AUDL 4007: Auditory Perception

Measuring pitch from speech and other sounds

Using a program called WASP (http://www.phon.ucl.ac.uk/resource/sfs/wasp.htm), you will record yourselves whistling and speaking

First make a test to check the recording levels. To do this, press the red record button and then check the “Test Levels” button. Whistle or speak and check that the level bar reaches most of the way but not all the way to the right edge. When you record a whistle, place the microphone off to the side of your mouth so that you are not blowing straight at the microphone, otherwise the recording will be affected by turbulent air directed at the microphone.

Once you have a recording, the display you will show both the waveform and spectrogram. You can use the left and right mouse buttons to position cursors on the display, and you can use the 'play' button to play the region between the cursors. The maroon up and down arrows in the toolbar allow you to zoom in and out.

Before you start the first exercise, select the “narrow band” spectrogram display using the button displaying several parallel lines. This sets the spectrogram to show a time-varying spectrum measured using filters that are 45 Hz wide.

1. Record yourself whistling a short melody of 8-12 notes. Zoom in and look at the shape of the waveform and the pattern on the spectrographic display. Use the cursors to replay a relatively low-pitched note and a higher pitched note.

a) Measure the duration of 10 cycles from the centre of each of the notes, and then divide that by 10 to get the average period of a single cycle. Convert these to frequency (1/period). Plot your frequencies as a function of note number and compare to the spectrogram. What is the advantage of measuring over 10 cycles instead of one?

Note	duration of 10 cycles (ms)	period (ms)	frequency (Hz)
1			
2			
3			
4			
5			
6			
7			
8			
9			

10			
11			
12			

Comment on the shape of the waveform and the pattern in the spectrogram for a particular note. How can you tell from the spectrogram how much the whistle resembles a sine wave? How does the spectrogram provide another way to estimate the fundamental frequencies (F0s) of the whistled notes?

2. Record the sentence “No, David rented a car” in two forms: the first as you might answer the question “Had David bought a car?” in which RENTED is emphasised. The second will be in answer to the question “Had David rented a bike?” in which CAR is emphasised. Select the F0 contour display (the button with a single line) to show a plot of F0 against time. Look at the F0 contours of the two sentence forms in WASP and note how high the F0 rises in “rented” and “car” in each of the two.

Peak F0	Rented	Car	
Form 1	---------	-------	No, David ***rented*** a car
Form 2	---------	-------	No, David rented a ***car***

What can you conclude, in this case, about the use of pitch to signal meaning?

How do the pitches of your speech samples compare to those of your whistles?