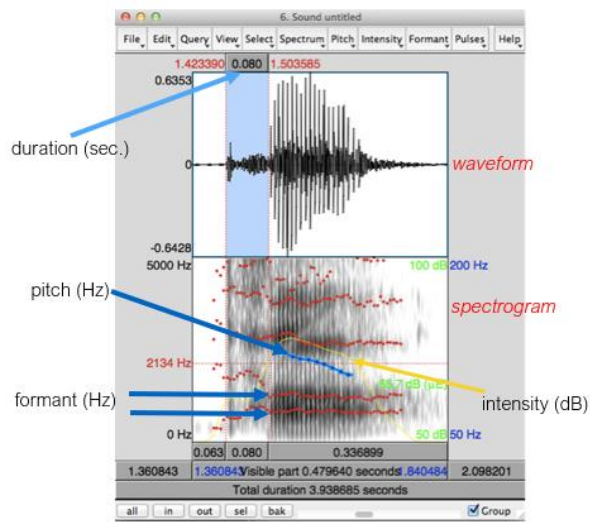Acoustic process in English. We can find out acoustic process by using Praat program.

By Praat, we can figure out the waveform, spectrogram and other more information. To be specific, intensity shows the decibel, pitch shows the hertz. Formant is the darkest line of spectrogram. Also, spectrogram is the one that turns spectrum in to time line. Now, having a closer look at the vowel acoustics, all of us have different pitch, so the sine wave(pure tone) of our sound looks different.

If we listen to a sentence, we can notice that it is not a pure or simplex tone. Thus, the sound we perceive through the mouth is complex tone. In addition, how sound like differs depending on our vocal tract. Listening to the source of the sound, there are just sound and pitch. According to sign wave, x-axis describes time line and y-axis describes the value. Moreover, you can turn the sine wave into the spectrum. Spectrum shows frequency by x-axis, and amplitude by y-axis. Simple tone of 100hz is a fundamental frequency, which we will call it as F0.. By synthesizing all simple tones, harmonics are made, and we call it complex tone. In terms of complex tone, the frequency of complex tone is same as that of fundamental frequency.

Human voice source consists of harmonics. Harmonics are composed of harmonic overtone. As usual, female has less harmonic overtone than male. After that, if filtered by vocal tract, the organization of harmonic overtone is same but magnitude differs from that of simplex tone. In other words, peaks and valleys appear in the complex tone.

In conclusion, the lowest pure tone is fundamental frequency, the rate of vibration of the larynx and the number of opening-closing cycles of the larynx per second. Amplitude of pure tones gradually decreases. On the other hand, if the sound is filtered by the vocal tract, spectrogram shows formants which is the peaks that frequencies vocal tract likes.

By means of Praat, we can synthesize source ourselves. As we create one lowest pure tone and make its harmonic overtone, we can make harmonics. In spectrum, there is a mountain from the beginning and we call it F1 and F2 in order. In spectrogram it appears as formants. Each vowel has distinguishable formants and that why we can classify each vowel. Also, if we put F1 as y-axis and F2 as x-axis, we can watch vowel space.

Source-filter theory

(from larynx)   (by vocal tract)

Voice Source

Output from lips

waveform

Time (in secs)

Time (in secs)

**Vocal Tract
Filter Function**

spectrum

X

=

Frequency (Hz)

Frequency (Hz)

Frequency (Hz)

Source Spectrum

Output Spectrum

Resonances =
Formant Frequencies