PhysioSoft – An Approach in Applying Computer Technology in Biofeedback Procedures

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A B S T R A C T

The paper presents description of original biofeedback computer program called PhysioSoft. It has been designed on the basis of the experience in development of biofeedback techniques of interdisciplinary team of experts of the Department of Health Psychology of the University of Applied Health Studies, Faculty of Electrical Engineering and Computing, University of Zagreb, and »Mens Sana«, Private Biofeedback Practice in Zagreb. The interest in the possibility of producing direct and voluntary effects on autonomic body functions has gradually proportionately increased with the dynamics of abandoning the Cartesian model of body-mind relationship. The psychosomatic approach and studies carried out in the 50-ies of the 20th century, together with the research about conditioned and operant learning, have proved close inter-dependence between the physical and mental, and also the possibility of training the individual to consciously act on his autonomic physiological functions. The new knowledge has resulted in the development of biofeedback techniques around the 70-ies of the previous century and has been the base of many studies indicating the significance of biofeedback techniques in clinical practice concerned with many symptoms of health disorders. The digitalization of biofeedback instruments and development of user friendly computer software enable the use of biofeedback at individual level as an efficient procedure of a patient's active approach to self care of his own health. As the new user friendly computer software enables extensive accessibility of biofeedback instruments, the authors have designed the PhysioSoft computer program as a contribution to the development and broad use of biofeedback.

Key words: psychosomatic; psychophysiology, biofeedback, neurofeedback, user interface, real-time data acquisition, data management, sampling frequency

Introduction

The term biofeedback refers to the procedure during which an individual is given information about her/his physiological functions, for example muscle tension, in order to help him/her regulate that functioning and reduce physical symptoms[1].

Although detailed feedback models of physiological phenomena have been elaborated much earlier[2–4], the year 1969 is usually considered as the beginning of development of biofeedback. It is the year 1969 when Budzinsky and Stoyva[5] present the application of the first biofeedback device. They designed an instrument by which muscle tension was recorded and it emitted a tone that varied in pitch according to the level of muscle activity that was detected, all of it with the purpose of enhancing the efficacy of muscle relaxation training. The assumption was that the relaxation training would be more successful if a patient was provided with feedback information about the degree of tension of his muscles in each single phase of training; the assumption has proved correct. In the same year the first annual meeting of the Biofeedback Research Society in USA took place and the term biofeedback was officially coined as the shortened version of »biological feedback«.

At the same time (1969) Kamiya[6] reports about the results of his study on the possibility of self-control of brain waves through operant conditioning. The actual attempt of the training was to increase the percentage of alpha rhythm under the presumption that the increased alpha amplitudes lead to deep physical relaxation and intense mindfulness. Such biofeedback studies resulted in the development of neurofeedback and extensive studies

about voluntary influencing a wide range of brain functions.

Since then biofeedback is used as a method of teaching stress management skills, aiming at efforts to decrease general anxiety and psychological stress, and to relieve the symptoms believed to be connected with psychological tension (e.g. headache, high blood pressure, asthma, chronic pain, etc.), and also as a procedure for the regulation of certain specific body functions that are related to individual physical symptoms (e.g. identification of specific problems resulting from abnormal muscle tension during movement), and tailoring the program to alleviate the specific faulty neuromuscular behavior pattern[7].

The biofeedback procedure includes three basic phases:

- *The phase of detecting and increasing the signal,* indicating a certain biological function, that could not be registered with the biofeedback instrument (e.g. monitoring of brain activity by EEG biofeedback, or muscle activity by EMG biofeedback, etc.).
- *The phase of signal transformation* into recognizable and understandable data, mostly visual and hearing.
- *The phase of presentation of data* about the changes in physical functions in real time.

The principal objective of biofeedback technique is to enable an individual to have insight into his own body functions and to train him in gaining self control over certain functions. First it is achieved by biofeedback instrument and later on even without it.

The development of biofeedback procedure is based on the idea of close inter-relation between mind and body, and on efforts to apply such concept for practical and clinical purposes. The obstacles in its development were mostly related to the prevailing traditional approach to body/mind relations, and to inadequate development of technological possibilities to precisely monitor physiological functions in early 60-ies of the 20th century.

The idea of the possibility to self control and self regulate onežs own body functions has for a long time been rather strange to traditional west European idea of the relation between mind and body, which has for centuries been based on the prevailing assumption that the spiritual, the rational, the psychic, are completely separated from the physical and they represent two separate entities that function according to entirely different laws. Such a Cartesian model of spirit-body relationship has been dominant for centuries in western philosophy, hence in west European medicine as well. According to this concept the mental, the rational, i.e. the psychic part of the individual has no impact whatsoever on his bodily, i.e. physiological events – since these are mechanical and out of control of an individual's will, and are therefore referred to as autonomic body processes. Naturally, they are controlled by the brain, but from the levels that are beneath the levels of consciousness and willful behavior. It is only in the second half of the 20th century, when more extensive studies were commenced within a new discipline known as *psychosomatic medicine*[8]*,* that more information is gained indicating the inaccuracy of the idea of complete independence of autonomic, i.e. visceral processes in the human body. Rapid increase in the quality and number of the studies investigating the mind-body relationship was stimulated after the 80-ies of the 20th century when an entirely new research field was established called *psycho-neuro-immunology*[9]. Already the initial research results of psycho-neuro-immunological studies have shown the complex and deep relations between numerous psychic processes, emotions and psychological stress in particular, with many endocrine and immune system functions. The complexity of inter-relations between biological, psychological, social and other factors and their impact on health and development of disease, becomes the subject of wider interdisciplinary interest resulting in even more complex studies showing gradually the need to redefine the old mechanical model of body-mind relationship, the model based on the assumption of body-mind dichotomy. In the theoretical and philosophical approach the body-mind dichotomy has for a long time implied a unidimensional, organicist, biological approach to the understanding of disease development in medical theory and practice. As a dominant model in the explanation of the onset of disease and methods of treatment, it has developed as theoretical basis to *biomedical* model, the model that entirely ignores the role of psychological factors, both in the development of disease and in the process of treatment of organic diseases. Instead of holistic, a rather reductionistic approach to health and disease has developed that does not take into consideration the impact of psychological, social and other factors on health, which significantly decreases the efficacy of the entire health care system.

Biofeedback and Holistic Approach to Health

The biofeedback is only one of many procedures that should help in overcoming the traditional reductionist biomedical model. Generally speaking, it is part of a wider field of complementary medicine, the development of which is based on new ideas of integral bio-psycho-social approach[10]. Even if for reasons of extensive use of modern electronic and other instruments during biofeedback therapy, to an uninformed observer it may seem just another use of technological novelties in medicine, the reality is quite the opposite. Namely, biofeedback is based on the assumption of body-mind unity, and practically all forms of its therapeutic application, except the use of instruments, comprise the relationship and communication between the therapist and the patient as an important therapeutic factor, which is of particular importance in view of the fact that each problem for which biofeedback therapy is needed is discussed at the inter-disciplinary level and includes experts of different profiles. It is especially the case in the application of highly sophisticated biofeedback techniques, such as quantitative EEG and neuro-feedback[11]. Biofeedback is conceptually more aimed at modern idea of health as the state of wellbeing,

i.e. the state that includes psychosocial and physical determinants as equal factors and does not mean only the absence of disease, but also the presence of pleasure and high life-quality among its defining characteristics. Therefore the symptoms that are usually treated by biofeedback procedures are distributed over a wide range, from the impact of psychological stress on bodily manifestations (e.g. muscle tension, vascular tension body temperature, heart rate, blood pressure, breathing rate, etc.) to the efforts of prodding effects on severe physical and mental health disturbances (e.g. asthma, Raynaud disease, heart abnormalities, migraine, tension headaches, functional diarrhea, diabetes mellitus, essential hypertension, attention-deficit hyperactivity disorder, gout, urinary incontinence, fibromegaly, irritable bowel syndrome, tinnitus, enuresis, depression, anxiety, epileptic seizures, and other[12]).

Beside for its acting on symptoms of diseases, a special type of biofeedback known as neuro-feedback is also used for the regulation of brain waves frequency with the purpose of increasing cognitive abilities through peak performance training[11].

Those who are in favor of biofeedback point out the following as its major advantages – the procedure is short-lasting and more efficient than traditional psychotherapy, it is cheaper and less dangerous than pharmacotherapy, its effects are easy to measure and last longer. The additional advantage is in complete participation and responsibility of the patient in the entire therapeutic process. Like many other techniques and procedures, biofeedback is more and more used in the field of the so-called complementary, or unofficial, medicine (acupuncture, relaxation techniques, massage, hypnosis, placebo, homeopathy, chiropractice), and it is only the additional technique but not the substitute for the existing traditional procedures of official medicine.

Computerization and New Era of Biofeedback

A rapid development of computer technologies in the 80-ies of the past century contributed to new incentives and extensive interests in biofeedback. Not only has the availability of biofeedback instruments increased, but the various possibilities of it application have motivated the use of modernized biofeedback programs. The previously rather expensive and complicated biofeedback instruments became easily and widely accessible. Their extensive use for all sorts of purposes – from computer games to highly sophisticated neurofeedback software – contributed to significantly increased interest in the technique itself. As it is basically the technique that is aimed at efficient learning, the wide variety of contents and presentations on computer displays (unlike previous simple sound and video signals) has significantly improved the efficacy of learning about self regulation of onežs own autonomic functions. For example, playing a video game in which the keyboard or joystick functions

show the heart rhythm is definitely much more interesting than the previous mere sound or video signals.

Still greater motivation can be achieved through non--animated video contents included into biofeedback training. For example a patient suffering from right arm paresis can be shown a film of actual person who slowly moves his right arm if the patient manages to move his own.

Further advancement in biofeedback procedure, or therapy, computerization is in the fact that the therapist can dedicate more time to relating to the client or patient, since the simplicity of the instrument does not require long adjustments, interpretation of results and similar technical time consuming activities. The procedure protocol defined in advance, modern software providing for average results of great number of measurements, the computer speed enabling feedback information in real time, the possibility of reducing artifacts through software programs (e.g. the effects of eye movements on the measurement of brain waves), together with the possibility to compare individual results with normative database parameters collected on great number of study subjects, open practically unlimited possibilities of control and efficacy of biofeedback procedures through the application of modern computer technology.

It should also be pointed out that following the initial training with the therapist, a number of relatively simple types of biofeedback procedures can successfully be maintained and trained at home on one's own computer, sending the data to the therapist via internet and creating a permanent internet connection with the relevant databases on the therapist's server. The increased speed and other possibilities of data transfer in real time will surely enable in the near future the direct internet communication with biofeedback protocols located on the servers of biofeedback centers from one's own home. Certain efforts in using these possibilities have already been realized today[13].

PhysioSoft Program

PhysioSoft is a stand-alone software and hardware application designed at Faculty of Electrical Engineering and Computing, University of Zagreb. The idea for PhysioSoft came from BioBench[14]. PhysioSoft, written in LabVIEW using G programming language[15], is designed to meet the data acquisition and data analysis needs of the life science and medical research. It has ready-to-run data acquisition and data analysis capabilities that turn personal computer to physiological monitoring system. Using data acquisition hardware[16], PhysioSoft can acquire data from virtually any type of physiological, linear-voltage signal source. While physiological data is being acquired, PhysioSoft can save it to disk along with any notations one wants to add. After the data is saved to disk, PhysioSoft can open data file for review and further analysis.

The main PhysioSoft features are as follows:

- *Data Management* – software automatically keeps track of the user name and the date and time each data set was acquired. Data management scheme
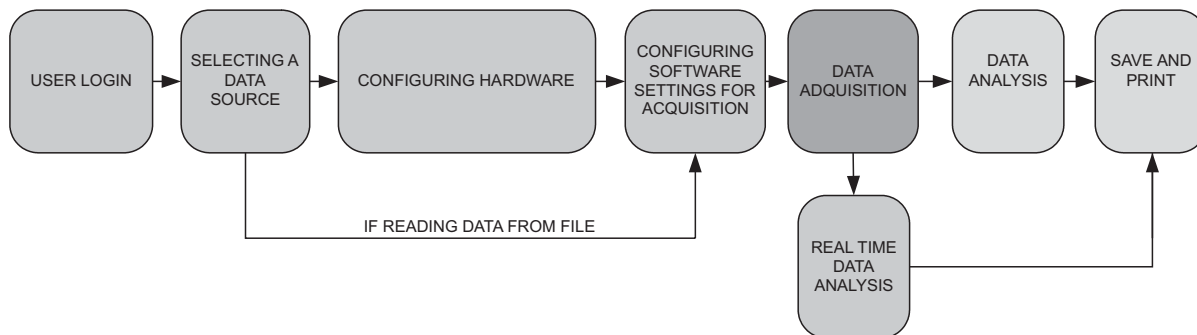
Fig. 1. Block diagram of PhysioSoft software structure.

allows data to be organized into test groups and associate a data set with any test group.

- *Automatic Journal Creation* – software automatically generates entries in a journal to indicate that a user changed voltage output stimulus levels or turned data logging on or off during an acquisition. Custom entries can be added to the journal.
- *File Analysis* – recorded data can be opened for post recording analysis and review.
- *File Exporting* – data can be exported to an ASCII spreadsheet file for further analysis in other software applications (compatibility).
- *Look and Feel of a Chart Recorder* – user interface graphs have the look and feel of traditional physiographs and strip chart recorders.
- *Configuration Settings* – PhysioSoft can load, save, and reset personal settings. This saves time when multiple users have different configuration settings.

Software Structure

Block diagram of software steps is shown in Figure 1. First the user must log in. After log in, software loads settings for the current user. The data source can be data acquisition hardware or a data file. The data file is a previously acquired measurement. If data acquisition hardware is used to acquire signals, then before any measurement hardware must be configured. To configure the hardware, types of signals that will be acquired on each channel must be defined through channel configuration dialog box (Figure 2).

After channel configuration is finished, the timing, alarm, and output stimulus parameters of acquisition are configured next. Configuration is also preformed through dialog box.

Timing

Important timing characteristics are:
- *Start Time, Manual* – session starts acquiring data as soon as the data acquisition is started.
- *Start Time, After Specified Delay* – session is set to delay data acquisition for a specified time after the data acquisition is started.
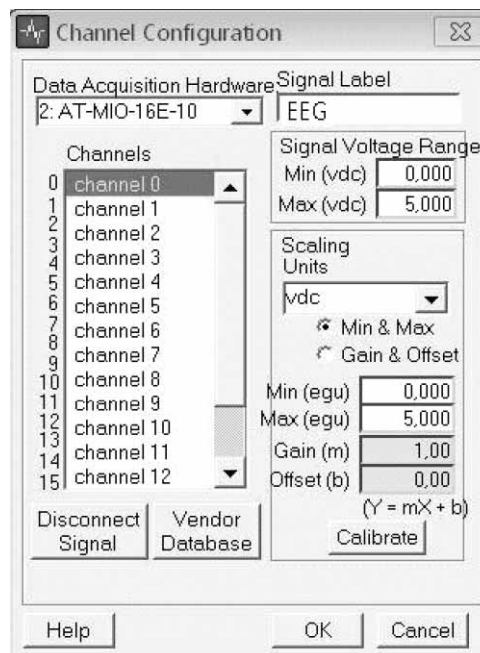

Fig. 2. Channel configuration dialog box.

- *Start Time, On Trigger* – data acquisition is delayed until a trigger condition occurs
- *Stop Time, Manual* – data acquisition stops when stop button is clicked by the user
- *Stop Time, After Specified Duration* – session automatically stops an acquisition after the specified time elapses.
- *Sample Rate* – The maximum sample rate depends on hardware used (from 1000 to 10 000 samples per second (Hz)). If a sample rate is set below 200 Hz, the notch filter is disabled during data acquisition.
- *Notch Filter Frequency* – the noise frequency is selected, 50 or 60 Hz, that should be attenuated, given a sample rate of 200 Hz or greater.
- *Scan List* – shows the signals configured in the channel configuration dialog box or available in the data file that is replayed.
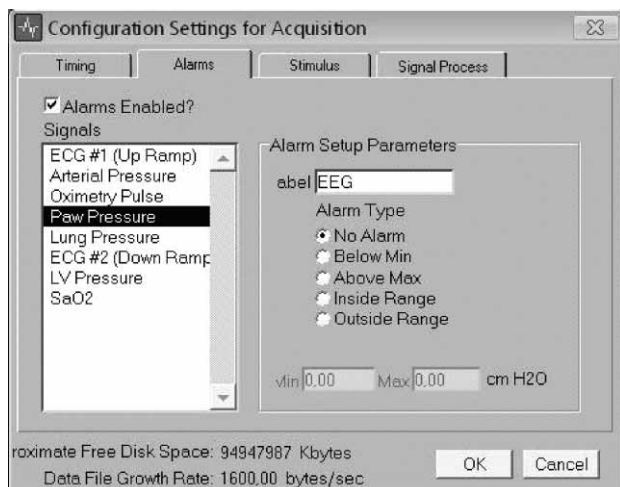
Fig. 3. PhysioSoft configuration settings dialog box.

Alarms

Alarm settings allow for automatic notification when measured signals, for instance heart rate, go out of the range that is specified. Alarms are configured through configuration settings for acquisition dialog box (the same as for timing settings) shown in Figure 3. Descriptions of each control on the Alarms tab of the configuration settings for acquisition dialog box follow:

- *Alarms Enabled* – enables or disables all existing alarms.
- *Signals* – this list shows all the signals configured in the channel configuration dialog box.
- *Alarm Setup Parameters* – this group of controls sets alarm parameters.
- *Label* – alarm label for the selected signal in this field. This label appears on the data acquisition view when the alarm condition occurs, if the signal is being displayed on a graph.
- *Alarm Type* – No Alarm, Below Min, Above Max, Inside Range, or Outside Range.
- *Min, Max* – specify minimum and/or maximum to define the level or range for the alarm.

Stimulus signal

Output stimulus settings are used to configure the characteristics of an analog output signal that can be used during data acquisition. To define or select an analog output stimulus, configuration settings for acquisition dialog box is again used. The stimuli that can be generated are:

- *Front Panel Manual Control* – software provides a fixed DC level output of either the Off Voltage or the On Voltage that the user specifies.
- *Stimulus Type, Pulse* – defines a pulse waveform for analog output stimulus. A graphical representation of the pulse waveform appears in the stimulus waveform graph in user interface.

- *Stimulus Type, From File* – an arbitrary waveform can be selected from file for analog output stimulus. A graphical representation of the arbitrary waveform appears in the stimulus waveform graph in user interface.

Data Acquisition

Acquired data is streamed to the disk and saved to file for later analysis. The real time data is shown in user interface during the acquisition. There are various combinations of graphs that can be viewed. Figure 4 shows four measured signals depicted in real time at four separate graphs. This user interface is used for all settings regarding data acquisition, like the start acquisition, stop acquisition, data logging, graph speed, trending, switching to analysis mode, etc. Data logging can be stopped or started any time during the measurement. Notes can be added in electronic journal during data acquisition. The journal also displays all events associated with a file, such as stimulus, data log, and user-defined events. The main journal features are:

- *File Notes* – displays any notes entered in the journal about the specific data file
- *List of Events* – shows all the events that have occurred during the acquisition, along with the time at which the event occurred.
- *Event Notes* – displays the notes associated with an event.
- *Type* – displays the type of event highlighted in the List of Events: user-defined, stimulus, or data log event.
- *User Event* – Displays the dialog box for users' events. This dialog box allows creation of user-defined events and notes during data acquisition.

Trends can be shown in collected data, for example, computing heart rate over time from an ECG signal. If
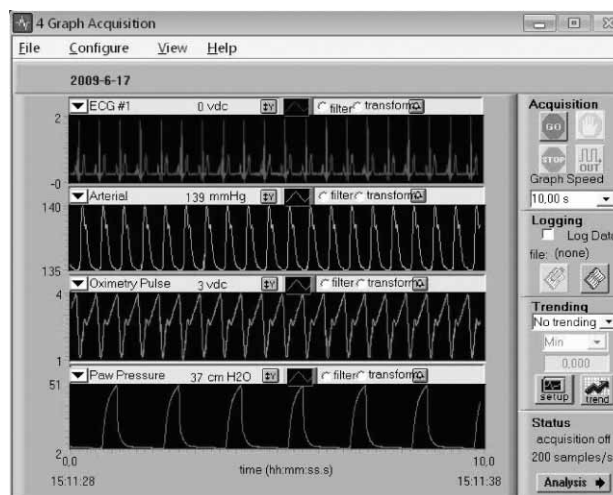

Fig. 4. User interface for real-time data acquisition showing four measured signals.

Fig. 5. User interface for data analysis after data acquisition.

the trending is enabled then trending graphs are shown during data acquisition. Trending is done in real time and therefore it cannot be used when the measured data is read from the file. LabVIEW chart is used for trend that has FIFO buffer (First In First Out Buffer) and when the buffer is full the oldest data point is removed.

One of the important features, as mentioned in *Timing* chapter, is notch filter that attenuates unwanted frequencies. Various IIR filter coefficients[17] are used to implement the notch filter based on the sample rate and notch filter frequency selected through user interface. The table 1 provides the IIR filter order, notch width, and attenuation for various filter scenarios.

Data Analysis

After the data is acquired it can later be analyzed. The selected file is loaded in to memory and user interface for data analysis is started (Figure 5).

User interface can be configured for various graph views. There can be single graph, two graphs, four graphs and overlaid graph. Overlaid graph can analyze up to eight different signals. Only subset of selected data can be analyzed if needed. Figure 5 shows selected graph area (gray area) which contains only small data subset that will be analyzed.

After the signal for analysis is selected filter and transforming options should also be selected. Filtering options are the following:

- *No Filter* – applies no filter to data.
- *Digital Filter* – applies a third-order Butterworth[17–18] filter of choice: Lowpass, Highpass, Bandpass, or Bandstop.
- *Median Filter* – applies a median filter over the number of seconds defined.
- *50-60 Hz Notch Filter* – applies a 50 Hz notch filter.

Transforms help analyze data by allowing user to create a new signal derived from an existing signal. For example, an ECG signal can be transformed into a heart rate by applying the BPM transform. The following transforms are available:

- *No transform* – applies no transform to data.
- *Minimum* – for each point in the data set, software calculates a new point by finding the minimum value for the preceding number of specified seconds.
- *Maximum* – for each point in the data set, software calculates a new point by finding the maximum value for the preceding number of specified seconds.
- *Mean* – for each point in the data set, a new point is calculated by finding the mean value for the preceding number of specified seconds.
- *Beats Per Minute (BPM)* – employs a beat-detection algorithm to create a signal that profiles the number of beats per minute, as in a heart rate, from an ECG signal.
- *Standard Deviation* – for each point in the data set, a new point is calculated by finding the standard deviation for the preceding number of specified seconds.
- *Simple Expressions* – creates a new signal by adding, subtracting, multiplying, or dividing the selected signal with a user-defined constant or any other signal that can be selected from an open file.
- *Derivative* – creates a new signal that is the first derivative of the selected signal.
- *Integral* – creates a new signal that is the integral of the selected signal.

TABLE 1
IIR FILTER ORDER, NOTCH WIDTH, AND ATTENUATION FOR VARIOUS FILTER SCENARIOS

Sampling frequency	IIR Filter order	Notch width	Attenuation
200 Hz	1	49.6 to 50.4 Hz	–70 dB
500 Hz	5	47.5 to 52.1 Hz	–63 dB
1000 Hz	4	45.5 to 54.2 Hz	–75 dB

IIR – infinite impulse response

Scalar analysis

After the signal was selected and the filter or transform applied a subset of the data on the graph must be selected to perform scalar analysis on that subset. The following scalar analyses are possible:

- *No analysis* – this option does not display any calculations.
- *Minimum* – this option displays the minimum value for the selected region.
- *Maximum* – this option displays the maximum value for the selected region.
- *Mean* – this option displays the mean value for the selected region.
- *Delta Y* – this option displays the difference between the *y* values for each of the markers defining the selected region ($y_2 - y_1$).
- *Standard Deviation* – this option calculates and displays the standard deviation for the selected region.
- *Slope* – this option calculates and displays the slope of the line defined by the two *y* values for each of the markers.
- *Integral* – this option calculates and displays the integral of the selected region.

Array analysis

After the signal has been selected and the filter or transform applied, a subset of the data on the graph can be selected to perform array analysis on that subset. There are for types of array analysis that can be performed on selected data: histogram, power spectrum, peak/valley detection, and XY analysis.

The histogram option creates a histogram of the selected data set. The power spectrum option calculates a power spectrum of the selected data set using Discrete Fourier Transform (DFT) algorithm[19]:

$$x[i] = \frac{1}{N} \sum_{k=0}^{N-1} X[k] e^{j\frac{2\pi}{N}ik}$$

$$X[k] = \sum_{i=0}^{N-1} x[i] e^{-j\frac{2\pi}{N}ik}$$

$$k = 0...N-1 \tag{1}$$

where: $x[i]$ is discrete signal in time domain,
   $X[k]$ is discrete signal in frequency domain and
   N is number of samples (frame size)

The size of the frame must be defined for the power spectrum. Algorithm calculates the entire power spectrum by iteratively calculating the power spectrum on portions of the data set of size equal to the frame size. The displayed result is the mean of all previously calculated power spectra.

The next analysis is peak detection that determines peaks or valleys (local maximum or minimum values) within the selected data set. Graph indicates the location of the peaks or valleys by placing a dot at the peaks or valleys.

The XY analysis allows drawing and analyzing two independent signals with respect to one another. Several regression analysis options are available for XY graphs. Specifically a linear, exponential or polynomial fit to any XY graph can be preformed.

Events

PhysioSoft uses two classes of events: *file events* and *search events*. PhysioSoft generates file events during data acquisition and these events can be any of three types: *user-defined events*, *stimulus events*, or *datalog events*. Search events mark specific times in the data file, as defined by criteria which the user enters. In the analysis views, file events can be viewed and saved during data acquisition, they also can be added, deleted and modified. User defined events are defined during acquisition or analysis. Stimulus events indicate when a manual analog voltage (stimulus) begins and ends and datalog events indicate when data logging is stopped during an acquisition.

All data analysis and events are stored in various files and can be printed or exported to ASCI format at will.

Conclusion

The biofeedback procedure used during the past 30 years has shown to have wide applications within the context of maintaining health and improvement of life quality, it has proved to be successful, harmless and easy to apply, all of which make it appropriate to be accepted by official medicine as a complementary method. An ever higher level of general education of population, either in the use of computer technology, or in the questions of caring for one's own health, together with the social need to reduce health expenditure, and increased number of iatrogenic diseases caused by inadequate treatment, by pharmacotherapy in particular – are only a few factors showing that the prognosis about rapid development of biofeedback technology is a reality. If we add here the unconceivable possibilities of computer and other technology development, further extension of the use of PCs and internet, cheaper and simpler use of computer, internet and tele-medicine technologies, the reduction of size of instruments to the level of palm or pocket sizes, and further development of new widely used procedures (e.g. quantitative EEG and neurofeedback in self regulation of brain waves), are only foundations for wide application of this technology in the near future.

All of these are accompanied by increased interest of patients in the use of diagnostic and therapeutic procedures beyond the field of the so-called official medicine. According to data on the use of health care services in 1993 in USA, about 35% of American citizens used some kind of complementary medicine procedure (the unofficial, or alternative procedure), amounting to the total cost of US$ 13.7 billion[20]. Dissatisfaction of many patients with the services of official medicine and greater awareness about the importance of self care and health maintenance will only strengthen general trend of complementary forms and techniques of health care, including the biofeedback.

The computer program presented in the paper is a contribution to the development of biofeedback technology. The program can enable the increased efficacy of the patients' learning ad ensure more time to therapists for their creativity in the development of their therapeutic approaches to the patients. Further application of a developed PsychoSoft computer program in everyday practice, will enable its adjustment to the needs of clinical use and also its supplements and upgrading.

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PHYSIOSOFT – PRISTUP PRIMJENI RAČUNALNE TEHNOLOGIJE U POSTUPCIMA BIOFEEDBACK-A

S A Ž E T A K

Interes za mogućnosti izravnog djelovanja na autonomne tjelesne funkcije rastao je proporcionalno s napuštanjem kartezijanskog modela odnosa između tijela i svijesti. Psihosomatski pristup i istraživanja obavljena pedesetih godina dvadesetog stoljeća, zajedno s istraživanjima o uvjetovanom instrumentalnom učenju pružili su dokaze o uskoj međuovisnosti tjelesnog i duševnog, kao i o mogućnostima voljnog djelovalovanja na vlastite fiziološke funkcije. Nove su spoznaje dovele do razvitka tehnike biofeedback-a oko sedamdesetih godina prošlog stoljeća i bile su osnova mnogim ispitivanjima koja su pokazala učinkovitost biofeedbacka u kliničkoj praksi u ublažavanju brojnih tjelesnih simptoma I poremećaja. Digitalizacija biofeedback instrumenata i stvaranje pristupačnih korisničkih računalnih programa omogućuju uporabu biofeedback-a na individualnoj razini kao učinkovitog postupka aktivnog pristupa pojedinca samozaštiti zdravlja. Budući da novi računalni programi omogućuju široku pristupačnost korištenju biofeedback instrumenata, autori su izradili računalni program pod nazivom PhysioSoft kao svoj doprinos razvoju i široj uporabi biofeedback-a.