

Beginning Praat Manual

A beginners guide to using Praat

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Introduction

This manual is intended for someone who is just starting out with Praat. There are a lot of resources for learning Praat out there, but I have found that there aren't as many resources for truly starting at 0, and many assume some prior knowledge. This manual was written to bring you from 0 to a starting point of being able to use those resources. This manual should have come in a folder of files that you will use later. I hope this proves useful to you!

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0: Before you get started...


0.1 File organization

Download

[Click Here to download the accompanying audio file .zip folder](#)



For Windows PC Users!

You will need to unzip the folder before you can access the files inside. In your File Explorer you will see the audioFiles folder looks like this  with a zipper down it. This means the folder is zipped and while you can see what's inside it, you can't access those files. You need to unzip it. So, right click on the folder and choose "Extract All" and you can accept whatever defaults it shows you. This will unzip the folder so you can access things inside it.

Please make sure you have this structure starting out. For any analysis you do in the future, I recommend a similar structure with a MAIN FOLDER containing your scripts, and then sub folders for files and outputs.

```
Beginning_Praat_Manual
  Beginning_Praat_Manual.pdf
  audiofiles
```

0.2 Downloading Praat

Click on the following URL or type it into your browser to navigate to the page where you can download Praat. <http://www.fon.hum.uva.nl/praat/>. This site will look a little... unprofessional, but I promise it is the correct one. In the top left-hand corner there will be a box for downloads for PC, Mac, and Linux machines.

0.3 Getting started with Praat

If everything installed correctly, you should now be able to find the Praat icon and open it.



When you open Praat, you should see a two windows like that in Figure 1.

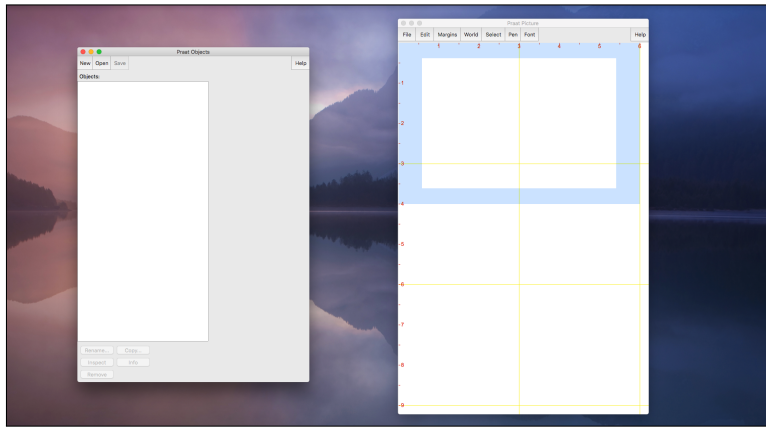


Figure 1: Praat Opening Screens

1: Introduction to Praat

Once Praat is open, you can close the window that says “Pratt Picture” as we won’t be using it. Looking to the main Praat window, you will see a button at the top left that says “Open” and then “Read from file”, shown in Figure 1.1. Navigate to where the “audiofiles” folder that came with this manual is. Open the “File1” file.

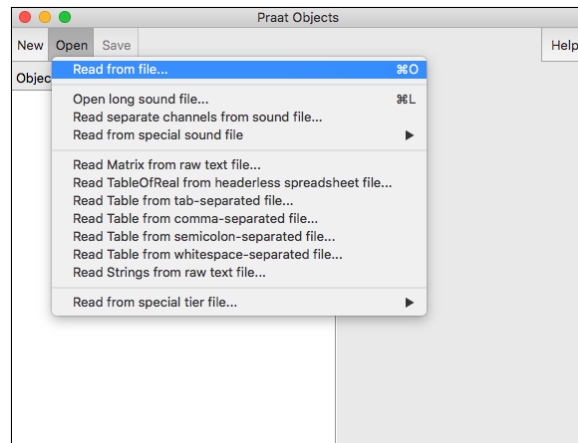


Figure 1.1: Opening an audio file

When you click on that, another window will appear as shown in Figure 1.2.

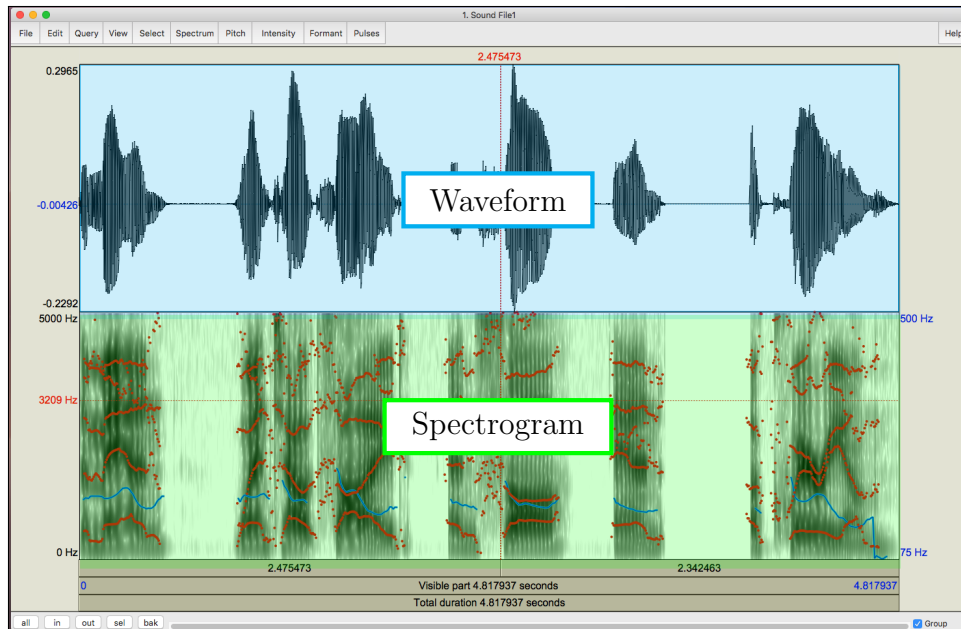


Figure 1.2: An open audio file

Go through the following actions in this window to practice using Praat. Commands

1. Using your mouse, click and drag to highlight a section
2. Press CTL+N or CMD + N to zoom in on the selection
3. Press CTL+A or CMD + A to go back to the whole audio file (All)
4. Using your mouse, click and drag to highlight a section
5. Press CTL+N or CMD + N to zoom in on the selection
6. Select another region in this area and zoom in on it.
7. Press CTL+B or CMD + B to go BACK to the view you were just on
8. Press CTL+O or CMD + O to zoom out slowly
9. Press CTL+I or CMD + I to zoom in slowly
10. Press CTL+A or CMD + A to go back to the whole audio file (All)
11. Press TAB to play the file
12. Select a region and press TAB to play that selection
13. Select a region and look at the bottom gray tab of that region. What is the duration of that selection?
14. Turn on/off Formants - Top tab Formant - > check or uncheck "Show Formants"
15. Turn on/off Intensity - Top tab Intensity - > check or uncheck "Show Intensity"

16. Turn on/off Pitch Tracks - Top tab Pitch – > check or uncheck "Show Pitch"

Close that window

Recording

1. On the main Praat window select New – > Record Mono Sound
2. Press Record and record yourself saying the vowels "a", "i", "e", "u".
3. Press Stop, then Save to List & Close
4. Click on your new sound to select it and open it with the View & Edit button
5. Investigate your vowels and look for differences between them using the commands you practiced above.
6. Try to find the start and end of each of your vowels.
7. Write down the duration of each vowel

2: Waveforms and Spectrograms

Please watch the following videos in order to get an introduction to waveforms and spectrograms.

Video 1 - Approx 7 min

[Click Here - Introduction to Waveforms](#)

Video 2 - Approx 4 min

[Click Here - Introduction to Waveforms and Spectrogram](#)

Video 3 - Approx 8 min

[Click Here - Introduction to Formants](#)

Video 4 - Approx 8 min

[Click Here - Introduction to Spectrograms & Formants](#)

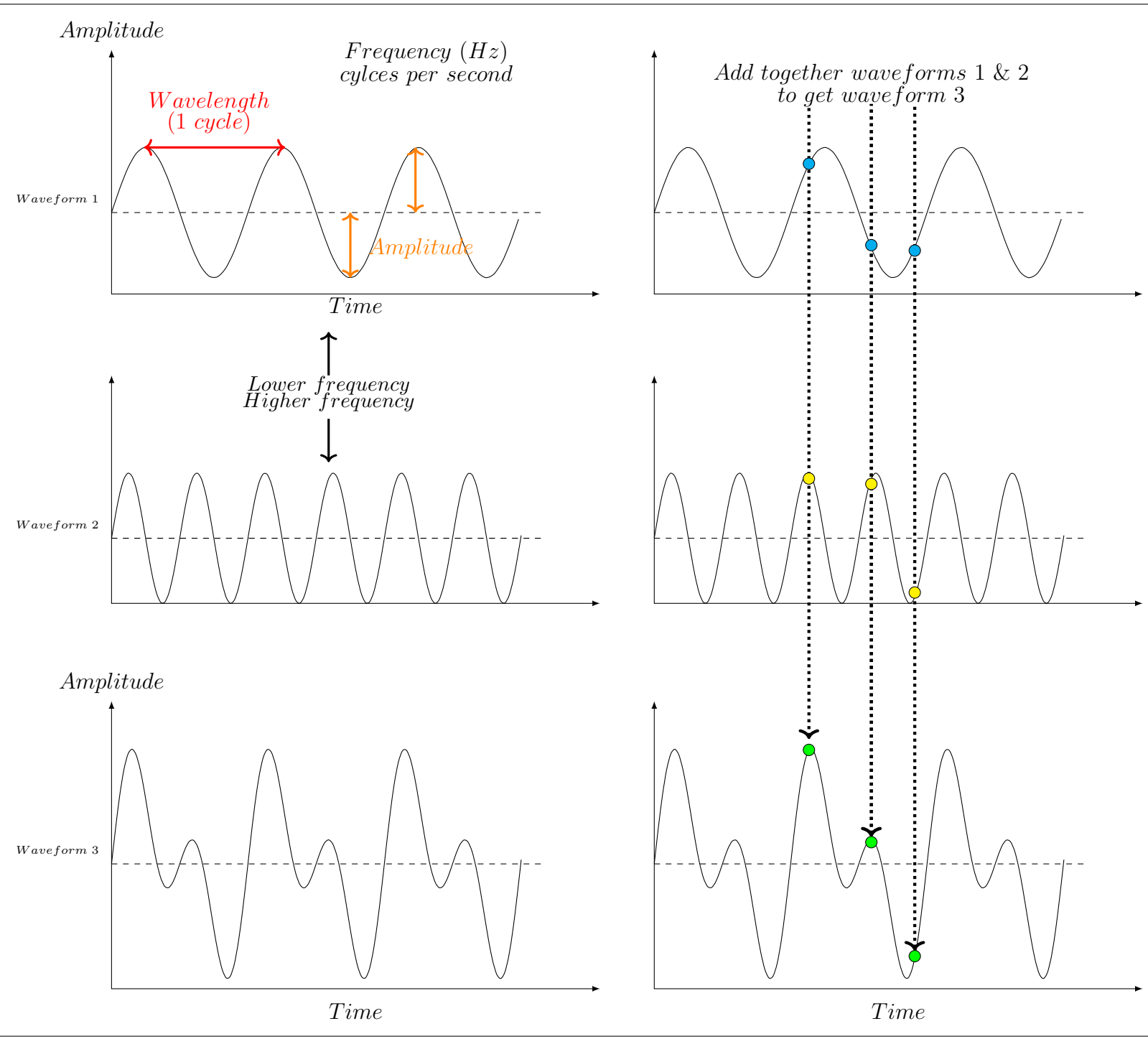


Figure 2.1: Waveform diagram and complex waveform creation

3: Annotate with TextGrids

If you prefer to watch this info in video form instead of reading, click below.
[Click Here for a Video Introduction to Praat & TextGrids](#)

Many times we need to know more information about a speech signal in order to analyze it properly, such as what word was being spoken or how long a certain segment is. In order to do these things, we can annotate a speech file using a TextGrid. A TextGrid is a text file that accompanies a sound file where you can input text and boundaries to section off periods of time in a speech file.

3.1 Create TextGrid

To create a text grid, select a Sound Object in the Praat window and click ANNOTATE in the right panel of options and then choose To TextGrid... ’

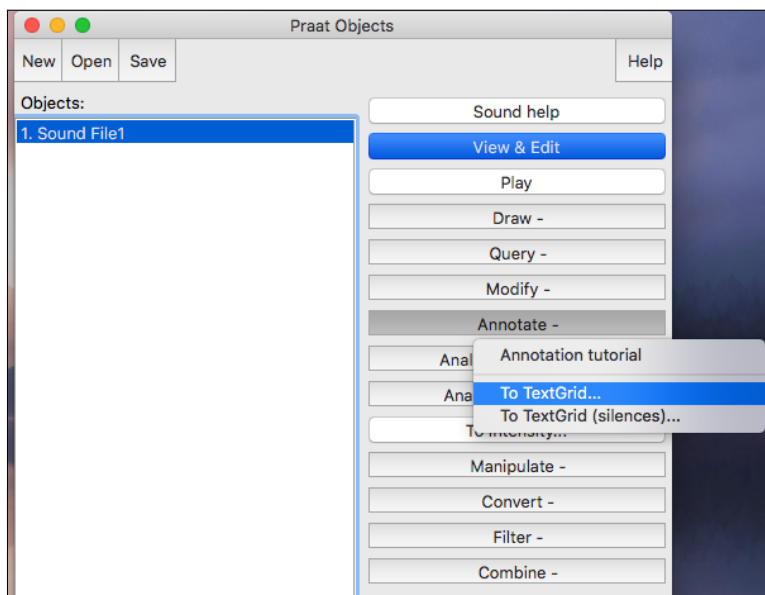


Figure 3.1: Creating a TextGrid

This will open up an options window (3.2). **Look around for it, it has a tendency to open on a different screen if you are using multiple monitors.** Here, delete the names in the names field and add in what you would like to name your tiers. Putting a space between words will create multiple tiers with the names of each word, so if you don't want multiple tiers, do not include spaces in your names. For now, we won't worry about the Point Tiers, so delete the word Bell from that field and leave it blank.

In the top field named "All tier names", you will put the names of your tiers. For right now, we only want one tier, so we are going to delete the words that are there and type in "TextGrid". If you want multiple tiers, simply put a space and type another tier name. This is important to know that if we actually typed text space grid for our tier, this would actually give us two tiers, one named text

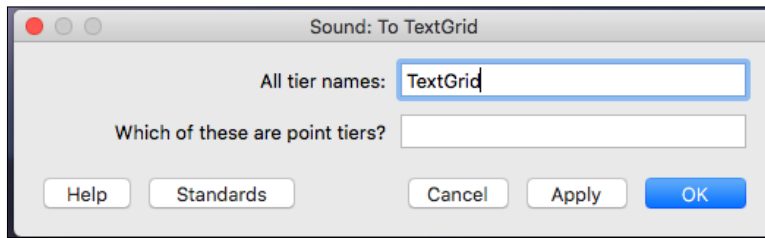


Figure 3.2: TextGrid Option Window]

and one named grid. In this case, I only want one here, so I'm going to use no spaces in my tier names. The second field is point tiers were not going to deal with pointers right now. So you can go ahead and delete the word Bell and leave that field blank. When you click okay, this will now create the text script file back in your Praat Objects window.

3.2 Open TextGrid and Sound

In order to open this new TextGrid with your sound file, you're going to hit shift and select both of your files together. They will both be highlighted in blue, and then you can click “View and Edit” (3.3). This will bring up a window that will show you the waveform, the spectrogram, and the yellow section down on the bottom is your text grid (Fig 3.4).

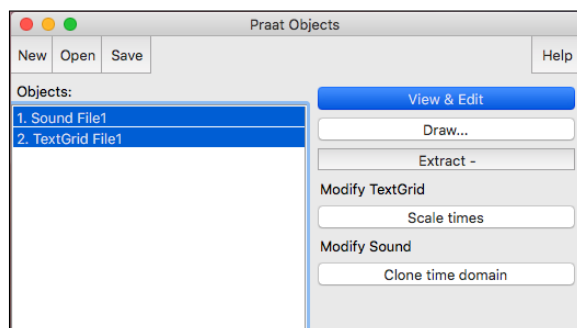


Figure 3.3: Select Region

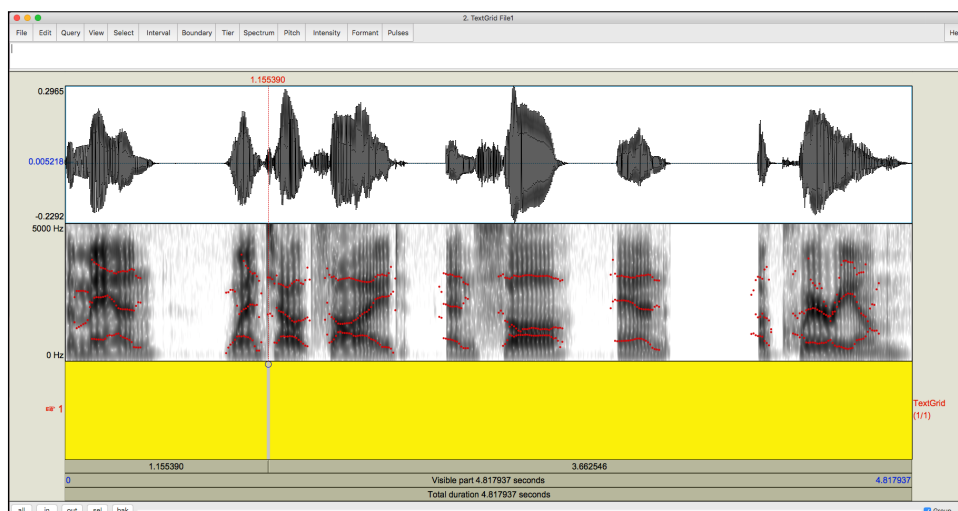


Figure 3.4: Opened TextGrid

Note! Giant IPA chart in your way?

If you end up with a large chart on the righthand side, go to File – > Preference/Settings and uncheck the box that says “Show IPA Chart”.

3.3 Adding Boundaries and Annotations

You can now select a region by clicking up in the spectrogram or the waveform and dragging to select a region we want to block this off in our text grid (Fig3.5). We will do this by adding boundaries into the TextGrid, which will mark off a section of time and allow us to add an annotation. Once you have a region selected, you can just hit ENTER and it will add boundaries at each of those places at the beginning and the end of the interval that you selected (Fig 3.6).

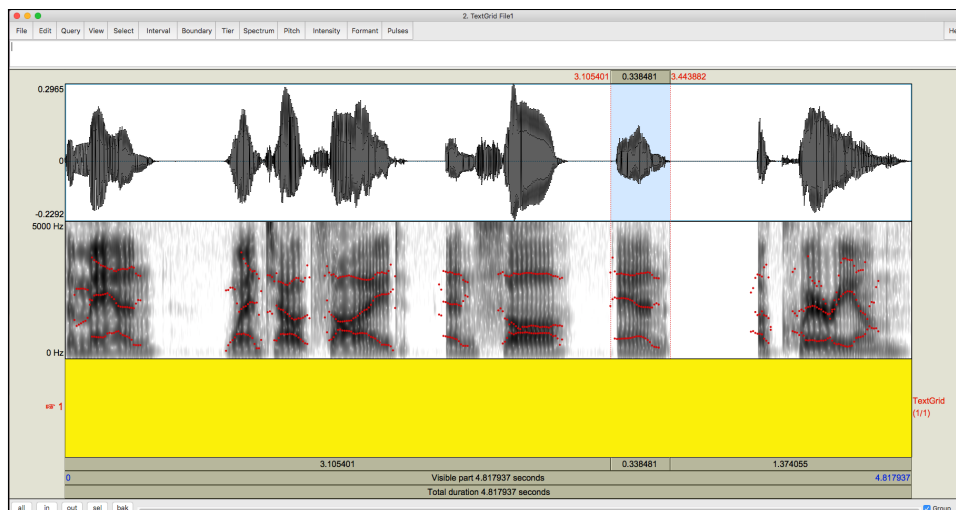


Figure 3.5: Select Region

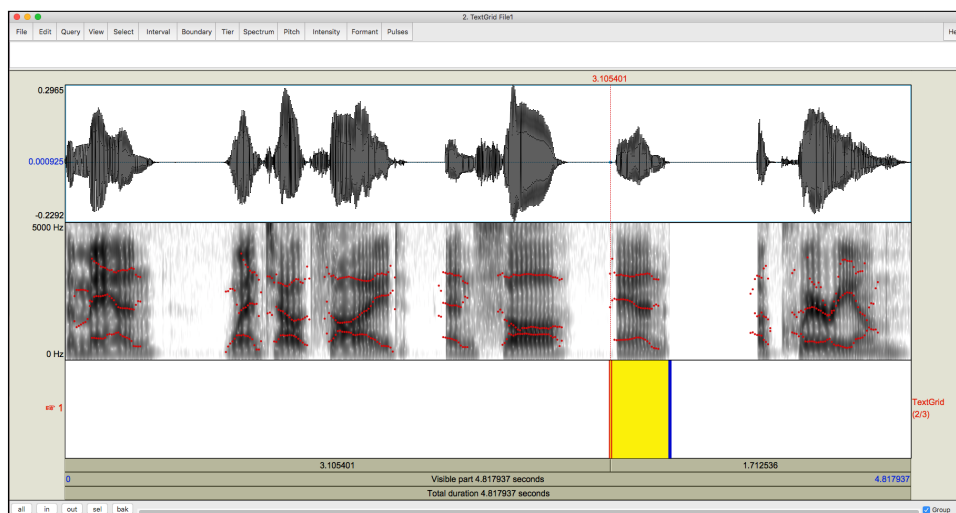


Figure 3.6: Add Boundaries

To put in an annotation, select in-between these boundaries and this will actually select that left boundary. So we see that yellow section and the boundary on the left is highlighted in red.

Now if I click in that space in between the two boundaries, the interval will highlight in yellow, and I can now start typing. We can type what that word actually is, what that sound is, or any relevant information about that interval of the speech signal. So I can go ahead and select from the very beginning and select multiple regions and actually type out what that word or what that section is actually saying (Fig 3.7).

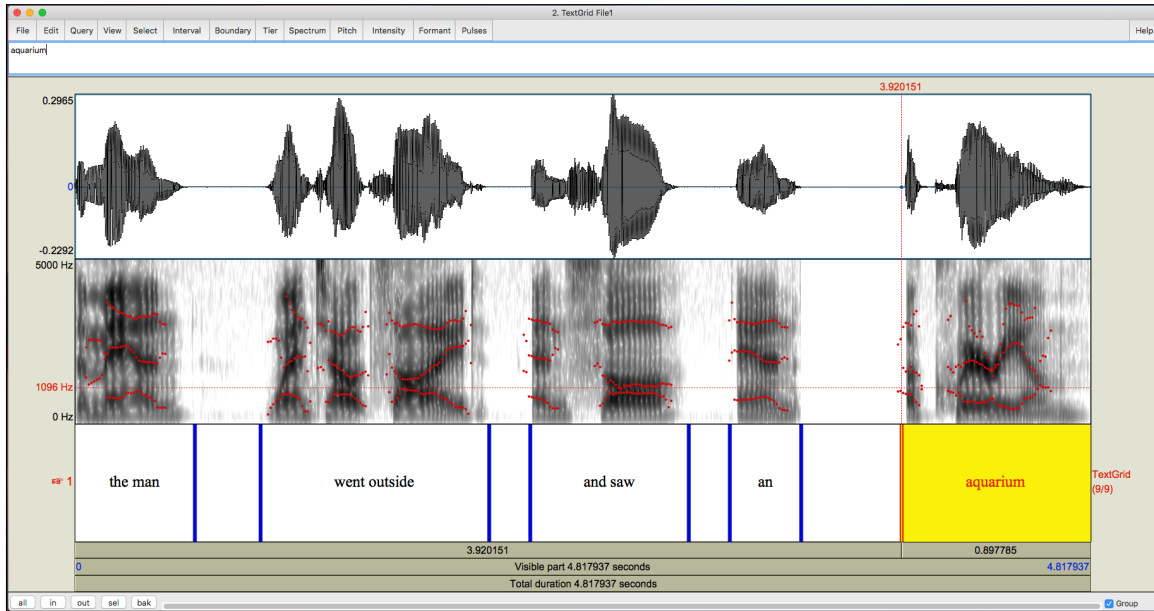


Figure 3.7: Final TextGrid

3.4 The Importance of Zooming in

It is very important that you zoom in when you are trying to insert boundaries. Let me explain. Consider the 2 figures below. Looking at the large image in each shows the waveform zoomed out, and it looks like the boundaries were successfully placed at the starts and end of each of the intended words. However, when you zoom in around those boundaries, you can see that the boundaries are actually quite far off. You may be asking yourself, “But it’s so small? How could that possibly matter?” Well, in language research, *TIMING MATTERS*.

As linguists or psychologists, we are often times looking at how fast we can process something, how quickly we respond to stimuli, when something happens compared to something else. We really care about timing in our work. And because of that, we need to be careful in things that measure time, like in audio. The kinds of errors as shown below could add up over a lot of items to large differences, which could *skew our results!* If the timing isn’t measured carefully, we could find nothing in our experiment, not because something isn’t there, but because we were sloppy when we measured the timing. Or even worse, we could find something that isn’t actually there!! all because we didn’t take the time to zoom in.

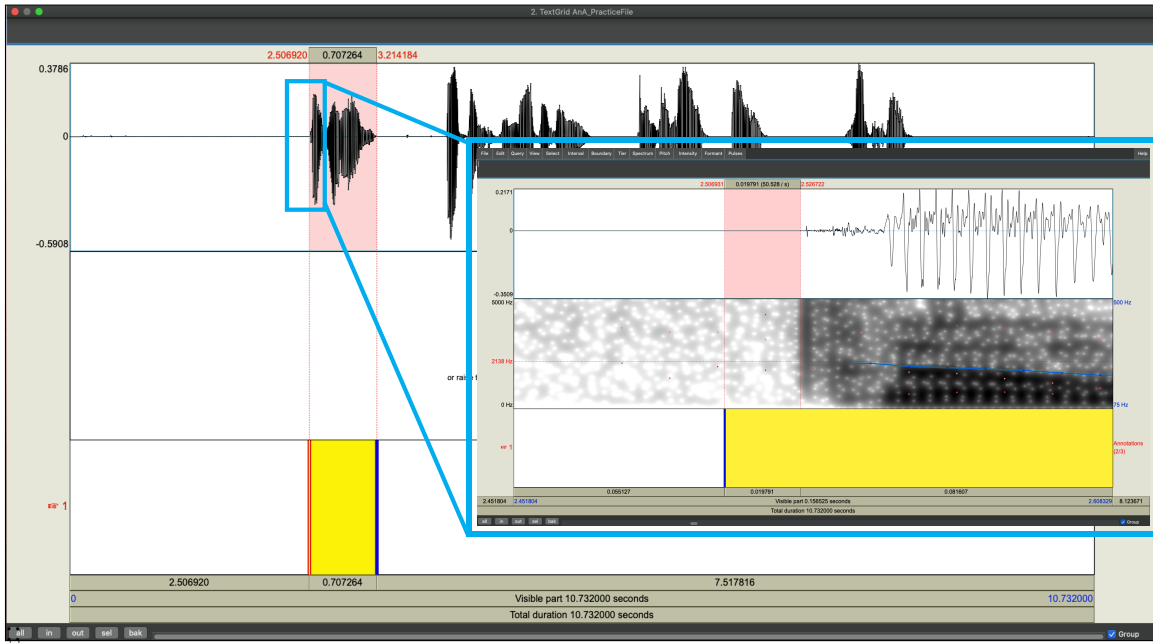


Figure 3.8: Zoom in Example 1

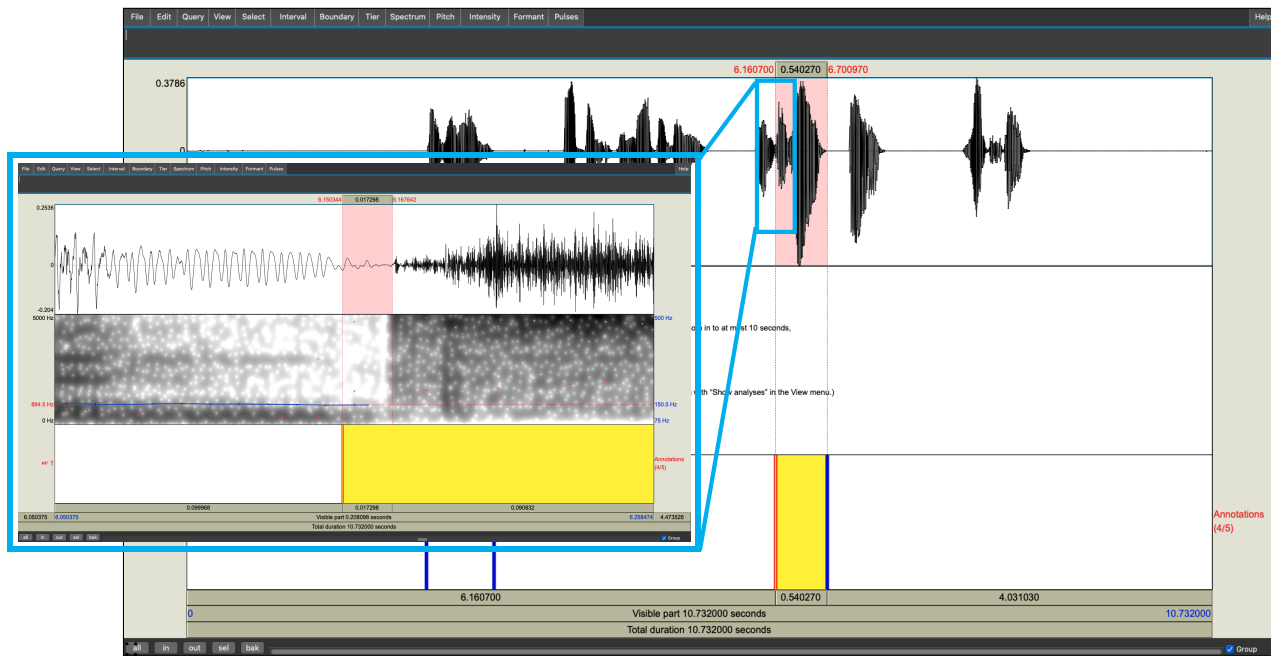


Figure 3.9: Zoom in Example 12

How zoomed in is zoomed in enough?

When you are entering a boundary, you should be **zoomed in far enough to distinguish individual periods in the waveform.**

You can of course enter the boundaries by sight zoomed out, but you **MUST** then go back zoomed in appropriately far and correct the boundaries.

3.5 Moving and Deleting Boundaries

If you want to find tune the placement of a boundary, you can just click on it and drag that boundary around. In order to delete a boundary, go up to the top menu of that window and click **Boundary** and then **Remove**. You can also see your shortcuts up there. If you click remove, it will delete that boundary.

3.6 Saving TextGrids

In order to save your texts grid. So now you've created it, but you have not saved it. You can use any of your standard say feature. So I'm going to hit Command S to save it. And it's going to bring up a window here. So I'm going to go ahead and save it as the same name as my my sound file to keep things very clear and I'm going to hit save. As a heads up. It will always ask you if you want to overwrite the old one. So if you save your file originally and then go back and make some edits and save it again. Unlike most things, it won't just update that file automatically. It will actually fully replace it. So every time it's going to ask you if you want to replace your old one. You're going to need to do this in order to save, or you must give it a new name. So this may surprise you when you see it, but that's okay, and that's just how the program works. So now you have your full text written with it annotated sound file that you can use for further analysis layer.

3.6.1 Practice

1. On the main Praat window select New – > Record Mono Sound
2. Press Record and record yourself saying the vowels “a”, “i”, “e”, “u”.
3. Press Stop, then Save to List & Close
4. Click on your new sound and create a TextGrid for it
5. Place boundaries at the beginnings and end of each of your vowels
6. Annotate the textgrid with the vowel said in that interval
7. Save your TextGrid and Sound
8. Upload them to Box

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4: Identifying Sounds & Words

Identifying word onset's and offsets can sometimes be a little tricky, and takes a knowledge of how different sounds look on a waveform or spectrogram. Here, I will attempt to give you the basics that you need to be able to reliably identify word onsets and offsets.

4.1 Sound Articulation & Classification

Source Filter Hypothesis

One way to talk about how speech sounds are produced is called the Source Filter Hypothesis. What this suggests is that there is a source of every sound we make that come from seep in our throats. Our larynx (commonly known as the "voice box") sets air into vibration as we exhale, and that vibration of air creates a sound. Now, that sound is always going to be the same if we don't alter it in some way, and so the *filter* is the everything above our larynx in our vocal tract. We can arrange our articulators in our mouth in various ways to change that original sound. This is how we can create the wide range of sounds that we can produce as humans.

Another helpful analogy for this might be optical filters. If I have a flashlight and I turn it on, it's going to be white light no matter what direction I point it. But, if I hold up a blue filter over that flashlight, the light at the source is still the same, but the light that we end up seeing has been altered and now takes on a new form. The filter changes the output of that source light. Our vocal tract is very similar to that, where we create a sound down deep in our throats (the source), and everything above it acts as a filter to change that sound in multiple ways. So instead of distinct colors, we emit distinct sounds.



Articulation of Speech Sounds

Please watch the following videos to learn about consonant and vowel articulation and classification.

Video 1 - Approx 6 min

[Click Here - Introduction to Consonant Articulation and Classification](#)

Video 2 - Approx 5 min

[Click Here - Introduction to Vowel Articulation and Classification](#)

Notes:

Manner of articulation: Refers to how close the articulators get to each other

- **Stop** - Complete closure, then released with a burst of air
 - [p], [b], [t], [d], [k], [g]
- **Fricative** - Closure is incomplete, but enough to cause turbulence or frication noise
 - [f], [v], [θ], [ð], [s], [z], [ʃ], [ʒ], [h]
- **Affricate** - A stop released as a fricative
 - [tʃ] as in “itch” [dʒ] as in “edge”
- **Nasal** - Closed vocal tract, but velum lowered to open nasal tract
 - [m], [n], [ŋ]
- **Approximant** - Articulators get close, but not enough to create turbulence
 - [w], [j] - glides
 - [l], [r] - liquids

4.2 Identifying Sounds Visually

Reading - Approx 15-20 min

[Click Here - Excerpt from A Course in Phonetics by Peter Ladefoged & Keith Johnson](#)
Just read, you don't need to complete any exercises mentioned.

4.2.1 Reference Images

Vowels

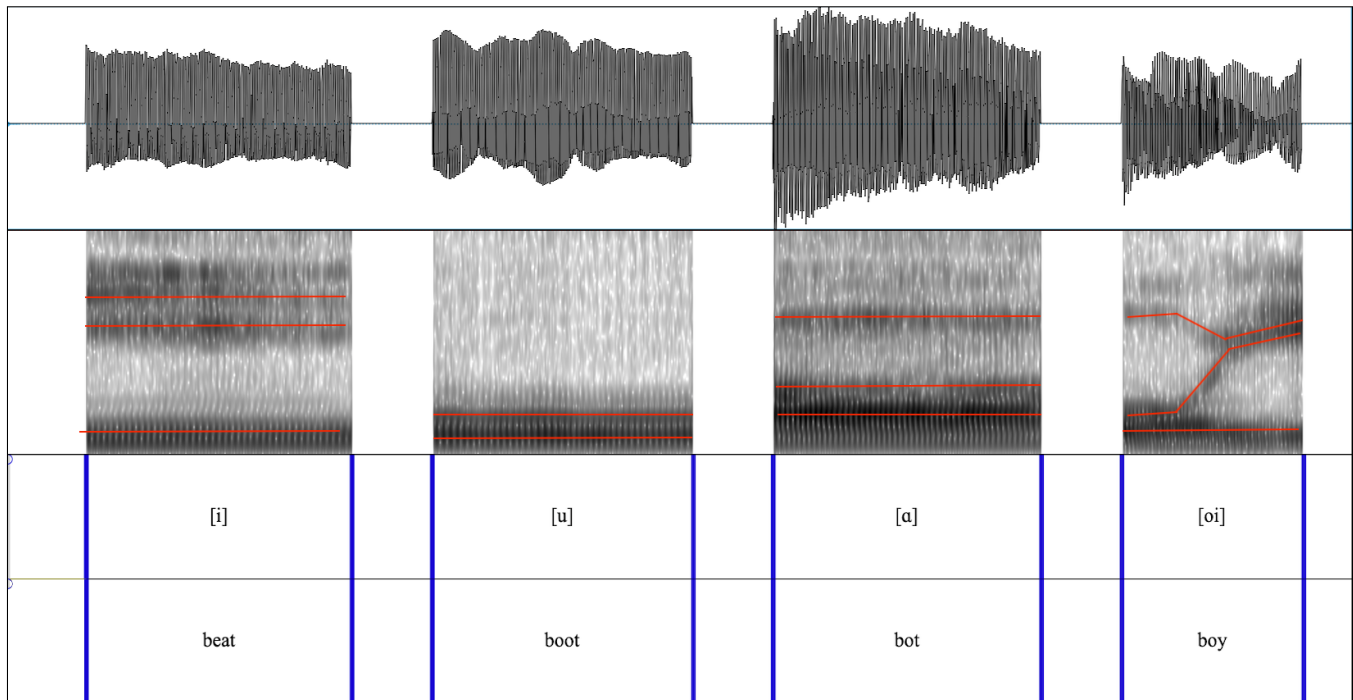


Figure 4.1: Vowels

Stops

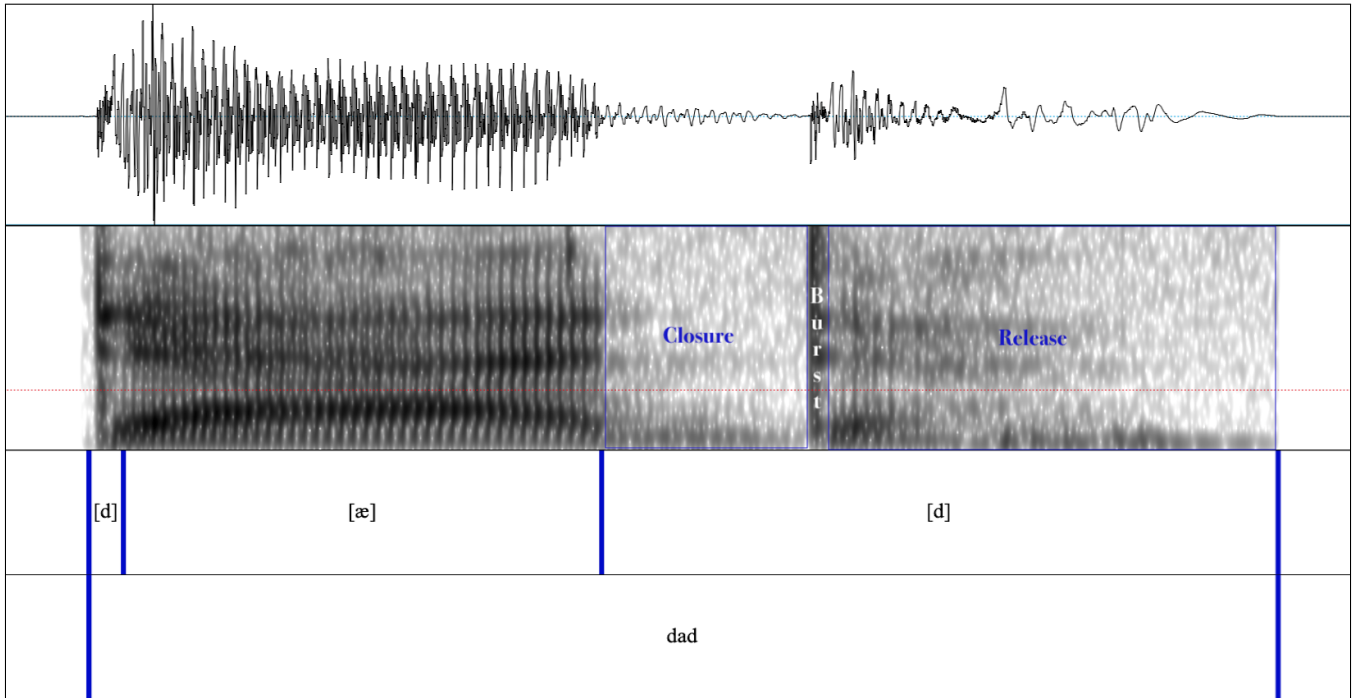


Figure 4.2: [d]

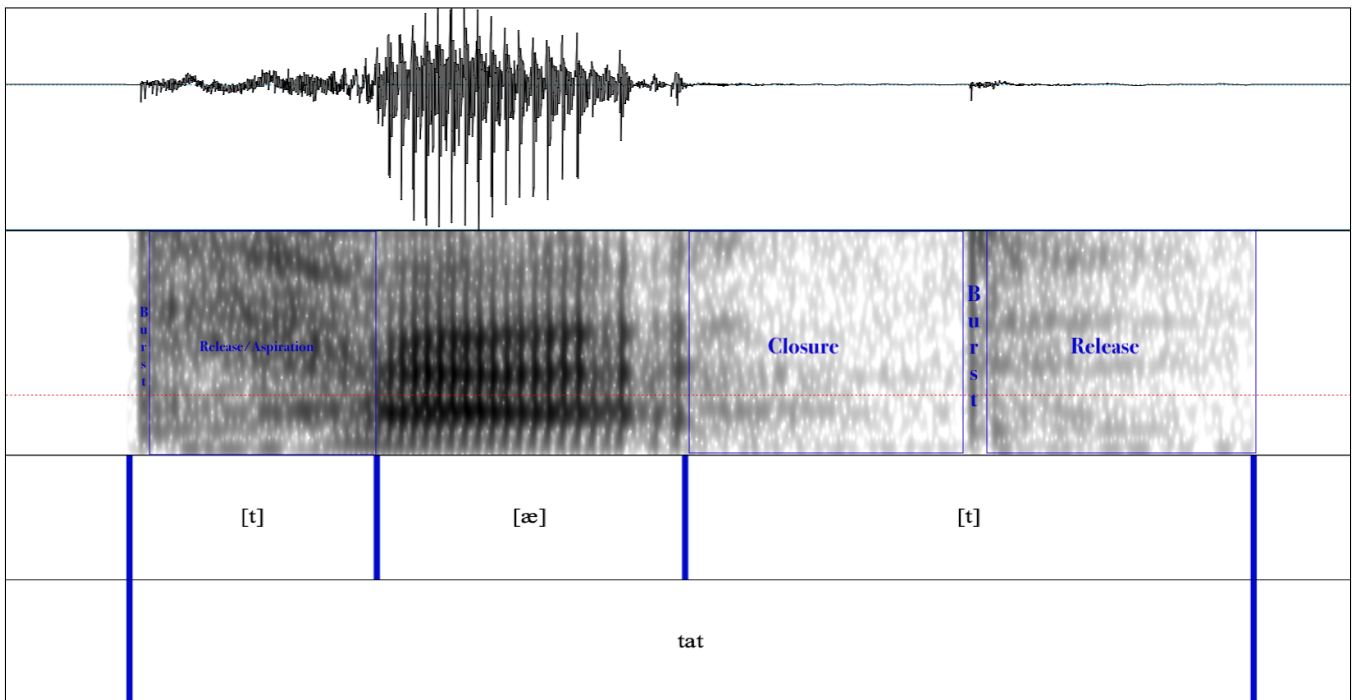


Figure 4.3: [t]

Fricatives

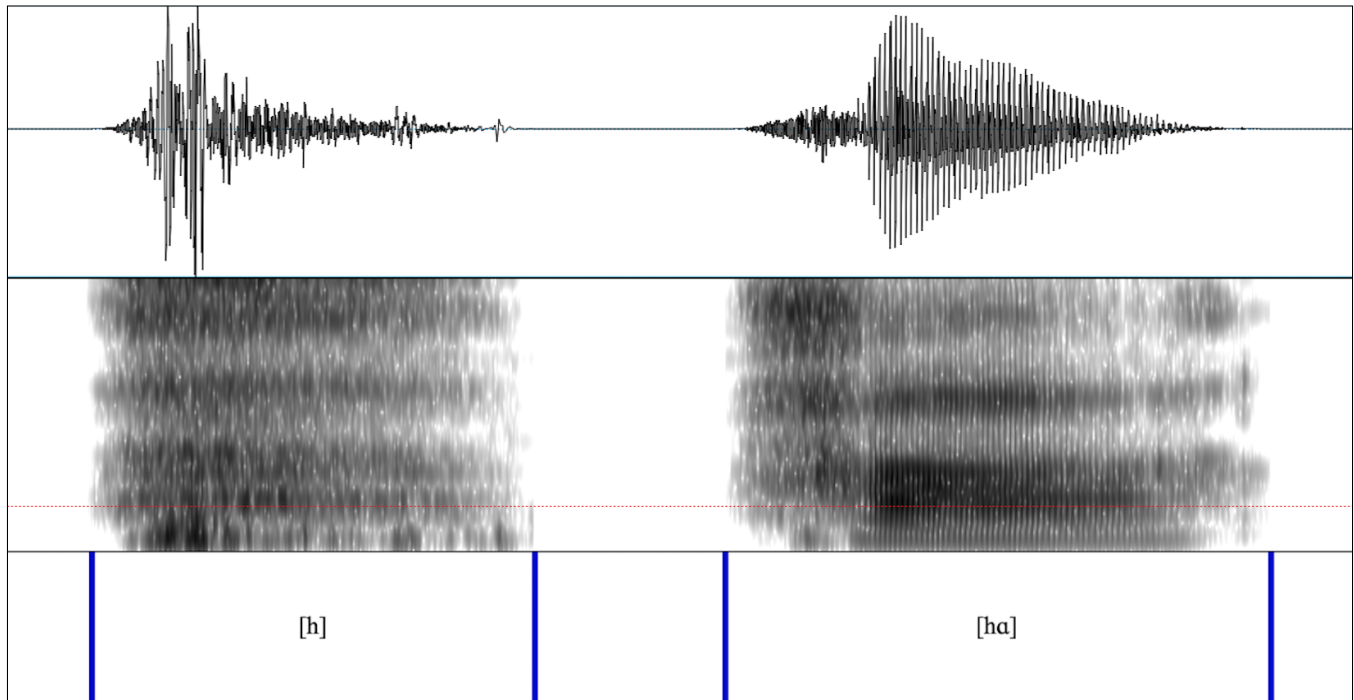


Figure 4.4: [h]

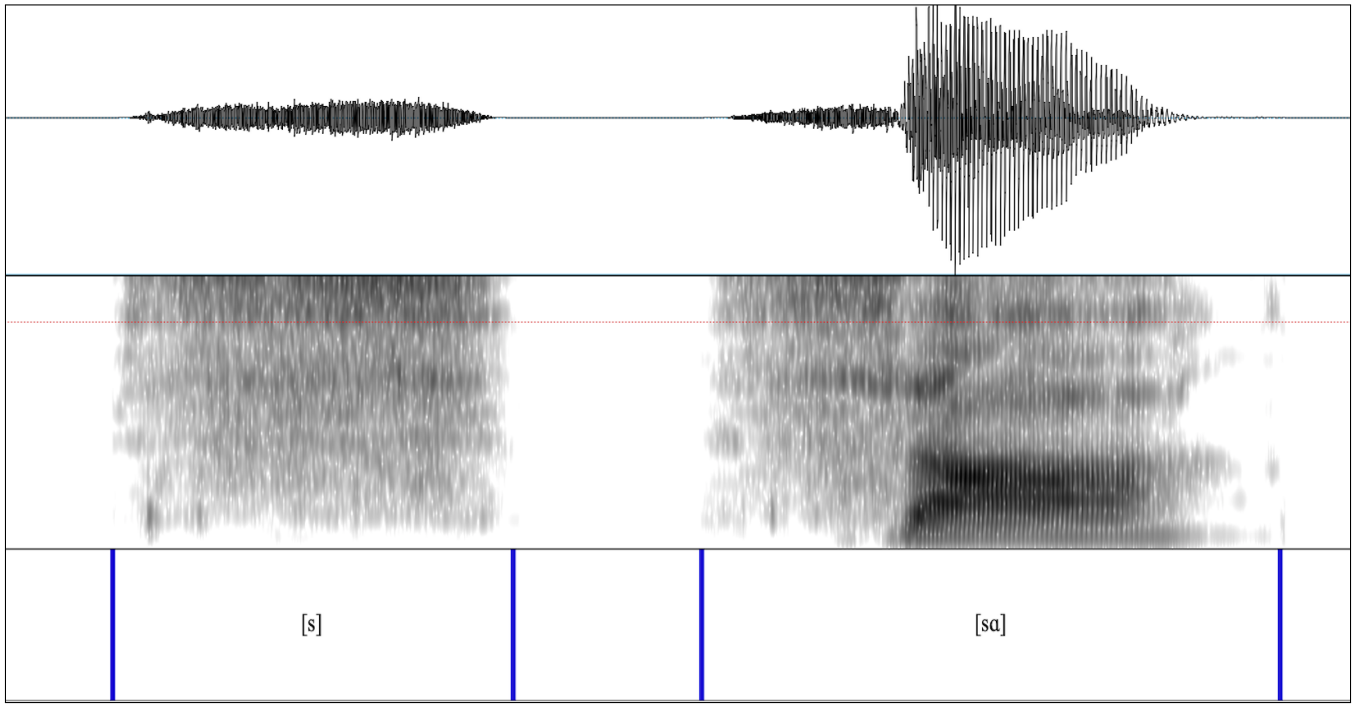


Figure 4.5: [s]

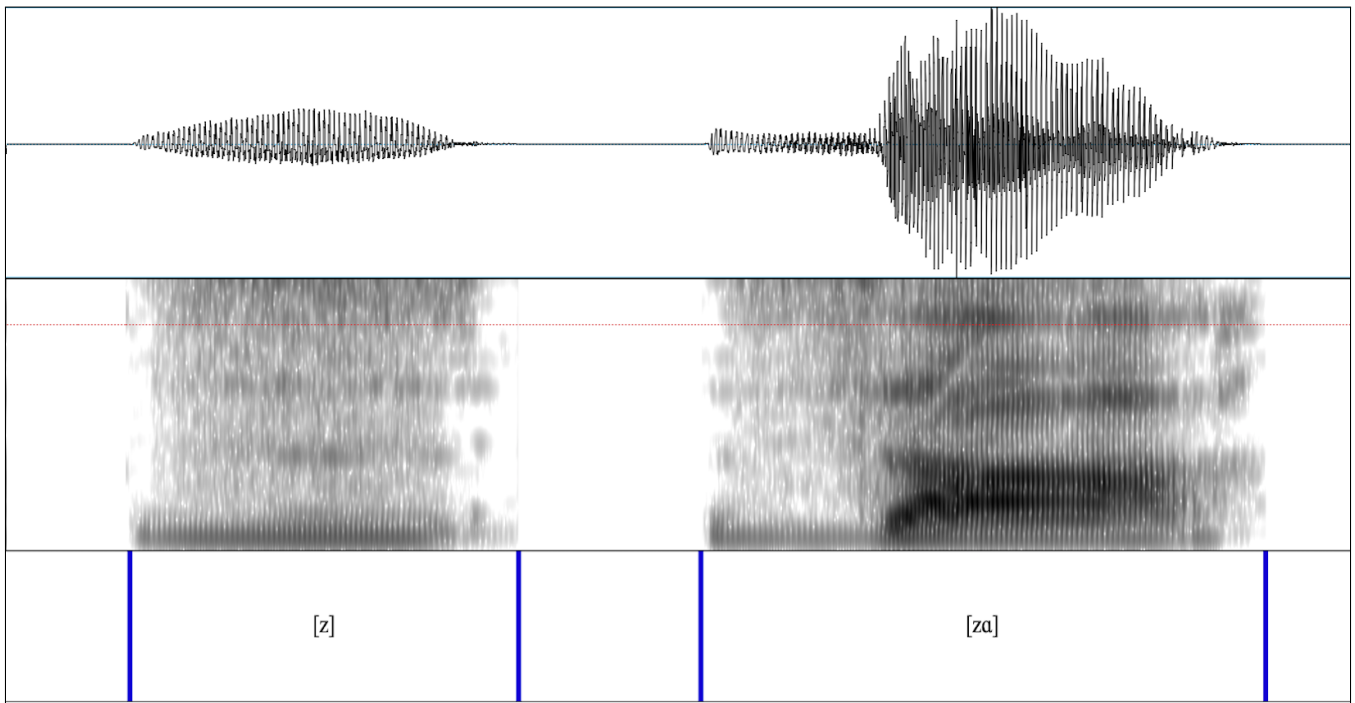


Figure 4.6: [z]

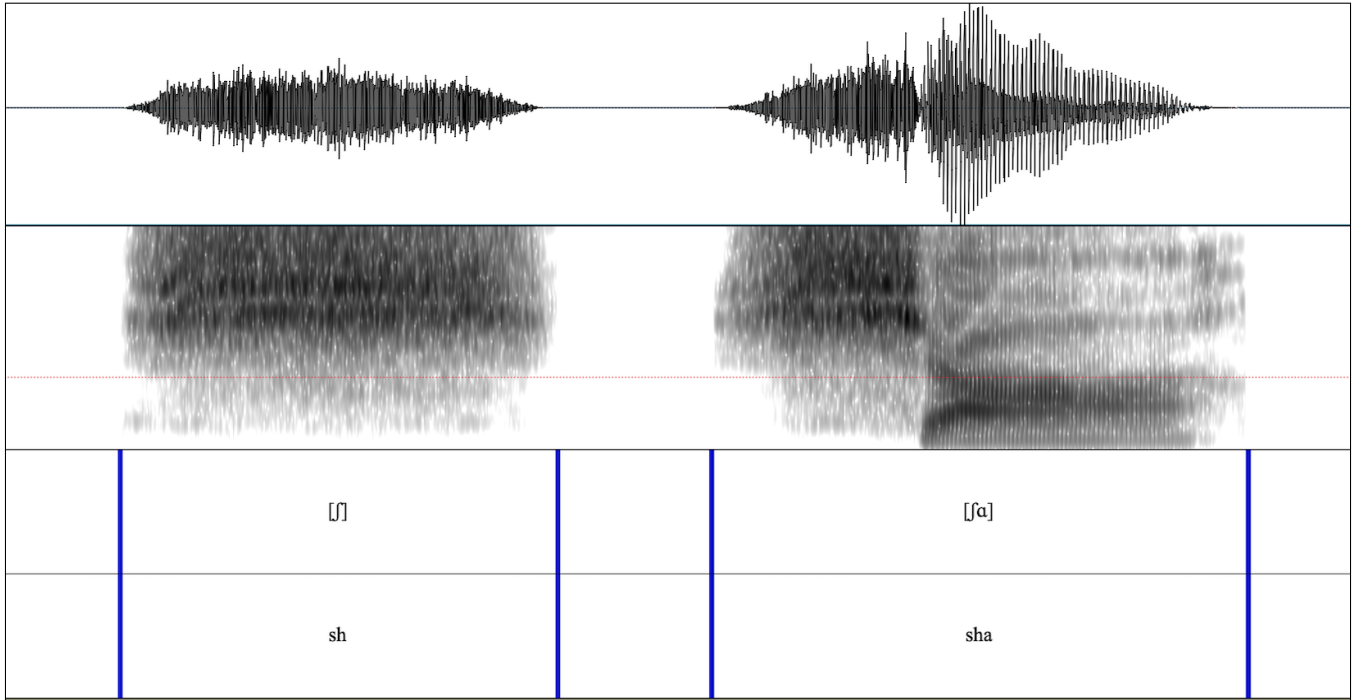


Figure 4.7: [ʃ]

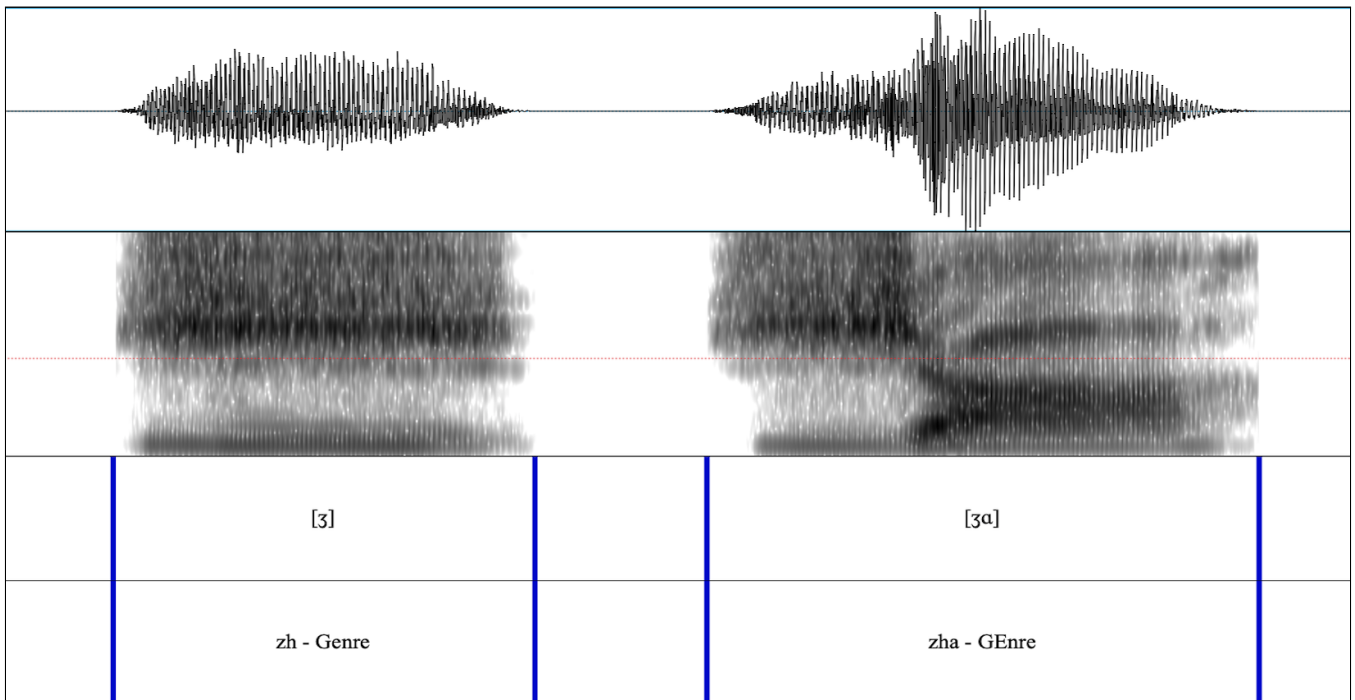


Figure 4.8: [ʒ]

Affricates

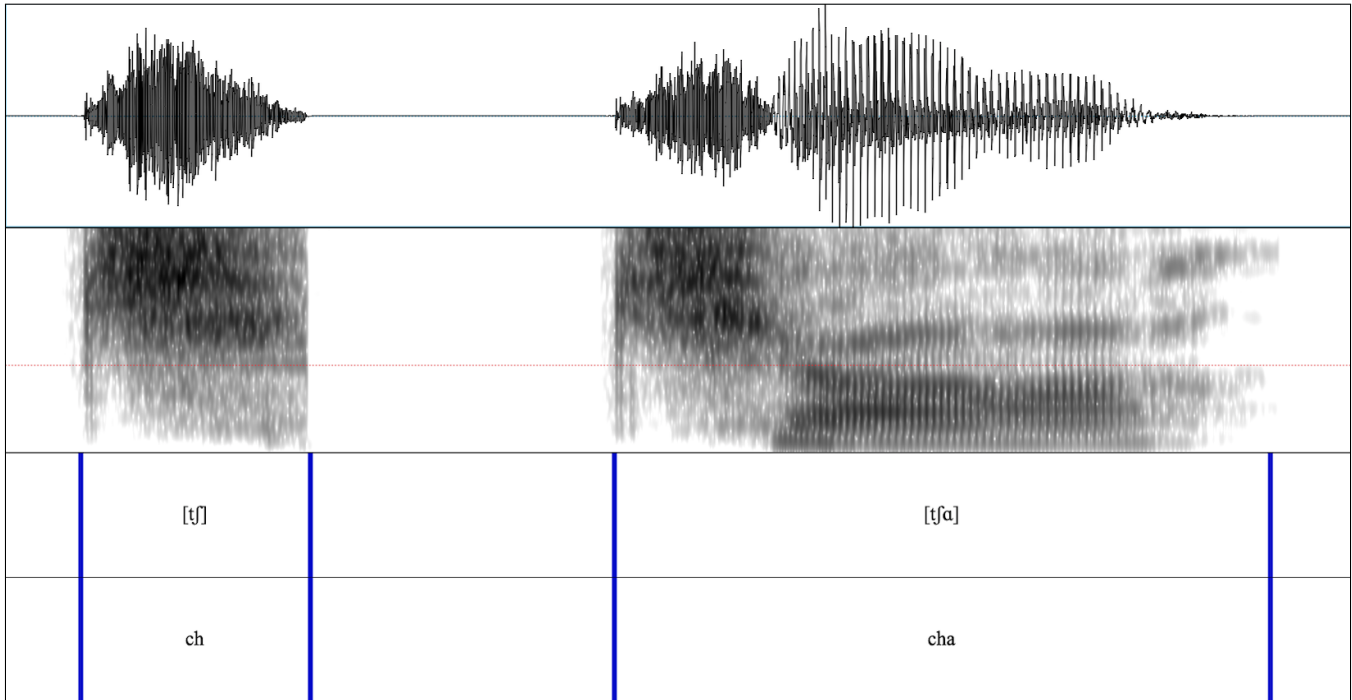


Figure 4.9: [tʃ]

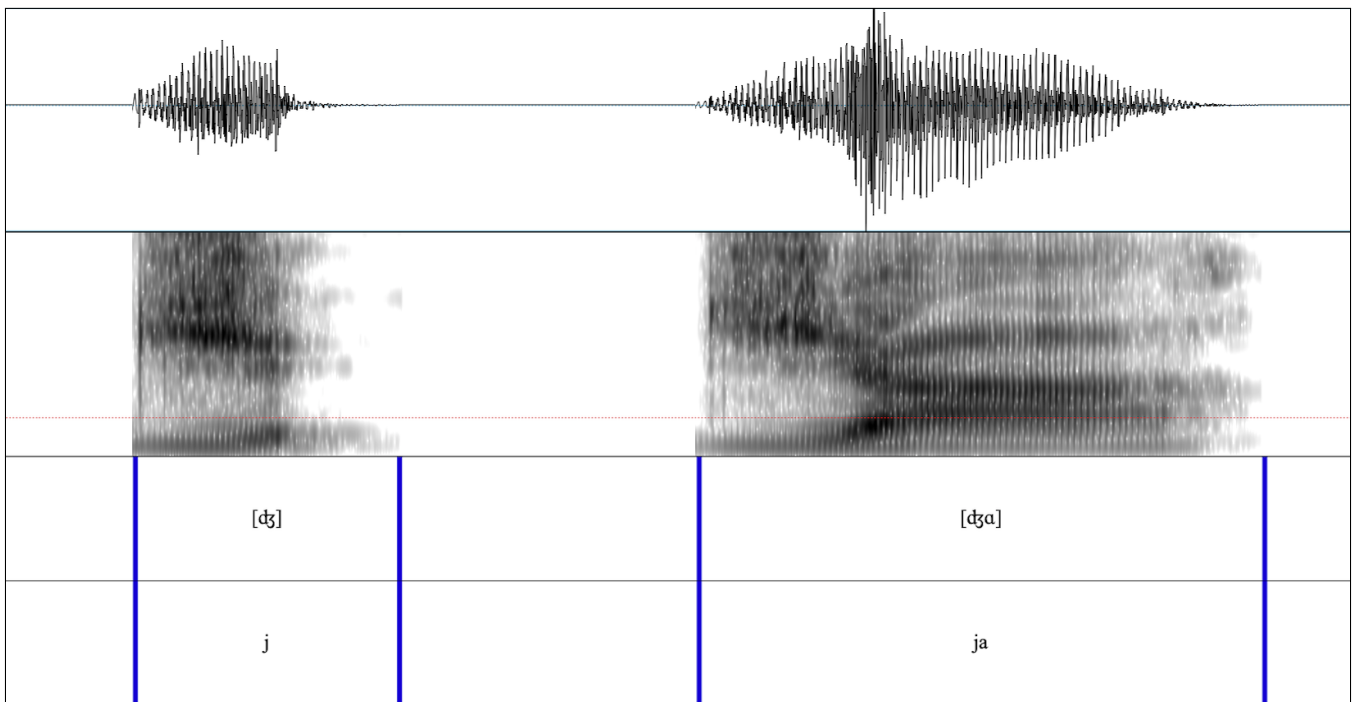


Figure 4.10: [dʒ]

Nasals and Approximant

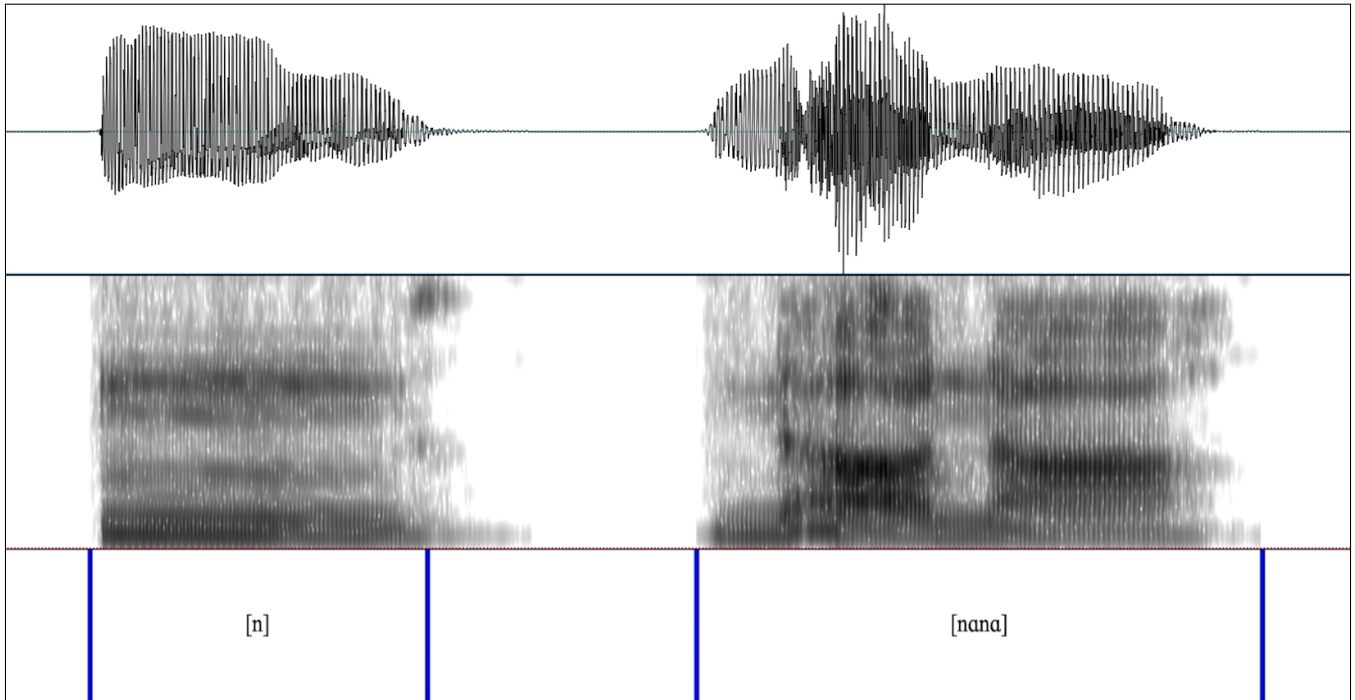


Figure 4.11: [n]

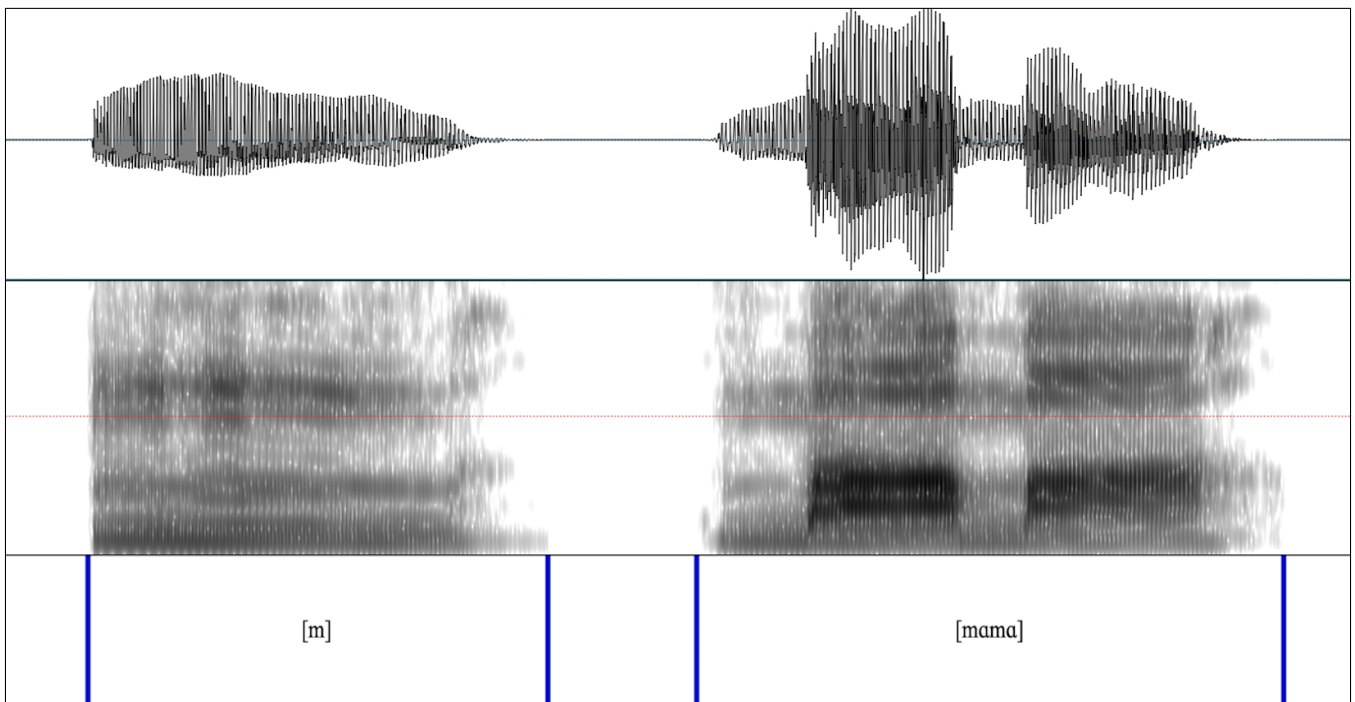


Figure 4.12: [m]

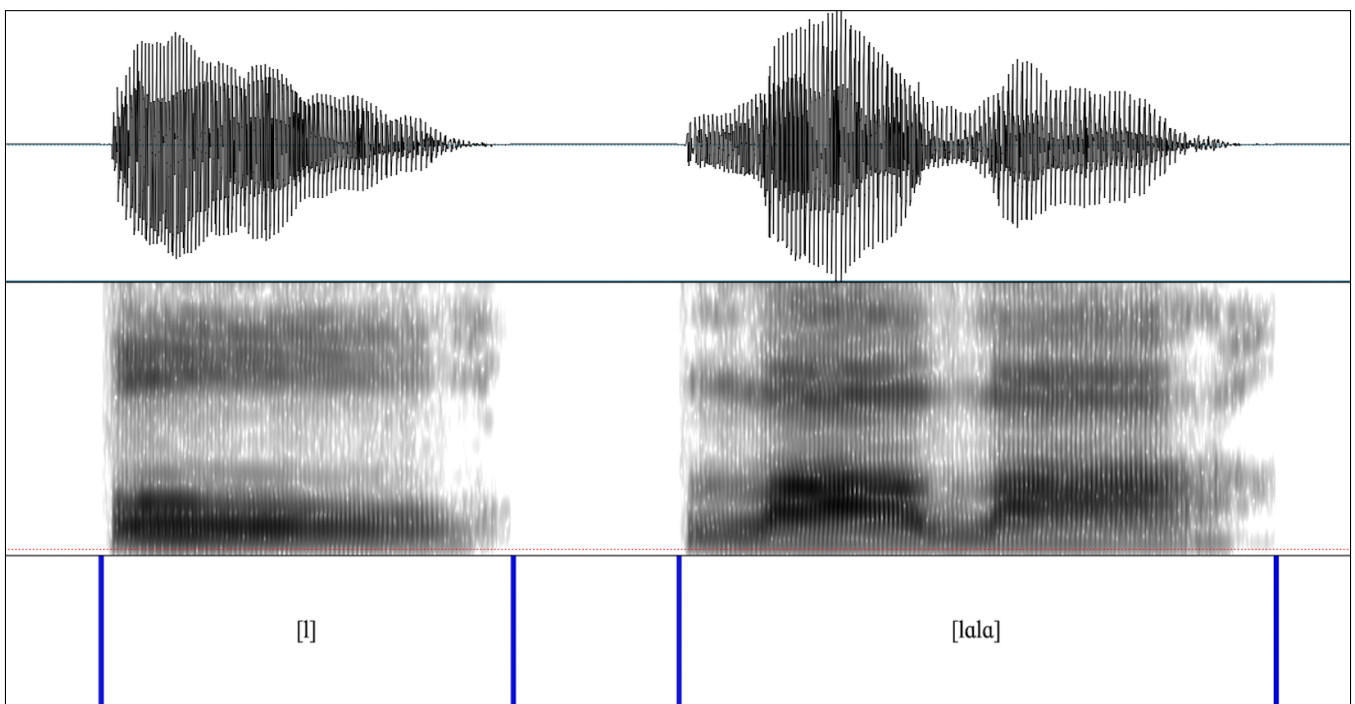


Figure 4.13: [l]

Example words

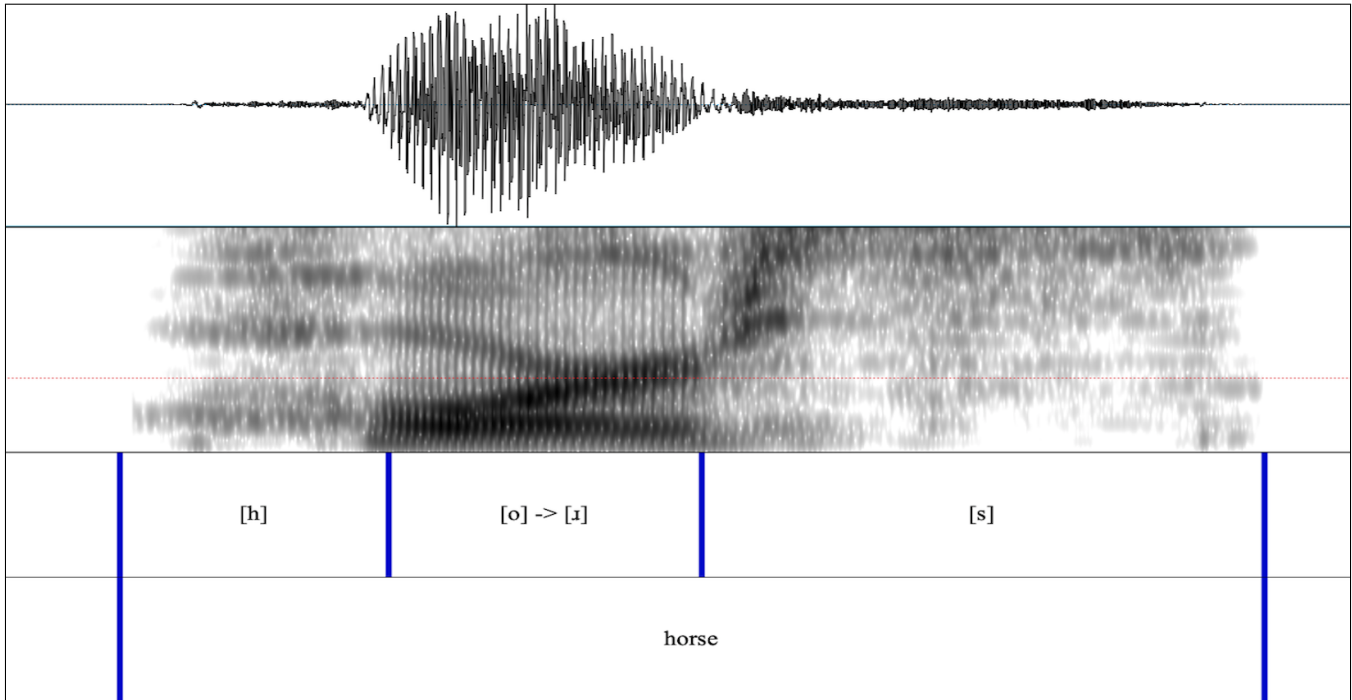


Figure 4.14: horse

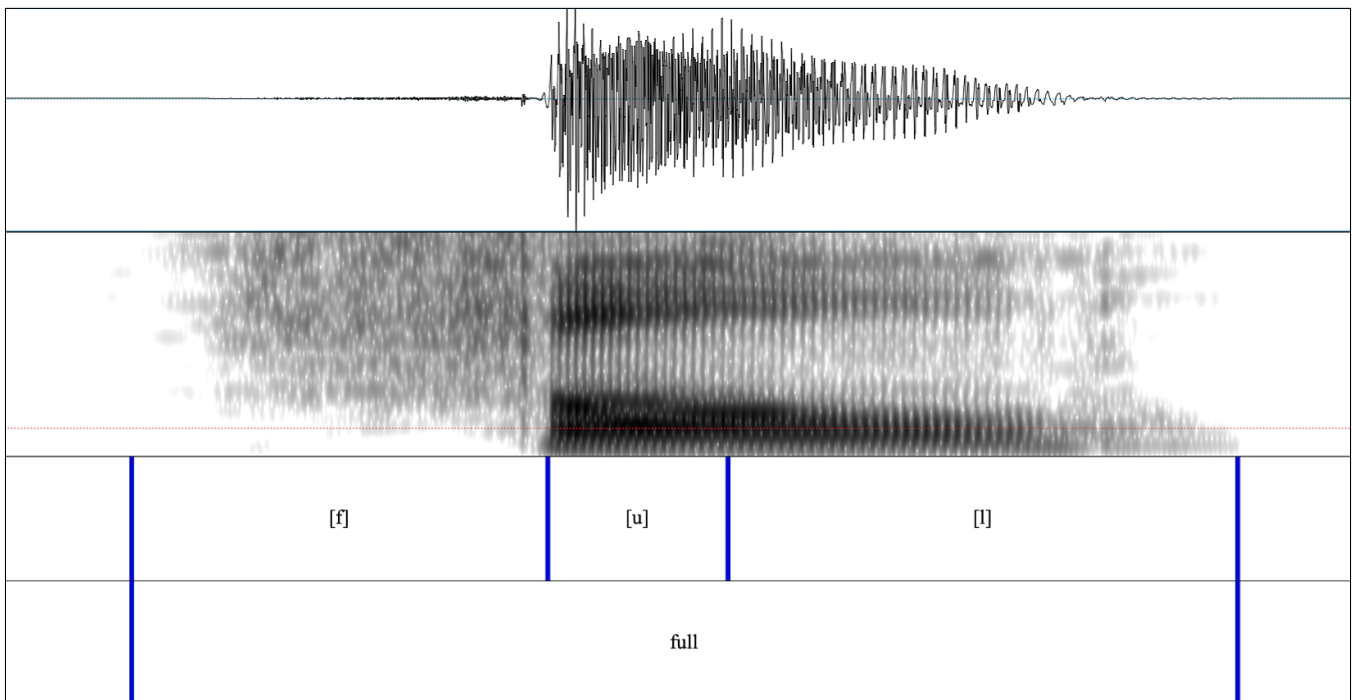


Figure 4.15: full

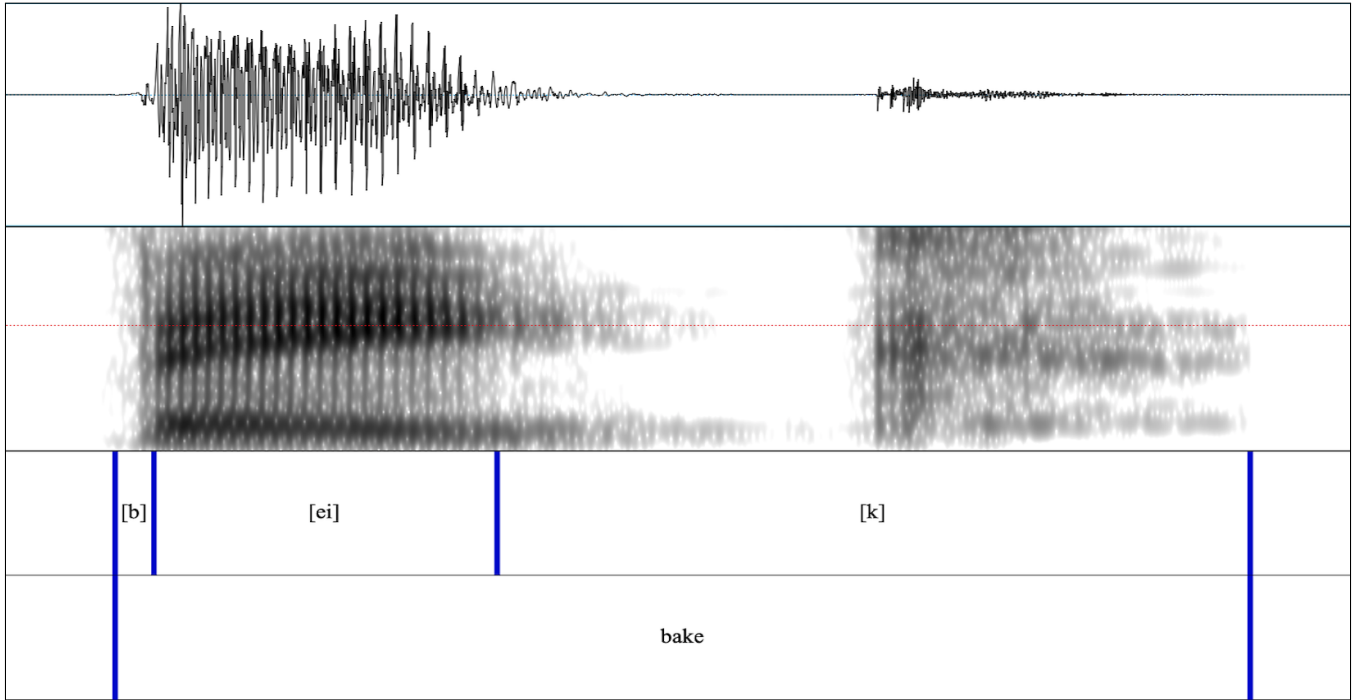


Figure 4.16: bake

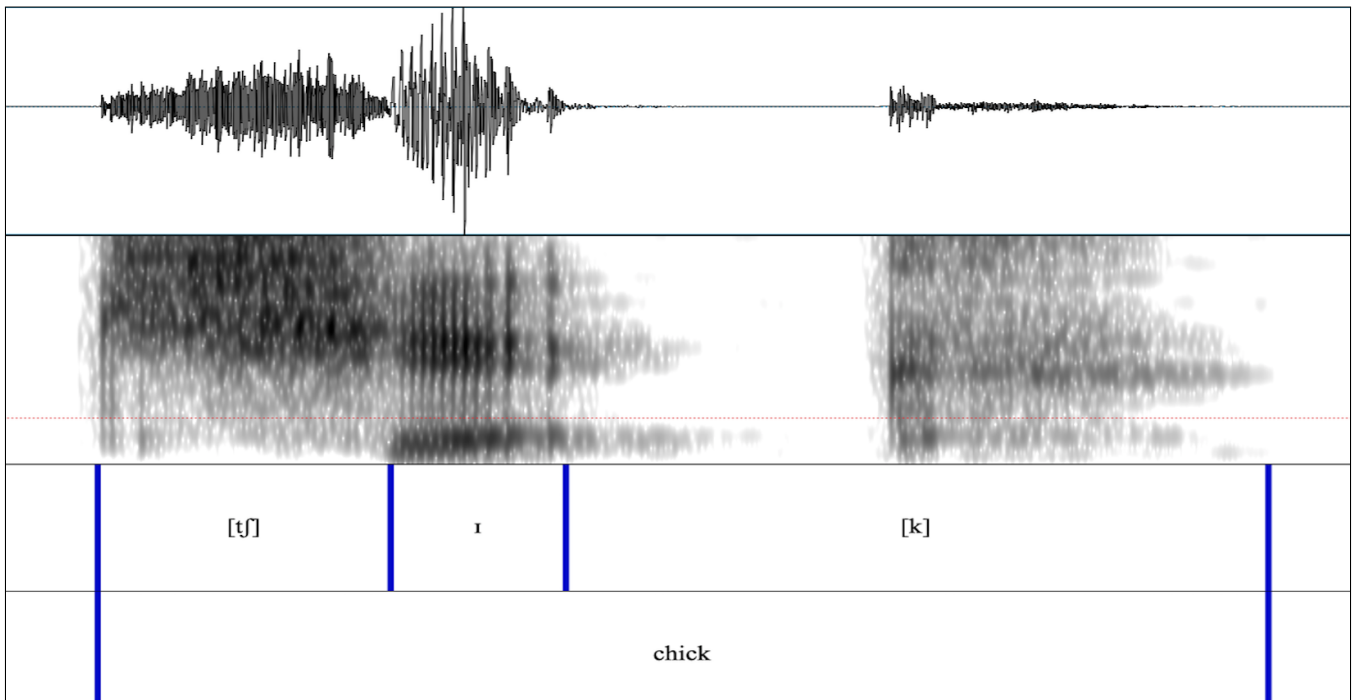


Figure 4.17: chick

4.2.2 Practice Sound Identification - The Mystery Spectrogram

Here is a mystery sound file for you to practice on. I have labeled 4 regions for you to identify. For each segment, ask yourself what kind of sound does it look like. Is it a vowel, nasal, stop, fricative, etc. Once you know they type, make a list of the possible sounds it could be in that type. See if you can narrow it down by comparing it to the reference images just shown. I don't expect you to be able to figure it out from what little you have learned here, but you should hopefully be able to figure out the type of each sounds, and if you do manage to figure it out, Nice Work!

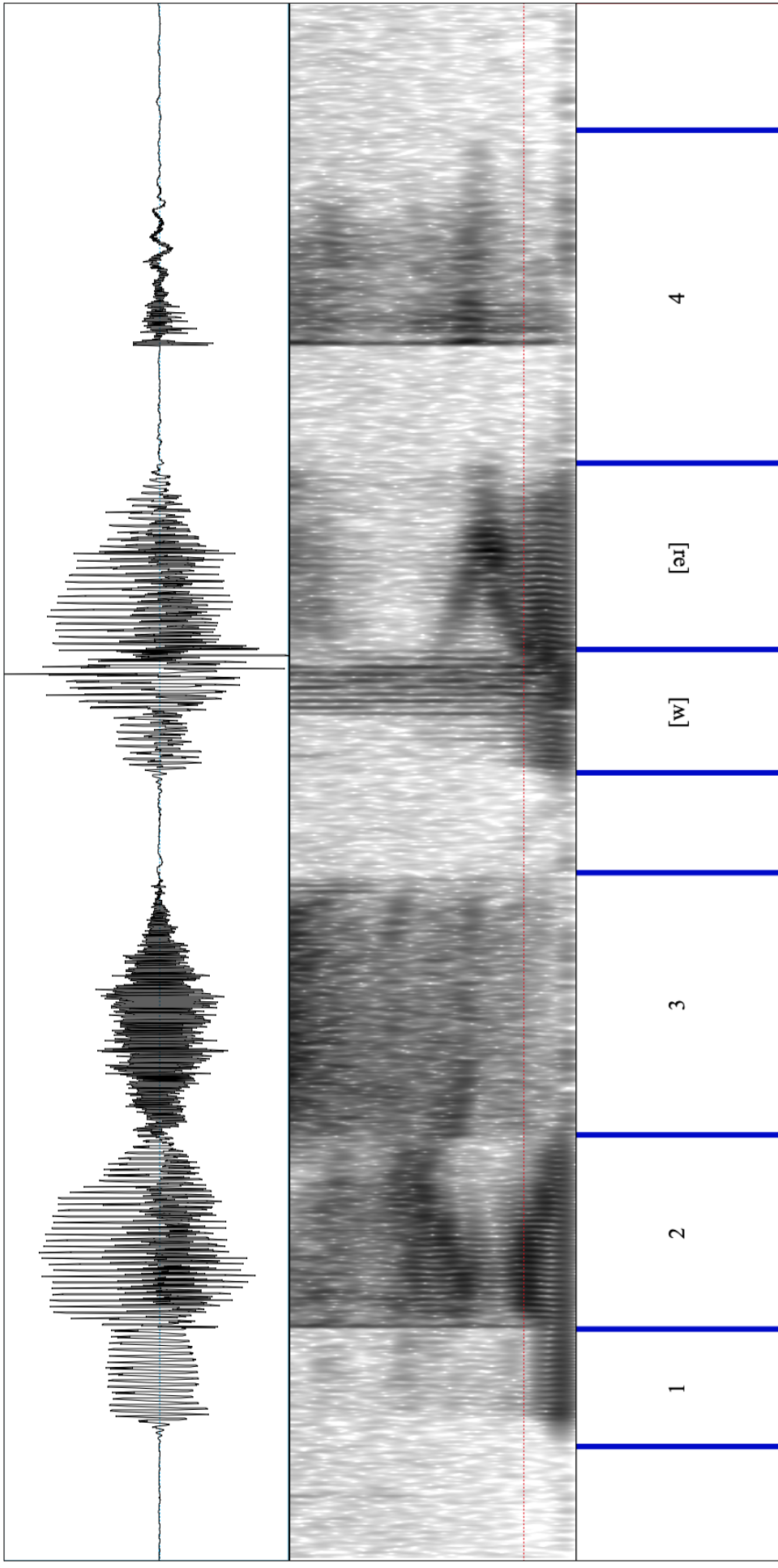


Figure 4.18: Mystery Sound File