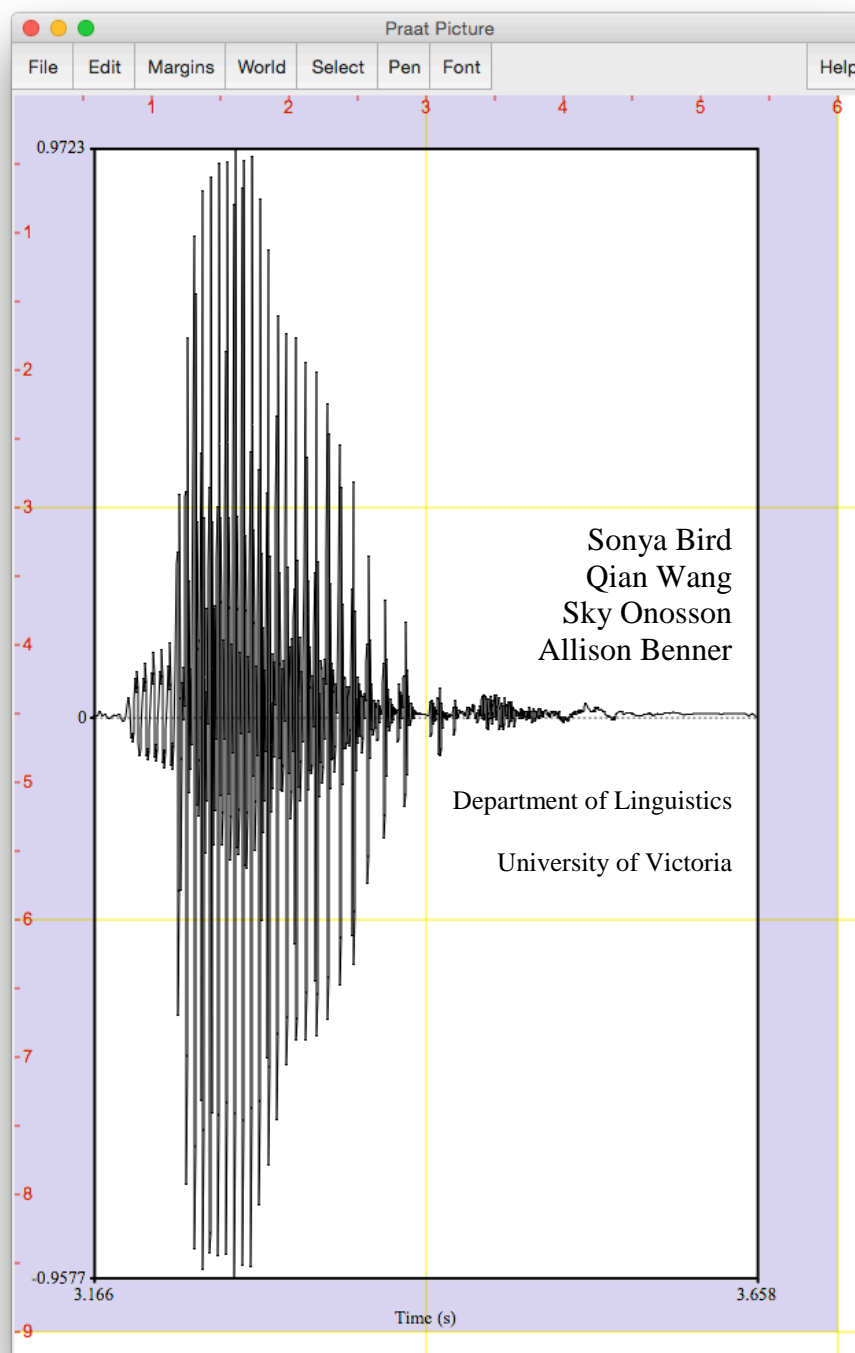


# LING 380: Acoustic Phonetics

## Lab Manual



## LAB 1 – EXPLORING PRAAT

### GOAL OF LAB 1

The goal of this first lab is to explore some of the basic features of PRAAT ([www.praat.org](http://www.praat.org)), which we will be using for speech analysis throughout the term. You will learn to make recordings, bring up visual displays of these recordings (waveforms and spectrograms), segment and label various components of these recordings, and export the visual displays into a word document. The skills you learn today will be useful for your lab work throughout the remainder of this course and beyond...

1. Open Praat: double click on the following icon (Figure 1.1):



Figure 1.1 Praat icon

2. Get to know the Praat layout (Figure 1.2)

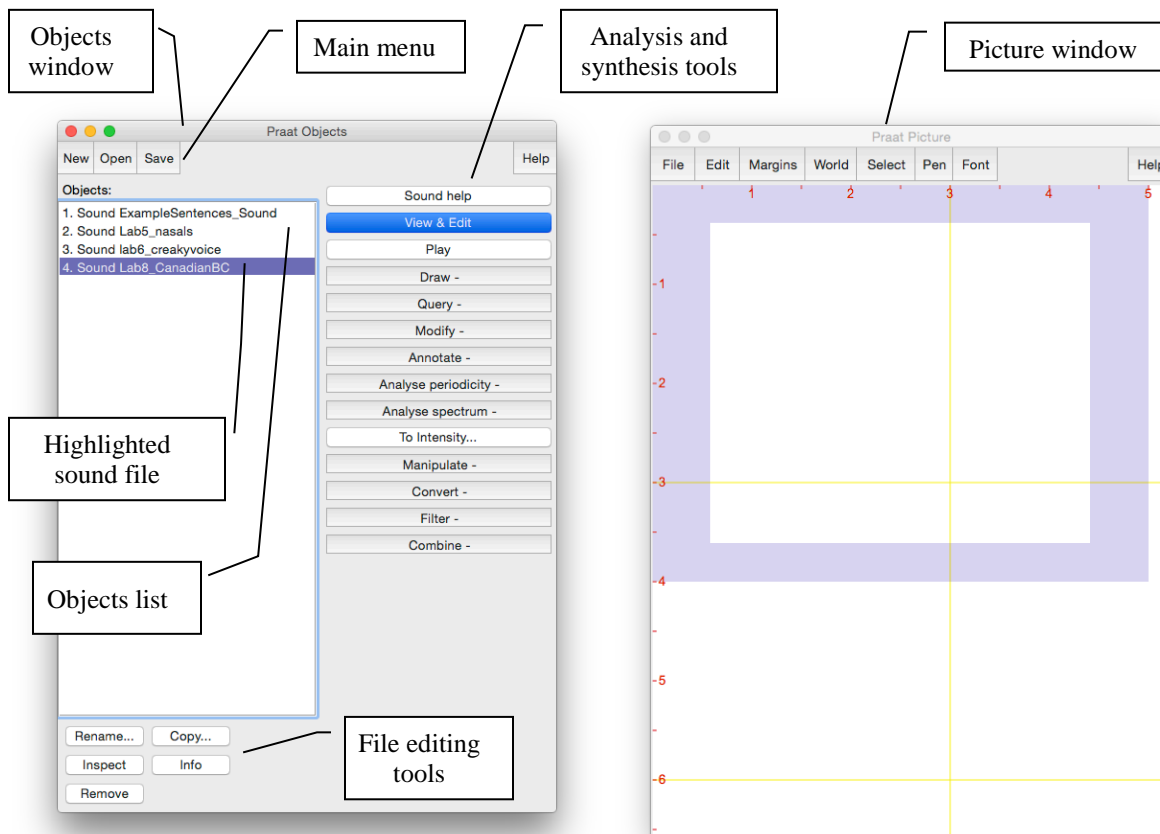


Figure 1.2 Praat layout

**TIP** The tools you see in the Analysis and Synthesis Tool Panel (see Figure 1.2 above) are specific to the highlighted object(s) in the list. For example, the tools that are listed for a sound object are different from that for a Textgrid object<sup>1</sup>. When you first open Praat, there will be nothing in your object list. As a result, nothing will show up in your Analysis and Synthesis Tool Panel.

3. Record the sentence: “My name is [first-name] [last-name]”
  - o In the main menu of the Objects window (see Figure 1.2):
  - o **New > Record mono Sound** (sampling rate: 44 100 Hz) (Figure 1.3)
  - o Make sure the volume bar is fluctuating as you record – if it isn’t, you’re not recording; if you don’t see the volume bar at all, you’re not speaking loudly enough.
  - o Watch out for clipping (Figure 1.4): if your recording level is too high and you go into the red on the volume bar, you’ll end up with what is called a “clipped” signal – this is very bad for speech analysis!
  - o Give the recording a name (in the box below “Save to list”)
  - o Save to list

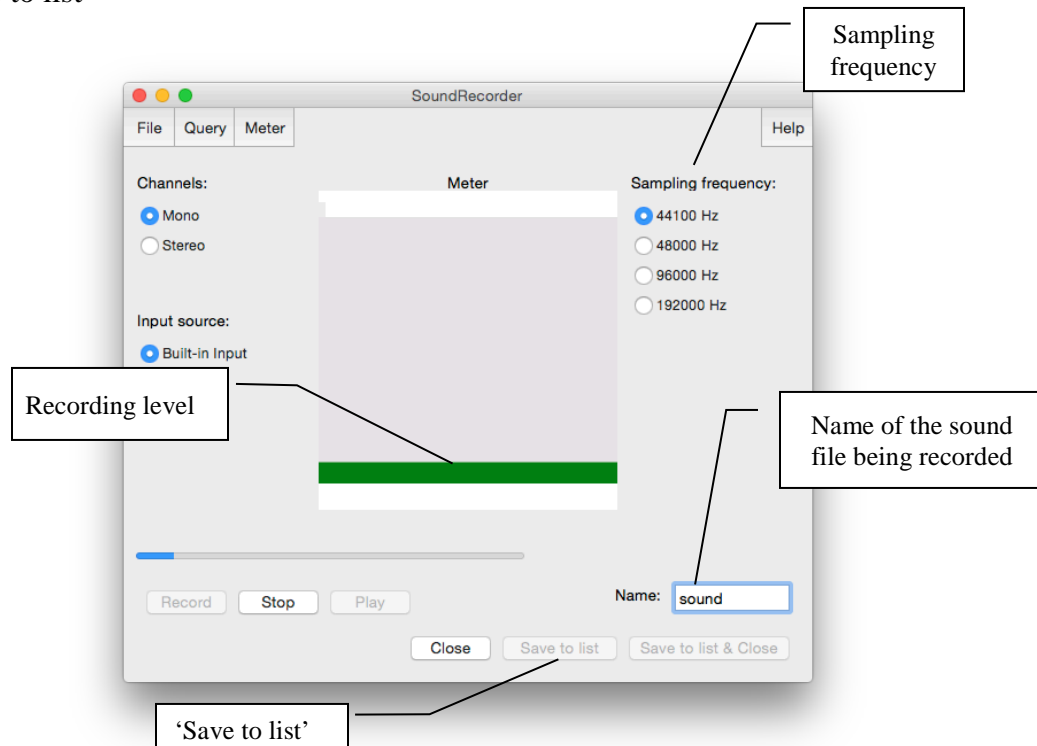
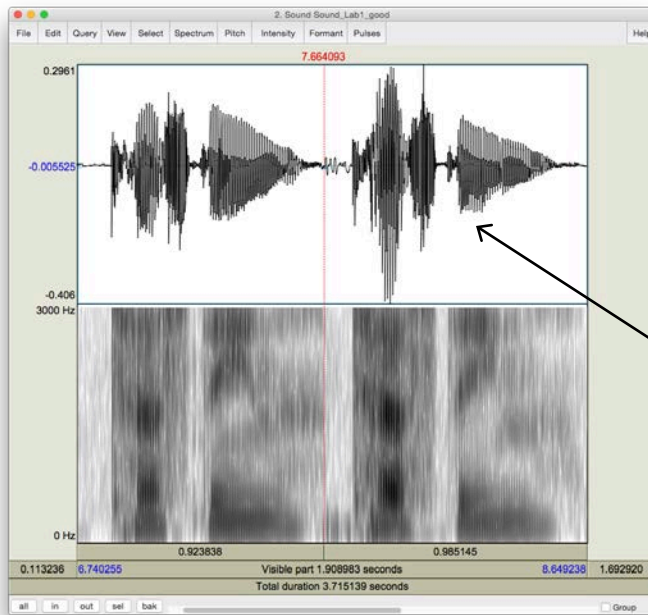


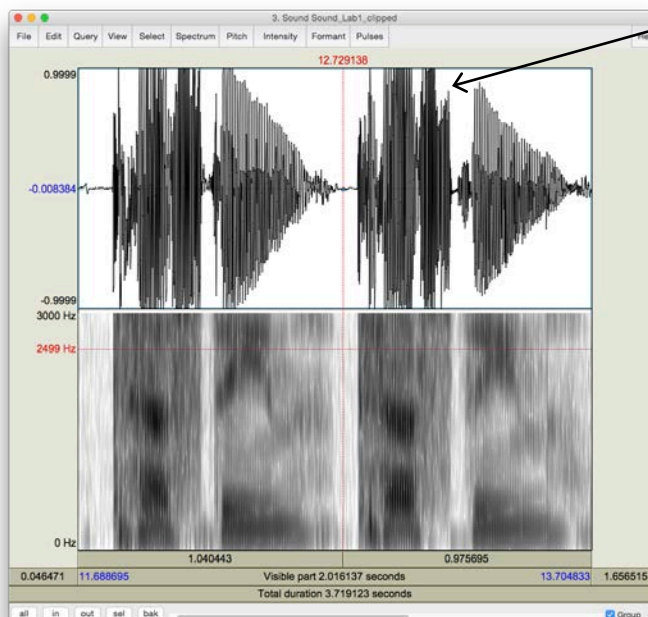
Figure 1.3 Recording a mono sound

<sup>1</sup> What is a Textgrid object? See step 9 below.



Good recording

Compare the waveform in these two cases. The one in the clipped recording has a square-like form.



Clipped recording

Figure 1.4 Clipped signal

4. Open the sound file in the Edit window:

- o In the Objects window (see Figure 1.2), highlight the sound file you've just recorded.
- o Click **View & Edit** on the "Analysis and synthesis tools" panel (see Figure 1.2).

When you first open a sound file in the View & Edit window, it may seem a bit of a mess. Depending on the default settings in the version of Praat you are using, you may see blue vertical lines in the waveform, and lines of red dots and a blue line in the spectrogram (see Figure 1.5). If you don't need these displays for your current purposes (you don't for this lab!), you can tidy up the visual display by doing the following: in the menu of the View & Edit window:

- o **Pulses > Show pulses** (click on this to unselect it)
- o **Formant > Show formants** (click on this to unselect it)
- o **Pitch > Show pitch** (click on this to unselect it)

Two things are being displayed now in the Edit window: the **waveform** on the upper level and the **spectrogram** on the lower level.

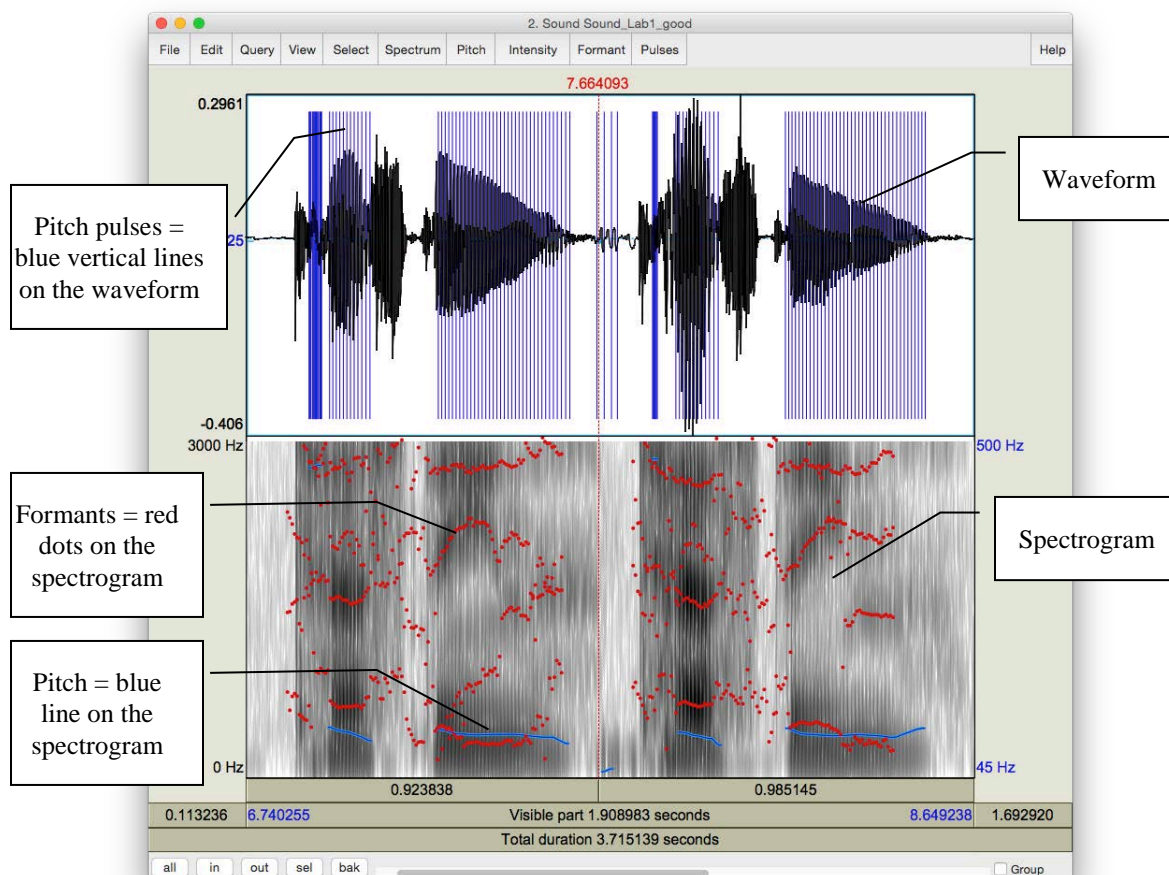


Figure 1.5 A crowded edit window

**TIP** Here are some common manipulations you will find useful:

Selecting a portion of the sound file and measure the duration of the portion

- o To select a portion of the sound file, place the cursor on the starting point on the waveform or spectrogram and drag the mouse over the portion you are interested in.
- o The number in black at the top and bottom of the display indicates the duration of the selection. The two red numbers on each side of the selection (on the top only) indicate the starting and ending time of the selection (see Figure 1.6).

Zooming into a portion of the sound file

- o To zoom into a specific portion of the sound file, select it first and click “sel” in the zoom options panel (see Figure 1.6).
- o You can also use the “in” and “out” buttons in the zoom options panel to zoom in or zoom out within the sound file. This will zoom the file around the center point of the window display, regardless of where your cursor is.

Listening to a sound file

- o In the View & Edit Window, you can listen to the sound file or a portion thereof by clicking on one of the panels at the bottom of the display (Figure 1.6).

5. Extract [first-name last-name]

- o Select the portion that corresponds only to your first and last name (see Figure 1.6)
- o **File > Extract selected sound (time from zero)** (The extracted selection will show up as an entry ('sound untitled') in the Praat objects window)
- o Close View & Edit window

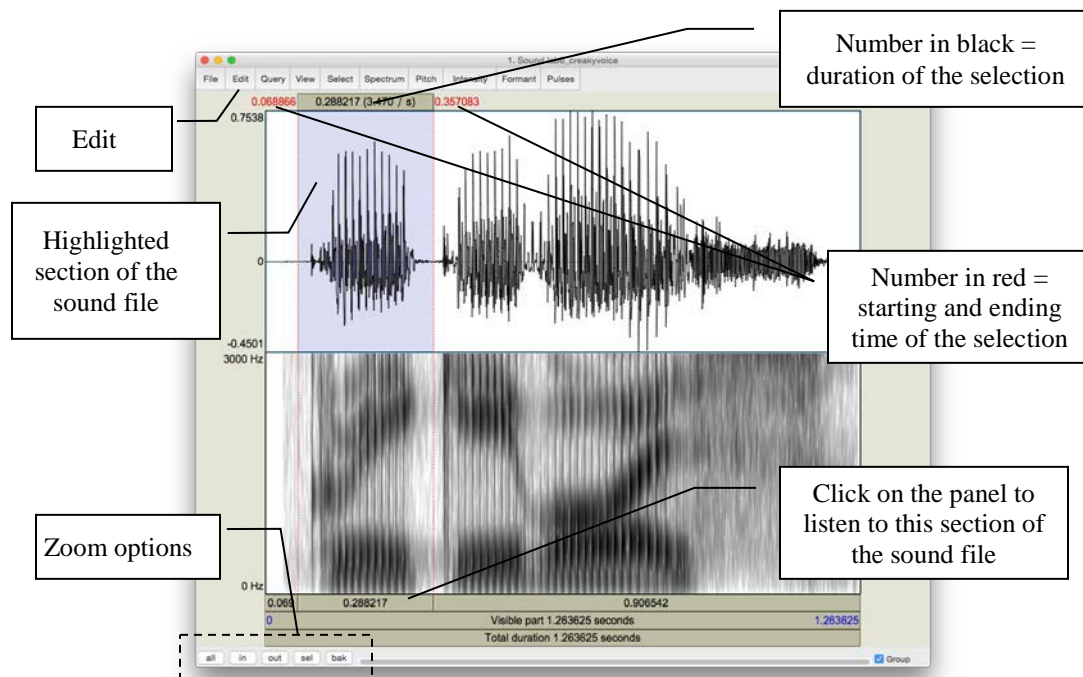


Figure 1.6 Editing a sound file

6. Rename the extracted file ('sound untitled' in the Praat objects window)

- o In the Objects window, highlight 'sound untitled'
- o Click **Rename** below the object list

7. Save the new sound file on the desktop:

- o Highlight the file in the object list
- o **Save > Save as WAV file...** (this is the most widely acceptable extension)
- o Select the desktop as the save-to location

8. Create a textgrid

Textgrids let you label or annotate the spectrogram (and sound file) – they are particularly helpful for acoustic analysis, to keep track of where you've taken measurements, etc.

- o In the Praat Objects window, highlight the newly renamed file (see step 6)
- o **Annotate > To TextGrid...** (see Figure 1.7)
- o Create two tiers (this will be enough for our purposes): All Tier names: **word segment**<sup>2</sup>

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<sup>2</sup> This creates 2 tiers, one with the name of 'word' and the other with the name of 'segment'. Ignore the second line in the TextGrid naming window "Which of these are point tiers". This is irrelevant at the present stage.

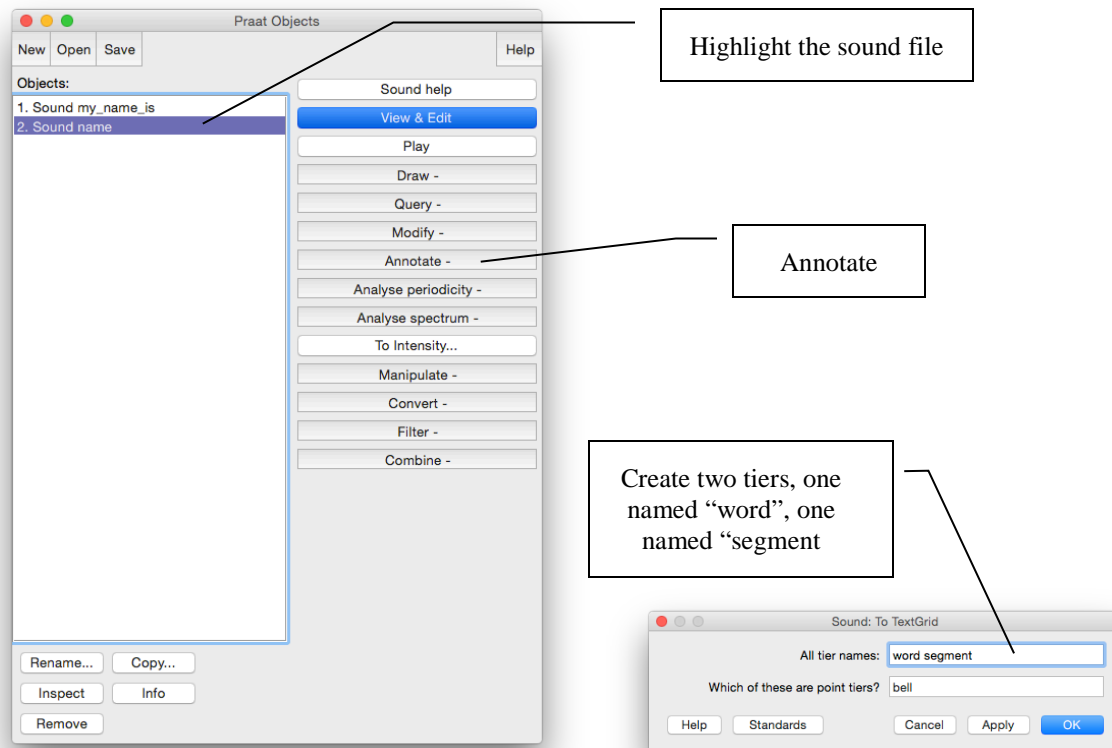


Figure 1.7 Creating a textgrid

9. Open the sound file and textgrid together: (see Figure 1.8)

In order to segment and/or label a sound file, you have to open the sound file **TOGETHER** with its textgrid file.

- o Hold down Ctrl (or Command on a Mac) and click on each file to highlight them both
- o **View & Edit**



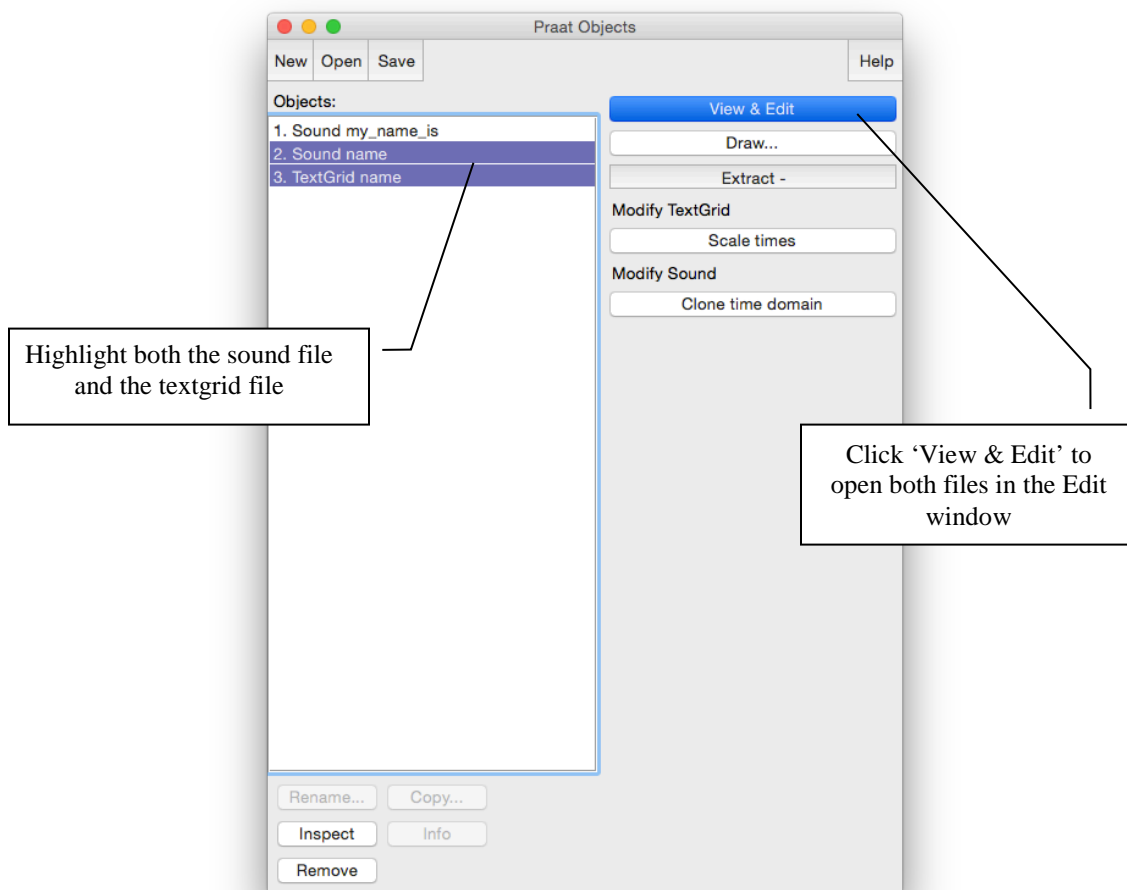


Figure 1.8 Opening a textgrid file with its corresponding sound file

In your display you should now see the waveform (top), the spectrogram (middle) and the textgrid (bottom) corresponding to your sound file (see Figure 1.9). We will talk about waveforms and spectrograms in detail later on.

#### 10. Segment the file (see Figure 1.9)

In the sound file, identify your first name and last name. Use the following steps to segment each:

- o To find your first and last name on the spectrogram, listen to the sound file and look at the spectrogram – these should give you hints as to where your first name ends and your second name and starts. It may help to zoom into small chunks of the sound file and listen to those.
- o Place the cursor at the beginning of the name on the spectrogram/waveform (not on the Textgrid tier). A boundary line will show up.
- o Click in the little circle at the top of the word tier in the Textgrid to create a boundary (Figure 1.9).

11. Label the intervals (see Figure 1.9)

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- The screenshot displays the TextGrid application window. At the top, a menu bar includes File, Edit, Query, View, Select, Interval, Boundary, Tier, Spectrum, Pitch, Intensity, Formant, Pulses, and Help. The main workspace is divided into several horizontal panels. The top panel shows a waveform of an audio signal. Below it is a spectrogram. The bottom panel displays a text grid with two tiers: a 'Word tier' containing the word 'sky' and a 'Segment tier' containing the phonetic transcription 's k a j a'. A red vertical line at 0.791852 seconds indicates a boundary. A yellow highlight covers the segment from 0.791852 to 1.190506 seconds. Annotations with arrows point to various features: 'Textbox for labeling textgrid segments' points to the top menu bar; 'Click on the circle to create a boundary' points to a small circle on the spectrogram; 'Word tier' points to the 'sky' entry; 'segment (8)' points to the 'a' entry; 'Textgrid' points to the bottom status bar; and 'Visible part 1.982358 seconds' points to the duration information.

Figure 1.9 Segmenting and labeling

12. Follow steps (10) and (11) to segment your [first name + last name] into segments.

**TIP** To use phonetic symbols in your segment tiers,

- 10

13. Save your textgrid:

- o **File > Save TextGrid as textfile...**

14. Export your labeled waveform and spectrogram to Word (see Figure 1.10):

- o Maximize the Edit window: click on the little square at the top right of your Edit window
- o Take a screen shot of your screen
- o Open Word and past the screen shot into your document.

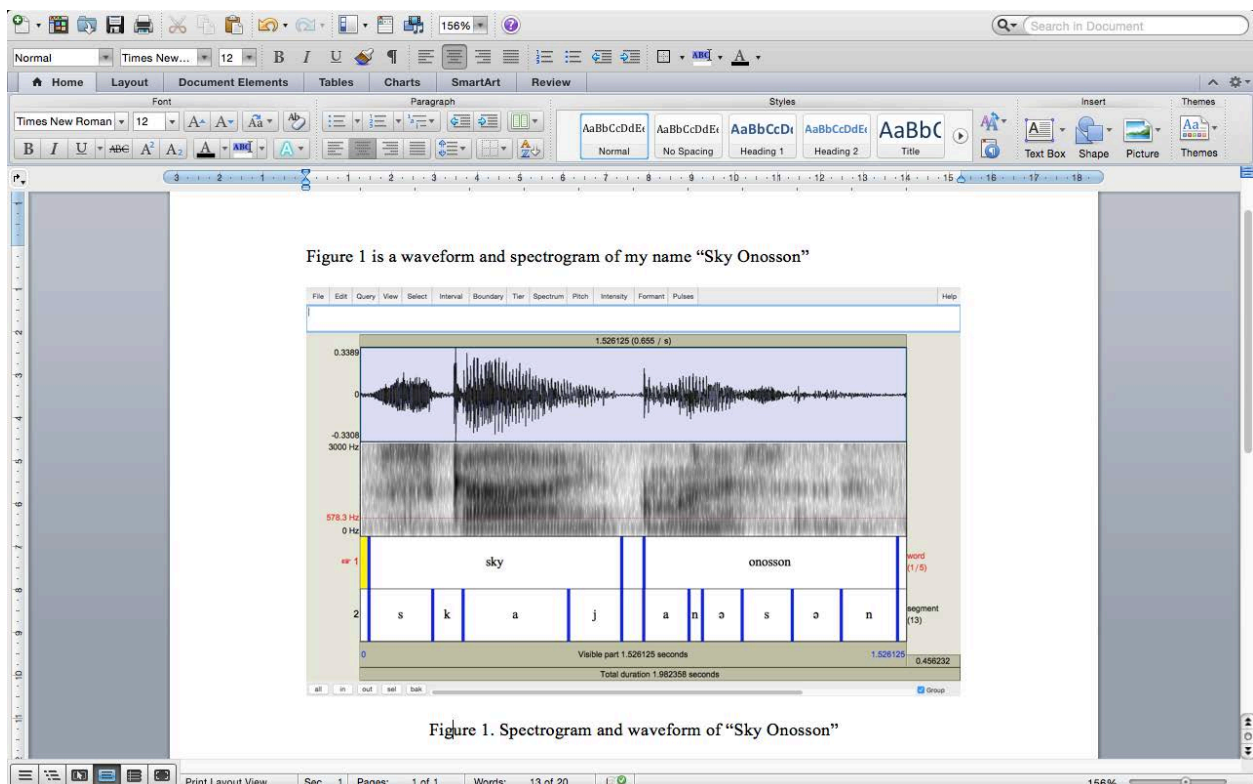


Figure 1.10 Example of Word output

If you complete all of these steps, you should end up with a word file with an image of the labeled waveform/spectrogram corresponding to your name, as in Fig. 1.10. You can save this file, and your Praat files (sound and textgrid) for future reference!