A Brief Introduction to Praat

Praat is a free, downloadable program that you can use to do phonetic analysis of speech. Praat is a software application designed to investigate the acoustic properties of speech. It was developed in the Netherlands by Paul Boersma and David Weenink (*praat* is the Dutch word for 'speak'), who have made it freely available to the linguistics community.

There are very many sophisticated functions available in Praat but we will limit ourselves to the most basic. The Help function in Praat is fairly good and there are a large number of websites that also provide help for Praat users. An online video tutorial for VOT measurement in English is available here:
https://youtu.be/m2xajNt65IY

In this brief tutorial you will learn how to measure VOT for plosive sounds in English.
Before you begin, do the following:

1. Download the most recent version of PRAAT to your computer.
http://www.fon.hum.uva.nl/praat/

2. Download all the files in the folder *Praat exercise* to your desktop.

3. Open Praat (double click on the icon).
4. Close the window on the right (the Picture Window).
5. In the 'Objects' window, go to the 'Open' button on the top.
Select 'Read from file…'. Go to the PRAAT exercise folder on the Desktop.
Open the file 'English_bilabials.wav'. It should now appear in your list of objects as 'Sound English_bilabials'.
6. Next, open the file TextGrid English_bilabials. It will appear on your list of objects.
7. Select both the files and then click on 'View & Edit' on the right side of the window.

This should appear:
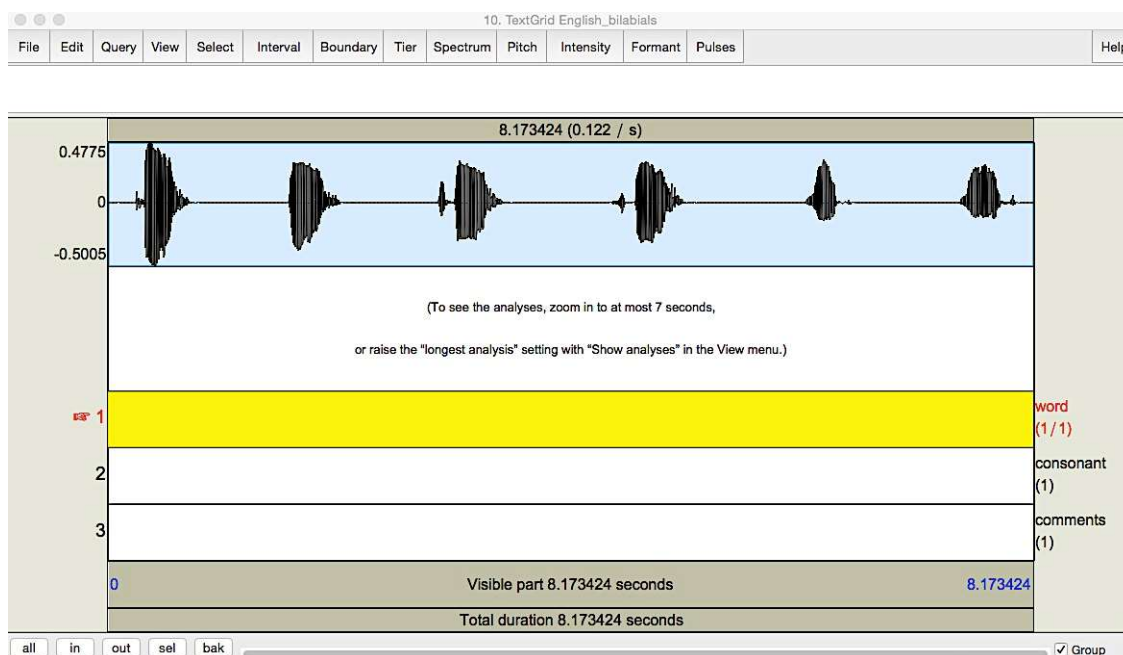
Step 1: In order to measure VOT, you must first zoom in on the consonant you want to look at. Start with the first word on the recording, 'pie'. Select it and then click on the 'sel' button along the bottom of the screen. That will zoom in on what you highlighted.

Now go to the 'Spectrum' button that is on the top of the screen. Click on the option 'Show spectrogram'.

Click on the waveform. A red line will appear on the textgrid. Click on the open circle that is on the 'word' tier (look at the left side for the tier labels). Once you have done that a blue line should appear on the textgrid. Now look for the end of the word and place another boundary there.

Now look for the release burst for the [p]. Once you have correctly identified the end of the burst, click on the waveform and a red line will appear on the text grid. Click on the open circle to place a boundary at the end of the burst on the 'consonant' tier. A blue vertical line should appear.

The next step is to determine where voicing, or periodicity begins. Select the end portion of the silent period after the release burst and look for the point where the waveform becomes more periodic. This is where voicing begins. Once you have identified this point, click on the waveform and place a boundary on the 'consonant' tier.

Adding phonetic symbols:
Click on the spot in the tier that you want to write your phonetic symbols. It should be yellow. Go to the Help button (top right corner). Click on phonetic symbols. Select consonant, vowel or diacritic option. Follow the keyboard shortcuts for each symbol.
For example, the keys for aspiration are \^h
Your screen should look like this:
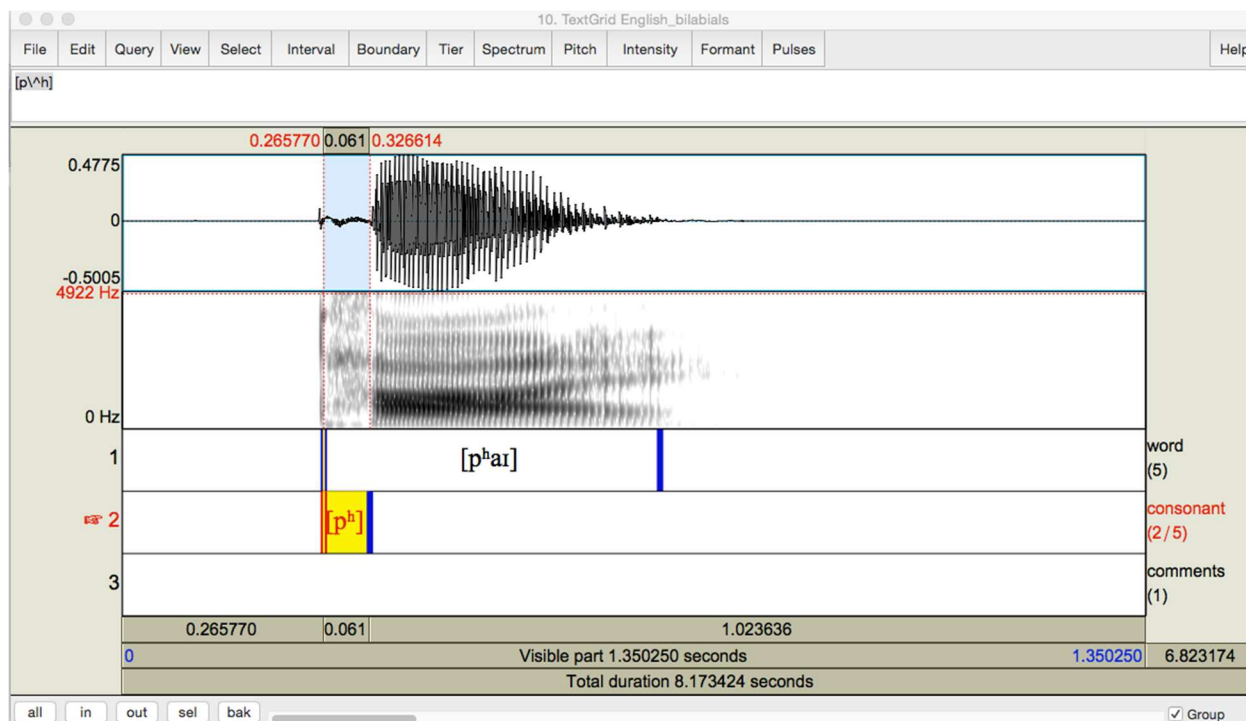
*** SAVE YOUR TEXTGRID***

Once you have placed boundaries and written text on the textgrid it must be saved. (You have not modified the sound file so it does not need to be saved again.)
With the soundwave and textfile visible, go to 'File' (top right corner). Then select 'Save texgrid as textfile' and save it to your desktop folder where the rest of your files are located.

Step 2. Now zoom out and click on the interval between the two boundaries on the consonant tier. This is the period of voice onset time. For the word 'pie', as pronounced in this sound file, VOT is approximantely 61ms.

Step 3. The next word in the file is 'by'. What is the consonant at the onset of this word?
Go through the same steps as above for the rest of the words in this file.
The voiced and voiceless consonants appear in three different phonetic contexts.

As mentioned in the chapter, phonetic context affects the pronunciation of sounds. Fill in the chart below and compare your results to those of a classmate.
Then answer the questions related to this exercise at the end of the chapter.

WORD	IPA	PHONETIC CONTEXT	VOT (or closure duration)
1. pie			
2. by			
3. a buy			
4. spy			
5. nap			
6. nab			

For words 3 and 4, the target bilabials are in intervocalic position (a buy) and part of a consonant cluster, following [s].

Step 4. Finally, for 5 and 6, how long is the closure duration for the consonants?
Compare the duration of the preceding vowel. Are there any differences between the vowel that precedes the voiceless consonant and the one before the voiced consonant?
What might this tell us about how listeners perceive the difference between word-final [p] and word-final [b]?

Additional exercises:
1. If you know people who are non-native speakers of English and whose native language does not have aspiration (e.g., French, Spanish, Italian, Portuguese), record them saying words in their L1 that start with these same consonants. Measure the VOT for these items and compare them to the values for English.
2. The sound file american_vowels.wav is in the same folder. Open that file to see the different formant configurations for each vowel. You can look online for some help with measuring vowel formants and creating TextGrids.
3. You can also look at the files d_dh.wav and b_bh.wav for examples of VOT differences in Hindi.