Andrew Sivaprakasam | Final Project - Progress Report 3

Final Project Repo: `https://github.com/sivaprakasaman/BME_511_FinalProject`

Current State of the project:

Decent progress, still a lot to do but starting to get going on finding the best way to analyze data. Main progress from last week includes getting modulation and carrier-frequency PSDs working for a given stimulus (see SAM tone and Violin stimuli below). I tried a few different PSD calculations. But it appears using multi-taper estimates are helpful because I can adjust the time-bandwidth product to focus in on spectral features I'm interested in.

Before the presentation, I'm trying to get a good measure of the correlation between the apPSTH Modulation/Carrier Frequency (ENV/TFS respectively) spectrum and that of the stimulus ENV and TFS. After meeting with Satya, it appears a good way to do this is first passing the stimulus through a filter bank to get spectra that correspond to a particular CF, rather than the whole-band stimulus. This would result in a more realistic analysis since the apPSTHs generated correspond to a particular CF, rather than a wide-band filter.

After passing the stimulus through a filterbank (I'm planning on using 125 Hz, 440 Hz (F_0), 880 Hz (F_1), and 4 kHz as my CFs) and extracting Hilbert TFS/ENV I'll plan to get a magnitude-squared coherence spectrum to demonstrate the coding strength of timbral features (i.e. harmonics, envelope). We can then observe if this coding strength is consistent across instruments/articulations and if it's impacted by hearing loss.

Figures: