Neurofeedback method – what might influence on therapy BFB results

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Abstract   **This paper presents basic principles biofeedback method, particularly neurofeedback training method and shown influence FFT window on the results BFB therapy. Is described a general principle operation method and mechanisms used for biofeedback therapy. On the basis of analysis are set session parameters, which are designed to promote a range of brain waves, and the inhibition of another range of brain waves.**

Keywords   **brain activity, EEG, biofeedback (BFB) method, signal processing method, brain wave.**

I. INTRODUCTION

Neurofeefback is described as direct link between machine - computer and human brain. This is one from the most famous biofeedback (BFB) method, called as neuro BFB. The next popular method is muscle biofeedback, where we use activity of muscles for feedback with technical machine [1].

History of neurofeedback started when in the 60s N. Miller proved that the functions of the autonomic nervous system can be modified through the so-called. operant conditioning. In 1972 Sterman in studies on cats proved that they can learn how to increase the amplitude of the 12-15Hz wave frequency in the region of sensor motor cortex.[Further experiments and studies showed that this also applies to people. After this experiments NASA starts applying neurofeedback for training of astronauts before sending them into the space. It was the first practical use of neurofeedback.

Neurofeefback method is based on the electroencephalogram (EEG) [4, 5, 6]. This method of measure bioelectric signal provides high temporal resolution, it's easy to use and at the moment is not too expensive method. The constant development of signal processing methods, modification algorithms allows introducing new automated method for analysis of EEG signal [1].

II. NEURO BFB TRAINING METHOD

Neurofeedback method exploits the fact that an effort of will and systematic training can achieve superiority of brain waves of a specific frequency, damping waves at different frequencies.

We use here a feedback loop by which we learn to respond to a particular pattern of EEG to a specific situation. Repeat the training leads to a strengthening of the pattern.

III. TECHNICAL SOLUTIONS USED IN NEURO BFB METHOD

Biofeedback method requires a biological signal processing on a computer-readable signal. To do this it is necessary to perform several operations: EEG acquisition signal, digitize signal, signal filtration, FFT analyse. Results of those operations is graphical visualization EEG signals and real-time FFT analyze (Fig. 1), where are separated all ranges of brain waves.

Those signal transformations help technician set parameters of biofeedback therapy.
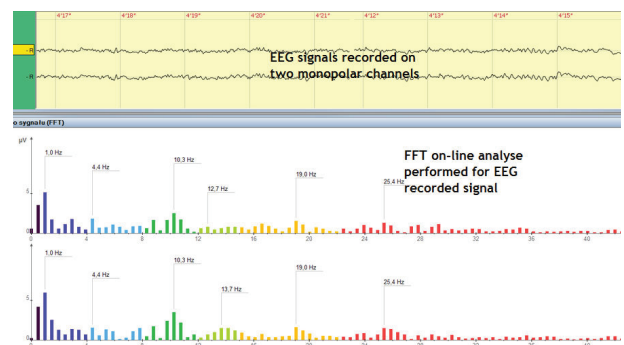

Fig. 1. Window of DigiTrack BFB software . Shown EEG signal and FFT analyze

IV. EXPERIMENTS

An important issue that affects the outcome of BFB method is FFT analyze, which is one of the most important parameters BFB therapy. On the basis of this analysis are set session parameters, which are designed to promote a range of brain waves, and the inhibition of another range of brain waves. The authors noted that the use of different shapes of the FFT time window might be affect the outcome of the therapy BFB. On this basis, was made reference measurement. Then FFT analysis was performed. For this purpose, was used the commercial system of EEG Digitrack Elmiko Medical. It's consisting of four electrode head and software to conduct neurofeedback therapy.

V. REFERENCES

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