

Use Praat!

Note: I do this all on a PC.
If you're using Mac or Linux, it might look different
and require an alternate action here or there.

Downloading the program

www.praat.org or
www.fon.hum.uva.nl/praat

select your
operating
system



Praat: doing phonetics by computer

Download Praat:

- * [Macintosh](#)
- * [Windows](#)
- * [Linux, FreeBSD](#)
- * [SGI, Solaris, HP/UX](#)
- * [the source code](#)

Information on Praat:

- * Introductory tutorial: choose **Intro** from Praat's **Help** menus.
- * Extensive manuals and tutorials: in Praat's **Help** menus.
- * [Beginner's manuals by others](#).
- * Paul Boersma's [publications](#) on algorithms and tutorials.

The authors

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[Phonetic Sciences](#), University of Amsterdam
Spuistraat 210
1012VT Amsterdam
The Netherlands

Questions, problems, solutions:

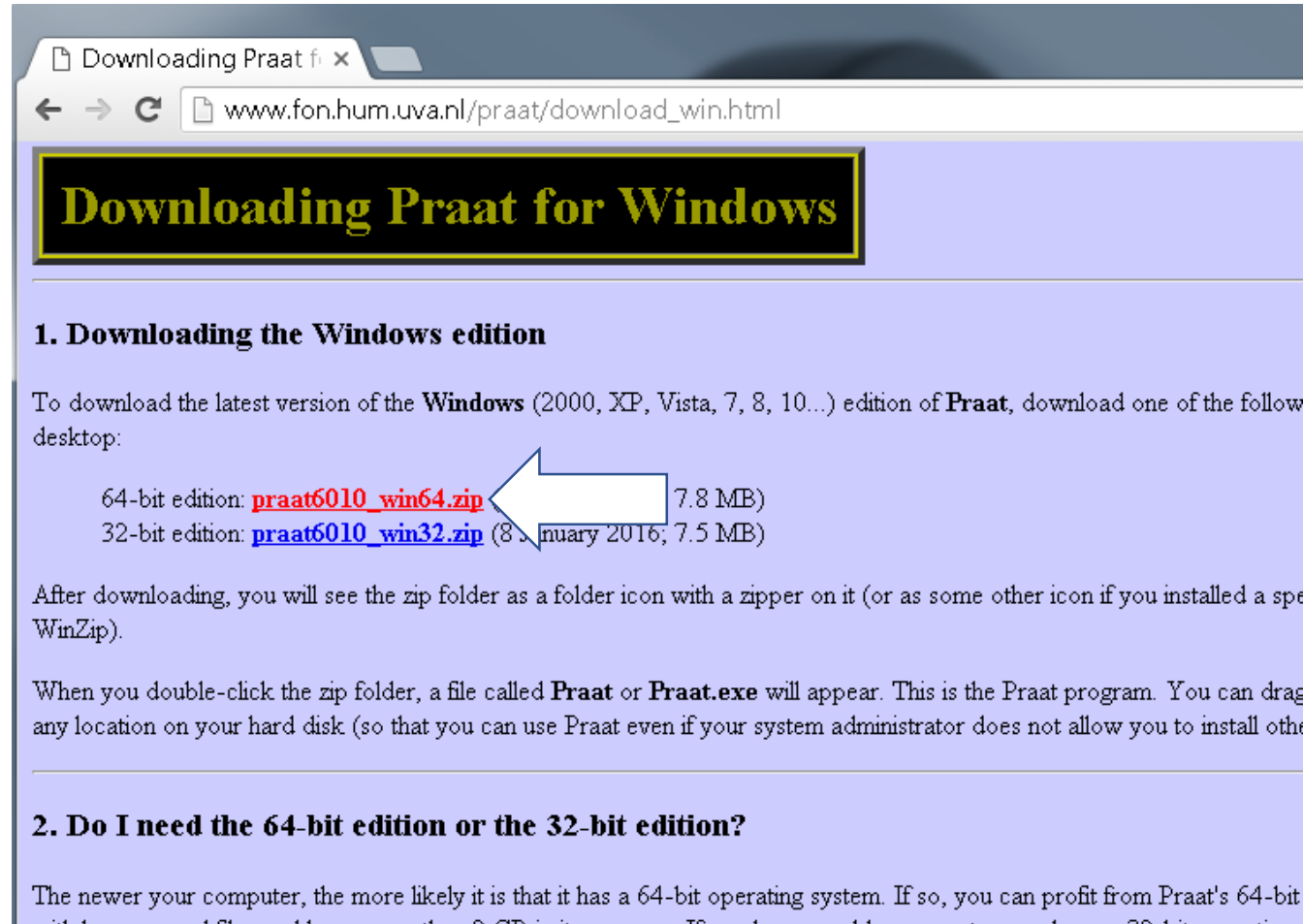
1. Many problems can be solved by upgrading to [version 6.0.10](#) of Praat.
2. Make sure you have read the [Intro](#) from Praat's **Help** menu.
3. If that does not help, use the **Search** button in Praat's manual window.
4. Or consult the [Frequently Asked Questions](#) directly.
5. There is a user group on the Internet: the [Praat User List](#).
6. If none of the above helps, you may send mail to paul.boersma@uva.nl

Functionality

The following gives you an idea of the features of the Praat program. The links take you into the web copy of the manual. The same manual is also available from Praat's Help menus, in which case you can do searches.

Speech analysis: Speech synthesis:

Click on the file link for your system



Downloading Praat for Windows

1. Downloading the Windows edition

To download the latest version of the **Windows** (2000, XP, Vista, 7, 8, 10...) edition of **Praat**, download one of the following from the desktop:

64-bit edition: [praat6010_win64.zip](#) (7.8 MB)
32-bit edition: [praat6010_win32.zip](#) (8 January 2016; 7.5 MB)

After downloading, you will see the zip folder as a folder icon with a zipper on it (or as some other icon if you installed a special program like WinZip).

When you double-click the zip folder, a file called **Praat** or **Praat.exe** will appear. This is the Praat program. You can drag it to any location on your hard disk (so that you can use Praat even if your system administrator does not allow you to install other programs).

2. Do I need the 64-bit edition or the 32-bit edition?

The newer your computer, the more likely it is that it has a 64-bit operating system. If so, you can profit from Praat's 64-bit edition. If you have a 32-bit operating system, you should use the 32-bit edition.

Find the downloaded file

(it might pop up right in your browser)

2. Do I need the 64-bit edition or the 32-bit edition?

The newer your computer, the more likely it is that it has a 64-bit operating system. If so, you can profit from Praat's 64-bit edition, which can work with larger sound files and have more than 2 GB in its memory. If you have an older computer, or chose a 32-bit operating system, the 64-bit edition will not work on it, so you have to install the 32-bit edition instead. If you are in doubt, try the 64-bit edition first, and switch to the 32-bit edition if the 64-bit edition does not work.

3. How to start

To start up the Praat program, just double-click it. If you use Praat for the first time, choose **Intro** from the Help menu.

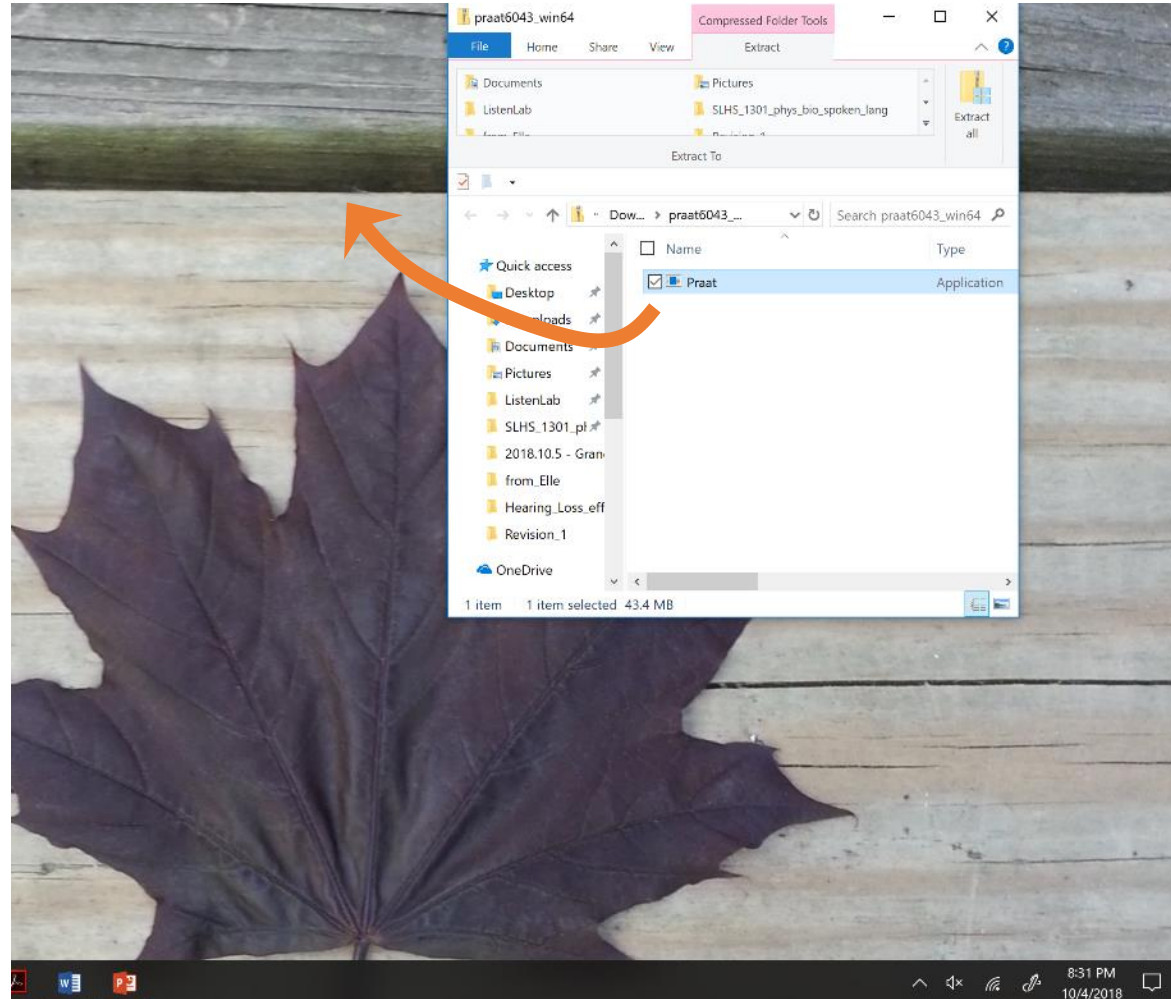
4. Phonetic and international symbols

praat6010_win64.zip

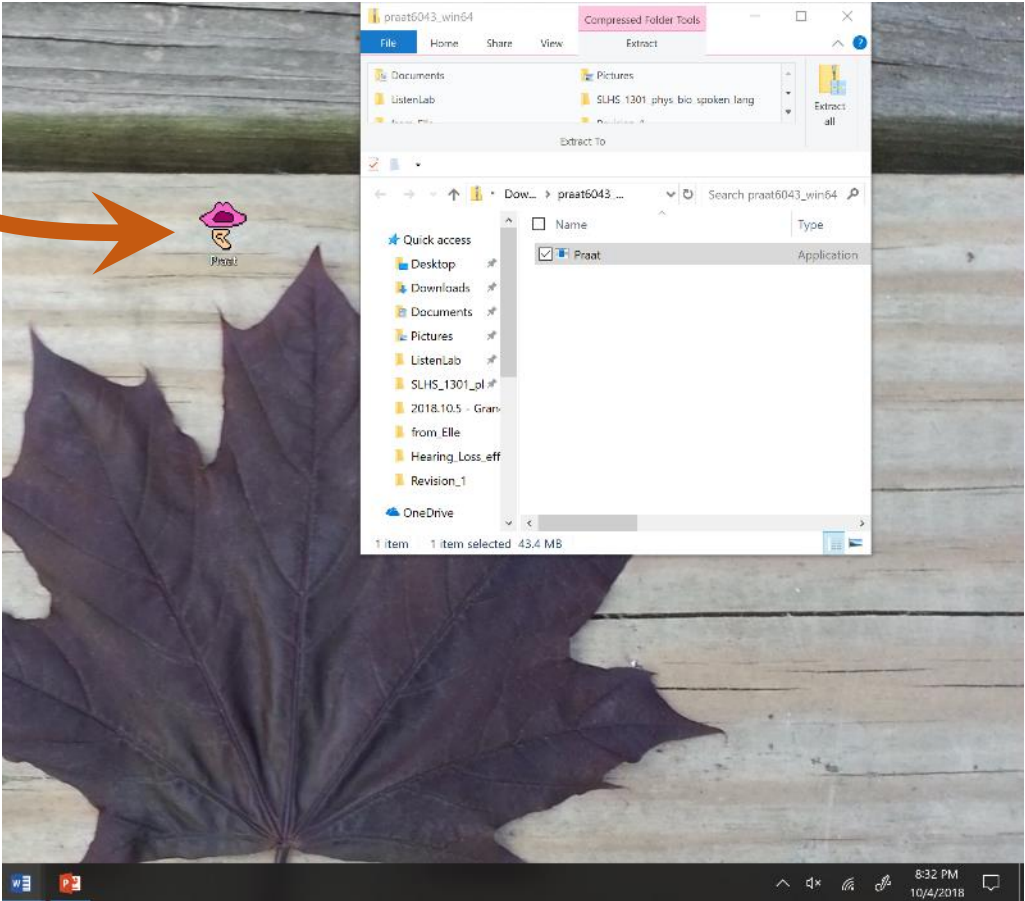
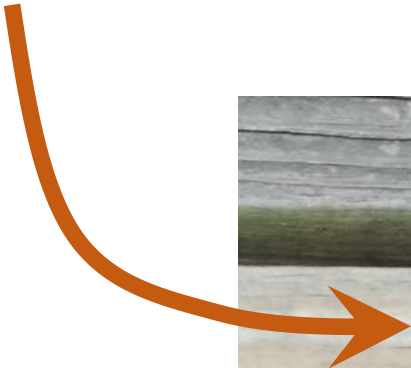
↓ Show all downloads...



Drag the .exe file on to your desktop

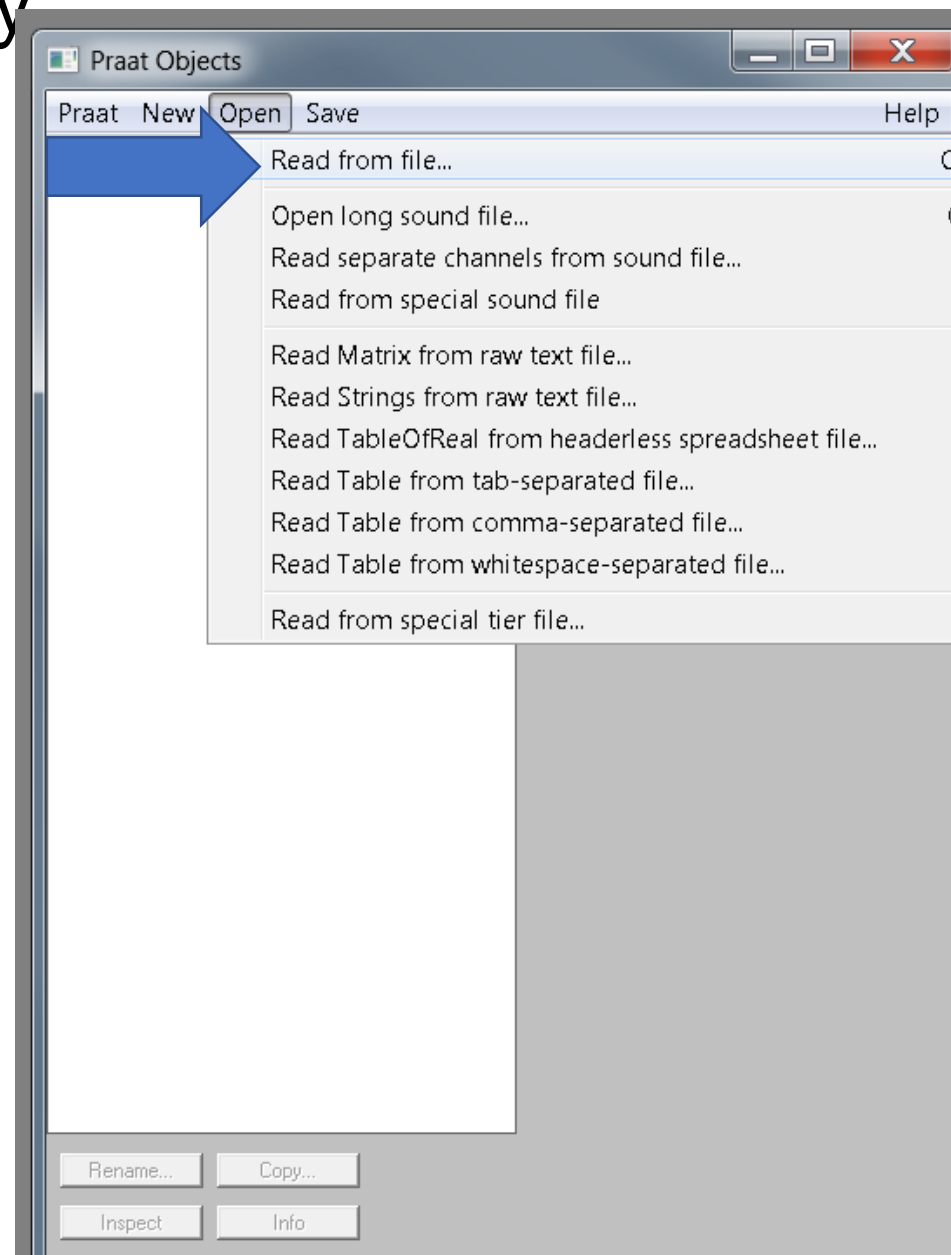


There it is!

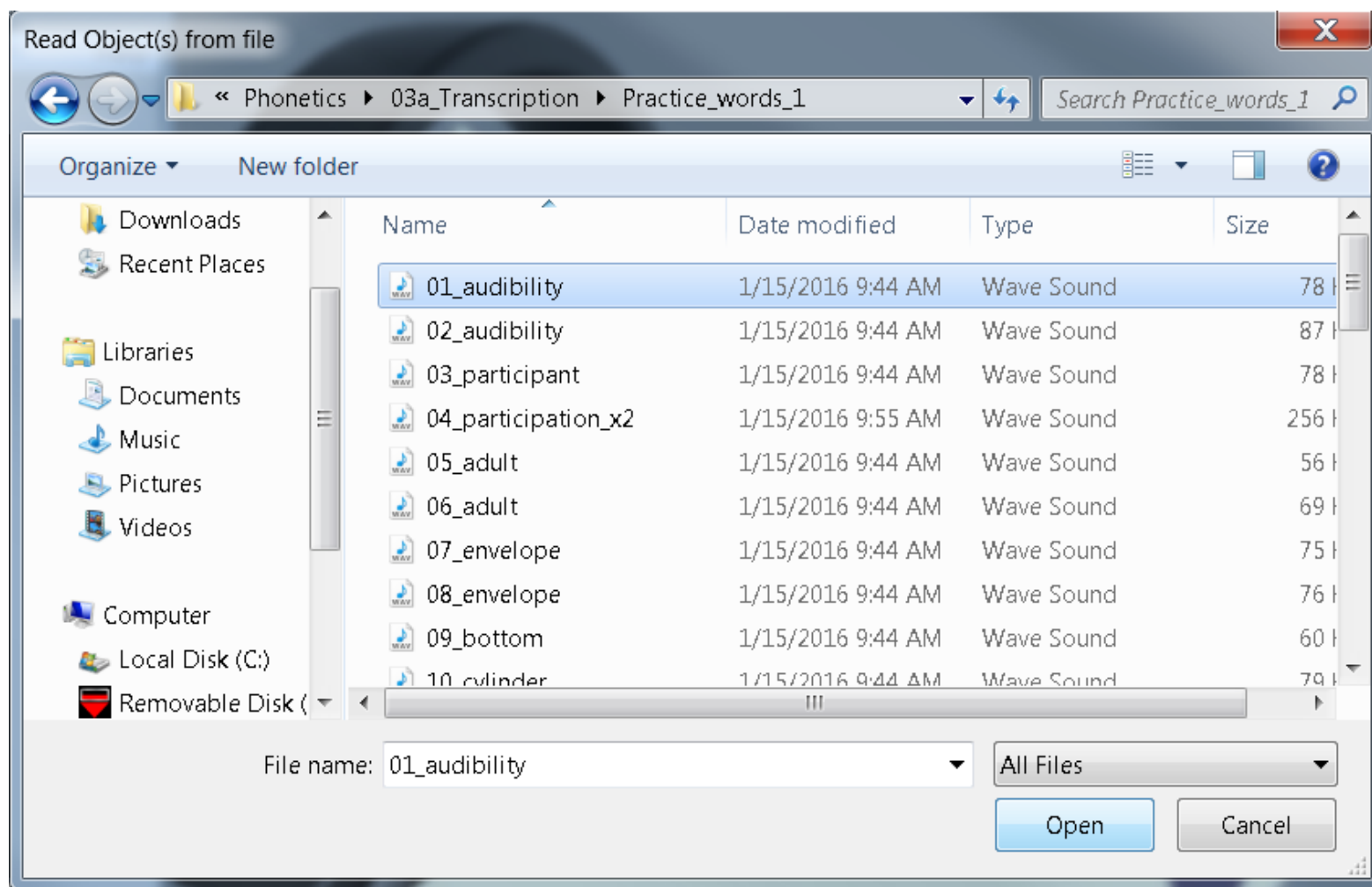


After you open the program, you can search for your audio files as you would open any other file in Word, Excel, etc.

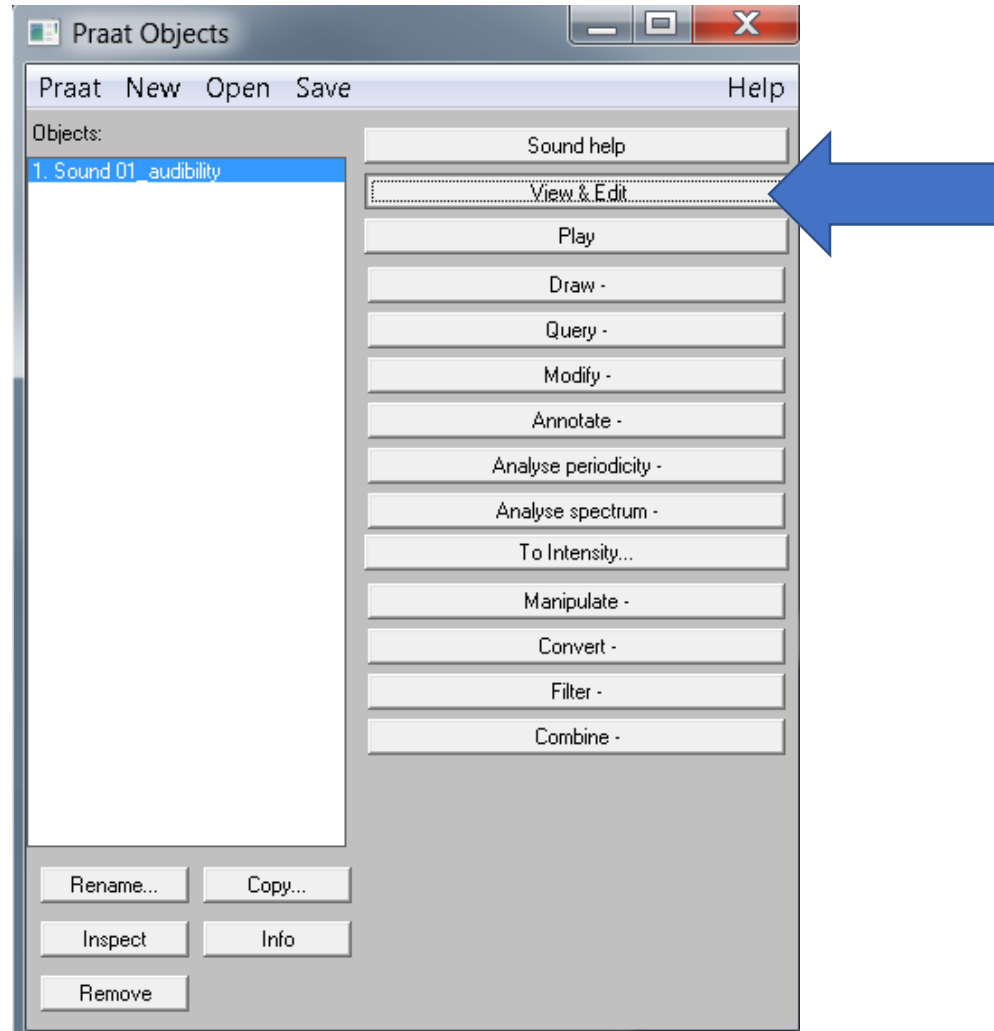
Open... Read from file...



There's the file

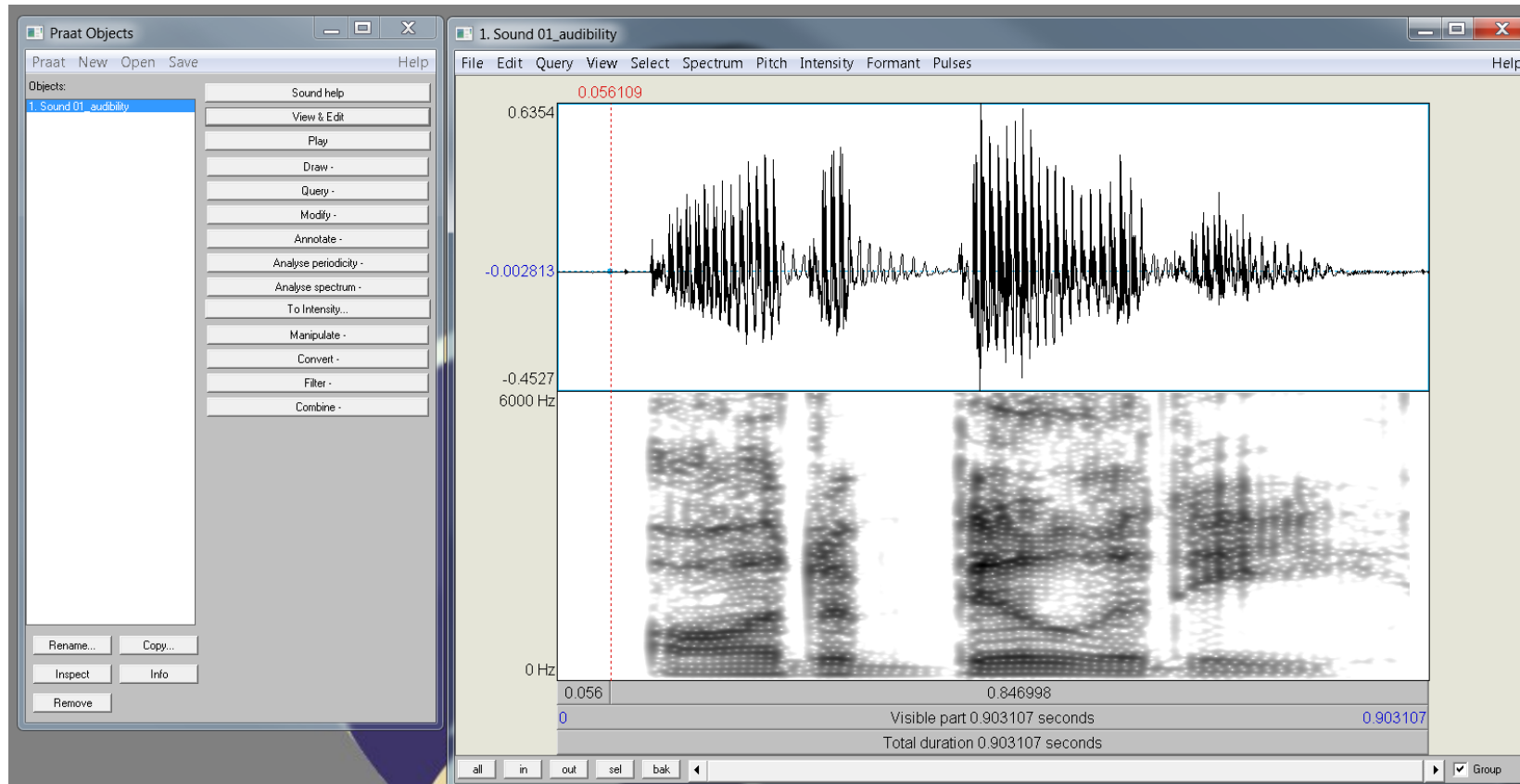


It appears in the objects window.
Now click “View & Edit”



The window with the sound wave is called the “editor window”

Click anywhere on the sound wave to set a start point for sound playback. Press Tab to play the sound.

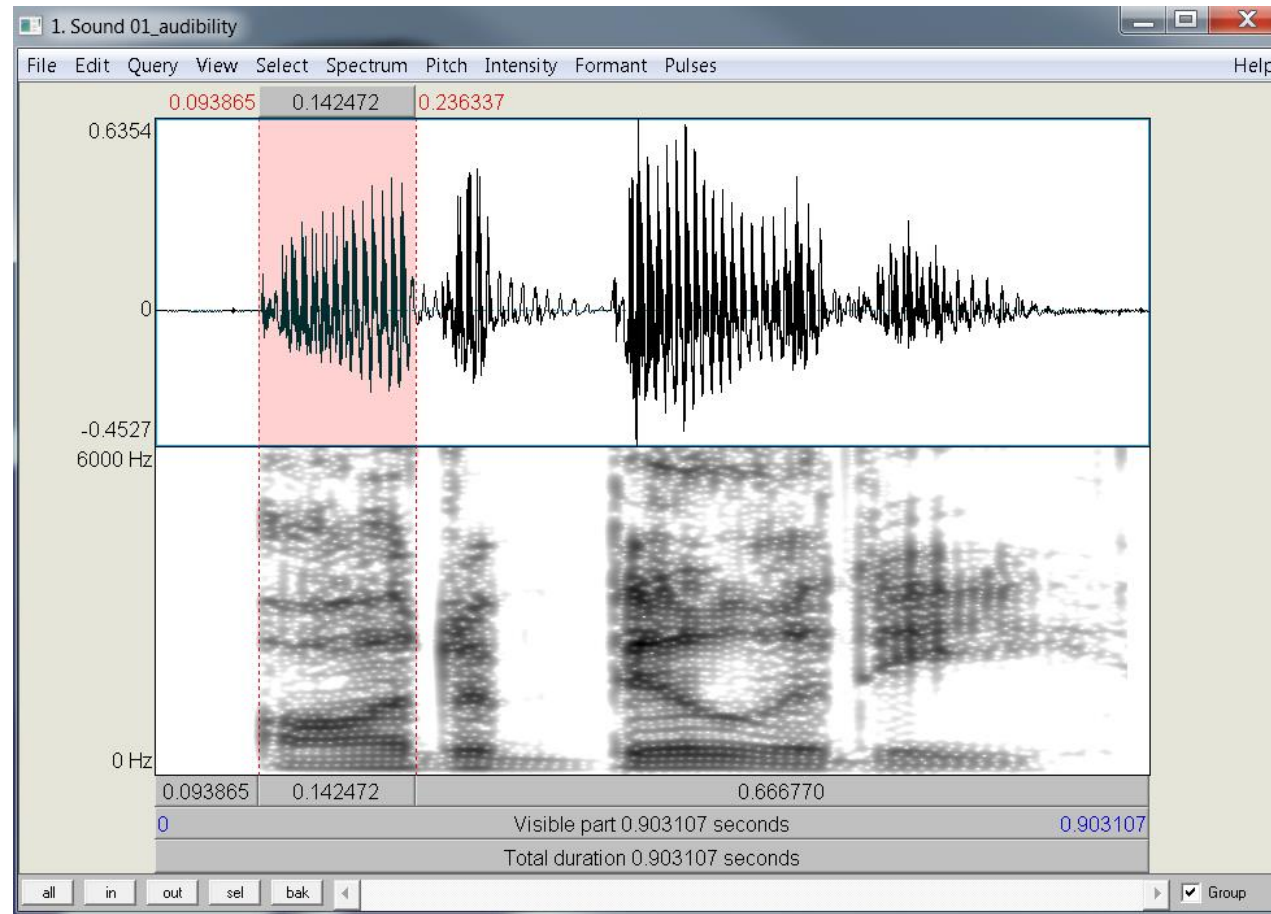


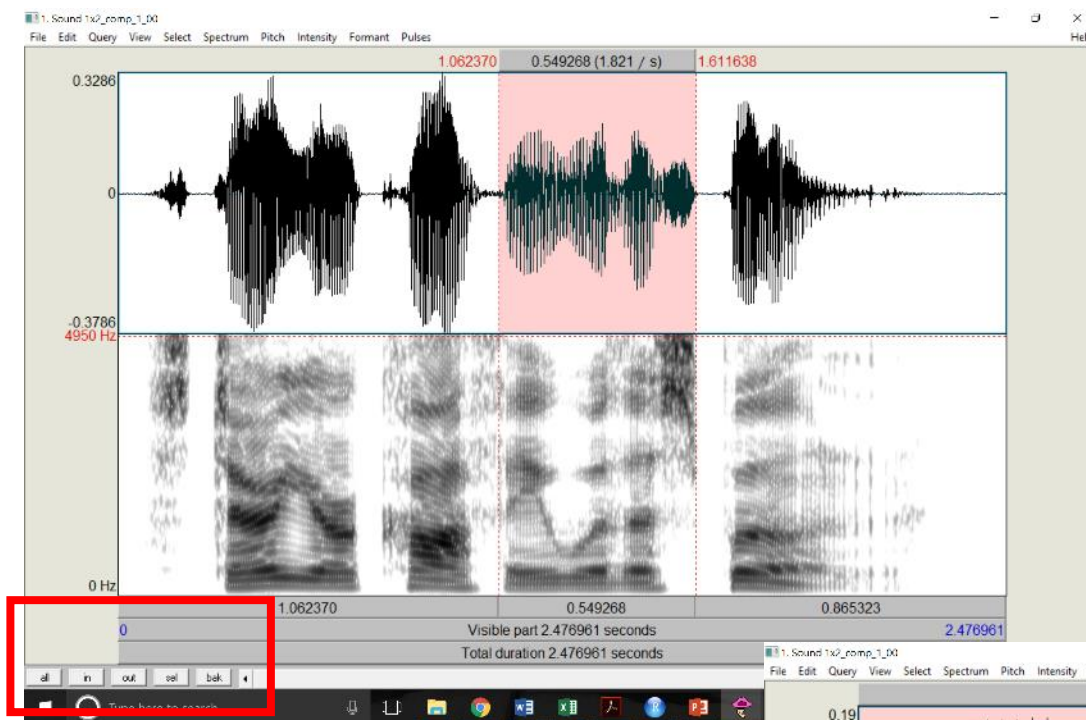
You could also click on the gray bars to play the sound. The top one plays your selection. The middle one plays the entire viewable sound. The bottom one plays the whole sound.

Playing sound

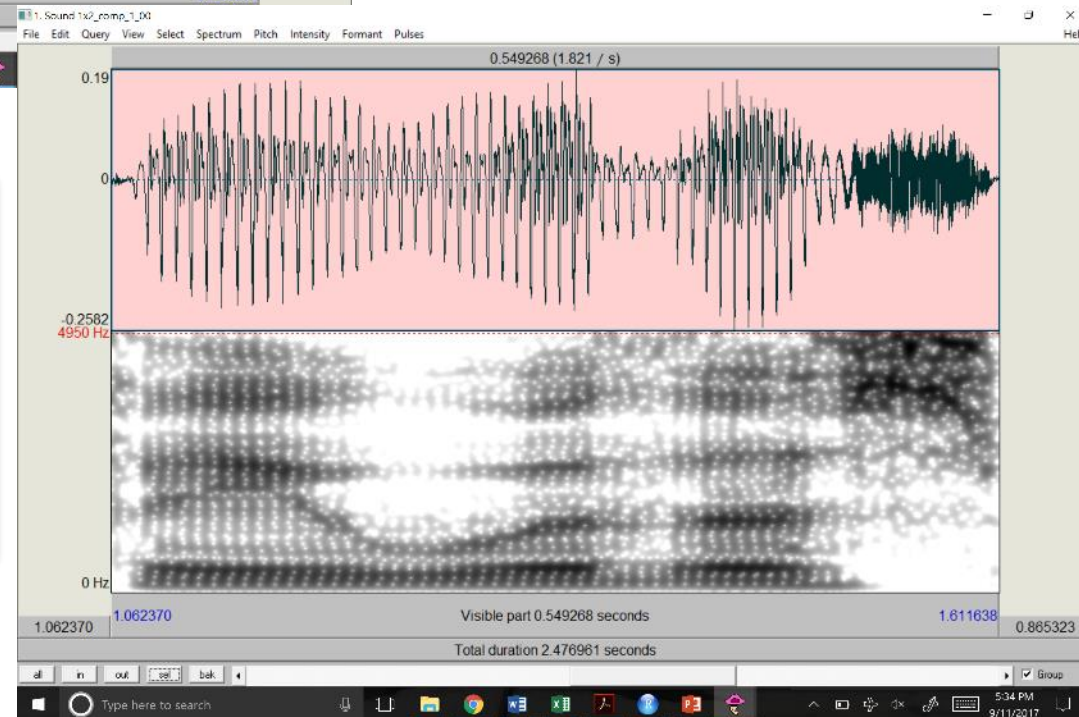
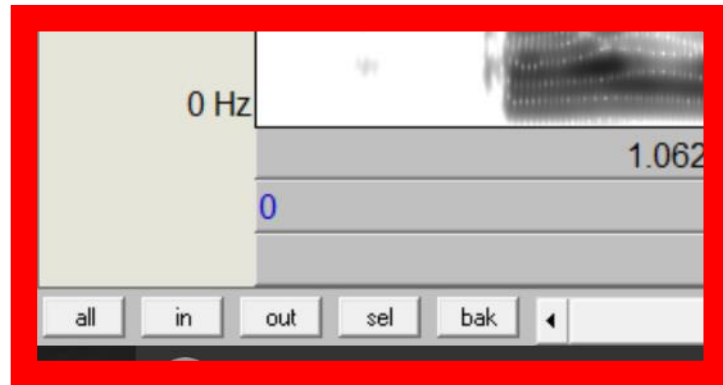
You can also click & drag to highlight a specific region of the sound to play. Here I have highlighted the first syllable.

This is good for listening to very short little pieces of the sound





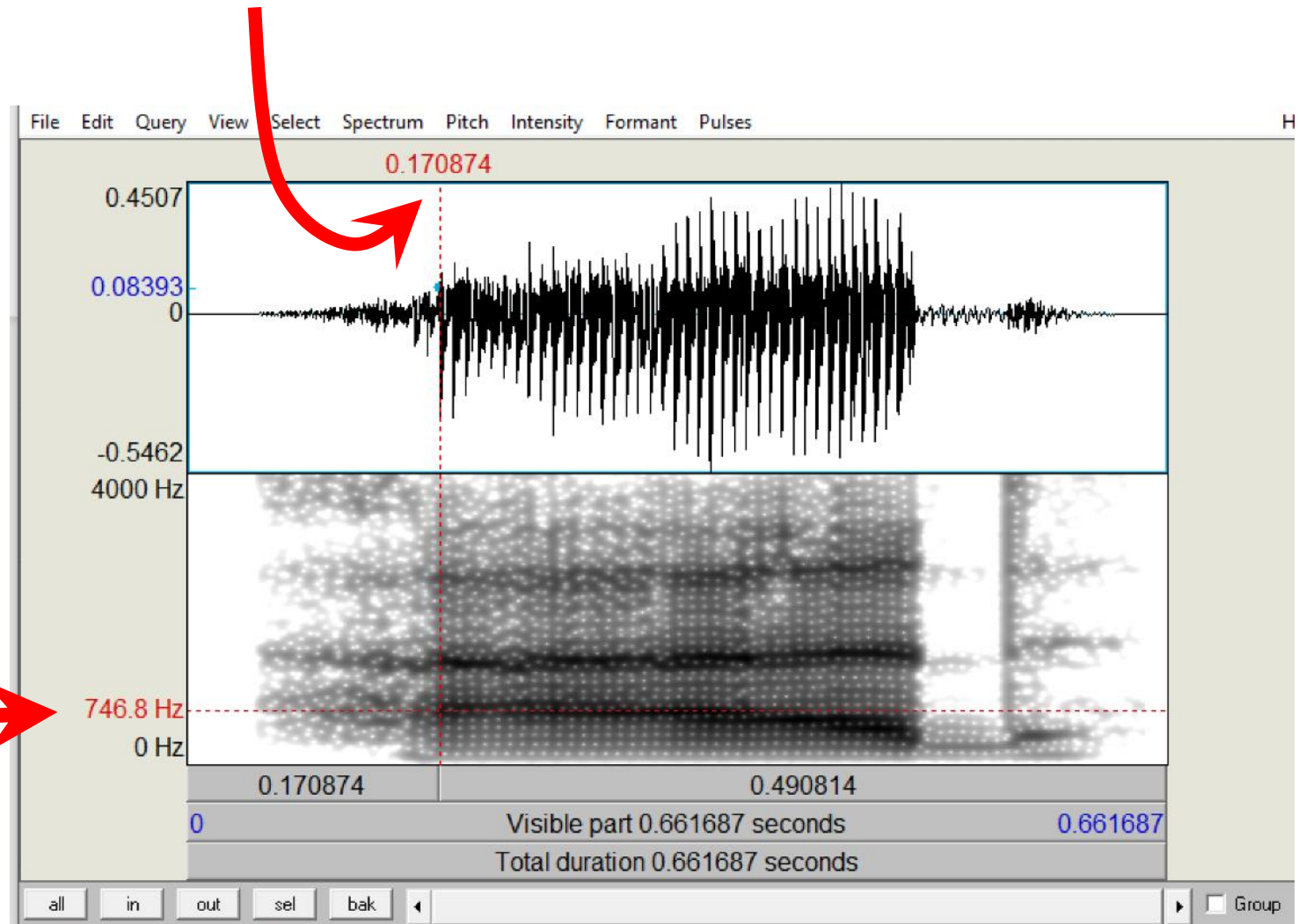
Select a region,
click “sel” to zoom
to that selection



Navigating the spectrogram

When you click somewhere on the spectrogram, the red number on the TOP shows you what time corresponds to the horizontal position of your cursor click

When you click somewhere on the spectrogram, the red number on the left shows you what frequency corresponds to the vertical position of your cursor click.



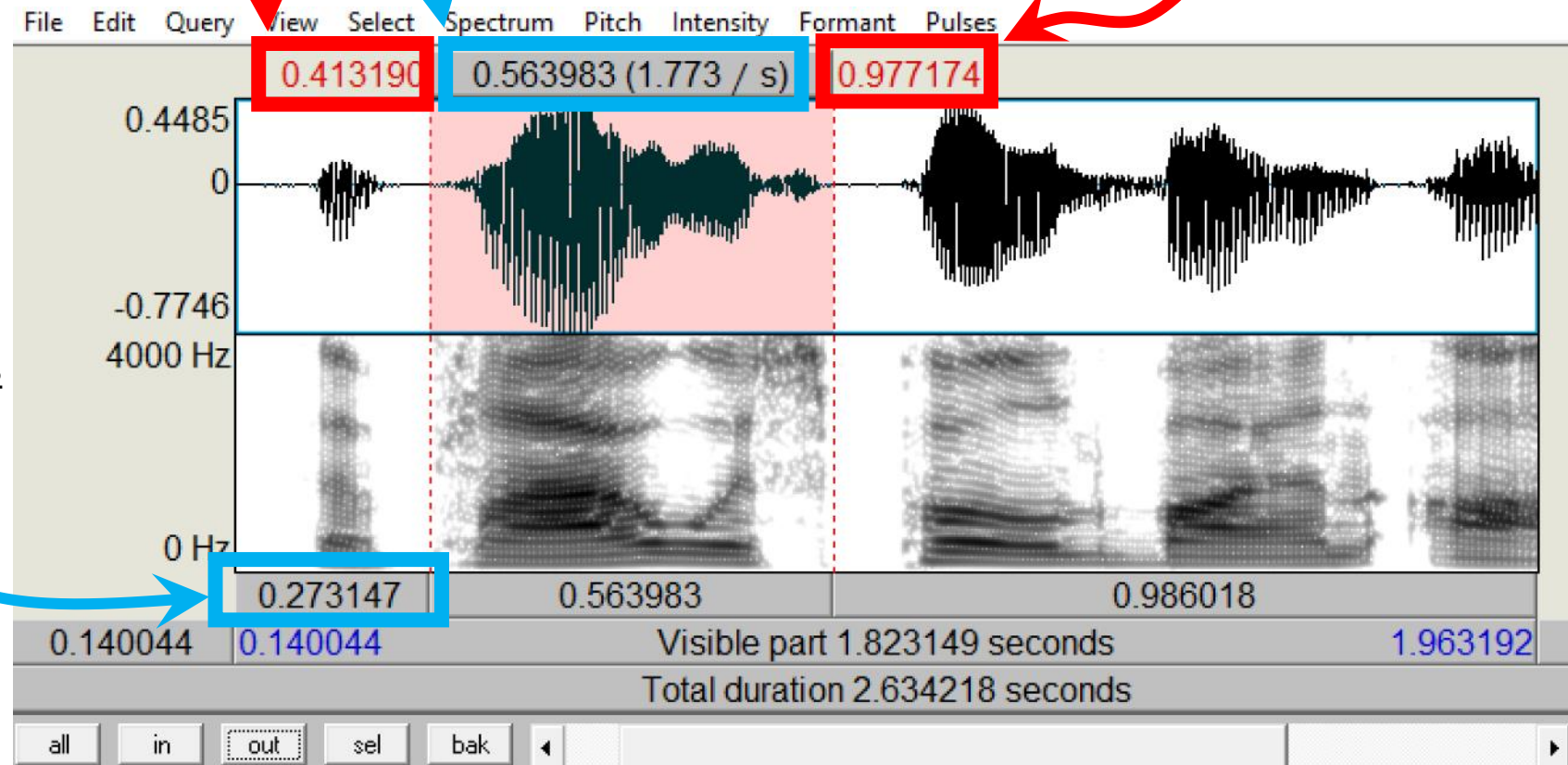
Finding durations of sound segments

Duration of the portion in the whole sound earlier than the section you highlighted

Duration of the portion that you highlighted

Duration of the portion in the whole sound after than the section you highlighted

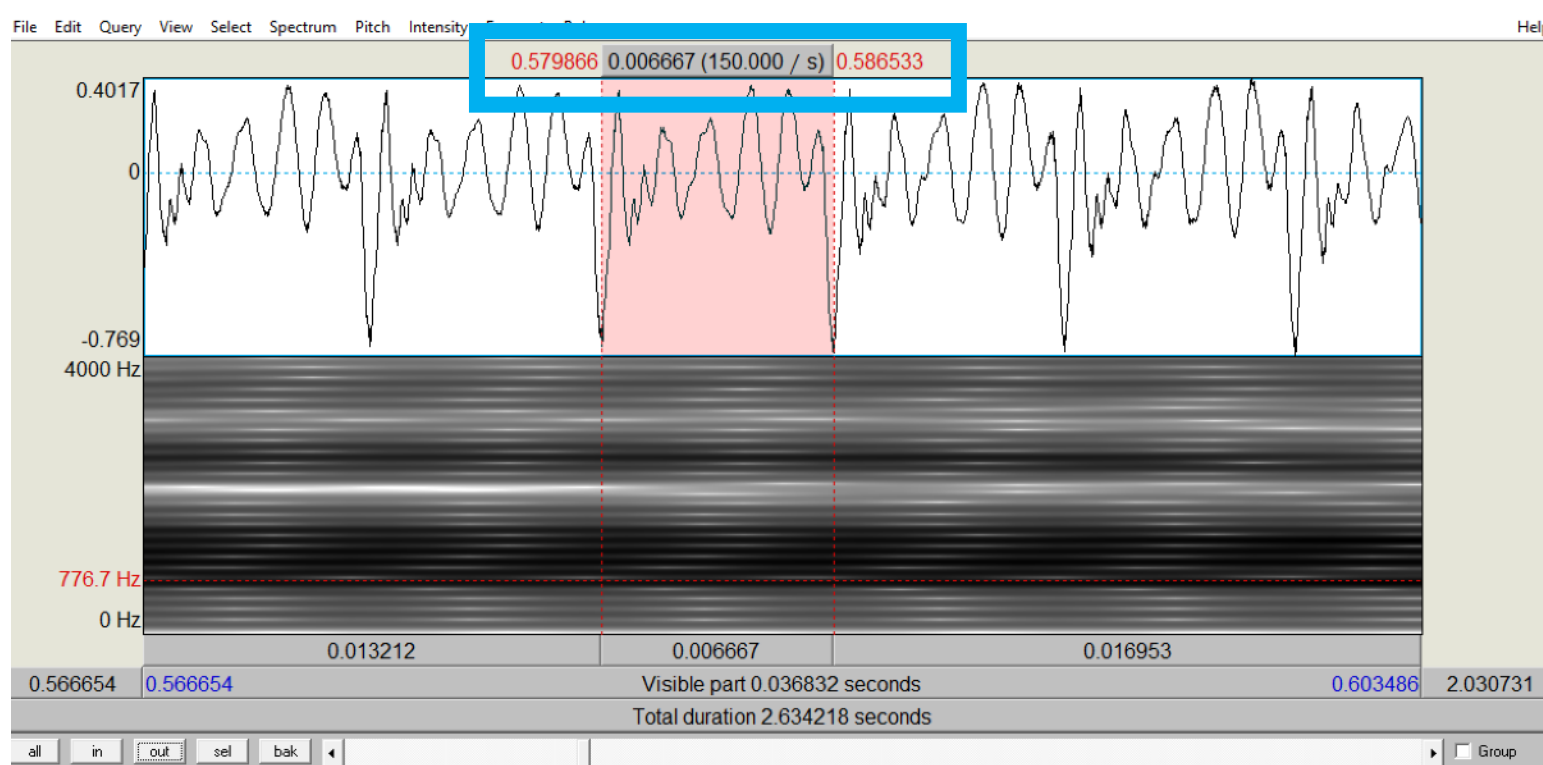
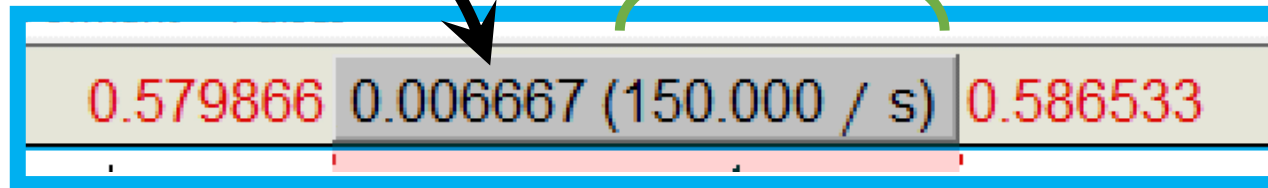
Duration of the portion of the sound visible in this window earlier than the section you highlighted



Seeing the relationship between duration and F0

Duration of the portion that you highlighted

The frequency of a sound whose period equals the duration of the portion you highlighted

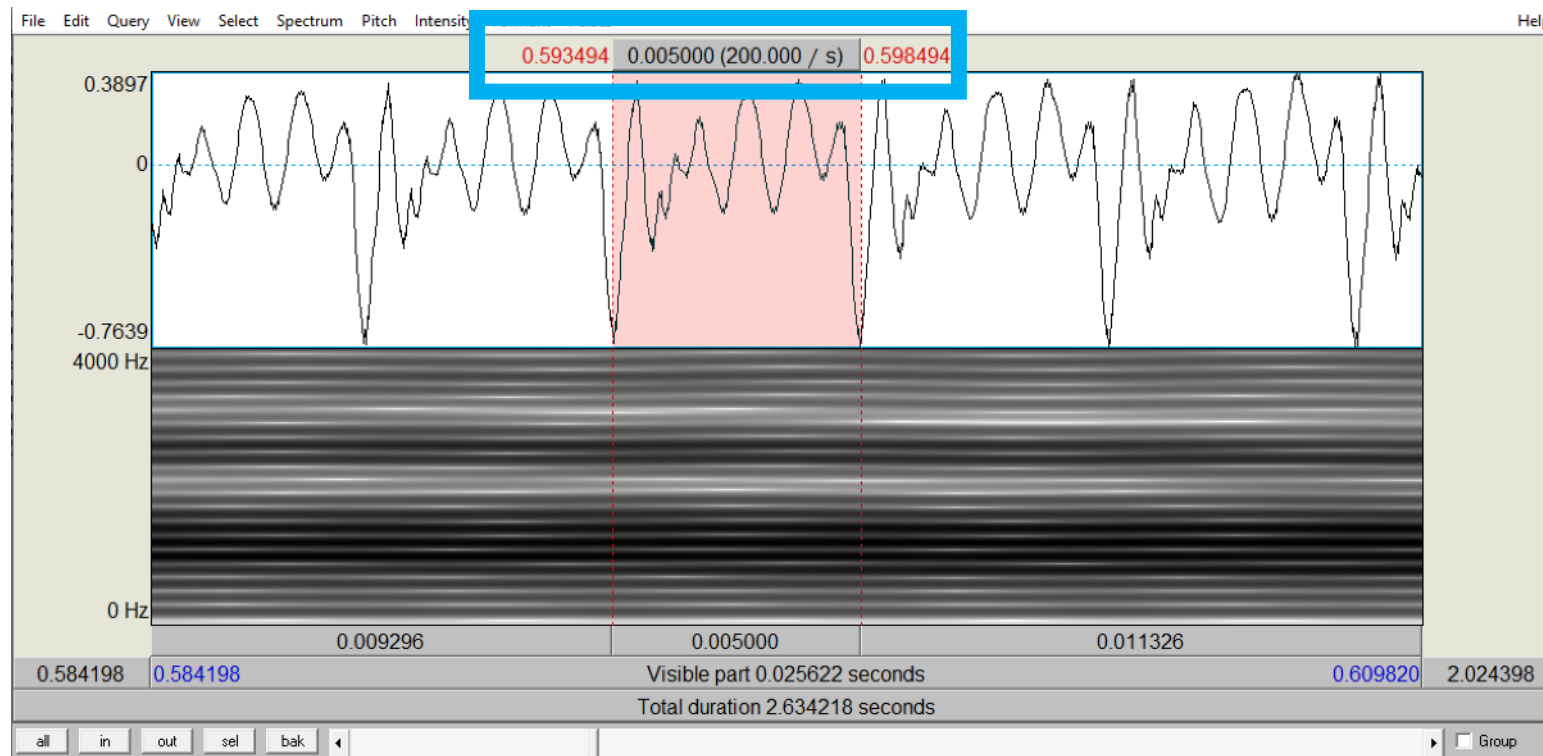
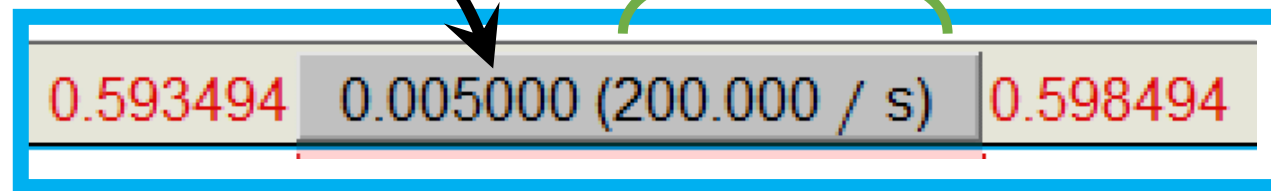


If you highlight a region that is a single pitch period, then this number in parentheses will give you the fundamental frequency

Seeing the relationship between duration and F0

Duration of the portion that you highlighted

The frequency of a sound whose period equals the duration of the portion you highlighted



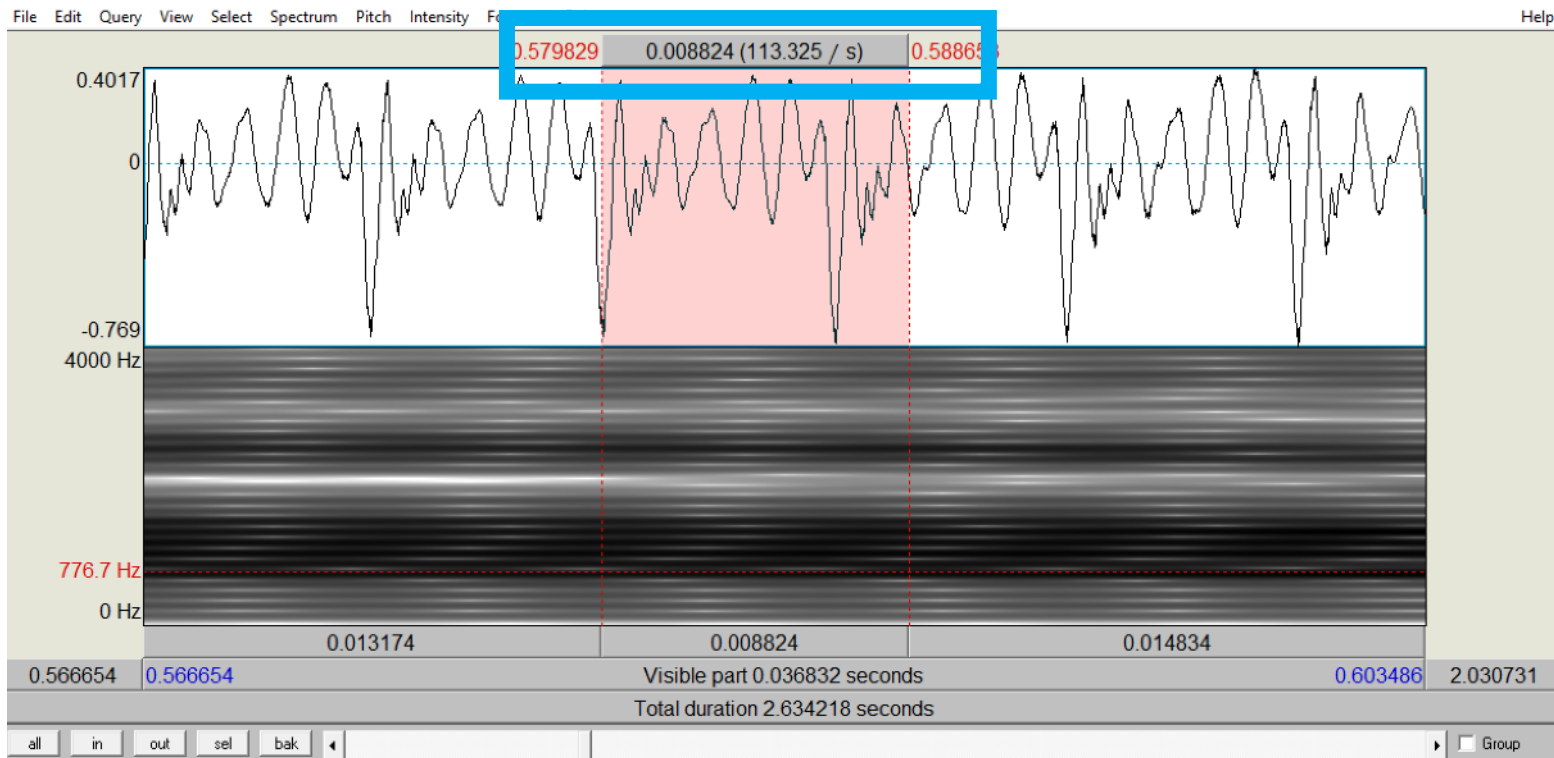
If you highlight a region that is a single pitch period, then this number in parentheses will give you the fundamental frequency

Seeing the relationship between duration and F0

Duration of the portion that you highlighted

This selection is NOT a good estimate of the pitch period; it is more than one cycle.

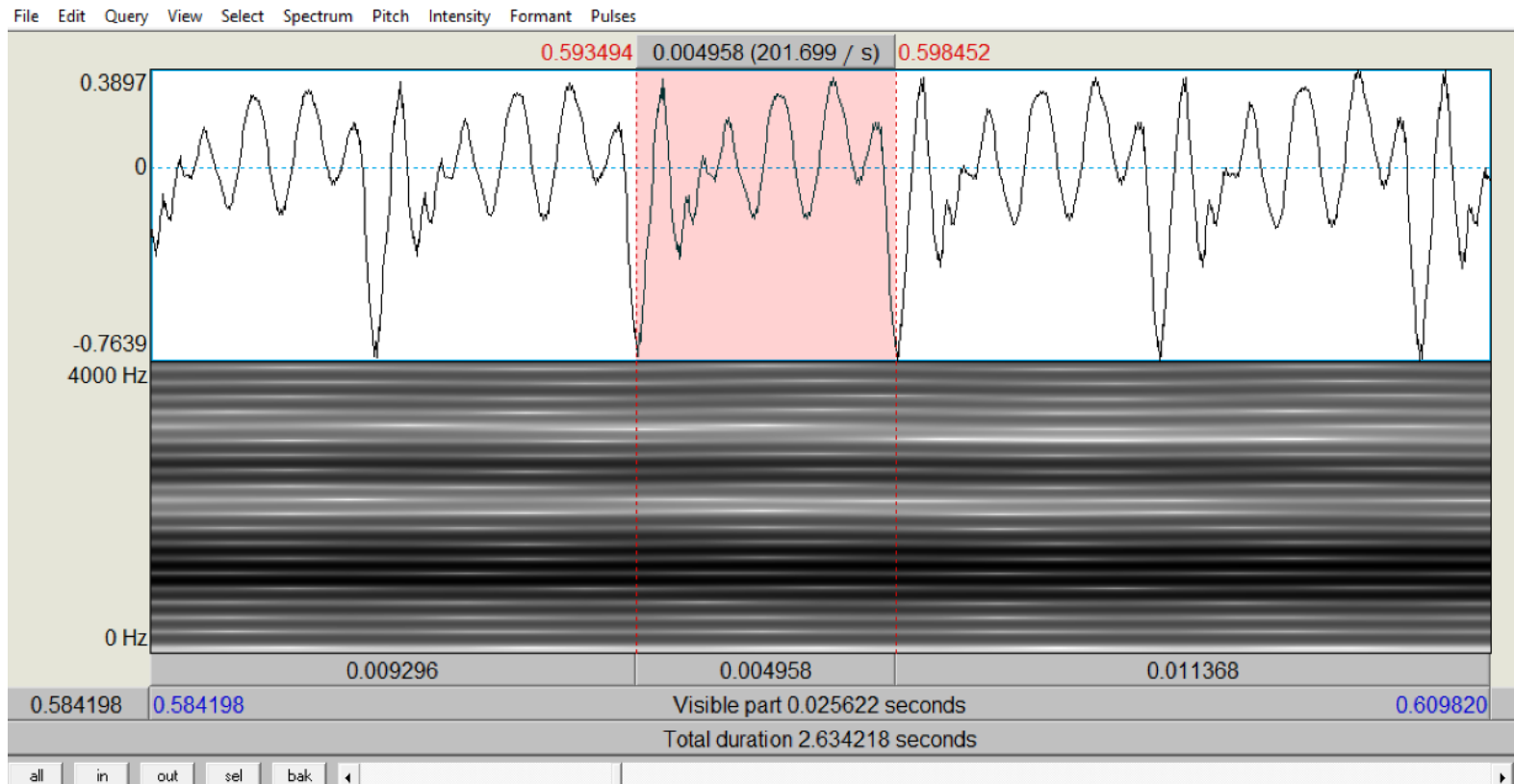
0.579829 0.008824 (113.325 / s) 0.588653



Since the selection doesn't have anything to do with the cycles in the sound, this number in parentheses will NOT give you anything related to the fundamental frequency

Human error

0.004958 (201.699 / s)

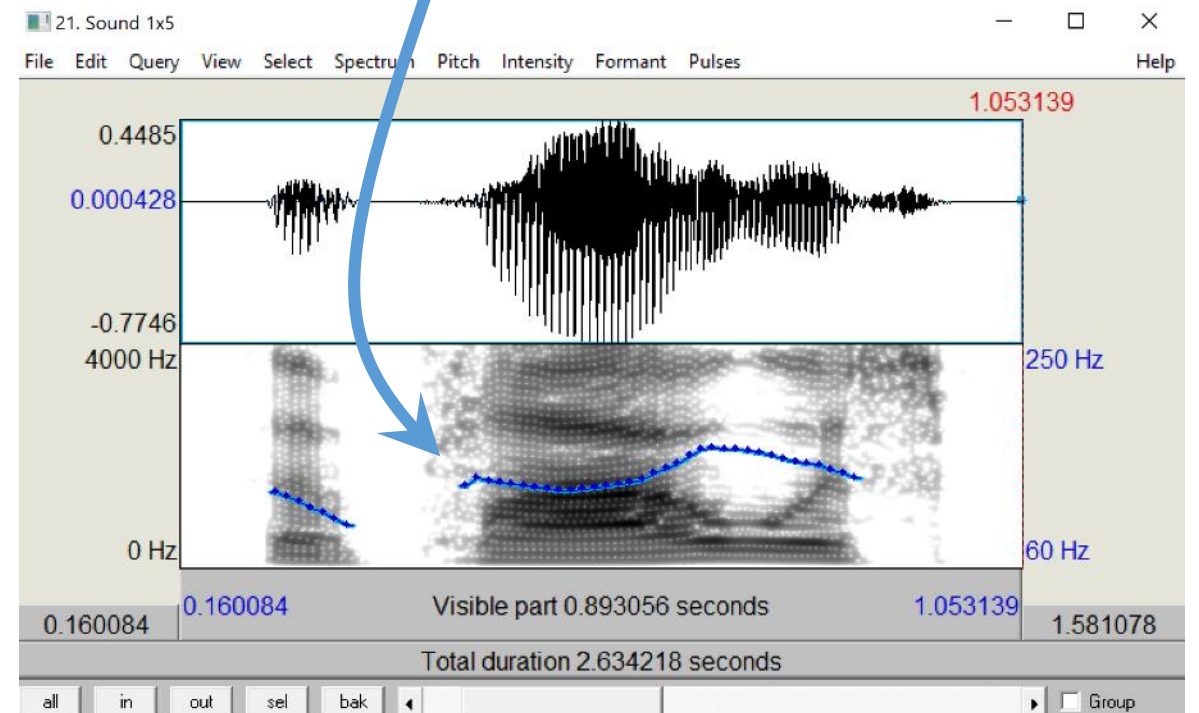
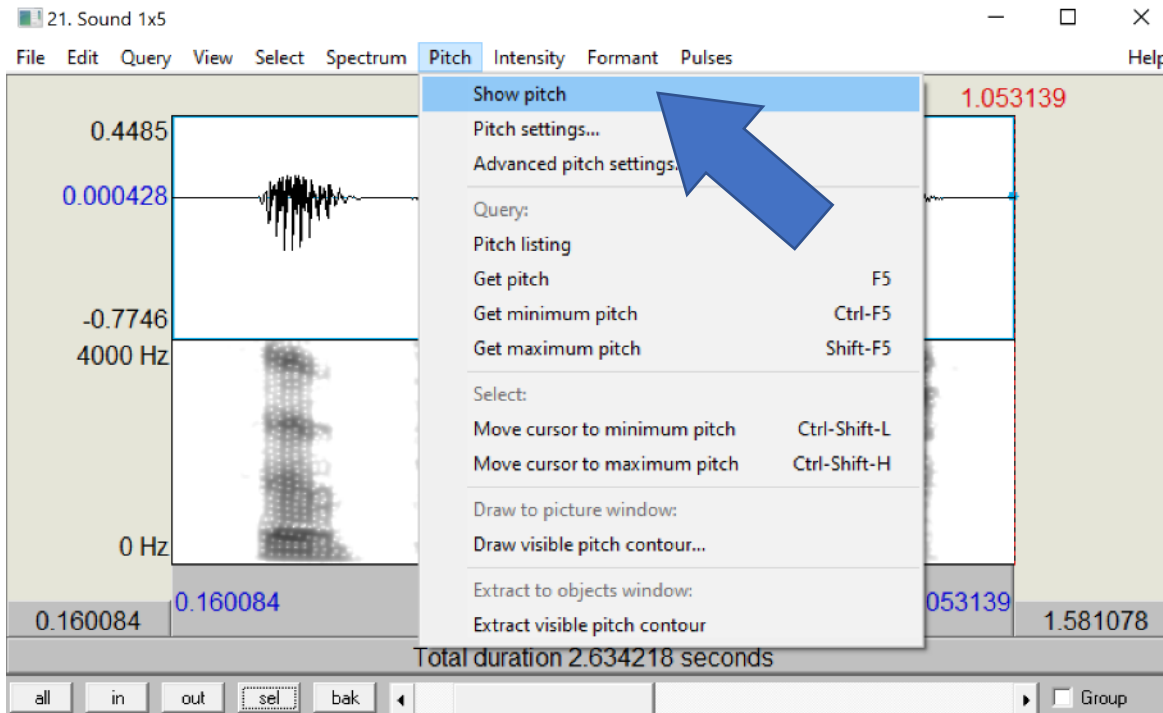


The number you get will be off by a little bit depending on how accurately you click and highlight the relevant pitch period

Automated F0 tracking

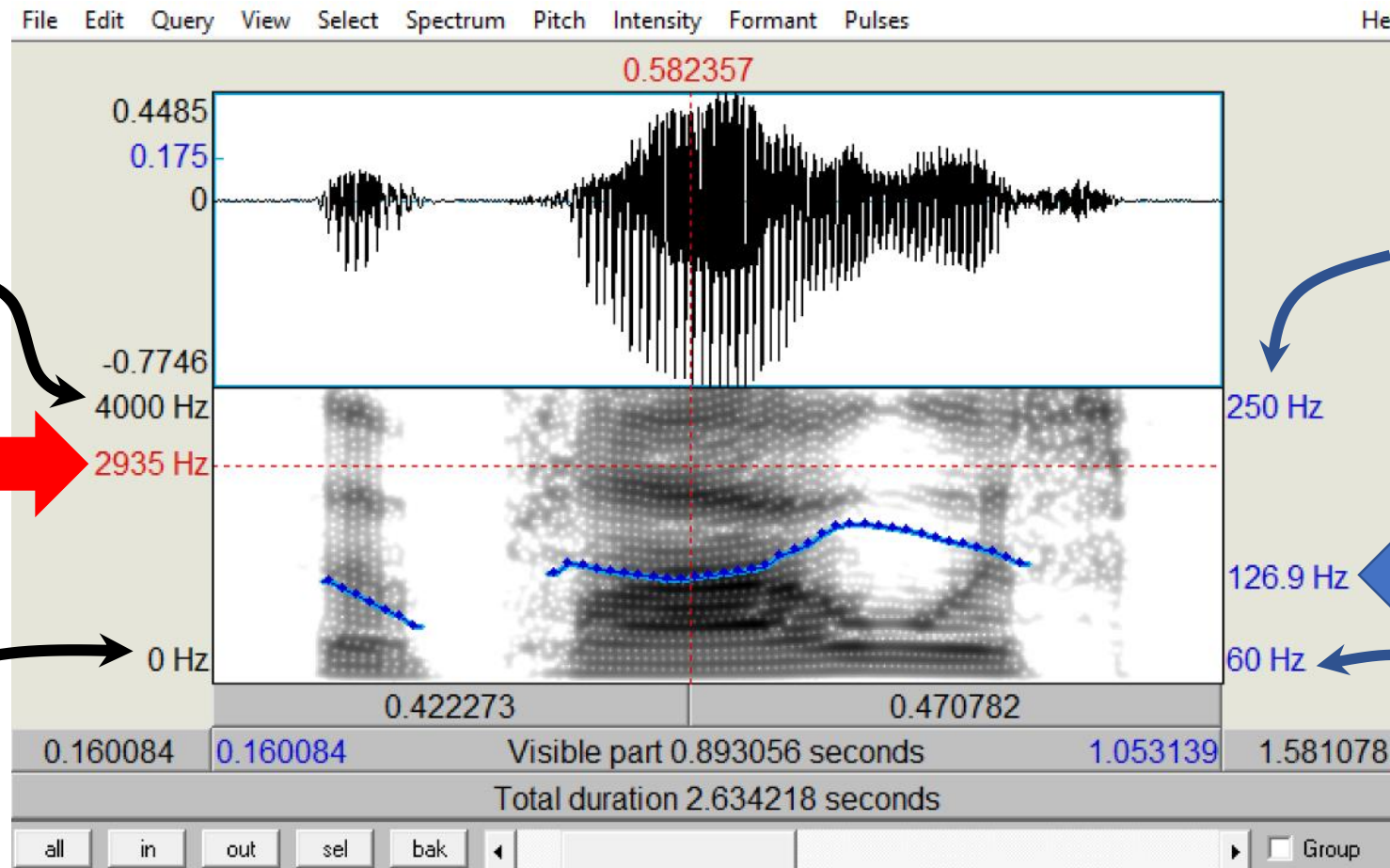
Selecting Pitch → Show pitch will overlay a blue contour on top of the spectrogram.

This is the F0 contour.



Reading the output of F0 tracking

and keeping it separate from frequencies in the spectrogram – note the **left axis for spectrogram frequency** and the **right axis for F0**



Highest frequency that would be visible in the window, according to the current spectrogram settings

Frequency at the point you clicked in the spectrogram (NOT the pitch!)

Lowest frequency that would be visible in the window, according to the current spectrogram settings

Highest F0 that would be visible in the window, according to the current pitch settings

250 Hz

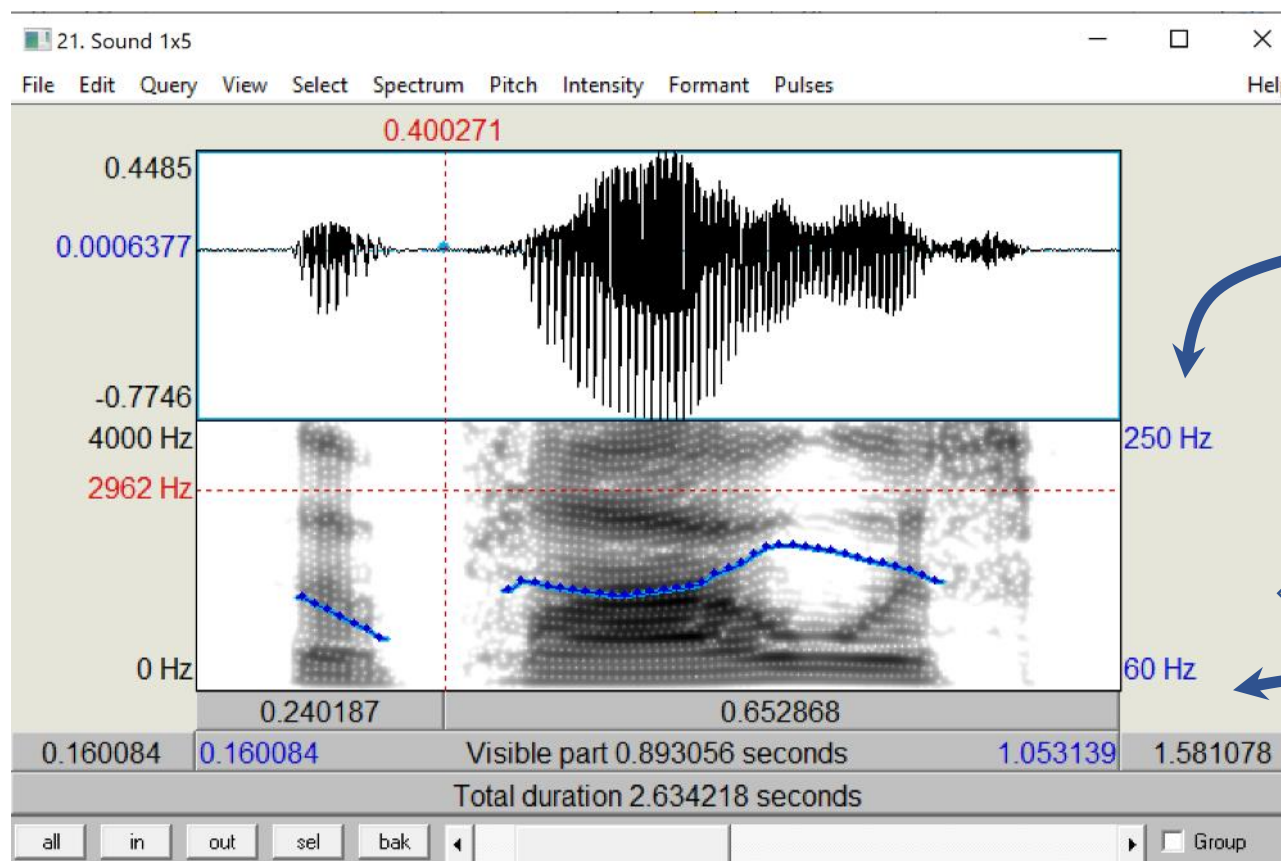
126.9 Hz

60 Hz

F0 of the speech at the time where you clicked

Lowest F0 that would be visible in the window, according to the current pitch settings

Some parts of the sound don't have a F0

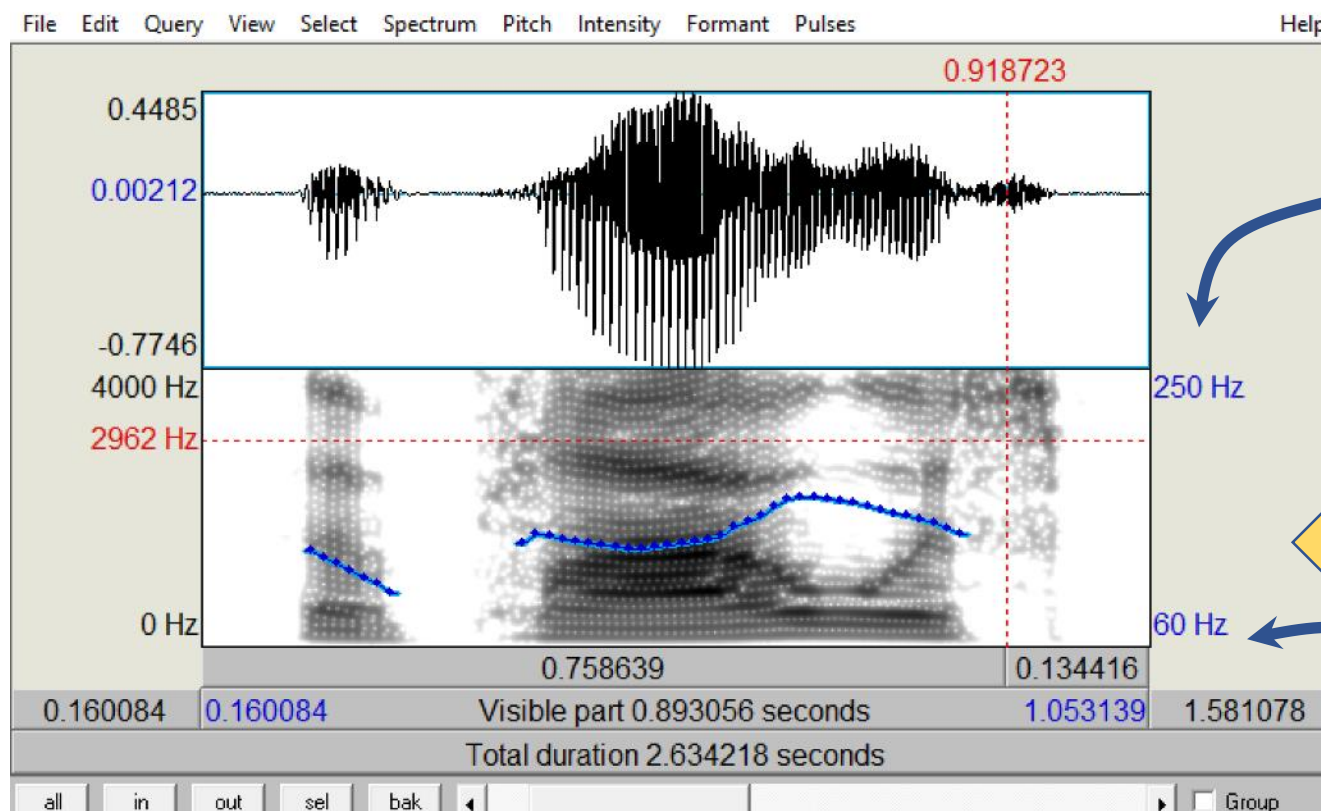


Highest F0 that would be visible in the window, according to the current pitch settings

No F0 because there is no sound at the time where you clicked

Lowest F0 that would be visible in the window, according to the current pitch settings

Some parts of the sound don't have a F0



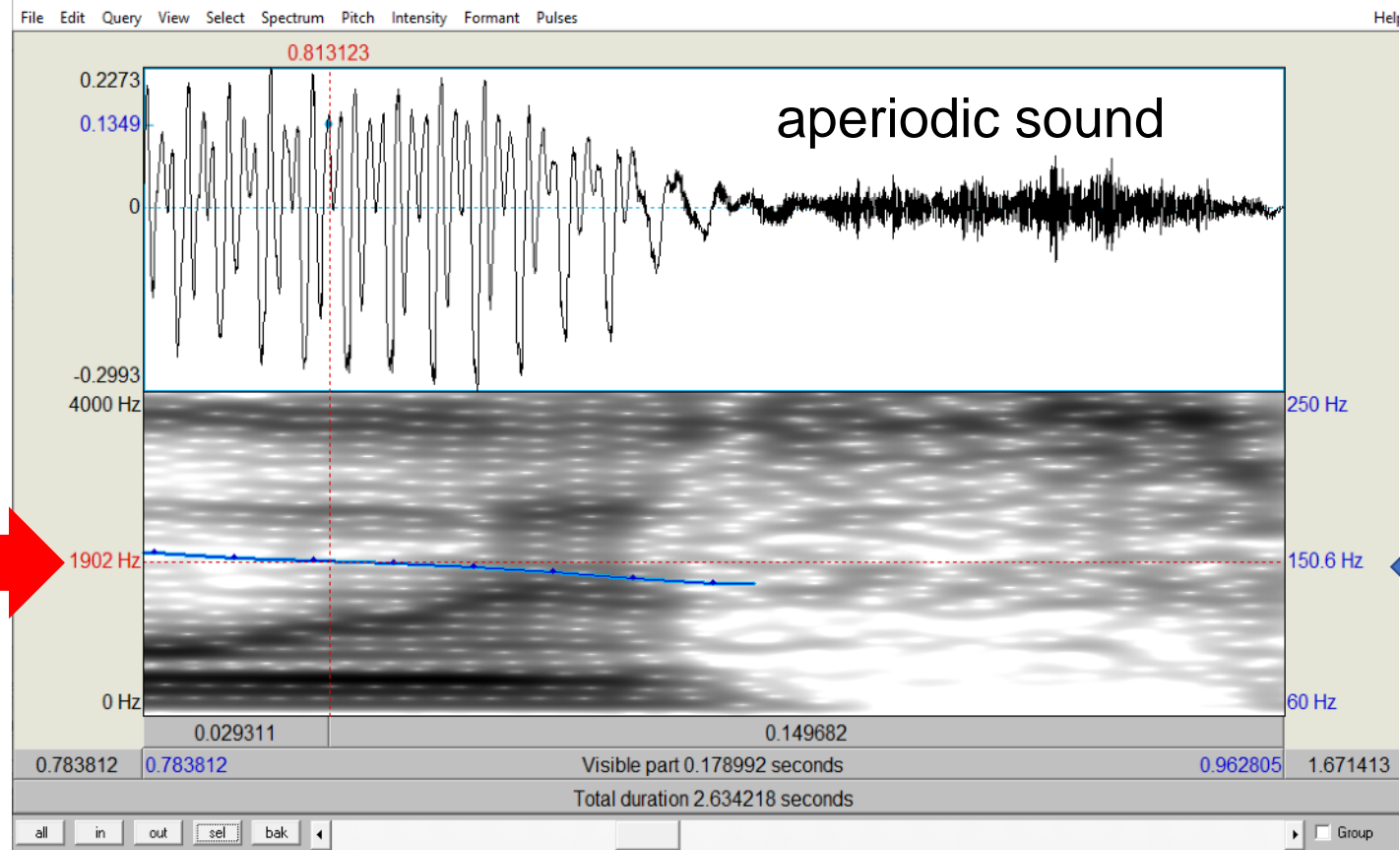
Highest F0 that would be visible in the window, according to the current pitch settings

No F0 because the speech is not **periodic** at the time where you clicked

Lowest F0 that would be visible in the window, according to the current pitch settings

Periodic and aperiodic sounds

periodic sound



Frequency at the point you clicked in the spectrogram (NOT the pitch, even though you clicked exactly at the vertical position of the blue contour, this left axis does NOT refer to the pitch / F0)

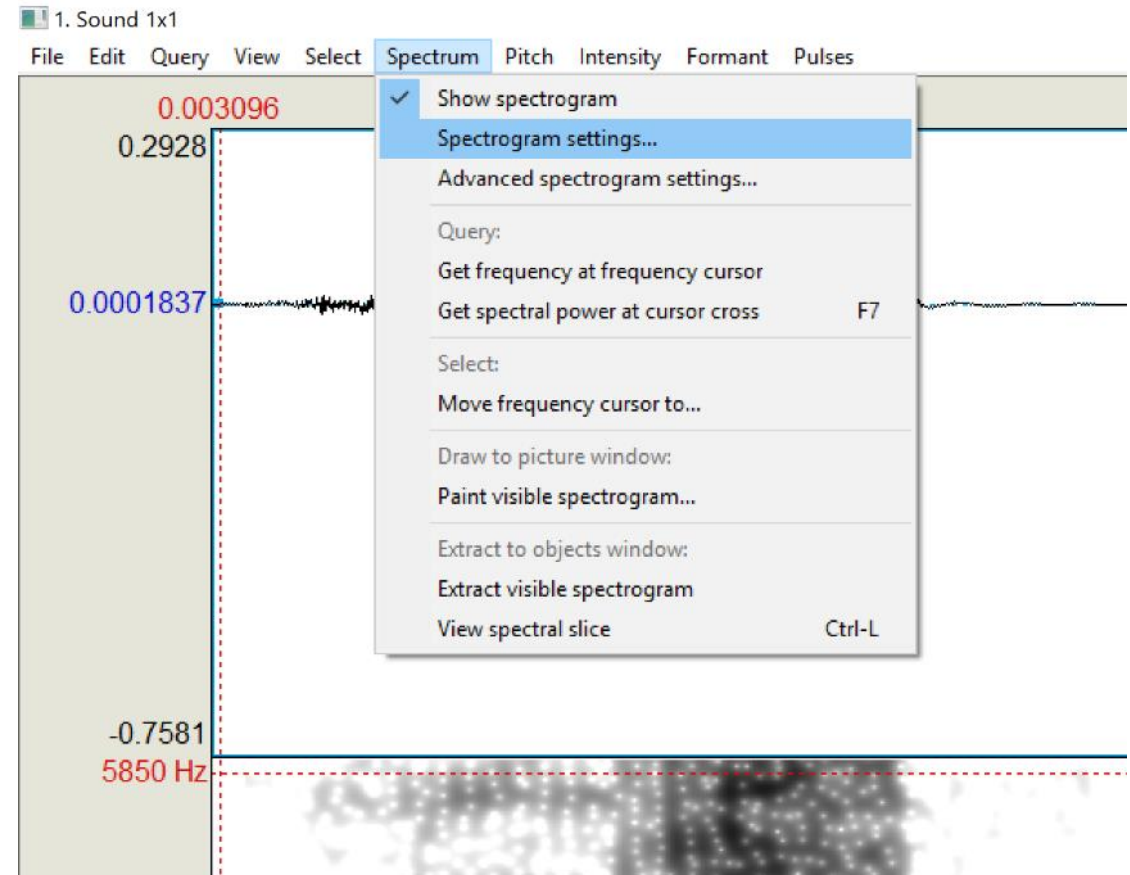
F0 of the speech at the specific time where you clicked (off to the left)

Notice how the pitch tracking gives a **blue contour** when it is a periodic sound

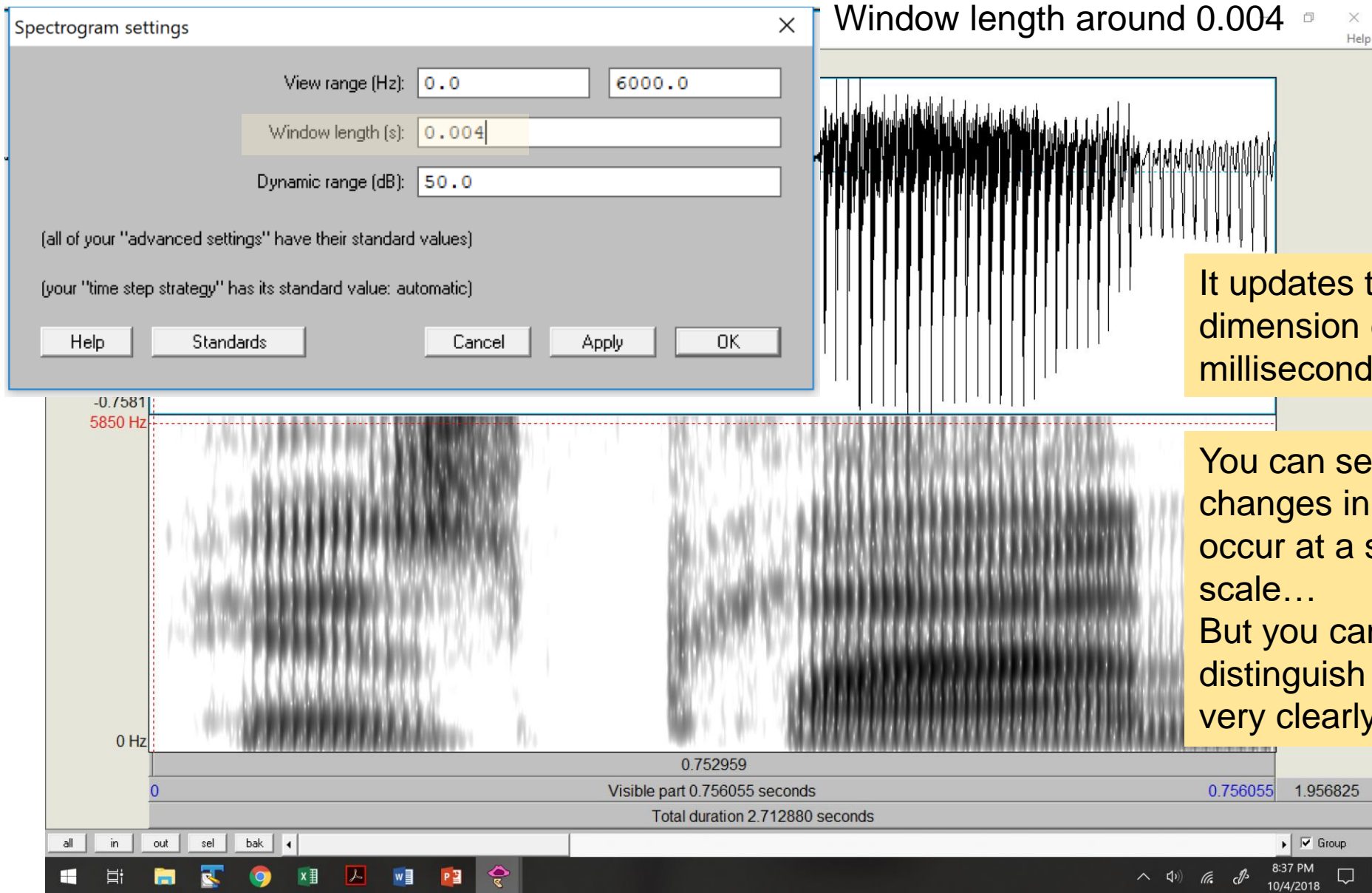
No periodicity → no F0 tracking, because the F0 is a rate of regular repetition.

Spectrogram settings that determine timing and frequency resolution

- Found in the Sound editor window
- Spectrum → Spectrogram settings



Broadband Spectrogram



It updates the vertical dimension every 4 milliseconds (that's fast!)

You can see rapid changes in amplitude that occur at a super-fast time scale...
But you cannot distinguish frequencies very clearly.

Narrowband spectrogram

Spectrogram settings

View range (Hz): 0.0 4000.0

Window length (s): 0.04

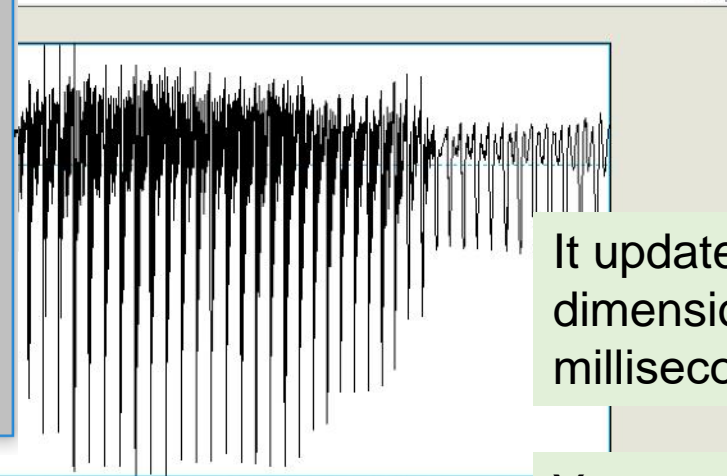
Dynamic range (dB): 50.0

(all of your "advanced settings" have their standard values)

(your "time step strategy" has its standard value: automatic)

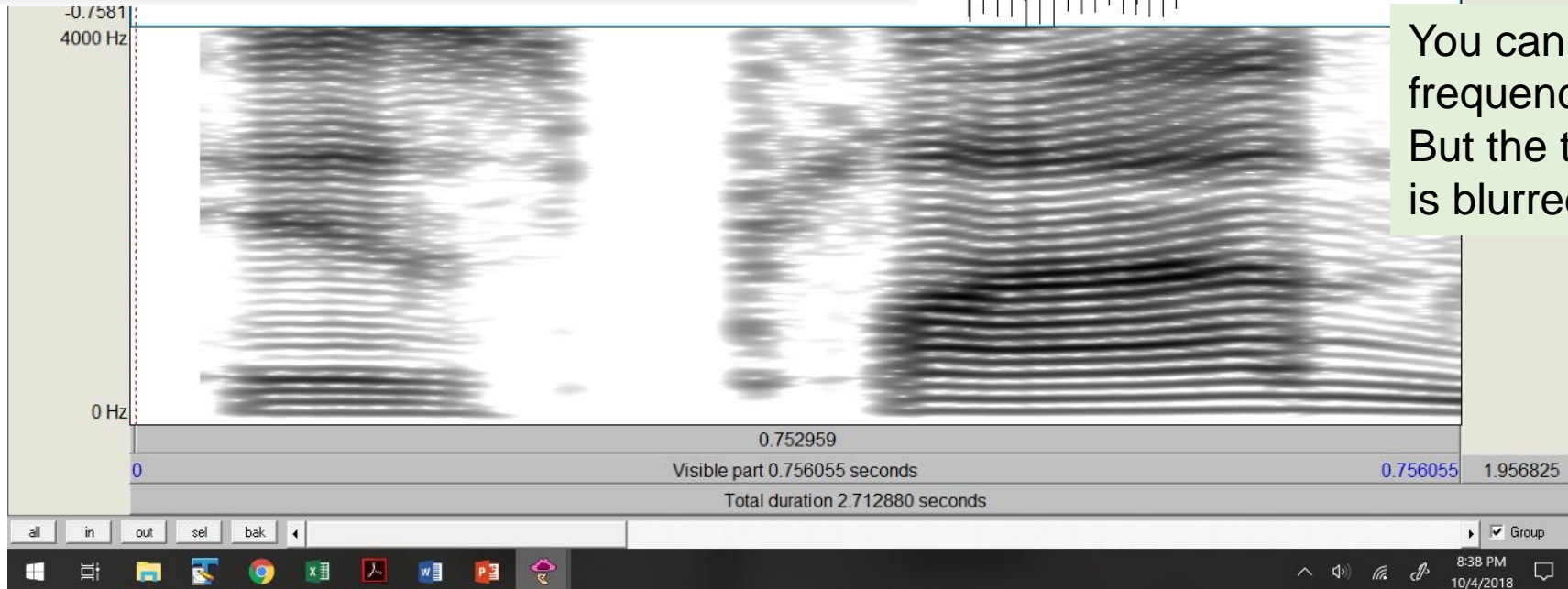
Help Standards Cancel Apply OK

Window length around 0.04

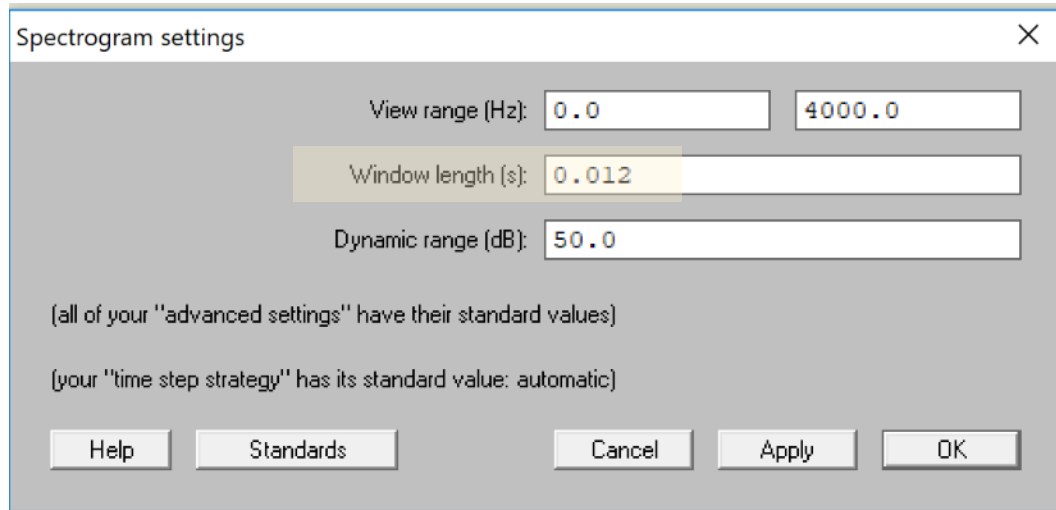


It updates the vertical dimension every 40 milliseconds (that's slow!)

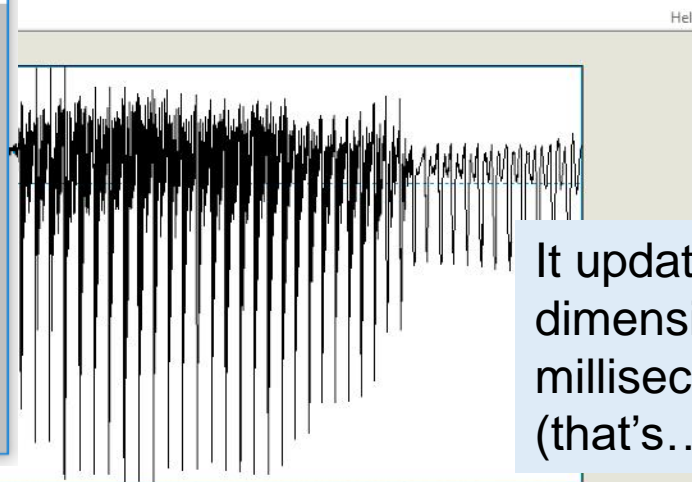
You can distinguish frequencies very clearly. But the timing of events is blurred across time.



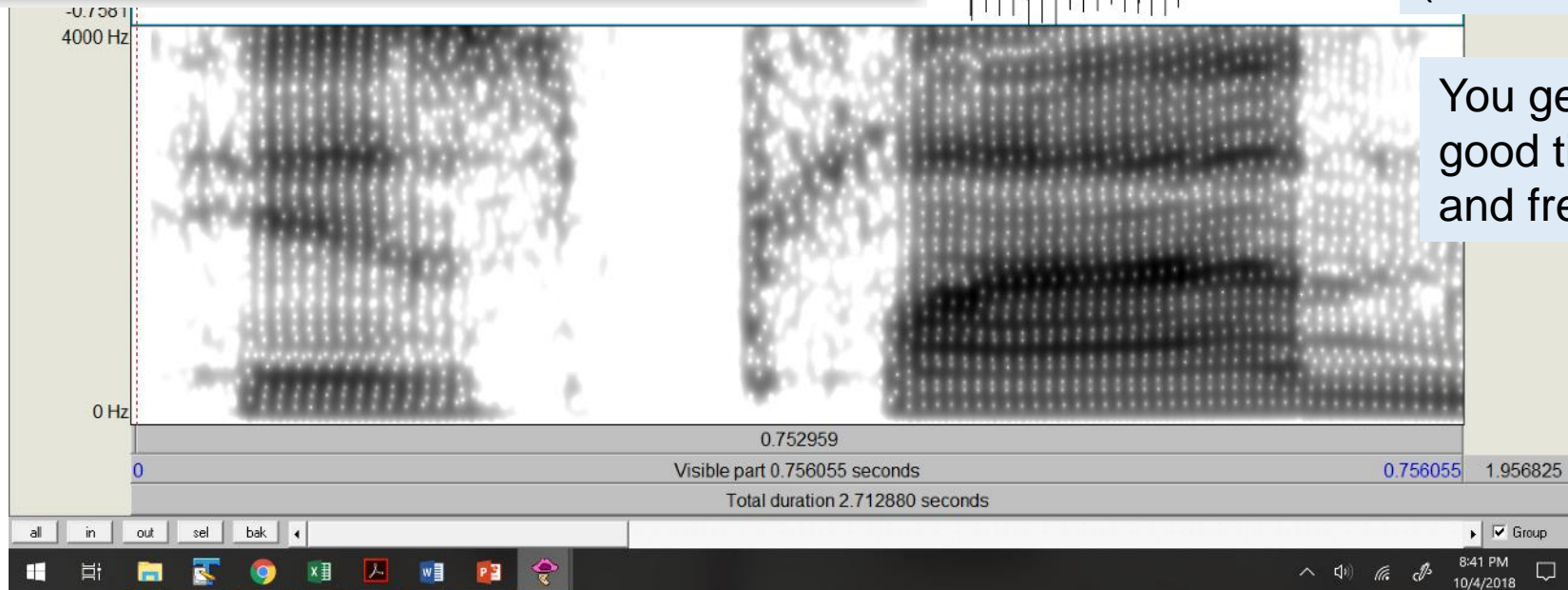
Intermediate spectrogram



Window length around 0.012



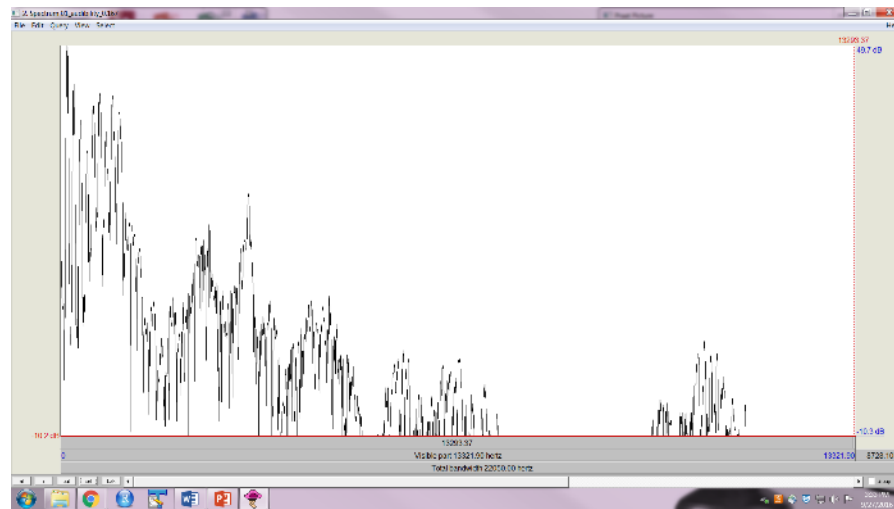
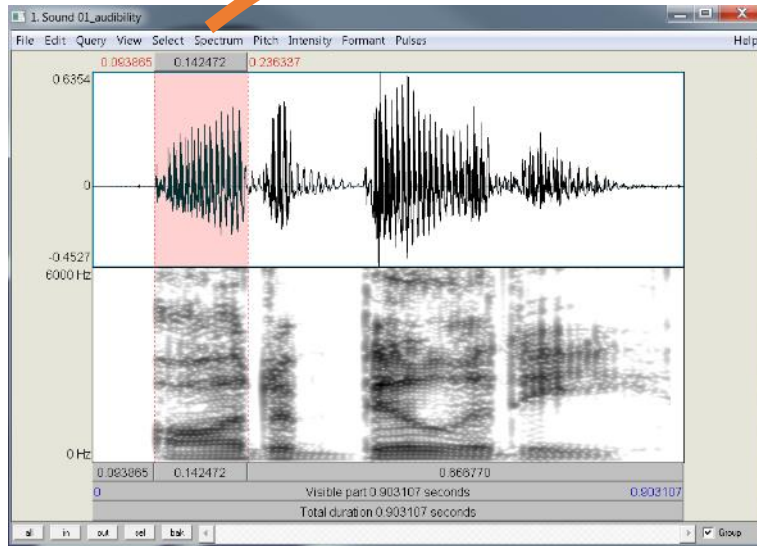
It updates the vertical dimension every 12 milliseconds (that's... medium)



You get reasonably good timing info and frequency info

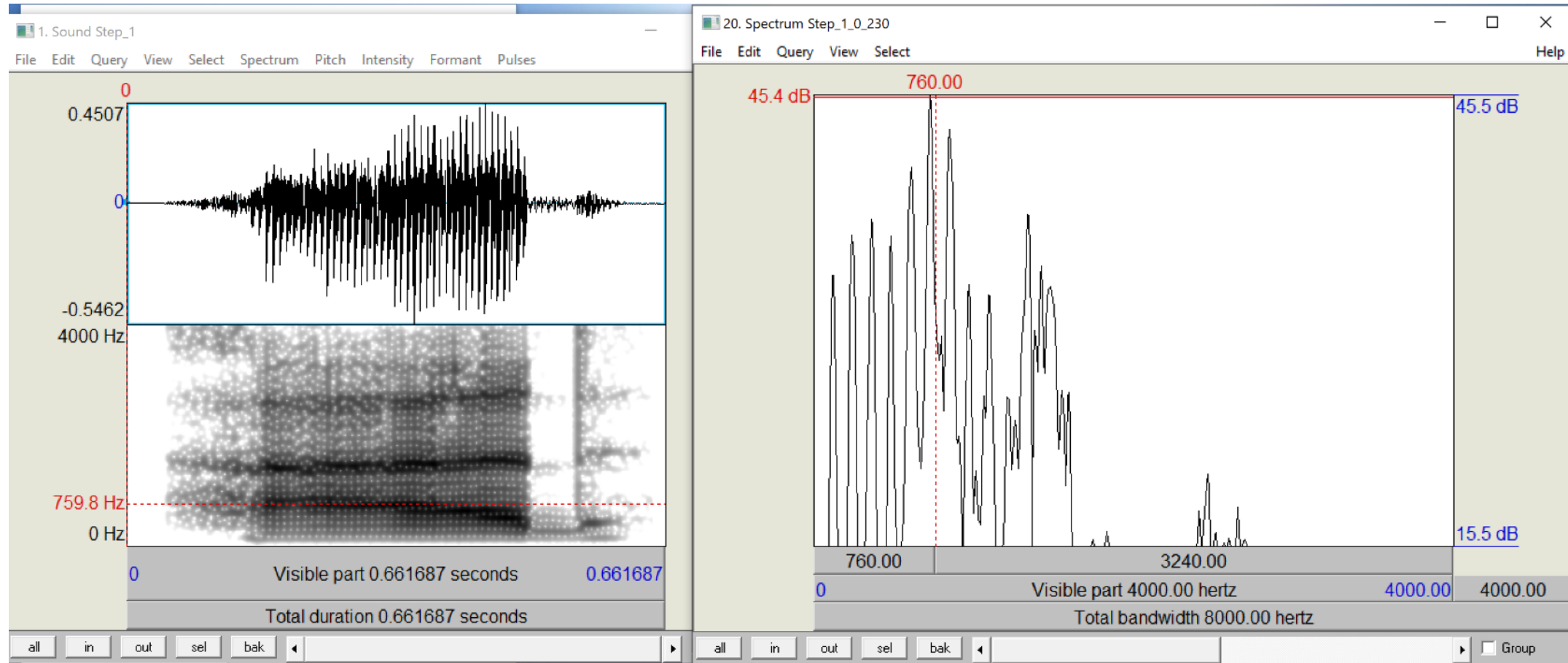
To view a sound's spectrum at a particular time:

- Click & drag to highlight a region, click Spectrum ... view spectral slice (ctrl+L on Windows)



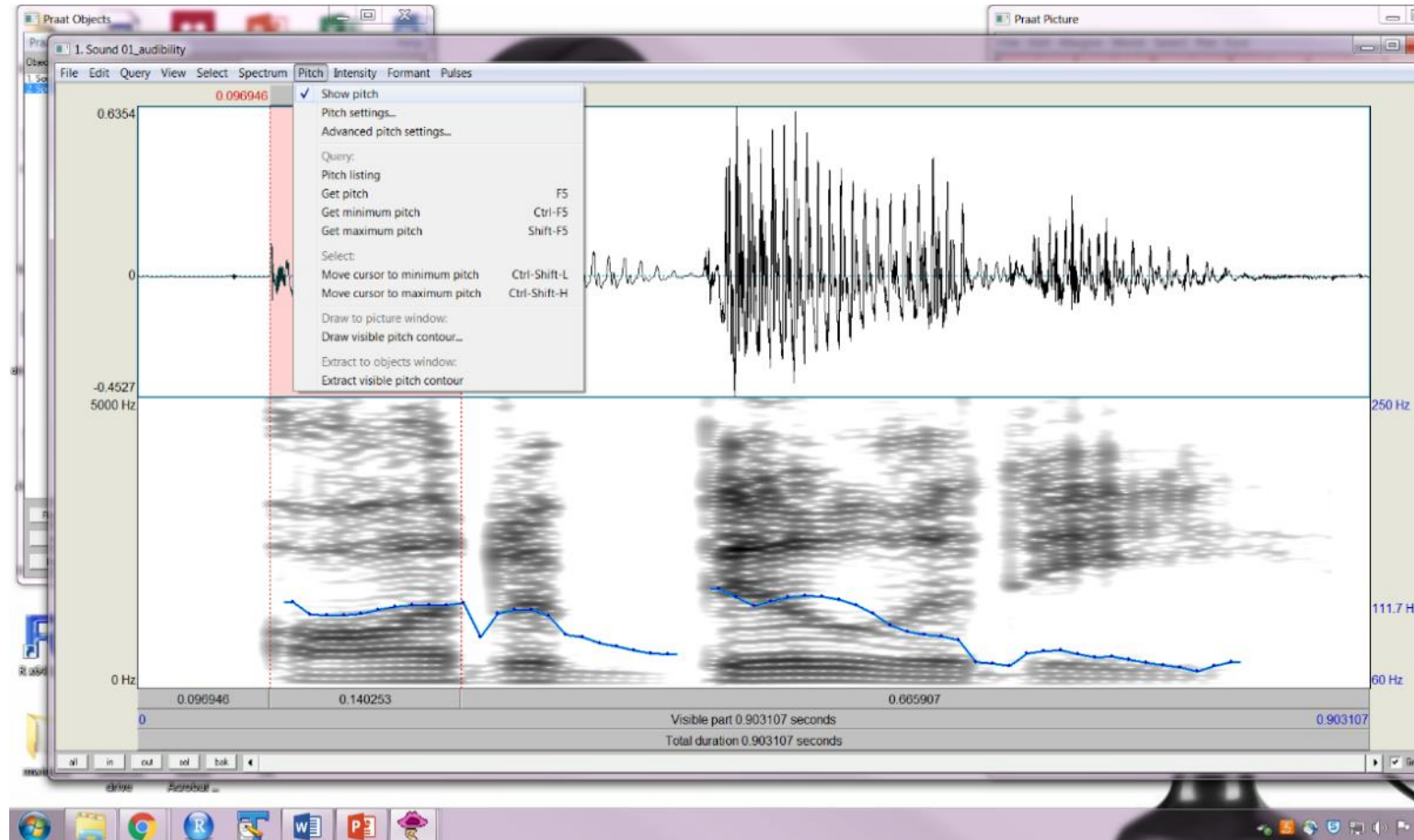
Navigating the spectrum

Correspondence of the spectrogram and the spectrum



The three dark bands on the spectrogram (left) correspond to the three main frequency peaks on the spectrum (right)
As you click on these landmarks, the frequency is shown on the screen in the appropriate place

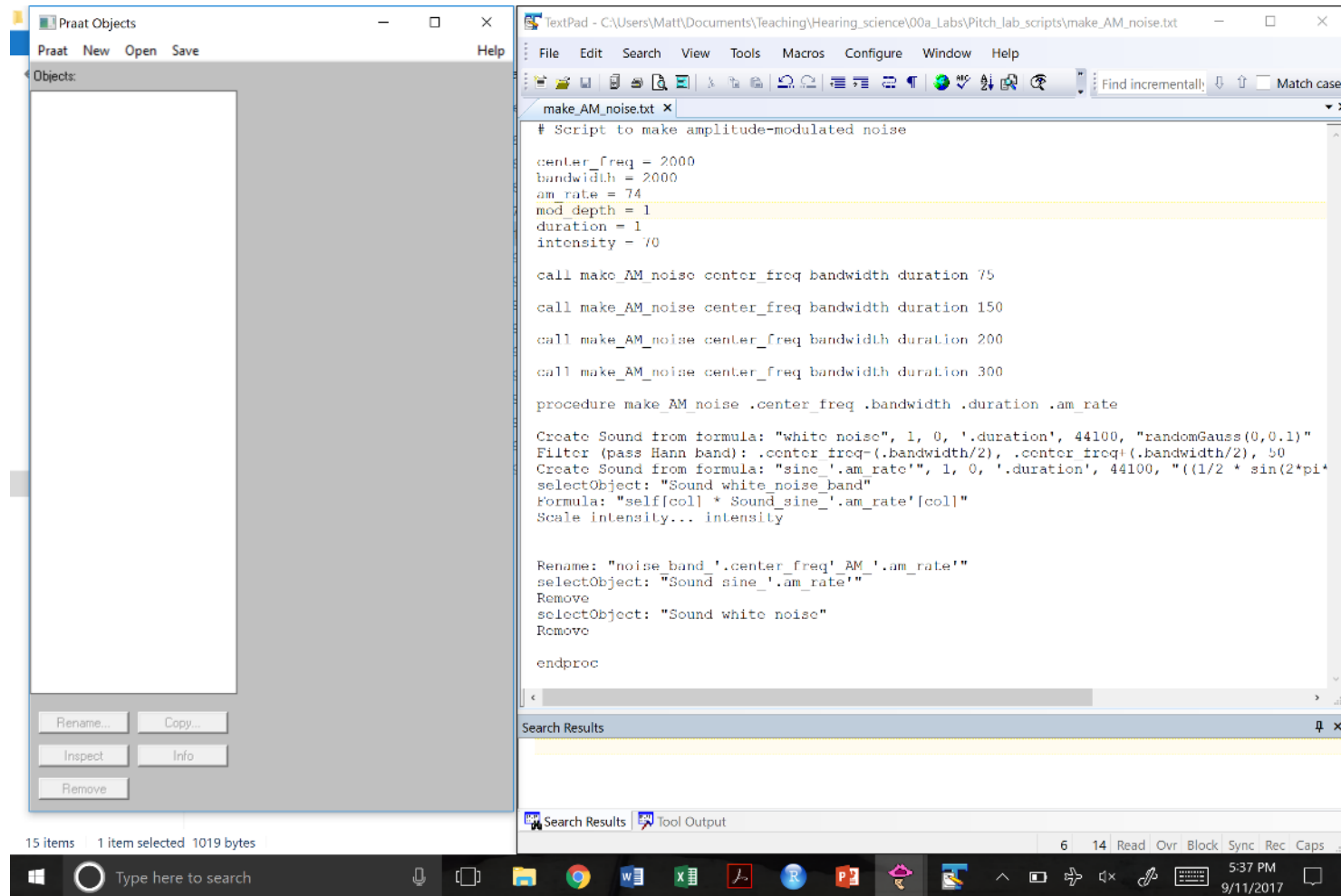
Play with the settings on the top bar to toggle views of **pitch contour**, pitch period pulses, intensity contour, spectrogram settings, etc.



Praat scripts

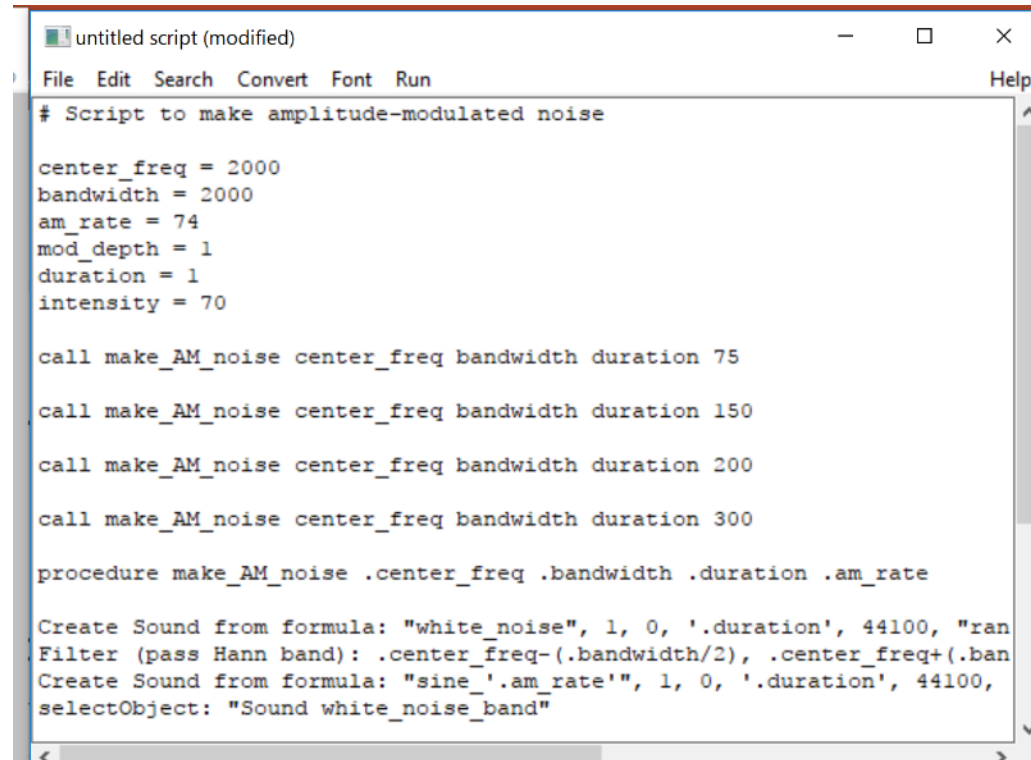
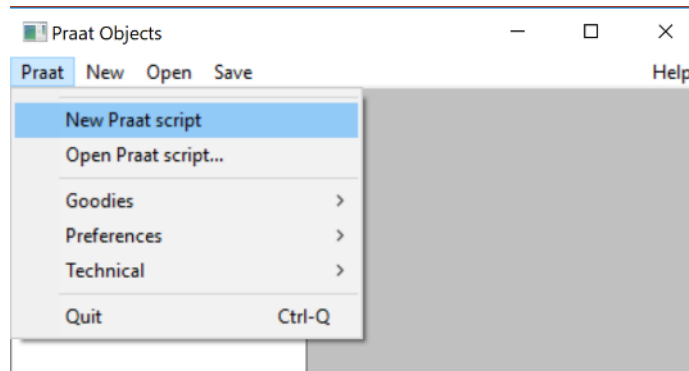
Running a script (1)

- Open up the script in a text file outside of Praat



Running a script (2)

- File... New Praat script
- Copy the text into the new window



```
untitled script (modified)
File Edit Search Convert Font Run Help
# Script to make amplitude-modulated noise

center_freq = 2000
bandwidth = 2000
am_rate = 74
mod_depth = 1
duration = 1
intensity = 70

call make_AM_noise center_freq bandwidth duration 75

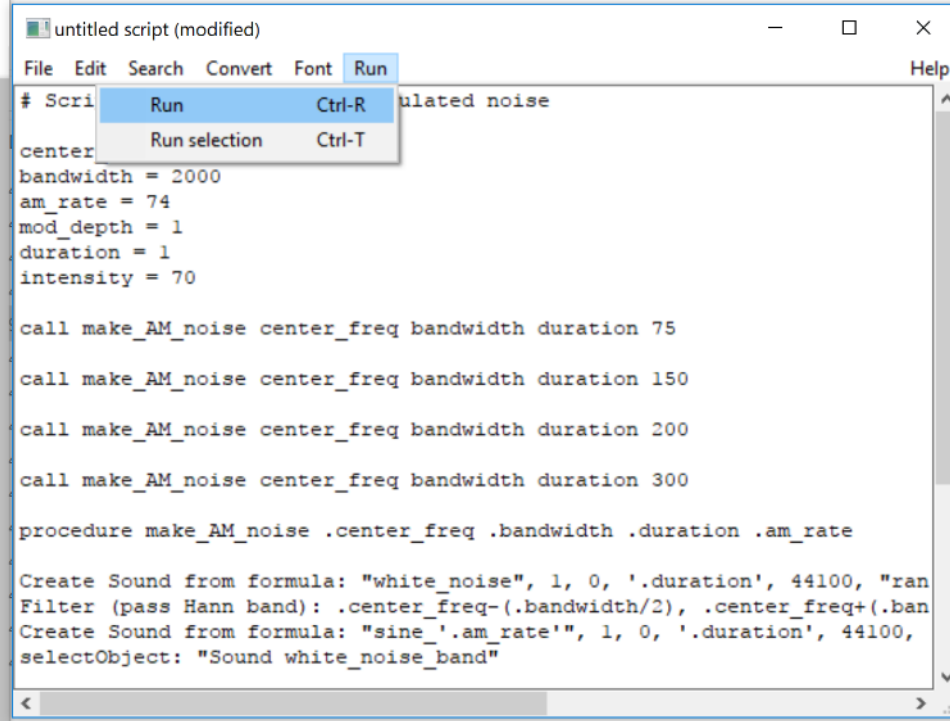
call make_AM_noise center_freq bandwidth duration 150

call make_AM_noise center_freq bandwidth duration 200

call make_AM_noise center_freq bandwidth duration 300

procedure make_AM_noise .center_freq .bandwidth .duration .am_rate
Create Sound from formula: "white_noise", 1, 0, '.duration', 44100, "ran
Filter (pass Hann band): .center_freq-(.bandwidth/2), .center_freq+(.ban
Create Sound from formula: "sine_'.am_rate'", 1, 0, '.duration', 44100,
selectObject: "Sound white_noise_band"
```

Run the script



```
untitled script (modified)
File Edit Search Convert Font Run Help
# Script: make_AM_noise_scaled_noise
center_freq = 75
bandwidth = 2000
am_rate = 74
mod_depth = 1
duration = 1
intensity = 70

call make_AM_noise center_freq bandwidth duration 75

call make_AM_noise center_freq bandwidth duration 150

call make_AM_noise center_freq bandwidth duration 200

call make_AM_noise center_freq bandwidth duration 300

procedure make_AM_noise .center_freq .bandwidth .duration .am_rate
Create Sound from formula: "white_noise", 1, 0, '.duration', 44100, "ran
Filter (pass Hann band): .center_freq-(.bandwidth/2), .center_freq+(.ban
Create Sound from formula: "sine_'.am_rate'", 1, 0, '.duration', 44100,
selectObject: "Sound white_noise_band"
```

Notes

- If sounds are in the Objects window, that doesn't mean they are saved on your computer.
- You can save them
- You can also create pictures
- You can filter sounds and do lots of interesting manipulations
- Play with the functions on the screen to see what they do to sounds
- You can manipulate speech pitch contours, etc.