

Study of the Dynamics of Users' Psychophysiological Reactions in the Master Kit

Modern life is accompanied by a fast rhythm, so it is almost impossible to avoid situations that contribute to emotional tension. In case of constant and repeated exposure to stress factors, negative emotional states can become chronic and affect the somatic (physiological) level. The mobilization of energy and the body's structural resources are required to restore and maintain the optimal emotional background.

According to the Cannon–Bard thalamic theory, physiological changes arise almost simultaneously with emotional feelings. Physiological mechanisms of emotions are directly related to the vegetative functions of the body. [1]

The practical impossibility of conscious control over the reactions of the autonomic nervous system and the close connection of these reactions with a person's emotional experiences allow for the hardware registration of psychophysiological changes in the process of psychological self-regulation.

Studies have proven that emotional stress is not merely a psychological process, and the functional purpose of emotions is not limited to diverse influences at the level of subjective reflection. According to R. Descartes, “the main action of all human appetites is that they induce and tune the soul of a person to desire what these appetites prepare his or her body for.” [2]

Since emotions signal the level of significance of what is happening, the preparation in the body's emotional tension for evaluation and probable actions was fixed evolutionarily and became one of the features that characterize the emotional processes. Many authors emphasize that the activation of the nervous system, and namely, the vegetative part, which takes place in a particular emotional state, is reflected on the physiological level and is manifested by numerous changes in the state of the internal organs and the entire body. The nature of these changes shows that emotional states cause either mobilization of the

organs of action, energy resources, and protective processes of the body or, in favorable situations, its demobilization, orientation to internal processes, and energy accumulation. [2]

The first study of the impact of mental stress on a person's functional state was mentioned in the work of the Dutch scientist K. Winkler [1899], who showed that performing arithmetic test leads to increased heart rate and blood pressure and decreased respiratory sinus arrhythmia. [3]

The state of mental tension that accompanies the intensive development of cognitive processes, emotional activity, or the preparation and execution of behavioral acts in a person is always accompanied by a change in his or her psychophysiological state, manifested by external physiological changes that can be objectively recorded with the help of a polygraph. [6]

The practical significance of the study is to conduct an objective assessment of changes in the psychophysiological reactions of users of the Master Kit technique for psychological self-regulation in the process of using the training tool.

The object of the study – experienced users of the Master Kit technique for psychological self-regulation, who have used the program for at least one year.

The subject of the study – the dynamics of psychophysiological reactions recorded by polygraph device in a state of emotional tension.

The aim of the study – to determine changes in emotional tension at the physiological level in the application of the Master Kit technique for psychological self-regulation.

Hypothesis – the Master Kit technique for psychological self-regulation helps to reduce emotional tension, which is expressed in the change in psychophysiological reactions of users in the use of the training tool.

Task – to compare the dynamics of psychophysiological reactions at the initial stage of transformation using the Master Kit training tool and at the stage of “post-transformation.”

The technical capabilities of the Concord ARSENAL modern computer polygraph allow it to be used in carrying out special psychophysiological studies for scientific activity in solving a wide range of problems. The Concord ARSENAL polygraph includes the device for pickup and registration of indicators executed on the basis of the KARDi2-NP digital polygraph amplifier (Medical Computer systems LLC production). [6]

The software of this polygraph makes it possible to analyze the reactions in variable poststimulus intervals unlimited in time.

Let us focus on the key concepts that are used in special psychophysiological studies with a polygraph.

Special psychophysiological research on a polygraph (SPPI) – the procedure of special knowledge application, including the use of technical means, without damaging the life or health of people that ensures the implementation of the analysis (assessment) of dynamics of the subject's psychophysiological reactions in response to imposed stimuli.

Polygraph – a medical and biological registering device that makes it possible to monitor the dynamics of the examined person's psychophysiological reactions in response to the stimuli by registering physiological indicators of the respiratory system, cardiovascular system, secretion of sweat glands, etc.

Polygraph chart (reaction chart) – a set of physiological parameters recorded by the polygraph. [4]

Reaction – changes in the background activity of the physiological indices caused by the influence of an external targeted stimulus (for example, a question, an image, an object, etc.). [5]

In the interests of special psychophysiological studies using a polygraph, the following physiological parameters are subject to registration: breathing (thoracic and diaphragmatic); galvanic skin reaction (GSR), which determines the electrical

resistance of the skin; blood pressure (BP); and photoplethysmogram (PPG), characterizing the state of the cardiovascular system.

Chest (HDC) and diaphragmatic (NDH) breathing are normally simultaneous as a rule. Mismatch between thoracic and diaphragmatic breathing may indicate increased emotional tension in the subject. [4]

Galvanic skin reaction reflects the degree of nervous system activation, both vegetative and central, including the frontal lobes, which are responsible for a person's emotional background. [7]

Two components are distinguished in galvanic skin reaction: the phasic component and the tonic component.

The phasic component is a short-term change in the galvanic skin reflex: stimulus – reaction – return to norm.

The tonic component is a slow change in the skin's potential, which characterizes the neuro-emotional state, i.e., the background level of electrodermal activity.

The photoplethysmogram is the dynamics of the peripheral vessel lumen. With the help of a photocell, a certain light flux is applied to the fingertips. When the vascular tone is in a normal state, the light passes through in a certain way. And when the vessel is spasmed under the influence of external or internal factors, the tissue density increases, letting less light through. [4]

Study.

The study involved 23 experienced Master Kit users who have used the training tools for at least one year.

Given that functional disorders of the body can affect the quality of psychophysiological research and lead to artifacts, certain requirements were imposed on the participants of the study. Contraindications to the study were as follows:

- acute cardiovascular collapse.
- the second half of pregnancy or the period of severe intoxication.

- the use of potent drugs.
- severe fatigue.
- acute pain.

In order to determine the initial level of emotional state, background reactions were recorded at rest. Also, this stage makes it possible to identify artifacts associated with functional disorders in the activity of any physiological system.

To determine the adaptive characteristics and adequacy of physiological reactions, a “stimulation” test was performed which included acoustic stimuli, the presentation moment of which is determined randomly by a signal generator.

As part of the study, the participants were invited for “transformation” of the sensible subject with the help of the Image training tool included in the Master Kit technique. Physiological reactions were recorded during the significant stimulus presentation (the subject of transformation) at the initial stage and at the “post-transformation” stage.

To test the hypothesis, we registered physiological reactions with the use of a polygraph at the initial and final stages of the “transformation.” Based on the results of the study, a comparative analysis of informative features that determine the level of emotional tension was performed.

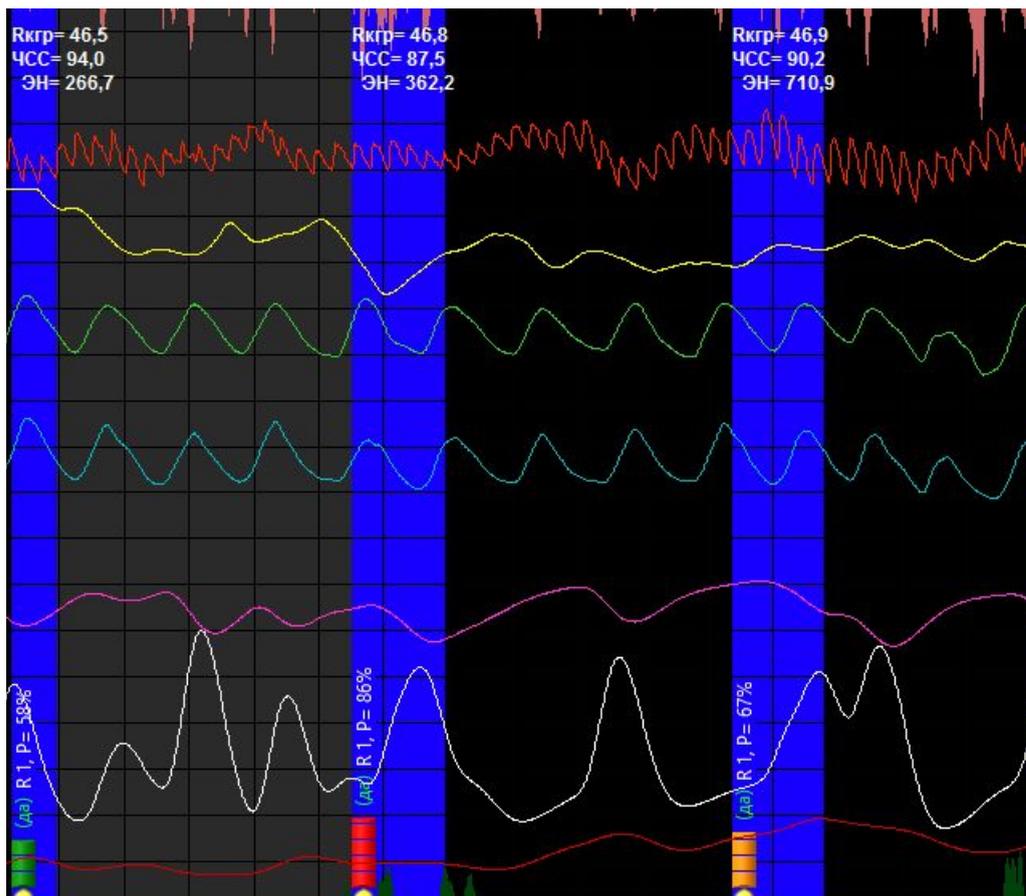


Fig. 1 Physiological reactions indices at the initial stage of transformation



Fig. 2 Physiological reactions indices at the final stage of transformation

The emotional tension index (stress index according to Baevsky's formula) decreases significantly at the final stage of the Master Kit training tool usage.

At the time of the presentation of a significant stimulus, high rates through the galvanic skin reaction channel testified to increased emotional tension. In the "post-transformation" stage, a decrease in the rate of change of the tonic galvanic skin reaction was revealed, which indicates a decrease in the level of emotional tension and an increase in stress tolerance.

At the initial stage of training tool usage, the majority of study participants manifested high frequency of heart contraction, indicating a rise in emotional tension. A decrease in heart rate was registered in the post-transformation stage.

The first stage of transformation was characterized by an increase in the number of respiratory cycles, and in the post-transformation stage, participants' breathing became freer, as evidenced by a decrease in the frequency of respiratory cycles.

This work is the initial stage, and further research will allow us to conduct a comparative analysis of psychophysiological indices throughout the process of transformation using the Master Kit technique and determine the degree of reaction severity of the autonomic nervous system at various stages of the training tool's usage.

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