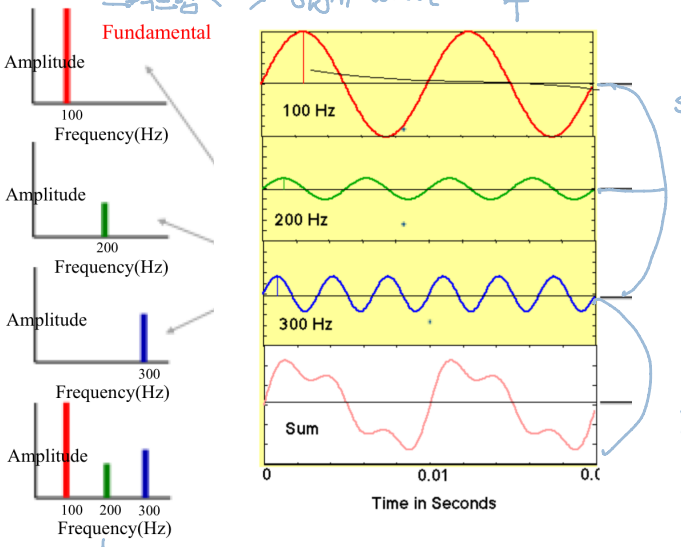
* Spectrum

모든 소리는 spectrum으로 이루어져 있음.

time x value (frequency)

스펙트럼 ↔ sign wave



simplex(Pure) tone

complex tone

: simplex tone을 합성한 결과.

frequency x amplitude (magnitude)

(주파수 x 그 주파수의 크기)

cf) Praat 기준

spectrum : 숫자 입력.

또는 : sign wave

* Source (목청에서만 나온 소리)

- Human voice source consists of *harmonics* 배음 증가
- A complex tone = sum of pure tones at integer multiples of the lowest pure tone
- the lowest pure tone
  - *Fundamental frequency (F0)* = Pitch
  - rate of vibration of the larynx
  - the number of opening-closing cycles of the larynx per second (초당 인두 진동수)
- Amplitude of pure tones gradually decreases

cf) 여 f0 ↑ → 등명등명

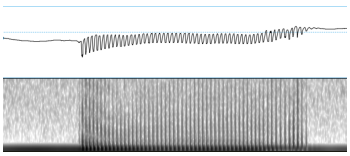
남 f0 ↓ → 백백.

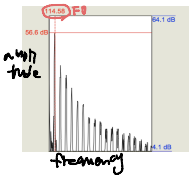
* Filter

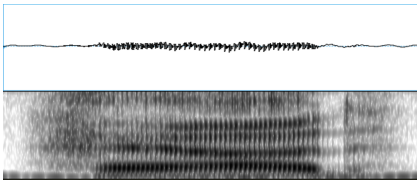
- Compare spectrums between audio and EGG
- EGG: gradual decreasing
- audio: peaks/mountains and valleys harmonics인데 그래프나, amplitude가 gradual decrease가 아님. → Curved.

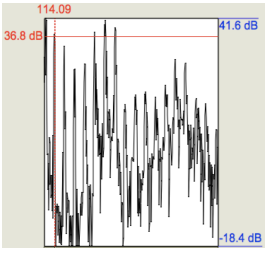
source로서는 가구.

- Because it is filtered by the vocal tract (VT)
  - peaks/mountains: frequencies VT likes = formants
  - valleys: frequencies VT does NOT like





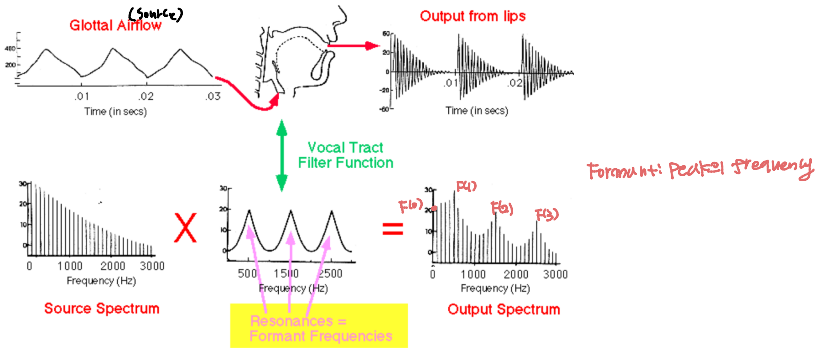




* Synthesizing Source

- convert to mono → 첫번째 sign wave의 주기일치, 높이도 조절해서 거의 비슷.
- 무한대로 가면, pulse train.

* Source-filter theory



Formant: peak의 frequency

* Spectrogram

- Dark band : mountains = Formants

* F1, F2 만으로 모음구분 可