

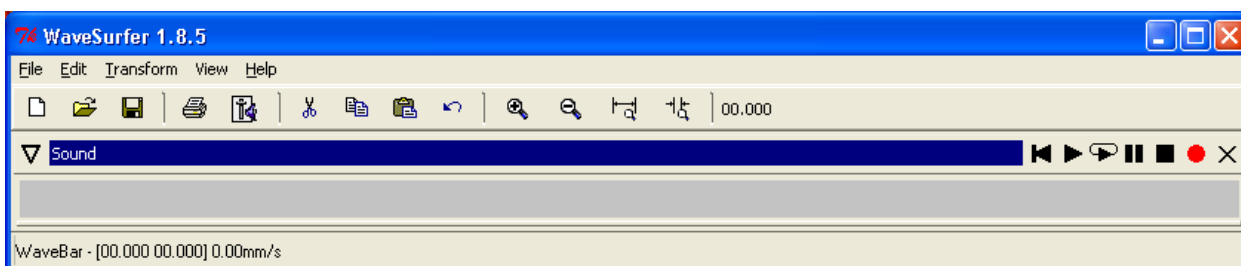
Assignment 1: Recording and analysis of American English vowels

Step 1: *make a set of vowel recordings and carry out an acoustic analysis*

(1) Download the WaveSurfer program (www.speech.kth.se/wavesurfer/download.html).

WaveSurfer is an Open Source tool for sound visualization and manipulation. Extract the program file (wavesurfer.exe) from the .zip archive and save it on the desktop.

(2) Double click the WaveSurfer icon:  This will open the window shown below:



(3) Press the red button to start recording; you should see the recorded waveform scrolling from right to left. Click the black square to stop recording, and the right facing triangle to listen to the recorded sound.

(4) Next, click right on the recording signal and choose the option “Create Pane” => “Waveform” to display a larger version of the waveform. Click on the waveform display to mark the beginning of the syllable; hold the mouse button down and drag to the right until you reach the end of the syllable. Release the mouse button. Select “File” => “Save Selection” and enter a name for the file.

(5) Use this procedure to record the set of 12 vowels / i ɪ e ε æ ʌ ə ɑ ɔ o u / plus the 3 diphthongs / ai au ɔi / in hVd words in a carrier sentence, “Please say the word _____ again.” (See the list below for the spelled version of the words together with the phonetic symbols).

(6) Over the next two weeks we will carry out a series of acoustic analyses of the vowels and use the measurements as input to a statistical pattern classifier. For this week’s class, experiment with the available displays in WaveSurfer by right-clicking on the waveform and selecting “Create Pane” => “Spectrogram” or “Create Pane” => “Formant Plot” etc. In this week’s class we’ll extract acoustic measurements from the vowels and compare them with corresponding measurements from a Matlab analysis.

Steps remaining:

- (1) Measure the formant frequencies (F1, F2, and F3) and fundamental frequencies of the vowel and its duration, import the measurements into Matlab and create summary plots (details to be provided later). We'll compare the measurements obtained with WaveSurfer using TrackDraw, a graphical formant tracking program for Matlab. TrackDraw will be used to synthesize speech using the measured formant tracks and we can listen to the results to confirm the accuracy of the measurements and make notes of any measurement errors, difficult cases or discrepancies between the two approaches.
- (2) Compare the formant frequency measurements with published data for Western Michigan in Hillenbrand et al. (1995) and for N. Texas in Assmann & Katz (2000).
- (3) Use the measurements to train and test a statistical pattern classifier.
- (4) Test the predictions of the model against vowel identification performance by listeners.

i	heed	ai	hide
ɪ	hid	au	how'd
e	hayed	ɔi	hoyed
ɛ	head		
æ	had		
ʌ	hud		
ə	herd		
ɑ	hod		
ɔ	hawed		
o	hoed		
ʊ	hood		
u	whod		