The 3D-Language Acquisition Test (3D-LAT) And The Hard - of - Hearing

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A Dissertation submitted in part fulfilment for the Degree of M.SC (SPEECH & HEARING) to the University of Mysore

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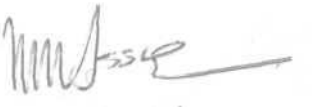
MYSORE 570006

May 1986

CERTIFICATE

This is to certify that the dissertation entitled "3D - LANGUAGE ACQUISITION TEST AND THE HARD-OF-HEARING" is the bonafide work in part fulfilment for the degree of Master of Science (Speech and Hearing), of the student with Register No. 8412



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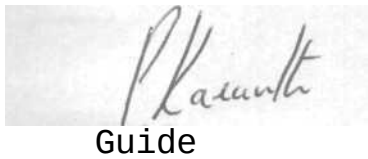
CERTIFICATE

This is to certify that this dissertation entitled: 3D-LANGUAGE ACQUISITION TEST AND THE HARD-OF-HEARING has been prepared under my supervision and guidance.



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12.5.86

DECLARATION

This dissertation entitled : 3D-LANGUAGE ACQUISITION TEST AND THE HARD-OF-HEARING, is the result of my own study under the guidance of Dr.Prathibha Karanth, Head of the Department of Speech Pathology, All India Institute of Speech and Hearing, Mysore, and has not been submitted earlier at any University for any other Diploma or Degree.

Mysore Register No. 8412

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INTRODUCTION

The territory of language seems virtually inexhaustible; language is simply too vast and multifaceted a domain to be completely represented in any single test. Every test is a map of sorts, a map which is clearly not the complete territory of language (Darley, 1979). Over the years, the emphasis in studies on language development has shifted among various aspects such as phonology, syntax, semantics, and more recently, pragmatics. Consequently, the various language tests that have been developed focus on different aspects of language. As the emphasis in the studies on language development keeps shifting, so also will the focus in the different language tests. Hence, a knowledge of the literature on language development, both in normals and in linguistically deviant populations, is essential for the speech-language pathologist.

Since the focus in the present study is on children from the hard-of-hearing population, recant studies on these children will be discussed. In addition, language tests that are standardized for this population will be reviewed briefly in the following chapter.

In general, tests are systematic procedures for observing an individual's behaviour and describing it with the help of a numerical scale or a category system. They aid in making many

kinds of decisions, including selection and classification of individuals, evaluation of educational or treatment procedures, and acceptance or rejection of scientific hypotheses.

In the field of speech and language, the Speech-language pathologist deals with language disordered children. Hence, tests are needed to assess the language of these children and to evaluate their disorders so that remedial programmes can be planned appropriately. In addition to being a clinical tool, a language test for children will help in gaining knowledge about the language acquisition, normal or linguistically deviant.

The present study:

A review of literature in this area shows a lack of tests directed at assessing the language abilities of very young children, probably because of the inherent problems in testing young children. This is even more so with language disordered children such as the hard-of-hearlng, particularly in countries like ours Where hardly any systematic study of very young hard-of-hearing children has been carried out. Hence the present study.

REVIEW OF LITERATURE

The consequences of hearing impairment in early childhood are far reaching and varied. The most devastating effect of this hearing impairment is its interference with the language acquisition process. When the hearing impairment ia congenital er acquired in as early as the first three years of life, the result is a major handicap in communication. The major area of handicap for the child is oral language, as, due to the hearing impairment, the child has little or no access to spoken language.

Until recently,much of the research on the language of hearing-impaired children has been focused on the oral language of these children. Most studies on hearing impairment and the process of language learning have used approaches such as evaluating a child's performance on an experimental language task (eg. Davis and Bladell, 1975) and, eliciting a sample of spontaneous utterances and comparing the child's production of selected structures in an unconstrained situation (eg. Goda, 1964). These studies have attempted to describe patterns of behaviour which are most characteristic of the language of the hearing-impaired, and have been conducted on groups of subjects for this purpose.

Reviewing studies, Norlin and Von Tasell (1960) have described and explained the three conclusions that have been drawn from them. These conclusions are:

1. Hearing-Impaired children make characteristic errors inthe use of oral language structure;
2. Hearing-Impaired children use the same strategies for rule-learning as normal hearing children;
3. Breakdown in rule-learning may be related to severity of hearing loss.

The information that is necessary for the identification of individual phonemes is present in specific frequencies of the acoustic speech signal. If, as a result of his or her hearing impairment, specific speech information is unavailable to a hearing-impaired child, then the child will have difficulty in learning and using the linguistic aspects within this information. A Child who has a high-frequency hearing impairment and who is exposed to English may have difficulty in learning to utilize morphological inflections such as plurals and posseasives. This is because in English, these markers constitute the fricatives /s/ and /a/ which are acoustically characterized by high—frequency noise (Norlin and Van Tasell, 1980),

Studies on the vocabulary of hearing-impaired children have indicated that these children have considerable difficulty learning individual vocabulary items, and that a reduction in the aize and complexity of their vocabulary secure in different classes of words (Young and McConnell, 1957; McGinitie, 1964; Brannon, 1968; Davis, 1974; Griswold and Commings, 1974; Walter, 1978). Accordins to Dicarlo (1964), a five-year old deaf child would probably have

a single-word vocabulary of less than twenty-five words. Griswold and Commings (1974) found that deaf children in the age range of 14 - 3 years had amaller vocabularies than normal children, and that they mainly used nouns, the other classes of wards used being modifiers, pronouns, verbs and prepositions. Results from this study and earlier studies, indicate that while hearing-impaired children exhibit restricted understanding and use of noun and verb concepts, they experience greater difficulty in the acquisition of words that are used to express relationships between other words in the context. In an explanation to this, Norlin and Van Tasell (1980) pointed out that these function words (such as prepositions, conjunctions, adjectives and articles) often do not have any apparent referrent, but they give information about relationships between people, objects or events that are expressed in the choice and order of wards used in a sentence. in other words, often the meaning of these words exists only in the context of a sentence. In addition, these words are short and unstressed, and hence, are more easily lost in the event of a hearing impairment. It is for these two reasons, according to Norlin and Tasell, that hearing-impaired children are deficient in these classes of words.

Studies on syntactic development in hearing—impaired children have suggested that the stability and complexity of their sentence structures is reduced. Besides, they show a deficiency in the usage of verbs (Presnell, 1973), Wilcox and Tobin, 1974), passive constructions (Power and Quigley, 1973), conjunctions (Wilotw,

Quigley and Montanelli, 1975), pronouns (Wilber, Montanelli and Quigley, 1976) and complements (Quigley, Wilbur and Montanelli, 1976).

If hearing-impaired children can function with an adequate balance between their innate potential for learning language and residual hearing, then the rules that they use for comprehension and formulation of oral language will be very much similar to those used by normal children. In other words, the number and complexity of the language rules that hearing-impaired children learn may be reduced by their hearing impairment, but the patterns in which they learn about phonology, syntax, semantics and pragmatics of the language they are exposed to is not altered.

Nevertheless, these children exhibit a delay in the acquisition of language. Since they utilize similar strategies for the learning and use of language rules, their language behaviour is highly similar to that of normally hearing children of younger age. Presnell (1973) stated that the deaf child will probably begin to acquire language from a year to four years behind the normally hearing child and found that hearing-impaired children do not progress at the same rate of syntactic growth in comparison with chronological age increases as do normal children.

Thus,upto a certain point, delay, rather than a deviance in the learning of oral language rules is observed in the case ease of hearing-impaired children. The point at Which this deviance or breakdown occurs and the extent of deviance depend

On, among other factors, severity of hearing impairment. As a rule, difficulty in rule-learning and severity of hearing impairment are directly related. The greater the severity of hearing impairment, the greater the difficulty in learning the rules of an oral language.

Considering the communicative potentials (pragmatics) in the hearing impaired children, it has been found that if they have difficulty in learning the structural forms of a language system, then they exhibit reduced ability to learn to use these forms in appropriate contents. Norlin and Van Tasell (1980) stated that this reduced ability may be the reason why hearing-impaired children often have problems with social perception and interaction.

Cognitive functioning in the hearing-impaired has been another area of study for several years. Research has shown that deafness might affect the development of some psychological processes rather than others. Thus, children with profound, congenital deafness may be inferior to their hearing counter-parts or those with acquired deafness, on tests measuring the psychological functions most affected, such as verbal, language and conceptual thought processes (Heider and Heider, 1941; Templin, 1950; Oleron, 1953; Myklebust, 1960b). A review of literature by Furth (1971) on concept formation in deaf children suggested that differences between deaf and hearing children in this area of cognition see often not significant when the

verbal aspects of the task are removed. Furth also stated that relatively small deficits are found in the logical seasoning of hearing-impaired children. Savage et al (1981) postulated that, in the absence of well-developed oral language skills, hearing – Unpaired children - especially those with prelingual deafness - may need to rely on abilities of a different nature in order to advance intellectually and educationally. They stressed the need for thorough investigations of the nature, structure, and measurement of cognitive functioning in the deaf and the relevance of the various components.

Language development of hearing-impaired children has also been studied as an interactive process involving their cognitive, communicative and linguistic potentials. Prutting et al (1977; 1979) found that hearing loss had not significantly altered their cognitive or communicative capacities to learn the rules of a formal language system. In their study, two-year old subjects communicated with a complete range of pragmatic functions - for example, they demonstrated the ability to command, protest, question, describe and summon using either verbal or nonverbal behavious. However, few Children used semantic relationships with words. In other words, while all the preschool subjects were communicative, few were linguistic.

Norlin and Van Tasell (1980) consider that the process of language development in children depends on the interaction between the success with Which the rules of a formal language system can

be conveyed to a learner, and, the capacity of the learner to extract the rules of the system from environmental information. Also, this process is facilitated since the three dimensions of content, form and use, which are linked to cognitive, linguistic and communicative potentials respectively, are integrated in every linguistic act. This interaction occurs because the contexts of these dimensions are embedded within one another. Due to a healing impairment, a child may not perceive information from any of these contexts, and as a result, all contexts may be affected. Since this child cannot perceive complete information from any context, he or she (unlike normal children) cannot use information from certain contexts to deal with ambiguity in another.

The studies discussed above, on the development of language in the hard-of-hearing, show a shift in focus from phonology, syntax, semantics, pragmatics, and an integration of these aspects. As mentioned in the Introduction, language tests in general have also focussed on these different aspects of language. A clinician dealing with language assessment in children needs to be aware of such developments in this area. With reference to hard-of-hearing children, some of the tests used for language assessment are discussed in the following pages.

TESTS:

Over the past few years, a number of testa have been developed to assess language acquisition in children. Tests that are standardized specifically for the hard-of-hearing children will be dealt with here, as also some of the other tests which though not standardized are being used to assess their language.

Scales of Earlv Communication Skills for Hearing Impaired Children (Moog, Jean, s., and Gears, Ann.V., 1975):-

This teat provides a means of evaluating the speech and language development of young hearing-impaired children between the ages of two and eight.

Oral communication behaviour is described based on experience with and knowledge of the child. In assessing the behaviour, three ratings are made: +, ± or -.

The test consists of four scales: Receptive Language Skills, Expressive Language Skills, Nonverbal Receptive Skills, and Non-verbal Expressive Skills. Norms are provided based on three hundred and seventy two children with hearing impairment greater than 90 dBHL.

It has been found that the test can be used only for a limited population, since the items mainly test receptive and expressive skills of the severely to profoundly hearing impaired enrolled in special classes, secondly, the children tested should

have intelligible speech. This requirement may eliminate many young deaf children from evaluation atleast on the expressive subtests.

Environmental Pre-Language Battery (EPB):
(Merrill, Charles, E., 1978):

This diagnostic and training instrument was designed for use with nonverbal or minimally verbal individuals who are functioning below or at the single word level. The primary purpose of this instrument is prescriptive. Secondly, it is used for language programme evaluation by comparing pretnerapy and posttherapy summary test scores.

There are two sections - nonverbal and verbal. The non-verbal section includes a brief history of early sound production (obtained from the parents); observation of preliminary skills including eye control, sitting behaviour, on-task behaviour, and object permaneace; observation of functional play with toys and objects; motor imitation; and assessment of receptive language, including identifying objects, understanding action verbs, identifying pictures and responsiveness to instructions. The verbal section assesses sound imitation, noun imitation, noun production, action verb production, two-word phrase imitation, and two-word phrase production.

This is not a standardized testy no normative data are reported. The authors report that it has been extensively used

with mentally retarded and language delayed individuals, with young or difficult to test children and children with visual, auditory or physical impairment. No items are included in the nonverbal section for assessing expressive language.

Environmental Language Inventory (ELI):
(MacDonald, James, 1978)

ELI is a diagnostic strategy for assessing and training of children of with a severe delay in expressive language. It is also used to measure language changes (post therapy) and to investigate early language development of normal children. It is based on analysis of the semantic - grammatical rules governing the early constructions of normally developing children. Distribution of these rules, utterance length, and intelligibility are assessed in three production modes: imitation, conversation, and free play.

No age range is specified in the inventory, and no normstive data is available. Besides, only the expressive aspect of language development is assessed.

Utah Test of Language Development:
(Mecham, Jex and Jones, 1967, 1978)

The purpose of this teat is to measure expressive and receptive verbal language skills in both normal and handicapped Children between one and a half and fourteen years of age. Items,

selected from standard sources (like Vineland Social Maturity Scale, Peabody Picture Vocabulary Teat and Stanford Binet Test), include recognizing body parts, responding to simple commands, naming common pictures and colours, repeating digits, copying geometric forms and decoding written words. They are scored as correct (+) or incorrect (-). The total score,indicating the total number of items passed, gives the chronological age (CA) equivalent of the child's language development.

This test has extremely limited norms. It gives only a general measure of language performance, which is not very useful if it is already known that there is a general problem with language and if it is necessary (So determine which aspects of language are affected.

Grammatical Analysis of Elicited Language simple Sentence Level (GAEL-S) :

This test was designed for hearing-impaired children between the ages of five and nine years; and evaluates the productive use of constructions in sixteen grammatical categories. It was standardized on orally trained children.

Test of Syntactic Abilities (TSA):

The test was designed to be both a criterion-referenced and a norm-referenced indepth diagnostic battery, appropriate for 10-19 year old hearing impaired individuals. It consists of a screening test and twenty individual paper-and-pencil tests covering nine of the major syntactic structures of English.

TESTS IN KANNADA:

Thare are no standardized language tests for the hard-of-hearing population in India.

The 'Test for Acquisition of syntax in Kannada' was developed by Vijayalakashmi (1981) to assess the acquisition of syntax in normal children. In addition, this test was administered to a sample of hard-of-hearing children (12 years and 15 years of age) with the history of delayed speech and language development to find out whether they score differently from normals. There are no norms available for the hard-of-hearing children. Only a mention has been made that this test can be applied to linguistically deviant populations of any age.

Kathyayani (1984) studied the expressive language of six-hearing-impaired children in the age range of 6-0 years. The degree of hearing loss, I.Q, duration of therapy were not considered. No norms are available. The six hearing-impaired children were compared with normals (30 in number), and with two mentally retarded children on the basis of acquisition of concepts.

A look at the tests discussed hitherto points out to the need for tests that will assess the communicative ability on the whole, of young hard-of-hearing children.

The problems in getting young children to cooperate and in conditioning them are wall known to us. Being children, the

presence of strangers in a testing situation often prevents them from exhibiting their typical communication behaviours. And often, clinicians are able to observe the children only during infrequent and short intervals, which makes it difficult for them to study their language behaviour. Due to these reasons, the interview method was used in the present study - data was collected from the parents. This method was all the more useful because the hard-of-hearing children in thestudy fell into the age range of 18 months to 36 months, a period wherein it is very difficult to test the young children directly.

Continuing along the same lines, it can be said that these difficulties can probably be overcome if a delay in language, in the absence of other contributing factors, is seen in these children. The task of early identification would become easier particularly if certain specific patterns are seen in the acquisition of language by hard-of-hearing children as compared to normals.

The issue of verbal vs nonverbal modes of testing in the ease of hard-of-hearing children emphasizes another need for the present study, Over the years, various studies have pointed out the differences in the performances of hard-of-hearing children and normal children on tests of language, intelligence, and cognition. A number of researchers consider that these differences reflect the communicative difficulties the hard-of-hearing childre encounter in the testing situation. Due to their generally low

THE CURRENT STUDY - METHODS

The aim of the current project was to study the performance of young hard-of-hearing children on the 3D-Language Acquisition Teat. The 3D-Language Acquisition Test (Geeta, H, 1986) was construct) based on the data collected by Vaidyanathan (1984). His study on language development was carried out within a pragmatic model that was given by Narasimhan(1981).

The test format, and the format of the response sheet are given in the Appendix.

Subjects:

Hard-of-hearing children ranging in age from 18 months to 36 months were selected aa the subjects of this study. The criteria for selection of the subjects was as follows:-

— Only those children having a congenital hearing impairment, or a hearing impairment acquired before She development of speech and language, were selected. The degree of heating loss ranged from moderate to profound (evaluated by screening procedures and/or freefield testing. In some cases, Brain Stem Evoked Response Audiometry was done).

- The children selected had no associated problems. If there was any history of convulsions in a child, such a child was selected only if the number of convulsions was restricted to a maximum of two attacks. In addition, only children with normal developmental motor milestones were considered for the study.

verbal language level, they will be at a disadvantage if the verbal mode of communication is adopted during testing. Consequently, the scores obtained by them on such tests become questionable. Therefore, while testing them, the nonverbal mode of communication should also be considered. Intelligence tests wherein the instructions were nonverbally communicated to the deaf Children have shown that they score within the normal range.

Hence, in the current study, data on non-verbal language behaviour of the hard-of-hearing children was also collected from the parents.

As mentioned earlier, there are very few language tests for the hard-of-hearing children as such. This is especially true in our country. As a result, tests already available are modified and used in our country. This may give rise to doubts regarding the validity of the tests used and the accuracy of the test results. Hence, the necessity to develop and use tests that are suitable to our population, culture, and needs arises. Besides the above needs, a language test for young hard-of-hearing children is needed to determine the level of their language functioning in terms of their receptive, expressive and cognitive skills - this would be useful in diagnosis as well as in therapy. In addition, such a test would be a good tool for an indepth evaluation of languge or language-related skills in a child undergoing therapy, and thus for determining to what extent therapy has been beneficial It may also be used in research studies.

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- The children selected had no associated problems. If there was any history of convulsions a child, such a child was selected only if the number of convulsions was restricted to a maximum of two attacks. In addition, only children with normal developmental motor milestones were considered for the study.

- Use of a hearing aid, if any, had to be restricted to within six months of collection of data.

Seven subjects 12 included in the study used hearing aids, but irregularly,

- No child in the study was undergoing therapy.

The subjects were children diagnosed as having bilateral moderate - profound hearing loss. These subjects were obtained at the All India Institute of Speech and Hearing, Mysore, the Institute of Speech and Hearing, Bangalore, The Government General Hospital, Madras; and at a few Speech and Hearing Camps. The mother tongue or the language used by the child was not a criterion for selection.

Children in the age range of 18 months to 36 months were evaluated for their language development along the three dimensions -that is, reception, expression and cognition, six age groups were made, with a time interval of three months between each. Five subjects were evaluated in each age group, except in the second group wherein only three subjects could be obtained. Hence the total number of subjects was 28. The different age groups and the number of children tested in each are given in Table-1 below: (Page No, 19)

Table-I:Distribution of subjects

Group	Age Range in months	Number of children	Number of Girls	Number of Boys
I	18-20	5	2	3
II	21-23	3	1	2
III	24-26	5	1	4
IV	27-29	5	3	2
V	30-92	5	4	1
VI	33-36	5	3	2
	Total	28	14	14

Information on the items of the test was obtained from the parents of each child, or from a person familiar with the child and hia or her behaviour. The chronological age of each child was noted. Wherever it was available, the exact date of birth of the child was also noted. Data collected in the case of the first few subjects pointed out a scattered pattern. Hence, data on all items of the test was collected for all the subjects.

While collecting data, the verbal and nonverbal modes of communication were considered. Our intention was to see whether the children who did not score on the verbal scale acquired items when the nonverbal mode of communication was considered.

The responses were recorded in the response sheet, the format of which, aw mentioned earlier, is given in the Appendix.

*Markings for the responses were as follows:

- When the behaviour was reported to be established : '+' (Plus)
- When the behaviour was not exhibited* '-' (minus)
- When the behaviour in question wa* partially exhibited '±' or inconsistently exhibited. (plus-minus)

On the average, the time taken for evaluation was 15-20 minutes for each child.

SCORING AND ANALYSIS:

Responses marked as '+' were scored with two points and these marked as '±' were scored with one point, while responses marked as '-' were given a score of zero. The total score obtained by each child under each dimension/(reception(R), Expression (E), and cognition (C)/ was determined. These scores were then cumulated to arrive at a total score for each age group, under each dimension. Using the latter scores, the mean and standard deviation for each age group were calculated for each of the three dimensions.

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* The same markings ware adopted for both the verbal and nonverbal modes, of communication. In the most cases, the items for the nonverbal scale are the same as those on the verbal scale, but in the nonverbal form. Examples are given for the first item on all 3 dimensions.

The scoring and analysis aa discussed above were made separately for the verbal and nonverbal modes of communication. (Here, the nonverbal mode of communication actually included use of both speech and gesture (latter to a greater extent) by the child and others).

The results and discussion of the analysis of the data collected are given in the next chapter.

RESULTS AND DISCUSSION

In the present study, information on the language development of young hard-of-hearing children in the age range of 18 months to 36 months was obtained from the parents of these children. The '3D-tanguage Acquisition Test' was used for this purpose. Information on verbal and nonverbal modes of communication was obtained.

Mean and standard deviation scores, and the coefficients of correlation were computed separately for each of the three dimensions, and for verbal and nonverbal modes of communication. Only a small sample of subjects (26) could be taken up for the study due to the difficulties encountered in getting young, hard-or hearing subjects and due to the time constraint. A comparison with the data collected on 10 normal children (Geetha, H, 1986) was made. In addition, a comparison was made considering the two modes (verbal and nonverbal) of communication in the case of the hard-of-hearing children. The results are given below:

The mean score values for subjects in the different age groups, along with the average ages, are given in Table II(A) (verbal scale) and II(B) (nonverbal scale). The mean score values for normal children in the corresponding age groups are also given for comparison.

Table-II(A): Mean scores at different ages (Verbal scale)

Hard of hearing children					Normal children			
Age Range (in months)	Average age	Mean score			Average age (in months.)	Mean Score		
		R	E	C		R	E	C
18-20	19.2	0.4	2.2	9.4	19.6	27.4	23.3	23.5
21-23	21.3	0	2.3	12.6	22.2	37.4	30.8	33.3
24-26	24.0	0	2.4	14.6	25	41.5	35.6	39.0
27-29	26.0	0	3.4	16.0	28.2	46.7	43.1	43.5
30-32	30.4	0	2.6	19.0	31.3	49.1	47.6	47.6
33-36	35.0	0	2.6	17.8	34.7	53.5	52.0	51.4

Table-II(B): Mean scotes at different ages: Non-verbal scores fox hard-of—hearing subjects va veral scores for normals.

Hard of Hearing children (Nonverbal)					Normal children (verbal)			
Age range (in Months)	Average age	Mean score R	E	C	Average age (in months)	Mean R	score E	C
18-20	19.2	12.6	6.4	9.6	19.6	27.4	23.3	23.5
21-23	21.3	14.3	9.0	12.6	22.2	37.4	30.8	33.3
24-26	24.8	17.4	10.6	14.8	25.0	41.5	35.6	39.0
27-29	28.0	16.6	15.2	17.6	28.2	46.7	43.1	43.5
30-32	30.4	22.4	17.2	22.4	31.3	49.1	47.6	47.6
33-36	35.0	19.6	16.8	21.0	34.7	53.5	52.0	51.4

The coefficient of correlation between average age and average score was also determined. This was calculated for the entire group, for all the three dimensions. In addition, the two different modes of communication were considered and the correlation values were computed for the verbal and nan-verbal scales separately. The average age and mean scores for each of the six age groups, on the verbal and nonverbal scales, were used to calculate the coefficients of correlation. These values are given in Table-III, as against the values for normal children.

Table III: Coefficient of correlation values for hard-of-hearing children, and normal children.

	Hard-of-hearinp children			Normal children			
	Whole group	R	E	C	R	E	C	(whole group)
Verbal		-0.5	0.38	0.75	0.68	0.88	0.88	
Nonver-bal scale		0-71	0.77	0.77				

Discussion:

Age Vs scores:

Verbal Scale:

- Reception: Only one subject (in the age group 18-20 months) scored two points (raw score). All the other subjects scored zero. Thus no linear relation was seen between average age and

mean scores. The graph (Fig.33 dhows a wide difference between the performance of normals and the subjects.

- Expression: (Fig.II) On this dimension, the mean scores obtained by the children of different age groups showed negligible differences. Thus, no linear relation was seen between age and scores obtained - that is, with increase in age, there was no increase in scores obtained, unlike in the case of normals where a linear relation was seen. This reflects the poor performance of hard-of-hearing Children on verbal language testing, a finding supported by many studies in literature.

- Cognition:(Fig.III): An increase in mean scoria with increase in age was seen upto Group-V(36-32 months; average age 30.4 months). A decrease in score was seen in the last group, that is Group-VI.

This could be because the later items on cognition(items 22, 23, 24, 26, 27) involve more of verbal language.

Considering all the three dimensions in the case of normals (Figs. I, II and III) it has been found that in general, with increase in age across different age groups, there is an increase in the scores obtained too (Ceetha, H, 1986).

Comparison of the scores obtained, by the hard-of-hearing children on the three dimensions showed very poor performance on the items for reception, both within the age groups and across age groups. Between expression and cognition results showed that the latter was better than the former. This again points out to

FIG. 1. PERFORMANCE OF HARD OF HEARING CHILDREN OF DIFFERENT AGE GROUPS ON RECEPTION (VERBAL SCALE) AS AGAINST PERFORMANCE OF NORMALS (VERBAL SCALE).

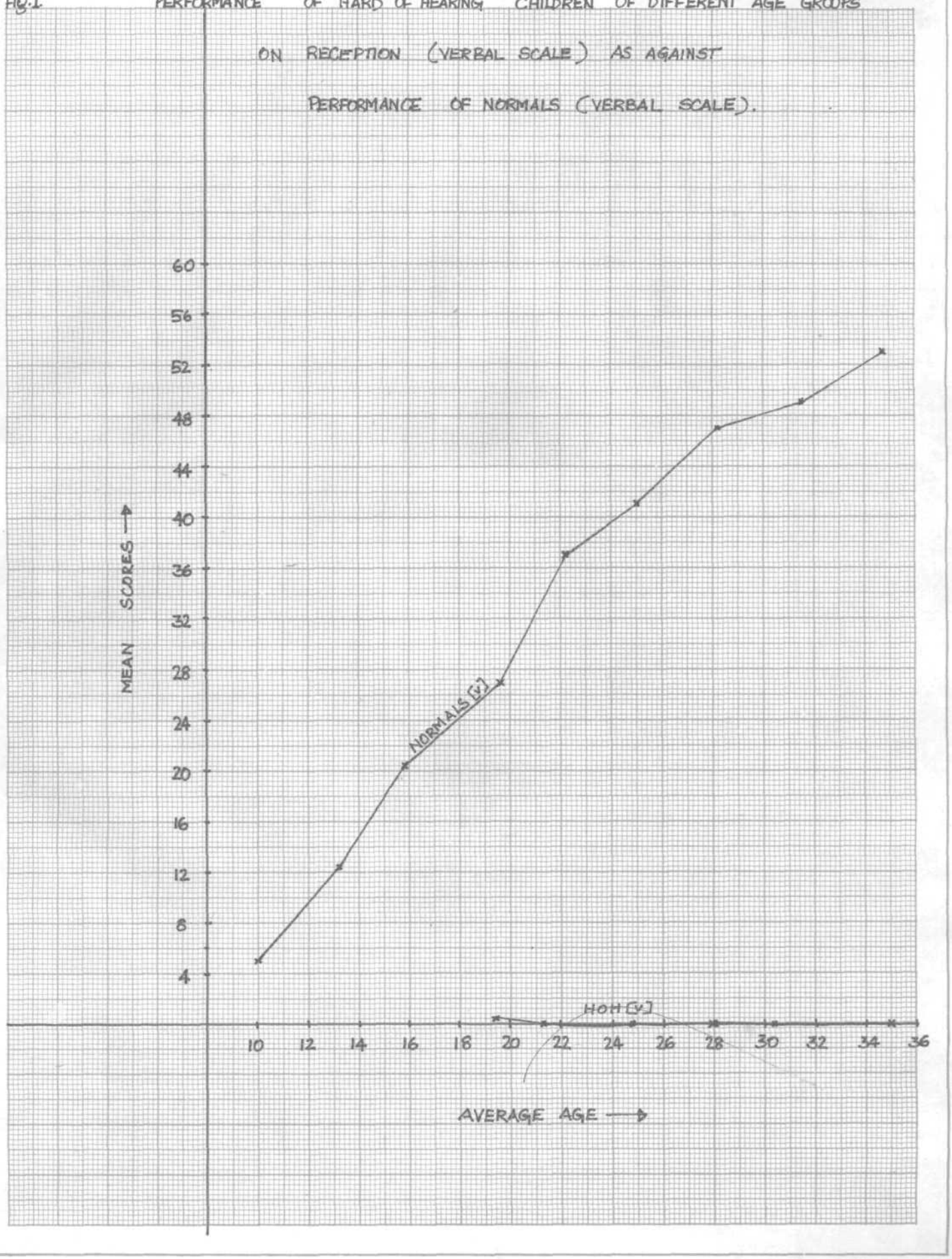


FIG. II. PERFORMANCE OF HARD OF HEARING CHILDREN OF DIFFERENT AGE GROUPS ON EXPRESSION (VERBAL SCALE) AS AGAINST PERFORMANCE OF NORMALS (VERBAL SCALE).

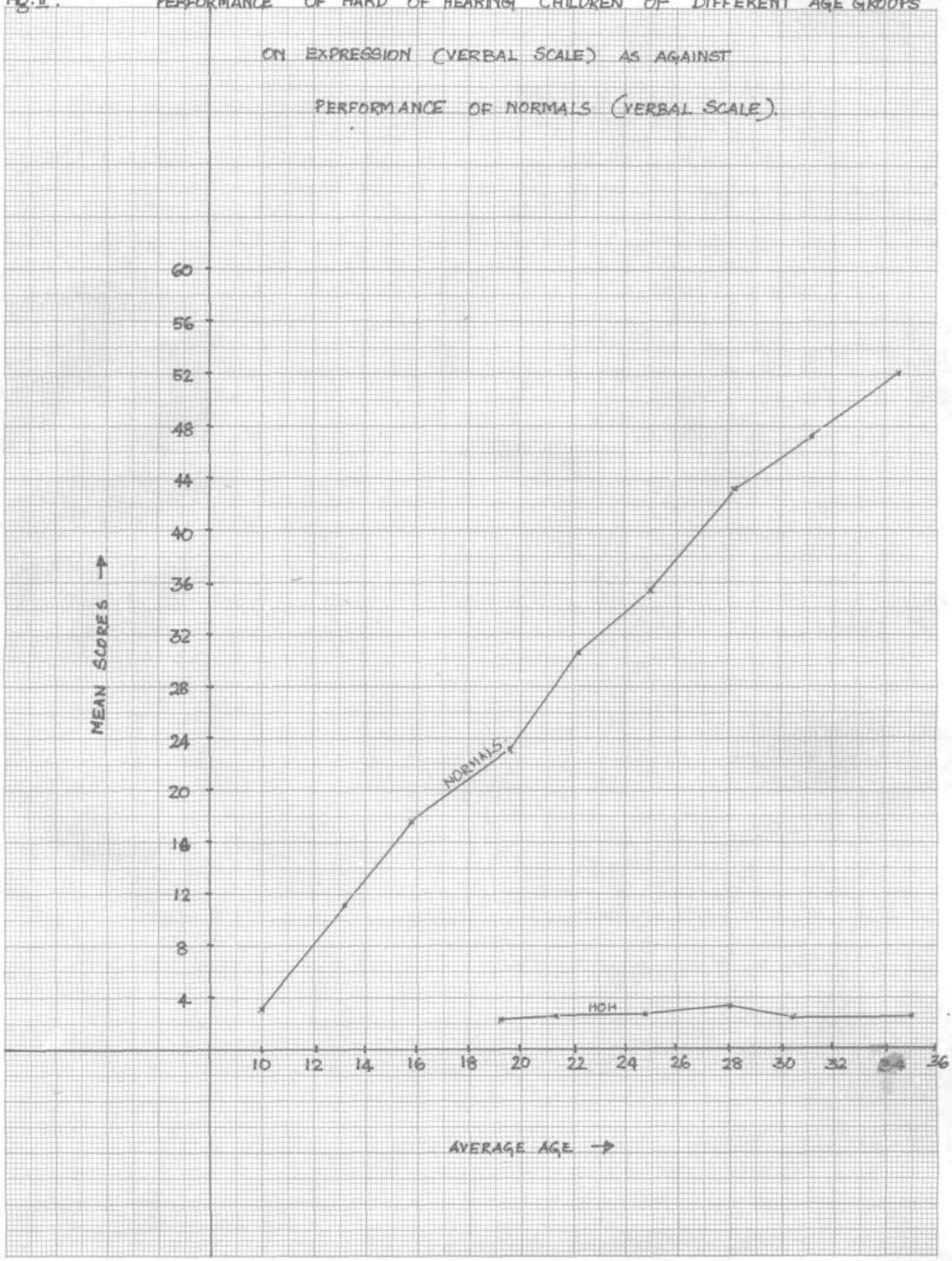
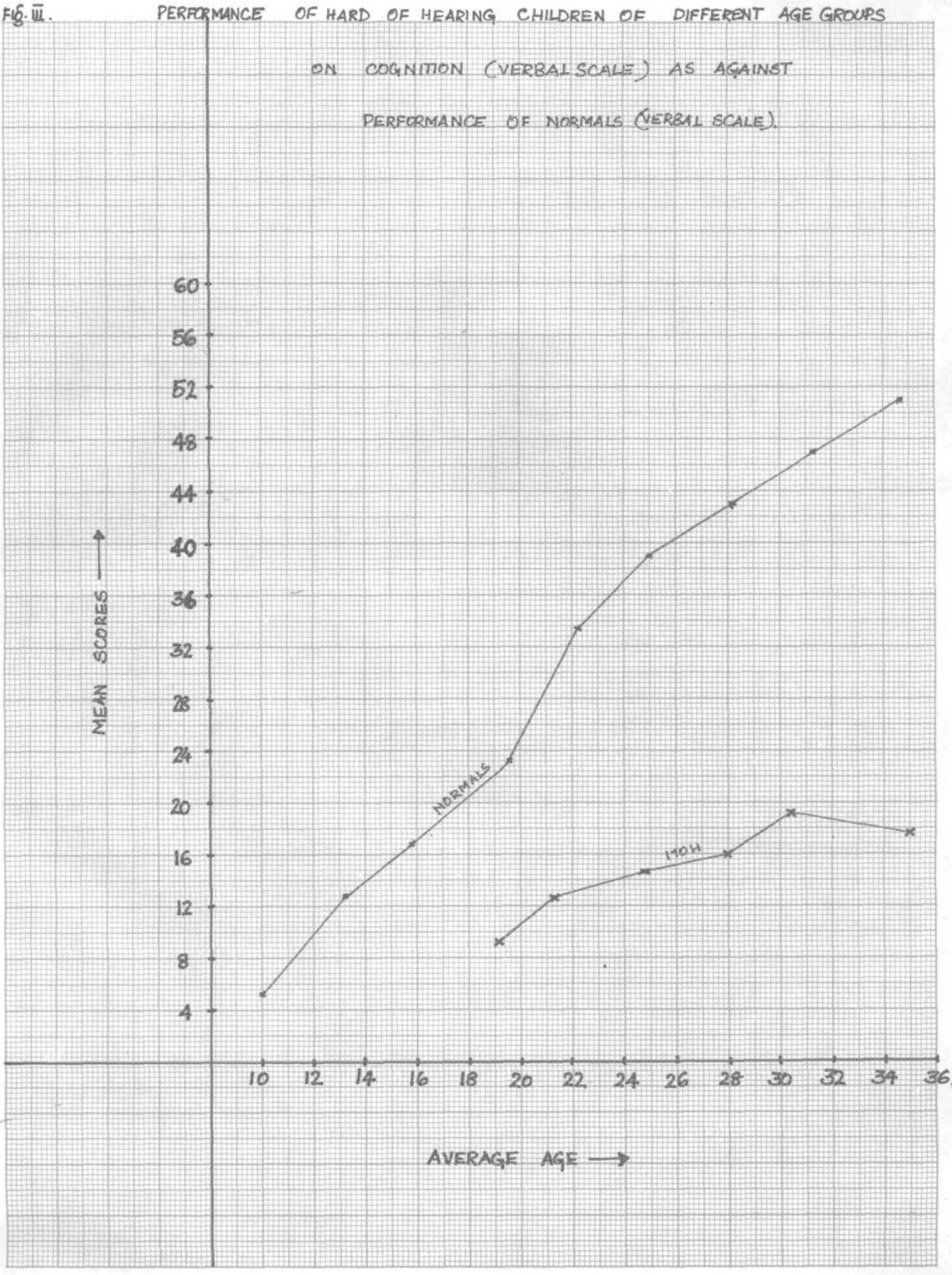


FIG. III. PERFORMANCE OF HARD OF HEARING CHILDREN OF DIFFERENT AGE GROUPS ON COGNITION (VERBAL SCALE) AS AGAINST PERFORMANCE OF NORMALS (VERBAL SCALE).



the poor performance seen when theae children are required to use the verbal mode of expression.

Standard deviation scores across the age groups on expression in the verbal mode showed a range from 0.54 to 1.81. (Corresponding values for normal children range from 1.26 to 7.79. While the higher scores in acme age groups in normals have been explained as occuring due to greater variability in the performance of subjects, the lower and more uniform scores indicated lesser variability in responses. In thecase of the hard-of—hearing children, low standard deviation scores were obtained due to lesser variability and also due to the uniformly poor responses obtained.

On the cognitive items, greater variability ia seen in general, as compared to normal children. However, as mentioned earlier, the hard-of-hearing children performed better on the cognitive dimension than on the receptive or expressive scales, supporting the notion of cognitive development free of linguistic development, at least in the early years.

NONVERBAL SCALE: (Refer to Figs. IV, V and VI)

On all three dimensions, a linear relation was seen between age and mean scores, upto Group V. In the nonverbal scale Values for Group VI showed a slight decrease.

A point that should be remembered here is the difficulties encountered in obtaining information about the nonverbal mode

FIG. IV. PERFORMANCE OF HARD OF HEARING CHILDREN OF DIFFERENT AGE GROUPS ON RECEPTION (NON VERBAL SCALE) AS AGAINST PERFORMANCE OF NORMALS (VERBAL SCALE).

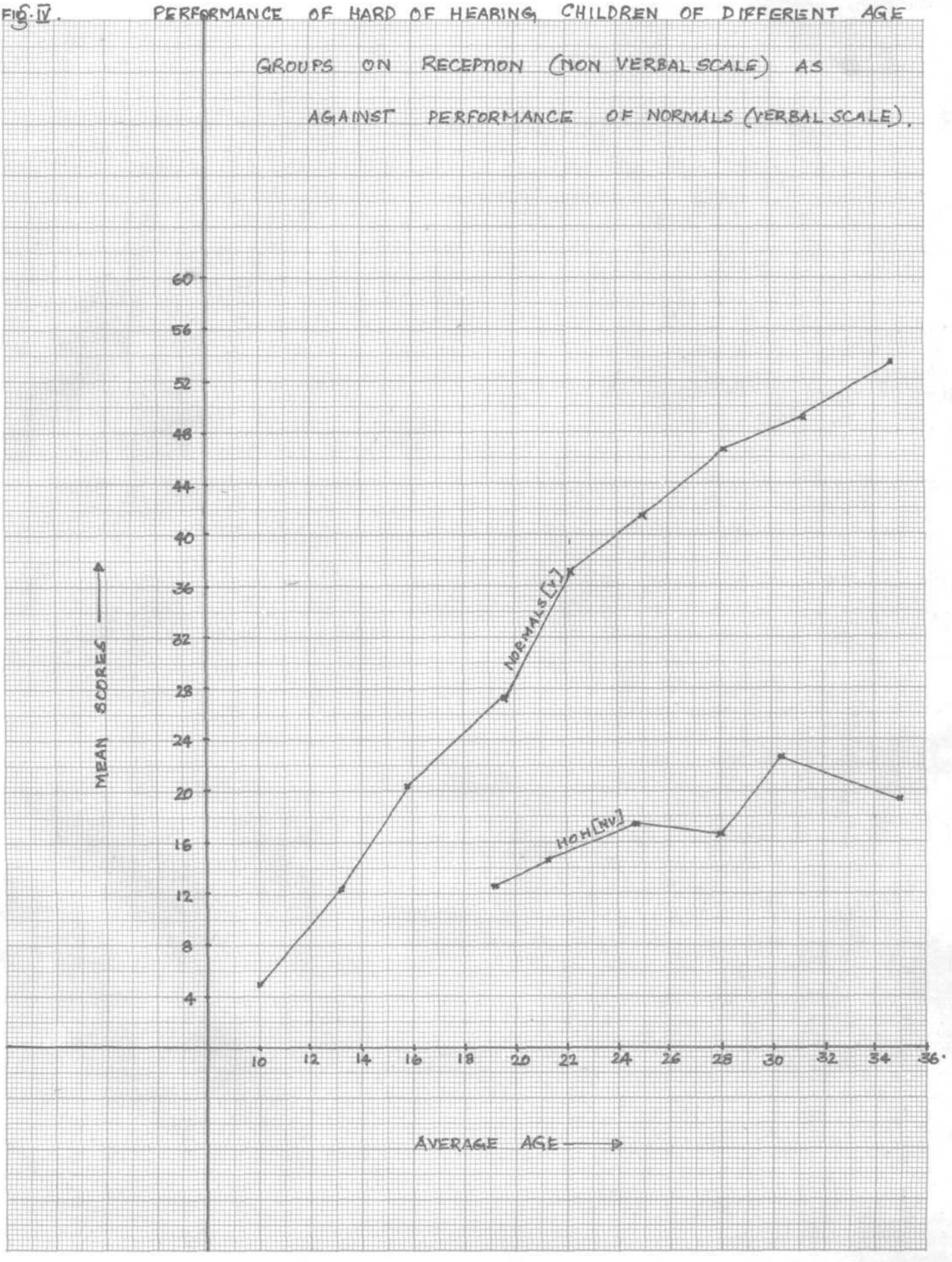


FIG. V. PERFORMANCE OF HARD OF HEARING CHILDREN OF DIFFERENT AGE GROUPS ON EXPRESSION (NON VERBAL SCALE) AS AGAINST PERFORMANCE OF NORMALS (VERBAL SCALE).

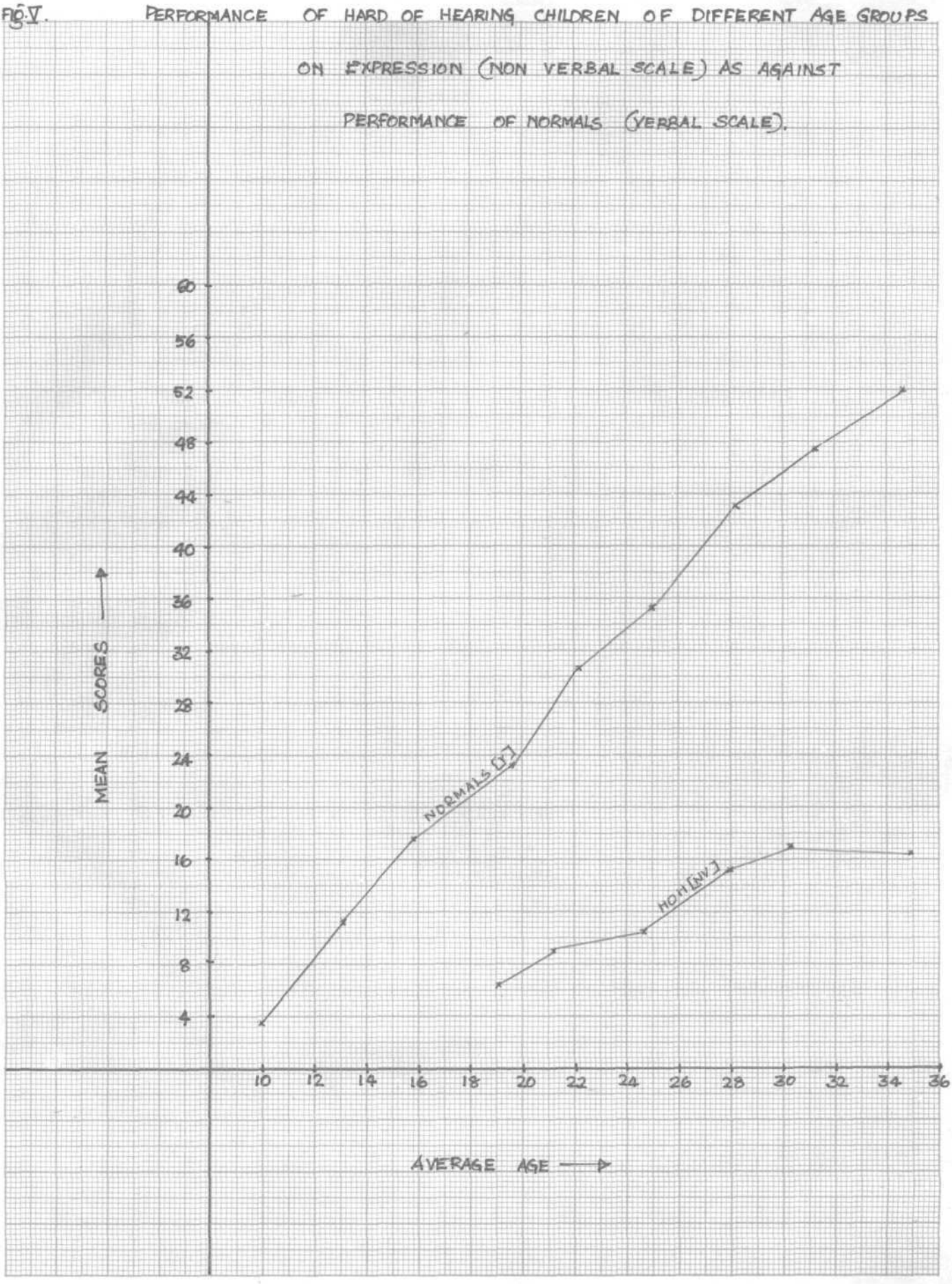
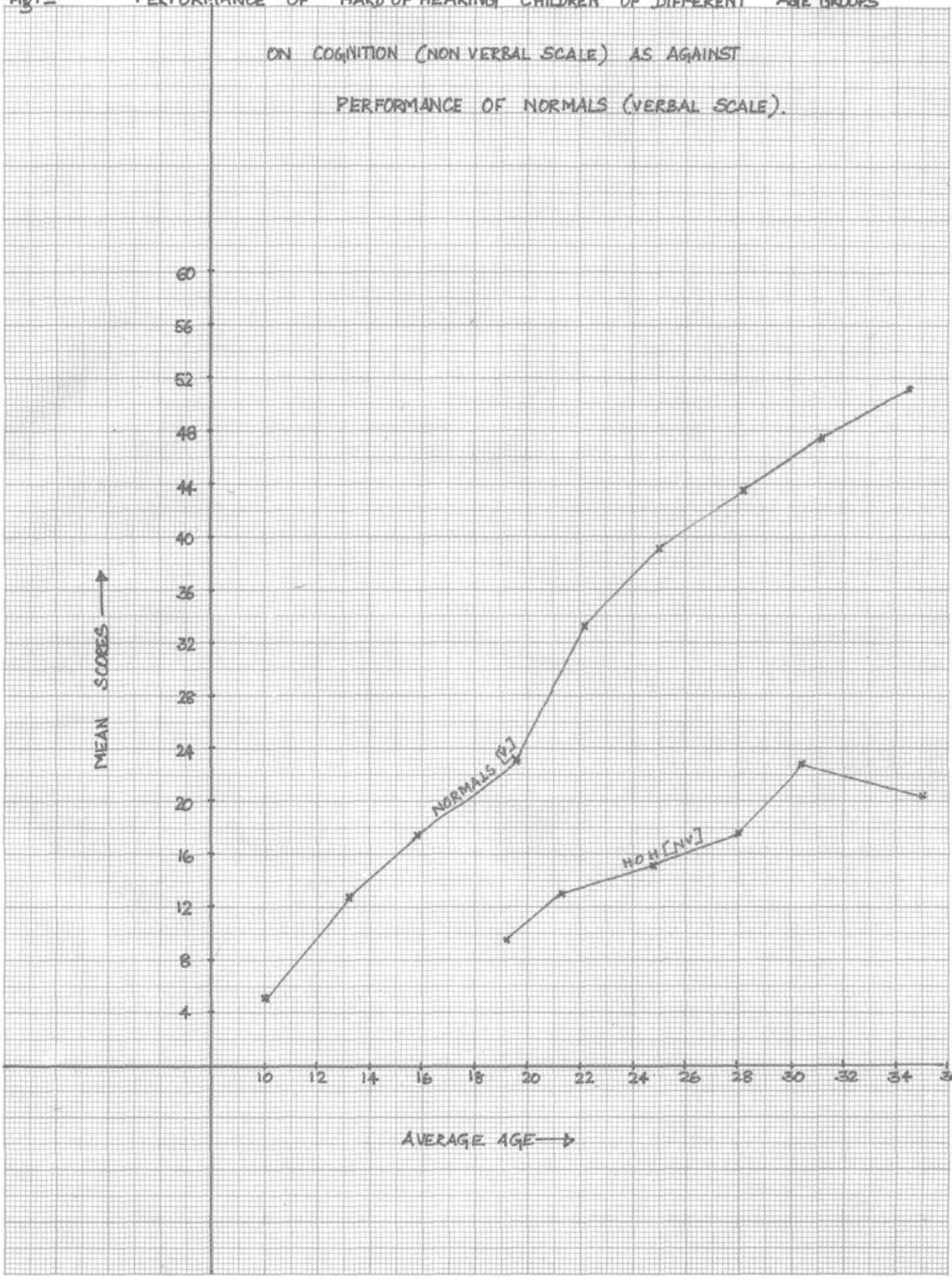


Fig. VI PERFORMANCE OF HARD OF HEARING CHILDREN OF DIFFERENT AGE GROUPS ON COGNITION (NON VERBAL SCALE) AS AGAINST PERFORMANCE OF NORMALS (VERBAL SCALE).



of communication. For example, when a question on reception, such as 'Is he able to comprehend questions on imaginary situations? (Item 25) was asked most of the parents reported that auch a question was beyond the receptive ability of the child, or that the child was too young to understand it. It was also difficult to elicit information on items such as the twenty-sixth, under expression (Does he make use of complex sentential constructions?), and the twentyseventh under cognition (Does he ask questions about language usage?). Probably, the hard-of-hearing child can communicate such information nonverbally, in some way which we are not aware of. These areas should be further explored.

When the scores on all three dimensions were compared on the basis of nonverbal performance subjects were found to perform better on the receptive and the cognitive items than on the expressive items. As mentioned earlier, scores on the verbal scale showed better cognitive development than receptive and expressive language development in the subjectas.

The wide gap in performance that waa noted when the scores of thehard-of-hearing children on the receptive and expressive items of the verbal scale were compared with normal scores was found to be largely reduced When their corresponding scores on the nonverbal scale were compared with normal scores. This can be seen on comparison of the graphs given in each case. Considering their performance on cognitive items along the same lines of

comaperison, not much variation was seen between the verbal and nonverbal modes. Performance differed only on the few cognitive items wherein verbal language was involved. While testing cognitive abilities, such items should not be included. Hence, in the present test item ?, 11, 13, 22, 23, 24, 26 and 27 under cognitive should be modified for use with the hard-of-hearing.

The above findings are important ones which need to be considered in the rehabilitation of the hard-of-hearing. Until recently, in our country, more emphasis has been laid on their verbal mode of communication only in rehabilitation and nonverbal modes of communication, generally discouraged. However in view of the fact that their cognitive development as measured by their non-verbal behaviour is close to that in normals, these alternate modes of communication should also be given due consideration.

Higher standard deviation scores were obtained on the non-verbal scale for the subjects as compared to their scores on the verbal scale. The values ranged from 4.66 to 7.09 on receptive items; from 4.27 to 7.75 on expressive items; and from 3.05 to 8.27 on cognitive items. This indicates greater variability in performance of the subjects within each age group, on the non-verbal scale, The values given above were also found to be higher than the values Obtained for normals (Geetha, H, 1986) on the verbal mode. Coefficient of correlation between average age and average scores for the whole group.

On the verbal scale, a good correlation in the positive direction was seen for cognition. A poor correlation was noted, in the positive direction, for expression. For reception, a correlation of -0.5 was obtained. For normals, a good correlation in the positive direction was seen, along all 3 dimensions (Geetha, H, 1986).

On the nonverbal scale, a good correlation was seen in the positive direction for all the three dimensions in the case of hard-of-hearing subjects. This further points out to the need for more exploration of the nonverbal language behaviour in the hard-of-hearing children.

Conclusions:

The results discussed above have shown that the twenty-eight hard-of-hearing children in the age range of 18 months - 36 months fall far behind normal children of the some age groups, especially in terms of verbal receptive and expressive language. Their performence in the nonverbal mode has been found to be much better than their performance in the verbal mode of communication. Many studies in the Western literature on language and intellectual development lend support to these findings. They should be checked out on a larger population of hard-of-hearing children in India. Also, nonverbal behaviour should be considered in their rehabilitation. Tools for assessing nonverbal behaviour

should be developed. Some of the items (such as items 2 and 7 under cognition) in the "3D-Language Acquisition Test" should be suitably modified in order to tap nonverbal behaviour. Hence further studies along these lines are essential.

SUMMARY AND CONCLUSIONS

A brief summary of the present study and the conclusions drawn are given below:

A group of twenty-eight young, hard-of-hearing children in the age range of 18 months to 36 months were studied for their performance on the "3D-Language Acquisition Test". Six age groups, with an interval of three months between each, were considered within the age range mentioned above. Five children were included as subjects in the age groups, I, III, IV, V and VI. In Group II, only three subjects could be obtained. Language development was studied under three dimensions - reception, expression and cognition. The verbal and nonverbal modes of communication (the later actually including nonverbal and verbal language) were considered. Information was collected from the parents or a close associate. The results of the study were compared with norms obtained for 90 normal children on the same test (Geetha, H 1986) Performance of subjects, on the verbal scale as against the non-verbal scale were compared too. These results are mentioned here briefly.

In the case of normals, a linear relation was seen between average age and mean scores along all the three dimensions of reception, expression and cognition (Geeta, H l966). In the present study, a definite delay in overall language acquisition by the

hard-of-hearing subjects was seen. On the verbal scale, a wide gap was seen in between the performance of subjects and of normals on the teat items. The subjects performed comparitively better on the cognitive items. On the non-verbal scale, the wide gap referred to above was found to be considerably reduced. In addition, a good correlation was seen in all the three dimensions in the positive direction, between average age and average nonverbal scores for the entire group.

These findings stress the need for further studies on language development - verbal and nonverbal of hard-of-hearing children.

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APPENDIX-A

Age 9-11 months:

Reception	Expression	Cognition
1.Does the child point to or indicate in some way when an object in named? eg.Where is the light? where is Ram? point Nonverbal: Does the child/to or indicate in some way when an object is gesturally indicated?	l.Does he point to and name father and mother sometimes? Nonverbal: Does he point to and indicate father and mother sometimes? Eg. indicating father by pointing to morestache	1.Does he engage in somewhat structured play? eg. Hide and seek; throwing/ kicking ball accompanied by much vocalization but no ver- balization. Nonverbal: Hide and seek or throwing/picking ball, with or without vocalization.
2.Does he comprehend simple commands such as "Say Bye Bye"?	2. Does he ask for desired things by pointing,stretching hand orsometimes accompanied by 'give'?	2.Does he make attempts to sing? (Vocolise tunefully?)
3.Does he mine when an action is named? Eg: How does a car.go?	3.Does he say finished to signify completion of action?(eating)	3.Is he beginning role playing with dolls with vocalization and some verbalization? Eg: getting it to sleep 'Powders its face".

Age 12-14 months

4. Does he point to named body parts?	4.Does he express need by saying 'give' or naming the object? eg bikki?	4. Is he interested in looking at picture books? Does he pretend to read verbalizing nas* words, papa,mama,etc.

5.Does he point to himself when asked such questions such as 'whose shirt is this'?	5.Does he being naming objects, animals, eatables etc.	8.Doeshe show increased activity in manipulating objects. a)Turning on the radio b)Picking up a shoulder bag and swinging it on shoulder?
6.Does he follow simple commands that require action or verbalization on his part eg. Good bye Bring (your) shoes, sings song (child says a-a-a)	6.Does he describe an event by naming the person involved along with some action? Eg. ' Daddy' + waving of hand.	6.Does he show better structured dance movements in play? Eg. Ring-a—Ring-a-Roses
Age 15 to 17 months.		
7.Does he respond appropriately to 'where' question eg.Where is mama? -taa - taa. Where is papa? - office.	7.Does he make appropriate animal and vehicle noises when asked?	7.Does he identify familiar noises by naming the individual concerned.
8.Does he understand who and what questions? eg.Who/what is this? what is in the bottle/Medicine.	8.Does he repeat when asked to repeat?	8.Does he see reflection of himself in mirror or spectacle and utter his name?
9.Does he understand instructions like 'call mummy', wash your face, bring a plate'.	9.Does he signify disappearance with one-two word utterances eg. papa gone?	9.Is he interested in using a pencil or pen for more sustained scribbling on paper/ walls?
Age 18 to 20 months		
10.Does he comprehend questions querying action of agents in pictures?(Responds either by naming the action-baby talk form-or more often by miming) eg. what is this man doing-Bathing (BT form).	10.Does he ask for objects using "where"? eg.Where ball?	10.Is he increasingly moving away from baby talk to more standard forms of vocabulary?

ll.Does he comprdiend questions concerning habitual behaviour of named agents? Responds with one word answers eg.what does mummy cook? - Chappati.	11.Does he use possessor/posse ssion relationship eg. Mummy chappal.	ll.Does he remember past event in which he was a participant and respond to queries about details? eg. where did we go yesterday?
12.Does he comprehend questions querying states (attributes) of objects .Responds with one word answers eg. How does this coffee feel? Hot.	12.Does he use more kinship terms? eg.aunt, uncle, elder sister and proper names?	12.Does he comprehend one/many distinction? Does he count 1-2-3 as a response to ' how-many'.
Age 21-23 months		
13.Does he comprehend. grammatic-ally more complex 'who' ques-tions? eg. who gave the medi-cine?	13.Does he ask questions regard-ing names of objects involved in action eg."what are you reading?"	13.Does he remember past event & respond to queries appropriately Eg.who is in the town? Younger sister.
14.Does he understand questions regarding object manipulation eg .will you comb Dartys hair.	14.Does he use future tense to describe events?	14.Does he involve in role switching games as 'mother/father? eg.Plays using toy cooking set? pretends to prepare tea/coffee for others. Pretends driving, going to office etc.
15.Does he understand when asked to say something? eg. Did you say 'Thank-You'?	15.Does he make assertive nega-tlve statements? eg. you must not do that.	15.Does he involve himself in More structured and imaginative play. eg.talks over the telephone pretends to hide things.
Age 24 to 26 months		
16.Does he comprehend questions with case markers and respond appropriately Eg.Whose is this? Ramya' s what happened to Vinod? Vinod has pain in the ear.	16.Can he initiate conversative by asking a question, draw-ing attention to something in a book? Eg. What is this? Did you see, he is wearing a cap?	16.Does he use sophisticated tools? eg. Pasting a paper, making arrow with paper.

17. Does he comprehend 'where' questions and respond using words/suffixes indicating spatial relations?
Eg.Where is he playing?
In the water. Where is the book. Onthe table.

17. Does he use past present & future tenses in sentences to describe events?

17. Does he use basic colours (blue, green)

18. Does he comprehends 'How' questions and aspect evaluating its quality. Eg. How was that? It was nice.

18. Does he use some prepositions and adverbs? Eg.up, down, behind, later, after words.

18. Does he exhibit social knowledge -knowing about holidays for people at home talks about letters, reprimands dolls etc.

Age 27 to 29 months

19. Does he comprehend 'how' question and respond giving the cause? Eg.How did you get hurt? I feel like this.

19. Does he use 'if-then' construction eg. If the eyes hurt, they will put medicine.

19. Does he involve in pretended role switching activities in an extensive way?
Eg.Mends elothes(shirt button) cleans utensils, washes clothes, involves in repair work(Hammering etc.)

20. Does he comprehend 'what are you going to do' and answer correctly? What are you going to do? I am goingto write.

26. Does he express-ability/ mobility to do something also queries this aspect of others?
Eg.Can't you do(action)?
I can't do it.. The baby is not standing.

20. Does he(or use match boxes) join blocks and make configurations like chair, table?
Or making houses on the sand?
making a train with clay?

21. Does he comprehend 'why/what for' questions and respond giving reasons? Eg. What do you want the pen for?
I am going to write.

21. Does he produce a sequence of instructions to get agent to perform a task?
Eg.I am going out.
You get up. Put on your chappals.

21. Does he imitate the mannerasim of others?
Eg.Wears spectacles like teacher.

Age 30 to 32 months

22.Does he comprehend questions of all types and respond negatively? Eg. what did you eat? Nothing. Who is there? No one. Why did you bring this? I did not bring it.

22.Does he use conversation increasingly to describe fantasized events? eg.What I go there 1 will.... when I am big....

22.Does he inhibit the concept of reasoning while making statement? Eg. Won't take bath. I am hungry, 1 want to eat. It's torn,put gun. Take umbrella. It's raining.

23.Does he comprehend 'how many' question and respond by countering? How many? - Two.

23.Does he involve himself in conversational episodes over a longer period and or with greater self assurance? eg.Child-I want sweets. Mother-When we go to the market we will buy some. C-When shall we go? M-In the evening. C-How shall we go-Bus or walk?.

23.Does he exhibit the concept of reasoning while asking responding to questions? Eg.Why don't you want that? It fell down. It is dirty It is hot. I don't want it.

24.Does he comprehend 'Why' question quering reasoning and give correct answer? why is the eye burning? You applied medicine, did not you?

24.Does he ask 'why' questions asking for reasons? eg.Why are you pouring with the pipe? Why don't you wan't this?

24.Does he talk about people in their absence?

Age 33 to 35 months

25.Is he able to comprehend questions on imaginary situations? Eg.What will you do if it rain when we go out?

25.Does he demonstrate ability to imitate dramatically others behaviour including speech? Eg.Imitating moth r scolding the child or imitating the teacher in class.

25. Does he exhibit the concepts of job and salary? Eg.If one goes to work, will give salary.

26.Does he comprehend 2 or 3 sequential verbal instructions?
eg.To write 'E' drawn one long line and then drawn 3 short lines.

Draw a circle, draw and eyes and nose.....

27.Does he comprehend descriptive statements about objects/individuals?
eg.Who stops buses and car's on the road? Who uses the stethoscope?

26.Does he make use of complex sentential constructions?
eg.What shall I do if my top gets spoilt?

27.Does he use time relationship terms such as 'Next year'

26. Does he plan about the future? Eg. Talks about schooling.

27.Does he ask questions about language usage.
eg.Asks for equivalent meanings in another language that he knows or asks for help in expressing a particular thing.

How do I say....correctly.

APPENDIX-B

Format of the response sheet used in the current study

Date of testing

Age: Date of birth Sex F/M

Father's Name.....

Age: Occupation

Mother' s name.....

Age: Occupation

Income: Language:

Problem:

Brief History of problem:

Hearing Loss MA IQ

SCORING SHEET

Age * range	item No.	R	E	c	Remarks
9-11	1.				
	2.				
	3.				
12-14	4.				
	5.				
	6.				
15-17	7.				
	8.				
	9.				

Age Range	Item No.	R.	E.	C.	Remarks
18-20	10.				
	11.				
	12.				
21-23	13.				
	14.				
	15.				
24-26	16.				
	17.				
	18.				
27-29	19.				
	20.				
	21.				
30-32	22.				
	23.				
	24.				
33-35	25.				
	26.				
	27.				

APPENDIX-C*

TABLE SAMPLE NORMS

Age (in months) when given percent of population pass items

Reception (Geetha H, 1986)

Items	25%	50%	75%	90%	100%
1	-	-	-	-	10
2	-	-	-	10	13.1
3	-	10	11.6	13.1	15.8
4	11	11.8	12.8	14	19.6
5	11	11.8	12.8	14	19.6
6	10.6	11.4	12.6	13.1	15.8
7	13.1	14	14.8	15.8	19.6
8	13.1	14.8	15.6	18.2	22.2
9	13.1	14	14.4	15.0	15.8
10	15.5	17.3	19.4	21.0	22.2
11	16.8	18.2	19.6	21.0	22.2
12	14.1	15.1	16.3	18.5	22.2
13	17.9	19.6	20.6	22.2	25.0
14	14.9	16.6	18.6	22.8	28.2
15	15.9	17.6	19.8	24.2	31.3
16	19	20.5	21.4	24.2	25
17	21.2	22.4	23	26	28.2
18	20.3	20.9	21.7	22.9	25
19	21.9	22.9	24.2	26	28.2
20	22.8	23.9	24.8	26	28.2
21	21.4	24.0	26.8	29.4	34.7
22	23.8	26.5	28.8	30.2	31.3
23	23.8	26.5	28.8	30.2	31.3
24	23.8	26.5	28.8	30.2	31.3
25	30	31.5	33.1	34.2	34.8
26	32.7	33.5	34.4	34.8	35.1
27	30	32.7	34.2	34.8	35.1

[* Note : Data given here was collected on 90 normal children in the age range of 9 months to 36 months]

EXPRESSION:

Item	25%	50%	75%	90%	100%
1	-	-	-	11.2	13.1
2	-	-	11.3	12.4	13.1
3	-	10.8	13.1	15.0	19.6
4	10.3	10.6	11.8	13.1	15.8
5	11.1	12.1	13.7	16.2	19.6
6	11.0	12.1	14.6	17.3	19.6
7	13.1	14.5	15.3	17.4	19.6
8	12.4	14.1	16.3	18.7	22.2
9	14.7	16.6	18.3	21.1	28.2
10	17.3	18.9	21.3	24.8	28.2
11	15.5	16.2	17.9	19.8	22.2
12	14.3	15.5	19.6	21.6	22.2
13	19.9	21.5	23.4	25.8	28.2
14	21.5	22.9	24.8	26.7	28.2
15	18	20.4	23.4	25.8	28.2
16	23.4	25.6	28.3	31.3	34.7
17	21.9	23.4	25.2	28.3	31.3
18	20.8	22.2	24.2	26.9	31.3
19	25.0	26.8	28.5	33.2	-
20	23.3	25.5	27.3	30.7	34.7
21	22.6	24.6	27.0	29.5	34.7
22	26.6	29.0	31	33.2	34.7
23	26.4	28.2	29.8	30.7	31.3
24	25	28.2	31.8	-	-
25	28.5	31.0	32.9	33.9	34.7
26	32.9	34.2	34.7	35.0	35.2
27	34.7	-	-	-	-

Cognition:

Items	25%	50%	75%	90%	100%
1	-	-	-	-	10
2	-	-	-	-	10
3	-	10.8	13.3	14.8	15.8
4	11	12	13	14.2	16
5	10.4	11.3	12.1	12.6	13.1
6	10.9	11.8	13.1	15.5	19.6
7	11.6	13.1	14.9	17.7	22.3
8	13.1	16.1	19.1	20.8	22.3
9	11.6	13	14.5	15.4	16
10	16.3	18	19.1	20.6	22.3
11	16.3	18	19.8	22.5	25
12	17.0	18.6	20.5	22.5	24.6
13	18.9	20.5	21.5	23.8	28.2
14	18.9	20.5	21.5	23.8	28.2
15	20.2	21.5	22.6	26.0	31.3
16	24	25.8	28.2	31.5	34.8
17	20.8	22.2	24.4	28.2	34.7
18	22.2	23.8	24.4	26.7	32
19	20.8	22.6	25.5	28.2	31.3
20	24	26.5	31.4	26	-
21	21.2	23	26.6	29.4	34.7
22	24.5	28.4	30.1	30.9	31.3
23	24.5	27.5	29.6	30.6	31.3
24	22.6	27.2	30.3	31.0	31.3
25	31.0	33.6	36.0	-	-
26	30.5	32.4	34	34.7	35.4
27	33.8	-	-	-	-