DEDICATED IN

LOVING MEMORY OF MY PARENTS.

DEVELOPMENT OF A DELAYED AUDITORY FEEDBACK (DAF) TEST FOR THE ILLITERATES

Register No. 8402

An independent project work submitted as part fulfilment for the first year M.Sc. (Speech and Hearing) to the University of Mysore.

MAY 1984

AH India Institute of Speech and Hearing,
MYSORE-570 006.

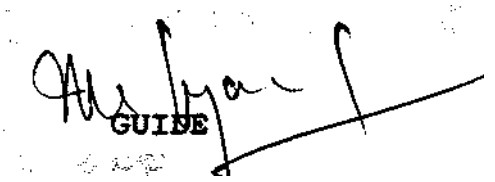
C E R T I F I C A T E

This is to certify that the Independent Project ntitled **"Development of a Delayed Auditory Feedback DAF) Test for the Illiterates"** is the bonafide work one in part fulfillment for First Year M.Sc., (Speech nd Hearing) of the student with Register Number. . . . .

Director
All India Institute of Speech and Hearing, Mysore - 570 006

C E R T I F I C A T E

This is to certify that the Independent Project entitled: **"Development of a Delayed Auditory Feedback (DAF) Test for the Illiterates"** has been prepared under my guidance and supervision.



D E C L A R A T I O N

This Independent Project entitled "**Development of a Delayed Auditory Feedback (DAF) test for the Illiterates"** is the result of my own work undertaken under the guidance of Dr. M.N. Vyasamurthy, Lecturer in Audiology, All India Institute of Speech and Hearing, Mysore-6, and has not been submitted earlier at any University or Institution for any other Diploma or Degree.

REGISTER NUMBER.8402

Mysore

Dated -

ACKNOWLEDGEMENT .

I am greatly indebted to my teacher. Dr. M.N.Vyasamurthy, Lecturer in Audiology, All India Institute of Speech and Hearing, Mysore, for his invaluable guidance in each and every facet of the study.

I sincerely thank Dr. N.Rathna, Director, for having permitted me to conduct the study at A.I.I.S.H.

I sincerely thank Mr. S.S.Murty, Lecturer in Electronics, A.I.I.S.H., Mysore, for his technical help.

Mr. N.P.Nataraja, Reader in Speech Science, is thanked for providing the equipment.

I express my sincere thanks to Mr. C.B.P.Srivastav, for his co-operation through out the study.

I extend my sincere thanks to Ms. Rajalakshmi R Gopal, for typing the manuscripts.

CONTENTS

INTRODUCTION

INTRODUCTION

In daily routine of audiology clinic, not all patients are cooperative for their hearing evaluation. This non-co-operation may be due to:-

(1) not understanding the test procedure.
(2) not motivated for tests.
(3) incapability of the patient physically or emotionally.
(4) wishes to conceal a handicap.
(5) deliberate feigning of hearing loss.
(6) unconscious motivation to response.

Usually these non-cooperative patients exhibit functional hearing loss. Many terms have been used in literature to describe functional hearing loss. The most popularly used terms in the literature today are "nonorganic hearing loss", "pseudohypacusis", "psychogenic hearing loss"and"malingering". Williamson (1974) cautions that such terms do not necessarily describe the same phenomenon, as the clinician does not know that the threshold obtained is the result of conscious or unconscious motivation. So one should use generic terms. Carhart (1961) proposed a term "pseudohypacusis".

Regarding non organic hearing loss, a committee on Hearing and Bioacoustic reports as follows (Glorig 1965):

Non organic hearing impairment designates auditory dysfunction for which no plausible anatomical or chemical basis can be found. The term includes auditory disorders ranging from conscious, purposeful malingering to noncon-scious, apparently purposeless disorders variously called hysterical deafness, psychogenic deafness and the like conditions existing outside the auditory system, such as mental deficiency senility and brain injury, which tend to affect hearing adversely, constitute a separate problem. However these conditions must be identified and excluded in order to establish a diagnosis of nonorganic deafness or hearing loss.

The specification of types of nonorganic hearing impairment at present rests on no precise terminology framework. Description tends to depend on factors such as motivation, causation, and degree of impairment. For example the factor of motive may be regarded as extending from deliberate seeking of tangible reward to unconscious avoidance of unpleasant circumstances. In the individual case unfortunately, motive is more easily inferred than specified with any degree of assurance. The extent of conscious volition is difficult to determine short of a frank confession. The causes of nonorganic hearing impair-ment are not known, although plausible contributing factors occasionally can be discerened. At the present time, only the presence of nonorganic auditory disorders can be determined with reasonable assurance. The amount of nonorganic hearing loss may be measured only with difficulty if at all".

Several tests have been reported to test pseudohypacusis. Among these the Delayed Auditory Feedback for speech has its own entity.

DAF test was first given by Lee and Black (1950, 1951). They reported that normal speakers experienced a change in their speech similar to the stuttering, when they heard their speech under various conditions of the delay (Newby, 1972).

Black (1951) studied the effect of DAF under different delay conditions: viz. 1/8 sec., ¼ sec., and 1/15 sec. He found that the effect was quite marked at 1/8 sec. At ¼ sec. delay the effect was still present but at 1/15 sec. DAF, little or no effect was noted.

One of the early attempts to use DAF as a test of hearing levels was done by Tiffany and Hanley (1952). College students with normal hearing who feigned malingering were tested. The effect on reading rate was found to be significant when the signal was at 75 dB HL. Most investigators choose a delay of 0.1 and 0.2 sec. Tiffany and Hanley,(1952); Chaiklin and Ventry, (1963), suggested that the test is effective at high levels of the feedback signal.

Need for the study:

DAF test for identifying pseudohypacusis has been found to be very useful clinically. This test can only be administered if the subjects are literates. Hence the usefulness of the test is limited to the literate subject. To use the DAF test on illiterate subjects it is essential to modify the available DAF test. The present study deals with standardization of DAF test for illiterate subjects.

Null Hypothesis:

1) There is no significant difference between post-test reading rate and pre-test control reading rate.
2) There is no significant difference between the pre-test control reading rate and the reading rate obtained under DAF condition.
3) There is no significant difference between the reading rate obtained under DAF condition and the post-test control reading rate.
4) There is no significant difference between the control reading rates obtained for Hindi and Kannada language speakers.

TERMINOLOGY

Reading (naming) rate:

Time taken by the subject to name all the picture items which are kept in a sequence.

Pre-test control reading rate:

Reading rate obtained without DAF before the DAF experiment is done.

Post-test control reading rate:

After obtaining the reading rate under DAF, the subjects are asked to name the picture items in the absence of DAF and the time required to read (name) the picture items is determined. This time is considered as post-test control reading(naming) rate.

REVIEW OF LITERATURE

REVIEW OF LITERATURE

Several tests are found in the literature to test pseudohypacusis.

Test-Retest-Reliability:

Inconsistent response is one of the important indications of functional hearing loss of pseudohypacusis. (If it is unilateral then there won't be a shadow response). If pseudohypacusis patient is tested repeatedly there will not be a consistency in response pattern. Counselling the patient about his inconsistency or inaccuracy may encourage more accurate responses.

The Speech Stenger Test:

This test is for Unilateral Functional hearing loss. The stenger principle states that when two tones of the same frequency are introduced simultaneously in to both ears, only the louder one will be perceived.

Using speech as a signal to verify a unilateral hearing loss is based on the classical pure-tone stenger test (Taylor 1949; Johnson, Work and Mc Coy 1956; Watson and Tolan 1967). Most frequently spondiac words are used for this test. At

different sensation levels, both ears are stimulated patients with normal hearing or a bilateral hearing loss is conscious of hearing the speech in the ear which receives speech at higher intensity.

The Story Test:

Although this test is not considered the part of the stylish repertoire of nonorganic tests. But this can be still used to idenity a unilateral hearing loss.

The patient is instructed that he is going to hear a story through the earphones and when the tester finishes the story he has to repeat as many parts of the story he remembers. The part of the story is fed to the poorer ear, pseudohypacusis in which it is suspected. The presentation level is very important. The level is same for both the ears. The level is chosen so that it is slightly above the admitted threshold in the better ear. The cross hearing may interfere with the validity of the test if the level for the poorer ear is more than 30-35 dB greater than the level for the better ear (Newby, 1972).

Lombard or Voice Reflex Test:

This test is based on the principle that the speaker

regulates his voice intensity so that he accommodates to the noise present in his speaking environment (Hopkinson, 1973). Unless one does not hear the noise in his environment, he will raise his vocal intensity to compensate for the level of noise (Hopkinson, 1978).

In this test the patient will be given reading material and asked to read while the masking noise is fed through the earphones, he is wearing. With the increase and decrease of the noise level, the changes in voice intensity are noted. The test is positive if increase in voice intensity is noticed, when the masking noise is increased. If the noise level which brings changes in intensity of voice, is less than the admitted hearing levels, functional component can be suspected. The test is negative if no changes in voice level are observed regardless of the noise level. The standardization of this test is not done. A sophisticated patient may beat this test (Newby, 1972).

DAF Test:

According to Hanley and Tiffany (1954) 0.18 sec delay time has a critical value in DAF study. The procedure starts with several reading rates while there is no DAF, followed by 10 dB increments.

A stop watch is required to note the reading times. Subjects are given reading passages according to their level of intelligence and ability to read. Before starting the test the Threshold of intelligibility (50% correct) for running speech should be established for normal hearing.

The distance between the microphone and the mouth of the patient is kept constant. The patient is instructed "when I put the earphones on you, please read this passage aloud. Read it through, then wait until I ask you to read it again. That will happen several times". Then the earphones are placed on the patient. With the help of stop watch reading time is noted. This reading will be without DAF. Three reading rate will be obtained is the same manner.

The next time patient is asked to read the passage in the presence of 0.18 sec of DAF and equipment is set 10 dB above the normal 0 dB intelligibility level. Here again the reading time is noted down by stop watch. Again the level is increased by 10 dB, with same DAF, the reading time is obtained. This procedure continues until the patient feels obvious difficulty in reading. During the readings, each time, a VU meter level should be written down for comparison purposes. When the tester notes any tendency to control reading rate, he should repeat the test at the same level.

To substantiate a change of a few seconds in reading rate at a certain level SFB (simultaneous feed back) may be used. The subjects reading is fed back to the earphones without delay but with amplification. Reading rate obtained in this manner can be compared with the first reading rate obtained at the same level with 0.18 sec delay.

With earphones and microphone in the same place but without any delay and feedback the subject is asked to read the passage again. Here again the reading time is recorded to compare this with three pre-test reading times. It has been observed that following the experimental readings subjects seemed to read faster (Hanley and Tiffany, 1954).

The above literature shows that DAF test is a useful test for detecting pseudohypacusis. To extend the application of this test to the illiterates also, standardization of DAF test using pictures instead of reading materials is essential. The present study deals with the standardization of DAF test for illiterates.

METHODOLOGY

METHODOLOGY

The study involved five steps:-

1. Selection of the subjects.
2. Screening the subject's hearing.
3. Preparation of the materials.
4. Eliciting the response from the subjects for the prepared materials with and without auditory delay.
5. Recording the time by stop watch for each responses.

Step 1:

Two groups of subjects were included for the study.

Group A:

This group consisted of 15 (fifteen) Hindi speaking adult: in the age range of 18-30 years.

Group B:

This group consisted of 15 (fifteen) Kannada speaking adults in the age range of 18-30 years.

Step 2:

The subject's hearing was screened at 20dB HL (ANSI 1969) at 250 Hz to 8 KHz.

Step 3:

Sixteen pictures of familiar items were selected as the reading material. The list of the items is given in the appendix-1.

Step 4:

The above 16 (sixteen) items were displayed on separate cards and the each card were arranged in a sequence. The cards which were arranged in a sequence were shown to the subjects. Then the following instructions were given.

Instruction:

Here are some pictures to which you are familiar, look at them, identify them and name them one by one (The subjects were asked to name them). I am going to place the earphones on your ears. You are required to name the pictures on the cards one after the other. You have to name all the 16 pictures. I may ask you to name the pictures several times.

With the above instructions the test was started.

Instrumentation:

a. Lotus Clinical Audiometer type la-8112 was used for screening the hearing of the subjects.

b. Before starting the experiment the loudness at different volume settings of DAF apparatus were measured by using an artificial ear and SPL meter. Block diagram shows the setting to measure the intensities interms of dB SPL at different volume settings.

c. Delayed auditory feedback unit DAF 2 was used for introducing the delayed auditory feedback. The different delayed eg. 200 msec, 250 msec, and 300 msec at different intensities were used for the present study. The volume settings of 1, 3, 5 and 7 were used for this study.

d. A stop watch was used to measure the time taken to name all the sixteen pictures.

Testing environment:

The testing was carried out in a single room situation.

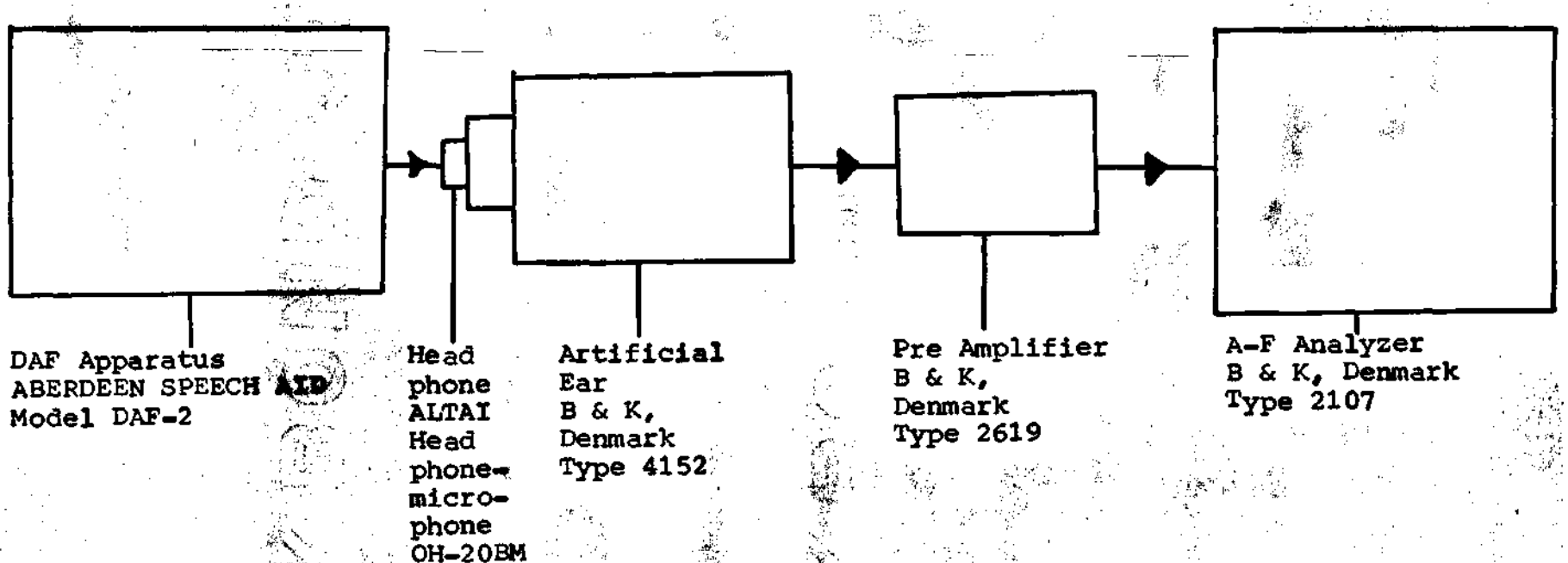
Step 5:

A total of 16 (sixteen) reading rates were recorded for each subjects.

Procedure:

Control study:

Subject was fitted with earphones of the DAF apparatus.



(Schematic diagram showing the arrangements for measuring the SPL output of the DAF apparatus headphone)

The instrument was switched on and delayed auditory feedback was not introduced. In the presence of SAF (volume 1), the reading time required to complete the sixteen pictures was noted down. This way three control readings were determined. These reading rates have been reported as pre-test control reading rates.

Experiment:

The reading rate of the subjects in the presence of DAF (Delay of 200 msec, intensity volume 1) was determined. In the same manner reading rates of the subjects under the following conditions namely:

Volume-3	-	delay 200 msec
Volume-5	-	delay 200 msec
Volume-7	-	delay 200 msec
Volume-1	-	delay 250 msec
Volume-3	-	delay 250 msec
Volume-5	-	delay 250 msec
Volume-7	-	delay 250 msec
Volume-1	—	delay 300 msec
Volume-3	-	delay 300 msec
Volume-5	-	delay 300 msec
Volume-7	-	delay 300 msec

After obtaining the reading rates in the above conditions, post-test control reading rate was established again. Thus for each subject a total of sixteen reading rates were determined.

RESULTS AND DISCUSSIONS

RESULTS AND DISCUSSIONS

Table-1: shows the pre-test reading time in seconds for Hindi speaking subjects. The average time taken by the subjects to name the objects ranges from 10.1 sec. to 20.6 secs. The group mean is 15.2 secs.

Table-2: shows the pre-test reading time in seconds for Kannada speaking subjects. The average time taken by the subjects ranges from 10.6 secs, to 21 secs. The group mean has been found to be 14.77 sees.

Table-3: illustrates the reading time at different volumes in the presence of DAF (200 m.sec) for Hindi speaking subjects.

Similarly, Table-4: shows the reading time at different volumes in the presence of DAF (200 m.sec) for Kannada speaking subjects.

Table-5: and Table-6: show the reading time at different volumes in the presence of DAF (250 m.sec) for Hindi speaking subjects and Kannada speaking subjects respectively.

Table-7: and Table-8: show the reading time at different volumes in the presence of DAF (300 m.sec) for Hindi speaking

Table-1: Pre-test Reading time in secs, for Hindi speaking subjects.

Subject	1st trial (Reading time)	2nd trial (Reading time)	3rd trial (Reading time)	Average
1	16	14	16	15.3
2	20	16	21	19.0
3	16	15	15	15.3
4	13	14	13	13.3
5	22	16	16	18.0
6	14	19	19	17.3
7	18	17	19	18.0
8	15	14	15	14.6
9	14	13	12	13.0
10	23	22	17	20.6
11	12	12	11	10.1
12	15	14	13	14.0
13	13	15	14	14.0
14	9	12	10	10.3
15	15	13	18	15.3

Mean of the Average : 15.206

Standard Deviation : 2.99

Table-2: Pre-test Reading time in secs, for Kannada speaking subjects.

Subject	1st trial (Reading time)	2nd trial (Reading time)	3rd trial (Reading time)	Average
	10	17	18	17.6
2	13	13	13	13.0
3	17	17	14	16.0
4	13	12	14	13.0
5	11	12	11	11.3
6	21	18	17	18.6
7	26	20	17	21.0
8	16	15	16	15.6
9	11	12	9	10.6
10	17	10	l1	12.6
11	15	14	13	14.0
12	12	12	14	14.0
13	12	16	11	13.0
		14	12	12.3
15	24	17	16	19.0

Table-3: Reading time at different volumes in the presence of DAF (200 m.secs.) for Hindi Speaking subjects.

Subject	Reading time at Vol.1 (in secs)	Reading time at Vol.3 (in secs)	Reading time at Vol.5 (in secs)	Reading time at Vol.7 (in secs)
1	16.0	16.0	17.0	16.0
2	26.0	20.0	29.0	24.0
3	15.5	20.0	20.0	21.0
4	15.0	15.0	14.0	16.0
5	14.0	16.0	20.0	18.0
6	16.0	14.0	15.0	15.0
7	16.0	16.0	19.0	17.0
8	20.0	24.0	24.0	28.0
9	20.0	15.0	16.0	20.0
10	24.0	35.0	21.0	21.0
11	14.0	10.0	11.0	15.0
12	20.5	24.0	27.0	26.0
13	16.0	15.0	17.0	18.0
14	10.0	10.0	13.0	12.0
IS	14.0	13.0	14.0	18.0
Mean	17.1	17.5	18.4	19.0
S.D.	4.19	6.40	5.16	4.39

Table-4: Reading time at different volumes in the presence of DAF (200 m.secs) for Kannada speaking subjects.

Subject	Reading time at Vol.1 (in secs)	Reading time at Vol.3 (in secs)	Reading time at Vol.5 (in secs)	Reading time at Vol.7 (in secs)
1	19.0	15.0	16.0	14.0
2	13.0	15.0	13.0	16.0
3	14.0	16.0	19.0	16.0
4	16.0	16.0	18.0	18.0
5	13.0	15.0	14.0	16.0
6	18.0	16.0	19.0	18.0
7	25.0	20.0	26.0	23.0
8	14.0	14.0	18.0	14.0
9	10.0	10.0	11.0	13.0
10	15.0	17.0	18.0	18.0
11	19.0	19.0	20.0	20.0
12	16.0	17.0	16.0	17.0
13	14.0	13.0	13.0	16.0
14	14.0	14.0	16.0	15.0
15	15.0	16.0	16.0	17.0
Mean	15.6	15.5	16.8	16.7
S.D.	3.51	2.38	3.60	2.52

Table-5: Reading time at different volumes in the presence of DAF (250 m.secs) for Hindi speaking subjects.

Subject	Reading time at Vol.1 (in secs)	Reading time at Vol.3 (in secs)	Reading time at Vol.5 (in secs)	Reading time at Vol.7 (in secs)
1	13.0	13.0	16.0	20.0
2	17.0	18.0	25.0	21.0
3	16.0	17.0	17.0	19.0
4	13.0	14.0	13.0	16.0
5	16.0	17.0	16.0	17.0
6	13.0	13.0	15.0	18.0
7	15.0	19.0	24.0	24.0
8	25.0	24.0	26.0	24.0
9	16.0	18.0	20.0	20.0
10	18.0	16.0	17.0	19.0
11	10.0	15.0	12.0	14.0
12	20.0	18.0	16.0	20.0
13	14.0	18.0	15.0	19.0
14	12.0		11.0	10.0
15	12.0	10.0	12.0	13.0
Mean	15.3	16.0	17.0	18.2
S.D.	3.73	3.53	4.75	3.82

Table-6: Reading time at different volumes in the presence of DAF (250 m.secs) for Kannada speaking subjects.

Subject	Reading time at Vol.1 (in secs)	Reading time at Vol.3 (in secs)	Reading time at Vol.5 (in secs)	Reading time at Vol.7 (in secs)
1	14.0	13.0	12.0	12.0
	10.0	18.0	17.0	18.0
3	15.0	16.0	16.0	17.0
4	16.0	18.0	17.0	18.0
5	12.0	13.0	13.0	18.0
6	15.0	16.0	16.6	15.0
7	18.0	24.0	26.0	24.0
e	13.0	11.0	13.0	12.5
9	10.0	9.0	10.0	10.0
10	15.0	17.0	19.0	21.0
11	17.0	14.0	15.0	15.0
12	15.0	15.0	13.0	14.0
13	13.0	12.0	12.0	13.0
14	10.0	11.0	13.0	12.0
15	14.0	13.0	15.0	14.0
Mean	13.8	14.6	15.1	15.5
S.D.	2.48	3.71	3.83	3.76

Table-7: Reading time at different volumes in the presence of DAF (300 m.secs) for Hindi speaking subjects.

Subject	Reading time at Vol.1 (in secs.)	Reading time at Vol.3 (in secs)	Reading time at Vol.5 (in secs)	Reading time at Vol.7 (in secs)	Post test control reading time (in secs)
1	15.0	15.0	16.0	16.0	11.0
2	20.0	17.0	26.0	26.0	15.0
3	17.0	16.0	18.0	17.0	15.0
4	14.0	15.0	15.0	15.0	11.0
5	16.0	15.0	14.0	18.0	13.0
6	18.0	17.0	17.0	14.0	15.0
7	19.0	18.0	19.0	18.0	12.0
8	24.0	25.0	28.0	31.0	15.0
9	20.0	19.0	19.0	19.0	11.0
10	18.0	17.0	18.0	17.0	14.0
11	10.0	10.0	13.0	14.0	12.0
12	12.0	13.0	20.0	21.0	12.0
13	16.0	15.0	15.0	13.0	10.0
14	17.0	10.0	10.0	10.0	8.0
15	10.0	12.0	12.0	11.0	12.0
Mean	16.4	15.6	17.3	17.3	12.4
S.D.	3.83	3.73	4.83	5.48	2.09

Table-8: Reading time at different volumes in the presence of DAF (300 m.secs) for Kannada speaking subjects.

Subject	Reading time at Vol.1 (in secs)	Reading time at Vol.3 (in secs)	Reading time at Vol.5 (in secs)	Reading time at Vol.7 (in secs)	Post test control reading time (in secs)
1	13.0	15.0	14.0	17.0	9.0
2	15.0	15.0	15.0	14.0	11.0
3	14.0	16.0	18.0	17.0	15.0
4	17.0	17.0	18.0	19.0	12.0
5	13.0	14.0	16.0	18.0	11.0
6	15.0	16.0	16.0	15.0	14.0
7	19.0	23.0	17.0	24.0	20.0
8	11.0	13.0	14.0	18.0	12.5
9	10.0	9.0	9.0	10.0	8.0
10	13.0	16.0	16.0	17.0	10.0
11	14.0	14.0	15.0	16.0	11.0
12	13.0	12.0	13.0	16.0	15.0
13	16.0	12.0	12.0	14.0	12.0
14	11.0	11.0	14.0	11.0	10.0
15	14.0	16.0	14.0	16.0	13.0
Mean	13.8	14.6	14.7	16.1	12.2
S.D.	2.35	3.22	2.34	3.31	2.95

and Kannada speaking subjects respectively. The post-test control reading rate also can be seen from the table-7 and table-8. The post-test control reading rate for Hindi speaking subjects ranges from 8 secs to 15 secs and for Kannada speaking subjects it ranges from 8 secs, to 20 secs.

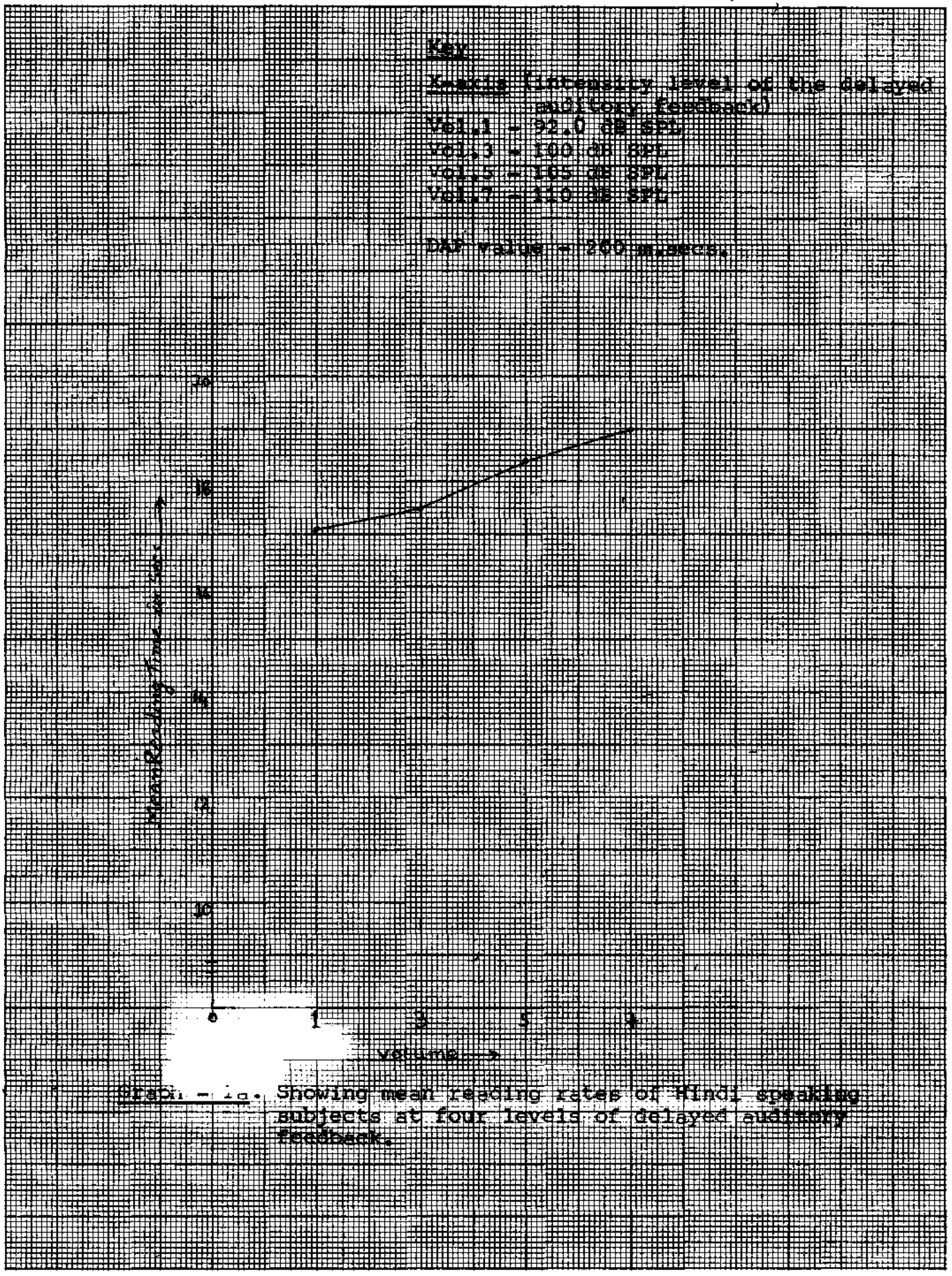
The group mean of post-test control reading rates for Hindi speaking and Kannada speaking groups were found to be 12.4 secs, and 12.23 secs respectively.

Graphs viz. la, lb, 2a, 2b, 3a and 3b show the mean reading rates at different levels of delayed auditory feedback,

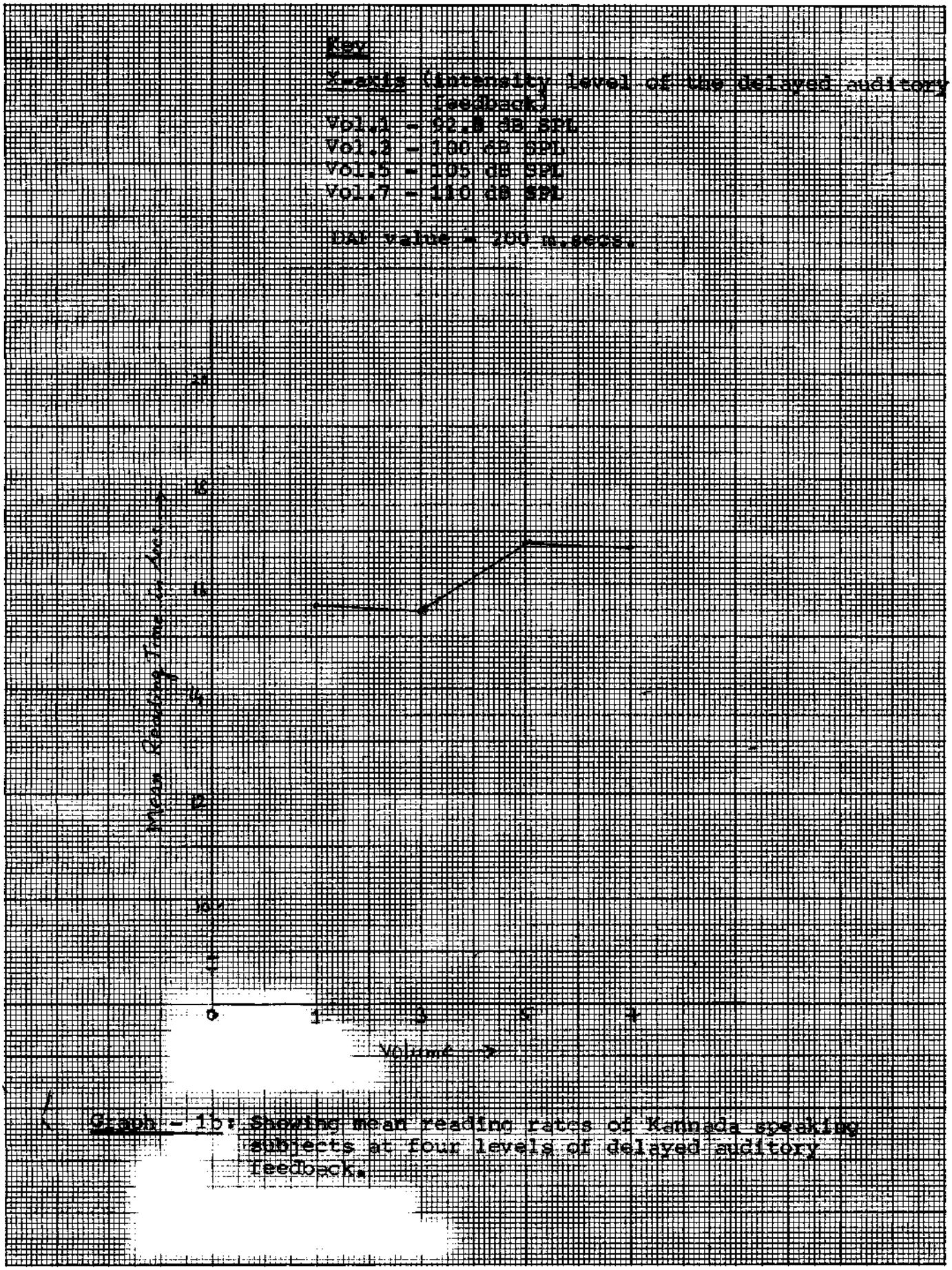
The pre-test control reading rates and post-test control reading rates obtained were subjected to statistical analysis. Significant difference was found between these two readings for both Hindi and Kannada speaking groups. So the null hypothesis (1) has been rejected.

The pre-test control reading rates were compared with the reading rates obtained under several values of DAF (200 m.sec, 250 m.sec, and 300 m.sec) at volume-1.

No significant difference was found between the pre-test reading rates and reading rates obtained under DAF (200 m.sec) at volume-1, for Hindi speaking subjects.



Graph - 1a. Showing mean reading rates of Hindi speaking subjects at four levels of delayed auditory feedback.



Graph - 1b: Showing mean reading rates of Kannada speaking subjects at four levels of delayed auditory feedback.

Key

X-axis (intensity level of the delayed auditory feedback)

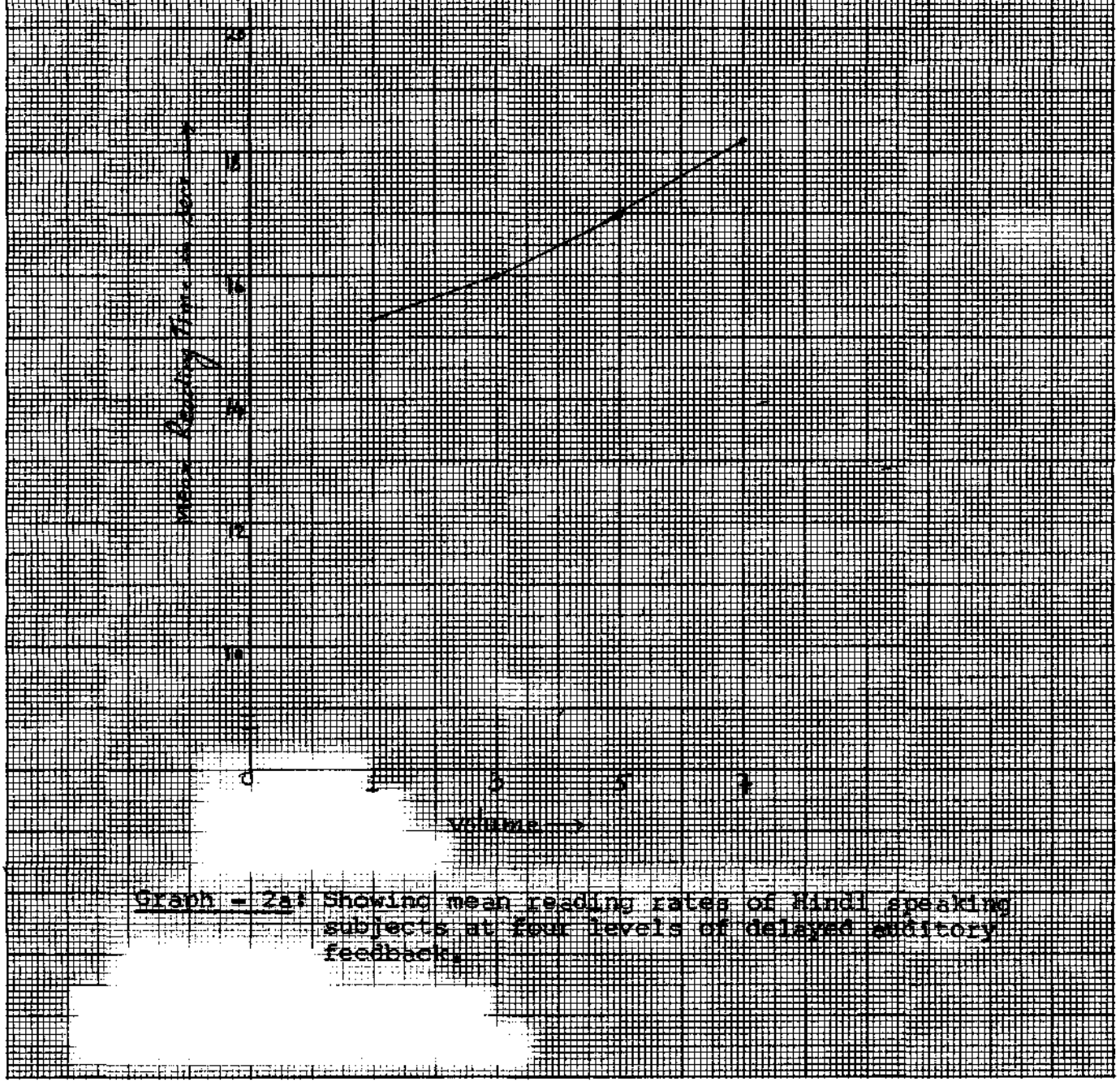
Vol.1 = 92.0 dB SPL

Vol.3 = 100 dB SPL

Vol.5 = 105 dB SPL

Vol.7 = 110 dB SPL

DAF values = 250 m.secs.



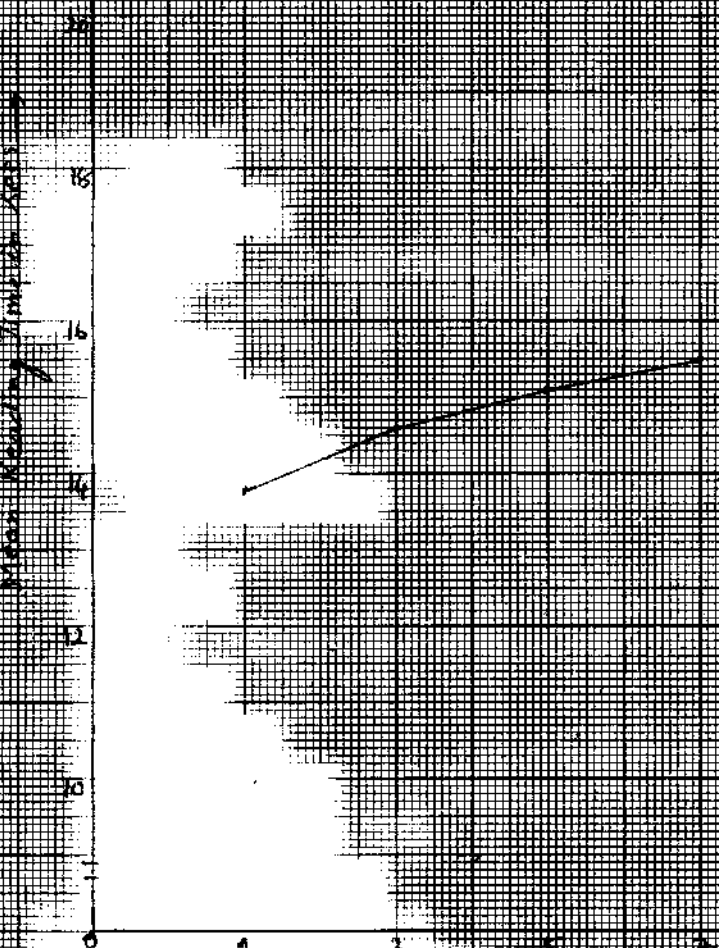
Graph - 2a: Showing mean reading rates of Hindi speaking subjects at four levels of delayed auditory feedback.

Key

X-axis (intensity level of the delayed auditory feedback)

Vol.1 - 92.0 dB SPL
Vol.3 - 100 dB SPL
Vol.5 - 105 dB SPL
Vol.7 - 110 dB SPL

DAF value 250 m.secs.



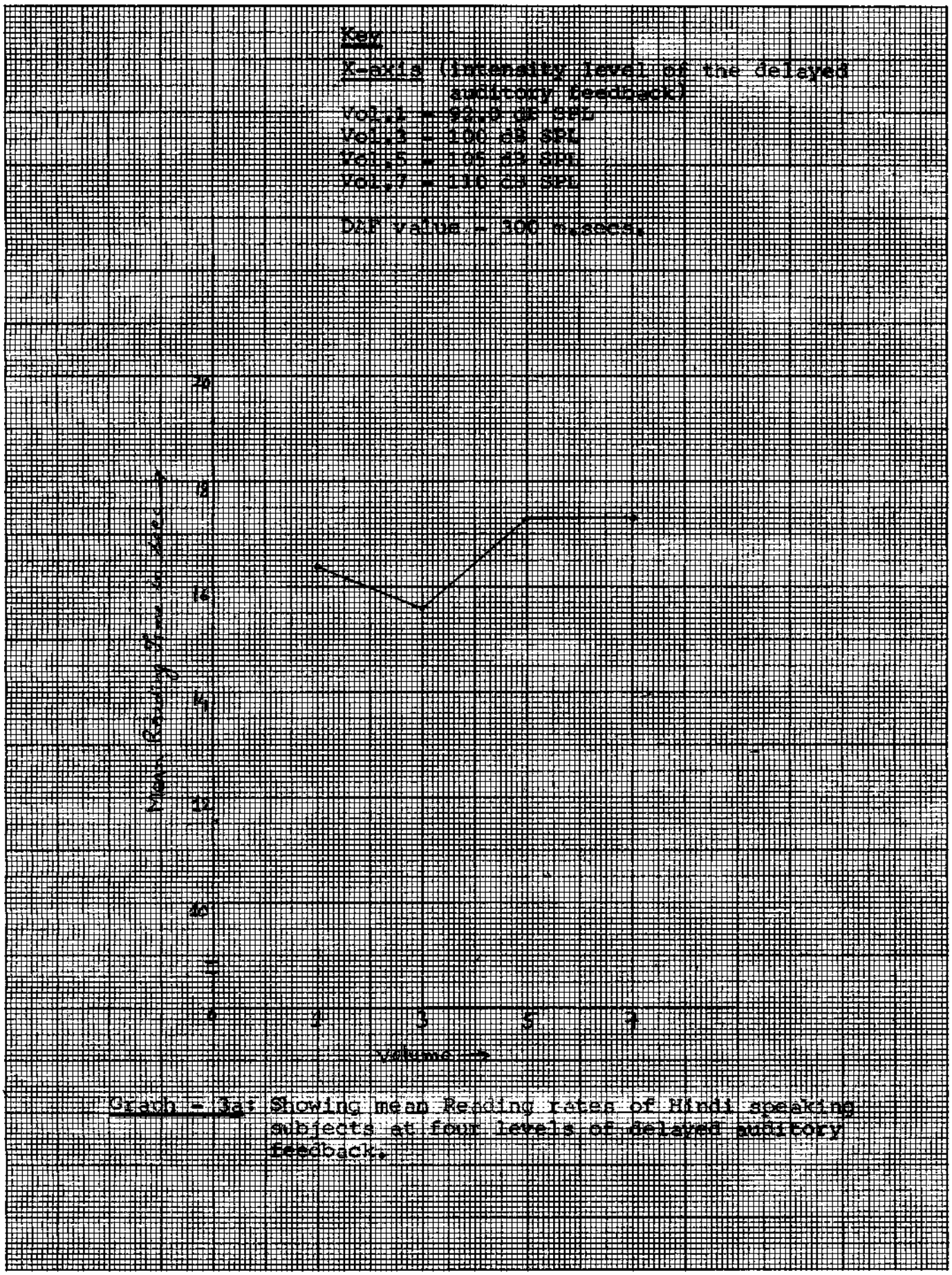
Graph - 2b: Showing mean Reading rates of Kannada speaking subjects at four levels of delayed auditory feedback.

Key

X-axis (Intensity level of the delayed auditory feedback)

Vol.1 = 92.9 dB SPL
Vol.3 = 100 dB SPL
Vol.5 = 105 dB SPL
Vol.7 = 110 dB SPL

D/F value = 300 m.secs.



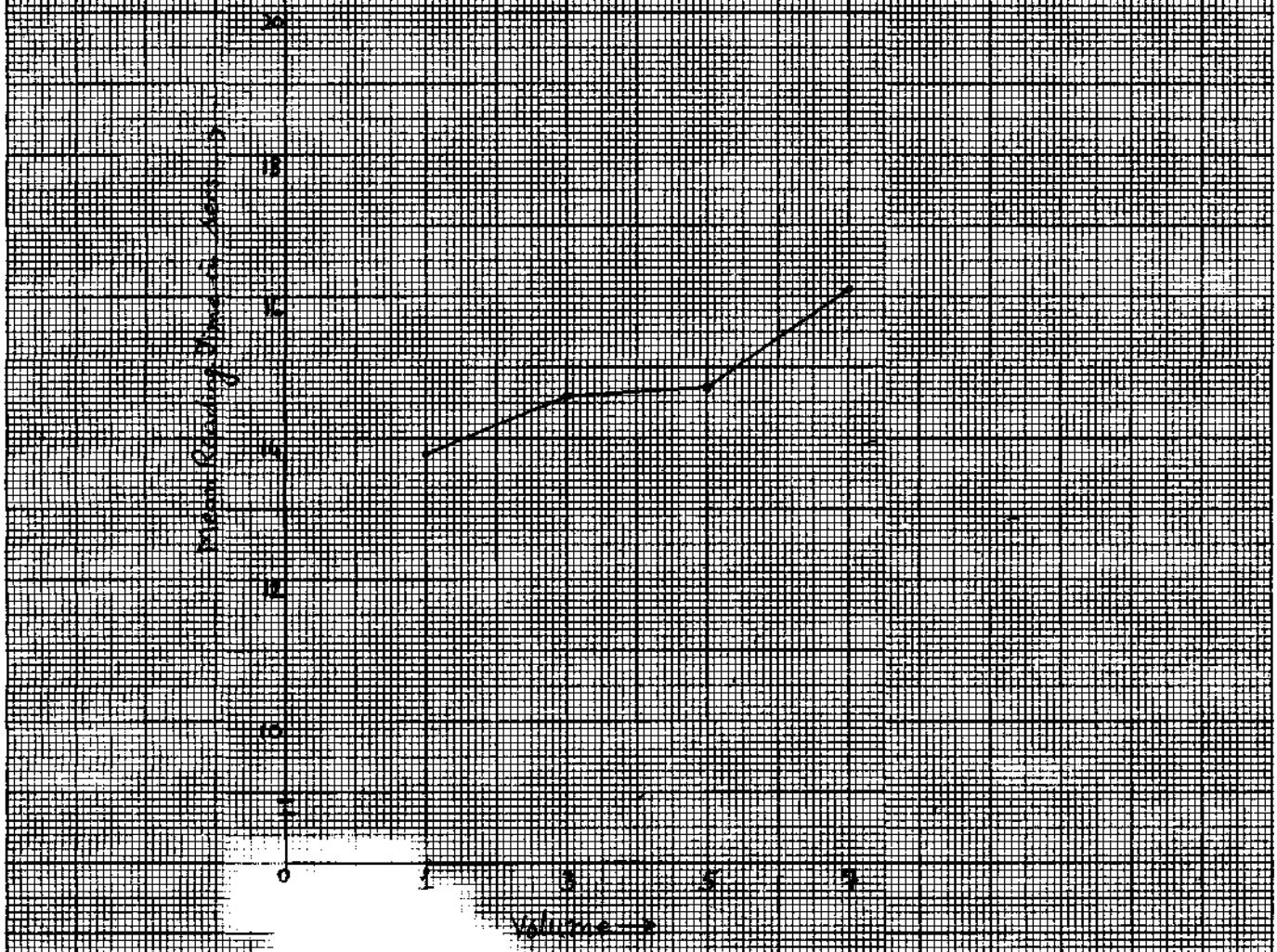
Graph - 1a: Showing mean Reading rates of Hindi speaking subjects at four levels of delayed auditory feedback.

Key

X-axis (Intensity level of the delayed auditory feedback)

Vol.1 - 90.0 dB SPL.
Vol.3 - 100 dB SPL.
Vol.5 - 105 dB SPL.
Vol.7 - 110 dB SPL.

DAF value - 300 m.secs.



Graph - 3b: Showing mean Reading rates of Kannada speaking subjects at four levels of delayed auditory feedback.

Also there was no significant difference between pre-test control reading rates and the reading rate obtained under DAF (200 m.sec) at volume-1 for Kannada speaking subjects.

No significant difference's were observed between pre-test control reading rates and the reading rates obtained under DAF (250 m.sec) at volume-1 for Hindi speaking and Kannada speaking groups.

No significant differences were observed between pre-test control reading rates and the reading rates obtained under DAF (300 m.sec) at volume-1 for both Hindi and Kannada speaking groups. Thus the null hypothesis (2) has been accepted.

Significant differences were observed between the reading rates obtained under DAF (200 m.sec & 250 m.sec) and post-test control reading rates for both Hindi and Kannada speaking groups.

Also a significant difference was observed between the reading rates obtained under DAF (300 m.sec) and post-test control reading rates for Hindi speaking group.

A significant difference only at 0.05 level but not at 0.01 level was observed between the reading rates obtained

Key:

Group-A : Hindi Speaking Subjects

Group-B : Kannada Speaking Subjects

N.S : Not Significant at 0.05 Level

S* : Significant at 0.05 Level

S** : Significant at 0.01 Level

Group	Variable	't' value
Group-A	Pre test control reading rate Vs Post test control reading rate.	-4.66 S**
Group-B	Pre test control reading rate Vs Post test control reading rate.	-4.09 S**
Group-A	Pre test control reading rate Vs reading rate obtained under DAF (200 m.secs) at Vol.1	2.13 N.S
Group-B	Pre test control reading rate Vs reading rate obtained under DAF (200 m.secs) at Vol.1	1.449 N.S

cond...

Group	Variable	't' value
Group-A	Pre test control reading rate Vs reading rate obtained under DAF (250 m.secs) at Vol.1	0.124 N.S
Group-B	Pre test control reading rate Vs reading rate obtained under DAF (250 m.secs) at Vol.1	1.458 N.S
Grcup-A	Pre test control reading rate Vs reading rate obtained under DAF (300 m.secs) at Vol.1	1.182 N.S
Group-B	Pre test control reading rate Vs reading rate obtained under DAF (300 m.secs) at Vol.1	1.246
Group-A	Reading rate obtained under DAF (200 m.secs) at Vol.1 Vs post test control reading rate	-5.253 S**
Group-B	Reading rate obtained under DAF (200 m.secs) at Vol.1 vs Post test control reading rate	-4.754

cond...

Group	Variable	't' value
Group-A	Reading rate obtained under DAF (250 m.secs) at Vol.1 Vs Post test control reading rate	-4.193 - S**
Group-B	Reading rate obtained under DAF (250 m.secs) at Vol.1 Vs post test control reading rate	-2.563 S**
Group-A	Reading rate obtained under DAF (300 m.secs) at Vol.1 Vs Post test control reading rate	-4.273 S**
Group-3	Reading rate obtained under DAF (300 m.secs) at Vol.1 Vs Post test control reading rate	2.825 S*
Group-A and-B	Pre test control reading rate for Hindi speaking subjects Vs Pre test reading rate obtained for Kannada speaking subjects	0.444 N.S
Group-A and-B	Post test control reading rate for Hindi speaking subjects Vs Post test control reading rate for Kannada speaking subjects	-0.203

under DAF (300 m.sec) and post-test control reading rates for Kannada speaking group. So the null hypothesis (3) has been rejected.

No significant difference was observed between the control reading rates (pre-test control reading rates) of Hindi and Kannada speaking groups. Also there was no significant difference between the control reading rates(post-test control reading rates) of Hindi and Kannada speaking groups. So the null hypothesis (4) has been accepted. This shows that the time required to name Kannada materials and Hindi materials under control condition, is not different for the two materials. The present study shows that the language is not a variable for naming the materials.

Since there is no significant difference between the pre-test control reading rates and the reading rates obtained under DAF conditions, the pre-test control reading rates cannot be used to decide the effect of DAF.

To decide the effect of DAF, the reading rate obtained under DAF condition should be compared with the post-control reading rates.

SUMMARY AND CONCLUSIONS

SUMMARY AND CONCLUSIONS

The present study deals with the standardization of DAF test for illiterates in both Hindi and Kannada languages.

15 (fifteen) adult subjects in each group in the age range - of 18-30 years were selected for the study. Their hearing was screened at 20 dB HL (ANSI 1969) for frequencies from 250 Hz to 8 KHz. 16 (sixteen) pictures of familiar items were selected as a reading (naming) materials.

Pictures were placed infront of the subject. With following instructions the test was started:

" I am going to place the earphones on your ears, you are required to name the pictures on the cards one after the other - you have to name all the 16 (sixteen) pictures. I may ask you to name the pictures several times".

Then the subject was fitted with the earphones of the DAF apparatus. The microphone of the DAF was attached to the collar of the subject. He was asked to name all the pictures with DAF apparatus in off position. Reading rate was noted down(stop watch was used). This way three reading rates were obtained and averaged.

After obtaining pre-test reading time, DAF apparatus was switched on and the Delay was introduced. Three delay values

were selected for the present study viz. 200 m.sec., 250 m.sec, and 300 m.secs. Under the difference DAF conditions reading rates were obtained at different intensities for both Hindi and Kannada speaking groups. After noting down the reading rate under the delay conditions, post-test control reading rates were obtained (i.e. with out any DAF, but with earphones on the ears) for both the groups. The obtained data were subjected to statistical analysis and following conclusions were drawn:

1) There was a significant difference between the pre-test control reading rate and the post-test control reading rate for both the groups.

2) There was no significant difference between the pre-test control reading rate and the reading rate obtained under DAF conditions for both the groups.

3) There was a significant difference between the reading rate obtained under DAF conditions and the post-test control reading rate, in both the groups.

4) No significant difference was found between the control reading rates obtained for Hindi and Kannada language speakers.

Recommendations:

1) The modified DAF test can be used for testing illiterate pseudohypacusis cases (Cases of functional overlay).

2) More number of normals may be tested to validate this study.

3) The modified DAF test can be administered to sensorineural loss cases of different degree to establish the validity of the test.

4) On the same lines of the present study, modified DAF test for illiterates may be developed in all the Indian languages.

5) The post-test control reading rates should be used to compare with the reading rate obtained under DAF condition for deciding whether the case has pseudohypacusis or not.

Limitations:

1) The modified DAF test for illiterates cannot be used with the cases who has hearing within normal limits.

2) Since the present study was conducted at a delayed auditory feedback level of 92.5 dB SPL Vol-1 (or 70 dB HL because 0 dB SRT = 20 dB SPL)the results of the present study are applicable to psudohypacusis cases exhibiting hearing loss of $\geq$ 70 dB HL (PTA or SRT). In other words, if the modified DAF test shows -Ve result on the subjects who show hearing

loss of 40 to 65 dB HL (PTA or SRT), pseudohypacusis cannot be ruled out. If a subject with hearing loss of 40 to 65 dB HL (PTA or SRT) shows +Ve result to the modified DAF test, it will not be possible to rule out organic hearing loss.

BIBLIOGRAPHY

BIBLIOGRAPHY

Black, J.W., The Effect of delayed side-tone upon vocal rate and intensity, J.Speech Hear.Disord., 16, 56-60, 1951.

Carthart, R., Tests for malingering. Trans. Am. Acad. Ophthalmol. Otolaryngol., 65, 437, 1961.

Chaiklin, J.B., and Ventry, I.M., Functional Hearing Lass. In Jerger, J. (Ed.), Modern Developments in Audiology, pp.76-125, New York: Academic Press, 1963.

Glorig, A., Evaluation of nonorganic Hearing loss, Audiometry: Principles and Practices, Glorig (Ed.), Baltimore, The Williams and Wilkins Company, 235-242, 1965.

Hanley, C.N., and Tiffany, W.R., An investigation into the use of electromechanically delayed side tone in auditory testing. J.Speech Hear.Disord., 19, 367-374, 1954.

Hopkinson, N.T., Functional Hearing loss. Jerger (2nd Ed). Modern Developments in Audiology (Chap.6) pp.175-207, New York: Academic Press, 1973.

Hopkinson, N.T., Speech Tests for Pseudohypacusis in Katz, J (2nd Ed), The Hand book of Clinical Audiology. The Williams and Wilkins Company, Baltimore, 291-303, 1978.

Johnson, K.O., Work, W.P., and McCoy, G., Functional deafness. Ann.Otol.Rhinol.Laryngol., 65, 154-170, 1956.

Lee, B.S., Some effects of side-tone delay. J.Acoust.Soc.Am., 22, 639-640, 1950.

Newby, H.A., Audiology, Ed.3. New York: Appleton-Century-Crofts, 1972.

Taylor, G.J., An experimental study of tests for the detection of auditory malingering. J.Speech Hear.Disord., 14, 119-130, 1949 (Cited by Hopkinson, N.T., In Hand Book of Clinical Audiology, Ed.by Katz, J., 1978).

Tiffany, W.R., and Hanley, C.N., Delayed Speech feedback as a test for auditory malingering. Science, 115, 59-60, 1952. (Cited by Hopkinson, N.T., in Hand book of Clinical Audiology, Ed. by Katz, J., 1978).

Watson, L.A., and Tolan., Hearing Tests and Hearing Instruments ("Facsimile of the 1949 Edition"). New York: Hafner Publishing Co., 1967. (Cited by Hopkinson, N.T., in Hand Book of Clinical Audiology, Ed. by Katz, J., 1978).

Williamson, D., Functional Hearing Loss: a review. Maico Audiol. Lib. Ser., 12, 33-34, 1974.

APPENDICES

APPENDIX-1

1. Well
2. Horse
3. Leaf
4. Cow
5. Mango
6. Snake
7. Dog
8. Cat
9. Elephant
10. Hen
11. Donkey
12. Monkey
13. Fish
14. Table
15. Tabbit
16. Chair

APPBNDIX-II

Loudness in intensity (dB SPL) at different volumes of the DAF apparatus.

Volume setting	dB SPL
1	92.00
3	100.0
5	105.0
7	110.0