integrated with direct sound energy may change some important aspects of a speech signal and interfere with intelligibility, producing a "time-smearing" or distortion of the original signal (Houtgast and Steenekeen, 1972). Information reading

from a direct speech signal can be 'burried' in a background of reflected energy and actually received at a lower intensity than the excess reverberant energy. (Hieber and Tillman, 1978). These above mentioned studies indicated that reverberation reduces the intelligibility. of the speech signal, and this could be one of the reasons for the differences. However the difference cannot be attributed to this factor alone as at the higher Sensation levels, the scores of Malini's (1981) study are better than the scores obtained for the Male talker of the present study.

THE LISTNER:

The present study made use of a strict control on the selection of subjects for the study. The criteria for selection are given in Chapter III. Malini (1981) study did not consider the linguistic effect of the subjects' mothertongue on the peroeption. She selected subjects irrespective of their mother tongue. Mother tongue is found to influence perception of a non-native language (Singh, 1960? Sapon and Carroll, 1957) and the magnitude and direction of errors that occur in perception are systematically related to the language spoken by the subject (Sapon and Carroll, 1957). The present study made use of a uniform criterion for selection of subjects

i.e., subjects who had Kannada as their mother tongue and English as second language, were only included.

Instrumentation:

The electrical and acoustic characteristics of the instruments and circuits intervening between the talker and listener is another factor governing the speech intelligibility of speech sounds (French and Steinberg, 1947). The instruments used in the two studies could have contributed to the difference. The tape recorder used in the present study (Uher Logic SG 631) was one with good fidelity and low distortion.

Talker Difference:

The fact that nalini's(1981) study made use of a different talker itself could be the cause for the differences in scores, as talker difference has been found to make a significant difference on the scores obtained in several studies (Brandy, 1966; Kruel et. al, 1967; penrod, 1980; Hood and Poole, 1980).

All the above mentioned factors could be acting simultaneously to produce the differences in scores. But the improvement of scores at the higher sensation levels in Malini's study as compared to the present

study suggests that the differences could be mainly attributable to talker difference and the influence of the listner's mother tongue on the perception of more than the recording environment and the instruments used.

2. Talker Difference:

The present study shows that the talker difference is significant at the 0.05 level of significance. This difference could possibly be because of

(1) The different linguistic background of the two speakers.
(2) The differences in male-female talker intelligibility.

(1) The linguistic background of the two talkers are different. The male talker had Tamil language as his mother tongue and was exposed to Kannada and English since childhood, while the female talker spoke English at home since childhood and she has also been exposed to Tamil and Urdu. Vocal parameter (Freisman, 1964) and regional dialectical differences are factors to be considered in discrimination testing.

Although the talker level interaction was not

significant according to the F ratio obtained, Fig. shows that the scores for both the talkers are divergent curves, stating from the same point at the lowest sensation level and diverging steadily to the higher sensation level; with the scores for the male talker lower than that for the female talker, if linguistic background of the speaker is the cause, then this effect would have been seen at low sensation level also. Therefore, the difference is because of a greater increase in intelligibility of the female talker with increasing sensation level as compared to the male talker.

Fletcher and Steinberg (1929, as cited in palmer, 1955) attributed male-female intelligibility difference partly to the fact that women's voices were fainter and partly because they occupied the higher frequency ranges than male voices. However, such a difference in intelligibility was not found in the study by palmer (1955). The trend of the curves indicate the probability of further diversion with further increase in the presentation level, it is important that further research be done in this area to identify those factors which aid intelligibility of the female voices at high sensation levels.

Implications of the Study:-

The results imply that talker difference should be considered a significant factor contributing to the difference in scores obtained. The diverging articulation function curves for the male and female talker with increasing sensation level indicates that at higher sensation levels, female voice has better intelligibility than male voice. It can also be seen that an asymptote has not been reached for the female talker even at 40 dB SL (ref. SRT). If speech discrimination score is defined as the point of maximum speech intelligibility for the particular message being used (Giolas, 1975) then 40 dB SL (ref. SRT) cannot be used in the clinic as the level for administering the N.U. 6 word lists speech discrimination as a further increase is possible with increase in presentation level. But such an increase could result in further divergence of the curves, for the male and female talker. Therefore, until it is otherwise demonstrated, the N.U. 6 should be interpreted with caution if it is used in the clinic for diagnostic purposes.

Recorded versions of the test are recommended as it reduces the variability of talker difference considerably.

SUMMARY AND CONCLUSIONS

The present study was conducted to see if any significant talker difference existed between the male and female talkers for the recorded versions of the N.U. Auditory test No.6. The recording procedure and calibration procedures are reported in detail. The subjects were 40 young adult native speakers of Kannada with normal hearing. They had to obtain a score of atleast 50% on the test of English ability to be included in the test.

The results of the study were analyzed and discussed along the following lines:

1. The effect of level of presentation.
2. The effect of talker difference on the scores obtained.

The following were the conclusions drawn from the study

1. No significant difference exists between the four lists of the N.U. 6, that is all the four lists are equivalent.

2. The effect of level was significant at the 0.01 level of significance, that is, the scores increased with increasing sensation level.

Chapter VI

SUMMARY AND CONCLUSIONS

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The present study was conducted to see if any significant talker difference existed between the male and female talkers for the recorded versions of the N.U. Auditory test No.6. The recording procedure and calibration procedures are reported in detail. The subjects were 40 young adult native speakers of Kannada with normal hearing. They had to obtain a score of atleast 50% on the test of English ability to be included in the test.

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1. No significant difference exists between the four lists of the N.U. 6, that is all the four lists are equivalent.

2. The effect of level was significant at the 0.01 level of significance, that is, the scores increased with increasing sensation level.

3. For the female talker, the scores did not show a plateau at 40 dB SL (ref. SRT), which indicates that further improvement in scores could be possible with increase in sensation levels.

But the articulation-function curves for the male talker did not show much increase in sensation level from 32 dB SL to 40 dB SL (ref. SRT).

4. Talker difference was significant at 0.05 level of significance. This implies that every recorded versions be standardized for that particular talker before it is used on a clinical population.

5. The scores obtained with the female talker were better intelligible than that obtained for the male talker. This difference should be accounted for while using the recording usedin this study in the clinic.

Although the N.U. 6 has been used for various studies on the Indian population, its clinical utility has to be held guarded till it can be complimented by further research in the following areas

1. To see if with further increase in sensation level, there is any increase in the scores obtained.

2. To see if there is a further difference in the

scores obtained by the male and female talkers at levels above 40 dB SL (ref. SRT).

3. To compare the performance of other Indo-Aryan and Dravidian language groups performance with that of the scores obtained by the language group in the present study i.e., subjects with Kannada as their mother tongue.

4. To see if performance improves with a revised version of the N.U. 6, which contains only those words that are judged most familiar by most subjects.

5. To see if recordings of other talkers also show significant difference as seen in the present study.

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APPENDICES

APPENDIX I

A TEST OF ENGLISH ABILITY
(CIEFL DB 2B 1980)

SECTION A

(I) Write suitable articles in the blanks in the following sentence

1. This is_____worst thing that could have happened
2. Mr.Sankar is_____honest man

(II) Write suitable prepositions in the blanks in the following sentences.

1. He was born _____ the summer_____1969.
2. She fell unconscious hearing the shocking news,

(III) Write suitable pronouns in the blanksin the following sentences.

1. The children have gone for a holiday with_____ parents.
2. is this cycle ? I've seen you using it.

(IV) Write suitable articles, prepositions or pronouns in the blanks in the following sentences.

1. The children are scared of him because_____

   shouts at _____
2. The doctor has advised_____to live

   fruits alone as he found that she had_____ very bad liver.
3. There are number of good films in Hyderabad now. I want to see them all. To do that, I must see them at_____rate of one a day. Even then, I am afraid I may miss some_____them.

(V) Insert suitable articles, prepositions or pronouns wherever necessary in the following sentences.

Example: Mt. Everest is the highest peak in the world

1. As there is lot of money in bank thieves are attracted by it.
2. I asked the teacher to explain me the new topic in Science.
3. The principal wants you to inform as soon as you arrive.
4. Talking about the accident, she said she had seen with own eyes.
5. If you are in need of anything ask it.

SECTION B

(I) Insert the right form of the verb given in brackets into each of the following sentences.

1. He _____ (go) there yesterday.
2. She (go) to school by bus everyday.
3. I must_____(meet) the Principal tomorrow.
4. He_____(have) his tea when I_____(telephone) him yesterday.
5. He_____(live) here since 1934.

(II) Put a ( ) mark against all the sentences which are grammatically correct and an (X) mark against those not grammatically correct.

1. Last year I walk to school every day. /____/
2. Last year I have walked to school every day. /_____/
3. Last year I walked to school every day. /_____/
4. Last year I was walk to school every day. /_____/

5. Hari did not came to class. /_____/

6. Hari has not come to class. /_____/

7. Hari has not came to class. /_____/

8. Hari does not come to class. /_____/

9. Kamal was been swimming since sunrise. /_____/

10. Kamal swimming since sunrise. /_____/

11. Kamal swims since sunrise. /_____/

12. Kamal has been swimming since sunrise. /_____/

(III) Make questions whose answers will be the following statements, use the words given in brackets to begin the questions.

1. The students like Science fiction. (What)

2. Hari has broken my glasses. (whose)

3. The children go to school by bus. (How)

SECTION C

(I) Read each sentence and decide if there is an error in any underlined part. Write the letter of the wrong part in the box. If there is no error write D. (NE stands for 'NO ERROR')

1. An object (A) normally becomes (B) hot when place it (C) in the sun. (NE) (D)

2. Ranjit and his sister are studying in same school. (NE) / /
(A) (B) (C) (D)

A.I.4

3. Balu and brother came to my house last night. (NE) /__/
   A B cD

4. She does not know anyone who works in that office. (NE) /
   A B C D

5. Why did you gave him my book? (NE) /_____/
   A B C D

6. I did not been able to pay my fees yet. (NE) /___/
   A B C D

7. It was difficult for me to hearing the speaker. (NE)
   ABCD

8. The Police complain that cyclists seldom observe

   traffic rules. (NE) /_____/
   C D

9. Mother asked to my friends why they were leaving
   A B

   so soon (NE) /_____/
   C D

10. I still do not understand that how a steam engine works.
    A B C

    (NE) /_____/
    D

11.. You will lose your purse unless you are not careful.
     A B C

     (NE) /_____/
     D

12. We searched everywhere but could not
    A B

    anywhere find the watch. (NE) /_____/
    C D

13. A friend of her told me that she has passed. (NE) /_____/
    A B C D

14. The Principal himself must sign both the copies
    A B

    of the application (NE) /_____/
    C D

15. I was sure he would join (A) this college although (B)
he did not do so. (NE) (C) (D) / /

SECTION D

(I) Select words from the list given to fill in the blanks in the sentences:

List of words:

is	what	who	although
are	when	whom	because
was	where	whose	However
were	which	that	therefore
am	while	so that	but

. He left the place early _____ he could reach home before sunrise.

2. I thought he would join the college _____ he did not do so.

3. When I telephoned him yesterday he told me _____ he returning only next week,

4. _____ are the candidates _____ are to be interviewed today?

5. He does not have the needed qualifications _____ he has been given a temporary appointment.

6. _____ the rains came late, farmers are hopeful of a good crop.

(II) Rewrite the following sentences correcting the mistakes in them.

1. He used to laughing at others.

2. How you open this gate?

3. He has left the college in 1978.
_____

4. can you tell how does it work?
_____

5. Having booking the ticket much in advance, we enjoyed a comfortable journey.

_____

_____

6. The man whom I met him yesterday is the new warden.
_____

SECTION E

Read each passage and the statements that follow it. Decide whether each statement is true or false, according to the passage, and put a /____/ or a / x / in the box.

(I) Rani asked Raju if he wished to own a scooter. He said he did not mind spending seven thousand rupees on buying one. But he could not spend two hundred rupees a month just for maintaining it.

1. Rani wants to sell a scooter for Rs. 7000/- /____/

2. Raju cannot imagine spending so much money on a scooter. / /

3. Raju can afford to pay Rs.7000/- for a scooter. /__/

4. Raju thinks that maintaining a scooter is expensive. /____/

(II) "No!" said Julie's father. "It's not right to keep a dog in a flat in the middle of a big town. Wait for a few weeks. Then we will have our own house with a garden.

5. Julie had asked her father to get a pet dog. /____/

6. Julie's father does not like pet dogs. / /

7. Julie's family were about to move to a new house. /_____/

(III) When my aunt was young there was no electricity or running water in the house. She used to walk half a mile everyday to fetch water from the village well.

8. My aunt walks half a mile everyday. /_____/

9. She does not go to the village well now. /_____/

10. She usually fetches water from the well. /_____/

(IV) We lived in Hyderabad many years ago. we were there for four years. Then my family moved to Madras, we haven't been to Hyderabad since then.

11. We are now living in Madras. /_____/

12. we used to live in Hyderabad. /_____/

13. We visited Madras from Hyderabad four years ago. /__/

14. we lived in Madras for four years before returning to Hyderabad. /_____/

15. We haven't visited Hyderabad for many years now. /_____/

SECTION F

(I) Read the passage carefully and answer the questions that follow:

The frail man wearing a jibba and dark glasses, and carrying a walking stick, was a familiar figure all over India. One day, people returning home from offices in Madras were surprised to find him walking along the road to the Centrail Railway station just like an ordinary man. There were surprised looks and excited inquiries, people asked one another, "Why is he walking in this crowd? It could be dangerous." The main they were talking about was Chakravarthi Rajagopalachari, the Chief Minister of Madras State. When Rajaji, as he was popularly and affectionately known, was asked why he was going to the station on foot, he had a simple answer. He had actually come by car. But the traffic jam near the station had forced the car to stop. He had to reach the station in time, so he had got out of the car and was walking.

In any case, he did not see any reason why he should not walk a few steps even though he was the Chief Minister of the State.

1. At what time of day did people see Rajaji walking on the road?
   (a) early in the morning (c)at about 10.00 a.m.
   (b) late at night (d)at about 5.00 p.m. /___/

2. what information supports your answer to question 1?
   (a) He was carrying a walking stick
   (b) He was wearing dark glasses.
   (c) The road near the station was crowded. /____/
   (d) People were returning home from offices.

3. There were surprised looks and excited enquiries because
   a) it was dangerous for a minister to walk in a crowd.
   b) Rajaji's train might have been delayed
   c) the Chief Minister was walking along the road /____/
   d) the crowd had forced the Chief Minister's car to stop but he was facing the situation bravely.

4. Rajaji's reason for walking to the station was that
   a) he believed in simple Gandhian principles.
   b) he thought walking would be more effective in the traffic jam.
   c) his popularity depended on being close to the common man.
   d) the crowd was hostile and he would be safer in the station. /_____/

5. "In any case, he did not see any reason why he should not walk...." This statement indicates that Rajaji felt that ministers should
   a) always walk and set an example. /_____/
   b) be prepared to walk whenever it seemed necessary.
   c) walk on the steps of buildings, not on the roads.
   d) help prevent traffic jams by not using big official cars.

6. Find the word nearest in meaning to the word in capitals which occurs in the passage.

FRAIL : a)fierce b)weak c)lmportant d)simple /___/
INQUIRIES: a)rumours b)slogans c)questions d)notices /____/
ACTUALLY : a)really b)usually c)earlier d)accidentally /_____/

APPENDIX II

CID W-l

1. Grey hound
2. School boy
3. Ink well
4. White wash
5. Pan cake
6. mouse trap
7. Ear drum
8. head light
9. birthday
10. duck pond
11. side walk
12. hot dog
13. padlock
14. mushroom
15. hard ware
16. workshop
17. Horse shoe
18. arm chair
19. base ball
20. Stairway
21. Cowboy
22. iceberg
23. North west
24. Rail road
25. Play ground
26. airplane
27. wood work
28. oat meal
29. tooth brush
30. Fare well
31. grandson
32. drawbridge
33. door mat
34. hot house
35. day break
36. sun set

*0*0*0*0*0*0*0*0*0*0*0*0*0**0*

APPENDIX III

N.U.Auditory test No:6

	List i	List II	List III	List IV
1.	Land	pick	base	pass
2.	boat	room	mess	doll
3.	pool	nice	cause	back
4.	nag	said	mop	red
5.	limb	fail	good	wash
6.	shout	south	luck	sour
7.	sub	white	walk	bone
8.	vine	keep	youth	get
9.	dime	dead	pain	wheat
10.	goose	loaf	date	thumb
11.	whip	dab	pearl	sad
12.	tough	numb	search	yearn
13.	puff	juice	ditch	wife
14.	keen	chief	talk	such
15.	death	merge	sting	neat
16.	Sell	wag	germ	peg
17.	Take	rain	life	mob
18.	fall	witch	team	gas
19.	raise	soap	lid	check
20.	third	young	pole	join
21.	gap	ton	road	lease
22.	bat	key	shall	long
23.	met	calm	late	chain
24.	Jar	tool	check	bill

Contd.

Appendix III Continued.....

	List I	List II	List III	List IV
25.	door	pike	beg	hole
26.	love	mill	gun	lean
27.	sure	hush	jug	tape
28.	knock	shack	sheep	tire
29.	choice	read	five	dip
30.	hash	rot	rush	rose
31.	lot	hate	rush	rose
32.	raid	live	void	fit
33.	hurl	book	wire	make
34.	moon	voice	half	vote
35.	page	gaze	note	judge
36.	yes	pad	when	food
37.	reach	thought	name	ripe
38.	king	bought	thin	have
39.	home	turn	tell	rough
40.	rag	chair	bar	kick
41.	which or witch	lose	mouse	lose
42.	week	bite	hire	near
43.	size	haze	cab	perch
44.	mode	match	hit	shirt
45.	bean	learn	chat	bath
46.	tip	shawl	phone	time
47.	chalk	deep	soup	hall
48.	jail	gin	dodge	mood
49.	burn	goal	size	dog
50.	Kite	far	cool	should

*0*0*0*0*0*0*0*0*0*0*

APPENDIX IV

CALIBRATION

The audiometer used, Madsen OB 70 was objectively calibrated before collecting the data, and later once weekly. It was calibrated for both the tone and speech input and the two modes of presentation - air conduction and bone conduction.

Pure tone calibration:

Pure tones were calibrated for both frequency and intensity.

Intensity Calibration:

For intensity calibration, the acoustic output of the audiometer was given to the artificial ear through the earphones (TDH-39) set in ear cushions (MX 41/AR), for air conduction mode. It was presented to the artificial mastoid via the bone conduction vibrator for bone conduction mode.

The output of the audiometer was set at 70dB HL for all the measurements via the air conducted mode and 40 dB HL for all measurements via the bone conducted mode.

Intensity calibration through earphone:

The output of the audiometer (set to read 70dB HL)

was given to the condensor microphone (B & K type 4144) of the artificial ear (B & K type 4152) through the earphones and set in ear cushion. The output of the condensor microphone was amplified by a preamplifier (type 2616) and fed to a Sound Level meter (B & K type 22O9). The values were noted against the corresponding frequencies and compared with the standard expected value (Ref+ ANSI, 1969). whenever a disparity of more than 2+5 dB was noted between the observed and expected values occured, an internal calibration was done, by adjusting the presets provided on the calibration deck of the audiometer. Thus, the output of the audiometer was maintained within 2.5 dB of the expected standards.

Intensity Calibration through bone conduction vibrator:

The audiometer output (set at 40 dB HL) was given to the artificial mastoid (B & K type 4390) through the bone conduction vibrator. The output of the artificial mastoid was fed to the SPL meter (B & K type 4152) using a suitable adaptor. The SPL reading was noted against each frequency. Internal calibration was done whenever there was a difference of more than 2.5 dB between the expected and observed values.

Frequency Calibration :

For frequency calibration, the electrical output of the audiometer was given to a frequency timer/counter (Rodart 203). The difference between the dial frequency reading and the counter frequency reading never exceeded the ANSI 1969 permissible limits i.e., + 3% of the dial reading is permissible according to ANSI 1969 standards.

Calibration for the tape input:

Calibration for the tape input was done to check for the following?

To see if there was any mismatch between the tape output and audiometer input*

To check this, electrical outputs of tones of 500 Hz, 1OOO Hz, 2000 Hz and 4OOO Hz were tape recorded separately from an audiometer (Beltone 200-c). The audiometer was checked previously to and found to be in calibration.

The recording was replayed on the tape recorder that was used in the study (Uher-Logic SG 631) and its output was given to the tape input of the clinical Audiometer Madsen 0B 70 used in the study. The output levels of the tones of 500 Hz, 1OOO Hz, 2000 Hz and

4000 Hz were found to be within + 3dB of the specified standard reference tone of 1000 Hz at 70 dB HL. All measurements were done with the same setup as in section 'Intensity Calibration'. Thus it was established that there was no impedence mismatch between the tape output and audiometer input.

To Check the tape output of the audiometer:

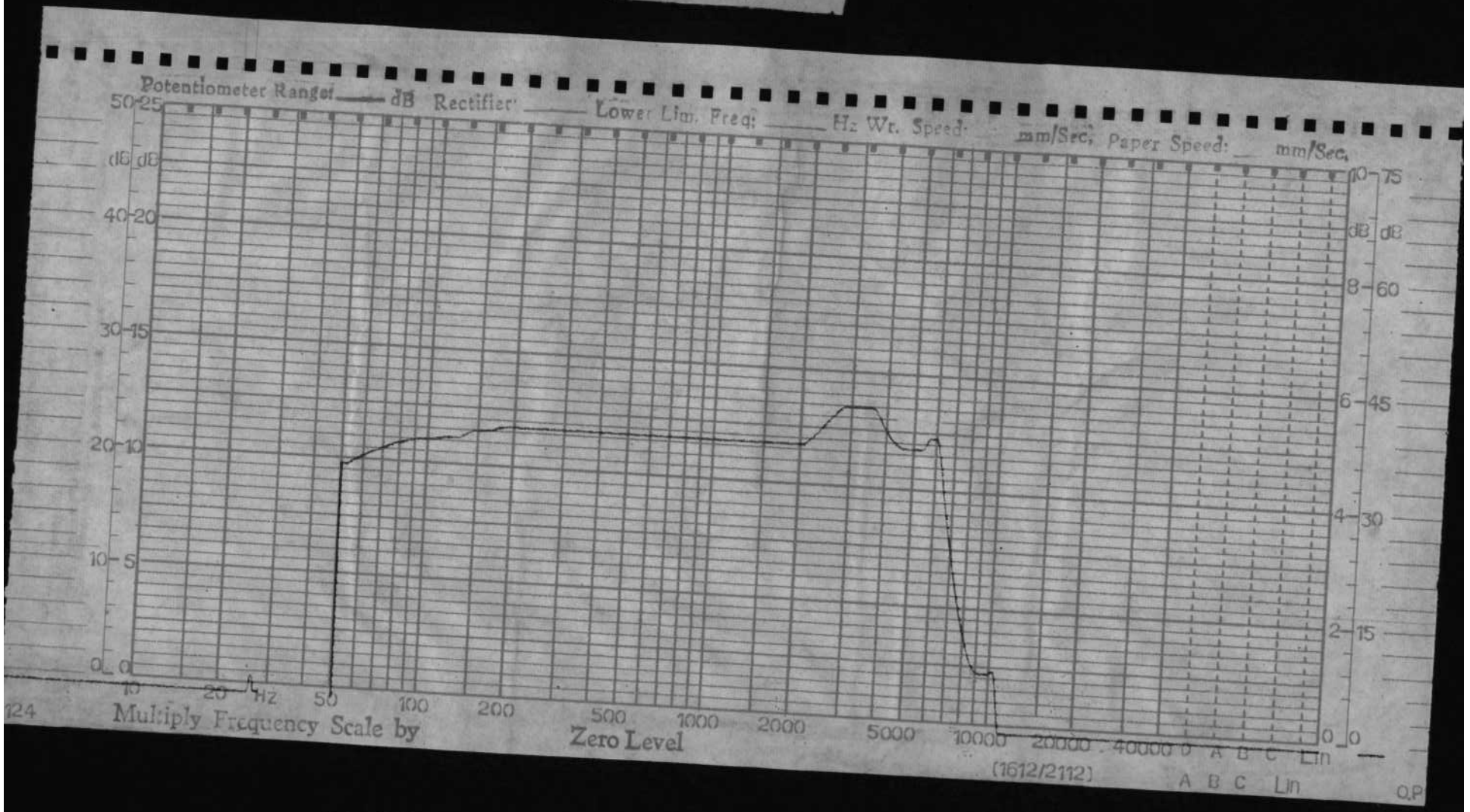
The electrical output of the speech spectrum noise was tape recorded from the same audiometer (Beltone 2OO-C). This was then replayed on the tape recorder used for data collection and its output fed to the tape input of the audiometer (Madsen OB 70). The acoustic output of the audiometer through the earphones (TDH-39) set in ear cushion (MX 41/AR) was given to a SPL meter (B & K type 4152) (procedure as described in section dealing with intensity calibration). The SPL of this output read 90 dB SPL with the audiometer dial reading at 70 dB HL which agrees with ANSI (1969) standards.

Earphone frequency response characteristics:

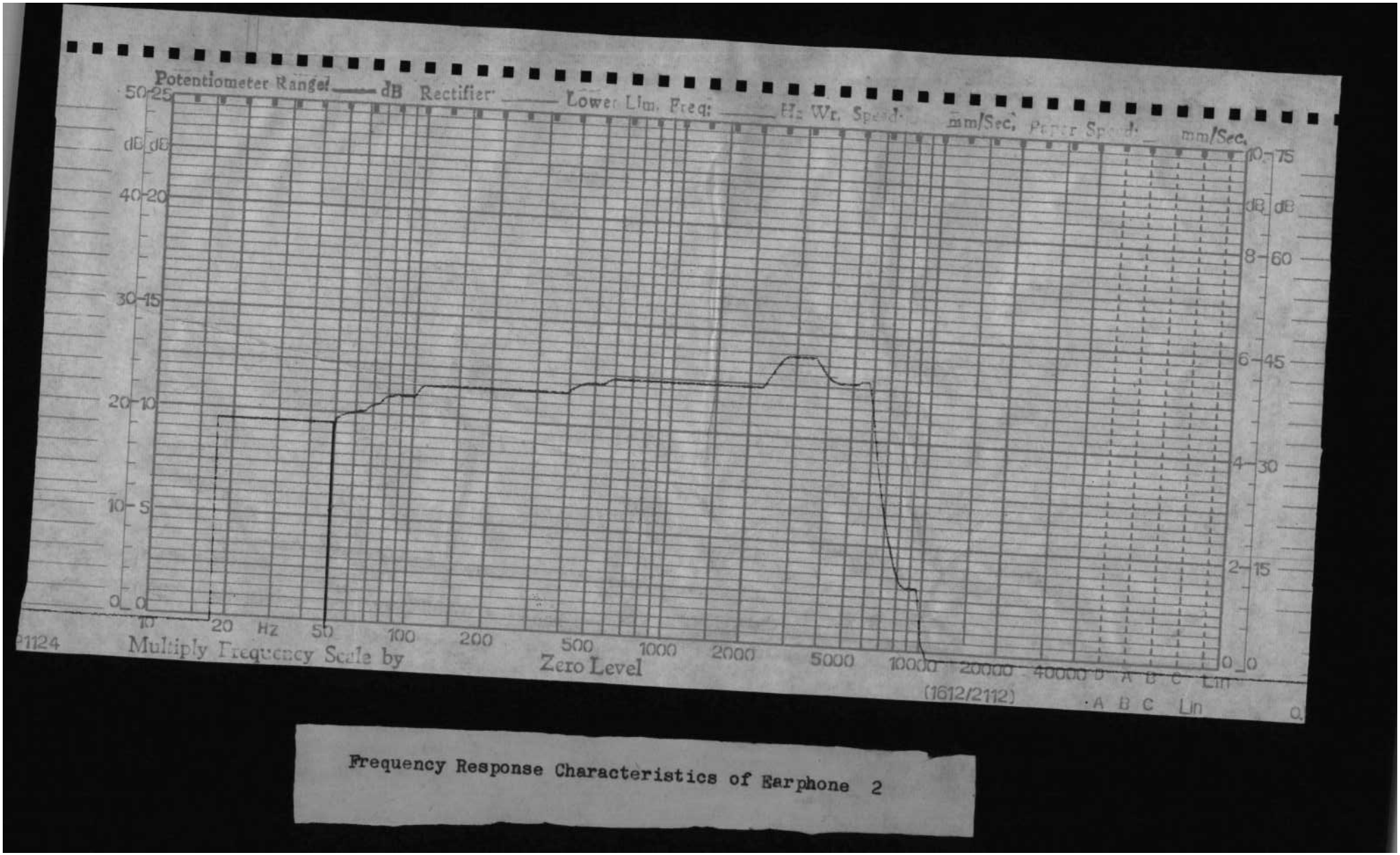
This was checked using a B & K frequency oscillator model 1022 and a level recorder, model 2305. The frequency of the puretones generated by the Madsen OB 7O

audiometer was checked previously with a frequency timer/counter (Rodart 203) and was found to be satisfactory. The electrical output of the audiometer (Madsen OB 70) was given to the earphones (TDH-39) set in ear cushions(MX 41/AR). The earphone's output was collected by a condensor microphone (B & K type 4144) connected to a pre-amplifier (B & K type 2616)+ This was given to a level recorder (B & K type 2305). The frequency response of the earphones was thus graphically recorded on the recording paper QP 1124. The frequency response characteristics of the earphone used in the study are depicted in Appendix v.

APPENDIX -V



Frequency Response Characteristics of Earphone 1



Frequency Response Characteristics of Earphone 2

APPENDIX VI

The Noise levels in the test room were as follows:

Octave Frequencies in Hz	Level in dB SPL
125	30
250	21
500	12
1000	12
2000	10
4000	10
8000	10
C-scale	33