Multi Dimensional Analysis of Voice Disorders

V. Anitha

Student, A.I.I.S.H, Mysore

In the present study "Multi-dimensional voice program Model 4305" was used to acquire, analyse and display the following thirty three voice parameters from a single vocalization. These extracted parameters were available as a numerical file which was subjected to statistical analysis.

I. Frequency Parameters :

1. Average fundamental frequency
2. Average pitch period
3. Highest fundamental frequency
4. Lowest fundamental frequency
5. Standard Deviation of Fo
6. Phonetory Fo range in semitones
7. Fo tremor frequency
8. Absolute jitter
9. Jitter percent
10. Relative average perturbation
11. Pitch perturbation quotient.
12. Smoothed pitch perturbation quotient
13. Fo Tremor intensity index
14. Fundamental frequency variation

II. Intensity Parameters:

15. Amplitude Tremor frequency
16. Shimmer in dB
17. Shimmer percent
18. Amplitude perturbation quotient
19. Smoothed amplitude perturbation
20. Peak amplitude variation
21. Amplitude tremor intensity index

III. Other Parameters:

22. Length of analysed sample
23. Noise to harmonic ratio
24. Voice Turbulence Index
25. Soft Phonation Index
26. Degree of Voice breaks
27. Degree of Sub harmonics
28. Degree of voiceless
29. Number of voice breaks
30. Number of Subharmonic segments
31. Number of unvoiced segments

32. Number of segments computed

33. Total pitch period detected

All the thirty three parameters were measured in a group of 60 normals (30 males and 30 females) and a group of 30 dysphonics (18 males and 12 females). The results were subjected to statistical analysis ('T' test and discriminant analysis) using NCSS computer programme.

'T' test results indicated the following :

1. There is no significant differences between the trails of vowels /a/, /i/, /u/ and sentence, (/alli/ /ga:di/ / ide/) interms of different parameters.

2. There is significant difference between the vowels /a/, *lil. lul* and the sentence interms of different parameters.

3. There is significant difference between the males and females in both normals and dysphonics interms of different parameters.

4. There is significant difference between the normal males and dyspohnic males and normal females and dysphonic females interms of different parameters.

The discriminant analysis showed that the following parameters were weighted in differentiating normals and dysphonics with an error ranging from 13-15% and the Wilk's lambda as low as 0.03 to 0.04.

1. Average fundamental frequency

2. Average pitch period

3. Lowest fundamental frequency

4. Phonatory Fo range

5. Amplitude Tremor frequency

6. Absolute Jitter

7. Relative average perturbation

8. Pitch pertubation quotient

9. Shimmer in dB

10. Shimmer percent

11. Smoothed amplitude peturbation quotient

12. Peak amplitude variation

13. Voice Turbulence Index

14. Soft Phonation Index

15. Amplitude tremor intensity index

16. Degree of Voice breaks

17. Degree of Sub harmonics

18. Degree of voiceless

19. Number of Subharmonic segments

20. Number of segments computed

This 13-15% error may be due to

1. Instrumental error while analysing the data

2. Intra subject variability

Recommendation's for further Study :

1. These parameters may be studied with different laryngeal pathologies before, during and after therapy to find out the exact effect of therapy.

2. Other parameters like aerodynamic parameters can be considered and correlated with these parameters for further study.

3. More number of dysphonic subjects may be used tor further study.