Music 175: Psychoacoustics
Assignment #3,
Due: Tuesday April 21, 2020

In this assignment, you will test how your hearing compares to two (2) of the Fletcher-Munson equal loudness curves: one quiet (40 phons) and one loud (80 phons). BEST RESULTS WILL BE WITH HEADPHONES.

- Download **frequencyAndLoudness.pd** from

  `http://musicweb.ucsd.edu/~trsmyth/pdpatches175/frequencyAndLoudness.pd`.

- Turn your computer volume level to maximum and the level in the patch to 80 dB. Protect your ears.
  - Play a reference tone at 1000 Hz: repeat the experiment for both quiet (40 dB/phons) and loud (80 dB/phons) reference levels (recall: loudness in phons is the level in dB at 1000 Hz).
  - Listen (briefly) until you get a sense of the loudness then mute the tone. DON'T PLAY THE TONE FOR EXTENDED PERIODS.
  - Select a frequency for the second tone using the index values 0, 1, 2, ..., 9 (don't select frequency values directly or your data won't be stored in the table).
  - Increase the gain (starting from 0 dB and using the number box labeled "Second_tone_level (dB)") until the tone sounds equally loud as the reference.
    - mute the test tone, then unmute (play) the reference to remind yourself of its loudness;
    - (re)mute the reference and listen to the second tone;
    - repeat until you're certain they are the same loudness, but don't play both reference and test tones at the same time!
    - the level value should automatically appear in the table.
  - Repeat for the loud (80 dB/phon) tone.

- **Discussion (D3)**: How do your equal loudness curves compare to the Fletcher-Munson equal loudness curves (see lecture notes on **loudness**)? How do curves for the soft and loud reference tones compare? In A2 (assignment 2, harmonicity2.pd) you were asked to select a square wave and increase the amplitude of the 3rd and 9th harmonic until you heard a change in the quality (timbre) of the sound:
  - when you compared the values, you may have noticed that a9 (amplitude of 9th harmonic) had to be increased less than a3 (amplitude of the 3rd harmonic) to create a change in the timbre;
  - can this be explained using the Fletcher-Munson equal loudness curves?

- If you haven't already done so, sign up (on Canvas) for your paper presentation.

- **Reading**: Cook, chapter 8.