

Report

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• SPECTROGRAM IN PRAAT :-

a) Wideband Analysis: -

- i) It is used for better time resolution.
- ii) Window length should be around 3ms-5ms.
- iii) It is used to observe formant structure.

b) Narrowband Analysis:-

- i) It is used for higher frequency resolution.
- ii) Window length should be around 20ms-50ms.
- iii) It is used to observe harmonic structure (Pitch info).

c) View range of spectrogram:-

Maximum frequency should be half of the sampling frequency. Spectrum will be blank for frequencies higher than the Nyquist rate.

d) Nasal sound analysis:-

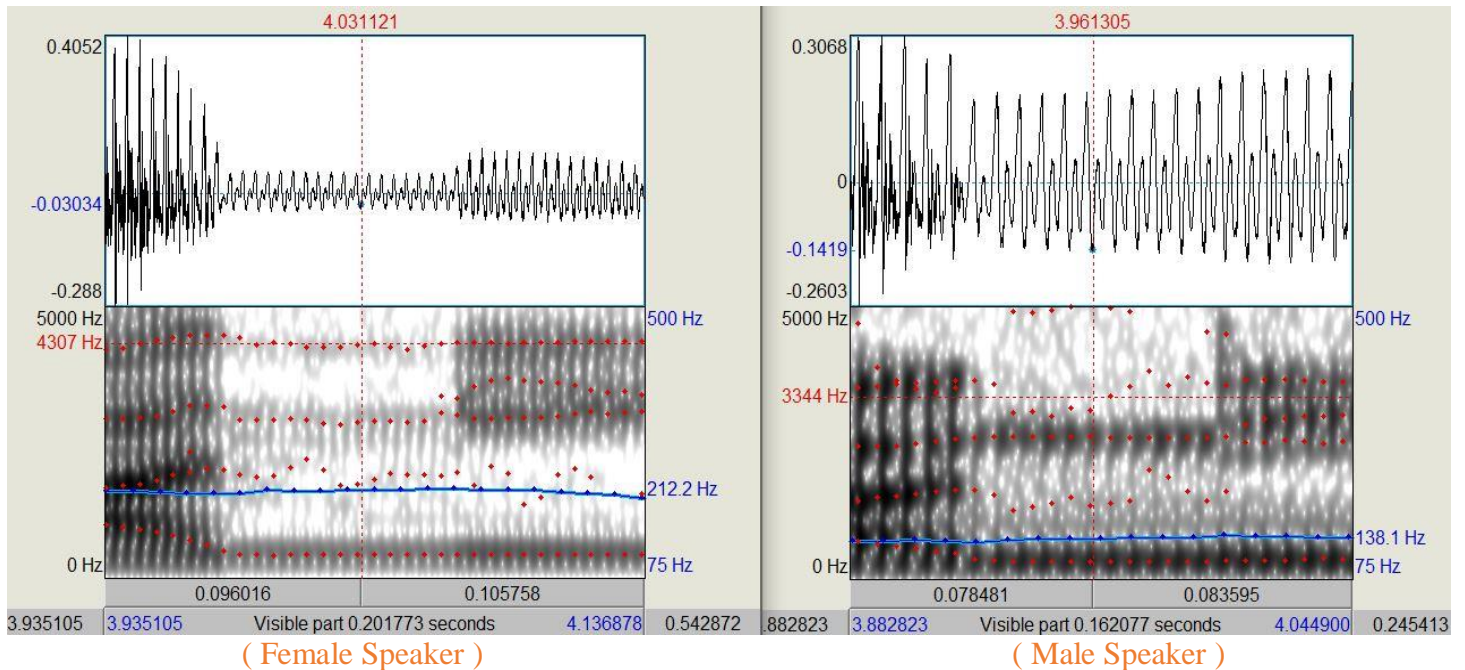
i) Nasal sound has lower amplitude than vowels so we get abrupt discontinuities in the spectrum.

ii) For example, in word “paani” (/p/ + /aa/ + /n/ + /i:/) discontinuities are observed at the start and end of /n/ in the spectrum.

iii) Following table shows the comparison between frequencies of formants for nasal sound (/n/) produced by male and female speaker.

Formant	Female speaker freq. (in Hz)	Male speaker freq. (in Hz)
F1	475.1	343.7
F2	1855	1417
F3	2840	2665
F4	4307	3344

iv) From this we can conclude that there is only difference between the position of respective formants of male and female (with female having frequencies of formants higher than male) and their pattern remains same.



e) Vowels analysis :-

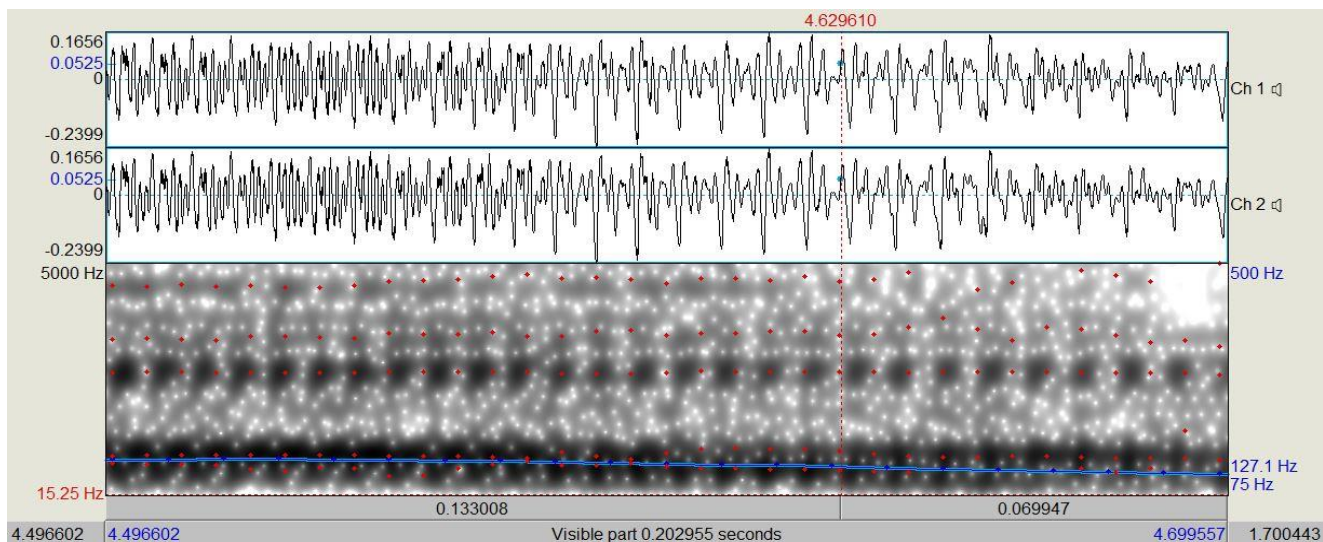
Waveform of vowels resembles periodi . Following inferences are obtained.

i) / i: / :-

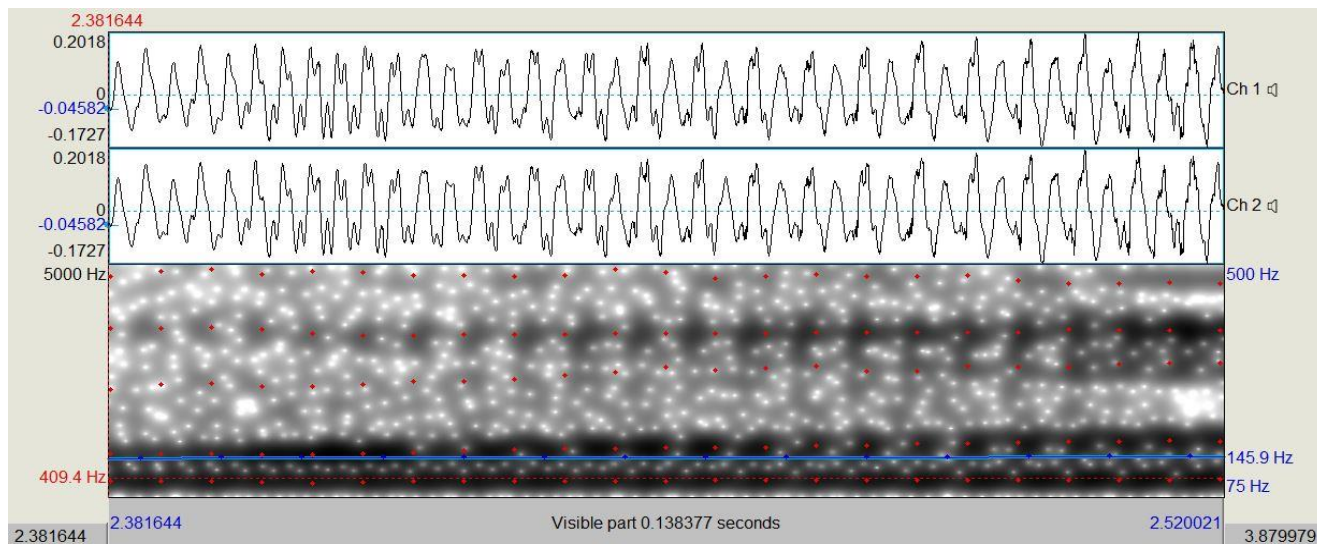
For vowel / i: / formant f1 and f2 has maximum frequency difference of all the vowels. f2 - f1 of female is greater than that of male.

ii) /aa /, /u /, /o/ :-

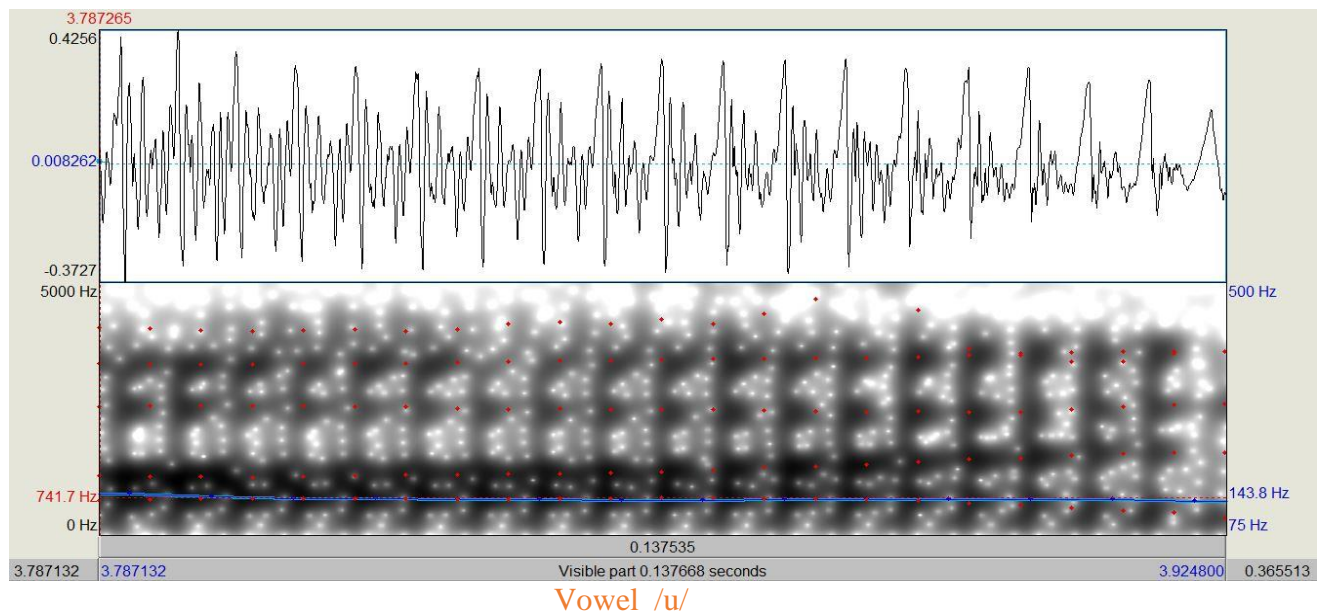
These vowels have maximum frequency difference between formant f2 and f3.



Vowel /O/



Vowel /aa/



f) Aspirated sound like /p/, /t/, /k/ :-

Puff of air comes from mouth while these sounds are produced. Waveform have closure region followed by burst region. Male and female have similar waveform structure.

g) Pitch analysis: -

For any group of sentences if we notice the overall contour of pitch, we can say that pitch rises towards the end of first phrase while ending sentence is marked by falling pitch.

Pitch of waveform can be calculated by,

- i) Waveform analysis
- ii) Using Narrowband analysis (calculating difference between harmonics)
- iii) Magnitude spectrum of a window segment
- iv) Directly by Praat window

h) Amplitude analysis: -

Shading in spectrogram corresponds to the amplitude of give waveform. Higher the amplitude darker will be the shade and vice versa.