

Background reading: Read the chapters 14 through 18 in Gold & Morgan, the section on auditory perception. This will cover some of the material on pitch and speech perception that was glossed over in the lecture.

Reading assignment: “Chimaeric sounds reveal dichotomies in auditory perception,” Smith, Delgutte, and Oxenham. *Nature*, 2002.

<http://www.ee.columbia.edu/~dpwe/e6820/papers/SmithD002-chimaeric.pdf>

This is a nice, concise example of psychoacoustic work: a specific hypothesis concerning how the brain processes information, clever stimulus design informed by signal processing, and clear, well-presented results.

Post a summary and some personal comments or reflections on the Courseworks discussion site.

Practical assignment: This week we use the Matlab Auditory Demonstrations produced at Sheffield University:

<http://www.dcs.shef.ac.uk/~martin/MAD/docs/mad.htm>

Follow their instructions to install the whole set, editing `madroot.m` as necessary. Then try following demos, in each case working through the related description page on the web site above.

- **bm:** This is a simple model of the basilar membrane. The best way to get an intuition about how the cochlea performs frequency decomposition is to look at a simulation like this.
- **detuning:** This demo shows the effect of harmonic mistuning on pitch. Try to match the pitch of the mistuned harmonic complex against that of the pure tone by clicking at different vertical positions at a given horizontal position (mistuning). The tuning differences are very small, so you have to listen carefully. Make a plot of your results (“print” from the Matlab prompt should work).
- **ti:** This demo allows you to investigate the ‘restoration’ of sounds behind noise maskers in a variety of conditions. Work through the suggestions in the documentation page.

You might also enjoy **vowelExplorer** for examples of the separation of synthetic vowel pairs based on pitch differences, and **sws** for examples of sinusoidal speech replicas. Post any comments or experiences on the discussion board.

Project: Continue developing your project ideas, using your web site to document your progress. My goal is to give each of you feedback on your progress so far this week.