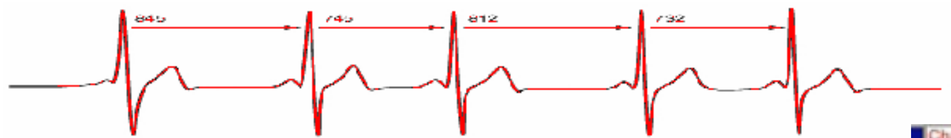
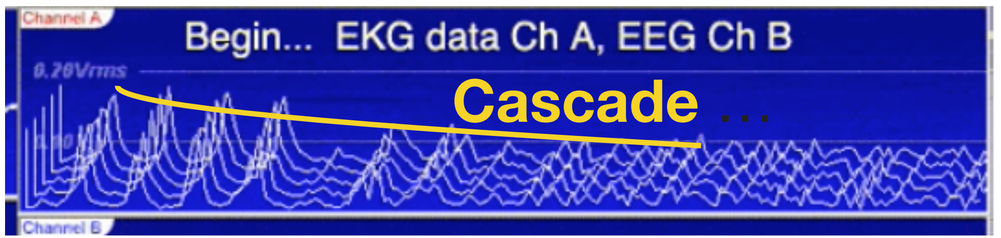
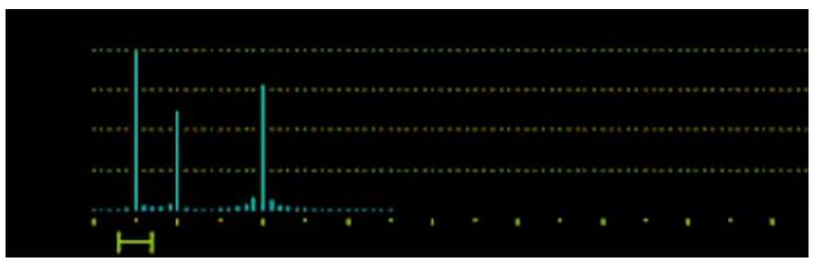
Heart Coherence - Dan Winter



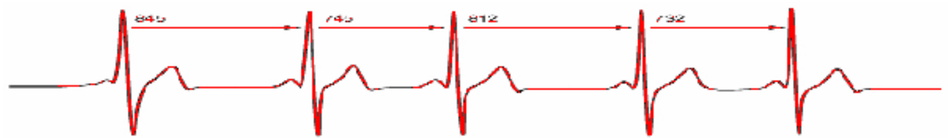


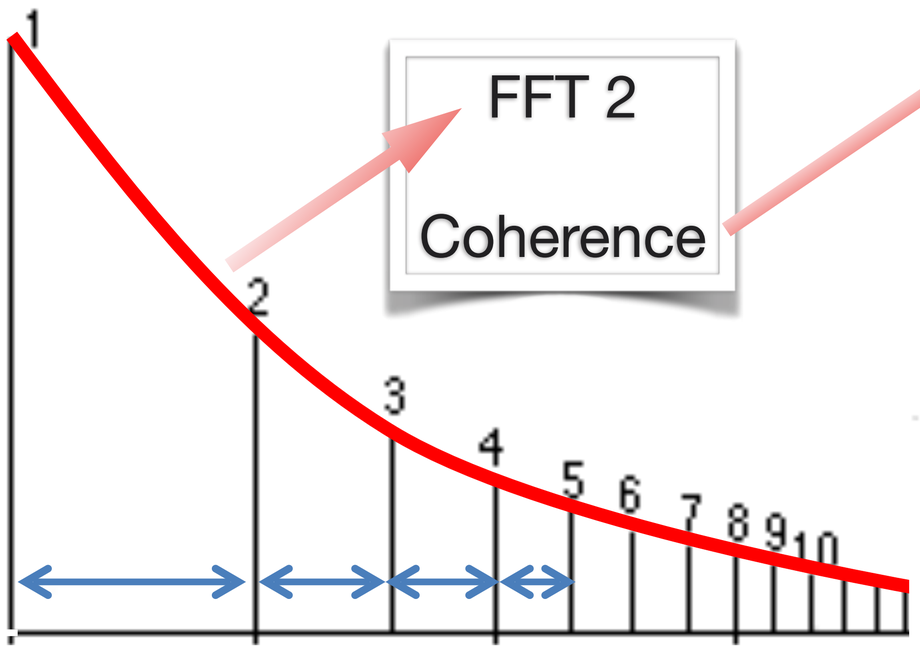
Musical ratios ??
Harmony ??

Coherence ??



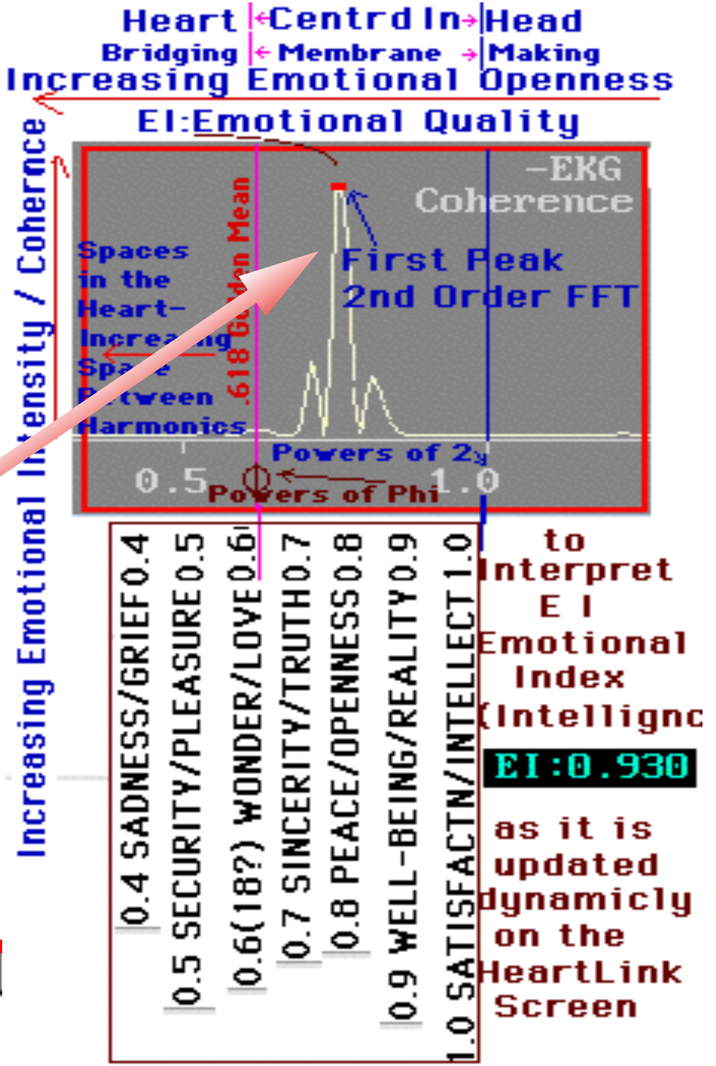
Heart Coherence - Dan Winter



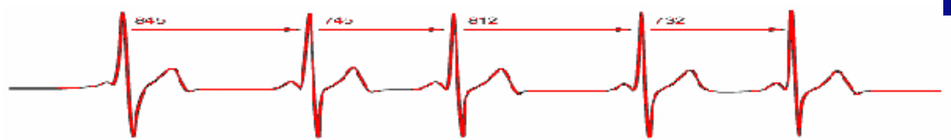


FFT 2

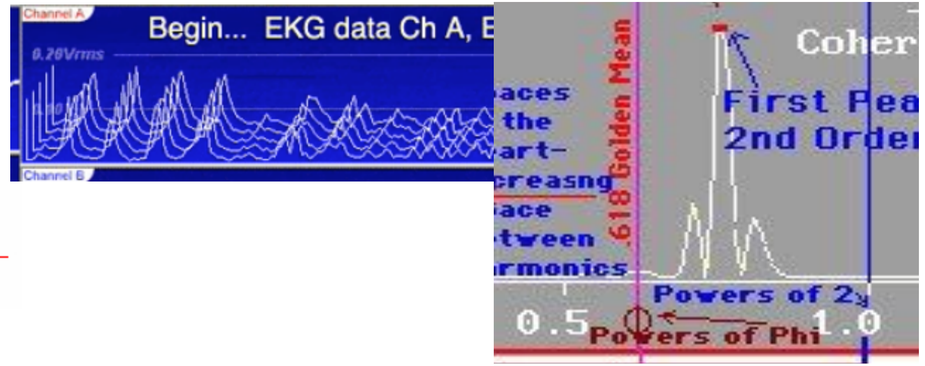
Coherence



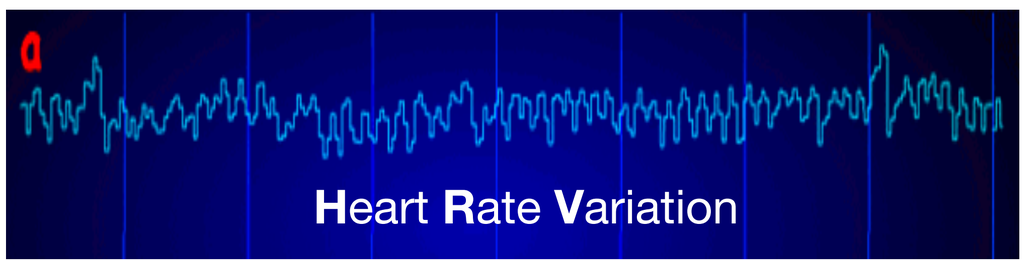
Heart Coherence - Dan Winter

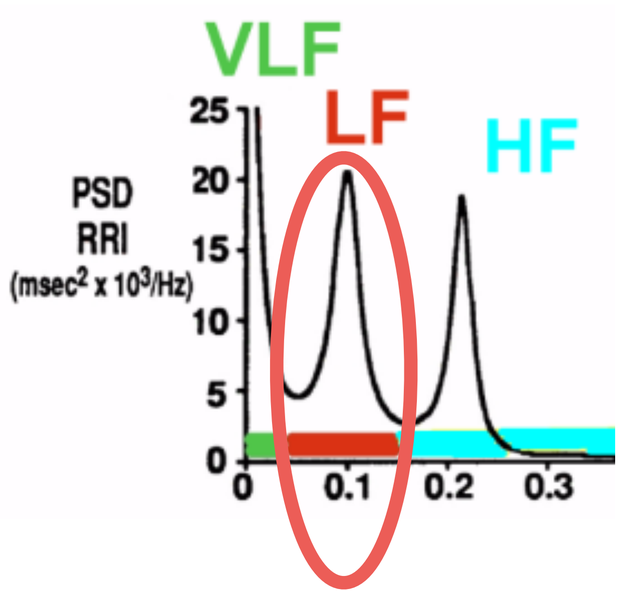


raw data of electrical pulses

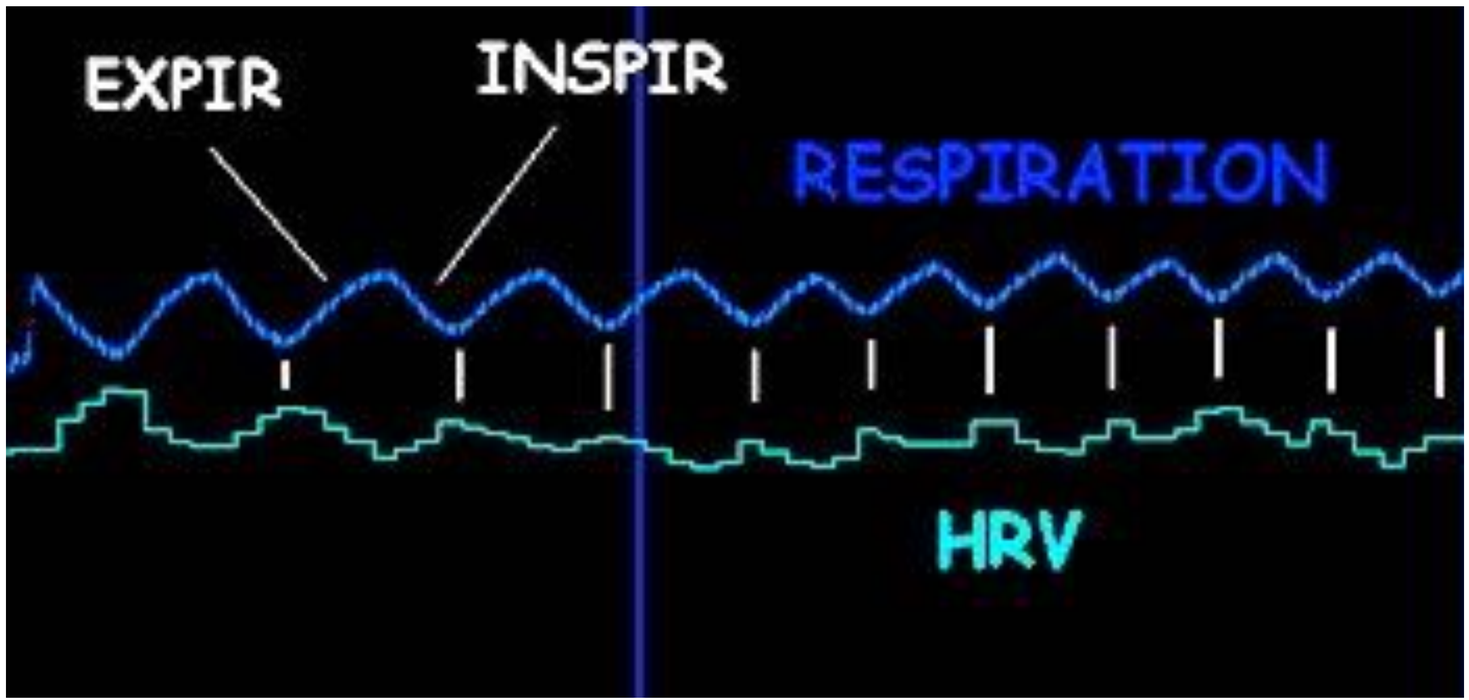


Heart Coherence - HeartMath





H R V & Respiration => RSA



HRV spectrum bands & single peak Coherence

HRV **Coherence** was originally defined as the size of the biggest LF peak compared to the amplitude of the broad HRV spectra (VLF+LF+HF).

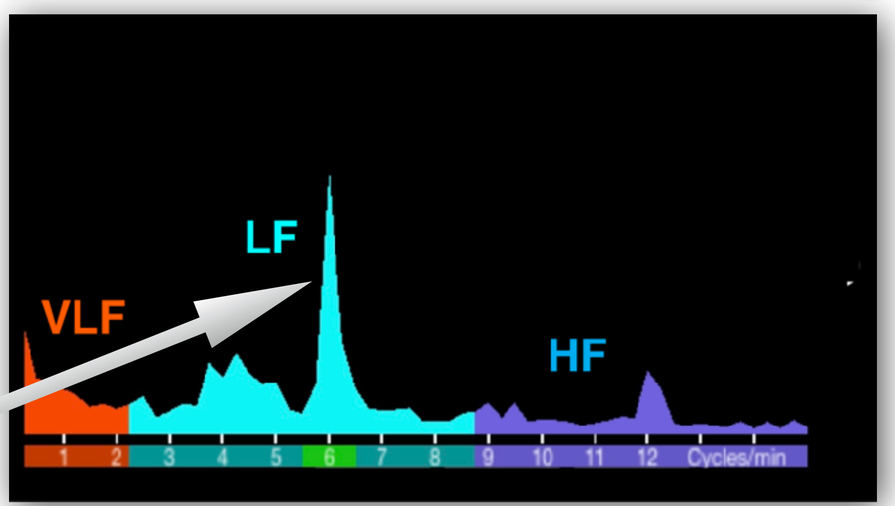
This way of analysis assumes you are breathing at a constant and fixed frequency (using a pacer around 0.1 Hz - 6 cycles/minute)) during the breathing session.

If the frequency of your breathing is changing during the session, the LF peak will be larger and its size will be affected, resulting a lower coherence value.

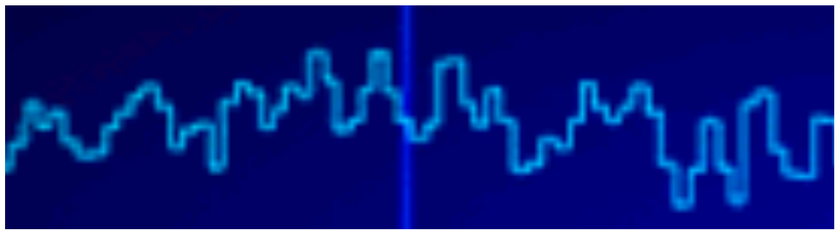
3 bands are usually described in HRV spectrum:

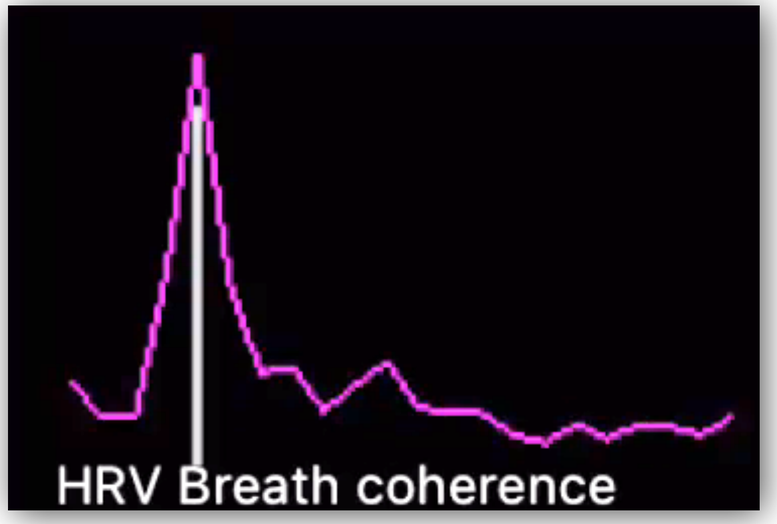
- **The VLF band** (up to 2.4 cycles per minute)
- **The LF band** (9 to 24 cycles per minute)
- **The HF band** (9 to 24 cycles per minute)

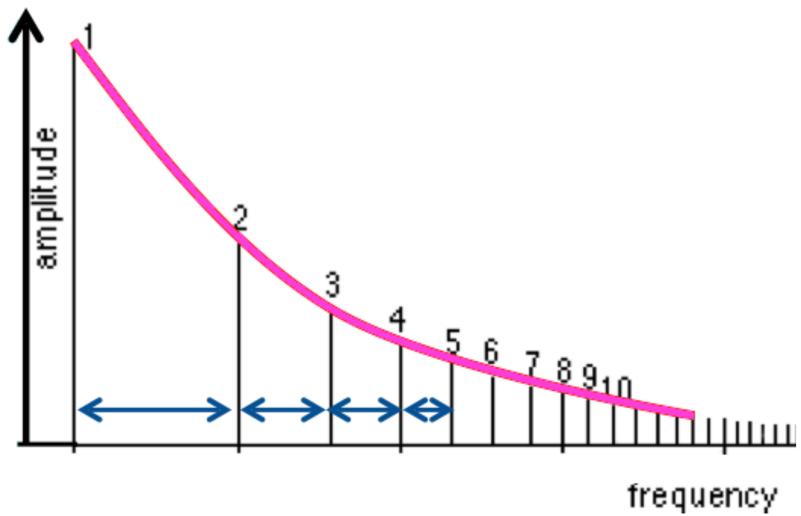
biggest LF peak



Broad spectra Coherence (FFT3)

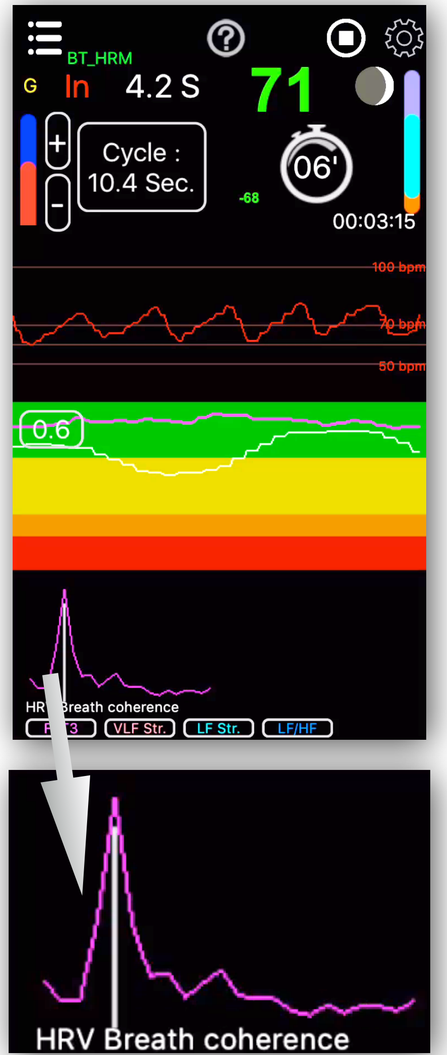






also taking care of **ALL**
good
or
bad music notes !!

Broad spectra Coherence (FFT3)

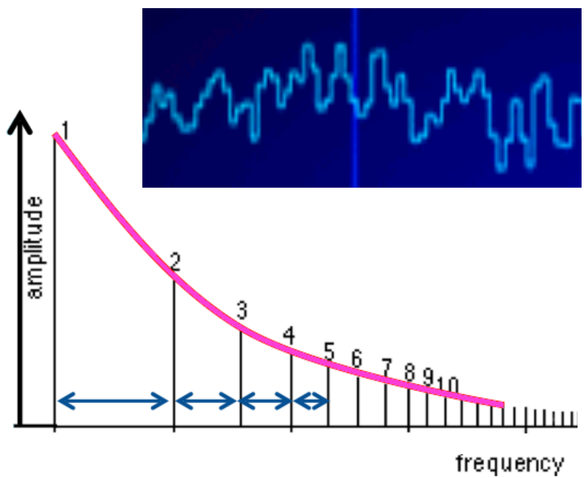


Another way to analyse the coherence from the heart HRV spectrum, is to analyse the relationship between all the peaks present in the spectrum.
The more these peaks will be related to musical (or golden) ratios, the more your HRV will be coherent (harmonic inclusiveness, fractal).

We have developped a new kind of mathematical analysis of 3rd order FFT (Fast Fourier Transform) of the broad HRV spectra.

The musical relationship between the peaks is defined by musical (or golden) ratios. These ratios are related by the respective sizes of the peaks and their relative position in the spectrum.

This could be visualized as an analysis for regularly spaced patterns in the shape of the purple line linking all the peaks of the spectrum.



white curve: single peak Coherence analysis

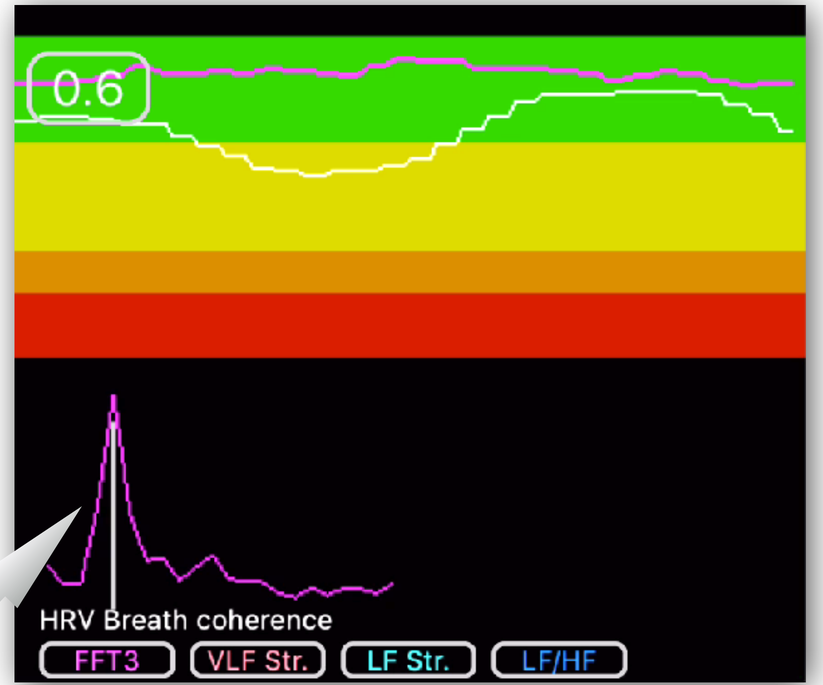
pink curve: 3rd order FFT Coherence (FFT3)
of the whole HRV spectrum

orange curve: VLF Stress

light blue curve: LF Stress

dark blue curve: HF Stress

VLF Stress is related to short term stress;
LF Stress is related to long term stress;
HF Stress is related to emotional baggage.

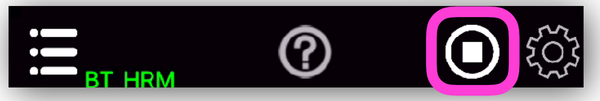


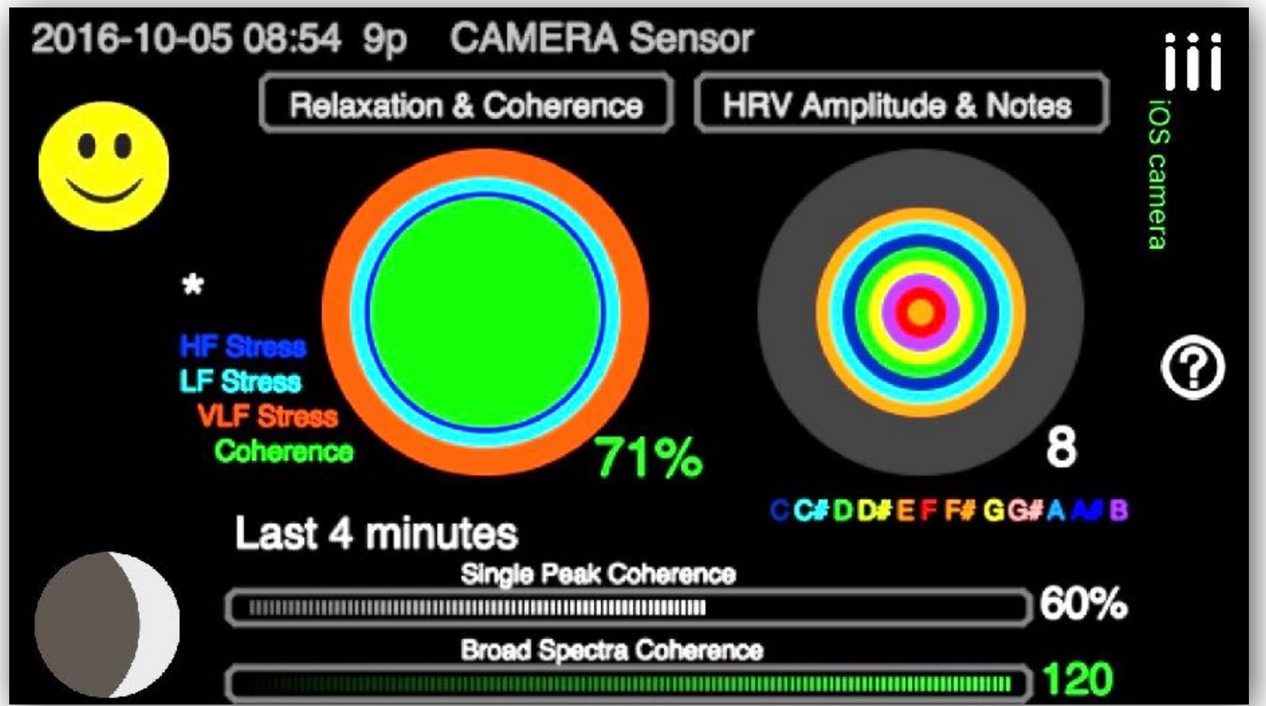
Coherence peak of the 3rd order FFT analysis
(of the broad HRV spectra)

The vertical white line is at 0.1 Hz (6 cycles/min).

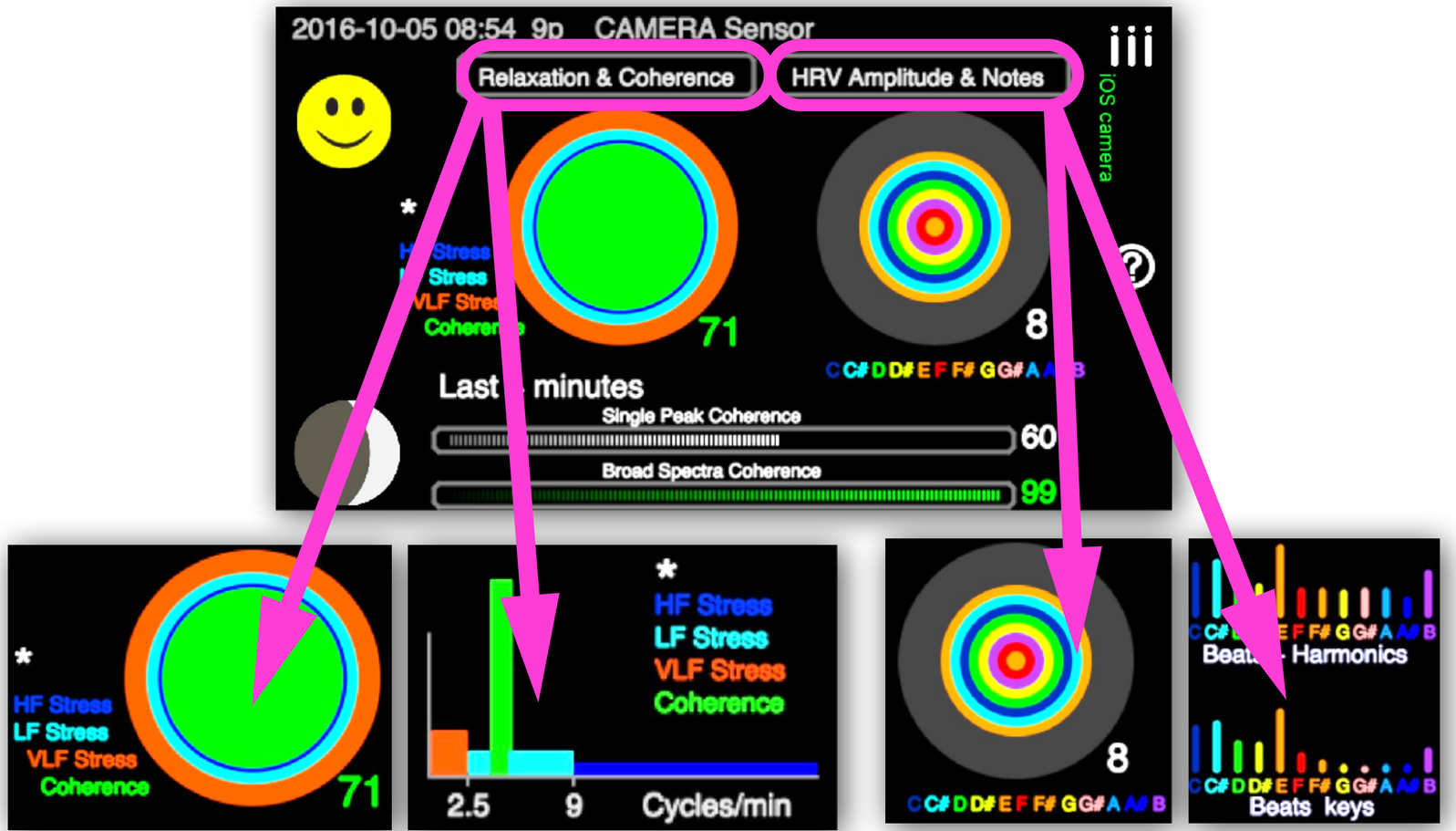
Touch the buttons
to show/hide the curves

Press STOP to finalize the session
and access graphic analysis

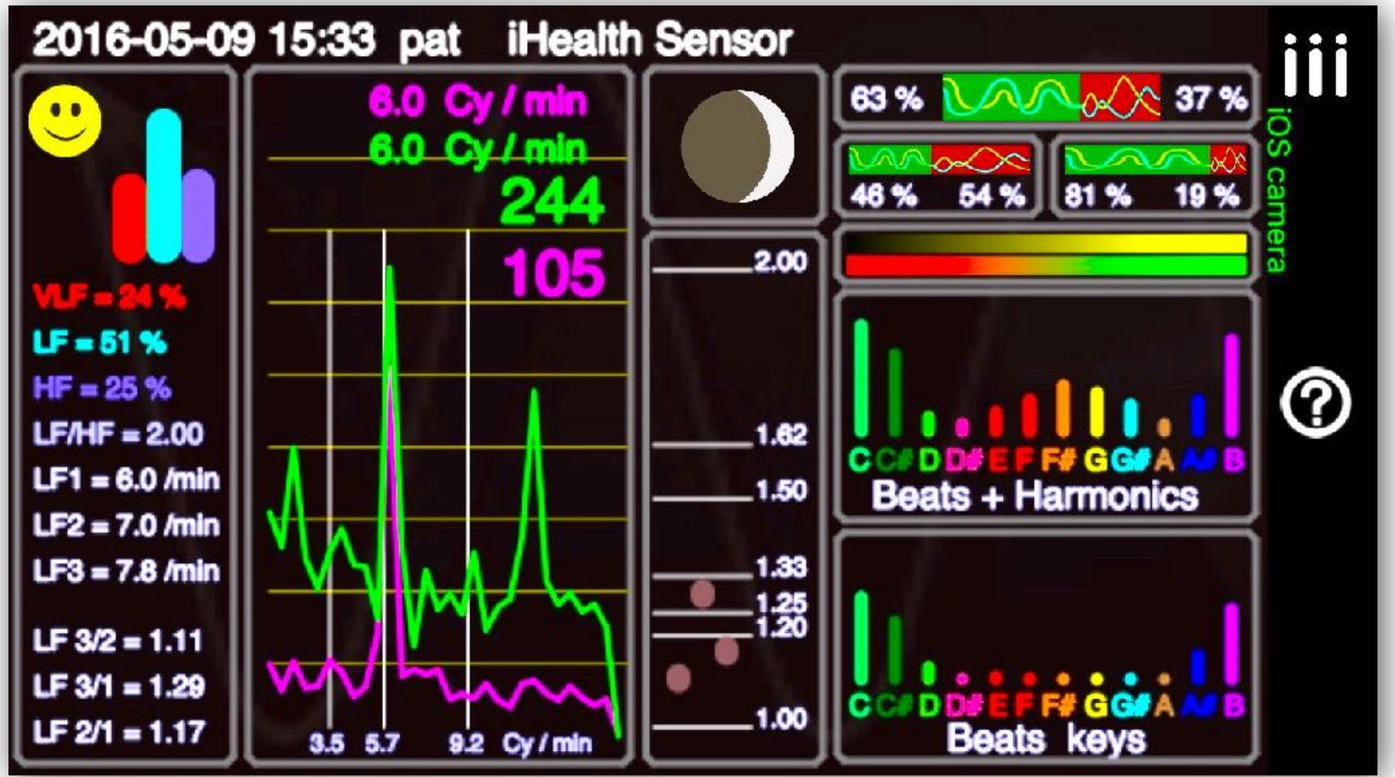




Touch the top buttons to display different graphs



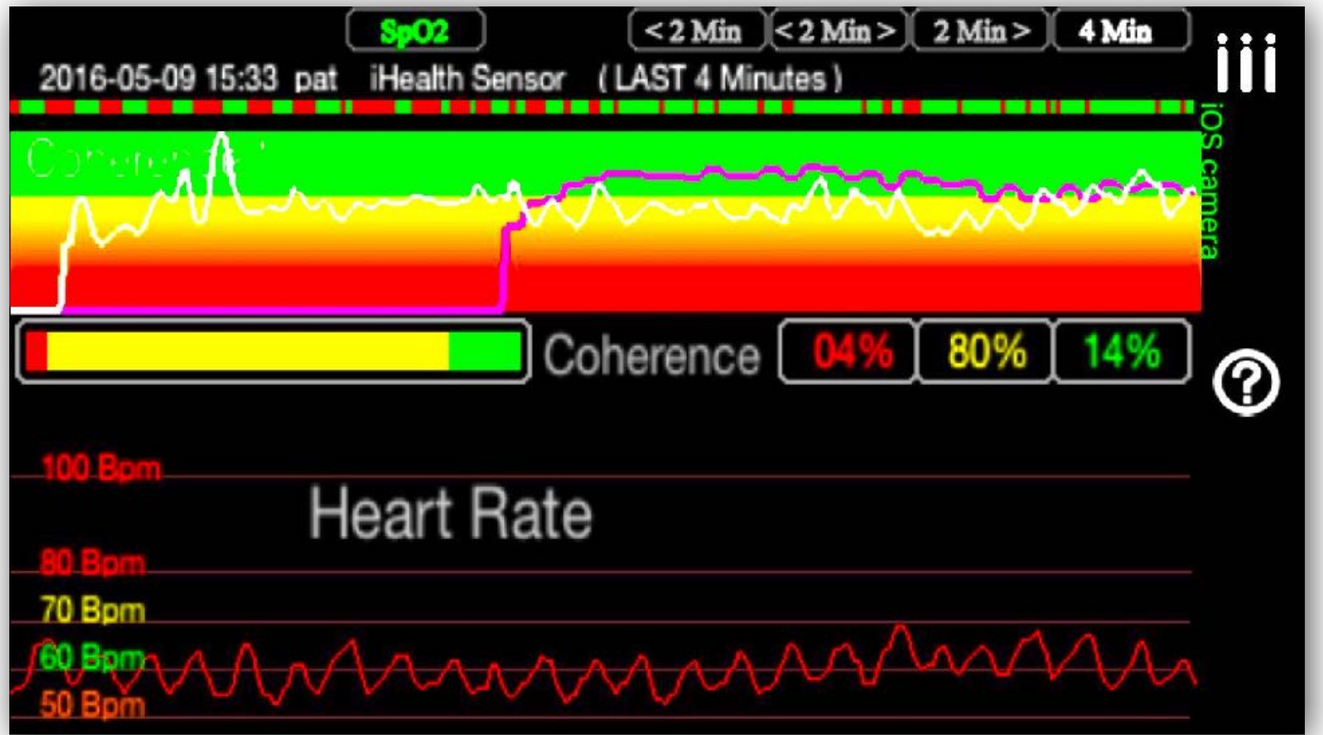
Dash Board of a training breathing record



Last 4 minutes averaging

Coherence display options:
full FFT3 coherence vs simple dominant harmonic amplitude coherence

see : « How iTHRVE measures coherence »



HRV % Coherence evolution over time

Options to display graphs:

- Long Term Stress Level
- Short Term Stress Level
- LF/HF
- FFT3: heart/breath Coherence (by third order spectrum analysis)
- Coher(ence) curve by simple single dominant harmonic amplitude

Night Heart Rate Analysis

The top bar displays the colours related to the selected activities during the running time of your recording.

Moon Phase

Your Mood

Two ways of HRV display :

- orange: below 60
- - green: between 60 & 70
- - yellow: between 70 & 80
- - red: above 80 (beats /minute).

- BARS: Show/Hide top heart rate bar display.
- MIN: Minimum heart rate
- MEAN: Mean heart rate
- MAX: Max heart rate
- MinMax: Minimum to Maximum heart rate

Night Heart Rate Analysis

MinMax

MinMax(Minimum to Maximum heart rate) shows the amplitude of the HRV

Deep HRV amplitude:
Young & healthy

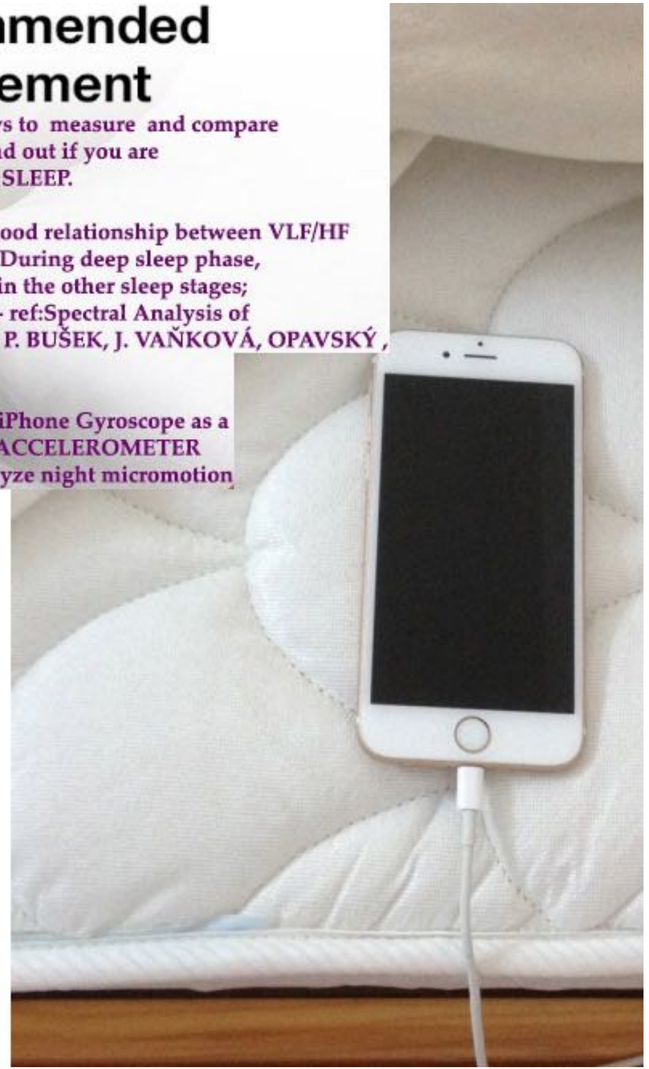
Lower HRV amplitude:
Old, less healthy or stressed

Recommended placement

itHRVe now features TWO Ways to measure and compare DEEP SLEEP ANALYSIS- to find out if you are getting the rejuvenating DEEP SLEEP.

- The first method- "There is a good relationship between VLF/HF ratio and the deep sleep phase: During deep sleep phase, VLF is significantly lower than in the other sleep stages; and HF is significantly higher" - ref:Spectral Analysis of Heart Rate Variability in Sleep P. BUŠEK, J. VAŇKOVÁ, OPAVSKÝ , Physiol. Res. 54: 369-376, 2005

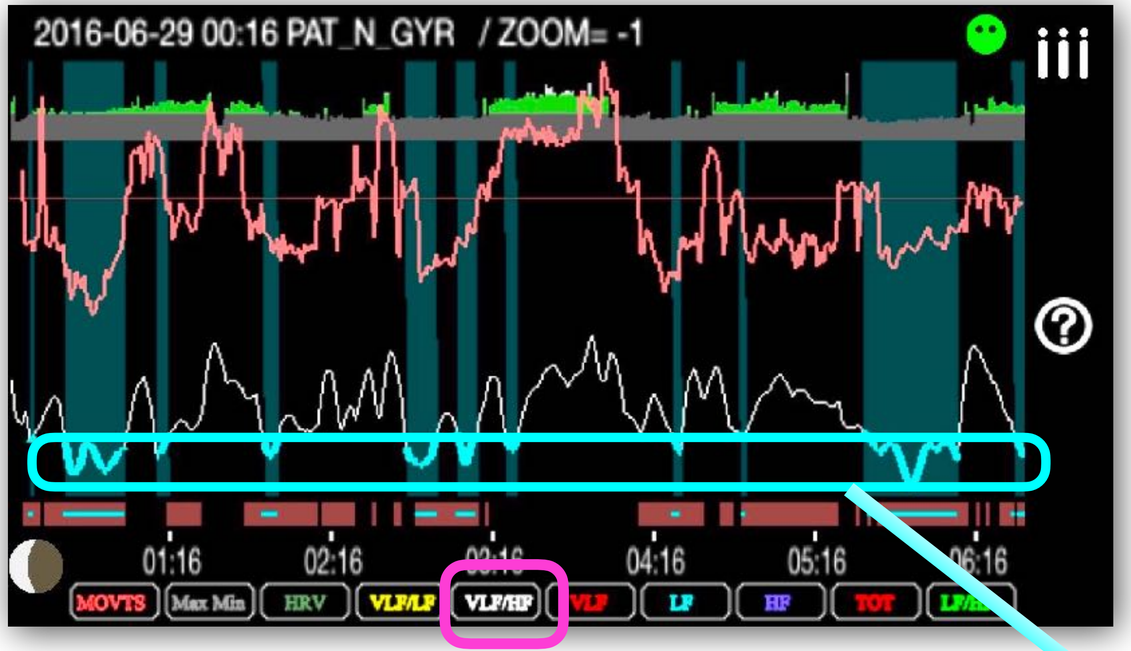
- The second method- Uses the iPhone Gyroscope as a sensitive ACCELEROMETER to analyze night micromotion



IF

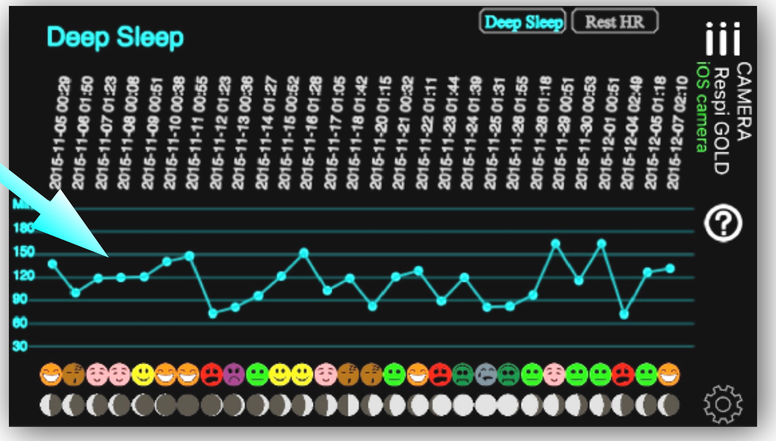
If Night Movements are selected,

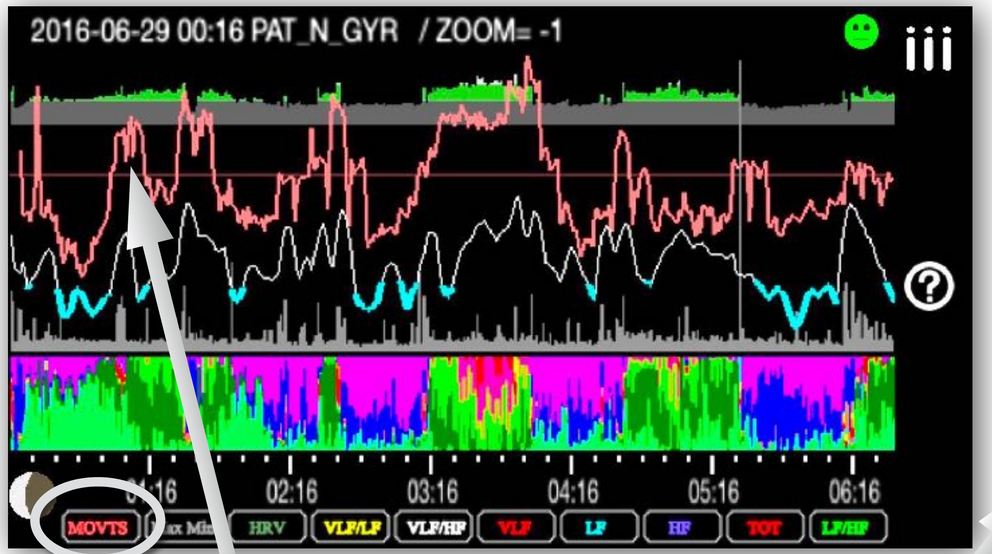
Place the iPhone near your pillow and make a small test record to check if your device can catch small movements
(see next slides).

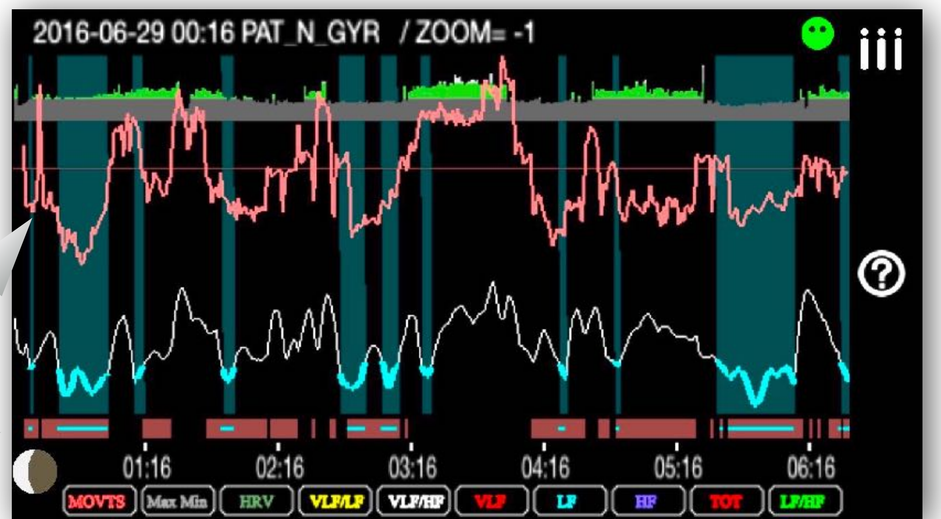


The light blue part
(deep sleep - lower VLF/HF)
of the night graph analysis
will be updated in
the Progress/History graph.

Progress / History







Analysis of the movements during the night