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Development and Standardization of Speech Test Material in Bengali Language

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To evaluate the extent of an individual's handicap may be assessed by assessing his ability to handle speech input. The conventional classical basic audiologic battery for each ear includes four measures of (1) Pure tone air conduction thresholds, (2) Pure tone bone-conduction thresholds, (3) Spondes thresholds (4) An estimation of his discrimination ability.

The foundation stone in the field of hearing science was layed as early as 1800. G.W. Pfirsten (1804) and Itard (1824) used various methods to show and reveal improvements in hearing speech (cited by Feldman - 1940). These efforts putforth, yielded way to the identification of speech discrimination as a separate concern by 1821.

Phonographs were used in Germany, which utilized cylinders to present materials to the listener but hence the reception was found to be poor.

In late 1800, various instruments and their modification were incorporated. Instruments such as Phonometer, microphenautographs were used. But these had minimal diagnostic significance (Fletcher and Steinberg, 1929, cited by R.R. Rupp - 1980).

Monosyllable words were first developed by W.H. Bristol in 1926 for children. In 1927, Fletcher produced an intelligibility test at Bell labs and was mainly used for hearing aid testing. Paired word list along with monosyllables were developed in 1930 was chiefly administered for hearing consideration and usage (West'38).

Hirsh (1951) developed 'W-22' test material and this material gained wide popularity. But this failed to differentiate satisfactorily between mixed deafness from conductive deafness (Hirsh-1952). In 1959 Lehiste and Petersen attempted at phonetic balance using C.N.C. (Consonent nucleas consonant) configuration. 1963, the North Western University developed NU-4 (Tillmen, Carhart et al) and NU-6 (1966-Carhart) which was phonetically balanced using CNC monosyllable words.

Later Rhyme list, closed set test materials were developed to assess the various aspects of communication disorder.

In Indian language, the available speech test materials are-Hindi (Abrol, 70, N.S. De 73), Tamil, (Kapur, 71, Dayalan '76) Kannada (Nataraja, '73); Picture SRT test for adults and children in Kannada language (Rajshekar 1978), Gujarathi (Mallikarjuna '84), Manipuri (Tanuja '85).

The purpose of the present study was to develop and standardize speech test materials in Bengali language, so that speech audiometry may be administered to Bengali speaking population.

Methodology: 60 polysyllable and 75 monosyllables words were selected to asses the speech reception threshold and discrimination respectively. These words were ranked as most familiar by a group of 15

Bengalees (consisting of various profession). Six normal subjects were taken for the study. This average pure tone thresholds is 10.16 dB, S.R.T. = 11.66 and discrimination score 100% (details of the subject is shown in table-1). They had no history of any otorhinolaryngological disorders.

The words were recorded using Philip Deck recorder. In between the words, a five seconds interstimulus interval is given. Each word is proceeded by carrier phrase

A calibration tone of 1 KHz was fed from the audiometer at the begining of the stimulus.

The 60 words selected for assessment of S.R.T. was divided into three lists namely list A, B & C. Each of the list again was randomized into six list was presented at 0 dB, 5 dB, 10 dB, 15 dB, 20 dB, and 25 dB HL (Ref : 0 dB HL - 20 dB SPL). Thus each list (randomized) is presented only at one intensity level.

The sixty familiar monosyllable words choosen to assess speech discrimination, was also divided-into three lists namely list A, list B, list C. These lists were randomized in five lists and was presented at five levels 5 dB, 10 dB, 20dB, 30 dB and 40 dB B.S.L. (ref: S.R.T.)

Two subjects were presented with one major lists and the results against each list is averaged.

Testing was done in two sound treated audiological rooms.

Results & Discussions: Articulation gain function curve for the three polysyllabic word lists are shown in Fig. 1 from the table 2 and the graph, it is evident that percentage of correct response increase with increase in sensation level. In this study, the mean S.R.T. level was attained at 12 dB HL (0 dB SPL). The mean pure tone average of the subjects taken for the study was 10.16 dB. The difference between P.T.A. and S.R.T. for the polysyllabic word list is thus 1.84 dB which shows that all these three lists yield almost equivalent scores at different hearing levels.

Table-3 and figure 2 shows the scores obtained with monosyllabic words lists, maximum discrimination scores obtained is 30 dBSL for list A and list C, Whereas for list B, the maximum scores was obtained at 40

Table 1: Showing the discription of the subjects (Total number of subjects = 6)

No	Age	Sex	Hearing level in dB			PTA in dB	SRT (English)	SD% (English)
			500Hz	IK]Hz	2 KHz			
1	25yrs	M	5	10	15	10	15	100%
2	21 yrs	M	5	10	10	8	10	100%
3	20 yrs	F	5	10	15	10	10	100%
4	25yrs	M	0	10	15	8	15	100%
5	18 yrs	F	10	5	15	10	5	100%
6	22 yrs	M	15	10	20	15	15	100%
Average 21.8 years						10.16	11.66	100%

PTA - Pure Tone Average

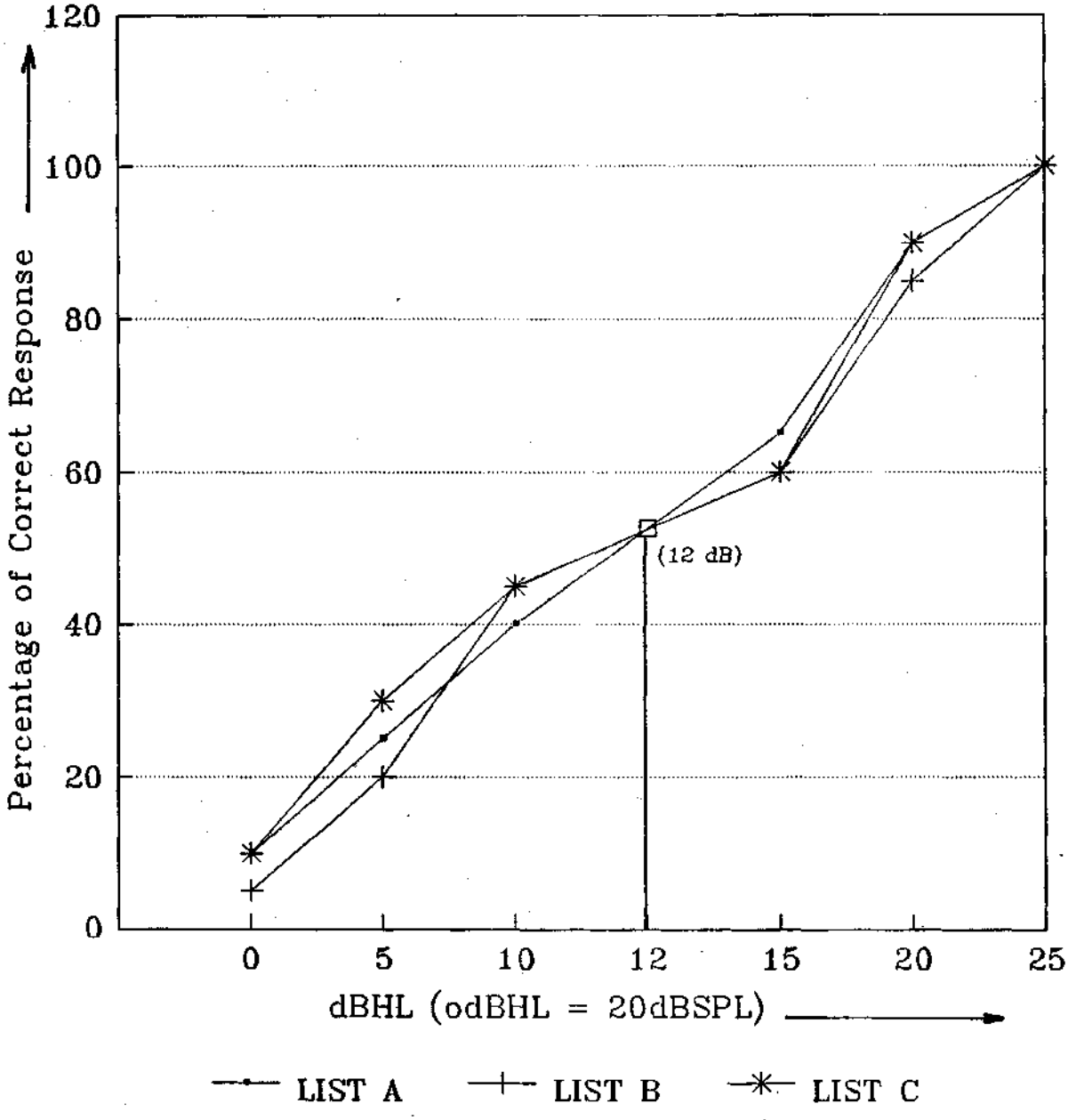
SD% - Speech Discrimination Score using cnglish monosyllables

SRT - Speech reception threshold using cnglish spondees

Table 2: Showing the Mean of the percentage of correct polysyllabic words at six hearing levels.

Hearing level	Mean value in Percentage		
in dBHL	List-A	List-B	List-C
0	10%	5%	10%
5	25%	20%	30%
10	40%	45%	45%
15	65%	60%	60%
20	90%	85%	90%
25	100%	100%	100%

MEAN ARTICULATION CURVE FOR POLYSYLLABLES WORDS FOR LIST 'A' TO LIST 'C'



MEAN ARTICULATION CURVES FOR MONOSYLLABIC WORDS FOR LIST 'A' TO LIST 'C'

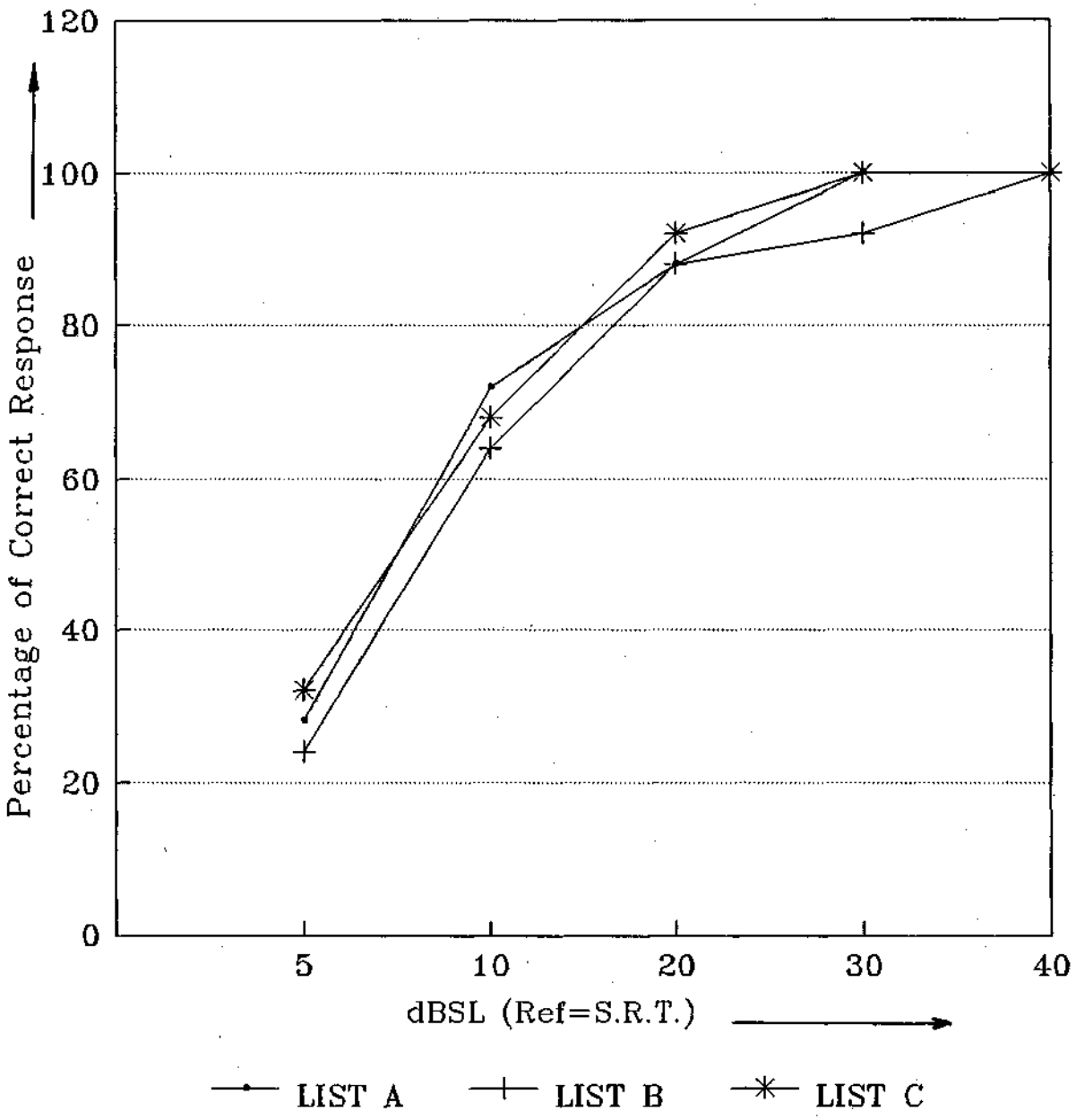


Table 3: Showing mean discrimination scores (%) at different sensation levels for the List A to D.

Sensation level	Mean value in Percentage		
in dB(Ref. SRT)	List-A	List-B	List-C
5	28%	24%	32%
10	72%	64%	68%
20	88%	88%	92%
30	100%	92%	100%
40	100%	100%	100%

dBSL (ref: S.R.T.). Figure-2 shows the combined articulation gain function for lists 'A' to list 'C using monosyllabile words.

Conclusions: 1. Established difference between S.R.T and P.T.A. is 1.84 dB. 2. Established hundred percent score was achieved at 30 dBSL for list 'A' & 'C' and for list 'B' its 40 dBSL.

Limitation:

1. The study was limited to only graduate studies.
2. Limited population tested.
3. Reliability with clinical population not tested.
4. Only three lists were tested.
5. The words are familiarized with adults and its validity with children is not tested.

Recommendation:

1. Standardization be done with larger population
2. Clinical population be tested.