

A Comparison of Two Methods of Measurement of Fundamental Frequency and Intensity Variations in Normals and Dysphonics

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The present study was aimed at developing normative data for the eight different measures of fundamental frequency and intensity variations. They are (a) Gross measures, Ex. F.Fo, Sp.F.Fo, Ex.F.I and Sp.F.I. (b) fine measures, JR, RAP, SHM and APQ. This study also aimed at comparing the gross and fine measures of fundamental frequency and intensity variations in order to find the highly weighted measures to discriminate normals and dysphonics.

Thirty normal adult males, thirty normal adult females and thirty dysphonics served as subjects. The age range of normal subjects varied from 17 to 35 years. Whereas the age range of dysphonic groups varied from 16 to 62 years. Three trials of EGG recording and for each of the vowels /a/, /i/ and /u/ were obtained using Kay laryngograph. The EGG recordings were digitized at 16KHz sampling frequency using 12 bits analog digital converter. Digitized data was stored on hard disk of PC-AT 386. The digitized EGG wave forms were smoothed, differentiated and peak picking method was used to extract the fundamental period and intensity. The obtained cycle to cycle fundamental period data and intensity were subjected to further analysis using PC-AT 386, to obtain JR, RAP, SHM, APQ, EX.F.Fo., Sp.F.Fo., Ex.F.I. and Sp.F.I.

The measured FF and I variations data were subjected to analysis of variance (ANOVA), linear discriminant function analysis. The following conclusions were drawn :

1. There was no significant difference between the trials for all the eight measures of fundamental frequency and intensity variations. Hence it is not really necessary to take more number of trial of the same vowel for the purpose of measurement of fundamental frequency and intensity variations. Even a single trial of recording can give same amount of information.
2. There was significant difference between the vowels /a/, /i/ and /u/ for SHM, APQ and Sp.F.I. measures, i.e., measures of intensity variation. Whereas rest of the measures JR, RAP EX.F.I., EX.F.Fo. and Sp.F.Fo, i.e., mainly the measures of fundamental frequency variations did not have any significant difference across vowels. This may indicate that fundamental frequency variations measures are constant across vowels, whereas Intensity variation measures vary across vowels. This may be due to different intra-oral breath pressure and different amount of lip radiation between vowels. Hence measurement of fundamental frequency and intensity variations across the vowels enhances the reliability of the data.
3. There was no significant difference between males and females for fine measures of fundamental frequency and intensity variation (JR, RAP, SHM. and APQ). Whereas the significant difference was present between males and females for gross measures of fundamental frequency and intensity variations. The presence of significant difference in gross measures of

Fundamental frequency and intensity variations were due to the absence of normalization in the measurement procedure of gross measures of fundamental frequency and intensity variation (Ex.F/Fo., Sp.F.Fo., Ex.F.I. and Sp.F.I.)

4. There was very high significant difference between normals and dysphonics across all the eight measures of fundamental frequency and intensity variations. Higher values of fundamental frequency and intensity variation among dysphonics is due to the abnormal and deviant vibration of vocal folds.
5. According to linear discriminant function analysis the Sp.F.Fo., SHM, EX.F.I. and APQ were highly weighted measure of fundamental frequency and intensity variations.
6. The same linear discriminant function analysis indicated that the fine measures of fundamental frequency and intensity variations were highly weighted and intensity variations. The fine measures of fundamental frequency and intensity variations

were highly weighted between gross and fine measures of fundamental frequency and intensity variations. The fine measures of fundamental frequency and intensity variation could classify 71.1% population correctly where as the gross measures could classify only 65.2% of the population.

7. The classification of normals and dysphonics using these measures had high degree of false positive classification. This is the major disadvantage of using fundamental frequency and intensity variation measures as screening and classification procedures. This aspect has to be further investigated.

However, the finer measures of fundamental frequency and intensity variation are powerful and reliable measures to discriminate between normals and dysphonics. It is also suggested to investigate the classification capability of these measures within the dysphonic groups.