Virtual brain

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This instruction is intended for use with the simultaneous registration of EEG from two (or a group) of subjects in order to study the possibility of identifying signs of interindividual interaction by indicators of bioelectric activity of the brain (with hypnotic influence on the state of consciousness, psychotherapy and various types of auto-training, interaction between a healer and a patient, a donor and recipient and in other conditions of a discrete transition to an altered state of consciousness). At the same time, one of the aspects of interindividual interaction, referred to as bioenergy-informational, is considered, since such interaction can occur between subjects when working with information bioregulatory systems and is associated both with their recognition and with the impact on their state.

Recently, interest in this issue has intensified in connection with the development of such types of diagnostics and therapy as extrasensory diagnostics, bioenergetic effects, intramural and extramural healing, etc. There is also a high interest in the study of this problem in such recognized fields of medicine as psychotherapy and hypnosis. In addition, similar tasks arise in connection with the development of methods and measures of protection and increasing resistance to the effects of unfavorable psychosocial factors by methods of regulation and control of the state of consciousness.

A feature of this common problem is that in all the conditions listed above, the possibility of an unconscious interindividual bioenergy-informational interaction is not excluded, the manifestations of which, as it is assumed, are associated with bioresonance properties, apparently, the most pronounced in some transitional states of consciousness.

Currently, one of the most adequate and productive ways to solve this problem is a group neurophysiological study of the biorhythmic activity of the brain with the simultaneous registration of EEG in several persons (at least two).

In connection with the emerging trends, research is already being carried out in individual scientific institutions of the Academy of Sciences of the Russian Federation and the AMS of the Russian Federation. Published works have shown that special states of consciousness correlate with certain ways of organizing the biorhythms of the brain. However, in these works, the analysis was carried out for each subject separately. The problem of identifying signs of interindividual energy-informational interaction by indicators of brain activity, while simultaneously registering it in two persons, remained unresolved.

Currently, for the first time, the results of neurophysiological

research of interindividual synchronization of biorhythms of the brain. The use of this methodology is important for the development of the following directions.

1. New methodological approaches to objectively assessing the presence, properties and characteristics of bioenergy-informational interactions, including face-to-face contactless and distance healing, hypnosis, some issues in the field of medical and social psychophysiology.

2. Development of research in the field of non-contact diagnostics and bioenergy information therapy, as well as in the relevant areas of medical and social psychophysiology.

3. Method development protection from unwanted bioenergy-informational impact, methods of their implementation and teaching them.

4. Proposals of strict objective criteria for licensing healers with psychic and bioenergetic abilities.

5. Development of methods for matching healers and patients, and also other methods of bioenergy-informational influence on patients.

6. Study of the nature of the influences on the patient with the help of devices-simulators of healers, determination of compatibility and selection of modes of exposure.

1. Adaptation of the hardware and software complex for simultaneous electrophysiological studies of groups or pairs test subjects

Electrophysiological studies of the bioelectrical activity of the brain of groups or pairs of subjects are carried out under standard conditions of a camera shielded from electromagnetic interference using an electroencephalograph with at least two channels (at least one channel for each subject) and an IBM-compatible computer complex.

Management of the processes of technical adjustment of the system, setting parameters for registration of encephalograms, formation of a databank and their analysis is carried out using specially developed software packages for mapping EEG data and the results of their processing.

At present, the FNECEC TMDL is developing a specialized software package for data analysis during group registration of EEG and other electrophysiological parameters. A feature of the algorithms of these programs is the consideration of additional sets of derived characteristics, which represent a special space of data reflecting the interaction of pairs or groups of subjects, but not belonging to any subject separately.

When installing the hardware and software complex, they strive to comply with two main conditions for the implementation of group or pair registration of EEG: first - multichannel pickup and processing of electrophysiological information; second - the possibility of freedom of manipulation with each individual channel. The technical interaction of the electroencephalograph with the computer is carried out through a built-in analog-to-digital converter, which is supplied with the data entry software.

2. Features of parallel electrophysiological removal information from several (two) subjects

The following scheme is used for recording the bioelectrical activity of the brain: two or several (but no more than the number of electroencephalograph channels allows) the subjects are side by side, without touching each other, in a shielded chamber in a sitting position, convenient for achieving muscle relaxation, with attached or pressed to the head using special helmets with electrodes. The electrodes of all subjects are connected to the electroencephalograph through a common input unit. The standard international scheme of biopotential derivation from the head surface is used (Homan RW, Herman J., Purdy P. Cerebral location of international 10-20 system electrod placement // EEG a. Clin. Neurophysiol. - 1987. - V. 66. - P. 376-382). With the initial rigid correspondence of the distributions of the inputs of the encephalograph and the zones of the cerebral cortex on the mapped image of the computer display, it is possible to conditionally assign each lead of the subject's electrodes a corresponding value to the zone on the brain map. In paired studies carried out with the use of the Brainsys software complex, the EEG derivations of each of the two subjects corresponded to the derivations of individual hemispheres on the brain map. For the convenience of making comparisons during further analysis, the eight-channel leads of each subject were assigned symmetric values of the hemispheric zones. For example, zones FP1, FP2, F3, F4, C3, C4, P3, P4 of the left and right hemispheres on the brain map corresponded to the leads of only the left hemispheres of both subjects, and zones F7, F8, T3, T4, T5, T6, O1, O2 - assignments of only the right hemispheres of the subjects. Table

3. Algorithmic structure of interaction with electrophysiological data in the framework of the program complex "Brainsys" when analyzing the data of the steam room registration

3.1. Formation of data files

According to the transitional periods of an altered state of consciousness, a relatively long, several minutes or tens of minutes, EEG registration is carried out. At the same time, large files are generated in the database. They contain (in digital form) the results of a parallel reading of the brain biopotentials of pairs (groups) of subjects. After reviewing, validating, and excluding artifacts from these large files, groups of 8-second files are created with specific designations for each transition state. The duration of the 8-second epoch of analysis corresponds to the generally accepted one and is justified by a number of published works (Sciarretta G., Ercuriani P. Introduction to EEG Spectral analysis. - 1989. - P. 120; Methodology and technique of psychophysiological experiment. -M., 1987. - S. 104).

The above procedure makes it possible, within the framework of the "Brainsys" system, after spectral and correlation analysis of each of the files, to apply grouping methods and test statistical reliability hypotheses.

differences. As a result, both individual and group dynamics of EEG characteristics can be analyzed.

Brainsys software package also allows how browse simultaneous recording of pairs (groups) of subjects, to carry out their comparison and analysis, and to carry out these operations separately using the "Converter" subprogram. In this case, the leads from the electrodes on the surface of the subject's head are brought into correspondence with the zones indicated on the brain maps at the output of the program.

3.2. Statistical analysis of the dynamics of individual spectral EEG characteristics

The algorithm for obtaining spectral characteristics of the EEG is based on the fast Fourier transform method proposed earlier for computer execution by Cooly JW, Tukey JW An Algorithm for the Mathine Calculation of Complex Fourier Series // Mathenatics of Computation. - 1965. - 19, N 90. - P. 265), then received the form of various modifications. Since the values of the EEG spectral power of the 8-second analysis epochs are close to the normal distribution, they were used to obtain the statistical parameters of the normal distributions. The study of the individual dynamics of the spectral characteristics of the EEG is carried out with files converted using the "Converter" into individual files.

3.3. Statistical analysis of group spectral data EEG characteristics

The use of clear criteria for modeling altered states of consciousness (for example, a hypnotic state of consciousness with a certain suggestion, diagnostics from photographs, a certain method of meditation, etc.) made it possible to combine the obtained data on groups of subjects not related in time, as well as pairs (groups) of subjects with parallel registration of EEG. Using the "Brainsys" software package, samples of individual and paired 8-second files were created. Further statistical processing was similar to the statistical analysis of the dynamics of individual spectral characteristics of the EEG.

3.4. Features of the analysis of correlations between biopotentials brain areas of the cortex of one subject

The calculation of the correlation coefficients for each pair of EEG recording channels was used to study the functional interaction between individual regions of the brain, primarily the cerebral cortex. This approach was previously justified by a large number of works not only in our country, but also abroad. A feature of our approach was the study of the dynamic structure of interconnections between brain regions in narrow spectral frequency bands with a step of up to 0.1 Hz. For this purpose, we used the results obtained previously using the "Filtration" subprogram of the "Brainsys" software package.

3.5. Features of the analysis of correlations between biopotentials brain of two subjects

When analyzing the values of the correlation coefficients between the biopotentials of the brain belonging to different subjects, but occurring within a single time, we proceed to consider a certain set of events formed in other spatio-temporal parameters, in comparison with the individual set of correlations between the biopotentials of different areas of the brain. This new set of correlations was analyzed both in the full spectrum of frequencies typical for the EEG, but limited by the filters of the electroencephalograph biomagnifiers (0.1 - 32 Hz) and the capabilities of the Brainsys software package, and in narrow-band frequency bands with a step of 1 Hz. In the latter version, the data was pre-processed by the "Filtration" subroutine.

4. Methodology

The bioelectrical activity of the brain was recorded each time simultaneously in two persons.

During the EEG recording, the operators were close by, at a distance of about 80 cm from each other, but without direct contact. The possibility of the emergence of contacts (motor, visual, speech) was controlled by EEG (all types of artifacts were excluded) and direct observation of the operators.

During the EEG recording, the operators were given the following settings:

- relaxed muscle tone and scattered attention (background);
- extrasensory diagnostics of the state;
- mutual biocorrection of the state.

In subsequent self-reporting, the operators noted the overall ... feature: mutual sensation of the state in a pair even before the start of EEG registration. It was present regardless of the setting in background recording. However, the subsequent interaction work heightened the sense of mutual influence.

An 8-channel system of monopolar leads was used (from the frontal - F, central - C, parietal - P, and occipital - O regions of the cortex of the left and right hemispheres). In order to connect indifferent electrodes, pairs of ear electrodes were combined individually for each operator.

In addition to the visual assessment of the EEG, the registration data was processed using the mapping method using spectral (within 0.125-32 Hz with a frequency resolution of 0.125 Hz) and correlation types of analysis. The main purpose of the processing was to compare correlations for individual frequencies of brain bioelectrical activity, simultaneously recorded in two operators. At the same time, bioenergy-information communication was understood as the presence of a mathematically expressed correlation dependence (with an absolute value of the coefficient above 0.6) between the potentials of two operators. This made it possible to assess the degree of combination of EEG changes and the structure of bioenergy-informational links in contactless interaction

test subjects.

The registration time was several minutes at each stage of the transition to an altered state of consciousness. The duration of EEG segments for subsequent spectral and correlation analysis was 8 seconds each.

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