SURVEY AND ANALISIS OF COMMERCIALLY AVAILABLE SOURCESOF ACOUSTIC STIMULI IDENTIFICATION AND REHABILITATION OF HEARING HANDICAPPED CHILDREN(0-3 YEARS)

Reg.No.M9017

AN INDEPNDENT PROJECT WORK SUBMITTED AS PART FULFILMENT

FOR THE FIRST YEAR M.Sc. (SPEECH AND HEARING) TO THE MYSORE

UNIVERSITY

ALL INDIA INSTITUTE OF SPEECH AND HEARING MYSORE - 6

1991

... MY PARENTS

WHO HAVE BEEN AN EVERGREEN

SOURCE OF MY INSPIRATION -AND

STRENGTHS

CERTIFICATE

This is to certify that the Independent Project entitled: "Survey and Analysis of Commercially available sources of acoustic stimuli in identification and rehabilitation of hearing impaired children (0-3 years)" is a bonafide work, done in part fulfilment for the first year M.Sc., (Speech and Hearing) of the student with Reg.No.M 9017.

Mysore
1991

Director
All India Institute
of Speech & Hearing
Mysore-6.

CERTIFICATE

This is to certify t*hat* the Independent Project entitled: "*Survey* and analysis of commercially available sources of acoustic stimuli in identification and rehabilitation of hearing impaired children (0-3 years)" has been prepared uinder my supervision and guidance.

Mysore
1991

Dr.(Miss) S.Nikam,
GUIDE

DECLARATION

This Independent Project entitled: "Survey and analysis of commercially available sources of acoustic stimuli in identification and rehabilitation of hearing impaired children (0-3 years)" is the result of my own study under the guidance of Dr. (Miss) S.Nikam, Prof, and Head of the Department of Audiology, All India Institute of Speech and Hearing, Mysore, and has not been submitted earlier at any other University for any other Diploma or Degree,

Mysore. Reg.No.M9017

1991

ACKNOWLEDGEMENTS

My sincere thanks go to my guide Dr. S. Nikam, Prof. and HOD, Department of Audiology, AIISH, Mysore without whose guidance this project would not have been complete.

My thanks are due to the Dr. S. Nikam,Director, AIISH, for Permitting me to carry out this project.

I am greatly indebted to my subjects and their parents for their kind cooperation during the study.

I'd also like to thank all those toy manufacturing companies who promptly sent us their catalogues.

I am greatly indebted to Mrs. Roopa Nagarajan, Mrs. Hemalatha and Ms.Manjula for their infatigable gaidance.

I'd also like to thank Mr.Vidyasagar, Lecturer in Clinical Psychology, AIISH, and Mr.Basaviah, Reader, Department of Maths, RCE, without whose assistance numerals in this project would not be available.

My heartfelt thanks are due to Mr.Antony Thomas, Lecturer in Clinical Psychology, AIISH for heightening my spirits whenever I felt low and for every steadying my wavering moods.

I highly appreciate the in timely assistance and support rendered by my classmates and friends Ms.Jaya, Sheila, Manju and others.

My sincere thanks to Mrs.Rajalakshmi without whose nimble fingers, this project could not have been typed, in so short a time.

TABLE OF CONTENTS

PAGE. NO

LIST OF TABLES AND FIGURES

PROLOGUE

Hearing is the most expedient basis for normal language acquisition and language is the key-stone of our modern society.

The ability to speech and our most precious gift of language is unique to man. He has paved way for his supremacy ia this vast universe of creatures because of his rich faculty of speech, enabling him to speak, listen and exchange thoughts and ideas. If man was a contestant in the "all creatures Olympics" he would noteven earn a bronze medal. But if there was an oration contest, he would be the only winner cun,participant.

Normal language acquisition in a child requires adequate sensory input with rich and abundant speech stimulation and adequate processing abilities. Hindrance to any one of these leads to hindrance of normal language acquisition. By and far the commonest cause of any delay in speech and language. is an impairment in the organ of hearing which Impede the infant from hearing words. sentences and other environmental sounds.

Hearing impairment in a child restricts the attainment of his best potentials for language, constrains his personal

development. gives rise to aberrant emotional behaviour and culminates in poor educational achievement. This is because there exists a critical period for the development of language function and a deprivation of auditory input would impede the acquisition of almost all aspects of language (young and McConnel, 1957; strong, 1958; Nannally and Bleurton, 1960) Cooper, 1967; and Ouigley, et al, 1974) .

This emphasis the need for early identification of hearing loss, so that its adverse effects may be contained to a certain degree through rehabilitation and we can help him to develop to his fullest in the society. To give him every opportunity to achieve this. an accurate diagnosis and identification of his problem is imperative.

In the recent past, number of tests have been developed for the diagnosis of hearing loss such as-

Behavioural observation audiometry: which includes tests such as screening test for children (Downs and sterrn, 1964; Awakening test (wedenberg, 1956; Localisation audiometry (northern and Downs, 1967)

According to Northern and Downs (1967) the different responses that are observable are -

a) Eyeblink/eyelid activity including -

1) Definite eyeblink; (2) Fluttering of eyes; (3) Contraction of eye, and eyebrows.

b)Moro's reflex- Violent startle reaction, jerking of the entire body, shaking or shouldering of arms and legs.

c) Cessation of activity: Marked quietening of cry and arm . or limb movements. Range of response varies from
- stopping cry momentarily
- stopping of playing

d) Limb movement may occur in response to a duditory stimulus.

e) Head turning towards or away from sound. Head turn may be direct toward either side. or stretching of neck. raising of head upwards.

f) Grimacing

g) Sucking rate increases in response to acoustic stimulus.

h) Arousal from sleep

i) Change in breathing patterns as a response to the stimulus.

j) Widening of eyes.

Conditioned audiometry: for the slightly older child such as - Play audiometry -Barr, 1965; Visual reinforcement audiometry (VRA) - Liden and Kankkonen, 1961; Peek-a-boo-Audiometry - Vander Host and Kuypey, 1969, Picture in the window ideatificatioa test - Houg, Beccaro and Guilford, 1967; Peep show audiometry - Dix and Hallpike, 1947; story telling test - Millar, 1963; Fairy tale audiometry in children - Lesak, 1970; Tangible reinforcement operant conditioning audiometry - (TROCA) Spgadlin and Llyod, 1968.

Other objective and electrophysiological measures of hearing acuity in a child include : Electrodermal response audiometry? Electrocochleography: Brain stem evoked response audiometry (BSERA)? Respiratory audiometry; Middle latency responses (MLR); Cardiac audiometry, etc.

These are some of the innumerable ways available to us for the purpose of screening the young child (0-3 years). Most of these require expensive and cumbersome instruments and in a country like ours financial constraints, non-availability of instruments and personnel make these objectives, indispensable. As a result, many children go unidentified and are deprived of rehabilitation at an earliest age. So an inexpensive and economical screening strategy should be adopted.

Noise makers have been found useful in identifying deafness in the paediatric population (Fulgrath, 1971; and Barr, 1955). Noise makers seem to be the most accessible tool to test hearing loss in children. They may be used to

1) cover wide range of frequency
2) cover wide range of intensity
3) not provide any visual cues.

Many a time, it becomes incongruently difficult for us to extend our facilities to the rural masses and even some

strata of the urban masses where audiologists are not available. Hence the present study was carried out to aid in the selection of commercially available noise Makers or play materials, in identification of the hearing impaired children. These can be used by parents and Anganwadi workers in areas that are incapacitated to avail the facilities of experts to identify the hearing impaired child.

Rehabilitation follows once the child is identified and fitted with a hearing aid. How can simple play materials be used effectively by parents and other non-professional workers to rehabilitate the hearing impaired child? A few suggestions for the same have been included here.

SURVEY And CLASSIFICATION OF THE COMMERCIALLY AVAILABLE PLAY MATERIALS

Toys are an outlet to creativity and imagination. They help enhance his personal growth and develop his motor and perceptual abilities. A survey of these was performed by procuring catalogues from different manufacturers all over India. An analysis of these catalogues was done and the following criteria were chosen for their classification.

1) **Spectral quality of the acoustic stimuli**: The spectra of the toys cover wide range of frequency and intensity. Its classification may be based on its frequency as high (above 2000 Hz). mid or speech frequencies (50O-20OOHz) and low frequencies (Less than 500 H_z) and on intensity of acoustic stimuli as soft (less than 50 ds SPL) or loud (greater than 50 dB SPL).

2) **Musical/non-musical** quality of acoustic stimuli produced by the play material. Musical toys are those toys that produce a melodious and harmonious pitch and quality. A number of such musical toys available in the market today are toy xylophone,musical baby, etc.

3) **Age of the child.t**he preference of play materials varies with age of the child. A child of 0-1 year prefers to play

with rattles, teethers etc. which he can grasp in his hand and move. A 1-2 year old child prefers to play with manipulatable and movable toys like pull along toys etc. At 3-6 years age child becomes interested in competitive games, engineering toys which require construction and imagination.

4) **Utility of play Material**. Play materials may be used for mere play and fun or may be used to enhance his *motor* perceptual/visual coordination. The latter may be called developmental toys eg. building blocks, educational toys etc.

5) **Electrical or non-electrical toys.** Electrical toys are those toys that are actuated by electricity when the power source may be alternate current or direct current. Many battery operated toys are available such as battery operated vehicles. crying baby and alternate current (AC) operated musical piano,

6) **Materials with which the toys are constructed**. The spectral quality of acoustic stimuli varies with materials of its construction eg. Wooden toys produce low frequency noise and damp other frequencies while metallic toys produce noise of high frequency.

7) **Quality of play material** may be based on its durability, size , shape, attractiveness, mobile or immobile, replacable components available or not etc.

8) Manufacturing companies of these sources of acoustic stimuli. A number of such companies have come up in the recent past. Such as Leo, Funskool, etc.

9) Cost of toys varies depending on its quality, durability, material etc.

10) Special toys are a special mention for special children as modified toys for the cerebral palsied child *or for* the mentally retarded child. Eg. Large toys fitted on wheel chairs that are easily manipulatable by the cerebral palsied child.

METHODOLOGY

The study was carried out in two stages.

Stage-1: Evaluation of the effectiveness of commercially available sources of acoustic stimuli 1B identification of hearing impaired children.

Stage-2: Selection of appropriate commercially available sources of acoustic stimuli for identification and rehabilitation of the hearing impaired children and brief guidelines on the same.

Stage-1:

Subjects: Ten hearing inpaired children, whose hearing thresholds ranged from 60-90 dB HL when tested in free field condition.

Equipment: The following equipment were used in the study.

1) A computerised real time analyzer (FONIX 6500)
2) A diagnostic audiometer with provision for free field testing (Madsen OB 822)
3) Commercially available sources of acoustic stimuli.

Test environment: The test environment was isolated and sound treated. The ambient noise levels in the test room were within permissible limits of less than 2o dB (A) (IS.1977).

A COMPUTERIZED REAL TIME ANALYZER (FONIX 6500)

NOISE MAKING PLAY MATERIALS USED IN THE STUDY.

Procedure: A survey of commercially available sources of acoustic stimuli was performed by obtaining catalogues from manufacturers all over India. Bases on this, these sources of acoustic stimuli were classified broadly.

Due to time constraints in procuring these materials, 20 of them were chosen according to their avail ability. Spectral analysis was carried out for the play materials using a computerised real time analyser. Presentation of the source of acoustic stimuli was one meter away from microphone. A print out of the spectra was obtained. Among the twenty play Materials taken, ten were chosen in low, mid and high frequency range having peak intensities between 60-90 dB SPL. (Table-1).

S.NO-	Peak frequency (in Hz)	Peak intensity (in dB SPL)
1.	500	72.2
2.	1000	72.00
3.	2000	72.7
4.	2600	66.6
5.	2900	79.2
6.	3500	77.9
7.	4200	62.9
8.	6700	69.2
9.	7400	60.0
10.	7700	66.6

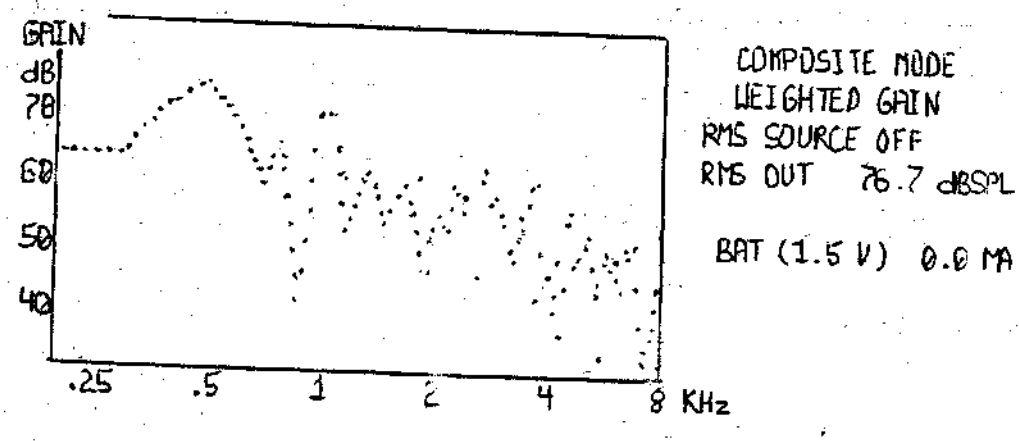
Table-1: Showing Spectra of different play materials used for the study.

Fig 1

Toy-1:

Peak Frequency 500 Hz

Peak Intensity - 72.2 dB SPL



FREQ Hz	GAIN dB	FREQ Hz	GAIN dB	FREQ Hz	GAIN dB	FREQ Hz	GAIN dB	FREQ Hz	GAIN dB
200	61.9	2000	53.4	3800	44.9	5600	51.0	7400	46.7
300	62.7	2100	55.5	3900	56.7	5700	41.7	7500	41.5
400	68.9	2200	54.2	4000	46.9	5800	50.5	7600	42.2
500	72.2	2300	59.1	4100	46.2	5900	48.9	7700	47.2
600	68.0	2400	58.2	4200	43.1	6000	58.4	7800	45.4
700	59.1	2500	52.0	4300	40.6	6100	52.3	7900	46.0
800	64.6	2600	34.3	4400	46.6	6200	45.4	8000	48.6
900	43.6	2700	60.8	4500	55.1	6300	44.2		

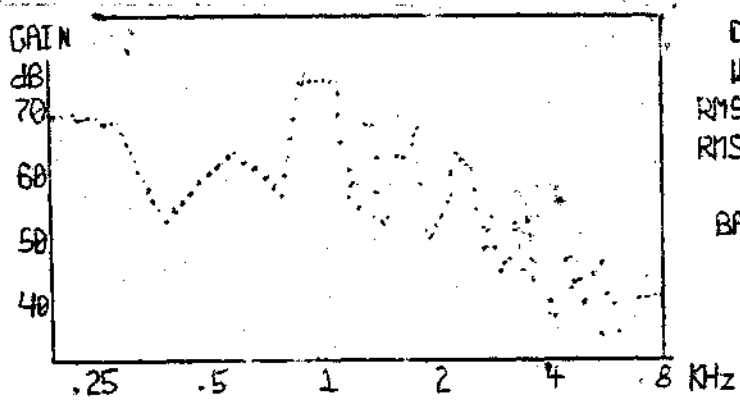
1000	67.6	2800	61.4	4600	56.1	6400	46.5
1100	68.1	2900	57.2	4700	48.9	6500	50.3
1200	63.2	3000	58.2	4800	50.8	6600	53.7
1300	59.8	3100	54.4	4900	44.6	6700	52.0
1400	61.2	3200	52.8	5000	52.8	6800	50.7
1500	53.9	3300	49.4	5100	52.3	6900	43.2
1600	56.3	3400	56.6	5200	49.8	7000	42.2
1700	59.5	3500	54.1	5300	46.8	7100	36.5
1800	53.5	3600	59.6	5400	37.5	7200	48.6
1900	47.9	3700	59.3	5500	45.6	7300	52.4

Fig 2

Toy-2:

Peak Frequency - 1000 Hz

Peak Intensity - 71 dB SPL



COMPOSITE MODE
WEIGHTED GAIN
RMS SOURCE OFF
RMS OUT: 78.1 dBSPL

BAT (1.5 V) 0.0 MA

FREQ Hz	GAIN dB	FREQ Hz	GAIN dB	FREQ Hz	GAIN dB	FREQ Hz	GAIN dB	FREQ Hz	GAIN dB
200	62.4	2000	51.0	3800	36.4	5600	43.3	7400	37.2
300	66.2	2100	[illegible]	3900	37.2	5700	24.9	7500	43.0
400	53.2	2200	56.0	4000	41.2	5800	35.0	7600	36.4
500	58.4	2300	61.9	4100	42.3	5900	42.4	7700	42.9
600	62.1	2400	61.2	4200	39.0	6000	42.3	7800	46.5
700	59.6	2500	59.6	4300	34.6	6100	42.3	7900	45.0
800	56.7	2600	54.7	4400	42.8	6200	42.8	8000	43.5
900	71.1	2700	49.6	4500	42.9	6300	31.1		

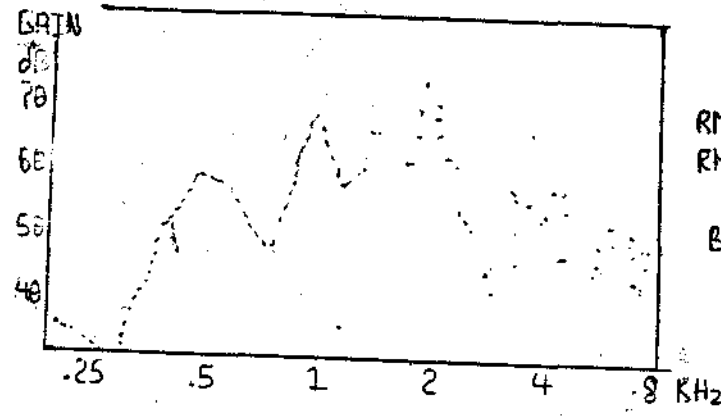
1000	71.0	2800	50.5	4600	44.6	6400	38.1
1100	70.8	2900	53.7	4700	44.9	6500	33.1
1200	56.0	3000	46.5	4800	44.9	6600	33.1
1300	66.0	3100	42.3	4900	42.5	6700	42.3
1400	65.3	3200	50.8	5000	46.3	6800	45.8
1500	48.9	3300	52.5	5100	49.5	6900	42.4
1600	61.6	3400	46.6	5200	45.8	7000	40.2
1700	62.7	3500	55.1	5300	40.9	7100	43.0
1800	64.8	3600	48.1	5400	38.6	7200	41.6
1900	51.3	3700	45.0	5500	47.3	7300	38.3

Fig 3

Toy-3:

Peak Frequency - 2000 Hz

Peak Intensity -72.7 dB SPL



COMPOSITE MODE
WEIGHTED GAIN
RMS SOURCE OFF
RMS OUT 27.5 dBSPL

BAT (1.5 V) 0.0 MA

FREQ Hz	GAIN dB	FREQ Hz	GAIN dB	FREQ Hz	GAIN dB	FREQ Hz	GAIN dB	FREQ Hz	GAIN dB
200	39.9	2000	72.7	3800	55.3	5600	47.7	7400	55.5
300	34.3	2100	66.9	3900	52.0	5700	41.5	7500	49.5
400	51.0	2200	61.6	4000	48.0	5800	50.3	7600	48.2
500	59.2	2300	60.7	4100	46.1	5900	52.8	7700	58.2
600	57.2	2400	54.6	4200	52.5	6000	53.4	7800	53.7
700	50.8	2500	53.1	4300	51.8	6100	48.3	7900	45.1
800	48.6	2600	52.3	4400	48.4	6200	43.9	8000	49.9
900	59.1	2700	52.9	4500	56.8	6300	39.2		

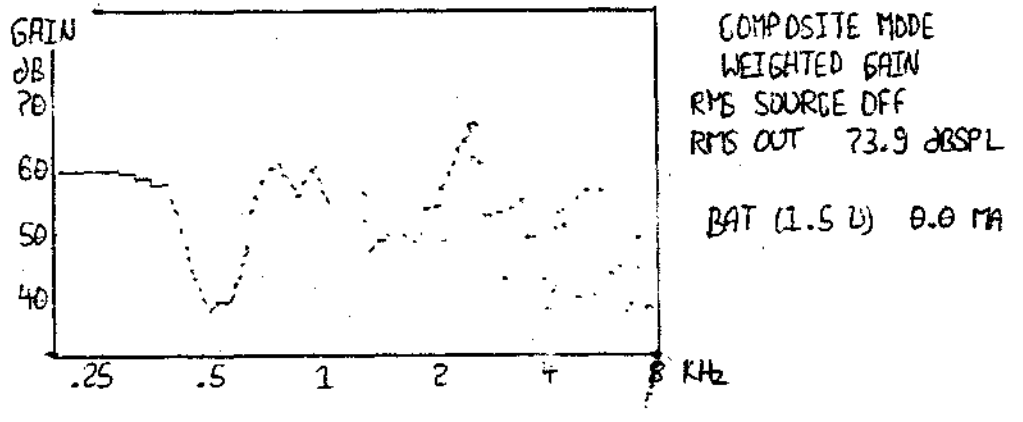
1000	67.8	2800	56.3	4600	54.7	6400	14.8
1100	58.6	2900	37.2	4700	52.6	6500	43.6
1200	57.2	3000	49.5	4800	52.5	6600	41.3
1300	59.6	3100	52.3	4900	54.4	6700	51.7
1400	64.8	3200	57.7	5000	57.6	6800	62.3
1500	64.6	3300	56.3	5100	49.1	6900	63.0
1600	55.6	3400	48.6	5200	43.7	7000	45.1
1700	60.0	3500	52.0	5300	46.1	7100	42.4
1800	68.3	3600	58.9	5400	47.4	7200	51.3
1900	82.4	3700	64.6	5500	51.0	7300	56.8

Fig 4

Toy-4:

Peak Frequency - 2600 Hz

Peak Intensity - 66.6 SB SPL



FREQ Hz	GAIN dB	FREQ Hz	GAIN dB	FREQ Hz	GAIN dB	FREQ Hz	GAIN dB	FREQ Hz	GAIN dB
200	59.3	2000	54.4	3000	41.4	5600	45.5	7400	40.6
300	58.9	2100	54.2	3900	45.2	5700	51.8	7500	41.2
400	52.7	2200	56.8	4000	53.3	5800	56.7	7600	61.2
500	40.6	2300	58.4	4100	52.8	5900	54.9	7700	64.6
600	41.8	2400	61.4	4200	49.0	6000	45.1	7800	60.0
700	56.8	2500	66.2	4300	53.5	6100	42.1	7900	59.1
800	59.6	2600	66.6	4400	54.6	6200	45.6	8000	61.7
900	56.0	2700	55.3	4500	46.5	6300	46.8		

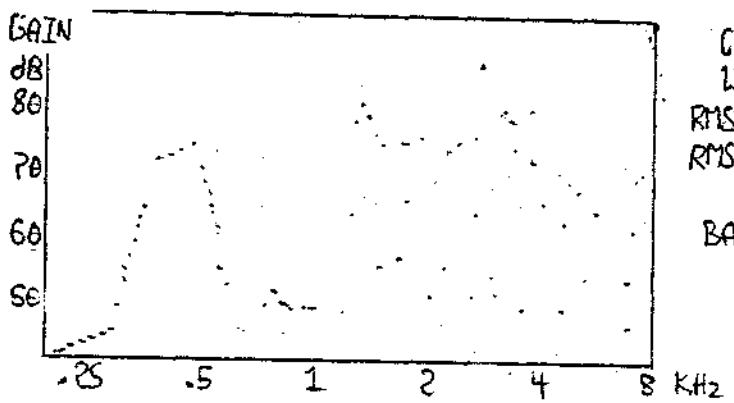
1000	59.3	2600	53.2	4600	51.5	6400	48.9		
1100	59.4	2900	53.7	4700	40.9	6500	40.6		
1200	60.5	3000	53.5	4800	42.5	6600	38.7		
1300	59.8	3100	45.2	4900	50.8	6700	42.0		
1400	48.4	3200	48.0	5000	48.9	6800	44.0		
1500	49.6	3300	53.5	5100	55.3	6900	47.5		
1600	46.5	3400	55.8	5200	56.7	7000	48.3		
1700	53.5	3500	51.2	5300	50.7	7100	54.4		
1800	47.2	3600	50.5	5400	39.2	7200	58.1		
1900	53.8	3700	48.0	5500	42.3	7300	54.8		

Fig 5

Toy-5:

Peak Frequency -2900 Hz

Peak Intensity - 79.2 dB SPL



COMPOSITE MODE
WEIGHTED GAIN
RMS SOURCE OFF
RMS OUT 88.6 dBSPL

BAT (1.5 V) 0.0 MA

FREQ Hz	GAIN dB	FREQ Hz	GAIN dB	FREQ Hz	GAIN dB	FREQ Hz	GAIN dB	FREQ Hz	GAIN dB
200	44.3	2000	69.2	3800	78.0	5600	64.7	7400	63.5
300	46.3	2100	46.9	3900	64.8	5700	65.9	7500	70.0
400	70.2	2200	42.9	4000	46.2	5800	49.9	7600	63.9
500	73.0	2300	72.1	4100	65.6	5900	26.2	7700	46.5
600	69.0	2400	73.2	4200	74.8	6000	49.8	7800	45.0
700	32.0	2500	59.3	4300	78.9	6100	56.5	7900	66.8
800	64.2	2600	53.6	4400	51.9	6200	52.7	8000	67.9
900	51.4	2700	74.4	4500	58.2	6300	40.8		

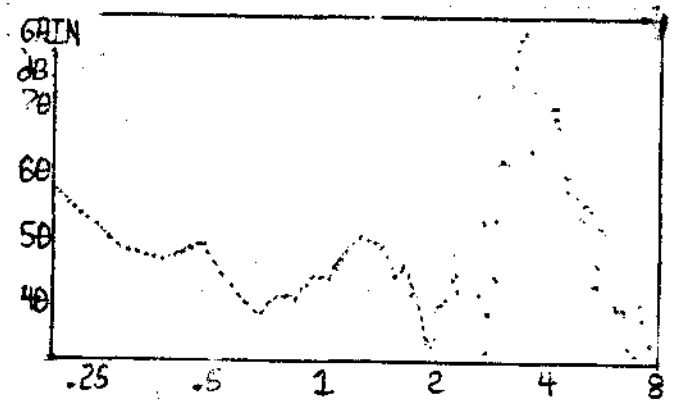
1000	51.3	2800	83.3	4600	63.0	6400	52.4
1100	39.2	2900	79.2	4700	68.4	6500	61.5
1200	37.0	3000	56.1	4800	64.2	6600	62.1
1300	70.7	3100	52.3	4900	43.1	6700	49.5
1400	79.0	3200	74.1	5000	53.5	6800	39.7
1500	73.4	3300	81.0	5100	66.8	6900	51.3
1600	24.8	3400	73.2	5200	66.8	7000	64.4
1700	51.2	3500	32.0	5300	55.7	7100	67.8
1800	73.4	3600	51.4	5400	44.1	7200	55.3
1900	77.8	3700	75.7	5500	51.2	7300	40.1

Fig 6

Toy-6:

Peak Frequency -3500 Hz

Peak Intensity - 77.9 dB SPL



COMPOSITE MODE
WEIGHTED GAIN
RMS SOURCE-OFF
RMS OUT 81.1 dBSPL

BAT (1.5 V) 8.0 MA

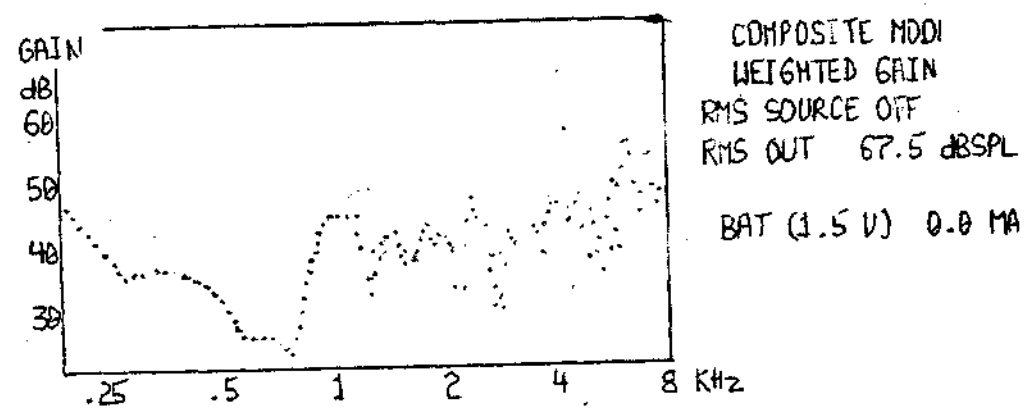
FREQ Hz	GAIN dB	FREQ Hz	GAIN dB	FREQ Hz	GAIN dB	FREQ Hz	GAIN dB	FREQ Hz	GAIN dB
200	57.7	2000	35.3	3800	61.0	5600	52.3	7400	34.6
300	49.8	2100	42.7	3900	57.2	5700	52.5	7500	37.8
400	48.2	2200	43.0	4000	60.5	5800	52.1	7600	23.8
500	49.9	2300	48.8	4100	69.7	5900	49.8	7700	33.9
600	44.6	2400	44.3	4200	67.2	6000	37.5	7800	19.6
700	41.0	2500	53.1	4300	65.8	6100	49.4	7900	36.4
800	43.5	2600	34.3	4400	60.5	6200	42.8	8000	29.7
900	43.5	2700	53.7	4500	59.6	6300	51.5		

1000	46.5	2800	30.7	4600	57.5	6400	46.3
1100	45.9	2900	45.8	4700	65.8	6500	41.7
1200	49.3	3000	61.0	4800	57.5	6600	47.7
1300	52.1	3100	61.7	4900	56.5	6700	33.2
1400	50.7	3200	69.2	5000	54.9	6800	34.3
1500	50.5	3300	73.8	5100	50.4	6900	41.7
1600	44.9	3400	77.7	5200	55.4	7000	31.5
1700	48.2	3500	77.9	5300	46.0	7100	42.8
1800	43.5	3600	62.7	5400	47.8	7200	41.2
1900	40.4	3700	70.4	5500	53.2	7300	32.5

Toy-7:

Peak Frequency - 4200 Hz

Peak Intensity - 62.9 dB SPL

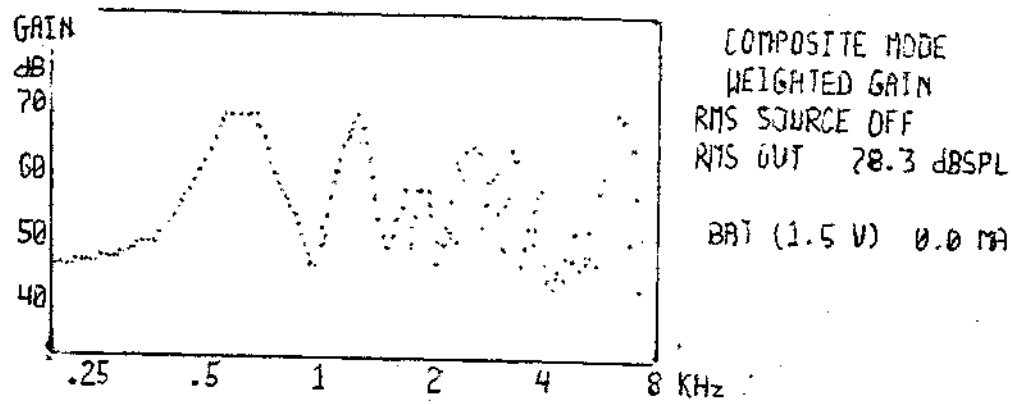


FREQ Hz	GAIN dB	FREQ Hz	GAIN dB	FREQ Hz	GAIN dB	FREQ Hz	GAIN dB	FREQ Hz	GAIN dB
200	47.2	2000	42.8	3800	43.6	5600	46.7	7400	44.6
300	37.0	2100	40.3	3900	45.8	5700	50.9	7500	45.8
400	38.2	2200	29.5	4000	44.4	5800	48.6	7600	43.4
500	35.6	2300	40.7	4100	58.0	5900	42.5	7700	49.1
600	28.6	2400	46.8	4200	62.9	6000	48.2	7800	53.4
700	28.8	2500	43.7	4300	55.3	6100	49.1	7900	53.4
800	27.2	2600	45.5	4400	44.1	6200	49.3	8000	49.6
900	37.5	2700	32.8	4500	35.1	6300	56.4		

1000	44.6	2800	35.6	4600	45.8	6400	53.7
1100	44.3	2900	33.0	4700	46.9	6600	52.5
1200	44.3	3000	42.7	4800	39.4	6600	49.8
1300	34.3	3100	41.2	4900	24.1	6700	44.9
1400	41.2	3200	26.4	5000	38.2	6800	46.6
1500	42.5	3300	25.0	5100	43.4	6900	38.5
1600	37.9	3400	27.8	5200	39.5	7000	48.6
1700	39.8	3500	43.0	5300	41.5	7100	52.3
1800	43.3	3600	42.3	5400	37.1	7200	45.2
1900	40.0	3700	39.7	5500	44.1	7300	41.5

Peak Frequency - 6700 Hz

Peak Intensity - 69.2 dB SPL



FREQ Hz	GAIN dB	FREQ Hz	GAIN dB	FREQ Hz	GAIN dB	FREQ Hz	GAIN dB	FREQ Hz	GAIN dB
200	46.3	2000	57.0	3800	54.4	5000	56.3	7400	51.6
300	48.0	2100	47.3	3900	56.8	5700	60.7	7500	31.1
400	51.2	2200	52.5	4000	50.1	5800	59.1	7600	50.7
500	59.1	2300	50.5	4100	47.6	5900	69.2	7700	57.0
600	66.9	2400	60.3	4200	44.2	6000	74.0	7800	45.1
700	66.5	2500	58.1	4300	45.7	6100	69.7	7900	58.6
800	57.5	2600	62.3	4400	46.5	6200	54.4	8000	60.3
900	53.7	2700	61.9	4500	47.9	6300	62.9		

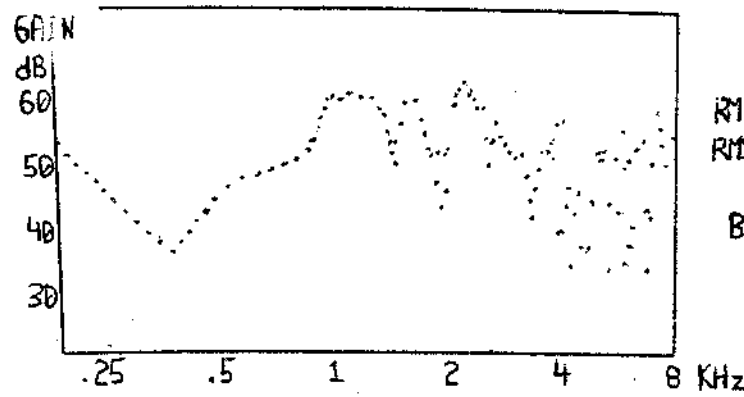
1000	45.3	2000	52.1	4600	45.5	6400	57.0
1100	55.5	2900	58.1	4700	48.0	6500	63.7
1200	62.7	3000	58.9	4800	51.4	6600	66.0
1300	66.9	3100	49.4	4900	47.6	6700	69.2
1400	61.2	3200	55.3	5000	42.5	6800	61.4
1500	51.2	3300	62.5	5100	47.5	6900	53.9
1600	49.0	3400	59.5	5200	48.6	7000	51.4
1700	57.1	3500	47.1	5300	52.1	7100	59.3
1800	49.4	3600	52.0	5400	52.1	7200	56.5
1900	57.2	3700	52.0	5500	47.3	7300	59.6

Fig 9

Toy—9:

Peak Frequ ency- 7400 Hz

Peak Intensity - *60* dB SPL



COMPOSITE MODE
WEIGHTED GAIN
RMS SOURCE OFF
RMS OUT 70.8 dBSPL

BAT (1.5 V) 0.0 MA

FREQ Hz	GAIN dB	FREQ Hz	GAIN dB	FREQ Hz	GAIN dB	FREQ Hz	GAIN dB	FREQ Hz	GAIN dB
200	62.5	2000	40.4	3800	51.0	5600	41.2	7400	60.0
300	43.7	2100	57.1	3900	54.8	5700	51.2	7500	50.3
400	37.9	2200	59.3	4000	54.9	5800	53.9	7600	50.1
500	44.3	2300	59.6	4100	41.2	5900	49.6	7700	48.7
600	47.3	2400	57.4	4200	46.7	6000	37.2	7800	48.2
700	48.6	2500	57.9	4300	36.7	6100	47.3	7900	46.7
800	49.6	2600	49.4	4400	43.6	6200	44.3	8000	54.4
900	51.9	2700	55.1	4500	46.1	6300	44.2		

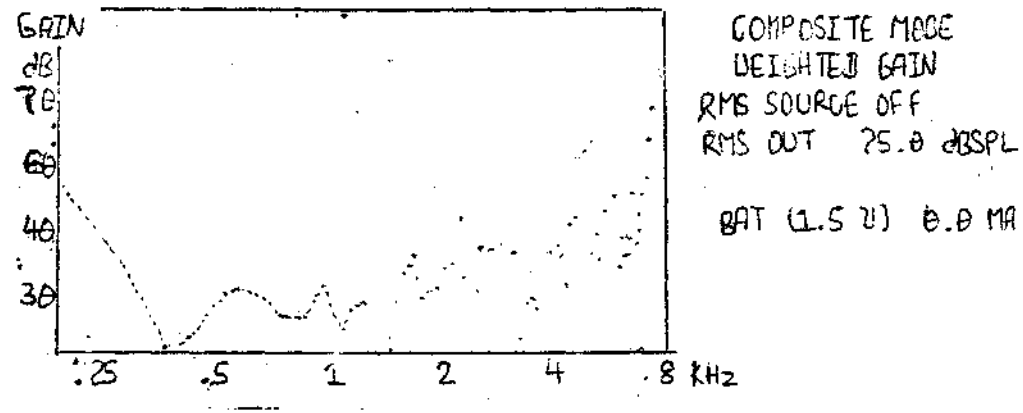
1000	57.5	2800	54.9	4600	39.2	6400	48.2
1100	58.2	2900	52.3	4700	38.7	6500	52.3
1200	58.5	3000	50.8	4800	39.0	6600	50.5
1300	58.2	3100	50.3	4900	44.5	6700	38.0
1400	55.8	3200	54.2	5000	45.3	6800	46.6
1500	49.3	3300	47.9	5100	50.3	6900	45.8
1600	57.4	3400	42.5	5200	51.2	7000	47.9
1700	57.9	3500	46.3	5300	35.8	7100	57.0
1800	51.4	3600	51.6	5400	44.3	7200	58.3
1900	51.2	3700	51.5	5500	50.5	7300	56.0

Fig 10

Toy-10

Peak Frequency - 7700 Hz

Peak Intensity – 66.6 dB SpL.



FREQ Hz	GAIN dB	FREQ Hz	GAIN dB	FREQ Hz	GAIN dB	FREQ Hz	GAIN dB	FREQ Hz	GAIN dB	1000	34.9	2800	38.7	4600	39.6	6400	39.3
200	46.8	2000	33.4	3800	38.4	5600	53.9	7400	66.1	1100	27.8	2900	39.1	4700	50.5	6500	51.7
300	38.3	2100	40.3	3900	38.2	5700	51.4	7500	61.8	1200	31.9	3000	21.8	4800	51.6	6600	52.5
400	23.9	2200	33.5	4000	45.6	5800	39.4	7600	54.1	1300	31.6	3100	37.9	4900	52.9	6700	41.2
500	30.5	2300	43.2	4100	39.4	5900	45.5	7700	66.6	1400	20.4	3200	27.5	5000	52.5	6800	41.8
600	33.3	2400	28.6	4200	37.9	6000	36.1	7800	65.4	1500	27.1	3300	26.7	5100	38.2	6900	52.1
700	31.9	2500	35.6	4300	34.2	6100	48.4	7900	62.9	1600	33.7	3400	36.1	5200	40.7	7000	48.4
800	29.3	2600	41.8	4400	42.1	6200	47.4	8000	59.7	1700	37.9	3500	32.5	5300	37.6	7100	48.2
900	29.6	2700	38.5	4500	43.2	6300	41.0			1800	30.0	3600	38.1	5400	43.7	7200	57.4
										1900	33.2	3700	39.4	5500	43.5	7300	62.7

Fig.1-10: Spectra of acoustic stimuli from ten noise making play materials used in this study.

For evaluating the effectiveness of these materials in identification of hearing impaired children the following procedure was adopted.

Ten auditorily trained hard of hearing children were screened using narrow band noise (NBN) in a free field situation using a diagnostic audiometer. The children were comfortably seated at a distance of one meter from the loud speaker placed at 45^0 azimuth. Eye blinking, widening of eye, body movements, cessation of activity and localisation (Northern, and Downs, 1967 were considered as responses.

The same children were screened using the ten selected sources of acoustic stimuli which were presented one meter away from subject. Each stimuli was presented five times and 50% response criteria was chosen i.e. responses greater than 3 was considered response for a stimulus.

Figure-1 give a comparison of responses given from Table-2 and Table-3. Due to non-availability of noise making play materials, peak frequency of these play materials could not be exactly matched with audiometric test frequency. So peak frequency of noise making play materials at 500, 1000, 2000, 2600, 2900, 3500, 4200, 6700,7400 and 7700 Hz were compared with audiometric test frequency, 500, 1000, 2000, 3000, 3000, 4000, 4000, 6000, 8000, 8000 H3 respectively.

Then number of valid and invalid responses were obtained (Fig.l). The percentage of valid responses in low, mid and high frequency range was obtained by

$$\frac{\text{No.of valid}}{\text{Total responses}} \times 100$$

Stage-2:

Subject: Five hard of hearing and five normal children in age range 0-3 years belonging to mid-socio economic status.

Equipment Selected sources of acoustic stimuli in Stage-1.

Questionnair e: Appendix-A.

Then The play materials were distributed among five hearing impaired children and five normal children in age range of 0-3 years. The responses of these children to the play materials was obtained using a combined approach of questionnaire and interview. The parents of these children were interviewed by an audiologist who was familiar with the questionnaire. Thus it was ensured that appropriate answer was elicited. This information was used to guide the parents of hearing impaired children in age range of 0-3 years in selection of play materials and suggesting activities for hearing screening and rehabilitation.

RESULTS AND DISCUSSION

These have been discussed in two stages.

Stage-1:

The results obtained by audiometric screening and screening using the selected commercially available sources of acoustic stimuli were recorded. (Fig 11). Figure-12. indicates 74% relation between audiometric screening and screening with the play materials at low-mid frequency (less than 3000 Hz) and 70% at high frequency (greater than 3000 H_z) for the hearing impaired children in the age range (0-3 years) i.e. 74% of children could be identified as hearing low-raid frequency hearing loss and 70% of children having high frequency hearing loss, accurately using the play materials. A slightly better relationship has been obtained at low frequency than at high frequency. However, we can say that, the high firequeney sources of acoustic stimuli are also usefulin identifjriag high frequency hearing loss in the hearing impaired child.

Hence the commercially available sources of acoustic stimuli can be used effectively to screen the hearing impaired children. So it has been suggested low and which of these commercially available sources of acoustic stimuli can be used for this purpose, after analysing the results obtained from questionnaire used in Stage-2.

Sub-jects	Frequency (H3)						
	500	1000	2000	3000	4000	6000	8000
	65 dBSPL	65 dBSPL	65 dBSPL	40 dBSPL	70dBSPL	70 dBSPL	55 dBSPL
1.	60 "	65"	65"	40 '	70"	70"	55"
2.	75"	70"	85"	85"	85"	85"	85"
3.	65"	70"	85"	80"	75"	85"	85"
4.	50"	60"	65"	55 '	55"	60"	45"
5.	50"	75"	75"	80"	85"	85"	80"
6.	70"	70"	75"	60"	75"	70"	75 '
7,	65"	75"	75"	60"	75"	70"	75"
8.	60"	65"	65 "	65"	75"	70"	80"
9.	70"	70"	65"	60 '	65"	75"	80"
10.							

Table-2: Showing response obtained from the subjects to narrow band noise in free field.

Sub - jects	Frequency (H3)									
	5000	1000	2000	2600	2900	3500	4200	6700	7200	7700
	Intensity(dB SPL)									
	72.2	71.0	72.7	66.6	79.2	77.9	62.9	69.2	60	66.6
1.	-	+	+	+	-	+	-	-	-	+
2.	+	+	+	+	+	+ +		+	+	+
3.	+	+	-	—	+		- +	—	-	—
4.	+	—	+	+	+	- -		-	-	-
5.	+	+	+	+	+	+	+	+	+	-
6.	-	—	-	-	-	+	-	+	-	—
7.	-	+	+	+	+	+ +		-	+	—
8.	+	+	-	+	+	+ -		+	-	+
9.	+	+	+	+	+	+ +		+	—	-
10.	+	-	+	+	+	+ +		-	+	-

Table-3: Showing subjects responses present/absent to selected available sources of acoustic stimuli.

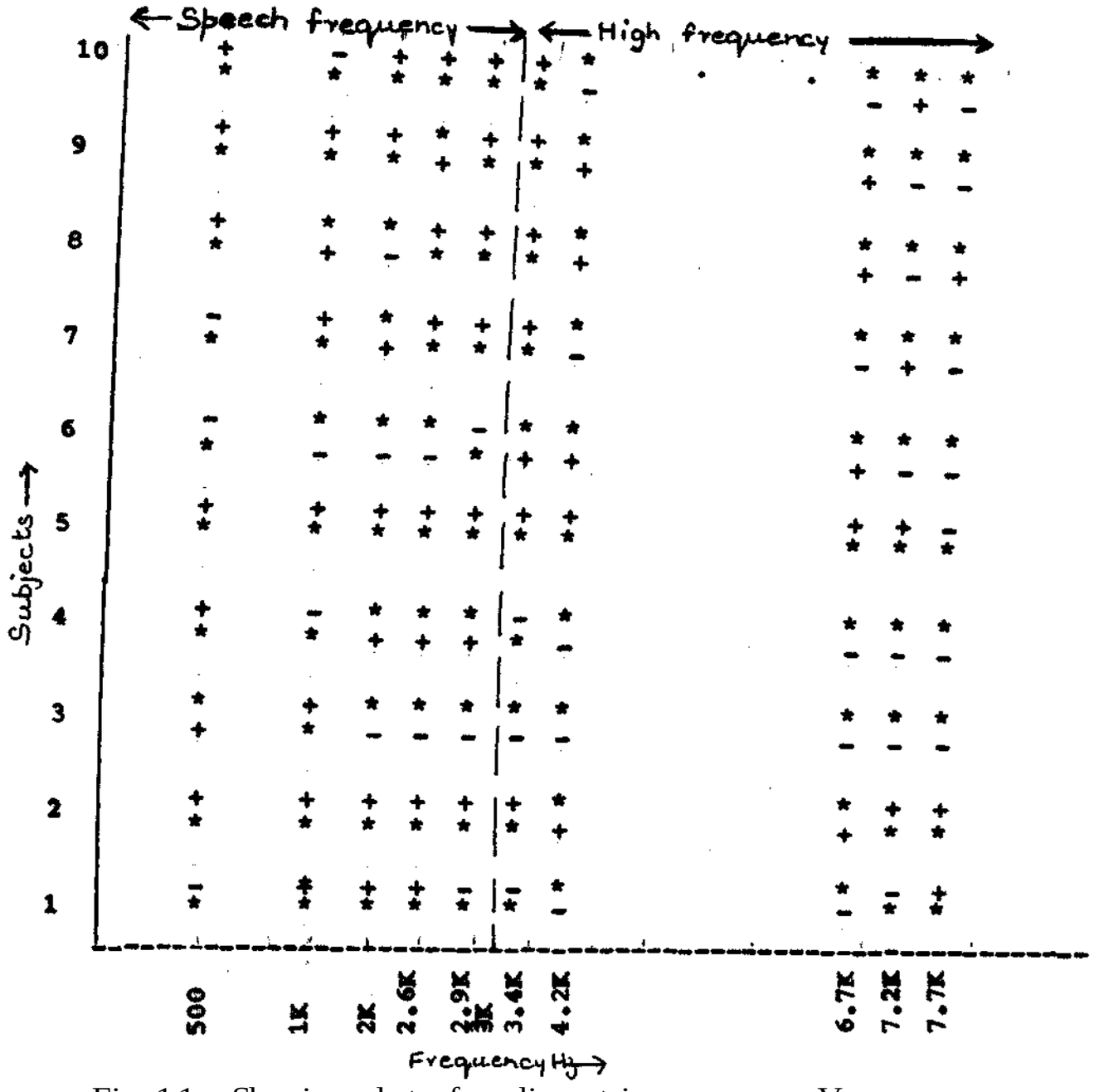


Fig 11 : Showing plot of audiometric responses Vs responses using play materials for each subjects at different frequencies.

* - indicates audiometric response

\+ - indicates response to play material present

\- - Indicates response to play material absent

Eg.

- At 500 Hz, subject-1 indicates response to play material
* absent at levels greater than audiometric response ie. 65 dB.(From Table 2)

+ at 1KHz, for subject-1 indicates response to play material
* Present at levels greater than audiometric response ie,65 dB.

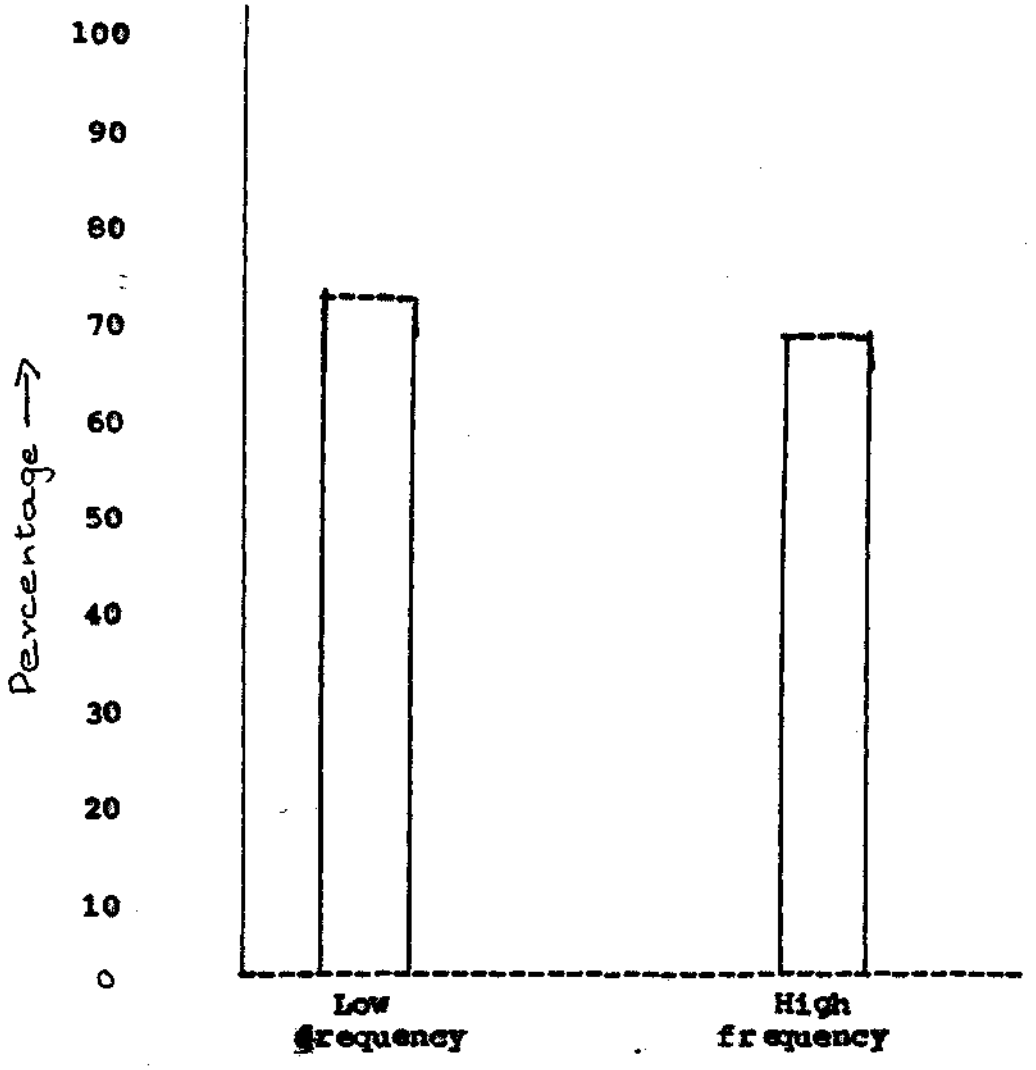
* at 4.2 KHz for subject-1 indicates response to play material
* absent at. level lower than andlometric response at 4 KHz ie. 70 dB.

* at 4.2 KHz for subject-2 indicates response to play material
+ present at levels lower than audiometric response at 4 KHz ie. 70 dB.

Responses - and * + are considered invalid because

-indicates the play Material was not useful to indicate presence
*of hearing at levels above audiometric thresholds.

indicates the play material indicates presence of hearing at levels below audiometric thresholds.



Figuare-12 Showing percentage of valid responses between audiometric thresholds and responses to play materials at low-mid frequency (500 Hz to 2.9 KHz) and high frequency (3.0 to 7.7 KHz).

Stage-2:

An analysis of the responses obtained from the combined. interview and questionnaire method (Appendix-A) reveals the following.

Children in the age range (0-3 years) showed interest in playing with movable and attracting, toys (brightly coloured and large). The children of younger age (below 1½ years) ware attracted by rattles and the like; white the 3 year olds showed curioaity towards squeakers. Some of the one year olds were even afraid of the squeakers. These children (0-3 years) were interested in playing with the play materials for less than ten minutes and they preferred to play withthe toys alone. One child 3 years of age was interested in imaginary play like using the kanjeera and flat rattle as a rolling pin.

These Play meterials were reported to be useful to improve visuo-motor skills, to teach concepts to children as body parts. names of animals and birds (teaching vocabulary) to a 1-2½ year old child andprimary colours to a 3 year old.

It was also observed, that even with increasing number of toy manufacturing companies, parents prefer to buy their children toys of the child' s choice. Parents belonging to the mid socio-economic group do not prefer any particular company.

However they considered the durability, nontoxicity of toy and if the toy was dangerous to the child (like having sharp edges), before buying play materials for their children. No differences were found between the normal and hearing impaired childs response to the play materials, except that the hearing impaired child seemed more interested in squeakers and the parents of these children found the low frequency toys particularly useful for auditory training.

A tabular chart may be prepared giving information about which toys best interest children of different ages. (Table- 4)

Table-4 = Showing age related interst to play materials (0-3year)

When the child can	Provide To encourage	
	0-6 months	
Follow objects with eyes, (attention caught by sounds.	Mobiles to fix on catrmusical or silent. Baby mirror on side of cat.	Listening, eye movements and following. Attention to movement.
kick legs.	Soft balls and foam bricks rattles with varying sounds.	Awareness of its own movement.
Begins to reach and grasp (But cannot yet sit without support) •	Toys to string on cat and *pram* small light rattles easily grasped by baby.	Aiming and grasping (Baby associates movement with sound)
	6-12 months	
Beginning to put its hands	Toys that are light# safe-suitable for woathing, eg. teethers.	Discovery of mouth
Bit supported at ist and Visuallyalert	Toys with suction base can be fixed on play tray. Toys that can be hung where baby can reach and grasp. Toys that move easily when touched.	Movement of hand and eyes toget - her (childs action produce a movement)
Lies on tummy.	Toys that move when touched.	Movement in lying position eg. rolling over.

When the child can	Provide 12-18 months	To Encourage
Spontaneously bang on table.	Drum, xylophone, hammer toys	More precise use of hands and eyes.
Nalk with support/without support.	Baby walkers and other push-toys on wheels. Pull along toys.	Confidence and independence. Better control of body movement. Refinement Of balance and walking skill,
Crawl and push objects along.	Balls of various sizes. Various push along toys especially those on short rigid handles.	Increase Of range of mobility and hence exploration.
Imitate sounds,understand simple phrases & words.	Rag books and picture books. Telephone baby mirror.	Simple imitation in social context. Understanding of Ist picture symbols.
Coordinate objects. Relate objects to a container.	Plastic pots and pans. Simple posting boxes (ie round and square box). Bricks and coloured cotton reels to put in and out. Large cupboard boxes and laundry basket.	Moving eyes and hand tgether Shape discrimination and putting into countainer.
Begins to imitate par eats domestic duties.	Simple domestic items, broom, duster, plastic cup, spoon. hairbrush.	Simple domestic play.

When the child can	Provide	To encourage
	19 months-2 year	
Drum with 2 sticks	Drum xylophone, and other hammer pegs.	Move eye and hands together and to channel ' banging' into constructive play.
Hold pencil	Paper and jumbe pencil and crjyon..	Improve use of hands and eyes Scribbling and later copying'
Build several bricks into a tower.	Building breaches and other stacking toys.	Simple building activity.
Use thumb/finger grasp-still preoccupied with container play.	All toys with pegs.	Controlled use of hand, eyes finger. Early representa-tional play.
Enjoy simple picture books and other simple pictures.	Picture? books. Lift out pictures with puzzles underneath.	Talking listening and conver-sations.
Recreate domestic situation.	Simple domestic play eg. cookers and pans, tea sets, furniture etc.	Imaginative play

When the child can	Provide	To encourage
	2 - 3 years	
Push and pull large items, climb steps with agility.	Large push along vehicles, trundle toy, wheel barrows.	Climbing on and off. Over come balance and steering.
Throw or kick a ball	Large plastic skittles, foot-ball	To develop aim and turn taking in games.
Manipulate with fingers and use 2 hands together.	Objects that can be explored with fingers.	Two handled play and five finger movement.
Give and take objects.	Objects that can be grasped and transferred from one hand to another, eg. rattles, plastic cotton rolls.	Practise in grasping and releasing. Bringing hand together in middle.

1. ACTIVITI ES FOR IDENTIFICATION OF THE HEARING IMPAIRED CHILD

The package of selected commercially available sources of acoustic stimuli used in this study with alternatives (other toys having similar range of peak frequency and intensity) may be used by parents or anganwadi workers? **where** hearing screening facilities are not availed. Auditory responses to the auditory stimuli way be observed as given by Northern and Downs (1967),

Once tile child is identified, the next step is to take him to the nearest audiologist and get him fitted with an appropriate hearing aid,

2. SUGGESTED ACTIVITIES FOR REHABILITATION INCLUDE;

a) <u>Activities for auditory training</u>

Auditory training is a set of procedures aimed at helping the aurally handicapped, become more proficient in attending to the sounds of speech, discriminating one from another and effecting an increase, in retention of sounds (Kelly).

The same package of play materials, as used in this study could be used as sources of acoustic stimuli, to, auditorily train the hearing impaired child. The low and mid frequency toys would be especially useful for the profound sensori-neural

hearing impaired child. Initially auditory awarenss is to be worked upon, later go on to activities needing gross and fine auditory discrimination.

Auditory awareness is to make the child aware of the presence of sound. Any of the play materials used in this study may be used for this purpose. start with the low-mid frequency toys for the profound sensory-neural hearing loss child.

Bombard the child with sounds. For the child less than 2 years age present the stimulus close to his car and observe for his auditory response such as eye blink, eye widening, cessation of activity, crying etc. For the older child greater than 2 years, he nay be trained to give conditional responses to the auditory stimuli.

Have your child and you. facing each other. You may use a few blocks also. Ask your child to have the block near his ear. Let your child watch you. Tell him that a sound will be heard when the rattle (for exmple) is Juggled. Make him understand that he has to listen to the sound when the rattle is moved. Use gestures, along with speech to make him. understand you.

Tell him that Whenever he hears the sound or sees you move the rattle, he should place the block down. How move the rattle. In the first few trials help the child keep the block, You may have tO demonstrate the activity initially. Repeat the presentation of stimulus till your child responds consistantly to it. At the end Of the activity a tower of blocks May be found. Once the Child responds tO the sound presented in front of him with visual cue, then go on to present the stimulus behind him. The ehild should now listen to the *sound* and respond to it. If child is not able to do it, go back to presentation of stimulus with visual cues.

Simil arly the child may be trained for different sounds produced by the different toys used in this study. Other alternatives toys may be used. Instead of blocks; leaves, stones,flowers may be used and responses to the stimulus nay be elicited by other interesting activities as the ehild jump-ing in response to sound etc.

Activity for auditory discrimination:

Here the child differentiates the sounds made by two different sound sources, Onee the ehild is aware of the two sound sources, then go on to this step. Initially use toys hearing high and low peak frequency. The large red rattle

(500 Hz peak frequency) and aeroplane(7700 Hz peak frequency) used in this study may be used. This can be worked upon for child greater than two years, when he can give conditional response to both sound stimuli. crayons or colour pencils may be used.

Have the two toys placed in front of the child. Draw the large rattle and an aeroplane on two sheets of paper and keep them in front of the child. Tell the child to colour a portion of rattle when rattle sound (low frequency) is produced and to colour portion of aeroplane when the high frequency sound is produced. Initially help your child by colouring then yourself, till he understands the game. Present both sounds one after other with sufficient time gap between the two. Allow the child to listen and discriminate between the two sounds and perform the required activity (response). This is done initially in front of the child. Later present the sounds behind the child and let him perform the same activlty. Once he gives consistent responses then the difference in frequency between sound sources may be decreased. Eg. Use red rattle (500 Hz - peak frequency and white rattle - 6.2 KHz peakfrequency) and let him differentiate between them and so on.

b) **Language teaching:**

The deaf child is totally cut off from the world of verbal communication. He has very little exposure to speech and language hence he fails to think by himself; creating an over-all retardation in him. However,helping him acquire language is not an unattainable task. You have to train him and help him acquire it. It is undoubtedly not an easy one. Language teaching would include teaching him to comprehend and express. You cannot expect your child to understand sentences rightaway you have to go step by step from simple vocabulary to simple two word sentences, 3 word sentences and slowly to more complex ones. Here are a few simple activities that may be carried out for the same, using the package of toys that have been used In this study.

Activity :

1. Developing concept of bird duck: Have about 4 toys with you, two of which could be the two squeakers (ducks) used in this study. Keep one duck and another toy with you and let your child have the other two. Now show him the duck and say "duck" several times. Next remote it from his sight and ask him to five you 'duck'. Before this you can also make him match between the two ducks ie. to make him match objects of similar

form. By doing this you also help your child to concentrate and improve his memory. Repeat till your child does the activity correctly and consistently. To generalize the concept, ask your child to match the duck with other picture of duck or actual duck if available. The same activity can be combined with auditory training also by asking him to pick out the duck when he hears a sound. Similar interesting activities may be carried out.

2) **Develop the concept of , aeroplane'** : Again as given in 1), chose 4 toys - one of which is an aeroplane. Show him the action of how it takes off with vocalisation. This gave can be used to make him vocalise also as 'uu', when the aeroplane take off. Paper cuttings of aeroplane can be used to make the activity interesting.

Similarly other toys can be used to teach the child the concept of different animals, birds, vehicles, etc. Use these toys that are mobile because the child (1-3 years) is most interested in such toys. For the younger child, large toys may be used, which are nontoxic and do not have sharp edges so he can mouth them if he wants to.

Helping your child learn to comprehend different names of birds and vehicles is not enough. You should help him communicate using verbal responses.

Activity:

1) To make him vocalise vowels /a/ /i/ /u/, diphthongs /au/ /ui/ etc. Move the rattle around and he has to vocalise /a/. Give him a tactile feedback by placing his hand on your neck and help him feel the vibration of vocale ords. Let the aeroplane take off and let him say /uu/. Use similar interesting activities to help him oocalise.

2) To elicit monosyllabic utterances from him such as /va/ /ta/ /po/ ete. meaning 'come' 'give' 'go' respectively.

Any of the toys used in this study may be used Eg. Use the rattle. Place it on the floor. If the child wants it, he has to indicate the gesture 'give' and also come out with the correct utterance /ta/' First show him the tongue position in the production of /ta/. Let him imitate you. Then make him vocalise giving him tactile feedback by placing his hand on your neck aad the other hand on his neck. Encourage him to say /ta/ for whichever toy he want. Let the toy jump tow ards him as he comes out with the utterance /ta/. Initially let him use gestures, gradually fade it out. Let him know, he will get the toy only if he asks for it.

Similarly teach him to say /va/ /po/ etc. Then gradually go on the bigger utterances. Give him a visual feedback and

encourage him to use the words meaningfully. Let comprehension and expression go almost hand ia hand. Most often comprehension precedes expression. Let this not worry you. It is a normal phenomena.

Toys are an outlet tocreativity, imagination and teaching. So toys used in this study may be useful to-

- Auditoril train your child
- Teach concepts of birds (activity-1) to the 2 year old child. Other activities as concept of vehicles, colours can be taught to the 3 year old child.
- Cut out of different vocabulary items also may be used to teach him concepts.
- Speech utterances as /ta/ /va/ /po/ names of toys giving them simple bisyllabic names as 'pom pom' for squeaker, ba-ba for duck etc may be taugh As observed from play behaviour as recorded by parents of hearing impaired children, the child (0-3 years) prefers to play with large,colourful and moveable toys. He does not show interest in an activity for greater than 10 minutes. So change the activity frequently. Keep these in mind when playing with, and teaching your child Choose the, toys according to interests and age of your child These toys with Table can be used alternatives/additions to teach your deaf child and help him become an effective communicator in society. So teach your deaf child through play, fun and games and it is sure going

to be interesting and rewarding, both for you and your child. You yourself will be surprised to see how your child' s new world unfurls and have parts of your jigsaw fall into place. Of course, an experts advise, will always be available to you at your nearest speech therapist. You are not alone in this unhill task we are with you.

EPILOUGE, LIMITATIONS AND RECOMMEDATIONS

The present study was aimed at -

1. Evaluating the effectiveness of noise making play materials in identification of hearing impaired children (0-3 years).
2. To give guidance to parents and other nonprofessionals workers in the selection of play materials in rehabilitation of the hearing impaired child and to suggest a few activities for the same.

Ten commercially available sources of acoustic stimuli were chosen having peak frequency of 500-8000 Hz and peak intensity of 60-80 dB SPL after carrying out a spectral analysis. Ten hearing impaired children (0-3 years) were for Screened for hearing acuity using audiometer, and the sources of acoustic stimuli which were chosen after spectral analysis. Both results, were compared to evaluate the effectiveness of the commercially available sources of acoustic stimuli in identification of these hearing impaired children.

Then these tea noise making play materials were distributed to five normal and five hard of hearing children (0-3 years) along with a questionnaire. The children' s play behaviour with these play materials was obtained by method of interview and questionnaire. These responses were used to guide parents in selection of play materials for rehabilitation of their hearing impaired child and activities for rehabilitation of these children.

The findings of the present study are:

1. Noise making play Materials are useful in identification of hearing impaired children 0-3 years.
2. Guidelines have been given to guide the parents and other non-professional workers in selection of play materials and activities given for rehabilitation of these children.

Limitations and recommendations:

Play materials available in different regions could be collected and subjected to similar measurements and analysis.

Periodical reevaluation of the play materials could be done to assess the reliability of theiroutput.

BIBLIOGRAPHY

Alexander Ewing and Ether Ewing(1971):"Hearing Impaired children under five - A guide for parents and teachers" Manchester University Press, USA.

Doctor P.V.(1963): "Communication with the deaf-A guide to parents of deaf children" Intelligence Printing Company, Laucester, Pensylvania.

Fredrich, N.Martin (1978): "Pediatric Audiology" Prentice Hall Inc, Englewood Cliffs, New Jersey.

George, T.Mencher and Stanford E Garber (1980): "Early Management of Hearing Loss". Grune and Stratton, New York.

Jerry, L Northern and *Marion* P Downs(1978): "Hearing in Children". The Williams and wilkins Company Baltimore, Maryland.

spencer Tracy (1968): -If you have a deaf child". Illinois annual School for mothers of the deaf Catalogues from toy manuf acturers.

APPENDIX-A

QUESTIONNAIRE.

Name of the child: Age:

1. Name the toys which your Child favoured to play with?
2. Your child liked to play with the toy because of its
   - attractiveness
   - sound it makes
   - it is movable
   - it produces a light flash
   - others (specify)

   (Tick wherever appropriate).
3. Was any toy rejected by your child? YES/NO
4. If yes, the/reason could be
   - he/she has outgrown the toy
   - he/she is too young for the toy
   - he/she does not have the dexterity to manipulate operate the toy.
   - others (specify)

   (Tick wherever appropriate).
5. Your child played with the toy for
   - ten minutes
   - more than ten minutes (specify)
   - less than ten minutes
6. your child played with the toy
   - alone
   . with his siblings
   - with peers of his age
   - with an elder person (specify)

7. Was the toy used to teach
   - colours
   - numbers
   - shapes
   - body parts
   - others (specify)
8. If you intend to buy a new toy for your child, would you prefer -
   - a toy of the child's choice
   - educable toys
   - others (specify)
9. What criteria would you use to choose the toy.
   - cost of toy
   - attractiveness of toy
   - durability of toy
   - noise it makes
   - others (specify)
10. Would you prefer any particular manufacturing company and why?

" This is not the end

It is not even the

beginning of the end.

But it is perhaps the end of the beginning".