european voice teachers association

Voice analyzing for beginners

Workshop at EVTA session in Helsinki 6-10.6.2012

Aija Puurtinen

Ritva Eerola

Although we often concentrate in smaller details with voice analyzers, it is good to remember that vocal expression is always psycho-physical.

- The function of the whole body influence on the quality of the voice: e.g. the movement of the diaphragm is indirectly connected to the vertical level of the larynx (tracheal pull)

Functional factors (larynx level):

-The sub- and supraglottal pressure

- Mass of vocal folds

- Glottal adduction

- Vertical position of the larynx

van der Berg
Aerodynamic-myoelastic theory

Function of the larynx is based on an intimate interplay of three factors:

1. The aerodynamic properties of the air which actuates the larynx,

2.the adjustment of the larynx, brought about by the proper nervous activation of the various muscles, and the myoelastic properties of the laryngeal components,

3. the aerodynamic coupling between (a) the subglottal system and the larynx, (b) the left and the right vocal fold, and (c) the larynx and the supraglottal system

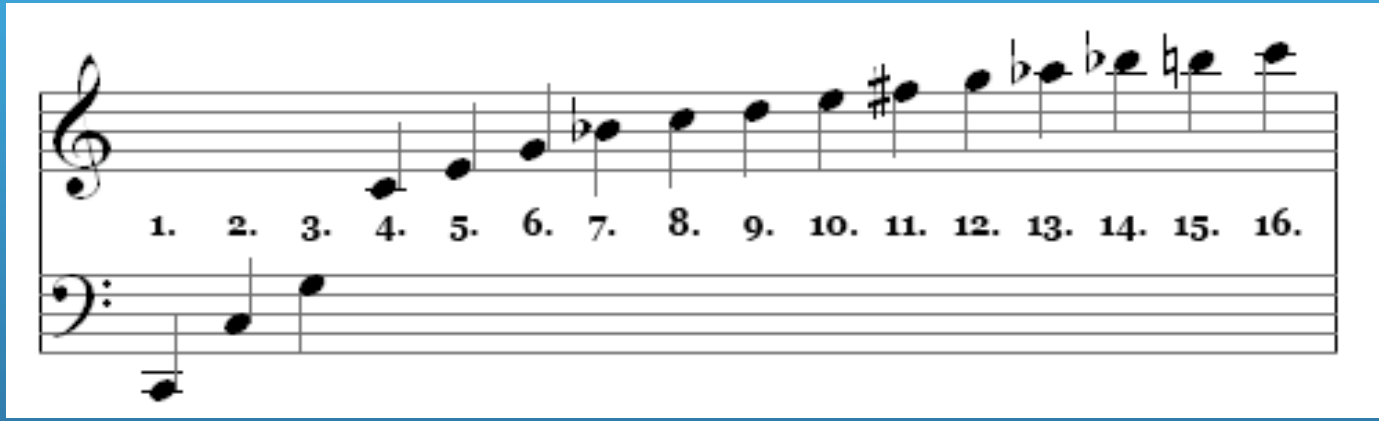
(B. Malmberg: Manual of Phonetics, 1970)

VOCAL FORMANT ↔ VOCAL TRACT

- Formant is the property of the voice, but resonance is the property of the vocal tract.

- Formant is the energy region of the strengthened harmonics

Harmonic series:



FORMANTS

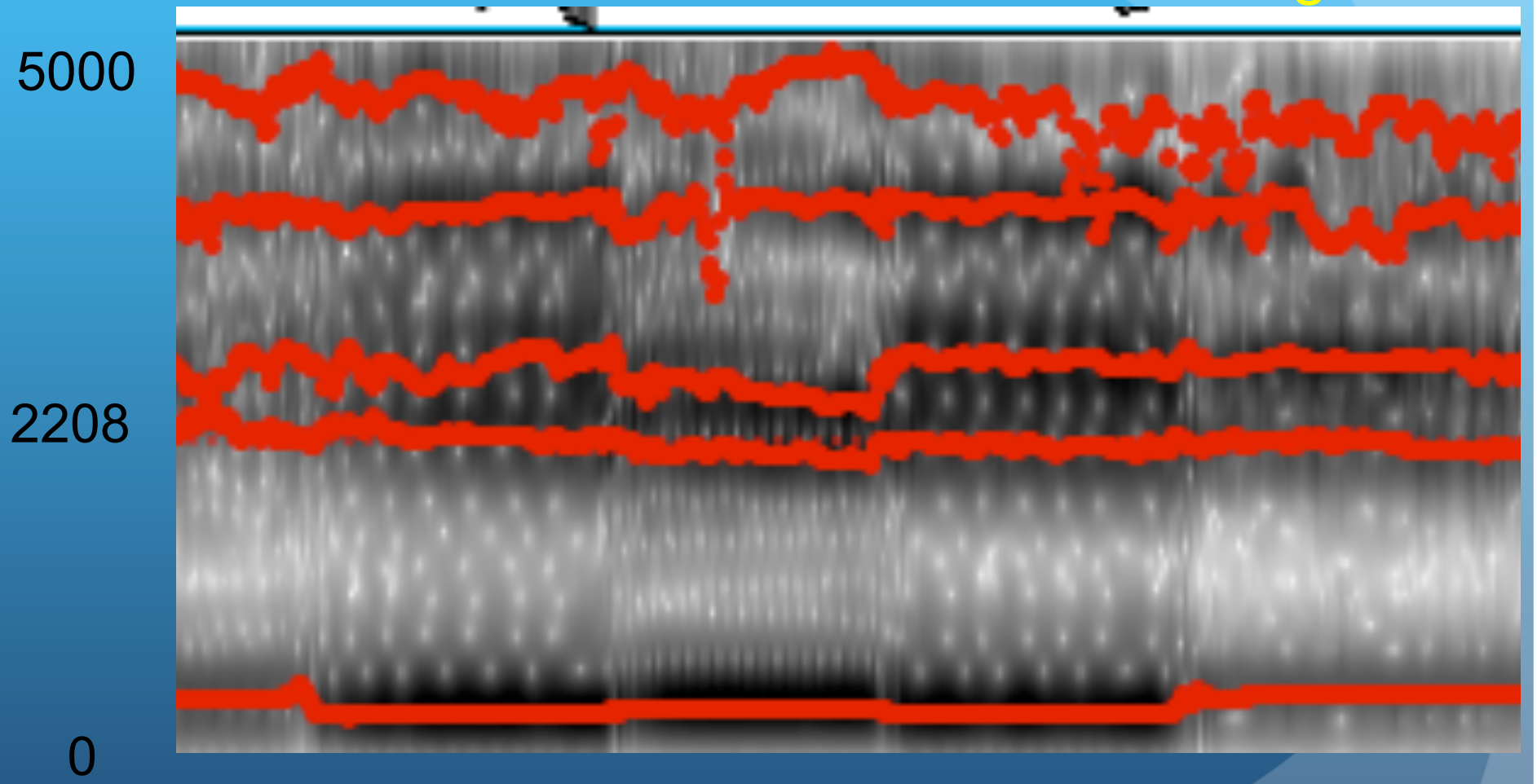
- vowel formants 1 - 2 (3 - specially on high pitch in singing)
- quality formants 3 - 5...

- male voices have a singing formant about 3000 Hz

- female voices do not have a singing formant, but however some harmonic peaks around 3000 Hz

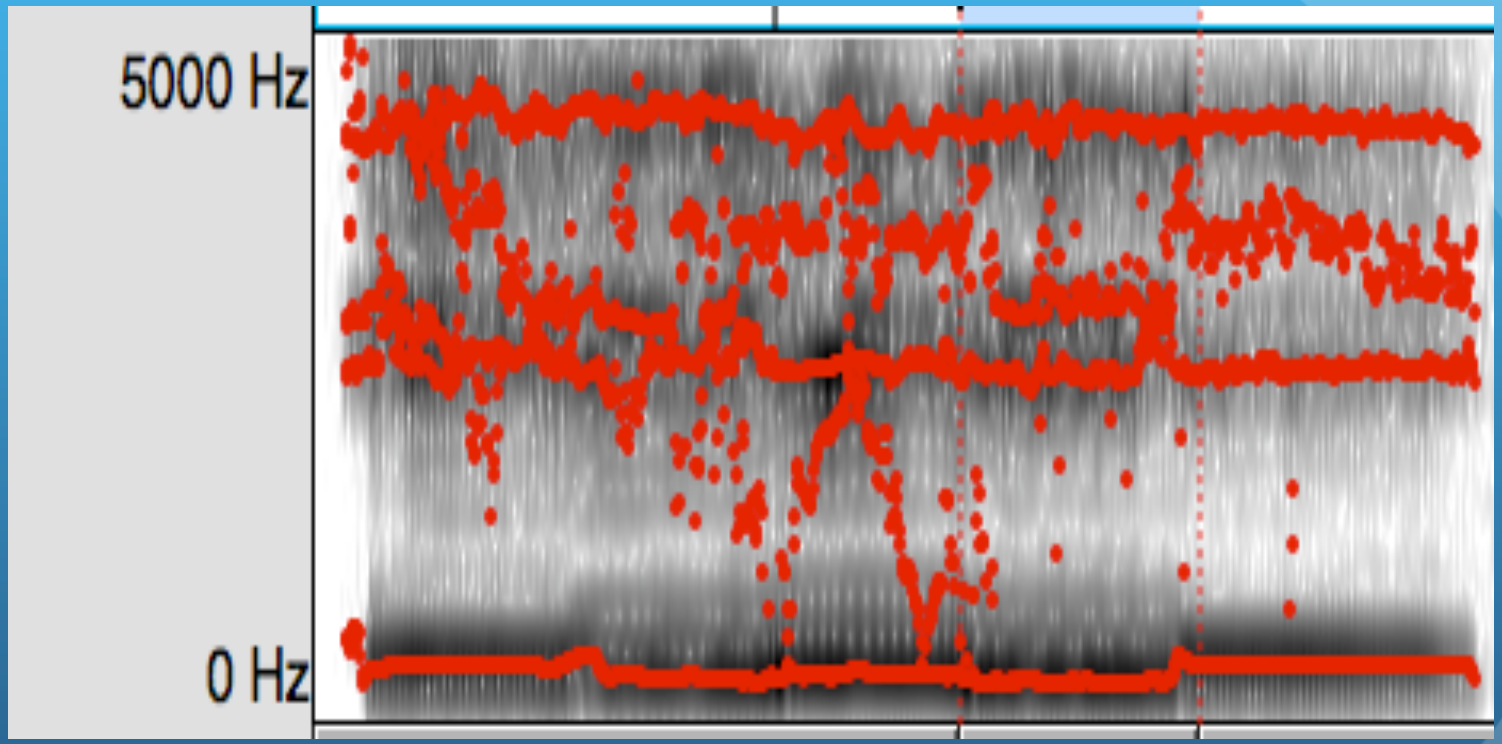
Praat: [i]-vowel, formants

Rather good



PRAAT: Formants

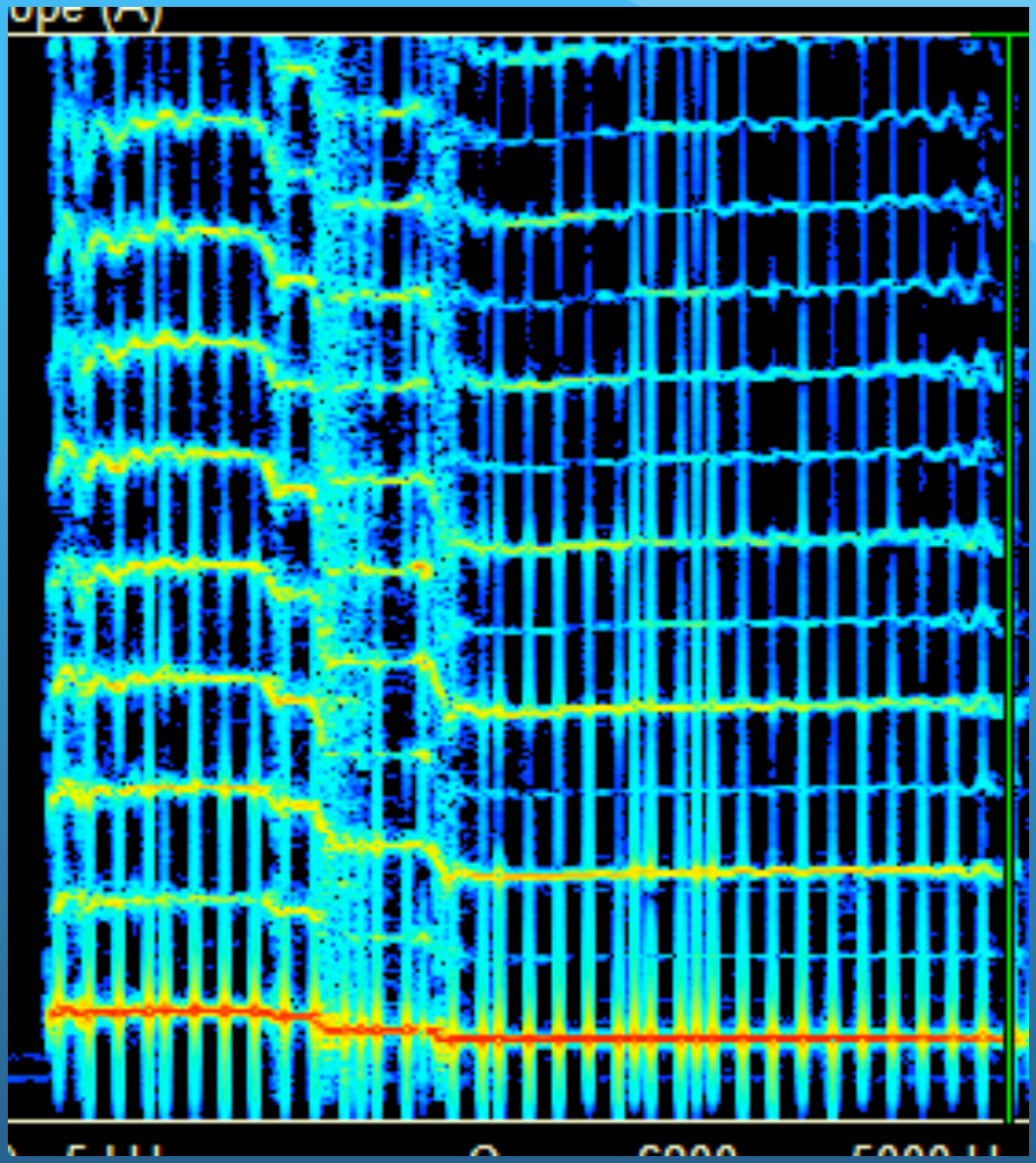
rather unbalanced example



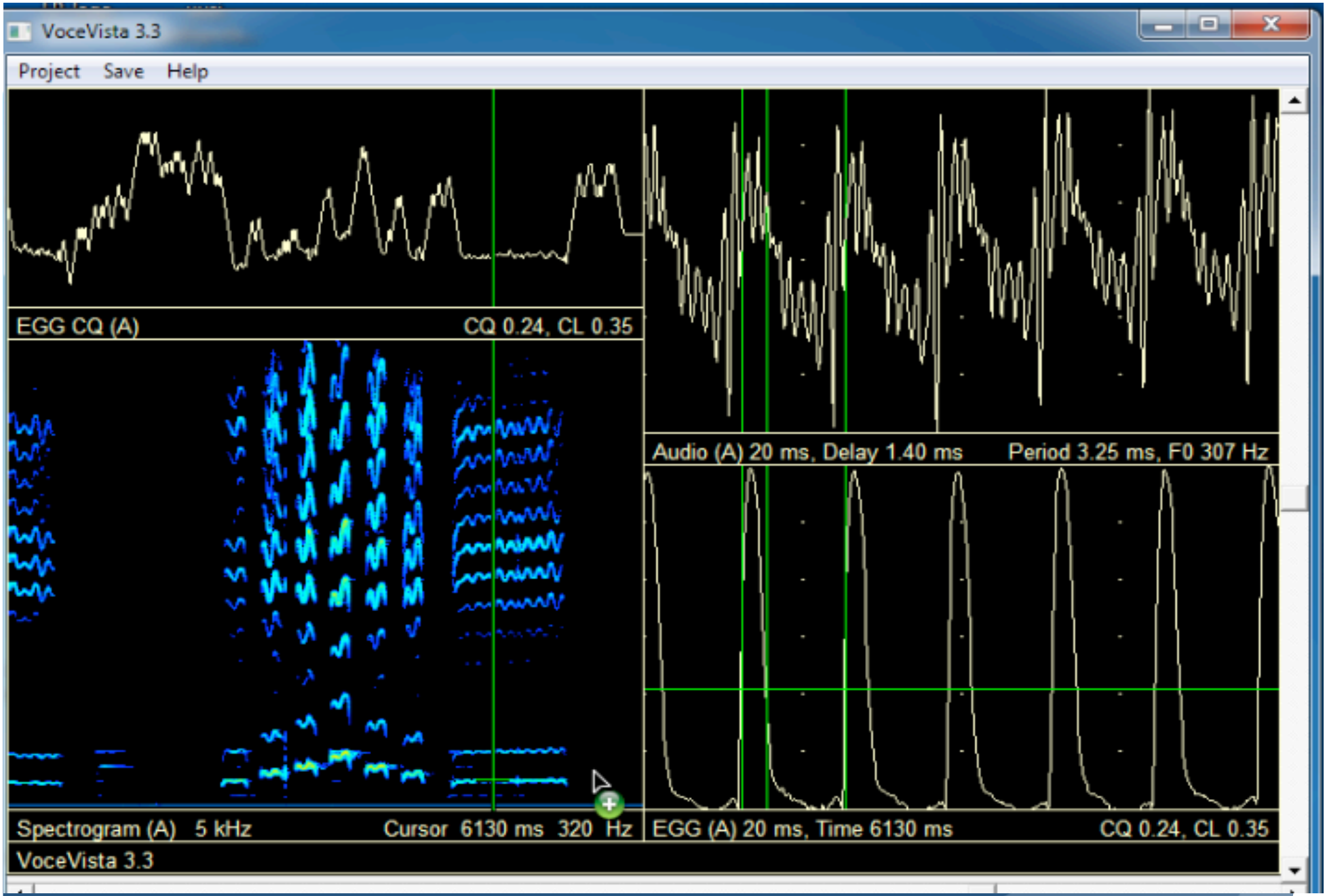
Spectrogram

- Shows the energy of the harmonics in vowels or sounding consonants
- In many softwares (VoceVista, Sygyt) stronger colours show the amount of energy (dB)
  (in spectrum they are shown as peaks)

VoceVista
(Chri…)

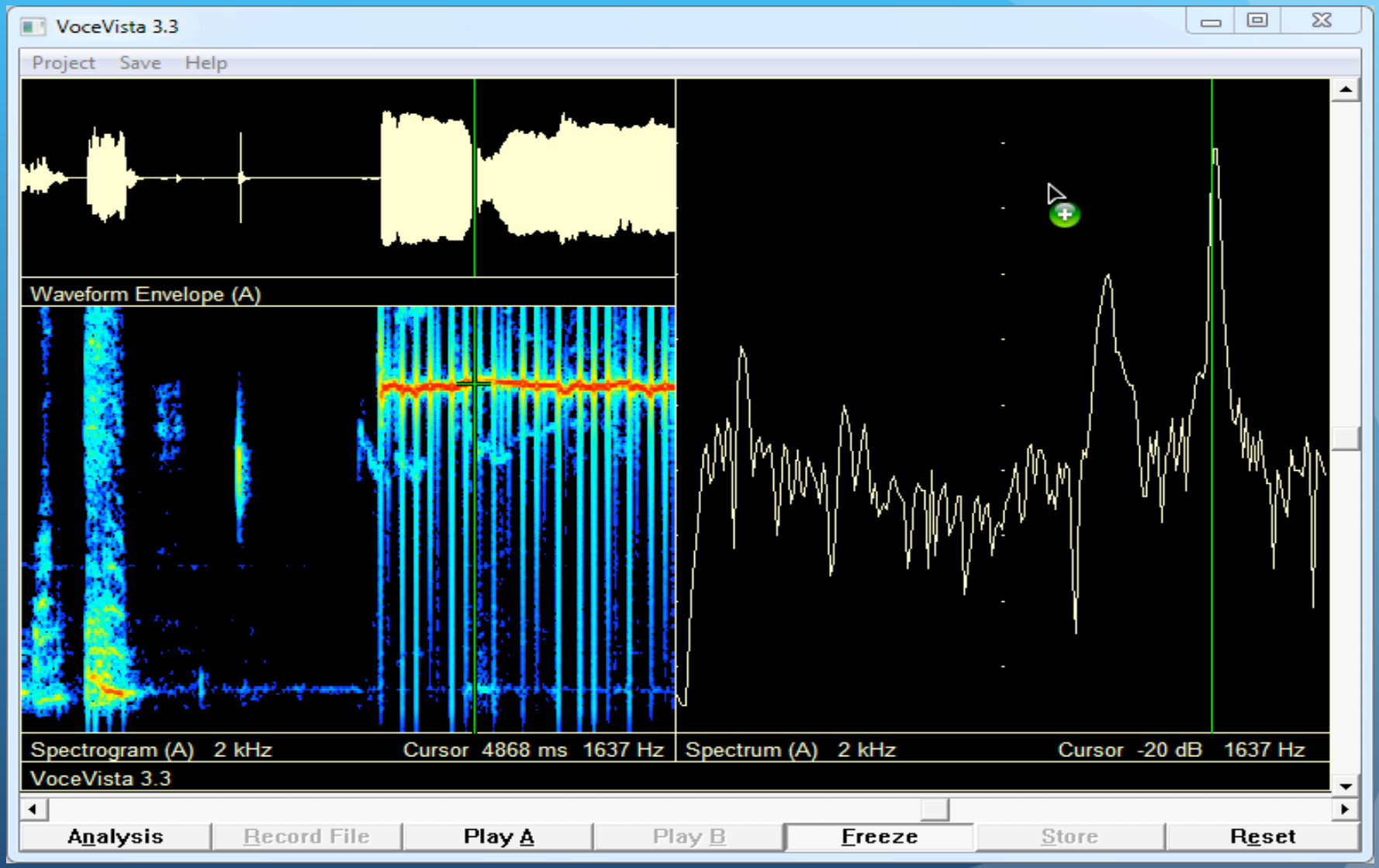


even, continuing lines – balanced body work

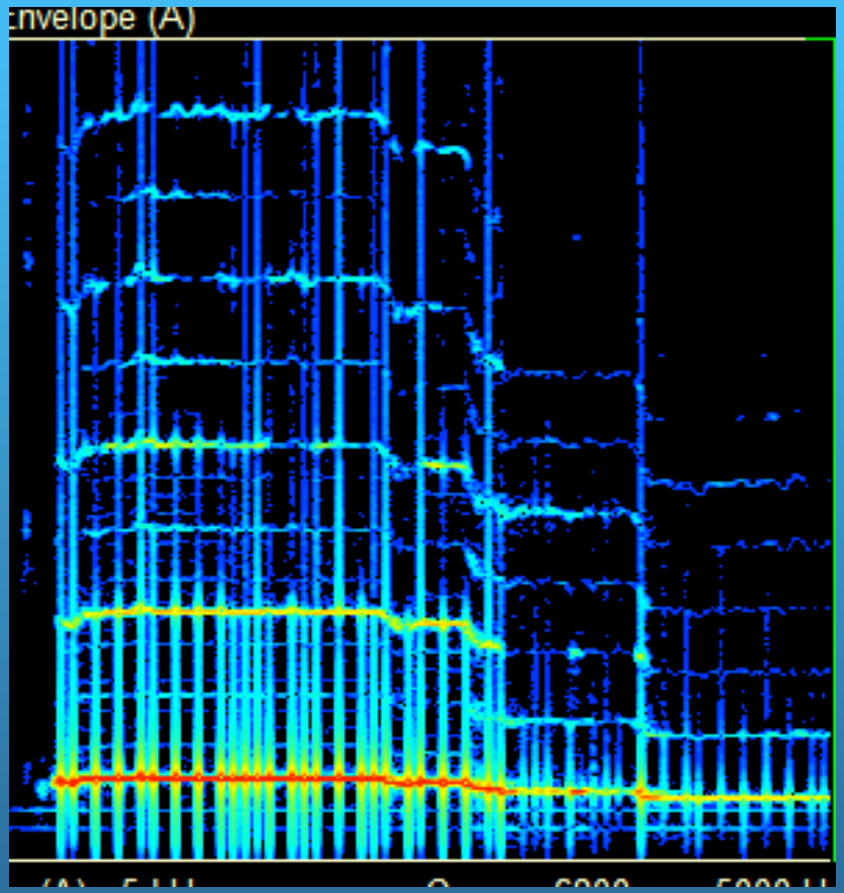


Even lines in staccato [i] -vowel

Flute register (good)

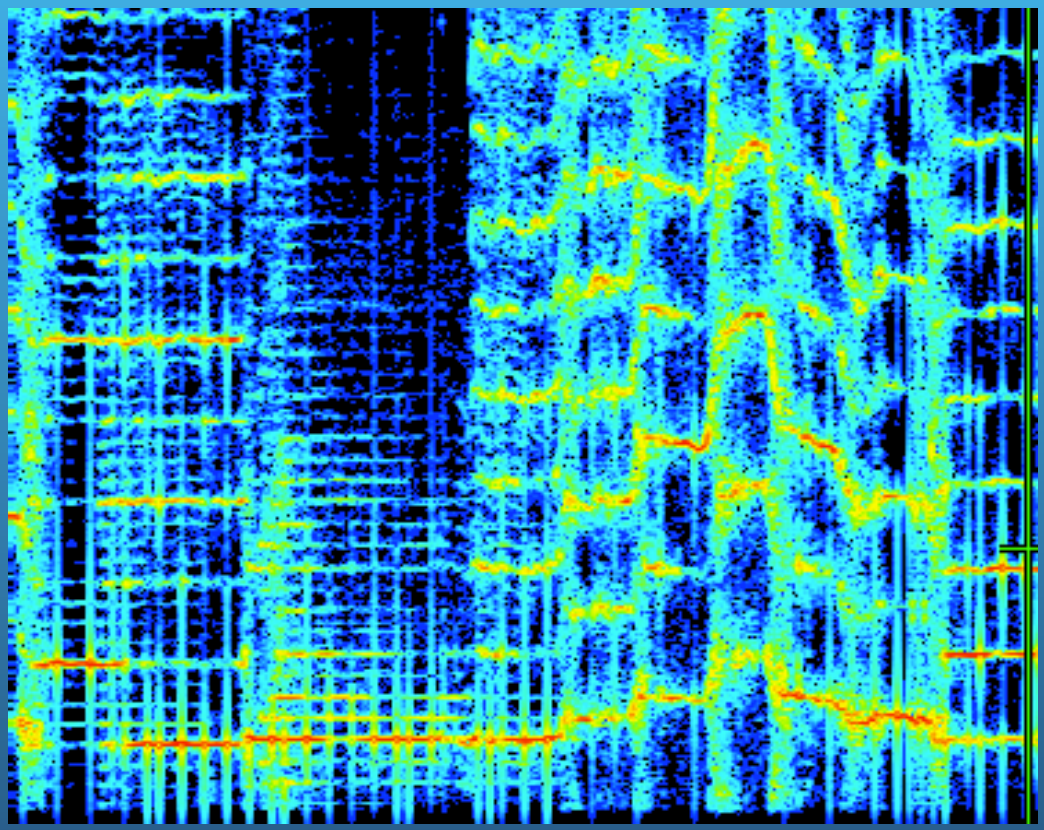


Breathy voice (VoceVista)

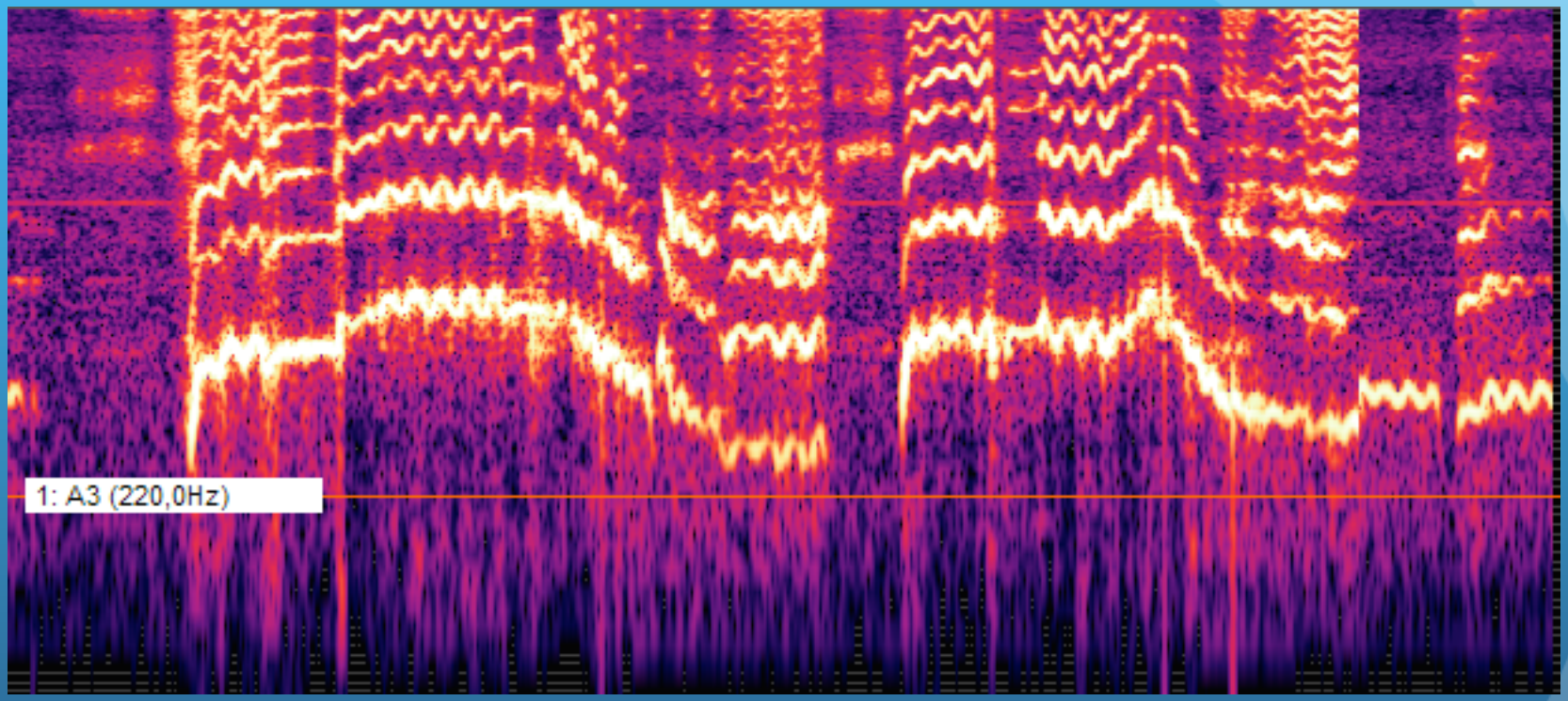


Black, empty area in higher harmonics
-breathiness and weaker body connection

Thick uneven harmonics lines and messy picture – subglottal pressure (Voce Vista) - often too much pressure



Thick uneven harmonics lines and messy picture (Sygyt) - even more pressure



Spectrum

The description of the components of the sound waves (frequency and amplitude)

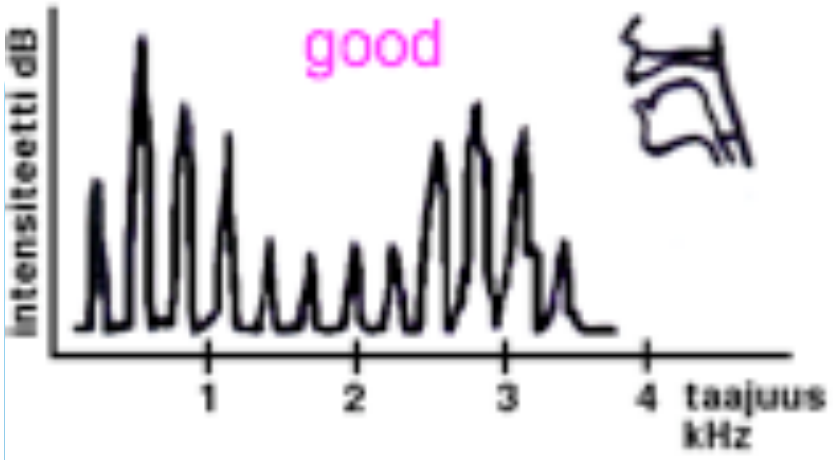
= a crosscut from the spectrogram. Colouring grades can be seen as peaks (dB).

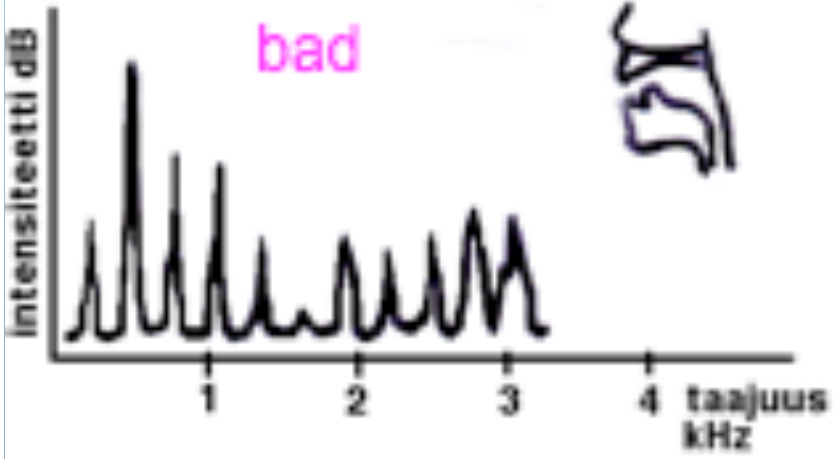
Sundberg:

If the difference between highest peaks is:

less than 10 dB – good voice quality

more than 20 dB – not good quality





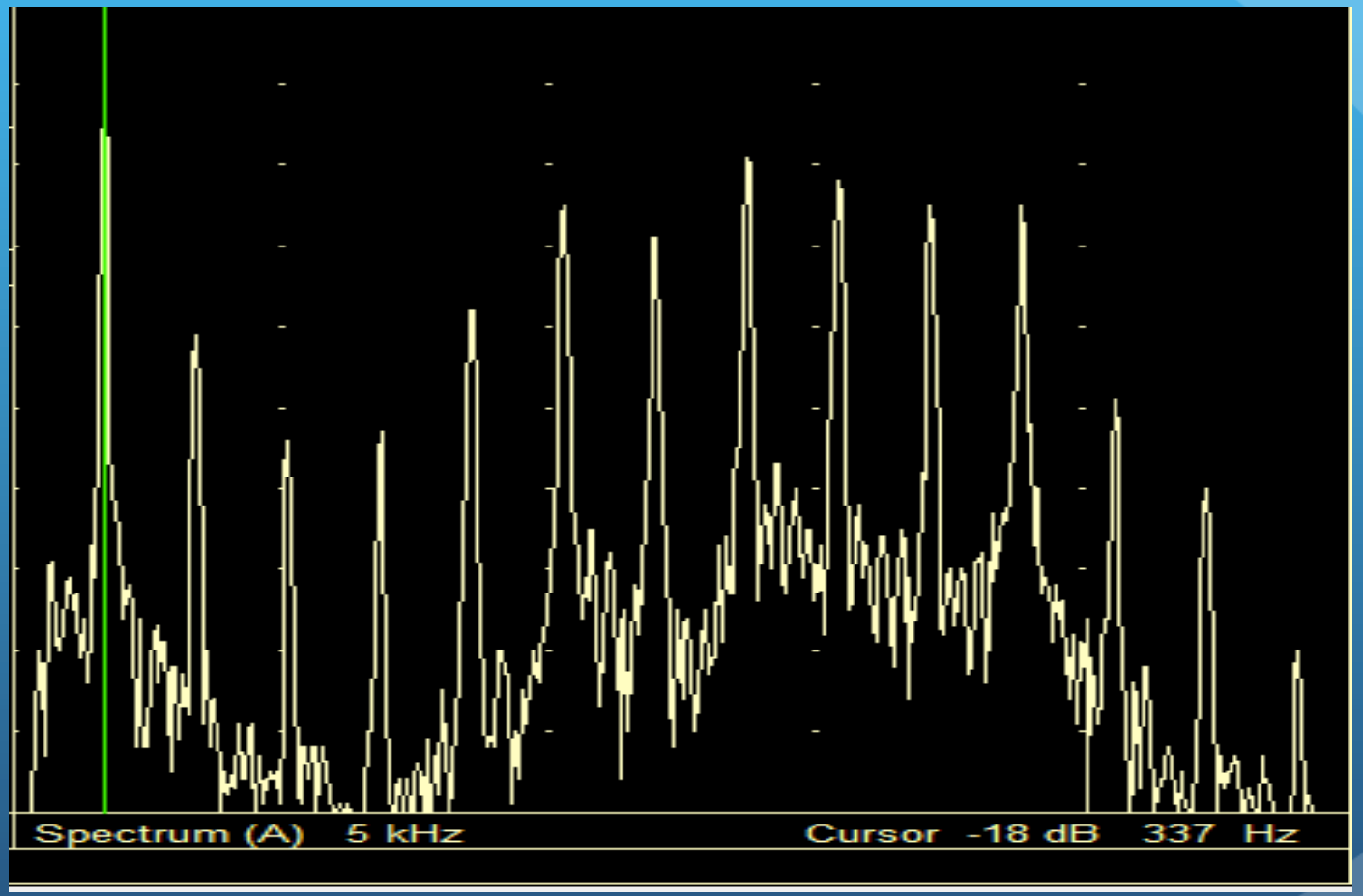
tongue blade is high;
roof of the tongue rises
from the pharynx
giving space

body of the tongue
down,
apex upright position,
roof of the tongue
sinks down to the
pharynx reducing
space

Sundberg

Spectrum (VoceVista)

Good quality,difference of the highest peaks less than -10dB



Donald Miller

VOCEVISTA & EGG

EGG - electroglottography

- Electrodes of EGG are set near glottis. During phonation the equipment registers the electric impedance between those electrodes, which correlates to the grade of the glottal closing and opening phase.

History of electroglottogaphy

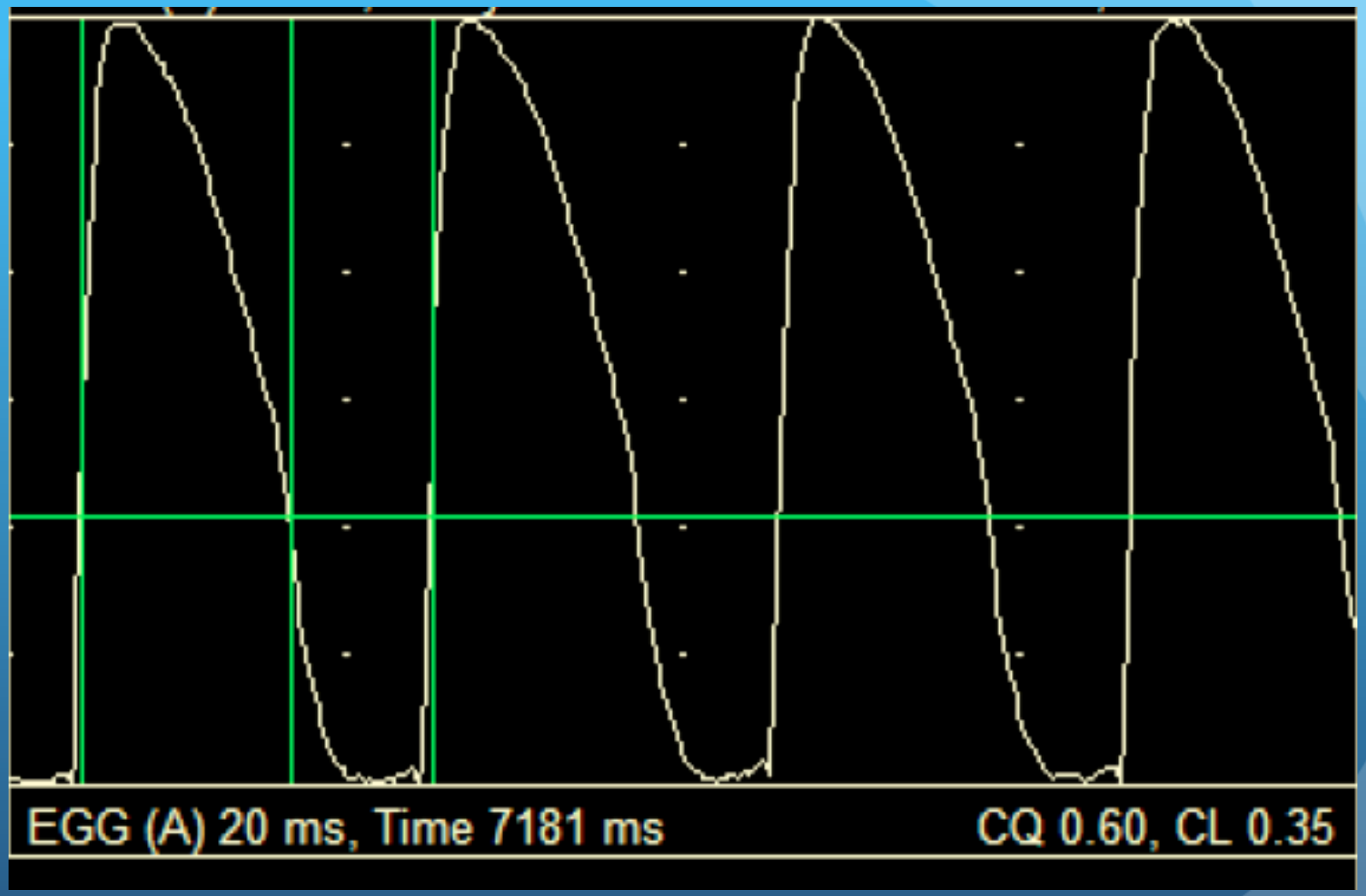
- first developed by Fabre 1957
- remarkable adds created by Fourcin 1971 and Abberton both Frokjaer-Jensen 1968 and Thorvaldsen

Producers of commercial equipments by Laryngograph Ltd., Synchrovoice and F-J Electronics, D. Miller

Closed quotient

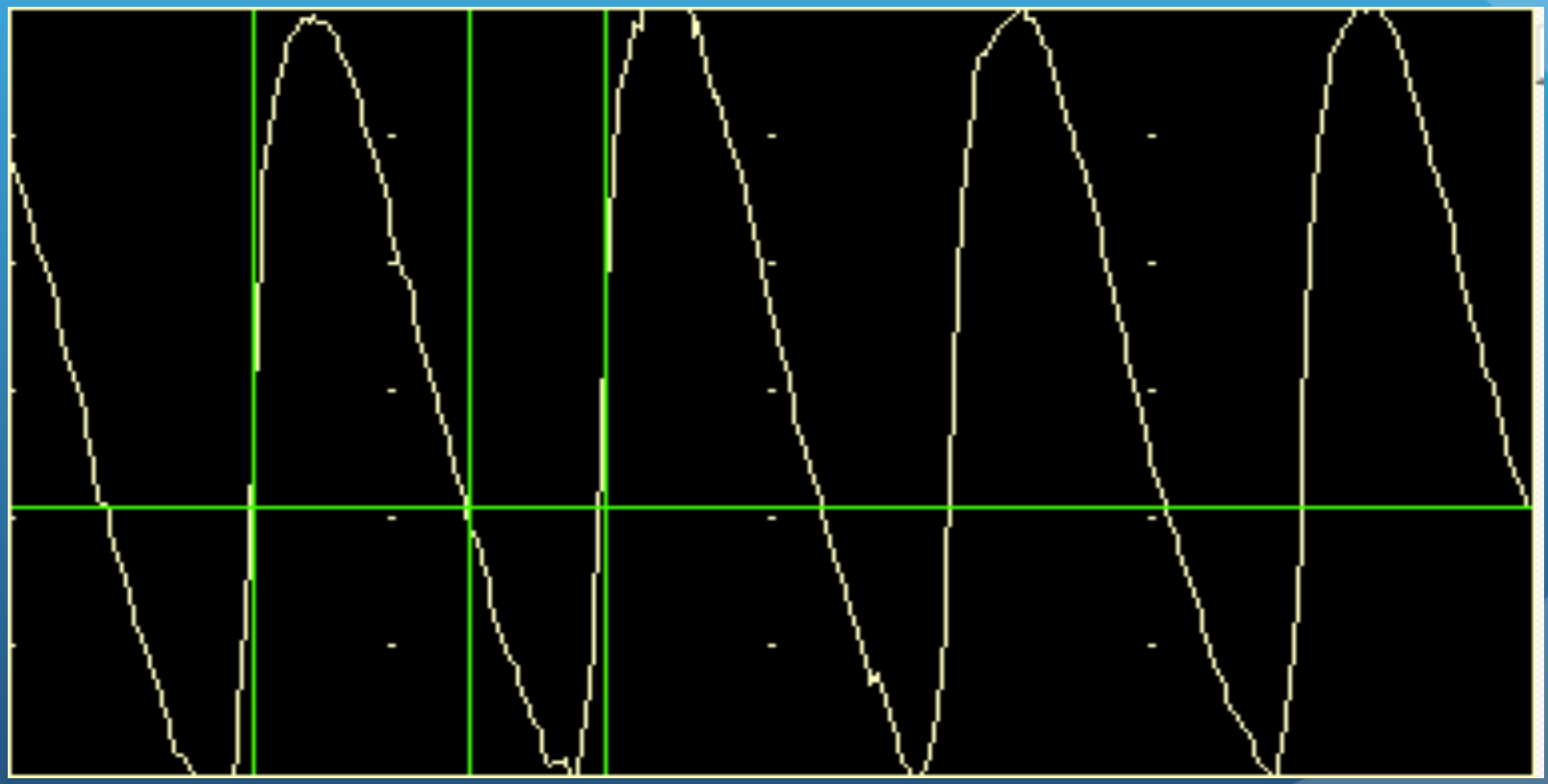
- quotient < 0.4 <=> hypo-adduction
- quotient > 0.6 <=> hyper-adduction

vowel [a]

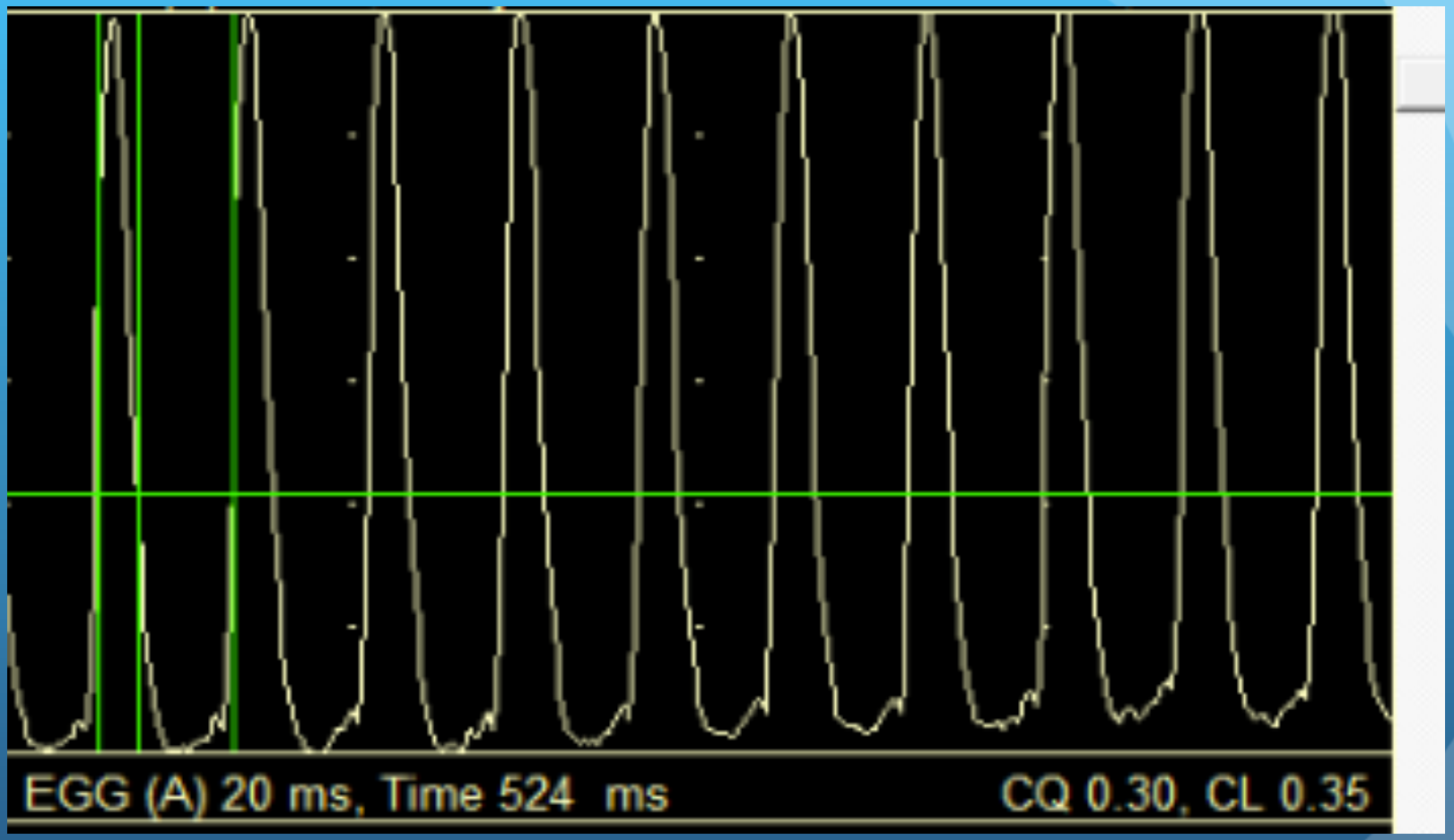


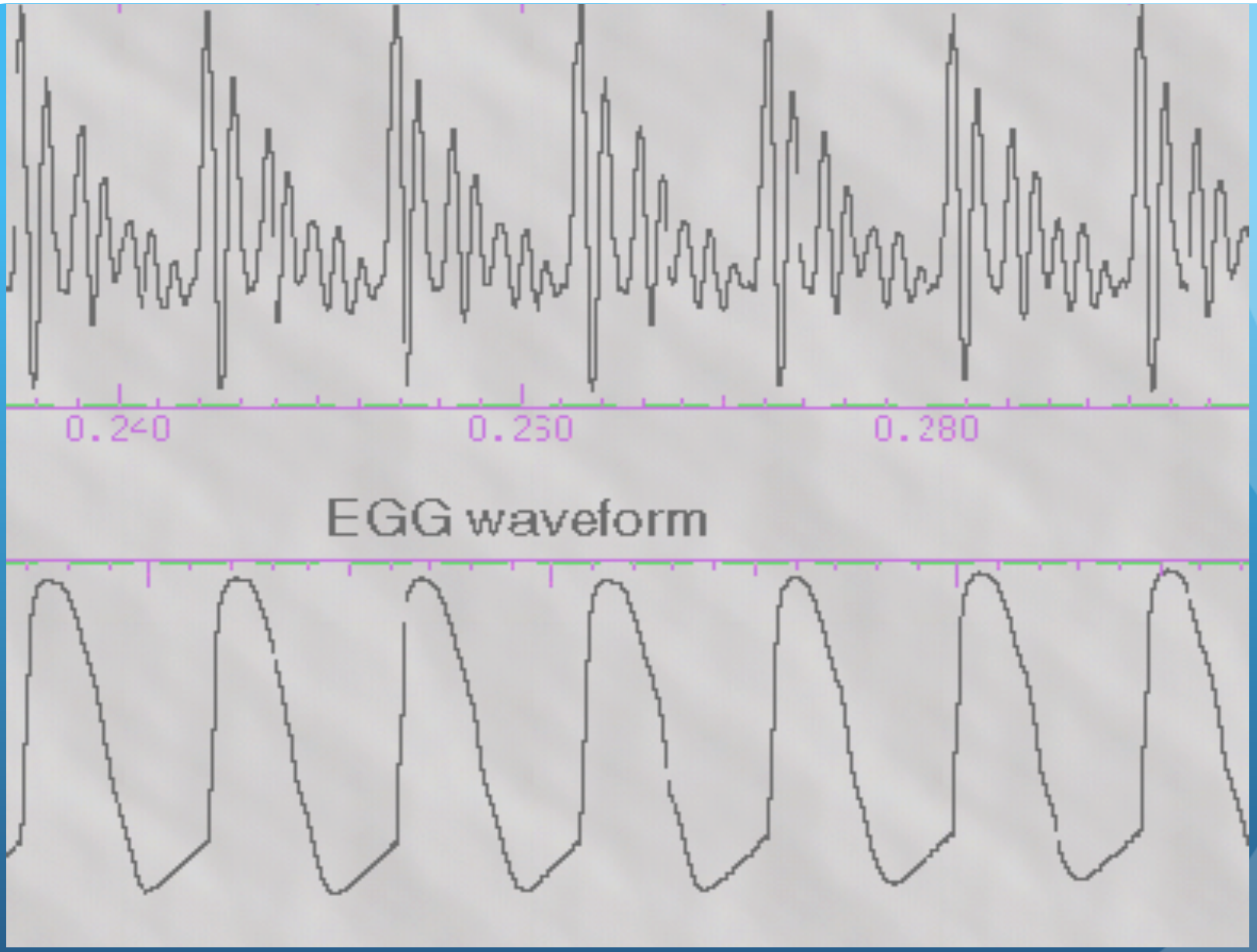
EGG shows the register mode

- chest register wide

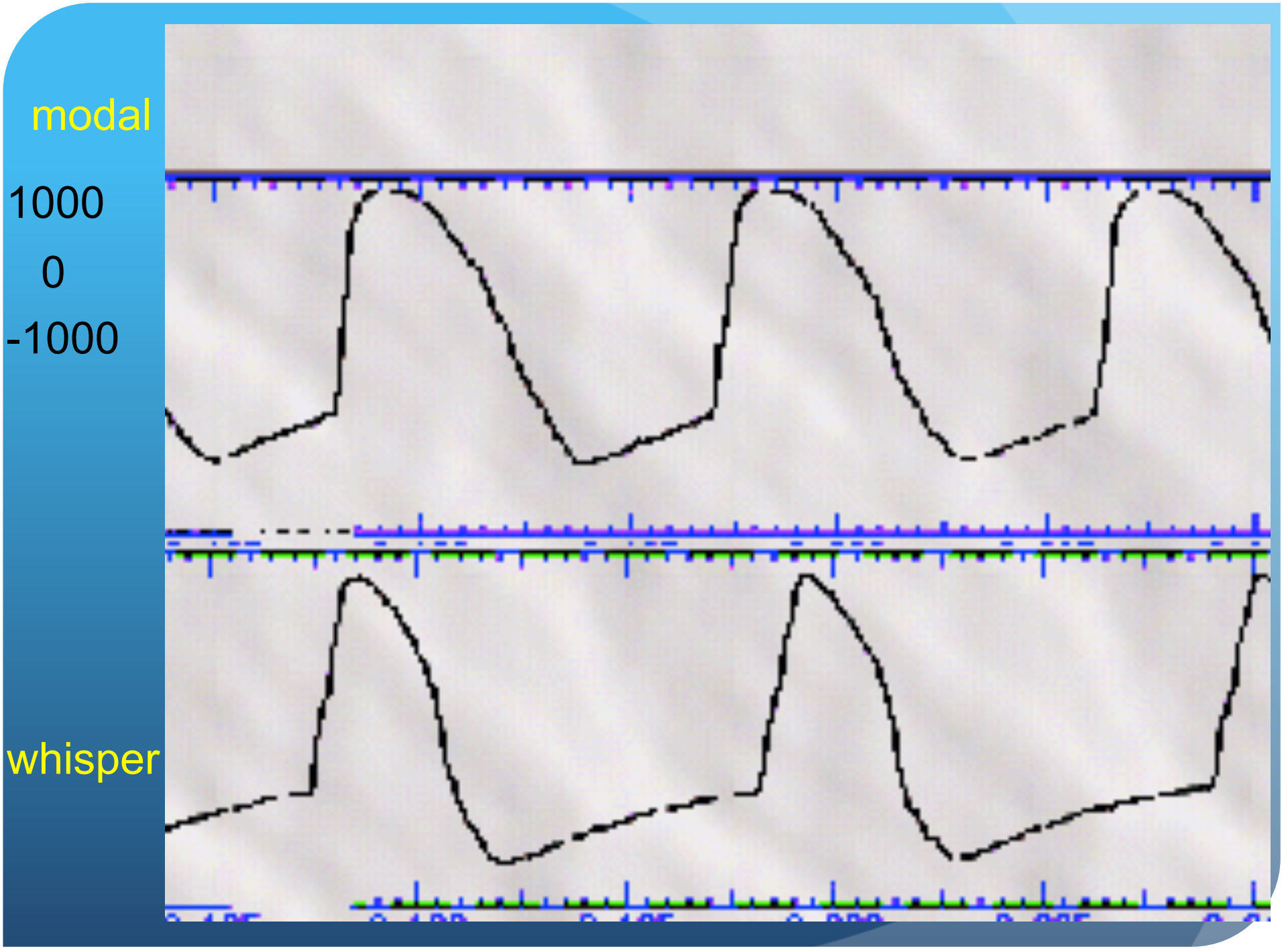


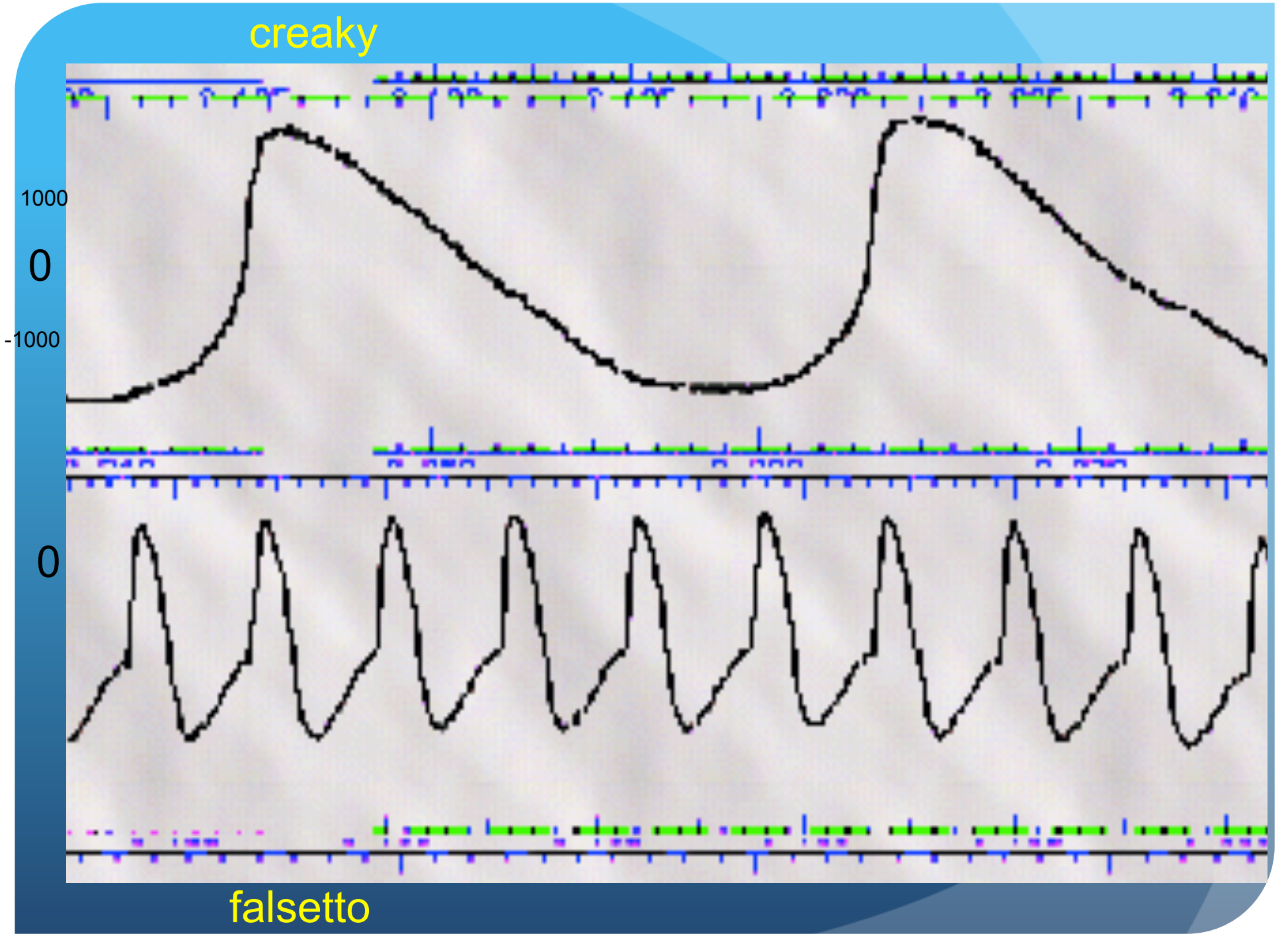
head register narrower



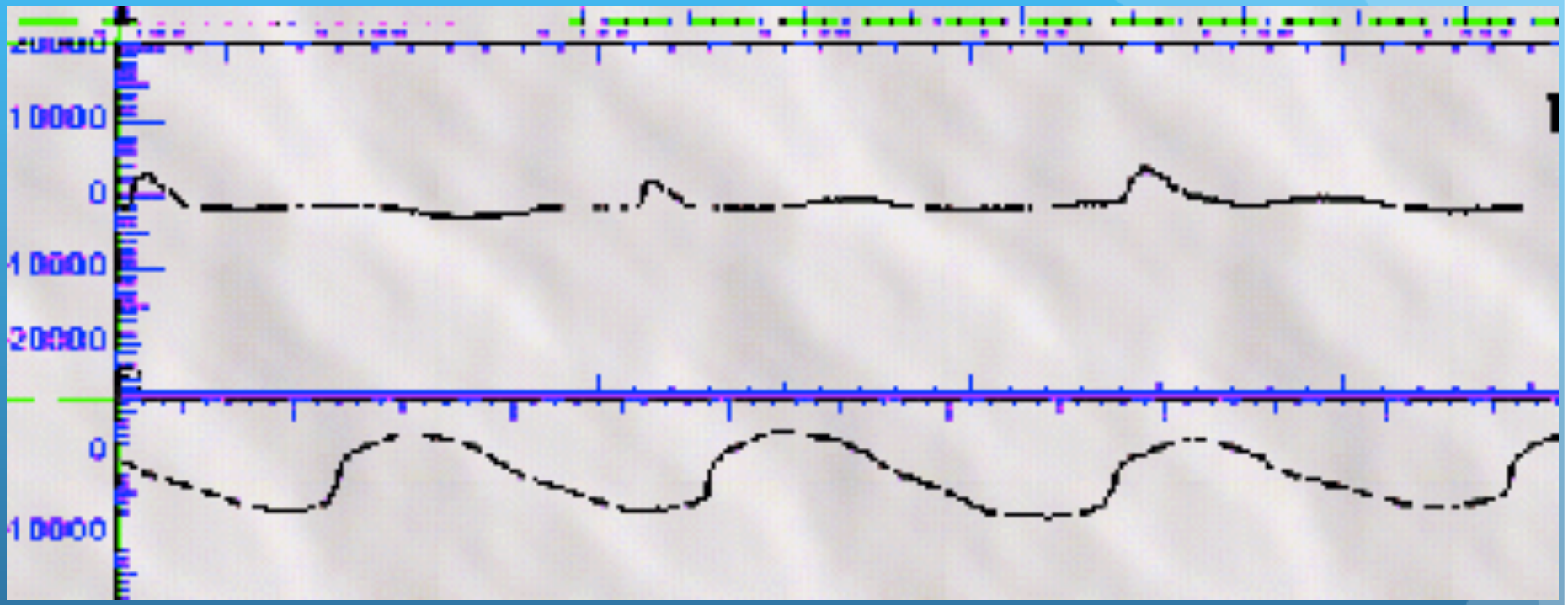


slides 30-39.: Pictures from website of University of Stuttgart


modal
1000
0
-1000
whisper


creaky
1000
0
-1000
0
falsetto

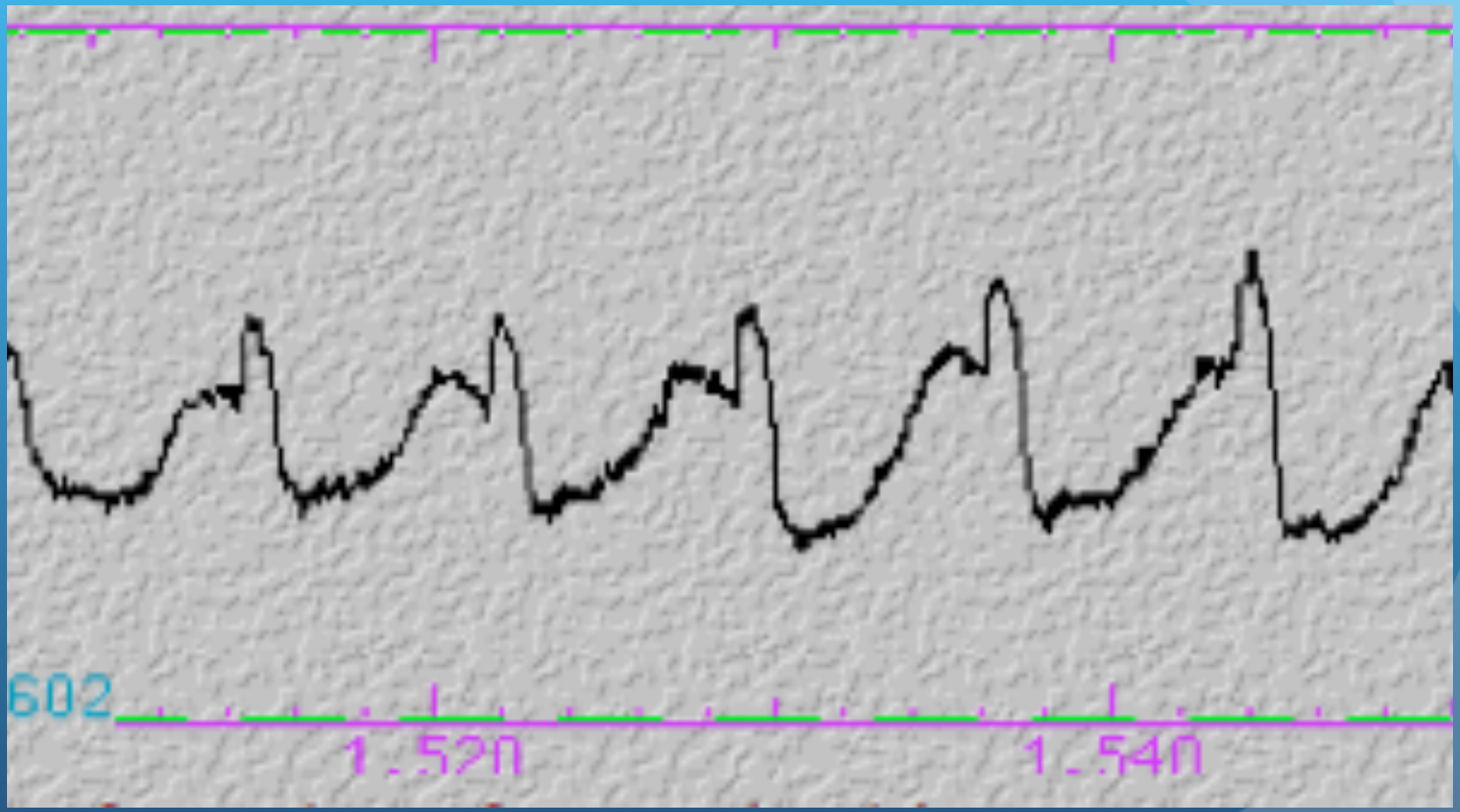
breathy



tensed

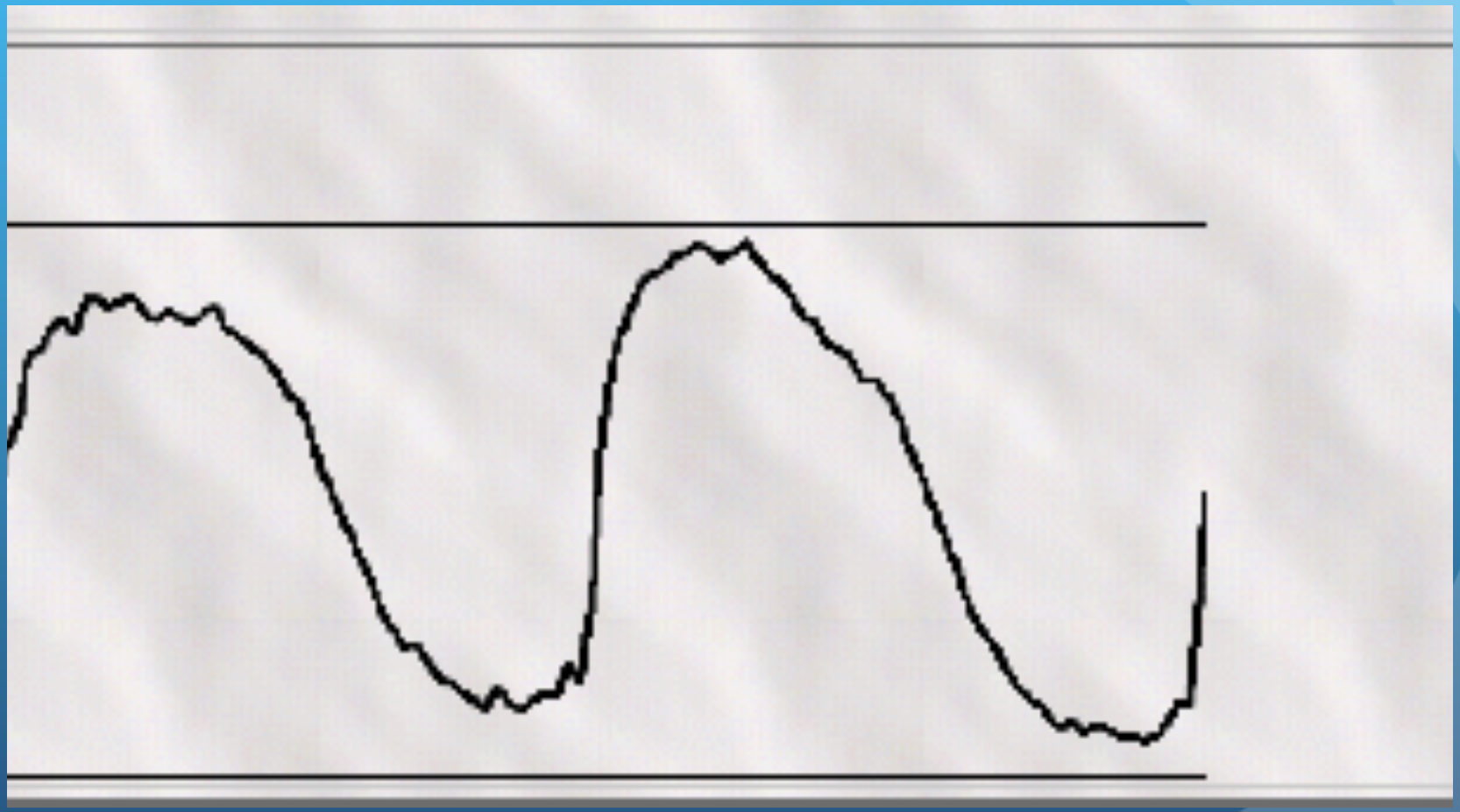
Vocal nodules

(Motta & Al. 1990)

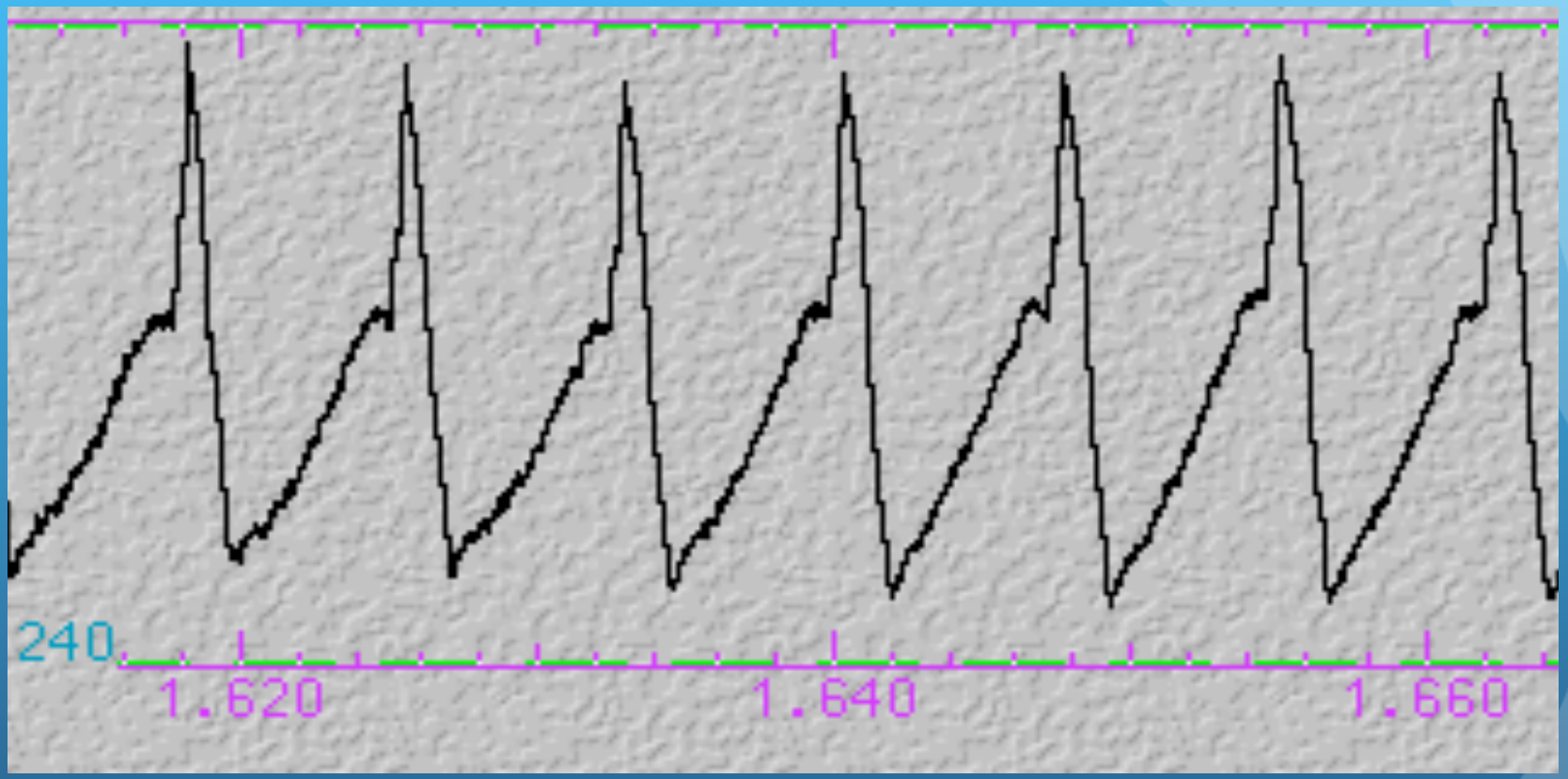


Childers and Krishnamurthy (1985)

vocal fold contact unstable

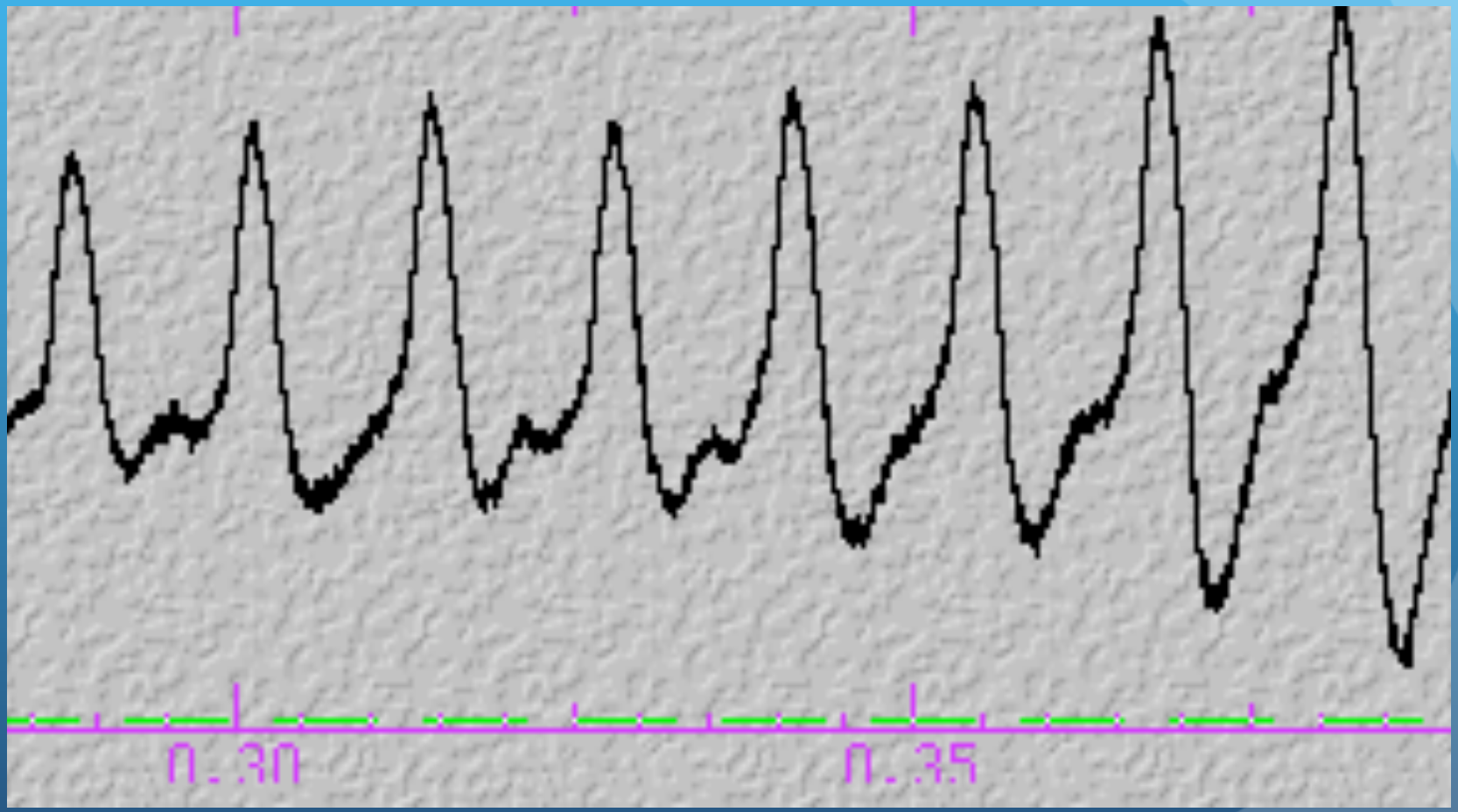


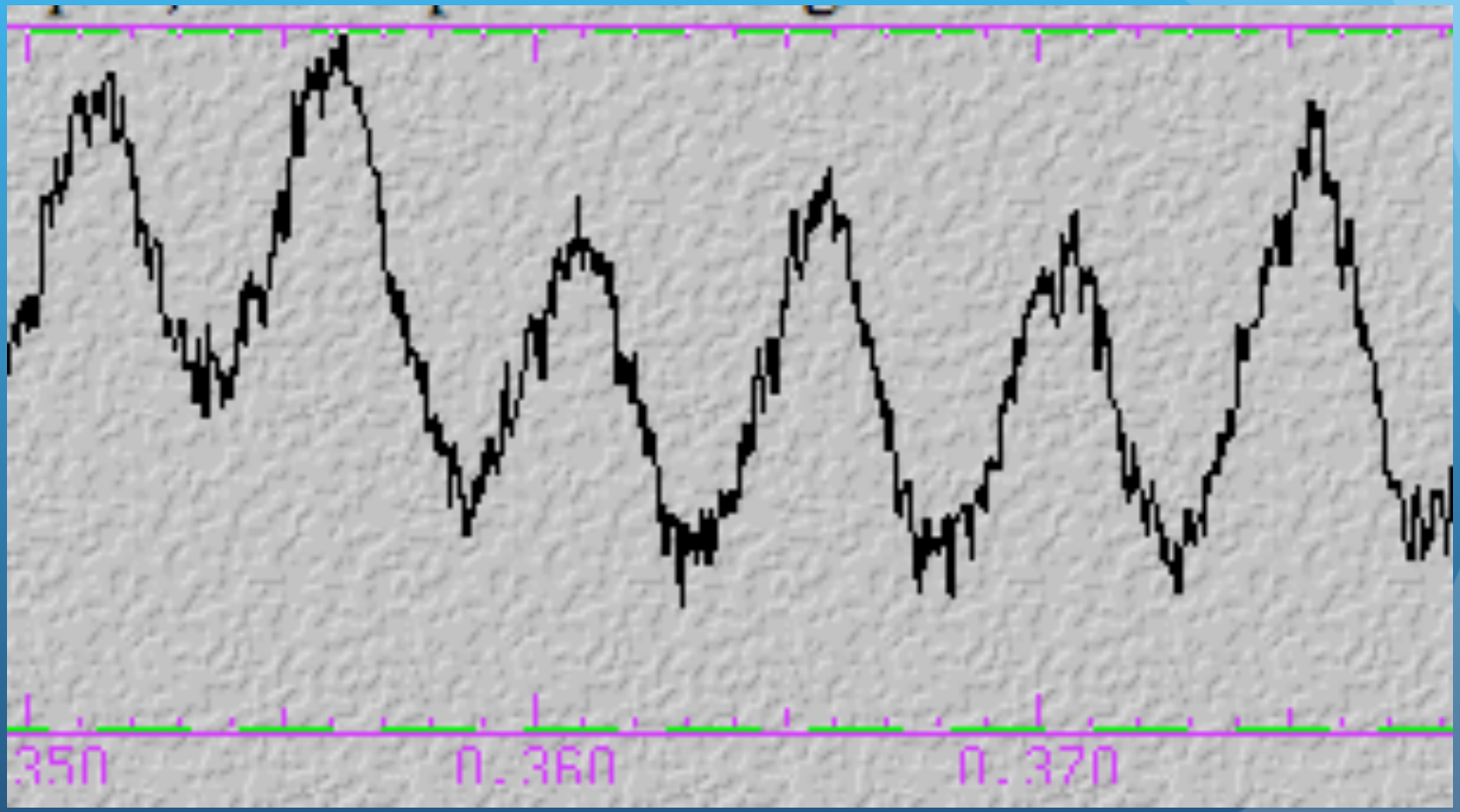
Pathological voices (Motta *et al.*, 1990)



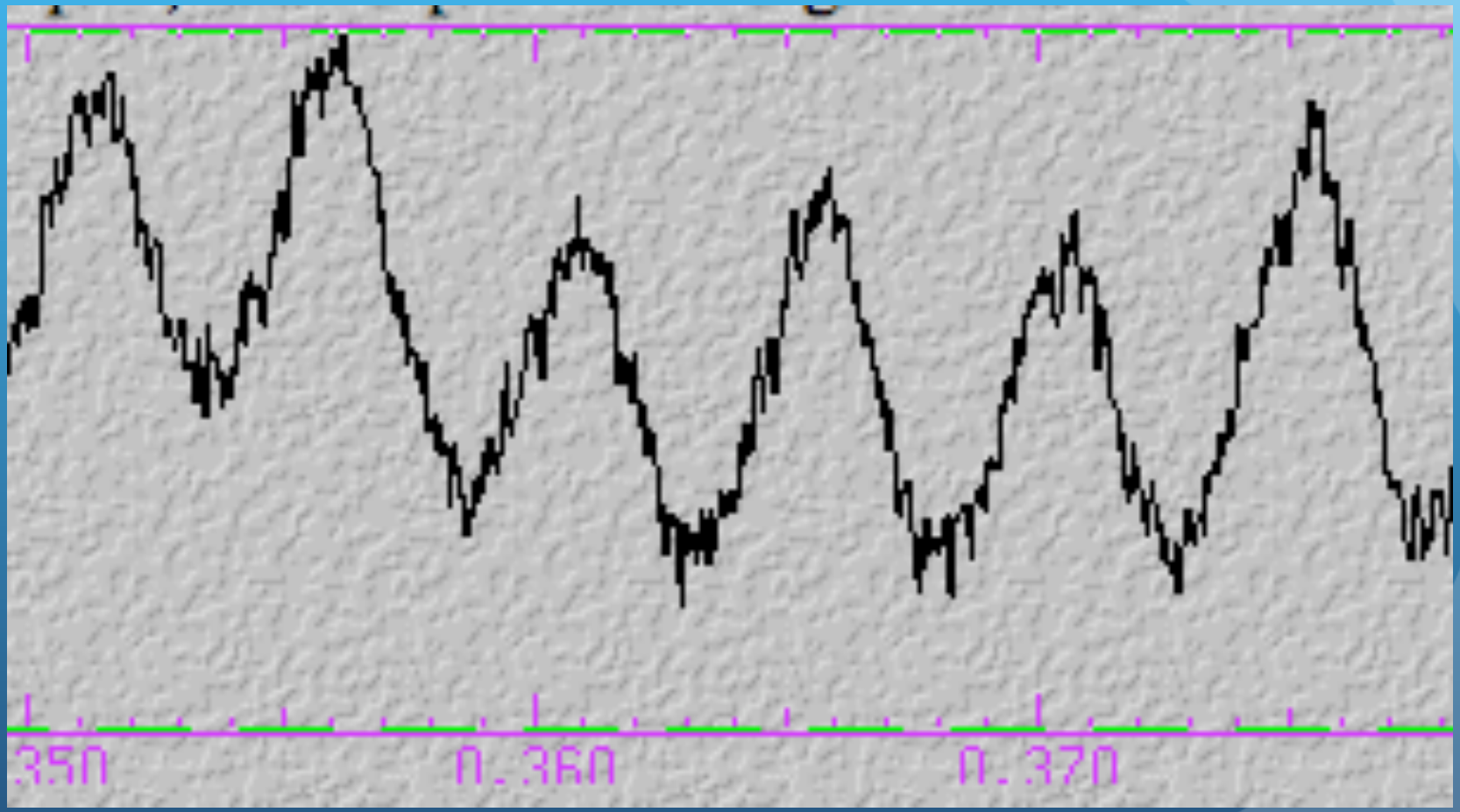
The amplitude perturbation of the EGG correlates well with perceptual judgements of voice hoarseness (Haji *et al.*, 1986)

Esling, 1984; Dejonckere & Lebacq, 1985; Houben *et al.*, 1992




350
0.360
0.370

Vieira *et al.*, 1996



So far there is no equipment and probably will never be which would be able to reach the level of the sensitive ear of human being.

Still we can benefit lots of softwares that show different kind of aspects from the voice.

In order to get reliable results it is important to remember to check the input level in all recordings.