Pitch

Auditory Sensations on a frequency scale from low to high, where frequency depends on the sound pressure & waveform

- Pitch perception is the basis of musical Melody
  - Variations in pitch give the sensation of musical tunes

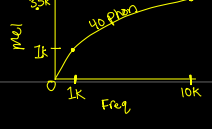
- "Tone height" describes musical pitch, & is related to the log of the frequency of the tone

- "Tone Chroma" is the quality of tones w/ the same letter on the musical scale

- "Pitch Strength" refers to the strength or weakness of a sounds pitch

MEL Scale

- The unit for Subjective Pitch is called MEL
  - ↳ the standard of 1k Hz @ 40 Phons (dB SPL) = 1k mels



↔ 3.5K mels covers the audible range

MEL as a function of Freq. where

- The Mel scale has its probs but it does indicate that pitch is not equivalent to frequency change

- & shows f/s to BM distance & Crit bands

(Pitch Perception)
- @ low freq, Pitch = Freq
- @ High Freq, Pitch < Freq

- When intensity increases, the pitch of LF <2kHz decreased
- When intensity increases the pitch of HF >4 kHz increases

Freq. Discrimination (FD)
- not a direct measure of pitch percep.
- We've gone over this honestly
- jnd - just noticable difference
- DLF - diff. limen for freq
- FMDL - FM detection limen

- DLF for PTones varies w/ - Freq, increasing @ HF
  - Intensity, improving @ high levels
- @ best Middle Freq. region (comfy listening level) is 2/10's (.2%) of the nominal Freq.

Theories of Pitch Perception

- Place theories - the idea that sounds are

analyzed Spectrally by the tonotopic (TTO) organization of the BM

Place theory
- HF tones Produce their max displacements @ basal end
- LF tones produce their max displacements @ Apical end
  ↳ w/ corresponding neural TTO from nerve to Cortex

- insufficient for LF

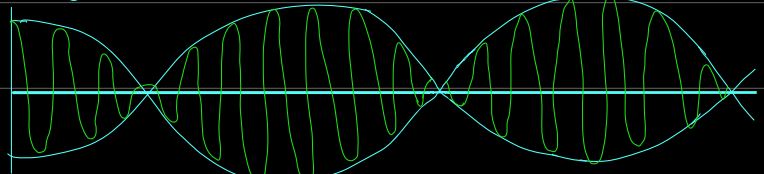
- Temporal theory - rely on the timing pattern of neural pulses of sounds
  - W/o Stimmy, neurons randomly fire
  - w/ Stimmy, neuron spikes are synchronized w/ period of signal for freq.s < 4-5k Hz
  - Pitch percep depends on the neural synchrony

- insufficient for HF

Both theories only cover part of Pitch percep.
- Place & Timing are involved w/ relative importance dependent on freq. & sound type

Beats (101)

- related to Pitch percep.
- When 2 tones that are similar/close in Freq (eg. 500 & 504 Hz) are Presented/heard (new)
- Then the Avg. of the 2 (1 tone that is) is what is perceived (eg. 502 Hz) & the tone will "wax & wane" in loudness = to the difference b/w 1st set of tones (eg. 4Hz)
  Waxing is out of Phase. Waning is in Phase



- "Best Beats" - When the intensity levels of 2 tones are equal the beats will be greater/louder

- As level difference increases the beat loudness decreases

Pitch of Complexes

- Pitch can be Periodic - Complexes having harmonics, the perception of these harmonics correspond to the F^0
  - When lower harmonics are removed from a periodic complex - the pitch still corresponds to that F^0 even if its missing
    - AKA Virtual pitch, low pitch, periodicity pitch, residue pitch & pitch of missing fundament
  - Virtual pitch can be heard in masking noise @ the F^0
  - Pitch perception can (possibly) be an Auditory pattern matching process or Temp processing

Moore's Model

- A model combining the other theories
- has 5 stages -

Resolves LF Harmonics → 1- Bank of BPF (band-pass Filters)

2- Neural Transduction

3- Analysis of Spike intervals

4- Comparison of time intervals across channels

5- Decision mechanism, Picking the most Prominent interval

Pitch of noise

- Highpass & Lowpass noise w/ steep slopes have cut-off freq that corresponds w/ pitch quality