

DAT335 – Principles of Digital Audio
Cogswell Polytechnical College
Spring 2009

Assignment #2
Time and Spectral Structure in Speech and Melody
Due 03/31/09

Perceptual Effects of Envelope and Fine Time Structure

Online, navigate to and peruse:

<http://research.meei.harvard.edu/chimera/index.html>

<http://research.meei.harvard.edu/chimera/motivation.html>

1. What is meant by “fine time structure”? By “envelope”?
2. Navigate to http://research.meei.harvard.edu/chimera/speech_noise.html. First listen to the demos under “Speech Envelope”, starting with “1 Frequency Band”. How many frequency bands does it take before you can understand the words in the sentence? How does this correspond to the number of frequency bands needed for speech reception in quiet environments? How do you think background noise or reverberation affects the number of bands required and (based on what we know about the cochlea) why?
3. On the same page, listen to the demos under “Speech Fine Structure”. What is the effect of the increase in the fine time structure of a speech pattern imposed on noise? Why might this be?
4. Navigate to http://research.meei.harvard.edu/chimera/speech_speech.html. What do these examples demonstrate about the relationship between number of frequency bands and time resolution in speech reception?
5. Navigate to http://research.meei.harvard.edu/chimera/music_music.html. Listen to the examples. What do you perceive? Do you agree with the conclusions stated by the researchers? In terms of experiment design, are there any aspects of the stimuli (here, the 2 MIDI melodies) that you think could influence the results?
6. Navigate to http://research.meei.harvard.edu/chimera/speech_music.html. Put on/in headphones, and make sure the left channel is on/in your left ear, and right channel is on/in your right ear. Listen to the examples.

For the “Speech Envelope and Music Fine Structure”, which side(s) do(es) the speech and/or music come from (which material do you hear where per example), and how does this change with the increase of frequency bands? Describe which examples give what effect.

For the “Music Envelope and Speech Fine Structure”, which side(s) do(es) the speech and/or music come from (which material do you hear where per example), and how does this change with the increase of frequency bands? Describe which examples give what effect.
7. What is the point of the lateralization (dichotic) demos, and what do they demonstrate?
8. Discuss what you find to be the most interesting or significant perceptual and/or musical implications of concepts tested in the Auditory Chimera project.

Additional information can be found on the project conference posters:

<http://epl.meei.harvard.edu/~zms/chimera.html>