DEVELOPMENT AND STANDARDIZATION OF A LIP-READING TEST IN KANNADA LANGUAGE TO DETECT PSEUDOHYPACUSIS*

SUBBA RAO, T. A.

INTRODUCTION

Occasionaly the patient is not cooperative for audiological evaluation. For this, reasons may vary from not understanding the test procedure to deliberate feigning a hearing loss. The terms 'functional hearing loss' (Ventry and Chaiklin, 1962) and 'pseudohypacusis' (Martin, 1978) are used generally to indicate a feigned hearing loss. There are many tests to detect pseudohypacusis, but there always remains a need for a simpler and more reliable tests to reveal the extent of a functional hearing loss.

Usually the patients with pseudohypacusis respond to ordinary conversation quite adequately. The reason they forward for this ability, is that they are good at lip reading. It can be expected that such patients do make use of their hearing ability, as it is usually very difficult to respond so well solely on the basis of vision only.

This aspect of lip reading ability has been extensively used in the detection of functional hearing loss. Falconer (1966) reported that these patients who claim a lip reading ability can be evaluated using a lip reading test. The lip reading test contains auditory as well as visual stimuli. It consists of monosyllabic homophenons words which are nearly impossible to perceive by lip reading only. But if the patient is unaware of this and continues to respond in his usual way to sound and stimuli. As can be expected, the correct responses would be the result of audition, inadvertantly the patient reveals some degree of functional hearing loss. The test is simple and is most effective with smaller degrees of functional hearing loss, (Falconer, 1966). The test has a remarkable ability in exposing functional problem without obviously indicating to the patient that he has been caught (Weiss, 1971).

An attempt is made here to develop and standardize the lip reading test in Kannada language, (originally test was in English by Falconer, 1966). It was planned to develop test material in Kannada language and then to test it on normals as well as on the clinical group.

Methodology

The study 'involved' three main phases :

1) The development of the test material in Kannada.
2) Testing it on normal hearing subjects, and
3) Testing it on clinical group.

*Abstract by the author : Guide : M. N. Vyasamurthy

The Development of the Test material in Kannada

This was done in line with the method followed by Falconer, (1966). It was aimed at preparing 8 lists of 20 homophenous words each. The 8 lists were divided into 2 sets of 4 lists each. Each word in one list would have its homophenous counterpart in other 3 lists of that set. The homophenous words were selected taking into account, the sounds which have same place of articulation, i.e., the words look alike on lips but sound different. As far as possible the phonemic distribution in two sets was equated. All words are familiar and meaningful. Totally 160 words are selected and prepared lists are randomized (See Appendix I for the prepared lists).

Four levels of presentation were chosen with reference to the SRT of each subject : SRT+10dB; SRT+0dB; SRT-10dB and SRT-20dB. Each list in 1 set was presented at 4 different levels. Thus 16 presentation combinations are obtained.

Subjects

Normal Group

Twenty subjects, age ranging from 18 years 2 months to 31 years (12F+8M) with a mean age of 22 years 8 months formed the normal group. They all passed a hearing screening test at 20dB HL for frequencies 250 Hz to 8 KHz. All subjects were fluent speakers of Kannada and they were good in English. This normal group was used for developing norms for the speech reading test.

The 20 subjects were grouped into 4, consisting of 5 subjects each. Out of the 16 presentation combinations in a set (4 levels x 4 lists), each group was randomly selected for 4 combinations. The same was maintained for both sets and no two groups got the same presentation combination. Only one ear was tested in each subject. By averaging results for all 4 groups, the normative data was established.

Sensori-neural group

Seven Kannada speaking-sensorineural hearing loss patients were tested on the speech reading test, to verify the value of 'predicted SRT' from this test. Age range was 18 to 71 years with a mean age of 30 years.

Instruments

Madsen OB 70, a two channel clinical audiometer, with settings for speech audiometer was utilized. Live voice testing was carried out. The subject's responses were noted with an adjustable gain talk back system. The audiometer was calibrated to 150 (1964) standards, using B & K calibration equipment.

Testing environment

Two room situation was used. The testing room was well sound treated. The act of

lip reading was dramatized by lighting brightly the control room and darkening the testing room, in which the patient was seated comfortably. The noise levels in the testing room were well within the maximum noise levels allowed.

Testing process

The testing process proceded from instructing the subjects, obtaining the initial SRT without visual cues and administering the speech reading test with both visual and auditory cues. The initial SRT measurements were obtained using standard procedure with the Harvard adult spondee lists, standardized to Indian Population (Swarnalatha, 1972). In case of clinical subjects who did not know Eglish, Kannada spondee list was used to obtain SRT. This list has been in use at the department of Audiology, All India Institute of Speech and Hearing, Mysore.

Instructions for the lip-reading test

"You can see the examiner's face very clearly from the observation window. You will hear different words, as well you can read them on examiner's lips. Use both cues and try to repeat exactly the word given to you. Let us see how good you are at lip reading. Be alert as soon as you hear the 'phrase *iga he li*, you will hear the word'. Instructions stressed the aspect of lip reading.

The steps in administering lip-reading test

1. The talk back microphone was placed close to the subject's mouth. The audiometer microphone six inches away below the chin of the tester.

2. The carrier phrase iga heli was spoken before presenting each word. The VU meter was constantly used for monitoring speech level. Each word took three or four seconds to articulate. The whole testing took around fifteen minutes to complete. After each presentation a pause was given for the patient's response. The word was repeated once if the patient felt inattentive for that word. Care was taken not to indicate anything about patient's response In case of normals the selected presentation combinations were used. In sensori-neural subjects the first list of set I was presented at 10 dB above the obtained SRT, then the subsequent lists were at levels SRT+0 dB; SRT-10 dB and SRT-20 dB respectively. The same was followed for set II also.

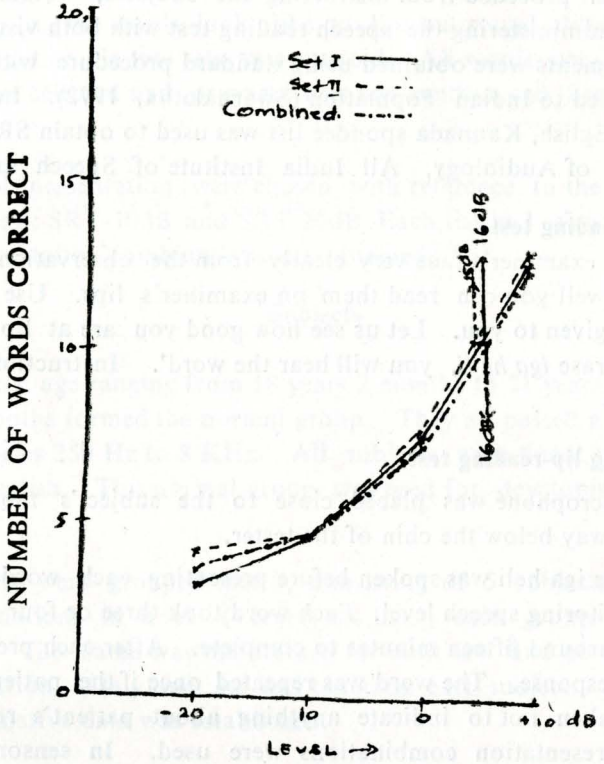
3. Responses were noted as number of words repeated correctly at each presentation level and were plotted on an articulation gain function curve.

4. To check the role of examiner's listening, two normal subjects were again asked to write the words 25 days after the initial testing. The same procedure for testing was used.

RESULTS AND DISCUSSION

The results were analyzed in terms of number of words correctly repeated at each level of presentation. From the normal group score it was observed that the most suitable criterion for predicting SRT from the lip- reading test was the level 5dB at which 10 words were repeated

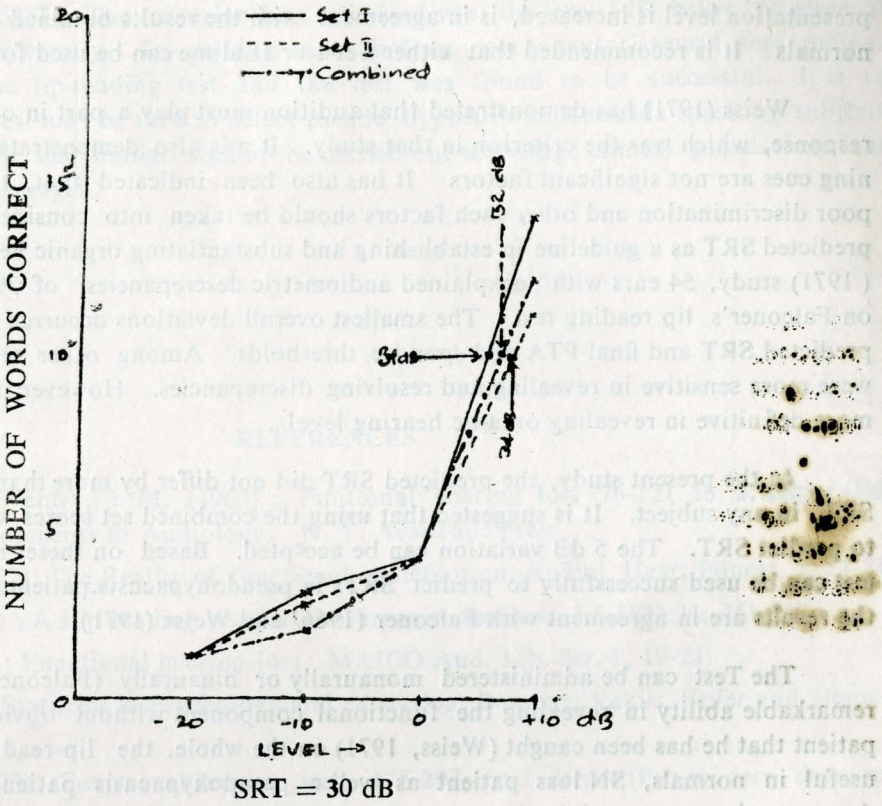
correctly (Fig.I). The average SRT for the normal group was 15 dB. The predicted SRT's were 16 dB from SET I, 15 dB from Set I and 16 dB from both sets combined.



AVERAGE SRT = 15 dB

Fig. 1 Articulation/Gain functions for the normal group with the predicted SRT.

Similarly sensori-neural loss subjects were compared. An example of a subject is given in Fig. 2. It was found that, the best criterion to predict SRT was same as in the case of normals i.e., the level 5dB below at which 10 words are repeated correctly. When the patient did not repeat 10 words correctly, the criteria for predicting SRT was 5dB below the level at which the score nearest to 10 was obtained (only one out of seven patients was predicted in this way.) Because of the non-uniformity of the seven subjects the sensorimental loss group as a whole was not considered for comparison. The SRTs and predicted SRTs from the combined scores curve are given in Table-I.



SRT = 30 dB

Fig. 2. Articulation/Gain junction and predicted SRT for a sensori neural loss subject.

Table 1

Showing obtained & predicted SRTs for the sensorineural patients, on the Lip-reading Test.

Patients Ser. No.	1	2	3	4	5	6	7
Obtained SRTs (dB)	45	70	70	35	30	25	70
Predicted SRTs (dB)	47.3	75	75	30	30	23	68

A paired 'T' test shows that, at all levels of presentation, the two sets are not significantly different Comparing oral and written scores of two normal subjects, it was observed that examiner's listening is not a variable. The curves for Set I, Set II and combined scores follow the same pattern and do not differ regarding scores. A steady increase in the scores as the

presentation level is increased, is in agreement with the results obtained by Falconer (1966) on normals. It is recommended that either Set I or II alone can be used for testing.

Weiss (1971) has demonstrated that audition must play a part in obtaining the five correct response, which was the criterion in that study. It was also demonstrated that visual and learning cues are not significant factors. It has also been indicated that, the sloping audiogram poor discrimination and other such factors should be taken into consideration when using the predicted SRT as a guideline in establishing and substantiating organic hearing levels. In Weiss, (1971) study, 54 ears with unexplained audiometric descrepancies, of 39 subjects were tested on Falconer's lip reading test The smallest overall deviations occurred between the Falconer's predicted SRT and final PTA and spondee thresholds. Among other tests, Stenger and PGSR were more sensitive in revealing and resolving discrepancies. However the predicted SRT was more definitive in revealing organic hearing levels.

In the present study, the predicted SRT did not differ by more than 5 dB from the initial SRT, in any subject. It is suggested that using the combined set scores would be the best way to predict SRT. The 5 dB variation can be accepted. Based on these results, the lip-reading test can be used successfully to predict SRTs in pseudohypacusis patient. The effectiveness and the results are in agreement with Falconer (1966) and Weiss (1971),

The Test can be administered monaurally or binaurally (Falconer, 1966) and it has a remarkable ability in revealing the functional component without obviously indicating to the patient that he has been caught (Weiss, 1971) on the whole, the lip-reading test appears to be useful in normals, SN loss patient as well as pseudohypacusis patients, where audiometric descrepancies are unexplained.

Summary and Conclusion

Following Falconer's (1966) study, a lip-reading test in Kannada language was developed. The test consisted of 8 lists having 20 homophenous words each. The 8 lists were divided into 2 sets of 4 lists each.

The test is used to determine organic hearing levels of pseudohypacusis patients. The test emphasizes the measurement of a subject's lip-reading ability. With reference to the obtained SRT level, four levels of presentation were chosen : SRT+10dB; SRT+0dB; SRT-10 dB and SRT-20dB. Since homophenous words look alike but sound different they are not likely to be perceived correctly by lip reading alone. If the patient is unaware of the examiner's intention he will probably respond in his customary manner to sound and vision, there by revealing his organic hearing level.

A group of 20 normal adults were used to develop this test. The lists and levels were randomly presented. The articulation/gain functions for the normal group enabled to develop

a criterion to predict SRT. The criterion best obtained was the level 5dB below at which 10 words are repeated correctly. To validate these findings seven sensori-neural loss patients were tested using the lip-reading test and the test was found to be successful. It is recommended that the test may be used to detect pseudo hypacusis in Kannada speaking subjects, It is also recommended that similar studies be carried out with large clinical populations and in different Indian languages.

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APPENDIX - I

TEST WORDS LISTS

Set I				Set II			
1A	1B	1C	1D	2A	2B	2C	2D
ಪಟ್ಟ	ದಕ್ಕ	ಮಾಡು	ದುಡಿ	ಪಾನ	ತೋಡಿ	ದಾನ	ನೋಡಿ
ಕಾಳ	ಗಲ್ಲು	ಲಾಕು	ಕಳ್ಳ	ತಬ್ಬು	ಚಾಡಿ	ಬಲ	ಜಡಿ
ಲಾಡು	ದಣಿ	ಪಂಚ	ಬಾಡು	ಚಾಳಿ	ಕೇಳು	ಜಟ	ಗಣಿ
ಮಂಜ	ತುಟಿ	ತುಳಿ	ಧಾಮ	ಪಡಿ	ಗಡಿ	ಬದಿ	ಗುಕ್ಕು
ನುಡಿ	ತಾಡಿ	ಕಾಟು	ಬನ	ಪುಟ್ಟ	ಬೇಡ	ತಾಣ	ತಾನ
ಪಣ	ಗಿಟ್ಟು	ಮಳ್ಳ	ಲಕ್ಕ	ದೂಕು	ದನಿ	ದಡ	ತಪ್ಪು
ಪಾಳಾ	ತಾಗು	ಕಿಣ್ಣು	ಗತ್ತು	ತಾತ	ದಾಳ	ಕಾಲಿ	ಮಾತು
ನಾಮು	ಬಾಳು	ನಾಟು	ಗೋಳು	ಪಾಲು	ಬುಟ್ಟ	ದಮ್ಮು	ತೂಗು
ಕಟ್ಟ	ಮನ	ಕಡ್ಡಿ	ದಾಳಿ	ತಡ	ದಬ್ಬು	ಪೇಟ	ಮಕ್ಕ
ತಣಿ	ಗೋಟು	ಲೋಟ	ಗಿಣ್ಣು	ತೋಟಿ	ನೂಕು	ಗೇಣು	ತಾಳ
ಚಾಟಿ	ತೋಟ	ತಾಪ	ಬಳ್ಳ	ತಾಳ	ಗುಗ್ಗು	ಬಾತು	ಬಲಿ
ನೋಟ	ಮಂಚ	ದಾಡಿ	ಪಂಜ	ಕಡಿ	ದಾತ	ತೂಕು	ಮೂಲ
ಕಲ್ಲು	ದಾಟು	ಮಣ	ನಾಕು	ಪೇಡ	ಬಾಲು	ಲಾಟ	ಬಳಿ
ತಾಳಿ	ಚಾಟಿ	ಕೂಳು	ಗೂಡು	ಕಾಳಿ	ಬಗ್ಗ	ಮಡಿ	ಮೇಳ
ತಾಕು	ಬಣ	ಜಾಡಿ	ತೋಳ	ಕೇಡು	ಬಡಿ	ಕಣಿ	ದಳ
ಬಲ	ಲಾಭ	ಕತ್ತು	ಚಾಳಿ	ತನಿ	ಮಾನ	ಕುಗ್ಗು	ಗಾಲಿ
ಕೋಟು	ಕೂಟು	ತಡಿ	ನಟ	ಪಕ್ಕ	ಗಾಳಿ	ದೋಣಿ	ಲಾಡಿ
ಕಟ್ಟು	ಗಾಳ	ಪಲ	ಪಟ	ಮತಿ	ತಳ	ಮುಟ್ಟ	ನಲಿ
ಕೊಡು	ಬಟ್ಟ	ತಗ್ಗ	ಗಾಣ	ಕುಕ್ಕು	ನಾಟ	ನದಿ	ಗೋಟು
ತಕ್ಕ	ಗಟ್ಟ	ಕೋಡು	ನಾಡು	ನಾಡಿ	ಪತಿ	ಮಗ್ಗ	ಬುಡ್ಡಿ