SIMULATION OF HEARING LOSS USING FILTERED SPEECH AND ITS EFFICACY

Reg. No.9713

Independent Project submitted as part fulfilment for the First Year M.Sc, (Speech and Hearing) to the University of Mysore.

ALL INDIA INSTITUTE OF SPEECH AND HEARING
MYSORE 570 006
1998

CERTIFICATE

This is to certify that this Independent Project entitled **SIMULATION OF HEARING LOSS USING FILTERED SPEECH AND ITS EFFICACY** is the bonaflde work in part fulfilment for the degree of Master of science (Speech and Hearing) of the student with Register No.M9713.

Mysore
May, 1998

Dr.** (Miss) **S.Nikam
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C E R T I F I C A T E

This is to certify that this Independent Project entitled ***SIMULATION OF HEARING LOSS USING FILTERED SPEECH AND ITS EFFICACY*** has been prepared under my supervision and guidance.

Mysore

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DECLARATION

This Independent Project entitled ***SIMULATION OF HEARING LOSS USING FILTERED SPEECH AND ITS EFFICACY*** is the result of my own study under the guidance of Mrs.C.S.Vanaja, Lecturer in Audiology, Department of Audiology, All India Institute of Speech and Hearing, Mysore and has not been submitted earlier at any University for any other diploma or degree.

Mysore
May, 1998 Reg.No.M9713

Ayyah

and

Guru Raghavendra

My dearest brother **Vijay,** I am happy that some one is there to care for me.

Last but not the least my **parents** who serve as the light house in my life, guiding me in troubled waters closer to my goals and showing me that success is not too far. A **mm** a and **Appa,** I assure you that I will live upto your expectations.

Lastly, **LORD R A G A Y E N D R A** who makes me believe in myself and to whom I owe everything I possess in this world, without whom my mere existence itself is questionable.

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INTRODUCTION

Communication is the process of imparting to one another ideas, thoughts, feelings or opinions by means of signs; symbols and signals expressed consciously or unconsciously. (Travis, 1971). **Man's** need for communication with his fellow man is possibly **his greatest** need and the fulfillment of his other needs and desires is largely dependent upon, or at least greatly facilitated by his ability to satisfy this basic need. The development of langauge, both spoken and written as a means of communication is one of mankind's greatest achievements (Hull, 1982).

Speech is the common mode of communication. Speech signal is an acoustic pattern resulting from the vibration of the vocal folds and modified by the articulators. Each speech sound arises from an unique combination of acoustic features that gives the sound its perceptual identity. The exclusion or dimunition of any feature by a hearing-impairment will result in a distortion of the pattern, as our hearing is dependent on the systematic processing of these features (Hull, 1982).

A hearing-impaired adult is someone who needs help in surviving in a society in which normal hearing is taken for granted. The hearing-impaired person and the society needs to understand to what extent he/she must live differently as a result of the hearing-impairment, to learn what adjustments he/she must make and to realize how to make them. These are people, who without help, will experience difficulty and frustration beyond that experienced by the normal hearing counterparts. They are people with practical problems of everyday living, problems that need direct intervention procedure.

Hearing-impairment reduces information at the cochlea, thus distorting the content received by the listener (Sanders, 1993). The effects of hearing-impairment upon the perception of spoken

language is difficult to understand as in normal communication, the message is perceived as linguistic values, not a series of discrete sounds.

Any reduction in the intensity of the signal received will result in a reduction of potential information. A hearing deficit always reduces the overall loudness of the speech signal; it also distorts the frequency spectrum by removing more energy at some frequencies than at others.

In persons with impairment of hearing, the intensity level at which word discrimination will be raised by the hearing deficit. The growth of loudness with intensity growth above that level, however, may be accelerated, reaching discomfort and pain thresholds at or below the levels for a normal hearing person. The most comfortable listening intensity likewise will occur at a lower intensity level than the degree of hearing deficit might lead. The effect of hearing-impairment on perception of different speech sounds varies depending on the acoustic cues used for their perception, voicing derives primarily from strong low frequency vibrations in the 125 Hz - 1550 Hz range with a median frequency of 500 Hz; manner of production extend into the middle and high frequencies, 335 Hz - 2000 Hz. with a median of 750 Hz; while almost all place cues, which are weak in intensity fall in the 880 Hz - 2650 Hz range with a median frequency of 1900 Hz (Miller and Nicely, 1955).

The pattern of hearing-impairment as depicted by the audiogram suggests the probable distortion due to loss of frequency information. The vowel sounds carry the greatest amount of energy, but that it is the consonant sounds that carry the greatest information and it is the second formant transition that is crucial to recognition of both vowels and voiced consonants at the syllabic level. Vowels suffer less from distortion than consonants, and weak vowelsare most prone to distortion (Sanders, 1993).

Thus, in case of hearing-impaired individuals, due to the disruption in the hearing mechanism, a part or whole of the information does not reach the brain. Hence, there is a problem in perceiving speech. In cases of high frequency hearing loss such as prebyacusis,ototoxicity, and noise induced hearing loss,the high frequency information is lost -where as low frequency information is intact. Similarly, low frequency hearing loss as in majority of cases with conductive hearing loss and in early stages of Meniere's disease, the low frequency information is lost whereas high frequency information is intact.

To some extent, these effects of hearing loss can be demonstrated to normal hearing subjects using filtered speech. Normal speech can be passed through an electronic filter to match different audiometric configurations. A filter is a device which selectively reduces the energy of certain signal frequencies while permitting others to pass through with little or no attenuation.

There are basically four different types of filters, high pass, low pass, band pass and band rejection filters. A high pass filter, rejects frequencies below the cut off frequency. A low pass filter passes only the low frequencies below the cutoff frequency. A band pass filter permits a band oT frequencies between two cut off values. It is also possible to eliminate a band of frequencies between two cut off limits. Such a filter is called the band reject filter. Any of these filters can be used to filter speech material. A few investigators have attempted to correlate the performance of normals to filtered speech with performance of hearing-impaired to normal speech (Owens, et al. 1972; Wang and Bilger, 1976; Walden, et al. 1981). Audio recording of such material are also available (Moore, 1996). These cassettes are useful in describing the effects of cochlear hearing loss on speech perception. They could also help in counselling the relative of hearing-impaired persons, regarding the difficulties faced by the hearing-impaired in understanding speech.

These cassettes can also be used in schools for demonstrating normally hearing children, the difficulties experienced by their hearing-impaired classmates and can convince them of the need to speak clearly. It could also be used to demonstrate the importance of hearing protection to people working in noisy areas. The demonstrations of these cassettes can help to convince such people of dire consequences of hearing damage caused by noise exposure.

A majority of these studies have been carried out in the western courtries. The speech material used for the study/audio recording is English. Therefore these cassettes cannot be used with Indian population. In the present study an attempt was made to develop such material in three Indian languages and study its efficacy in educating the public regarding effects of hearing loss on speech perception.

AIMS OF THE STUDY

i) To prepare filtered speech materials in Hindi, Kannada and English to demonstrate the effects of filtering on speech perception.

ii) To study the efficacy of these audio cassettes in an acoustfc camp.

REVIEW OF LITERATURE

Speech perception is a specialised aspect of a general human ability, the ability to seek and recognize patterns. Speech perception is the process of decoding a message from the stream of sounds coming from the speaker.

The sense of hearing is integrally related to communication and interaction 'with one's fellow beings. When the sense of hearing is impaired, the ability to relate may be impaired as well. Messages, may not be interpreted properly because crucial words are missed and the hearing-impaired person does not catch the meaning conveyed by a rising inflection, a pause or an emphasis in a particular part of an utterance. Faulty hearing often leads to misunderstanding and inappropriate behaviour (Verderber and Verderber, 1986).

Hearing-impairment distorts the signal received by the auditory system. This distortion limits the ability of the listener to receive the message which the speaker wishes to convey. If the hearing-impaired person's hearing deficit is so severe as to prevent adequate monitoring of his/her own speech production, then the production and transmission of correct speech sound patterns will also be affected (McGinnis, 1983).

Attempts have been made to simulate the effects of hearing loss. Majority of the researches have used filtered speech to demonstrate the effects of hearing loss on speech perception. Studies have been carried out to compare the perception of normal speech by subjects with sensori-neural hearing loss with those of normal listeners for filtered speech.

It is well known that speech can be degraded eliminating a portion of the frequency spectrum, via electronic filtering. For example, word recognition test Have been recorded through a low pass filter to remove a certain amount of high frequency acoustic

information normally present. French and Steinberg (1947) found that as the low pass filter cut off frequency was reduced from 7000 Hz to 1950 Hz the average syllable recognition score for normals reduced from 98% to 69%. Reduction in syllable recognition score for normals was also observed when a high pass filter was used to progressively eliminate low frequency energy. French and Steinberg (1947) also found that the frequencies both above and below 1900 Hz contributed equally to syllable recognition scores.

Owens, Benedict and Schubert (1972) compared phonemic errors of listeners with sensori-neural hearing loss above 500 Hz, with those of normal listeners presented with 780 Hz low pass speech. They found that persons with similar pure tone losses, but different etiologies, made the same kind of errors, and listeners -with sharply sloping audtograms made errors similar to those made by the normal subjects for filtered speech signal. In other words, Owens et al. (1972) found that the performance of normal hearing subjects listening through a 780 Hz low pass filter was highly similar to that of the comparable patient group.

Sher and Owens (1974), compared performance of patients with high frequency hearing loss above 2000 Hz and a group of normal hearing subjects listening through a low-pass filter with a cut off at 2040 Hz. They found that there was no significant differences between the two groups in overall scores, in probabilities of errors for individual phonemes or in the pattern of consonant confusions.

Wang and Bilger (1976) compared patterns of consonant confusion for normal hearing subjects listening under varying conditions of high and low pass filtering to that of hearing-impaired subjects with differing audiometric configurations using a specially designed control system. They found that patterns of feature recognition tended to be similar for normal hearing subjects and hearing-impaired subjects when the filter settings were comparable

to the audiometric configuration. As the low pass cut off was lowered the consonant confusions became similar to that of high frequency loss group.

Wang, Reed and Bilger (1978) found that listeners with sensoii neural hearing loss who show similar patterns of consonant confusion also tend to have similar auditory profiles. They determined whether normal listeners, when presented with filtered speech, would produce, consonant confusions similar to those previously reported for the hearing-impaired listener. They included twelve filter conditions with different band pass settings. The wide band conditions was on 80-5600 Hz pass band. For the high-pass conditions, the upper cutoff remained at 5600 Hz, while the lower cutoff took on values of 355, 710, 1400, 2000, 2800 and 4000 Hz. For the low pass conditions, the lower cutoff remained at 80 Hz, while the upper cutoff took on values of 2800, 1400, 1000, 710 and 500 Hz. It was found that low pass filtering produced consonant confusion comparable to those of listeners with high frequency hearing loss. Severe high pass filtering gave a result comparable to that of patients with flat or rising audiograms. And mild filtering resulted in confusion patterns comparable to those of listeners with essentially normal hearing. Thus they found that patterns of feature recognition tended to be similar for normal hearing subjects and hearing-impaired when the filtering conditions were comparable to audiometric configuration.

Walden, Montgomery, Schwartz and Prosek (1981) studied the relationship between consonant recognition under conditions of acoustic filtering and hearing loss in subjects with unilateral hearing-impairments. A spectrum shapef(a flexible multifilter) was used to match the audiometric configuration, thereby permitting a wider range of audiometric configurations to be simulated and matched more precisely. A comparison between consonant recognition scores for impaired ears and for the ears listening through the spectrum shaper revealed large individual differences among subjects.

Although overall consonant recognition and the probabilities for individual consonants tended to be different between ears, the patterns of feature recognition were quite similar.

Recently, Moore (1996) produced a compact disc in English which contains a series of simulations of the effects of cochlear hearing loss. The following aspects were simulated in the disc threshold elevation combined with loudness recruitment; reduced frequency selectivity and threshold elevation, loudness recruitment and reduced frequency selectivity. The effects were demonstrated using speech in quiet and in a background of noise and using a piece of music with a wide dynamic range. The purpose of the compact disc was for teaching and educational purposes and for counselling of relatives of hearing-impaired persons, for use in schools and for demonstrating the importance of hearing protection. However, the efficacy of the compact disc has not been studied.

Thus the review of literature shows that the effects of hearing loss can be simulated using filtered speech. In the present study an attempt has been made to simulate the effect of hearing loss on speech perception when the language used for communication is Kannada, English or Hindi.

METHODOLOGY

This study was conducted to demonstrate the effects of filtering on speech perception to enable a lay person to understand the effect of hearing loss on speech perception.

Subjects

Subjects were eighty B.Ed, students from a local Teacher's Training Institute, out of which fifty six were males and twenty four were females in the age range of 20-24 years with a mean age of 22 years. All of them were native speakers of Kannada.

Stimulus Material

The speech material consisted of words, sentences and paragraphs in three Indian languages; Hindi, Kannada and English. The words, sentences, and the paragraph were so chosen that they contained majority of the speech sounds in the respective languages. The speech materials used are given in the Appendix-A.

Instrumentation

The following instrument were used for the study :

a) SONY player cum recorder CFS-W4455
b) SONY TC-FX 170 stereo cassette deck
c) Hearing Science Lab.

Procedure

Preparation of Material

The speech materials were audio recorded on a Meltrack DRC-90 cassette using a SONY player cum recorder (CFS W4455) with a built in mic.

The recorded speech material were filtered using the Hearing Science Lab. Hearing Science Lab is an instrument used to demonstrate various psychophysical experiments.

The process of filtering was preceded by measuring the frequency response of the Hearing Science Lab using a signal generator (B&K 1023) and Graphic Level Recorder (B&K 2307) as shown in Fig.A. The signal input from the signal generator was fed into the Hearing Science Lab and the output was measured using the graphic level recorder.

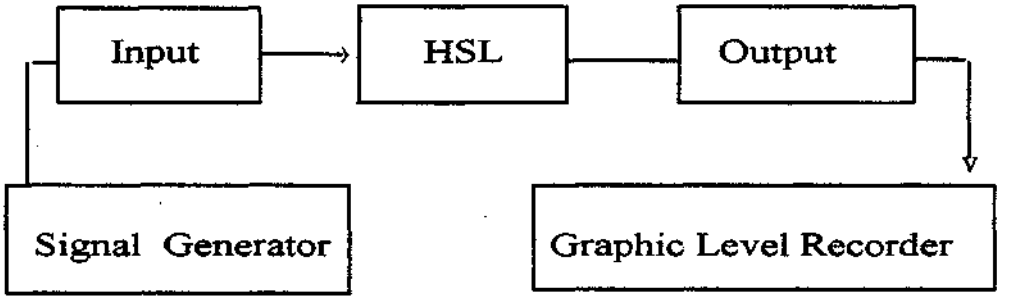

Fig.A: Schematic representation for the frequency analysis of Hearing Science Lab. [HSL]

The filtering of the speech-materials was then done. The recorded speech material was played on a SONY deck TC FX 170 whose input was fed into the Hearing Science Lab. The appropriate filter setting was set up in the Hearing science Lab. The filtered output was fed into another SONY TC FX 170 stereo cassette deck and the filtered speech materials both low pass as well as high pass was recorded on another Meltrack DRC—90 cassette. Fig.B shows the instrumentation for filtering process

Fig.B Instrumentation set-up for filtering process

The filtered speech materials in each language Hindi, Kannada and English were recorded on separate cassettes, with low pass filtering of male and female voices on one side and high pass filtering on another side.

Following Table shows the different cut-off frequencies chosen for the study. The slope of the filter was at 12 dB/octave.

Tl	250 Hz low pass
T2	250 Hz high pass
T3	500 Hz low pass
T4	500 Hz high pass
T5	1 KHz low pass
T6	1 KHz high pass
T7	2 KHz low pass
T8	2 KHz high pass
T9	4 KHz low pass
Tl 0	4 KHz high pass
T11	6 KHz low pass
T12	6 KHz high pass
T13	8 KHz low pass
T14	8 KHz high pass

Data Collection

An Acoustic Camp was conducted to educate the lay people regarding acoustics related to speech and hearing, through simple experiments and demonstrations. Effect of hearing loss on speech perception was also demonstrated in that camp.

Before the commencement of the acoustic camp, the subjects were given a pretest questionnaire which consisted of questions on filtering. Later in the camp, they were demonstrated in Kannada, regarding the effects of filtering on speech perception.

The lecture for the orientation program was as follows:

"Communication is mainly an active and intentional two way process of exchange of messages. Human beings communicate to share ideas, feelings, desires and emotions. The message can be transmitted through several methods like speaking, alarms, morsecode, reading, writing, gestures, etc. For an effective communication through speech, normal hearing is aprerequisite.

Speech is the most efficient and frequently used mode of communication. In speech, the words are combined in various ways to convey meaning. Speech is produced with the help of speech mechanism structures like tongue, jaw, lips, etc. in coordination with the nervous system.

To perceive speech is to extract frequency and intensity information from an acoustic signal. The unit of frequency is (Hz) and the intensity is decibel (dB). The frequency contributing most to the intelligibility of speech is balanced around 1900 Hz and the region of greatest sensitivity in the human auditory threshold curve i. e. between 200 Hz and 4000 Hz. The fundamental frequency of a male and female s voices are different. The fundamental frequency for male is lower and that of female s is higher.

A hearing-impaired individual tends to lose the information based on the frequencies that are affected. He has a major difficulty in understanding speech, because speech perception cannot be normal if some frequencies are cut off".

Hearing losses could be high frequency sloping hearing loss, low frequency rising hearing loss, etc.. The high frequency information is lost or reduced when a subject has high frequency hearing loss. Similarly in subjects with low frequency hearing loss, the low frequency information is lost or reduced.

In other words, the human ear acts like an electronic filter. An electronic filter is a device which may be used selectively to pass some frequencies and therefore to reject others. There are many types of electronic filters. If a filter passes only the frequencies below a certain cut off frequency while rejecting (attenuating) higher frequencies, it is called low pass filter. Conversely a high pass filter will pass frequencies only above the cut off. If frequencies only within a certain range or band are passed, the device is called a band pass filter.

It is difficult for a layman or a professional to understand exactly how it feels to be hearing-impaired.

One of the ways to simulate a high or low or mid frequency hearing loss would be by passing speech through these electronic filters. Filtering has an effect on speech perception.

It could be noted that low pass filtering to some extent resembles a high frequency hearing loss and high pass filtering resembles low frequency rising hearing loss.

To understand the effects of filtering on speech perception more clearly or to understand how speech is perceived by a hearing-impaired individual, let us listen to some of the speech materials subjected to low and high pass filtering with different cut off frequencies ".

The audio cassettes of both unfiltered and filtered speech material was then played.

After the camp, a post test questionnaire was given. The pretest and post test scores were calculated to determine their understanding of the concept of filtering.

RESULTS AND DISCUSSION

The results were analyzed using suitable statistical procedure.

Scoring Pattern

The pre- and post-test questionnaire items were scored in a binary system of correct or incorrect. Each correct answer was given a score of one and each incorrect answer was scored a zero. Items left unmarked were also scored zero. A total score was calculated for each subject by adding the scores obtained for individual questions. It was observed that the post-test scores were higher for all the subjects.

The post-test scores showed a definite improvement over the pre-test scores.

Table-1 shows the mean pre- and post-test scores obtained by eighty subjects and their corresponding SD and range.

The t-test was administered to determine the significance of difference between the mean scores for pre-test and post-test. The t-score indicated the difference to be significant at .01 level.

Table-1 : Mean, SD and Range of Pre-test and Post-test Scores

Mean	5.48	8.23
SD	5.42	7.93
Range	1-9	5-9

The nine questions of the questionnaire were subjected to item analysis. Table-2 shows the subjects who answered the questions correctly. Both the pre- and post-test questionnaire are included in

the Appendix-B. Item analysis revealed that questions Q1, Q3 and Q5 were relatively easy, as nearly 80% of them had given the correct answer. These questions were related to the parts of the ear and units of frequency and intensity. The subjects being teacher trainees and owing to their background knowledge, could score high for these questions. The rest of the questions Q2, Q4, Q6, Q7, Q8, Q9 were relatively difficult as nearly 70% of them had failed. These questions were related to the fundamental frequency of male and female's voice and to filtering. Question four was related to the functions of the ear. All of them knew that the ear is the organ of hearing but they were unaware that the ear is also the organ of balance, hence a low score was obtained for this question.

After the acoustic camp, a post-test was administered with the same questionnaire. All the subjects scored high in the post-test.

Table-2 :No.of subjects who answered correctly

No.of Subjects	Test Condition	Ql	Ql	Q3	Q4	Q5	Q6	Q7	Q8	Q9
80	Pre-test(Ol)	69	17	50	52	63	49	35	33	67
80	Post-test (O2)	80	62	76	80	77	74	64	62	77

Thus from the pre-test and post-test scores it is clear that the subjects were really benefitted from the demonstration on the effects of filtering on speech perception in the acoustic camp.

SUMMARY AND CONCLUSION

Speech Perception is a specialized aspect of a general human ability, the ability to seek and recognize patterns. Speech perception is the process of decoding a message from the stream of sounds coming from the speaker. Hearing-impairment affects normal speech perception (Dubno, Dirks and Langhofer, 1982; Owens, Talbott and Schubert, 1968). Some effects are predictable such as the fact that inherently louder sounds such as vowels are easier to distinguish than inherently softer sounds such as fricatives, whereas others are difficult to predict.

The present study aimed at developing filtered speech materials in three Indian languages to simulate various types of hearing-impairments like high frequency and low frequency hearing-impairments and demonstrating the effects of filtering on speech perception in an acoustic camp. Filtered speech materials were developed in Hindi, Kannada and English, with filter settings at 250 Hz, 500 Hz, 1000 Hz, 2000 Hz, 4000 Hz, 6000 Hz and 8000 Hz low and high pass filtering. The efficacy of the materials were evaluated using eighty subjects from a local Teachers' Training Institute.

The study was conducted in two steps. Initially a pretest questionnaire was given to the eighty subjects before the commencement of the camp and the pretest scores were obtained. The subjects were demonstrated regarding the effects of filtering on speech perception using the filtered speech materials in the acoustic camp. After the camp, a post-test was administered and the post-test scores were obtained.

The outcome of the study clearly demonstrated the efficacy of the acoustic camp regarding the effects of filtering on speech perception. The cassettes and the demonstration were well accepted by the subjects. The descriptive as well as statistical analysis of the

post test data revealed that the subjects had gained a significant amount of information on filtered speech material and how it simulates hearing loss.

As suggested by Moore (1996),a few applications of the audio cassettes containing the filtered speech materials developed as a part of the study are as follows:

1. The cassettes which contain a series of simulations of the effects of high frequency and low frequency hearing loss can be used for teaching and educational purposes.

2. These cassettes may be useful in courses that describ e the consequences of cochlear hearing loss for speech perception. The demonstration can give some insight into the difficulties experienced by the hearing-impaired.

3. These could also serve in demonstrating to relatives of hearing-impaired persons, the difficulties faced by the hearing-impaired. It can help in counselling the patients regarding the usefulness of hearing aids.

4. These cassettes can be used in schools which take both hearing-impaired and normally hearing children. Playing some of the demonstrations to the normally hearing children can help them to appreciate the difficulties experienced by their hearing-impaired classmates and can convince them of the need to speak clearly.

5. It could also be used to demonstrate the importance of hearing protection,as many people whose work involves exposure to intense and potentially damaging sounds and are reluctant to use hearing protective devices. The demonstrations of these cassettes can help to convince such people of dire consequences of hearing damage caused by noise exposure.

LIMITATIONS OF THE STUDY

1. Only two types of losses were simulated, high frequency sloping hearing loss and low frequency rising hearing loss while flat frequency hearing loss was not simulated.

2. The effects of threshold elevation and loudness recruitment has not been simulated. Only the effect of frequency was simulated.

3. Efficacy of the material was tested using subjects from a homogenous group.

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APPENDIX-A

1. Hindi Word List
2. Hindi Sentences
3. Hindi Paragraph
4. Kannada Word List
5. Kannada Sentences
6. Kannada Paragraph
7. English Word List
8. English Sentences
9. English Paragraph"

HINDI WORD LIST

1. ghar - bar
   घर - बार
2. chan - bin
   चान - बिन
3. देख - देख
4. dak - ghar
   धाक - गर
5. फल - फूल
6. दूप - डाप
7. नपन - कान
8. टाल - टूल
9. हात - मूँ
10. ऊंच - नीचे
11. shor - gul
    शोर - गुल
    पास - पोस

HINDI SENTENCES

1. me ladka hu
   मैं लड़का हूँ।
2. a:j somva:r he.
   आज सोमवार है।
3. बच्चें ढोल बजा रहे थे।
4. मुन्नी पढ रही है।
5. नाली में खाना रखा है।
6. जलने का पानी ठंडा है।
7. karn aur ganga ka ghar ghat ke nikat he
   करण और गंगा का घर घाट के निकट है।
8. vidya chat ke u.par phal kha rahi: thi.
   विद्या छत के ऊपर फल खा रही थी।
9. bhid vali bas me chadna mushkil he.
   भीड़ वाली बस में चढ़ना मुश्किल है।

HINDI PASSAGE

mesur karnatak ka ek chota sa shahar he. yaha ka mosam
मैसूर कर्नाटक का एक चोटा सा शहर है। यहाँ का मौसम
thanda tatha suhawana he. yaha chamundi dewi ka mandir,
ठंठा तथा सुहावना है। यहाँ चामुंडी देवी का मंदिर,
tipuka makbara, krishna raj sagar, jagan mohan mahal dekhane
टिप्पू का मकबारा, कृष्णाराज सागर, जगन मोहन महल देखने
ke yogya he. yaha dashara dhum dham se manate he. is din
के योग्य है। यहाँ दशरा धूम धाम से मनाते है। इस दिन
har ghar aur bazar ko sajate he. mesur ke mukhya bazar ke
हर घर और बाजार को सजाते है। मैसूर के मुख्य बाजार के
laghbag dhayi-tin kilometre raste par khub roshni ki jati he. us
लगभग ढाई-तीन किलोमीटर रास्ते पर खूब रोशनी की जती है। उस
din tarahtarah ki jhakiya nikali jati he. mesur me ane ke bad
दिन तरहतरह की झाकियाँ निकाली जाती है। मैसूर मे आने के बाद
kahi phir jane ka man nahi hotha.
कही फिर जाने का मन नहीं होता।

KANNADA WORD LIST

1.	mara	gida
	ಮರ	ಗಿಡ
2.	kallu	mannu
	ಕಲ್ಲು	ಮಣ್ಣು
3.	thayi	thande
	ತಾಯಿ	ತಂದೆ
4.	kashta	sukha
	ಕಷ್ಟ	ಸುಖ
5.	hola	gadde
	ಹೊಲ	ಗದ್ದೆ
6.	anda	tfanda
	ಮೊಂದ	ಭಂದ
7.	bandhu	balaga
	ಬಂಧು	ಬಳಗ
8.	pashu	pakshi
	ಪಶು	ಪಕ್ಷಿ
9.	gedge	pudge
	ಗೆಜ್ಜೆ	ಪೂಜೆ
10.	hottë	batte
	ಹೊಂಬೆ	ಬಟ್ಟೆ
11.	kanasu	nanasu
	ಕನಸು	ನನಸು
I2.	atha	itha
	ಅತ್ತ	ಇತ್ತ

KANNADA SENTENCES

1. bhanuvara shalege rajadina
   ಭಾನುವಾರ ಶಾಲೆಗೆ ರಜಾದಿನ.
2. hasuvina halu arogyakke olleyadu.
   ಹಸುವಿನ ಹಾಲು ಆರೋಗ್ಯಕ್ಕೆ ಒಳ್ಳೆಯದು.
3. suryanu hagalalli iruttane.
   ಸೂರ್ಯನು ಹಗಲಲ್ಲಿ ಇರುತ್ತಾನೆ.
4. chandra hunnimeya dina dundagi iruttane
   ಚಂದ್ರ ಹುಣ್ಣಿಮೆಯ ದಿನ ದುಂಡಗೆ ಇರುತ್ತಾನೆ.
5. nanage coffee yendre thumba ishta
   ನನಗೆ ಕಾಫಿ ಎಂದರೆ ತುಂಬಾ ಇಷ್ಟ
6. havu thumba vishakari.
   ಹಾವು ತುಂಬಾ ವಿಷಕಾರಿ.
7. makkala mukha thumba mrudu.
   ಮಕ್ಕಳ ಮುಖ ತುಂಬಾ ಮೃದು.
8. ghendamrugada charma bahala oratu
   ಹೆಂಡಾಮೃಗದ ಚರ್ಮ ಬಹಳ ಒರಟು.
9. bannada chathri mathu rathada meravanige nodalu chanda.
   ಬಣ್ಣದ ಪತ್ರಿ ಮತ್ತು ರತ್ನದ ಮೆರವಣಿಗೆ ನೋಡಲು ಚೆಂದ.
10. kogile kantha bahala madhura
    ಕೋಗಿಲೆ ಕಂಠ ಬಹಳ ಮಧುರ.
11. bheemana ayudha gadhe.
    ಭೀಮನ ಆಯುಧ ಗದೆ.
12. jebige jhana jhana hana lakshana.
    ಜೇಬಿಗೆ ಜಾಣ್ಮೆಗೂ ದುಡ್ಡಿಗೂ ಯಾವಾಗಲೂ ಲಕ್ಷಣ.
13. zeebra ondu sundra prani.
    ಜೀಬ್ರಾ ಒಂದು ಸುಂದರ ಪ್ರಾಣಿ.
14. police yandare nanage bhaya.
    ಪೋಲೀಸ್ ಎಂದರೆ ನನಗೆ ಭಯ.
15. rushi yagna madidhanu
    ಋಷಿ ಯಜ್ಞ ಮಾಡಿದನು.

KANNADA PASSAGE

bengaluru namma rajyadha ondhu dhodda ooru. ee oorannu

ಬೆಂಗಳೂರು ನಮ್ಮ ರಾಜ್ಯದ ಒಂದು ದೊಡ್ಡ ಊರು. ಈ ಊರನ್ನು

namma rajyadha "bombayi' ennuvaru. indiyadha dhodda

ನಮ್ಮ ರಾಜ್ಯದ "ಬೊಂಬಾಯಿ" ಎನ್ನುವರು. ಇಂಡಿಯದಾದ ದೊಡ್ಡ

nagaragalalli idhu ondhu. ee oorannu nodalu janaru bere-bere

ನಗರಗಳಲ್ಲಿ ಇದೂ ಒಂದು. ಈ ಊರನ್ನು ನೋಡಲು ಜನ ಬೇರೆ ಬೇರೆ

rajyagalinda, bere-bere oorugalinda baruvaru. idhallade namma

ರಾಜ್ಯಗಳಿಂದ, ಬೇರೆ-ಬೇರೆ ಊರುಗಳಿಂದ ಬರುವರು. ಇದಲ್ಲದೆ ನಮ್ಮ

rajyadalliruva belur, jog, nandhi, ivugalannu nodalu janaru

ರಾಜ್ಯದಲ್ಲಿರುವ ಬೇಲೂರು, ಜೋಗ, ನಂದಿ, ಇವುಗಳನ್ನು ನೋಡಲು ಜನರು

baruvaru. ee nadinalli reshmayannu beliyuvaru.

ಬರುವರು. ಈ ನಾಡಿನಲ್ಲಿ ರೇಷ್ಮೆಯನ್ನು ಬೆಳೆಯುವರು.

ENGLISH WORD LIST

1. Play Ground
2. Birthday
3. Outside
4. Starlight
5. Whitewash
6. House work
7. Farewell
8. Daybreak
9. Mushroom
10. Northwest
11. Stairway
12. Armchair

ENGLISH SENTENCES

1. The jungle faces the lake.
2. This pin is sharp.
3. Fishes are in the lake.
4. The dog bit the man.
5. The van is in the park,
6. I won the bet with my friend.
7. Put it in the box.
8. Don't beat the horse.
9. Don't loose your breath.
10. My father works here.
11. This chain is big but rusted.
12. I am yet to measure the wheat.

ENGLISH PARAGRAPH

When the sunlight strikes rain drops inthe air, they act like a prism and form a rainbow. The rainbow is a division of white light into many beautiful colours. These take the shape of a long rouch arch, with its path high above and the two ends apparently beyond the horizon. There is according to legend, a boiling pot of gold at one end. People look but no one ever finds it. When a man looks something beyond his reach, his friends say he is looking for the pot of gold at one end of the rainbow.

APPENDIX - B

1. Pre-Test Questionnaire
2. Post-Test Questionnaire

ALL INDIA INSTITUTE OF SPEECH AND HEARING

MYSORE 570006

QUESTIONNAIRE FOR ACOUSTIC CAMP

Pre-Test

Name: Age

Address Sex F / M

Occupation/Education :

Answer appropriately

1 - The Unit of frequency is

(a) Hertz (b) Decibel (c) Mel (d) None of the above

2. Fundamental frequency for males is ...,& that for females is ...

(a) Higher (b)Lower (c) Same.

3. The unit of intensity is

(a) Hertz (b) Decibel (c) Mel (d) None of the above

4. The ear is the organ of... and ...

(a) Hearing (b) Seeing (c) Balance (d) Feeling of touch

5. Our ear has 3 parts.

(a) True (b) False (c) I don't know

6. An electronic filter is a device

a) that provides frequency dependent transmission of energy.

b) that provides time-dependent transmission of energy.

c) none of the above.

7. A high pass filter

a) passes the frquencies above a certain cut-ofF frequency.

b) allows only high frequencies to pass through.

c) none of the above.

8. What is the effect of filtering on speech perception?

a) filtering does not have an effect on speech perception..

b) filtering has an effect on speech perception.

c) both of the above

9. A hearing-impaired individual

a) tends toloose the speech inforamtion in the affected frequencies

b) does not losse any information.

c) none of the above.

ALL INDIA INSTITUTE OF SPEECH AND HEARING

MYSORE 570006

QUESTIONNAIRE FOR ACOUSTIC CAMP

Post-Test

Name: Age

Address Sex F / M

Occupation/Education :

Answer appropriately

1 • The Unit of frequency is

(a) Hertz (b) Decibel (c) Mel (d) None of the above

2. Fundamental frequency for males is ....,& that for females is …

(a) Higher (b)Lower (c) Same.

3. The unit of intensity is

(a) Hertz (b) Decibel (c) Mel (d) None of the above

4. The ear is the organ of.... and …

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b) does not losse any information.

c) none of the above.