

Praktikum Instrumentalphonetik, Anleitung für Übung 1

Introduction and Background

First exercise in analysis of articulatory data: comparing the tongue position of emphatic and non-emphatic consonants of Moroccan Colloquial Arabic.

Traditionally, the so-called emphatic consonants of Arabic are regarded as having pharyngealization, i.e the tongue-root is retracted towards the rear pharyngeal wall (see my audio demo on secondary articulations).

In this exercise we examine whether differences are also observable in the front part of the tongue, too. It uses data from electromagnetic articulography. Three sensors were mounted on the tongue, as well as on the upper and lower lip, and jaw. All sensors will be displayed, but we will only actually analyze the tongue sensors.

Procedure

1.

Log on as user matlab (ask me for the password)

2.

```
cd mview/mca2a11
```

3.

Start matlab (simply type 'matlab')

4.

To analyze the data we will be using a matlab function called 'mview'.

We load all utterances containing a particular target consonant into mview by typing `mviewgo_ex1('t')`

Specifying 't' as the input argument loads all utterances with non-emphatic /t/.

The other sounds that can be chosen are:

- 'T': emphatic /t/
- 'd': non-emphatic /d/
- 'D': emphatic /d/
- 's': non-emphatic /s/
- 'S': emphatic /s/
- 'n'
- 'l'
- 'r': a flap or tap

The main mview window will be opened. Resize this a little bit smaller.

It should then be possible to also see the array editor window (this will be used to record analysis results in a sort of spreadsheet). Resize this so that about 5 lines and 9 columns are visible, and try and position array editor and mview window so that both can be viewed at once.

5.

In mview's 'Variables' drop-down menu choose the specific utterance to be analyzed.

For each target sound, e.g non-emphatic /t/, usually 7 utterances will be loaded. The number of the repetition is the 10th character in the complete filename of the utterance. In order that every participant can analyze as many different utterances as possible we will divide up the work so that each participant will be responsible for analyzing a specific repetition number of each target consonant (possibly simply determined by the number of your machine - this will be organized in the course).

Choose the specific utterance you have been assigned to.

The next steps show some of the basic ways of using mview, and will mostly need to be repeated for every utterance

6.

In the MVIEW drop-down menu make sure that 'Auto Update' is ticked

7.

Go into the top-right panel. This shows an overview of the complete utterance.

Hold the left mouse button down, and use the mouse to drag the left edge of the shaded area and then the right area of the shaded area towards the middle.

Assuming you have activated 'Auto Update' above, then all panels below the top one will zoom in to show only the shaded region marked in the top panel.

8.

Go into MVIEW drop-down menu again.

In the sub-menu 'Play', choose 'Selection'.

You should hear the sound corresponding to the selected (shaded) portion of the signal.

From now on, it is sufficient just to type Ctrl+p to hear the selected range.

(Warning: Don't repeat Ctrl+p too quickly as it may cause matlab to hang!)

9.

Now adjust the selected range (using the sonagram display and sound to help) to zoom in on the target sound. (Unfortunately sound does not always seem to work properly for very short selections.)

Each target sound is the middle consonant in a word something like /maC₁aC₂/ where C₁ stands for the target consonant, and C₂ for the consonant(s) at the end of the word.

Zoom in so that roughly the word with the target consonant is displayed, and make sure you know where the target consonant is in the sonagram.

10.

Now place the mouse in the sonagram, hold the left button down and move the cursor. Try and relate the position in the sonagram to the position of the tongue shown in the top left panel.

This is a sagittal display of the movements of the sensors on the tongue (joined by a grey line), the upper and lower lip, and the jaw.

The yellow line shows the outline of the hard palate (anterior is to the left).

(Each sensor is actually shown by a pair of coloured dots. This will be explained in the course. For the tongue, concentrate on the dots joined by the grey line.)

11.

The main task now is to record the x and y positions of the tongue tip, mid, and back at the point in time when the constriction for the target consonant is strongest.

We will assume that this is when the y-coordinate of the tongue tip reaches its highest value.

In the time panel marked 'TTIPPOS' the y-coordinate is the fainter line, the x-coordinate is the brighter line (similarly in the panels marked 'TMIDPOS' and 'TBACKPOS').

Place the cursor at the time location where the y-coordinate of the tongue tip has its highest value during the target consonant. This should be roughly in the middle of the closure phase as shown in the sonagram.

Check that the chosen position makes sense, by observing the tongue movement in the spatial display in the top left panel.

12.

With the mouse placed in the TTIPPOS panel at this time location hold the left button down and read off the x and y coordinate values in the numerical display at the bottom left of the window.

Important! Make sure that the text at the bottom left changes from 'Cursor' to 'TTIPPOS' when you hold the left button down.

Enter the values into the appropriate columns of the array editor.

The columns (from 1 to 9) are:

```
consonant repetition trialnumber TTIPPOSX TTIPPOSY TMIDPOSX  
TMIDPOSY TBACKPOSX TBACKPOSY
```

The column labels can be seen by choosing the 'descriptor' tab in the array editor. The data must however be entered with the 'data' tab selected.

After the data values for the tongue tip have been entered, move the mouse into the panel marked TMIDPOS, making sure the time location of the cursor stays the same. Record the coordinates of the tongue-mid sensor in the same way as just done for the tongue tip, and repeat the procedure for tongue-back.

Always cross-check in the spatial display that the values recorded make sense.

Each sound analyzed should be entered in a new line of the array editor.

To record what sound has been analyzed the following information must also be entered:

In column 1 the target sound in single quotes (after it has been typed in it will be displayed as a numeric value).

In column 2 the repetition number (i.e the 10th digit of the file name)

In column 3 the trial number (i.e the last 3 digits of the file name)

13.

When all the coordinates for the current utterance have been analyzed close mview by selecting 'close all windows' in the MVIEW drop down menu.

Then type 'return' in matlab's command window. This terminates the calling function mviewgo_ex1 and stores all the analysis results to disk.

Then restart mviewgo_ex1 with the utterances for the next consonant to be analyzed, i.e go back to step 4 above.