

Breath Duration in the Speech of the Hearing Impaired

SHUKLA R.S.

Breath duration was measured in the speech of the thirty severely hearing impaired individuals. Thirty normally hearing individuals matched for age, sex and education wherever possible were served as controls. Breath duration was found to be reduced in the speech of the hearing impaired individuals. This observation has been interpreted in light of the physiological studies hitherto reported.

The phonation duration which has been defined as the maximum amount of time an individual can sustain phonation after taking a deep inhalation, has been studied extensively both in normals (Van Riper, 1954; Fairbanks, 1960; Purushothama, Shashidhar and Rangamani; 1982) and in clinical population like laryngeal pathology (Von Leden, Yanagihara and Wener-Kukok, 1967; Michel and Wendahl, 1971; Nata- raja, 1987). Arnold (1959) has said that " this simple test gives information on the efficiency of the phonophonic sound generation in the larynx."

Inadequate breath control in the speech of the hearing impaired individuals was first reported by Hudgins In 1934. He concluded that the hearing impaired speakers expel much more breath while speaking than do hearing speakers and consequently they are likely to interrupt the speech flow more frequently in order to permit the intake of air. Scuri (1935) also reported that deaf speakers tend to use more breath while speaking than when not speaking. Asp (1975) and Nickerson (1975) opined that the breath duration is an important factor in speech intelligibility. Stoker and Lape (1980) studied the relationship between breath duration and speech intelligibility. They found a positive correlation between breath duration and speech intelligibility, thereby confirming the observation of Asp (1975) and Nickerson (1975). The present study aims to measure the breath duration in a large group of

hearing impaired individuals and to interpret the results obtained with respect to physiological data hitherto reported.

Methodology:

Thirty hearing impaired individuals were selected as subjects. The mean age of the subjects was 15.67 years, the age range being 11 to 28 years. The hearing impaired individuals had to satisfy the following conditions. 1) Should have congenital bilateral hearing loss (PTA of greater than 70dBHL, ANSI 1969, in the better ear), 2) Should have no additional handicap other than that directly related to the hearing impairment, 3) Should be older than 10 years of age. Thirty normally hearing subjects were selected to match the each hearing impaired subject in terms of age, sex and education wherever possible. No hearing impaired subject differed from his control by more than six months. Each subject was instructed to take a deep breath and then phonate [a] vowel. Each subject was asked to do this 3 times. These 3 trails were timed by a stop watch and the longest elapsed time in seconds was considered as phonation duration.

Results and Discussion:

Table 1 shows mean breath duration and standard deviation of younger (11 to 15 years old) and older (18 to 28 years old) subjects of normally hearing speakers. A comparison of breath duration between younger and older

Table 1 : Mean Breath Duration and Standard Deviation of Younger and Older Subjects of Normally Hearing Subjects.

	Mean	SD
Older group	17.30	2.3
Younger group	13.65	1.54
Difference in Sec.	3.65	0.49
Statistical significance	t = 13.03	CR = 1.17 NS

subjects, not surprisingly showed that the older subjects had a longer breath duration. The difference was found to be statistically significant. Previous research has also indicated a similar finding (Van Riper, 1954; Fairbanks, 1960; Purushothama et.al., 1982). However, the two groups did not differ in terms of variation in breath duration (Table 1).

Table 2 shows the mean breath duration and standard deviations in the normally hearing and the hearing impaired subjects. It may be noted that the hearing impaired speakers had a shorter phonation duration when compared to the normally hearing subjects. The difference was statistically significant. However, like in the normally hearing subjects, the older hearing impaired subjects had longer breath duration, that is, 12.2 sec., when compared to the younger hearing impaired subjects who had breath duration of 10.3 seconds.

The probable explanations for the reduced phonation duration in the speech of the hearing impaired are 1) The aberrant respiratory patterns like, initiation of phonation at inappropriate lung volumes, to speak within a fairly restricted lung volumes (Forner and Hixon, 1977; Whitehead, 1982), high average expiratory air flow rates (Itoh and Horii, 1985). 2) Inadequate control of the expiratory cycle particularly the co-ordination between the respiratory system and the laryngeal system. As Borden and Harris (1980) put it the problem of respiration common to some speech pathologists are not a matter of needing more energy since, one fourth of vital capacity is usually used at conversational levels but more likely are problems in control and modification of the air stream. 3) Abnormal laryngeal function is yet another cause for the reduced phonation duration in the speech of the hearing impaired. For example, Monsen (1979), demonstrated differences between hearing

Table 2: Mean and Standard Deviation of Breath Duration in the Speech of the Normally Hearing and Hearing Impaired Subjects.

	Normally Hearing	Hearing Impaired
Mean	15.20	10.93
Standard Deviation	2.21	2.98

impaired and hearing subjects, for successive changes of the glottal waveforms from one period to another, evidences of diplophonia in the waveforms of the hearing impaired. Metz et. al., (1982), also provided evidences of abnormal laryngeal function, that is, inappropriate positioning of the vocal folds prior to the onset of phonation and subsequent patterns of abnormal vocal fold vibration in the hearing impaired speakers. Thus, these physiological evidences namely aberrant respiratory patterns, inadequate respiratory and laryngeal co-ordination and abnormal laryngeal function confirm the earlier observations made by Hudgins (1934), Scuri (1935), Asp (1975) and Nickerson (1975).

Therapeutic Implications:

Previous research plus the present study have reported shorter phonation

duration for the hearing impaired speakers. Research also has indicated a positive correlation between breath duration and speech intelligibility (Stoker and Lape, 1980). Therefore speech, therapy should aim at improving the duration of phonation right from the early stages of speech therapy. Attempts at modifying aberrant respiratory patterns improving the co-ordination between respiratory and laryngeal systems and improving the efficiency of the laryngeal system should help in improving the phonation duration.

Acknowledgements:

This article is a part of the Ph.D. dissertation submitted to the University of Mysore. I am grateful to Dr. N. Rathna director, All India institute of Speech and Hearing, Mysore, for his guidance. This research work was supported by Indian council of Medical Research, New-Delhi (Grant No. ,3/1/1/5(73)/81 CAR-II.

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