MOQ – INTERFACE

Nathalie HENRICH
Département Parole et Cognition, GIPSA-lab
Nathalie.Henrich(at)icp.inpg.fr

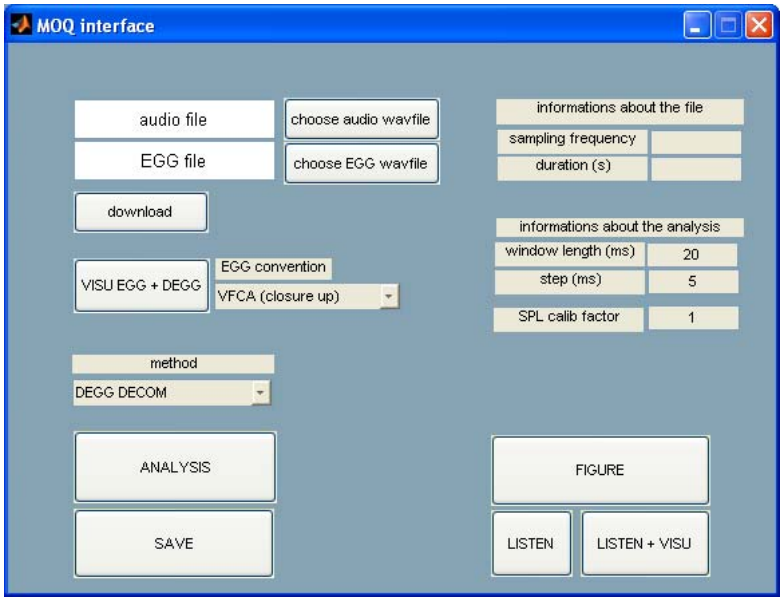
MOQ is a friendly Matlab interface for measuring fundamental frequency and open quotient on electroglottographic (EGG) signal and its derivative (DEGG), using one of the following method :
- DEGG DECOM (from Henrich et al., 2004)
- EGG 35% and EGG 50% (from Rothenberg and Mahshie, 1988)
- 3/7 (from Howard et al., 1990, 1995)

A brief description of the interface and its use is given here. It describes the different steps needed to download the required files, analyse, save and plot the data.

MOQ has been implemented and tested using Matlab R14.

1. Downloading procedure of audio and EGG files

Open Matlab Command Window. The command *moq* will automatically launch the MOQ interface.

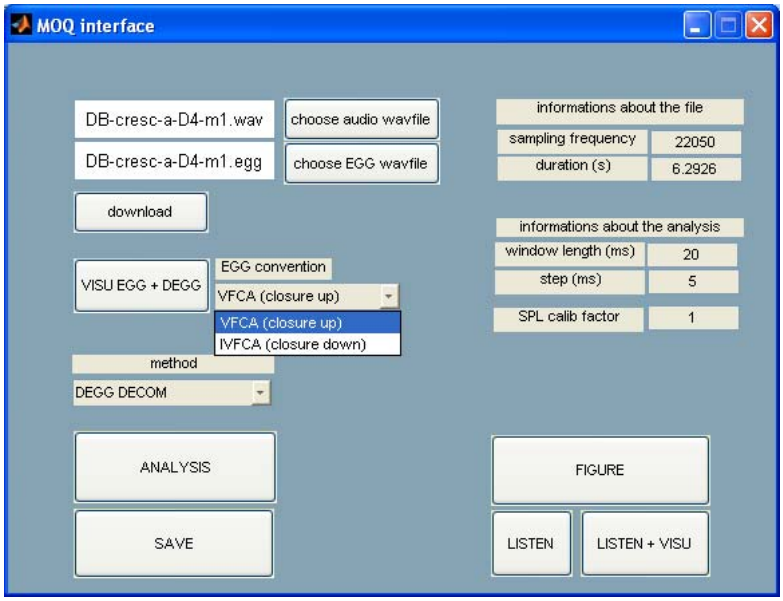


Select the audio and EGG files using the press buttons *choose audio wavfile* and *choose EGG wavfile*. The soundfiles should be in *wav* format. By default, the interface will add the filename XX.egg in the EGG wavfile case when you first download the audio file. You can manually modify the filenames.
Download the audio and EGG files by pressing the *download* button.

For the purpose of illustration, audio and EGG wavfiles of one sustained vowel are provided: DB-cresc-a-D4-m1.wav and DB-cresc-a-D4-m1.egg (from Henrich, 2001; Henrich et al., 2005)

2. EGG visualisation and convention

For the analysis purpose, you should specify the convention used for your EGG signal: either presented as a vocal-fold contact area signal (convention VFCA, in which closure is up) or inverted (convention IVFCA, in which closure is down). You can use the *VISU EGG + DEGG* button to look at the downloaded EGG signal and its derivative.

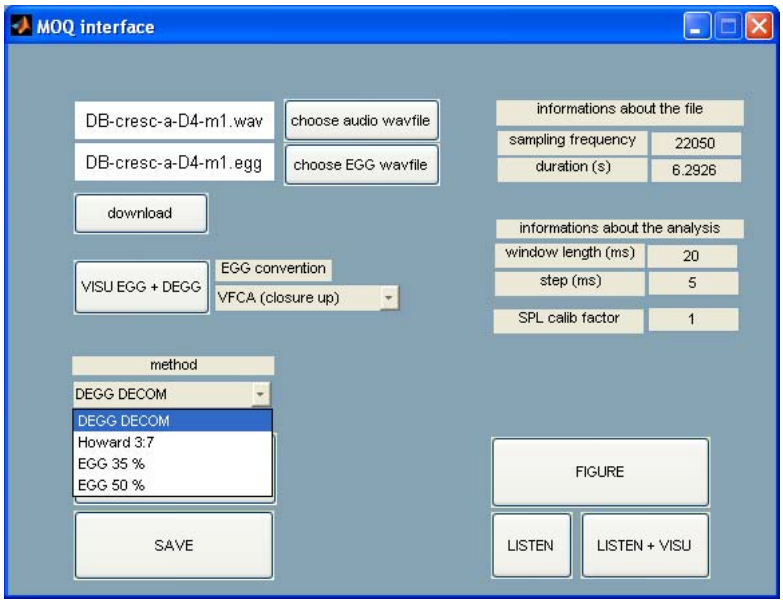


By default, the VFCA convention is selected.

If you test the *DB-cresc-a-D4-m1* wavfile, you will notice that the convention in the file is IVFCA. The selection of IVFCA (closure down) is then required prior to the analysis.

3. Selection of analysis method

A slider allows the selection of the desired analysis method.



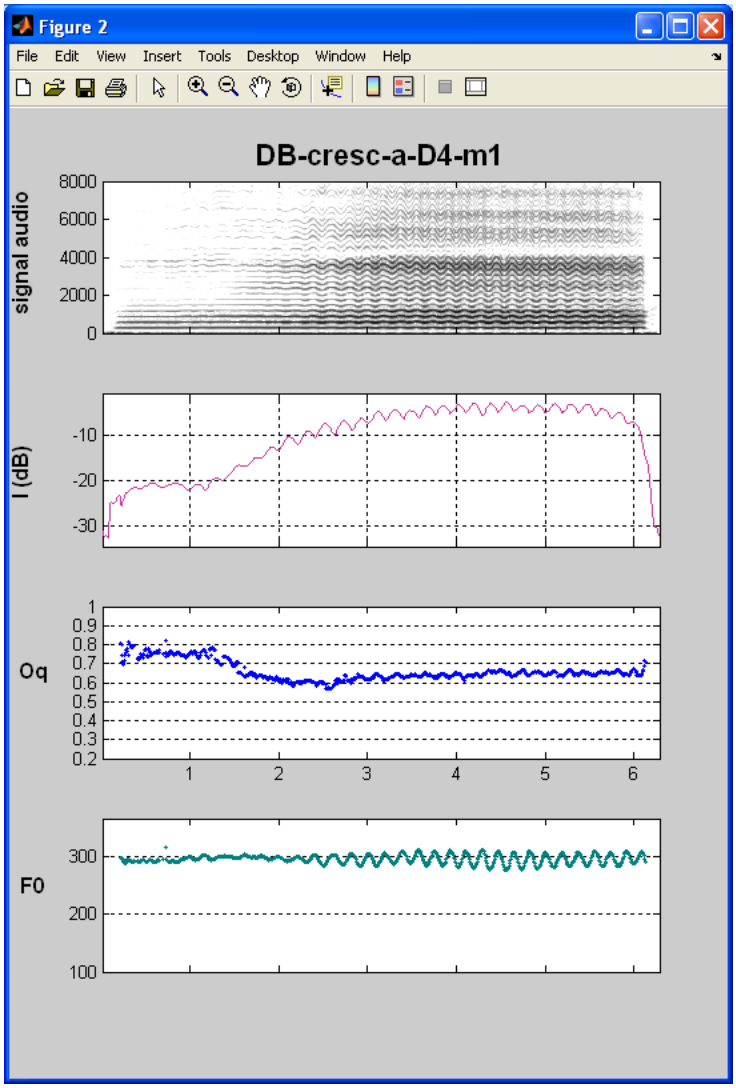
The different method implemented in MOQ analysis are:
- *DEGG DECOM* (from Henrich et al., 2004): a correlation-based method using the DEGG signal
- *EGG 35%* and *EGG 50%* (from Rothenberg and Mahshie, 1988): a threshold-based method using the EGG signal. Two thresholds (35% and 50%) can be selected.
- *howard* (from Howard et al., 1990, 1995): a hybrid method detecting closing peaks on the DEGG signal and estimating opening peaks on the EGG signal using a threshold of 3/7.

A comparative study of the differents methods can be found in Henrich (2001) and Henrich et al., 2004.

The window length and step can be parametrized in the *information about the analysis* panels. By default, window length is 20ms and step is 5ms. Audio signal can be calibrated for purpose of absolute SPL measurements, in giving a SPL calib factor. The audio signal is then divided by this factor. By default, it is set to 1.

4. Analysis and save

Press the *ANALYSIS* button to start the analysis process. Once the analysis is done, press the *SAVE* button to save the resulting data in a mat file.
The result is a matlab structure *rsl* containing the following fields :
- .t: time
- .Idb: vocal intensity
- .f0: fundamental frequency
- .Oq: open quotient
- .npicf et .npico: number of closing and opening peaks detected within a glottal period (in the case of DECOM method). This number helps to detect doubled or imprecise DEGG peaks.



5. Figures

The results can be plotted in pressing the *FIGURE* button.

The figure presents 4 panels: 1. spectrogram analysis of the audio signal; 2. vocal intensity in dB (relative values); 3. open quotient; 4. fundamental frequency (Hz).

If a gain is known for calibration of vocal intensity, its value can be given in the *SPL calib factor* window prior to the analysis. The audio signal will then be divided by this factor.
Audio signal can be played using the *LISTEN* button. Use the *LISTEN + VISU* to plot and play part of the signal.

6. References

Henrich N. (2001) Etude de la source glottique en voix parlée et chantée: modélisation et estimation, mesures acoustiques et électroglottographiques, perception. Phd thesis, Université Paris 6, Paris.

Henrich N., d'Alessandro C., Doval B. and Castellengo M. (2004). "On the use of the derivative of electroglottographic signals for characterization of nonpathological phonation." J Acoust Soc Am 115(3): 1321-32.

Henrich N., D'Alessandro C., Doval B. and Castellengo M. (2005). "Glottal open quotient in singing: measurements and correlation with laryngeal mechanisms, vocal intensity, and fundamental frequency." J Acoust Soc Am 117(3 Pt 1): 1417-30.

Howard, D. M., Lindsey, G. A., and Allen, B. (1990) ‘‘Toward the quantification of vocal efficiency,’’ J. Voice **4**, 205–212.

Howard, D. M. (1995) ‘‘Variation of electrolaryngographically derived closed quotient for trained and untrained adult female singers,’’ J. Voice **9**, 163–172.

Rothenberg, M., and Mahshie, J. J. (1988) ‘‘Monitoring vocal fold abduction through vocal fold contact area,’’ J. Speech Hear. Res. **31**, 338–351.