

Assigned: Tuesday 2001-01-23

Due: Tuesday 2001-01-30
Dan Ellis <dpwe@ee.columbia.edu>**Reading assignment:**

“Auditory perception of breaking and bouncing events: Psychophysics,” W. H. Warren, Jr. & R. R. Verbrugge, in *Natural Computation* ed. W. Richards, MIT Press 1988.

This paper (available on the web site) looks at how listeners can perceive the higher order structure of acoustic events. Neither the physics, nor the perception, of phenomena of this ‘scale’ have been much studied, so this is a rather distinctive paper.

Add a paragraph summarizing this paper to your web page for this class.

Problems:

1. Prove that convolution is commutative i.e. $h[n] * x[n] = x[n] * h[n]$

Exercise 6.13 from chapter 6 of Gold & Morgan

Exercises 7.6 and 7.7 from chapter 7 of Gold & Morgan

Practical assignment:

Produce two spectrograms of the `goodbad.wav` sound example, one in which the individual (near horizontal) harmonics are visible (a narrowband spectrogram), and one showing the (vertical) pitch pulses (a wideband spectrogram). You can use the ‘specgram’ function in Matlab. What is the maximum fundamental frequency of this example, and when does it occur?

Project:

Do some preliminary research on one (or more) possible project topic(s). Find a relevant paper/papers (online or in the library); read and summarize on your web page.