**Signal Analysis Methodology**

**Thursday 20/09/18**

Meeting with Bill on Discriminant Analysis:

Number of Cases(x) = Decay time conditions(4) \* Subjects(5) \* Music pieces(4)

= 80 Cases/Rows (20 in each decay time condition)

Decay time conditions are categories

Quantitative analyses of the audio data is performed in frequency bands. These bands are centered on the simulated modes, with 3 additional bands above the simulation range to investigate the influence on high frequency spectrum. The bands are as follows:

Band 1: 20Hz-40Hz

Band 2: 40Hz-80Hz

Band 3: 80Hz-120Hz

Band 4: 120Hz-160Hz

Band 5: 160Hz-200Hz

Band 6: 200Hz-230Hz

Band 7: 230Hz-260Hz

Band 8: 260Hz-800Hz

Band 9: 800Hz-3000Hz

Band 10: 3kHz-20kHz

Observations:

1. FFT of each master bounce (16 x 5 subjects). Total is 80 arrays of spectral data.
2. Sum of Squared Wave (Energy) of each frequency band (10) of each master bounce (16 x 5 subjects). Total is 800 single value results.
3. Sum of Squared Wave (Energy) of each frequency band (10) of each kick drum channel (16 x 5 subjects). Total is 800 single value results.
4. Cross correlation of (amplitude normalized) unmixed Kick drum channel with each post-mix kick drum channel (1 per task, x 16 tasks x 5 subjects).
5. Rating of Task Difficulty (1-5)
6. Rating of Fatigue (1-5)
7. Rating of Satisfaction with result
8. Time to complete

Total number of Cases Rows = 80

Total number of Observations (Columns) = 310

Having participated in the study myself, I’ve observed that the simulated room mode resonances are most obvious on the kick drum, so this channel is singled out for a spectral analysis and cross correlation with the unmixed kickdrum.

**27/09/18**

Vertical axis data in matrix for LDA needs to be arranged into cases, programs, subjects. Possible Solution:

- may need to rename files using a code for this… ie, ad (sim a, song d) and arrange into case folders so matlab reads them in in case groups.

- may need several analysis directories since “dir” can only search the beginning fo a filename.

Matlab will index files alphabetically, so a valid solution is to rename all files AS FOLLOWS: (CONDITION)\_(PROGRAM)\_(NAME)\_CHANNEL

Eg: a\_d\_max\_bass.wav

Then make a separate containing duplicates of kick channels, and one containing duplicates of masters. If these are named with the same naming convention, then matlab will read them in the correct order, maintaining the case sorting.

**MATLAB ANALYSIS – SCRIPT STRUCTURE**

Convert all audio to 44.1kHz, 24bit .wav first - DONE

**Copy WaveStas function – rename and remove unnecessary stats.**

1. CD to directory for Subject & Task
2. Audioread all .wav files in directory
3. Init global vars:
   1. Frequency vectors for each band
4. Spectral Magnitude Splitting
   1. Band split to 10 bands as defined above
   2. Plot spectrum

**Saturday 22/09/18**

Top level script started, two band split functions written. Each one is called inside a for loop that steps through all the wav files in the targeted directory. Output from the loop is one structure containing wide band splits of all input files, and a second containing narrow band splits of all inputs. Names are generated from input file names.

In order to create a structure of all master bounces, all master bounce file names must be changed to contain the word “master”, all lower case. – DONE