

Intonation des Deutschen

2019-20

Athens

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Sitzung 3

Praat

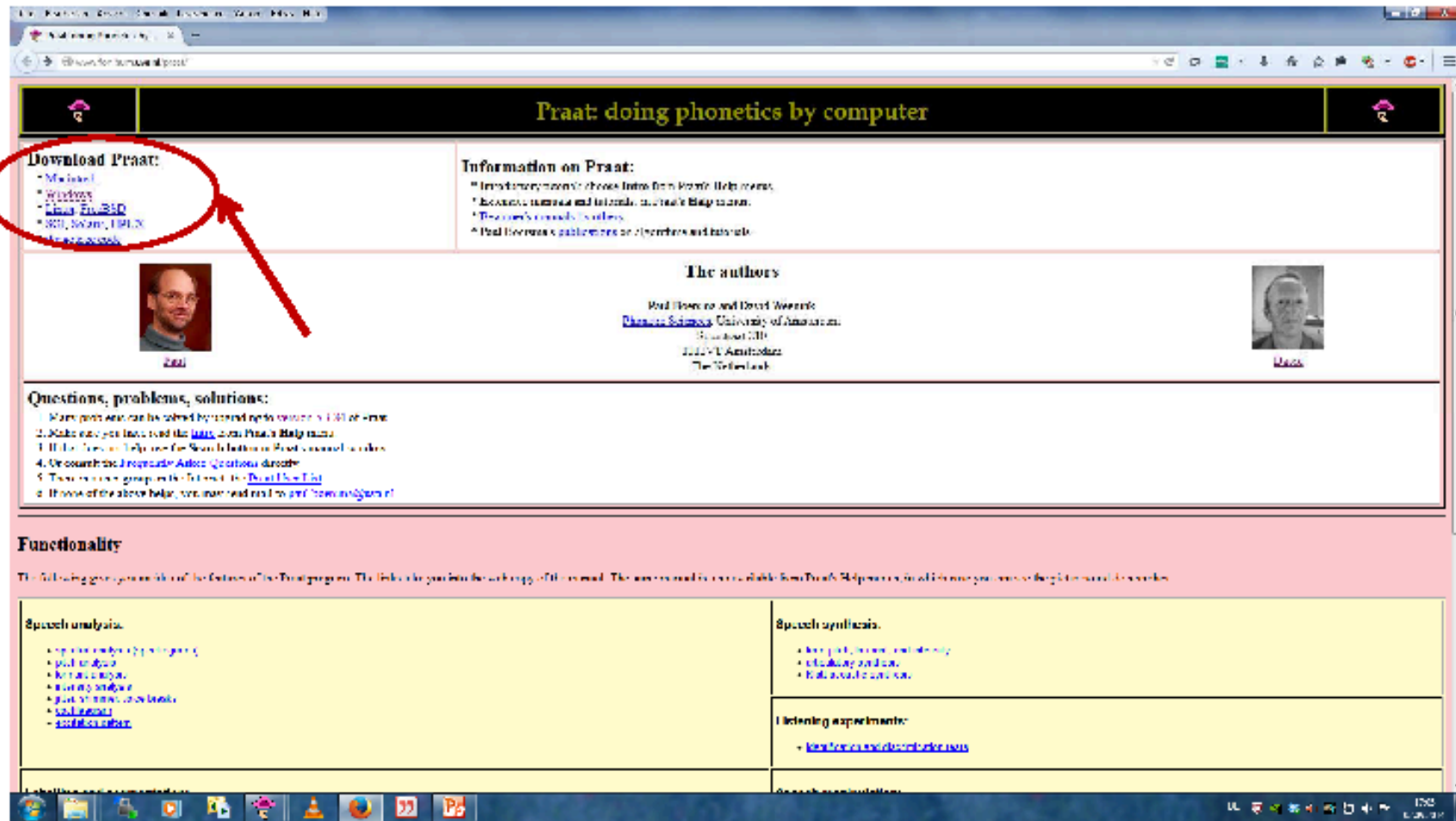
Introduction to Praat

- I. Praat basics (Installation, architecture, recording)
- II. Transcription
- III. Scripting – introduction
- IV. Vowels
- V. Consonants
- VI. Fundamental frequency
- VII. Praat picture
- VIII. Perception tests
- IX. Exercises

Praat (www.praat.org)

Boersma & Weenink 2014

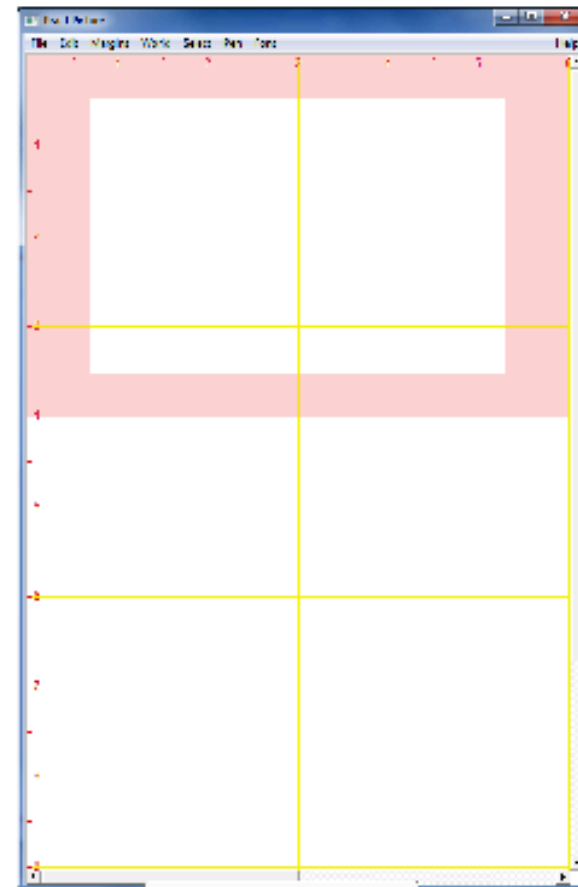
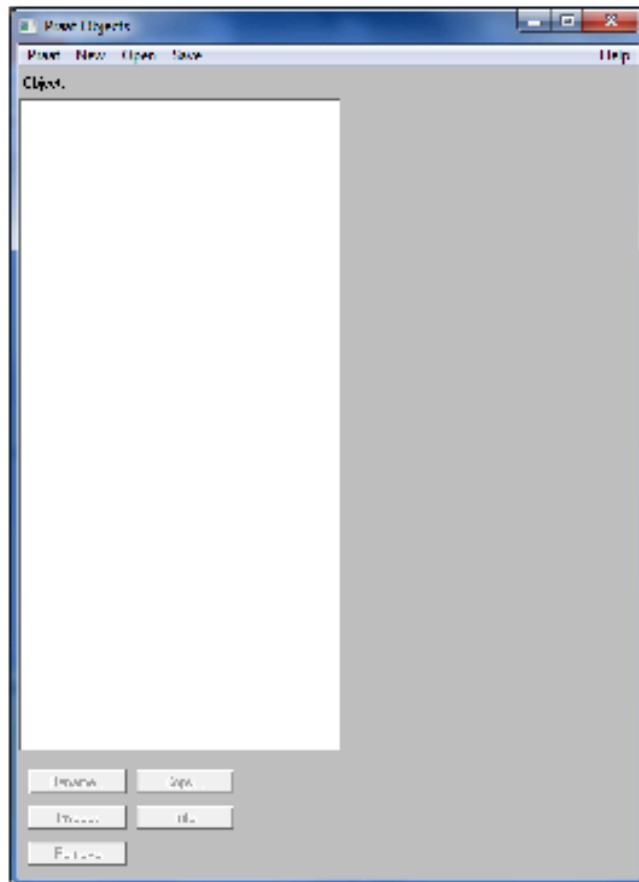
Installation: Download / double-click



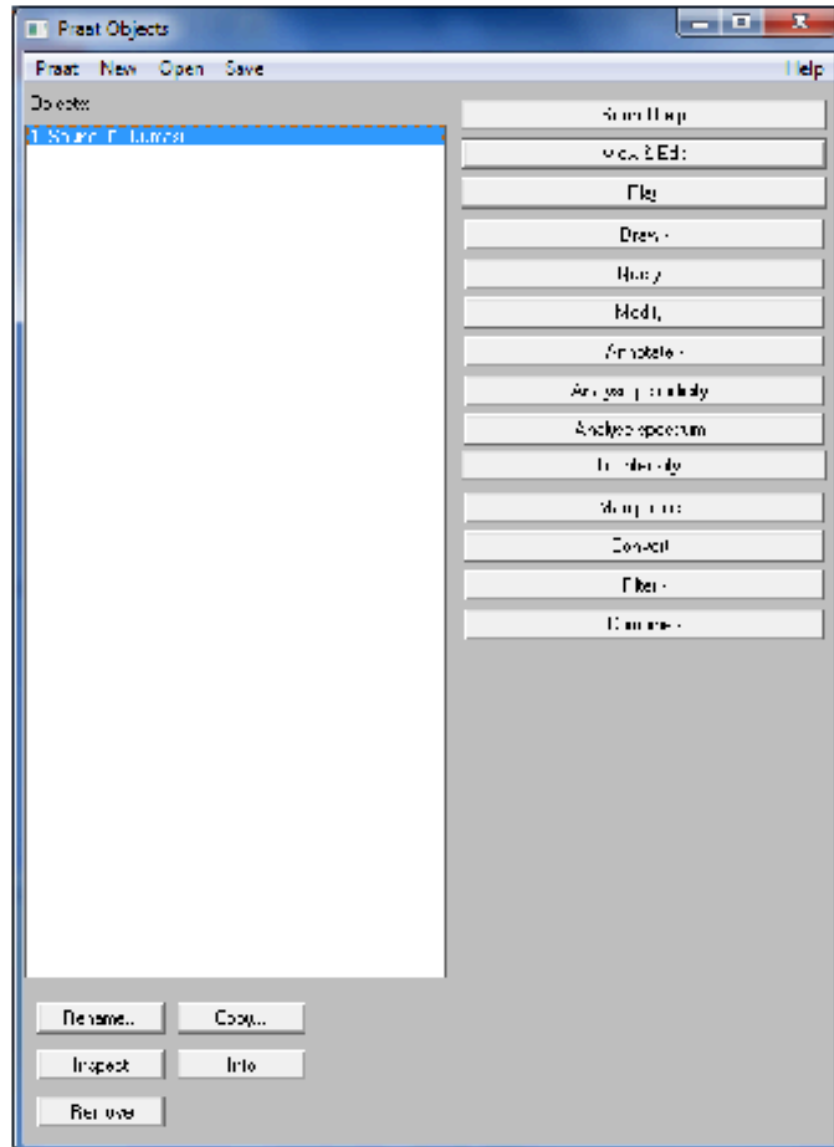
I. - Praat (www.praat.org)

Start configuration: Two windows – Objects and Picture

- **Object window handles file input and output (today)**
- **Picture window provides functions to create publication-quality graphics (later)**



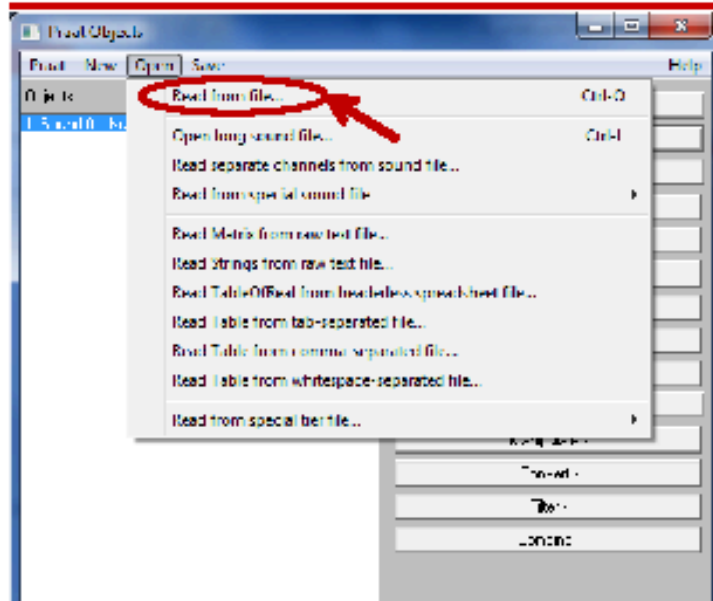
I. - Praat



- ◇ Open-source speech analysis program
 - Acoustic analysis
 - Speech synthesis
 - Sound manipulation
 - Creation of graphics
 - Annotation of sounds
 - (Semi-)automatic analysis across files

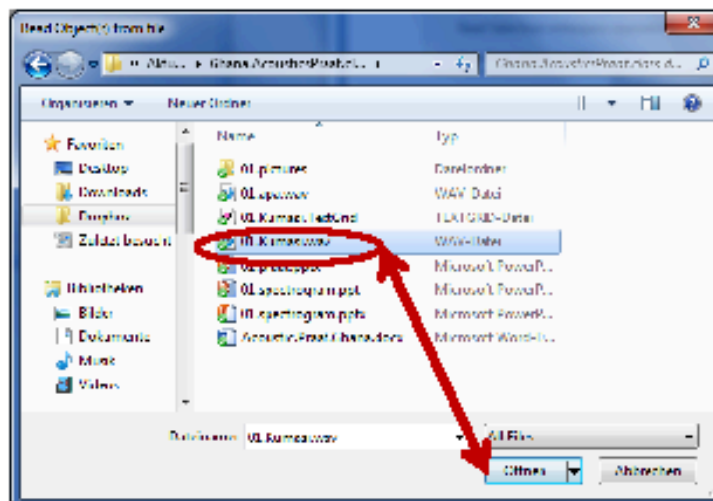
- ◇ Praat objects
 - File = object
 - to handle file input and output
 - data structures in memory
(=not saved! ⇒ **always save your edited / created objects !**)

I. – Praat: First steps



◇ Two types of menus – static vs. mutable

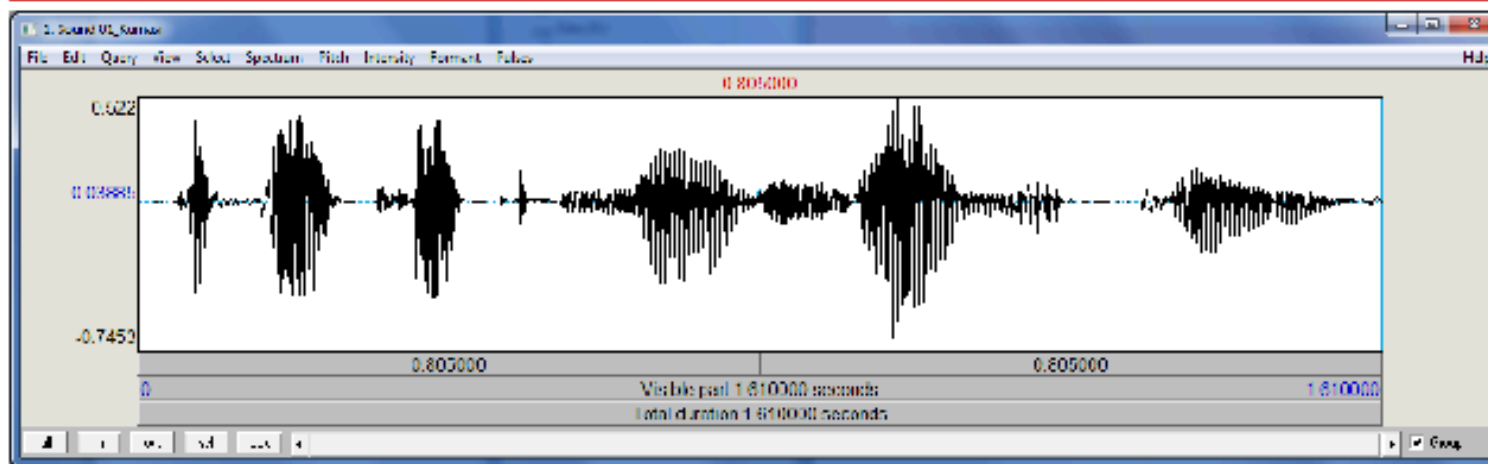
- Static menu (on top) – permanent and unchanged functions (Praat, New, Open, Save, Help)
- Mutable menu (to the right) – functions dependent on the type of object (e.g. Sound → Play)
 - each object has particular analysis, query and manipulation functions



◇ Open a file “Read from file...”

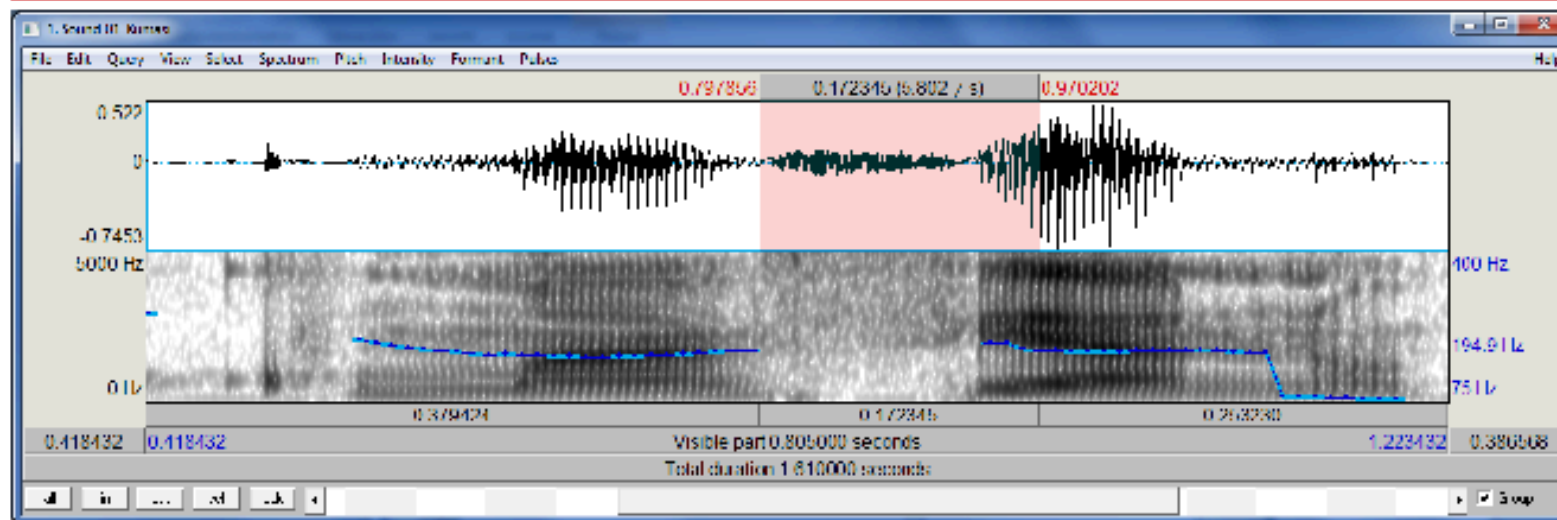
- e.g. a sound file “Kumasi.wav”
- Mutable menu shows all the options you have with a sound file
 - Click “Play”
 - Click “View & Edit”

I. - Praat: Sound window



- ◇ Window: Sound editor – the oscillogram
 - **Play:** top menu “View” / click on the bars below: parts or total sound
 - **Select part:** top menu “Select” / left mouse click & drawing
 - **Zoom:** top menu “View” / bottom left buttons
 - View spectral analysis → Menu: “Spectrum-Show spectrogram”
 - View fundamental frequency (pitch) → Menu: “Pitch-Show pitch”
 - View formants / intensity / pulses → Choose from top menu accordingly
 - Query menu: Get timing information of file selection
 - Edit menu: Cut, Copy, Paste sound(parts), Set selection to zero

I. - Praat: Sound window



- ◇ Effect of “zoom in” and “Show spectrogram / Show pitch (blue curve)”
 - Button-like rectangles above the oscillogram and below the analyses show
 - which part of the sound is selected (red part),
 - which visible part comes before and after selection,
 - and which invisible remaining parts of the whole file there are.
 - Spectral analysis scale is given at left: 0 - 5000 Hz
Change settings: Menu → “Spectrum-Spectrogram settings...”
 - Pitch analysis scale is given at the right side: 75 - 400 Hz
Change settings: Menu → “Pitch-Pitch settings...”

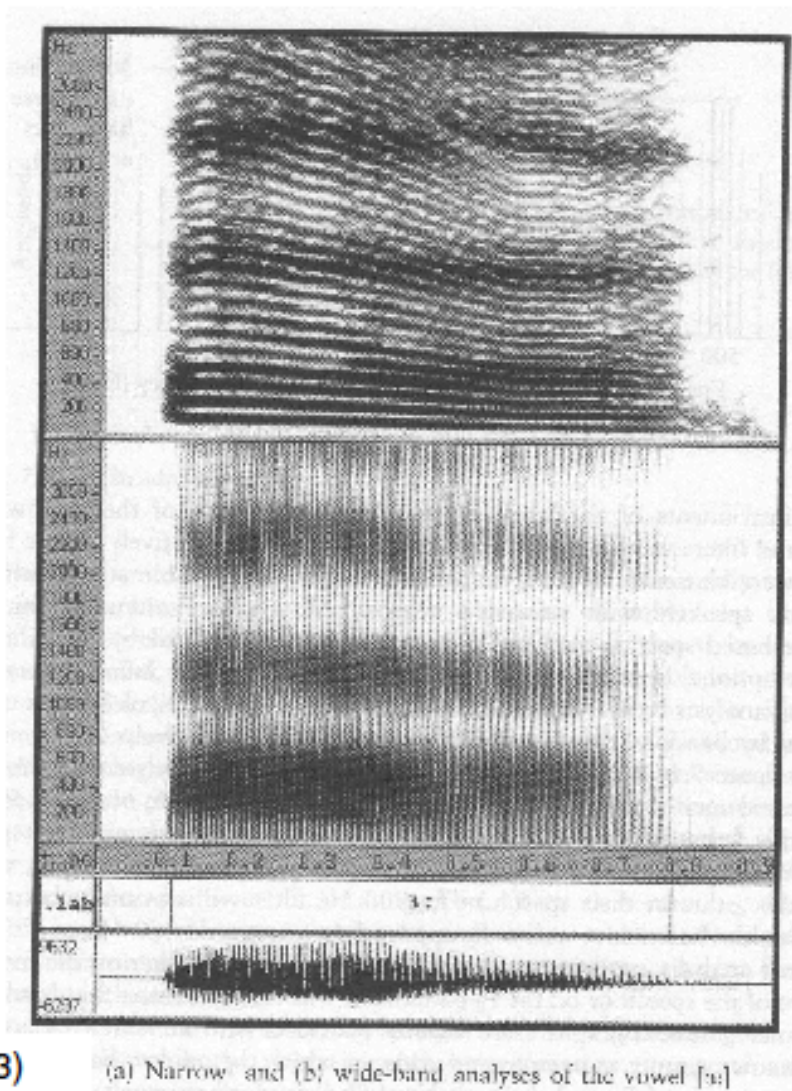
Narrowband and broadband spectrogram

narrowband

harmonics
(including F0)

broadband

formants



aus: Clark & Yallop (2007:253)

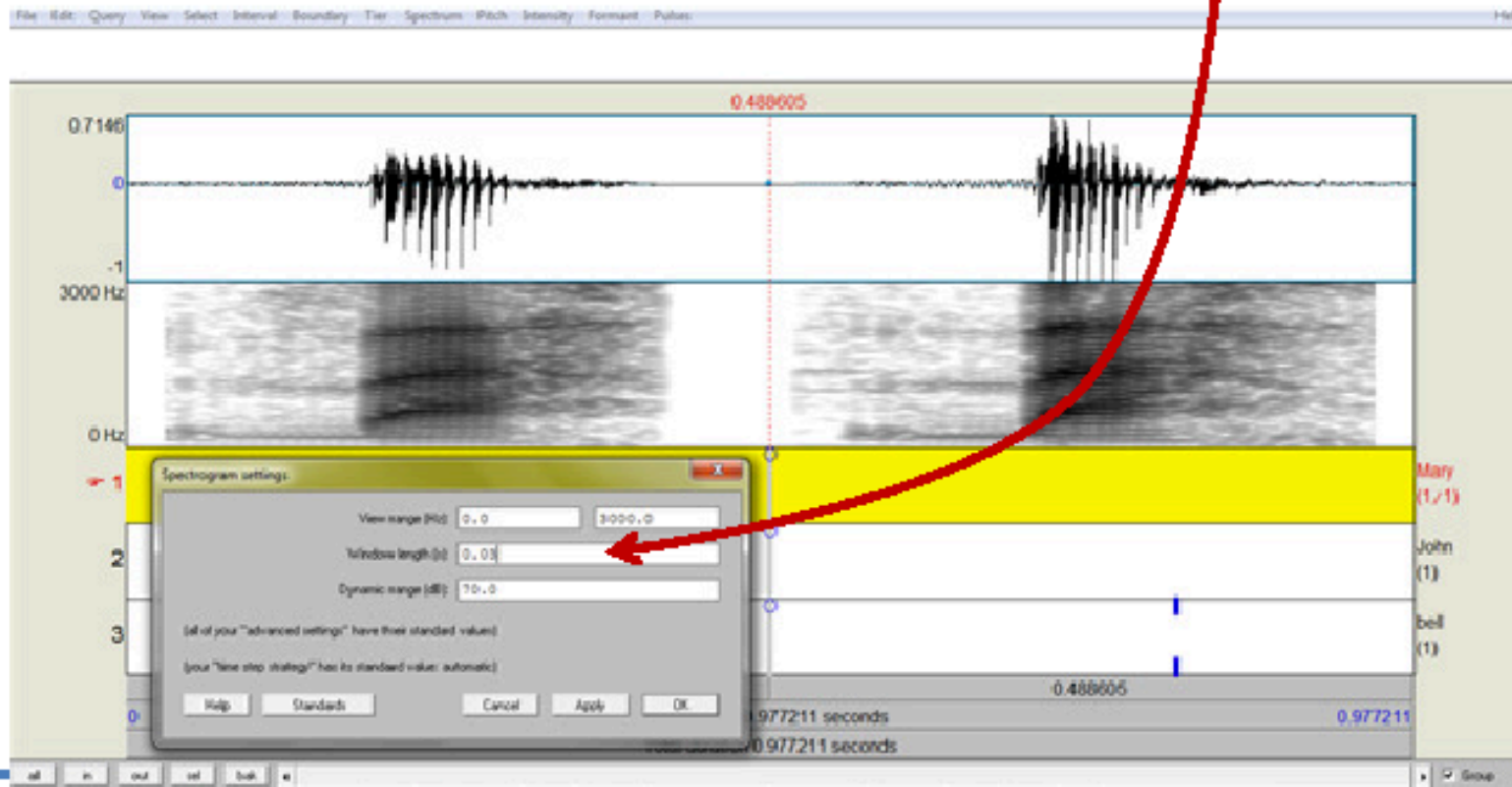
(a) Narrow and (b) wide-band analyses of the vowel [a]

Spectrogram

(Sound: Sounddatei 1)

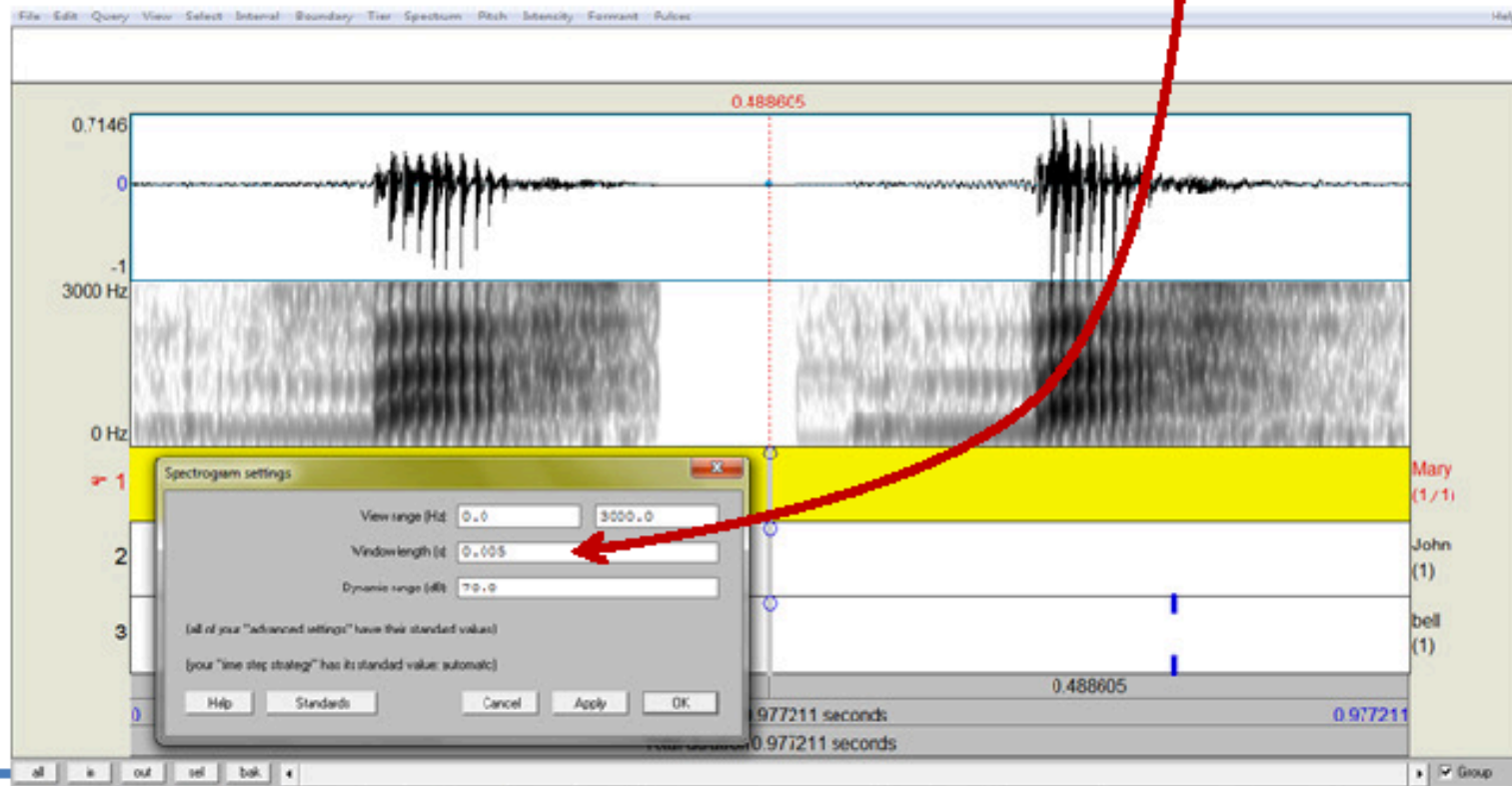
- Narrowband spectrogram (band width 50 Hz)
 - Higher frequency resolution
 - Representation of single harmonics
⇒ horizontal lines

Window length (s):
0.03



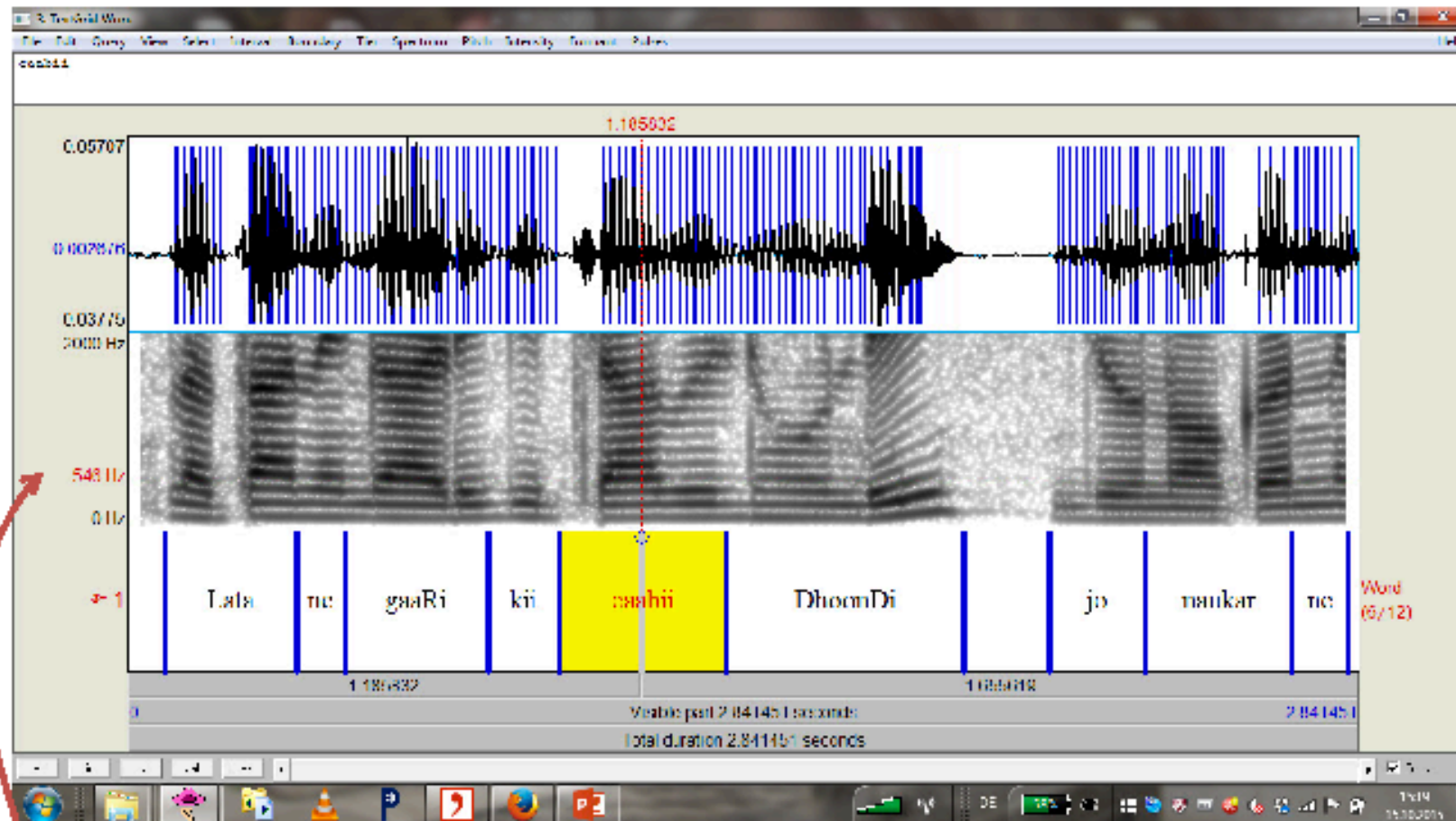
Spectrogram

- Broadband spectrogram (band width 300 Hz)
 - Higher resolution in time
 - Representation of glottis vibration
⇒ vertical lines



F0 Bestimmung

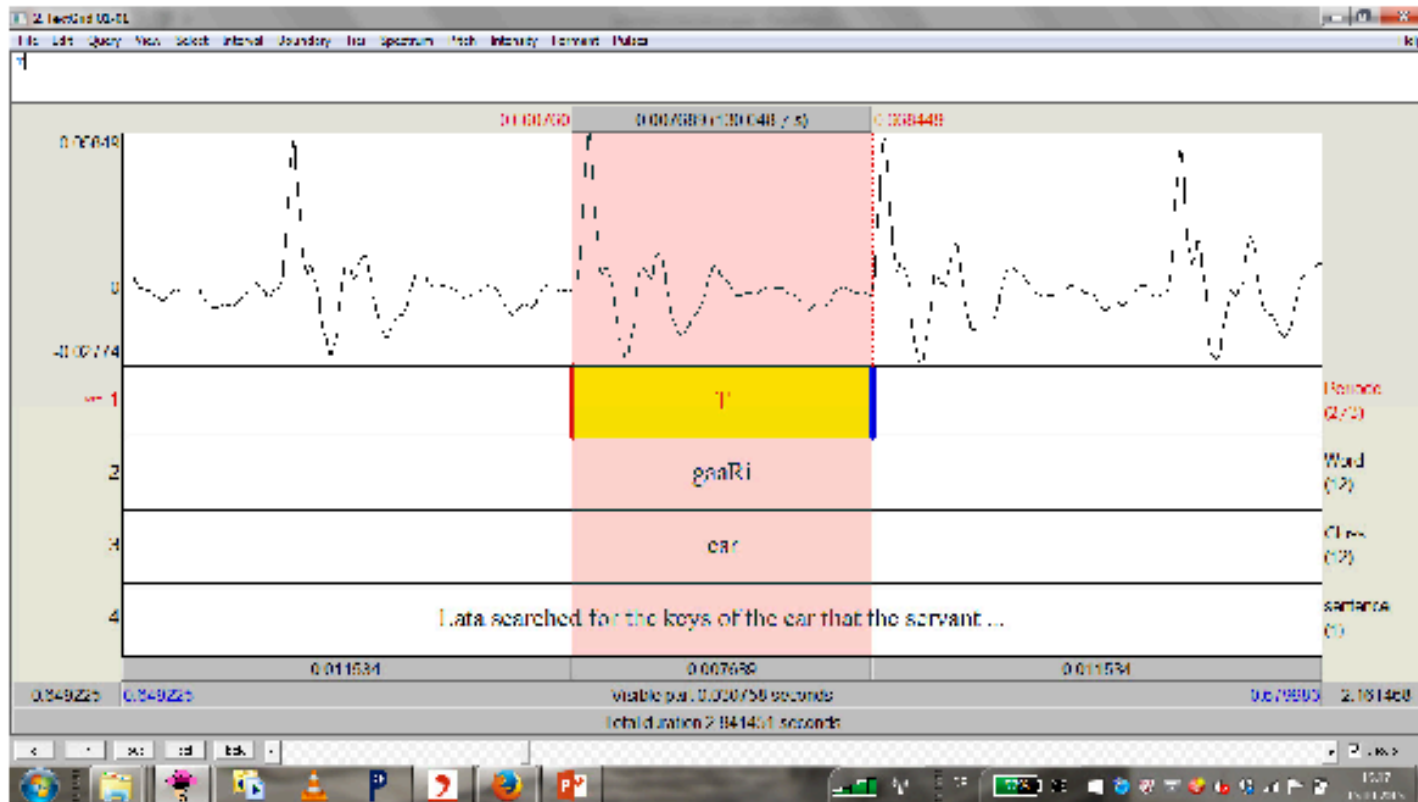
- Harmonische = ganzzahlige Vielfache der F0



4. Harmonische ~ 546 Hz: $546 / 4 = 136$ Hz

F0 Bestimmung

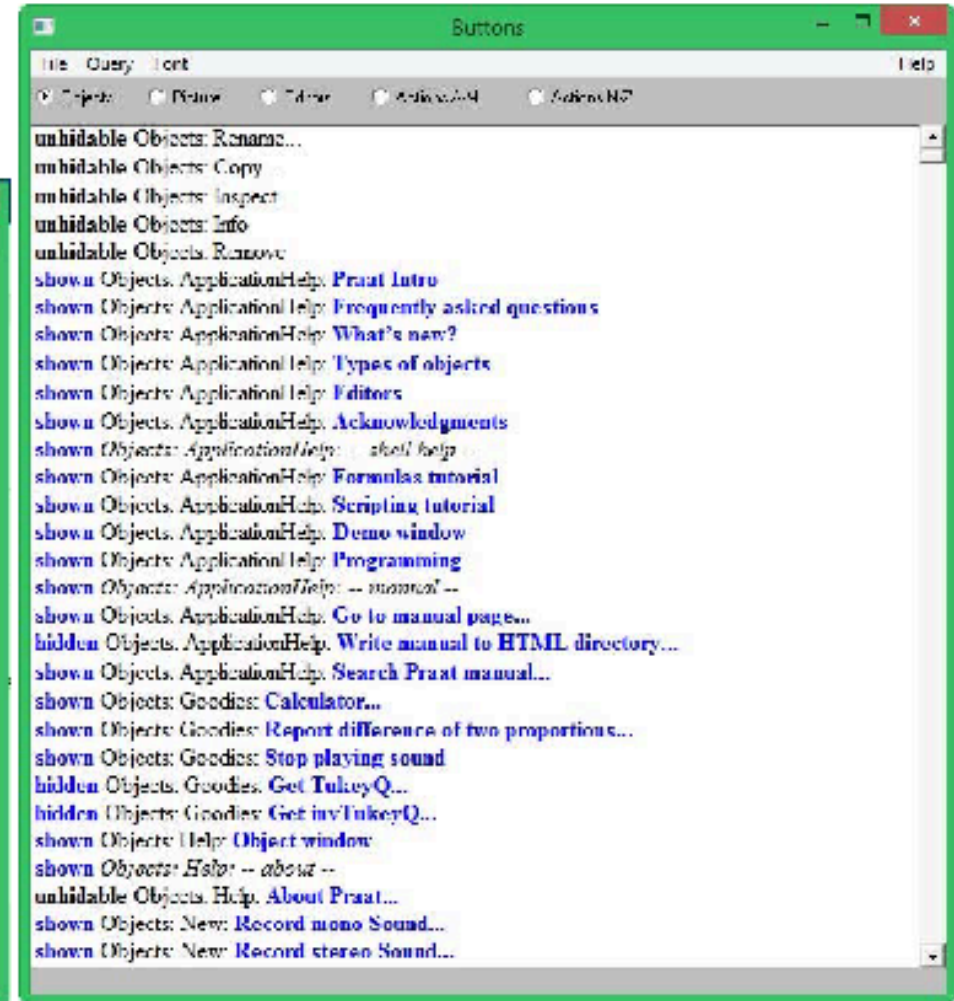
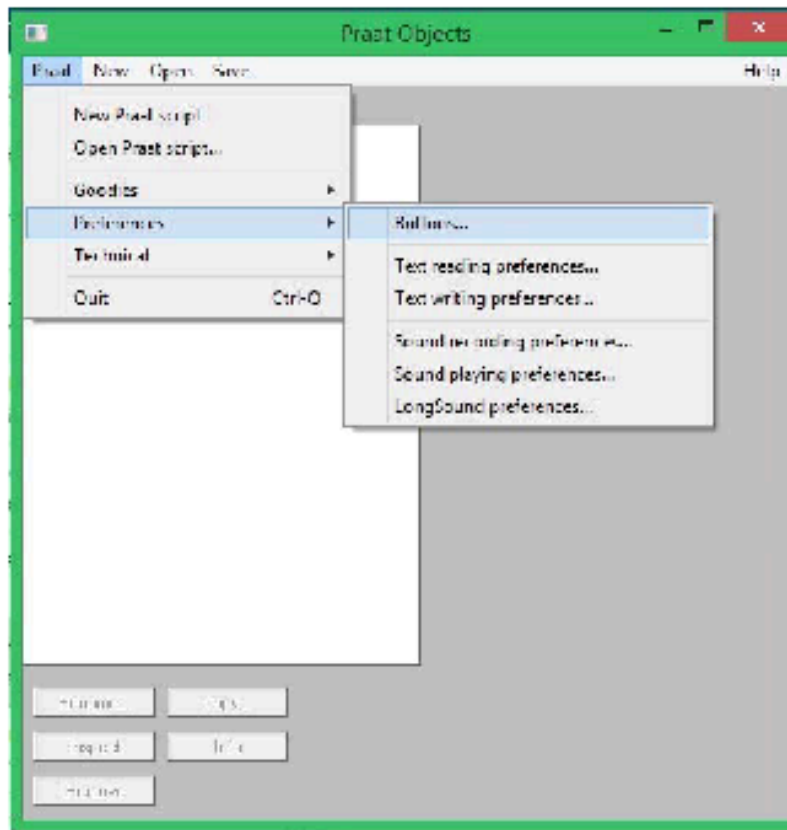
$$(1) f = \frac{1}{T} \quad (f = \text{Frequenz, } T = \text{Periodendauer})$$



$$f = 1 / 0,007689 = 130$$

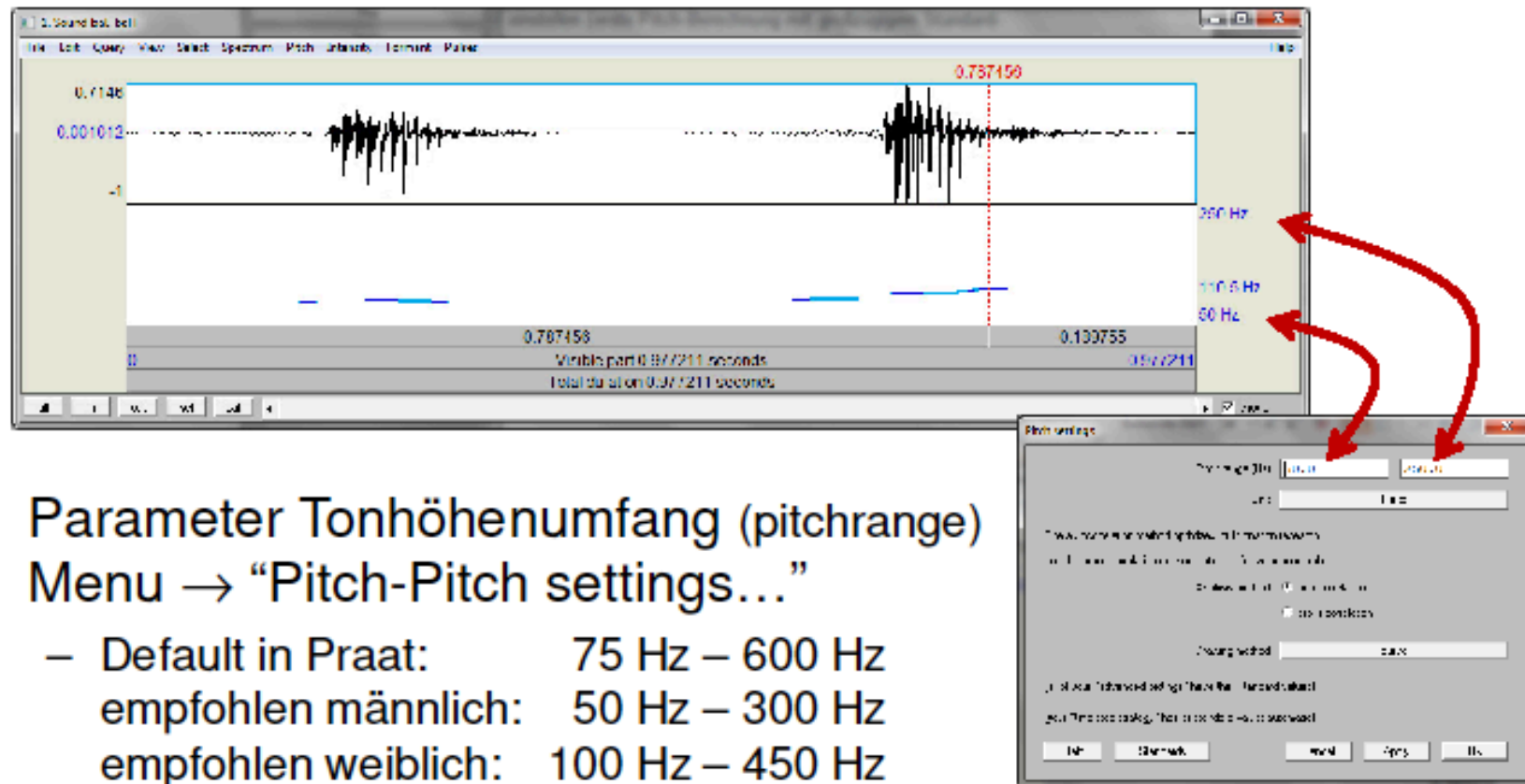
I. – Praat: First steps

- ◇ Buttons.ini
- ◇ Praat-preferences
buttons.ini



Praat – Analyse der F0

- Ton / Intonation: Tonhöhe (perzeptuell), F0 (akustisch, Hz)
- Melodieverlauf (*pitch contour*) in Praat (blaue Linie) im Sound Editor (Menu → “Pitch-Show pitch”)

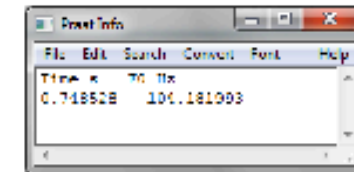
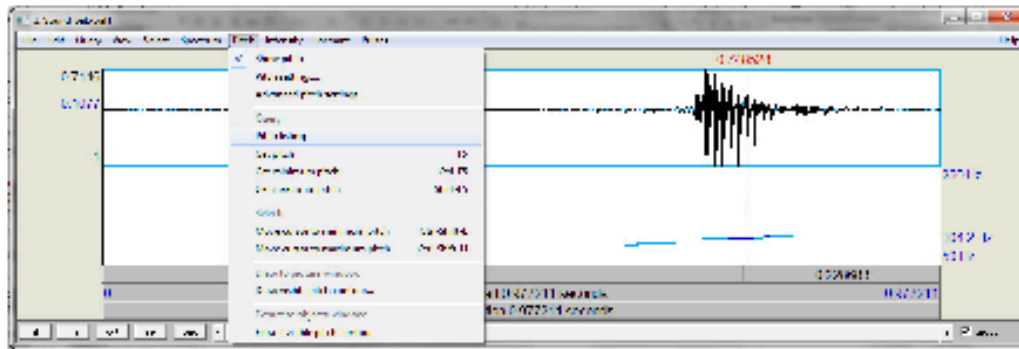


The image shows two windows from the Praat software. The top window is the 'Sound Editor' showing a waveform and a pitch contour (blue line) over time. A red vertical dashed line marks a specific time point at 0.787158 seconds. The bottom window is the 'Pitch settings' dialog, which has red arrows pointing to the 'Pitch range (Hz)' field and the 'Show pitch' checkbox. The 'Pitch range (Hz)' field is set to 'Auto', and the 'Show pitch' checkbox is checked.

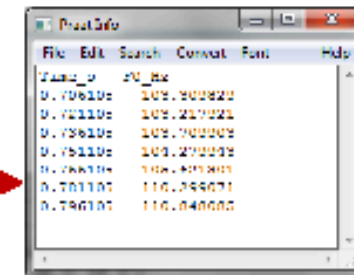
- Parameter Tonhöhenumfang (pitchrange)
Menu → “Pitch-Pitch settings...”
 - Default in Praat: 75 Hz – 600 Hz
 - empfohlen männlich: 50 Hz – 300 Hz
 - empfohlen weiblich: 100 Hz – 450 Hz

Praat – Analyse der F0

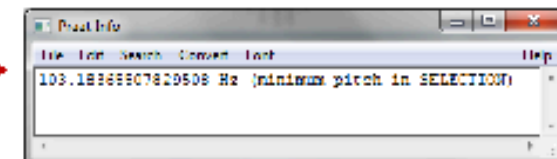
- Messung der F0 / eines Tons:
 - Cursor in die Mitte eines Vokals: Menu → “Pitch-Pitch listing”



- Auswahl des gesamten Vokals: “Pitch-Pitch listing”



- Menu → “get minimum pitch”
- Menu → “get maximum pitch”
- Voraussetzung: Auswahl eines Intervalls

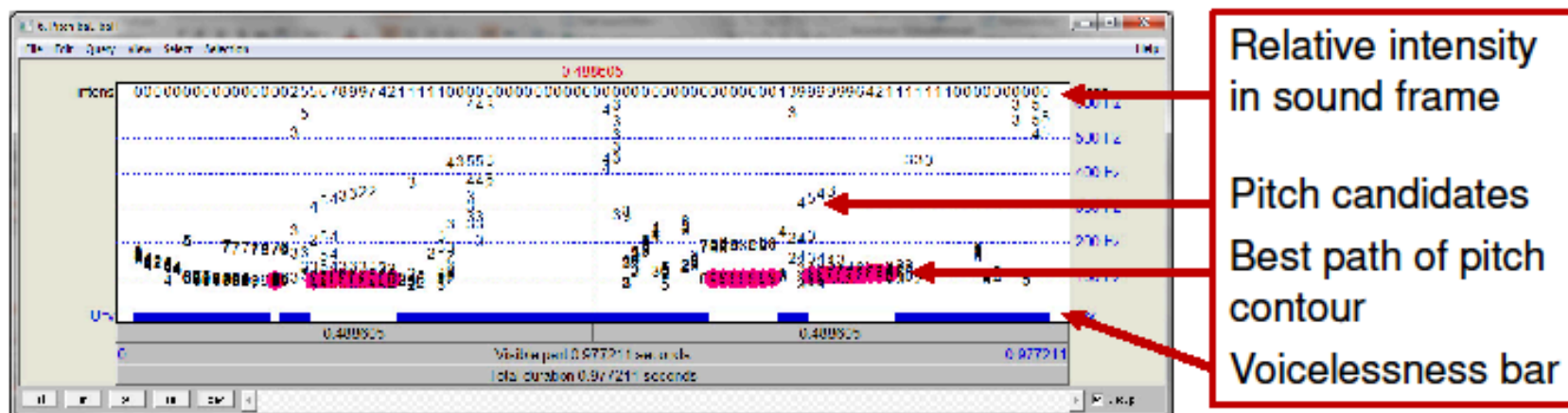


- “Move cursor to minimum/maximum pitch” vor Transkription eines Tons:

ÜBUNG: Transkribieren Sie den Text und Töne auf Oldenburg in „Sounddatei 2 „Oldenburg“ (1_1-1a.wav)

Praat – Analyse der F0

- Pitch object – für die präzise F0 Analyse (auch Praat scripting)
- Erzeugen eines Pitch object:
Sound auswählen, Menu → Analyse periodicity-To Pitch, OK



- Mögliche Änderung der F0 von Hand
Menu → Selection-Unvoice;
oder: Klicken auf die Ziffern
oder Befehl „change octave jumps“

Übungen

1. Übungen im Buch von Jörg Peters an: Kapiteln 1 und 2
2. Downloaden Sie Praat und explorieren Sie die Möglichkeiten.
Formulieren Sie ein Frage für die nächste Sitzung.