Praat Tutorial

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1 The components of Praat

- Basic options on the top: try opening a file!

- Plot window: the blue border determines the size/dimension of your plot

- Objects window: some common objects one can work with are – Sound, TextGrid, Manipulation, etc.

- Options on the right: differs depending on the object(s) selected

2 Recording

1. Connect the microphone and the associated equipment to your computer; check the sound system; open Praat.

2. `New` → `Record Mono Sound`

3. Select the input source (your microphone/audio interface)

4. Select the sampling frequency (usu. 44100 Hz)

5. Click `Record`

6. During the recording, be on the lookout for sound clipping (red/yellow bar) or low sound level

7. When done, press `Stop` then `Save to list`.

8. Select the recording from the objects window; press `View and edit` and spot check to see if everything is in order; some useful shortcuts when doing the spot check:

    - `Shift/Cmd + ↑/↓`: move start/end of selection to left/right
    - `Cmd/Ctrl + n`: zoom to selection
    - `Cmd/Ctrl + w` (close window)

9. Select the recording from the objects window; `Save` → `Save as WAV file`

3   Extracting sounds

- `File` → `Save selected sound as WAV file`

- Or extract to objects window first (`File` → `Extract selected sound`), fine-tune the edges, and save

- Some useful shortcuts:

    - `Cmd/Ctrl + i`: zoom in
    - `Cmd/Ctrl + o`: zoom out `Cmd/Ctrl + n`: zoom to selection
    - `Cmd/Ctrl + ,/.`: move edges to nearest zero-crossings

4   Creating matching TextGrids

- Why do we need TextGrids?

    - Facilitate both manual and automated analysis (because they generate units of inspection/measurement)
    - Also facilitate acoustic manipulation

- Select sound from the objects window

- `Annotate` → `To TextGrid`

- Designate tier names: two-tiered TextGrids with word tier and phone tier are the most common

- Tiers are of two types: point tier or interval tier; we will only be using interval tiers, so leave the answer to the second option blank

- Select both Sound and TextGrid from objects window → `View & Edit`

- Identify phone and word boundaries; select a tier; press `Enter` to create a boundary there

- Some useful shortcuts

    - `Alt + Delete`: Delete the selected boundary
    - `Cmd/Ctrl + ,/.`: move edges to nearest zero-crossings
    - `Cmd/Ctrl + 1/2/...`: Add interval on tier $1/2/\dots$
    - `Cmd/Ctrl + s`: Save TextGrid

- When the lengths of the selected Sound/TextGrid don't match, they will not open together

5   Extracting acoustic information manually

- For a given phone, you can do it at: (i) interval levels (average across the given phone), (ii) endpoints, (iii) midpoint, etc.

- The general process:

  1. Open Sound and TextGrid together from the objects window.
  2. Select a point (cursor) or an interval that you would like to analyze
  3. Use various options from the top menu (adjust settings if you need to)

- You can also opt to visualize various acoustic values (F0, intensity, formants, etc.) from the spectrogram and/or the waveforms

- **Pitch information**

  - Set unit of measurement and pitch range from `Pitch` → `Pitch settings` (e.g., Hertz/semitone, 50-500Hz)
  - Get the desired value by selecting various options; e.g., `Pitch` → `Get Pitch`
  - You can extract a pitch object for closer inspection (`Extract visible pitch contour`)
  - You can also draw pitch contours (`Pitch` → `Draw visible pitch contour (and TextGrid)`)
  - Although pitch contours are superimposed on top of the spectrograms, remember that the two are plotted on a different scale! (frequency range of each shown on the left end vs. the right end)

- **Formant information**

  - `Formant` → `Get first/second/... formant`
  - You can extract a formant object for closer inspection (`Extract visible formant contour`); with the formant object, you can do many things, including `Tabulate`
  - You can also opt to show formants and draw formants!

- **Voice Onset Time**

  - If your intervals for the stops in the phone tiers are aligned perfectly with the onset of the burst on the one end and the onset of the vowel/voicing on the other, then the VOT is just the length of your interval (shown at the bottom)
  - If not, inspect the waveform and select the appropriate interval with zero-crossings on either end

- You can also extract a spectral slice, intensity contours, etc.!

6   Using scripts for automated measurements

- There are a lot of useful Praat scripts out there which can automate much of data extraction when you are dealing with large scale data

- The general process:

  1. Open the script file directly or `Praat → Open Praat script`
  2. Press `Run` on top of the script window and set the parameters (including the directory of Sound/TextGrid files – in Mac OS, use front slash, and in Windows, use back slash.

- Practice using sample scripts: there's one that extracts formant values at midpoints, and also one that extracts maximum F0 values of intervals

6.1   Creating your own script

- It is useful to tweak existing scripts to create a new one that fits your needs.

- Find scripts that seem relevant to a particular project/analysis, and go over them.

- Identify parts in different scripts that would be useful to you, and combine/adapt them.

- Some helpful resources

  - A compendium of useful Praat scripts, categorized according to their functions:
    http://phonetics.linguistics.ucla.edu/facilities/acoustic/praat.html
  - Scripting tutorial by the developer of Praat:
    http://www.fon.hum.uva.nl/praat/manual/Scripting.html
  - It is also sometimes useful to analyze objects using GUI, then `Praat → New Praat script → Edit → Paste history`

- Praat scripts have a particular syntax – examining a few example will give you some ideas as to how they work.

Exercise: Modify the `collect-pitch-data-from-files` praat script so that it measures everything that your assignment requires.

1. Identify What needs to be measured

2. Find a script that does something similar

3. Carry out the measurements not covered by the script manually, then paste history to see what commands are needed

4. Tweak the script you found by adding the appropriate commands

7 Manipulating acoustic objects

When creating stimuli for perception experiments, you may want to vary the stimuli only along certain acoustic dimensions and control for other dimensions. Manipulating acoustic objects in Praat allows you to create controlled auditory stimuli.

7.1 Creating via splicing

- You can create spliced objects by working directly with the sound object

- Display the waveform and the spectrogram and carry out the bricolage using the usual commands!

    - `Ctrl/Cmd + x` or `Ctrl/Cmd + c`
    - `Ctrl/Cmd + v`
    - `Ctrl/Cmd + z`

- Commonly used to manipulate VOT, cross-splice coarticulations and transitions, etc.

Exercise Open a sound token (just the .wav file, not the matching .TextGrid) that has a voiced stop at the beginning; increase the VOT by copying and pasting a section (Some tips: selecting a smaller section to copy and pasting at the zero-crossing makes the resulting sound more natural). Save the manipulated sound. Compare with the original recording. Does the manipulated recording sound more aspirated?

7.2 Creating from manipulation objects

Particularly useful for manipulating the suprasegmental dimensions (especially prosody and duration).

- Select Sound object from object window

- `Manipulate → To manipulation`

- Select Manipulation object (you can also simultaneously open the Sound/TextGrid pair to align the Manipulation object with TextGrid)

- Perform manipulations: you can do many things, e.g., shifting the entire pitch frequency

    - **Pitch**: `Pitch → Stylize pitch` (st)
      `Pitch → Add pitchpoint at`, `Remove pitchpoints`, `Shift pitch frequencies`, etc.
    - **Duration**: Likewise, manipulate using duration points

- – You can also extract separate Pitch or duration tiers, manipulate these tiers, and replace the tiers of the manipulation object

- When done, from the object window, `Get resynthesis`

- Choose `overlap-add`

- Normalizing intensity of sound files: select sound files, `Modify` → `Scale intensity`

- To make the manipulations precise, it is helpful to add pitchpoints at precise time/value – when creating continua, you can more implement the process to be semi-automatic

7.3   Semi-automated manipulations

- To see how this might go, it is helpful to carry out a certain process that needs to be repeated, and paste history in a new script window

  - `Praat` → `New Praat script` → `Edit` → `Paste history`

- Then you can use the commands there to create a new script (you might need to know some basic syntax of Praat)

- I've created one such semi-script as a sample:
  `pitch-manipulation-semiauto.praat` script

Exercise Tweak the `pitch-manipulation-semiauto.praat` script to create 6 sound files from the same base recording (+10, +20, +30, +40Hz increments, -10, -20Hz decreases)