

Praat Scripting

01 Introduction to Praat

Praat is a free scientific computer software for the analysis of speech in phonetics. It was designed, and continues to be developed, by Paul Boersma and David Weenink of the University of Amsterdam. It runs on a wide range of operating systems, including various versions of Unix, Linux, Mac and Microsoft Windows. You can download Praat from <www.praat.org>

Recordings

1. **New** → **Record mono sound...** → choose a sampling frequency of 16.000 Hz → **Record**
2. Make sure that the level indicator stays green or hits yellow only temporarily, but does not become red
3. Click **Stop** at the end of your recording, insert a name and click **Save to list & Close**. The recording is now available in the **Objects window** of Praat but is **not yet saved** on the disc of your computer
4. Select the sound file in the Objects window and use **Save** → **Save to WAV file...** → (file browser) to store it on your computer

Read a WAV file from the disc

1. **Open** → **Read from file...** → (file browser)

Display a waveform

1. Select a **Sound** file in the Objects window and click **View & Edit**
2. Usually the **Spectrogram** is selected and additional features like **Pitch**, **Intensity**, **Formants**, and **Pulses** can be enabled individually

Add a TextGrid for labeling

1. Select your **Sound** file in the Objects window
2. **Annotate** → **To TextGrid...**
3. Replace **All tier names** with any other name - notice that two names create a TextGrid with two tiers/levels
4. Delete *bell* from **Which of these are point tiers?** and click **OK**
5. Select both **Sound** and the newly created **TextGrid** in the Objects window and click **View & Edit**
6. To create boundaries, select the beginning of a sound in the oscillogram or spectrogram
7. Click in the circle of the gray vertical line in the TextGrid or just press **Enter**
8. Type in the name of the segment

9. Select the end of the sound and create another boundary
10. To delete a boundary, select it and choose the tab Boundary → Remove or use the short cut Alt+Delete

Do not forget to save your TextGrid!!

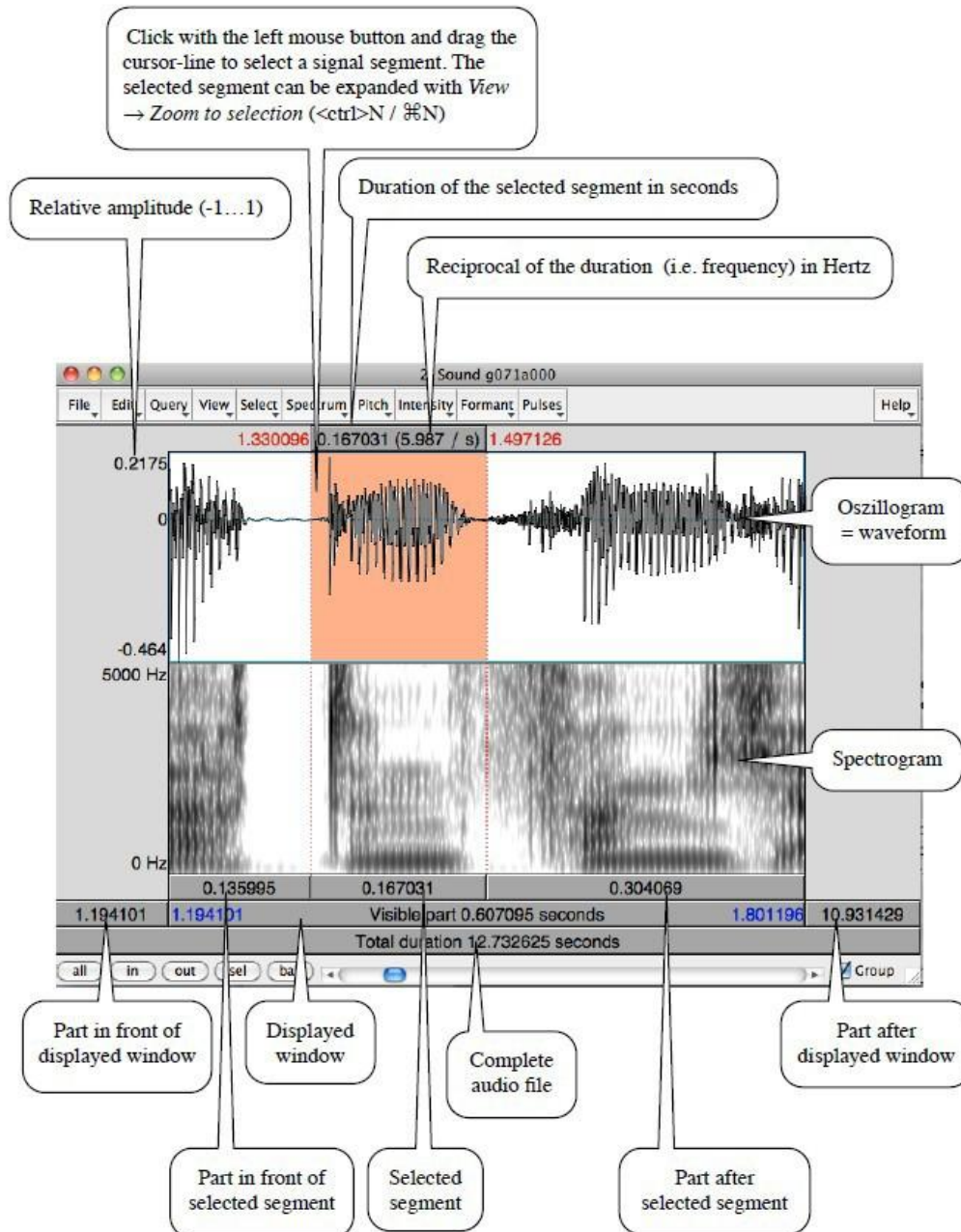


Figure 1: Layout of Praat's editor showing an oscillogram (top) and spectrogram (bottom) (overview by Henning Reetz, Goethe University Frankfurt)

Within the View & Edit window

You can enable more properties of the speech signal

a) Pitch: Representation of intonation movement (blue line)

- Only available for voiced sounds
- Default settings: Display of pitch movement between a range of 75 to 600 Hz
- **Pitch listing**: Get several Hz values for a selection
- **Get Pitch**: Mean pitch value for a selection
- **Get minimum/maximum pitch**: Lists minimum/maximum for a selection
- **Move cursor to minimum/maximum pitch**: Moves cursor to a specific position (min/max value)
- **Draw visible pitch contour**: Image of the pitch contour will be displayed in the Picture window
- **Draw visible pitch contour and TextGrid**: Image of the pitch contour and TextGrid (incl. boundaries) will be displayed in the Picture window (*only if **Sound** and **TextGrid** are selected*)
- **Extract visible pitch contour**: Makes pitch contour available in the Objects window
 - digits represent the goodness of the candidates (9 best, 0 worst)
 - path of red/pink discs display the best path/contour
 - blue rectangles display voiceless sounds, white rectangles voiced sounds
 - line of digits along the top represents the relative intensity
- if you want to manipulate the pitch of a file, choose the **Sound** file in the Objects window and choose **Manipulate** → **To Manipulation...**

b) Intensity: Loudness (yellow line)

- Default settings: Intensity range between 50 dB and 100 dB
- **Intensity listing**: dB for a certain point in time or several values for a selection
- **Get intensity**: dB for a certain point in time or mean value for a selection
- **Get minimum/maximum**: Lists minimum/maximum for a selection
- **Draw visible intensity contour**: Image of the intensity contour will be displayed in the Picture window
- **Extract visible intensity contour**: Makes intensity contour available in the Objects window

c) Formant: Resonance frequencies of the vocal tract (red points)

- **Default settings:** Maximal frequency of 5500 Hz and a quantity of five formants will be measured
- **Formant listing:** Lists F1-Fn for a certain point in time or for a selection
- **Get first/second/third/fourth formant:** Measures F1/F2/F3/F4 for a given point in time or mean value for a selection
- **Get first/second/third/fourth bandwidth:** Measures B1/B2/B3/B4 for a given point in time or specific values in the center of a selection
- **Get formant...:** Get a specific Formant for a point in time or mean value of a selection by stating the number of formant (e.g. 1 for F1)
- **Get bandwidth...:** Get a specific bandwidth for a point in time or the value in the center of a selection by stating the number of bandwidth (e.g. 1 for B1)
- **Draw visible formant contour:** Draws the visible formant contour to the Picture window
- **Extract visible formant contour:** Extracts the visible formant contour to the Objects window

d) Pulses: Glottis pulses or vibration of the vocal folds (blue vertical lines)

- **Voice report:** Information about pitch, pulses, voicing and some other additional information (only for a selection)
- **Pulse listing:** Lists the points in time where a pulse appears (only for a selection)

Alter the loudness of a recording

1. Select the **Sound** file in the Objects window
2. **Modify** → **Scale peak...** → Set value to 0.99
3. The highest peak will be set to 0.99 (relative amplitude ranges from 0 to 1) and the sound will become louder without any changes in the acoustic signal

Signal-to-Noise ratio

- To determine how "good" your recording is with regard to background noises
- Good: >50 dB, acceptable: >30 dB
- Choose the lowest and highest intensity in the signal and calculate the difference

Characteristics of speech sounds in the oscillogram and spectrogram

Sound	oscillogram	Spectrogram
Sonorants	Periodicity	Voice bar
Vowels	Periodicity, high amplitude	Formant structure
Nasals	Quasi-periodical signal, relative high amplitude	Higher frequencies strongly dampened, anti-formants
Diphthongs and Glides/Liquids	Gradually changing signal, difficult to separate from each other	Continuous formant movement
R-like sounds	Eventually irregularity, frequently no 'individual' sound	
Voiceless fricatives and aspiration	Relatively black, irregular structure	Energy in high frequencies
Voiced fricatives	Periodicity with irregular structure	Voice bar and (slightly less) energy in high frequencies
Voiceless stops	Pause in signal (closure) and following burst (release), typically longer closure duration and voice onset time (VOT), stronger burst	No energy during the closure, energy in all frequencies during the burst
Voiced stops	Pause in signal (closure) and following burst (release), shorter closure duration and VOT, weaker burst	Very low energy at the beginning (voice bar), energy in all frequencies during the burst