

**IMPORTANT \*\*\* IMPORTANT \*\*\* IMPORTANT**

Completion of this in-class assignment is necessary for you to complete your next homework assignment (HW5). If you do not complete the work required today, you will need to come back to the lab on your own time to finish. When not being used for instructional use, the lab is open M-F 8AM-6PM. If you need to come back, be sure to choose a computer that has headphones on it.

**BASIC TASK:** for today's class, you will be recording and measuring the formants of your vowels. As you will be working in pairs, make sure you budget your time wisely and that each person has a chance to work with Praat.

**RECORDING THE DATA**

1. On the desktop of the computer, there is an icon for the speech analysis program "Praat" (the icon showing a pair of lips and an ear). Double click on the Praat icon to open the program. Two windows will appear, a window that says "Praat objects" and a window that says "Praat picture". In the objects window, click the menu item "new" and choose "record mono sound." A program for recording sounds will start.
2. Put on the headphones and position the microphone in front of (but not touching) your mouth. Click "record" and then read the following words fairly loudly (don't yell, of course, but as we saw in class you'll need to have good volume to get clear spectrograms). Also, read the words at a fairly even pace (don't race through them; pause slightly between each word).

|       |        |
|-------|--------|
| bead  | /bid/  |
| bid   | /bɪd/  |
| bayed | /beɪd/ |
| bed   | /bed/  |
| bad   | /bæd/  |
| bod   | /bɒd/  |
| bode  | /boʊd/ |
| book  | /bʊk/  |
| booed | /buːd/ |
| bud   | /bʌd/  |
| bird  | /bɜːd/ |

|      |        |
|------|--------|
| baud | /boʊd/ |
|------|--------|

Add, if you have an /ɑ/~/ɔ/ contrast

3. As soon as you finish reading the words, click "stop." Under the "file" menu item, choose "write to WAV file." Save your sound file to the desktop as "yourname.wav".

## **VIEWING/EDITING YOUR DATA**

4. To view your file, go to the "Praat objects" window. Under the menu item "read", click "read from file." Go to "desktop" and choose the sound file that you just saved. (If you are not already at "desktop," click the "desktop" icon and then the name of your file.) Click "open."
5. In the objects window the name of your file ("*yourname*," without the .wav extension) will appear. Click on that filename in the objects window. Now click the "edit" button. A window with the waveform and spectrogram of your recording will appear.
  - If only the waveform appears, and in the blank window where the spectrogram should be it says "to see the analyses, zoom in to at most 10 (or some #) seconds" and below that "raise the *longest analysis* setting in the view menu" then go to "view" and select "show analyses". A new window will open; the bottom box in that window says "longest analysis" and shows a number. Type in 100 in that box and click "OK".
  - If only the waveform appears in the waveform window with and the space underneath shows no writing, then under the "spectrum" menu item, click "show spectrogram."
  - If the spectrogram has red or blue lines going through it, under the menu item "pitch" deselect "show pitch" and in the menu item "formant" deselect "show formant."
  - Click on the "maximize" button (the middle of the three little boxes in the upper right hand corner of the waveform/ spectrogram window) to get a bigger view.
6. To get a clear enough view of the formants for each word, you should display only about three or four words at a time. To do this, click and drag the mouse to select the first 3-4 words. A pink box will appear around them. Then click the "sel" button in the lower left corner of the waveform/spectrogram window to display the selection zoomed to the size of the window. (When you finish with the words you have selected, you can either click "all" in the lower left to display the whole file again and select the next few words, or you can use the scroll bar to move to the right.) Assuming you have clear spectrograms and do not need to re-record your vowels, you are now ready to start making measurements.

## **MEASURING YOUR FORMANTS**

7. For each word you recorded, you will now measure the frequencies of the first, second, and third formants. You should choose a point in time near the middle of each vowel, except for the vowels in "bayed" and "bode" (which are diphthongs). For these, you should choose a point in time relatively near the beginning of the vowel, about  $\frac{1}{4}$  of the way through the vowel.
8. To do this, locate the dark band in the spectrogram that is each formant, position the cursor in the middle (vertically) of the dark band, and click the mouse. A horizontal cursor will appear, and the frequency at which you have positioned the cursor will appear

to the left of the spectrogram. Write down the value for each formant in the table provided (on the next page).

*You do not need to write down the decimal places, just to the nearest Hz is accurate enough.*

- If you want to hear the word you are working with to be sure the vowel you're measuring is the one you think it is, you can select just that word as you did in (6) above. Then click on the short bar directly underneath your selection (which shows the length of your selected utterance).

| Vowel phoneme  | Word  | F1 | F2 | F3 |
|----------------|-------|----|----|----|
| /i/            | bead  |    |    |    |
| /ɪ/            | bid   |    |    |    |
| /eɪ/           | bayed |    |    |    |
| /ɛ/            | bed   |    |    |    |
| /æ/            | bad   |    |    |    |
| /ɑ/            | bod   |    |    |    |
| /oʊ/           | bode  |    |    |    |
| /ʊ/            | book  |    |    |    |
| /u/            | booed |    |    |    |
| /ʌ/            | bud   |    |    |    |
| /ɜː/           | bird  |    |    |    |
| /ɔ/ (optional) | baud  |    |    |    |

- Be careful what you select as the first, second, and third formants; be sure they are actually what you think they are!** Keep in mind that the first and second formants are sometimes very close together and can look like a single wide dark bar (especially in /u/), and the second and third formants can sometimes look like a single dark bar (especially in /i/). Also, remember that in these words there will be a voicing bar running along the bottom.
- Keep in mind what the expected pattern of formants is (e.g., F1 and F2 low for /u/, F1 low and F2 high for /i/, etc.). You may want to keep your class notes (from 10/28/04) on these patterns handy. Although you should not expect to see exactly those patterns as everyone's vowels are different.
- After you are done, please choose "quit" under the control menu, then click "OK." It's OK to leave your sound file on the desktop, but it may not be there if you come back later. If you are not finished, you can try emailing yourself the file to protect against losing it.