Creating the AN files: LSS 3 October 2013.

Overview: uncompressed audio files are filtered using the gammatone filterbank (gammatone1.m). These signals are then turned into a spike coding, based loosely on the coding in the auditory nerve.

Create\_AN\_file: creates the AN representation for the files called. The parameters are

1st three parameters: Stimulibasedir, experimentname, dirname: used to form the prefix for where the input audio files will be found. This is

[Stimulibasedir experimentname / dirname]

That directory is used both for locating the parameters file (parameters\_monoonset.mat, created by the setparameters\_monoonset.m function), and for the list of files (in this directory) to be processed. The list is contained in a file supplied as the 4th parameter, input\_filelist.

5th parameter: store\_bmSig: determines whether to run the gammatone filterbank (and if so to store the results), or to read a previously created gammatone filterbank output. 1 means create and save, 2 means load it from a pre-existing file.

6th parameter, bmSigdir, is the name of the subdirectory to be used for the gammatone output (used to be called Basilar membrane movement , hence bmm) files. If it doesn’t exist it is created.

7th parameter, ANSigdir, is the name of the subdirectory to be used for storing the AN signals If it doesn’t exist it is created.

**Create\_AN\_file** calls

bmsigmono: calls the gammatone filter bank (gammatone1.m), using parameters set up from the parameters file, from the AN structure created there. Returns filtered signal, the signal itself, sampling rate, length of the data, centre frequency of the filterbank channels, and a delay vector, (calculated from equation 41 of Cooke’s 1993 book).

AN\_coder\_GRM: Gabriel Reines’ versionthat codes the AN signals efficiently. Returns an array of cells: 1 cell per channel in the filterbank. Each cell contains a matrix, with one entry per zero-crossing (ZX). The first element of each entry is the sample number of the ZX, and the second element is the sensitivity level of that ZX.

Parameter file values used (setup in setparameters\_monoonset.m):

AN.datestr: the date and time (of the creation of the parameter file – should be calculated in the function itself)

AN.soundlength: maximal length of sound to use

AN.fmin: lowest frequency of the filterbank

AN.fmax: highest frequency of the filterbank

AN.channels: number of channels in the filterbank

AN.N\_erbs: width (in erbs) of each filterbank channel

AN.minlevel\_zc: minimal signal level for zero crossing

AN.multiplier: ratio of signal levels between sensitivity levels

AN.iterations: number of sensitivity levels

AN.filtertype: type of filterbank: nominally ‘gamma’ for gammatone filterbank.

The AN structure:

This is stored in a structure called AN: AN.signal is the actual AN signal, as described above, AN.cf is the array of the centre frequencies of the bandpass filter, AN.Fs is the sampling rate, AN.datalength is the length of the dataset, and AN.experiment is the name of the particular file that was used to create this dataset. The file has the same root as the filename, with \_ANSig.mat appended to the end.