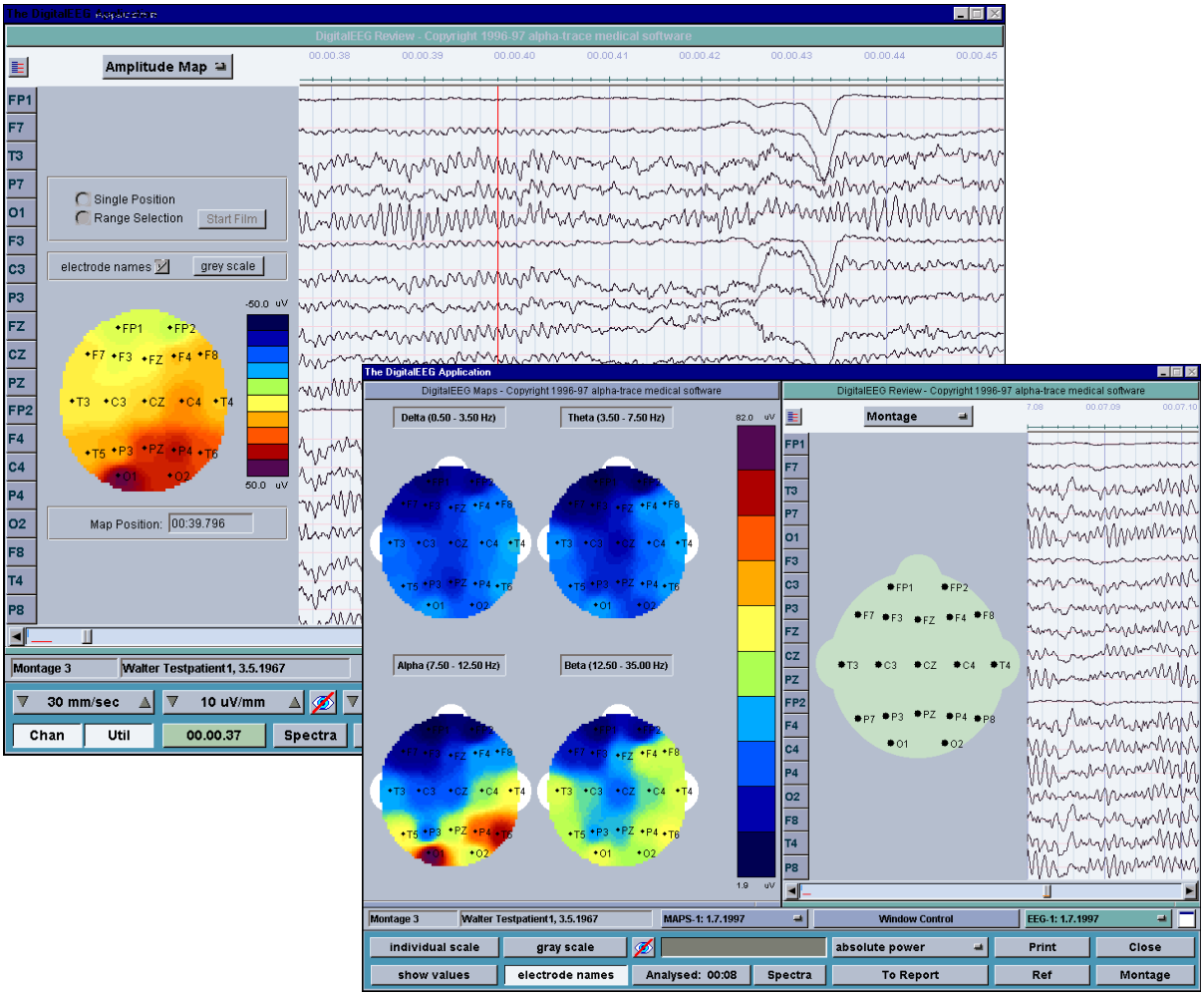
Digital-EEG Brain Mapping

Enkele mogelijkheden van de Q-EEG software



- Amplitude Mapping
- Frequency Mapping (Real Time)
- EOG Correction
- Export Target Variables
- FFT Spectra
- Position and Film Mapping

ALPHA TRACE

Introduction:

The optional Q-EEG package offers various possibilities for quantitative evaluation of the EEG. The software offers amplitude mapping for EEG and spectra, and an EOG correction for EEG, spectra, and maps.

The basic computations are the power spectra, which may be computed for a user defined analysis range just per mouse click. Just as straightforward is the computation of the maps for the four frequency bands Delta, Theta, Alpha, and Beta. The target variables like absolute- and relative power, dominant and centroid frequency are available per frequency band.

Results may be easily being transferred to the report in graphical form

Amplitude Mapping for EEG (position and film)

The next-neighbor algorithm used implies that an interpolated value will be influenced by its neighbors in reverse third-order proportion to the distance from neighboring electrode positions.

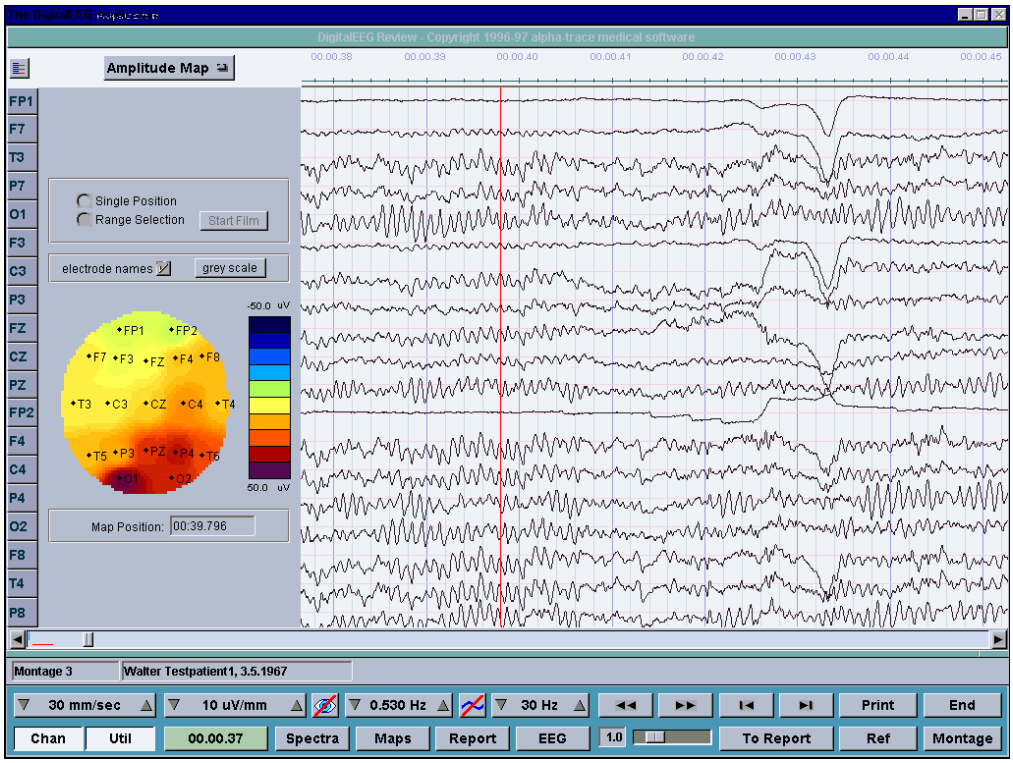


Figure 1: Amplitude Map

EOG Correction

The calculation of EOG correction factors is based on a correlation between the eye movement signals for horizontal and vertical eye movements and all EEG signals recorded. The correlation factors constitute a measure of how much the eye movements influence the EEG signals on a channel per channel basis. On EOG correction the eye movements are deducted from the EEG signal according to the respective correction factors. If there are no significant eye movements on hand, the EOG correction will render no results.

Display and Calculation of Spectra for a marked analysis range

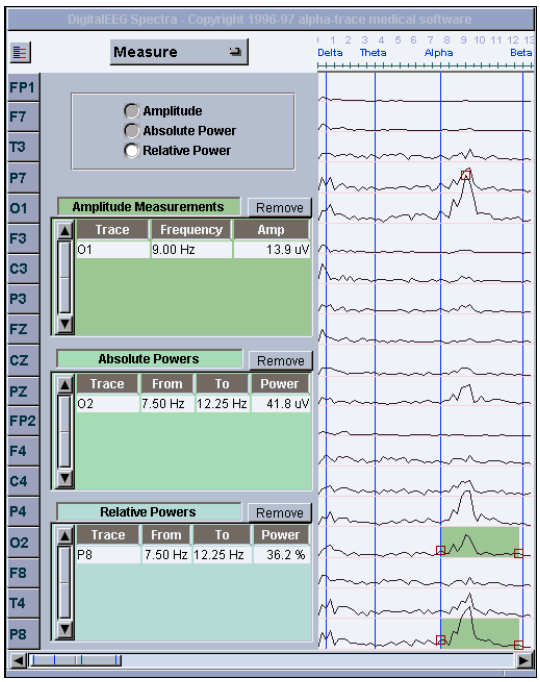


Figure 2: Calculation of Spectra

The spectra are calculated in blocks of 4-seconds each, using the FFT (Fast Fourier Transformation). A 25% cosine taper is applied to each block. The FFT is calculated for 1024 samples (sampling rate 256 Hz). Then the spectral density is calculated per block and the square root is taken. Finally the blocks are averaged. Within the predefined band borders the power is calculated per frequency band by integration (summation). Between the electrode positions on the map the values are interpolated using a next-neighbor algorithm. With bipolar montages the base-values are assumed to be just between involved electrode positions. The next-neighbor algorithm used implies that an interpolated value will be influenced by its neighbors in reverse third-order proportion to the distance from neighboring positions.

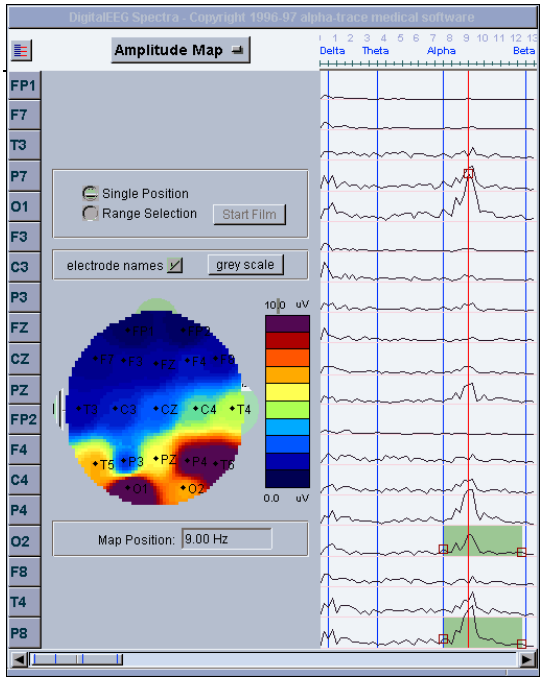


Figure 3: Display of Spectra

Display of Mappings in Frequency Bands (On-Line and Off-Line)

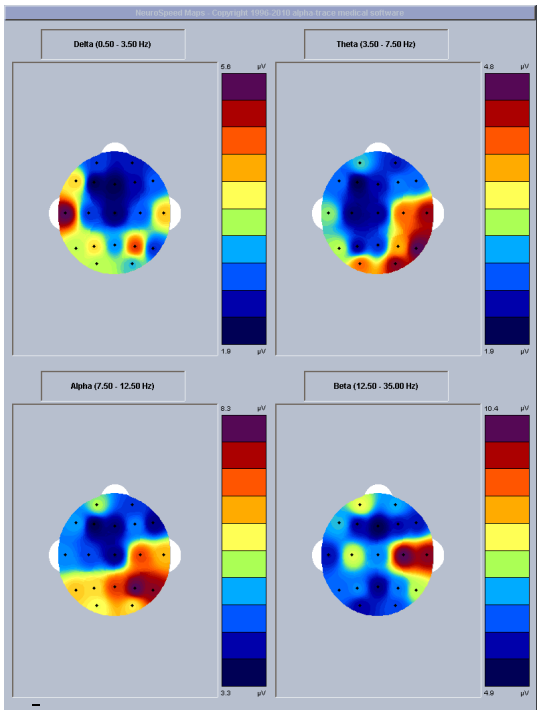


Figure 4: Mapping of the four Frequency bands

Absolute Power

The absolute power within a given frequency band corresponds to the area underneath the spectral curves for the respective frequency band. This is a measure of activity at the electrodes within the frequency band. The scale is in units of µV. Typically you will find more absolute power in the occipital regions with eyes closed than frontal or central.

Relative Power

The relative power is a percentage value comparing the absolute power within a given frequency band to the total absolute power for the total frequency range.

Dominant Frequency

The dominant frequency is the frequency value per channel where the amplitude of the spectra is maximal within the given frequency band. For a typical alpha-EEG the dominant frequency in the alpha band will be at about 10 Hz.

Centroid Frequency

If there is no clear maximal power value within a certain frequency band (e.g. beta band), the dominant frequency may not be a valuable measure. In this case the centroid frequency is of more use. This is the frequency value where the centre of gravity is located for the area underneath the spectral curve within the given frequency band.

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