

Physioacoustic Economy at Optimum Frequency *

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Present study was aimed at finding out the physioacoustic economy at the optimum frequency as located by an objective method of locating optimum pitch as described by Nataraja (1972).

The intensity range, maximum phonation duration, mean airflow rate were measured in 5 male and 5 female subjects with good voice, at optimum frequency, 50 Hz above optimum frequency, 100 Hz optimum frequency, 200 Hz above optimum frequency and 50 Hz below optimum frequency. The frequency range was also measured to know the location of optimum frequency in the frequency range.

The intensity range (maximum—minimum SPL an individual could phonate) at all the five frequency levels were measured using SPL Meter, stroboscope and tacho unit for all the subjects.

Using the same experimental set-up keeping the intensity constant the maximum duration of phonation for each individual at all frequency levels was measured.

The mean airflow rate was determined by dividing the total volume of air collected during phonation and the duration for which the volume of air collected. These

were measured using an expirograph and a stop-watch, at each of the five frequency levels, for all the subjects. The mean airflow rates were measured by keeping the intensity constant at all the five frequency levels, using SPL Meter, stroboscope and tacho unit. The frequency ranges, the highest and the lowest frequency an individual could phonate, were measured using SPL Meter, stroboscope and tacho unit combination.

Both male and female subjects showed maximum intensity range, longer phonation durations and minimum mean airflow rates at optimum frequency when compared with other frequency levels. Same results were also observed when males and females were taken as groups.

Statistical analysis using Wilcoxon matched pairs—signed ranks test has also revealed (1) that there is significant difference between intensity ranges when a comparison of intensity range of optimum frequency and the intensity range at other frequency levels is made, both in case of males and females; (2) in both male and female subjects, the maximum phonation duration has been found to be significantly different from that maximum phonation durations at other frequencies; (3) the mean air flow rates at other frequencies have been found to be differing significantly from

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that of the mean airflow rate at optimum frequency in both male and female subjects.

The location of the optimum frequency in the frequency range showed greater variations both in case of males and females.

Conclusions

- (1) There will be a greater intensity range at optimum frequency than at other frequency levels.
- (2) The maximum phonation duration will be longer at optimum frequency than at other frequencies.
- (3) The mean airflow rate will be minimum at optimum frequency than at other frequencies, when the optimum frequency is measured using an objective method of locating optimum frequency as described by Nataraja (1972), both in males and females.

- (4) It is not possible to locate the optimum frequency by using pitch range and the location of optimum frequency as used in this study varies from individual to individual, both in males and females.

Recommendations

- (1) To carry out the study on larger population.
- (2) To carry out the study using more sophisticated instruments like pneumotacho unit.
- (3) To carry out the study in anechoic chamber.
- (4) To carry out the study using trained singers.
- (5) To confirm the findings of the present study using electro-myograph.