EXPANSION OF PSYCHOLOGICAL TEST BATTERY BIOTECHNICAL PSYCHOPHYSIOLOGICAL DIAGNOSTIC SYSTEM

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Abstract. *An experimental version of the psychological testing system with fixing the psychophysiological parameters of the test person in real time is developed. As sources of physiological data, the data of the electrocardiogram (ECG), skin-galvanic reaction (SGR) are determined. The hardware-software complex of psychophysiological testing allows, when answering each question of the test, to record and evaluate the psychophysiological state of the test person, which provides additional information for psychologists and personnel services.*

As a questionnaire, the "Big Five" test was chosen - it is a five-factor personality model designed in such a way that a structured and fairly complete portrait of a personality can be drawn from a set of features included in it. The test was conducted among students of the 3rd and 4th year of the University of Turan. The total number of participants is 60 people.

Keywords: *electrocardiogram, photoplethysmogram, skin-galvanic reaction, five-factor personality model, "Big Five", personality portrait, personnel selection, psychological testing.*

ПСИХОЛОГИЯЛЫҚ ТЕСТ БАТАРЕЯСЫН КЕҢЕЙТУГЕ ПСИХОФИЗИОЛОГИЯЛЫҚ ДИАГНОСТИКАЛАУДЫҢ БИОТЕХНИКАЛЫҚ ЖҮЙЕСІ

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Аңдатпа. *Мақалада нақты уақытта тестілеуші адамның психофизиологиялық параметрлерін анықтай отырып, психологиялық тестілеу жүйесінің тәжірибелік нұсқасы жасалды. Физиологиялық деректердің көзі ретінде электрокардиограмма (ЭКГ), тері-гальваникалық реакция (ТГР) анықталады. Психофизиологиялық тестілеудің аппараттық-бағдарламалық кешені тесттің әр сұрағына жауап берген кезде тестілеуші адамның психофизиологиялық жағдайын тіркеуге және бағалауға мүмкіндік береді, бұл психологтар мен маман қызметтеріне қосымша ақпарат береді.*

Сауалнама ретінде «Үлкен бестік» тесті таңдалды – бұл бес факторлық жеке тұлға моделі, осы құрылымдық және жеткілікті толық портретті жасау үшін жеке тұлғалық белгілер жиынтығын қолдануға болады. Тест Тұран университетінің 3-4 курс студенттері арасында өткізілді. Қатысушылардың жалпы саны – 60 адам.

Түйінді сөздер: *электрокардиограмма, фотоплетизм, терінің гальваникалық реакциясы, бес фак-торлы жеке тұлға моделі, «Үлкен бестік», тұлғаның портреті, мамандарды таңдау, психологиялық тестілеу.*

РАСШИРЕНИЕ БАТАРЕИ ПСИХОЛОГИЧЕСКИХ ТЕСТОВ БИОТЕХНИЧЕСКАЯ СИСТЕМА ПСИХОФИЗИОЛОГИЧЕСКОГО ДИАГНОСТИРОВАНИЯ

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Аннотация. Разработан экспериментальный вариант системы психологического тестирования с фиксированием психофизиологических параметров, тестируемого в реальном времени. В качестве источников физиологических данных определены данные электрокардиограммы (ЭКГ), кожно-гальванической реакции (КГР). Программно-аппаратный комплекс психофизиологического тестирования позволяет при ответе на каждый вопрос теста фиксировать и оценивать психофизиологическое состояние тестируемого, что дает дополнительную информацию для психологов и работников кадровых служб.
В качестве опросника выбран тест «Большая пятерка» (Bigfive), это пятифакторная модель личности, разработанная таким образом, чтобы из набора входящих в нее черт можно было составить структурированный и довольно полный портрет личности. Тест проведен среди студентов 3 и 4 курсов университета «Туран». Общее количество участников – 60 человек.

Ключевые слова: электрокардиограмма, фотоплетизмограмма, кожно-гальваническая реакция, пятифакторная модель личности, «Большая пятерка», портрет личности, отбор персонала, психологическое тестирование.

Introduction

The active introduction of technological advances into the theory and practice of studying the functions of living organisms and biological systems is a distinctive feature of modern medicine, veterinary medicine, agronomy, ecology and biology. In this regard, knowledge of the basics of biophysics, biochemistry and systems analysis acquires a special role in training an engineer working in these areas. This knowledge serves as the foundation for the subsequent study of biomedical engineering design methods [1].

A single complex in which the interactions of a technical device with a biological object are purposefully implemented is called a biotechnical system (BTS). BTS includes a special class of complex systems consisting of biological and technical components (subsystems), combined and functioning in a single control complex. Basic subsystems of BPS - biological object B and technical device T. There can be material (flows of matter), energy (flows of energy), information (flows of information) connections between a technical device and a biological object [2-3].

Methods

Hardware methods of psychophysiological testing (in contrast to psychological tests-questionnaires) objectively assess physiological indicators characterizing the state of the central nervous system. When performing these tests, conscious control according to the "improvement" criterion is impossible and therefore the results obtained are more reliable and reliable [4].

Results

For psychophysiological research in medicine and other fields, various devices for collecting and analyzing human physiological reactions are widely used, which include polygraphs, voice stress analyzers, tensometric platforms, etc. These devices register and process human reactions to stimuli perceived by him [5].

In the article [6], a description of the BPS of psychophysiological testing is given, which allows, when answering each question of the test, to record and assess the psychophysiological state of the test taker, which provides additional information for the psychologist.

To increase the scope of applicability of the

psychophysiological testing developed by the BTS, it is important to adapt new psychological tests and include them in the battery of the complex.

In connection with the constant change in the nature of work, saturation, its intellectual content and an increase in tension, the psychophysiological analysis of human activity, the optimization of his psychophysiological states, the solution of the problems of professional selection and professional suitability, the determination and formation of individual psychological qualities of a person become essential directions of humanization and increase in labor reliability. important for the performance of a particular activity, and optimization of unfavorable psychological conditions. In the era of scientific and technological progress with its intense rhythms, new specific conditions of human activity, the requirements for his intellectual, emotional and volitional resources are significantly increasing. The loads on certain functional systems of the body are often excessive, leading to stress and disruption of adaptation mechanisms. This, in turn, leads to the emergence of maladjustment disorders, stress conditions, functional disorders on the part of the cardiovascular, respiratory, nervous, endocrine and other systems of the human body [7].

A characteristic reality is that in the branches of psychology, physiology and medicine, there is the use of modern scientifically grounded methods of diagnosis and correction of a number of conditions. The issues of increasing the efficiency of professional activity of specialists are among the most important social tasks. Paying tribute to the assessment of the dynamic general medical examination of the health of employees, the questions of the psychophysiological state and the study of the functional reserves of the body in their professional activities are of particular importance. Excessive intellectual loads, increased information flow, and in some cases, an unfavorable environmental situation aggravate early detection of dysregulatory disorders [8]. Today, in connection with the deep reorganization of state institutions and all structures of society, these issues acquire special relevance. If previous scientific research was mainly focused on psychophysiological tests for building a por-

trait of a personality, then in this project it is proposed to use hardware and software.

In psychology, the Bigfive is a five-factor personality model designed in such a way that a structured and fairly complete personality portrait can be made from a set of traits included in it. This model includes 5 main factors, each of which, in turn, unites a group of traits. In most studies, they are called primary factors. To measure the indicators of the «Big Five» offers a test with the appropriate name – a five-factor personality questionnaire.

The Big Five has become the most frequently used personality model in foreign studies, although not generally accepted due to the simplification of factorial ideas about personality, which does not correspond to other approaches to the analysis of personality structures. However, it is not necessary to adhere to this model in order to see the good diagnostic power of the Big Five questionnaire scales, which, according to the work of W. Norman [9], performed on the basis of a study of linguistic descriptions of personality, included extraversion (E – extraversion), consent (A – agreebleness), or conformism – in its original form, consciousness (C – conscientiousness), neuroticism (N – neuroticim), or emotional instability, and openness to new experience (O – opentoexperience).

The Japanese personality researcher Hiijiro Tsuyi, adapting the American five-factor personality methodology for the Japanese population, suggested bipolarity for each factor: EXTRAVERSION – INTROVERSION, ADDICTION – SEPARATION, CONTROL – NATURALITY, EMOTIONALITY – EMOTIONALITY – EMOTIONALITY – EMOTIONALITY characterize the personality, since each pole of the trait reflects its originality.

The Russian-language adaptation of the Five-Factor Personality Questionnaire was made by A.B. Khromov [10] according to the 5PFQ questionnaire developed by the Japanese researcher H. Tsuyi based on the original version of McCray and Costa. The questionnaire, adapted on a sample of more than a thousand people (Kurgan), included 75 pairs of statements that were opposite in meaning.

Discussion

The five-factor test questionnaire consists of 75 paired, opposite in meaning, stimulus statements characterizing human behavior. The stimulus material has a five-point rating scale (-2; -1; 0; 1; 2) for diagnosing the severity of each of the five factors: extraversion – introversion; attachment – isolation; self-control – impulsivity; emotional instability – emotional stability; expressiveness – practicality. Currently, the Big Five test questionnaire has become popular and has acquired great practical value both abroad and in Russia. The 5PFQ technique was adapted by A.B. Khromov in 1999.

Each main factor (higher order factor), in addition, includes lower order factors – subfactors, or facets. Facets are the more specific traits (or components of generic traits) that make up each of the five Big Five factors.

The first factor "EXTRAVERSION – INTROVERSION" is considered by H. Tsuyi traditionally, but unlike the interpretation proposed by W. Norman, the Japanese researcher takes into account the values of the poles of this factor, the primary components of which are: activity – passivity, dominance – subordination, sociability – isolation, search for new impressions – avoidance of new impressions.

The essence of the second factor is interaction with people. The term «ATTACHMENT» is better suited to denote a factor than «conformity» used in the American original, and includes such personal dispositions as friendship, gullibility, cooperation, as well as dependence and acceptance of the individual by the group. The opposite pole of this factor «SEPARATION» contains not only signs of distance and rivalry, but also independence. The components of the second factor are: warmth – indifference, cooperation – rivalry, gullibility – suspicion, understanding – misunderstanding, respect for others – self-respect.

The third factor is presented as «CONTROL – NATURALITY». Tsuyi deliberately does not use the term «consciousness», as it has too close attachment to ethical concepts and too narrow semantic meaning. The essence of the third factor is volitional regulation of behavior. An individual who controls himself, as a rule, shows purposefulness, conscientiousness, methodology and perseverance. A natural person in his behavior, on the contrary, 4 strives for harmonious relations with nature, he seems to «float with the flow of life». The Japanese version of the five-factor personality questionnaire contains the following primary components of this factor: accuracy – carelessness, persistence – lack of persistence, responsibility – irresponsibility, self-control – impulsiveness, prudence – carelessness.

The fourth factor contains the characteristics of the affective sphere of the personality. EMOTIONALITY in humans is manifested in increased sensitivity to environmental influences, especially in stressful situations. This personality is also prone to anxiety and depression. EMOTIONAL RESTRAINT, on the contrary, characterizes a person as inclined to show liveliness, slowness and self-sufficiency. The components of the fourth factor are: anxiety – carelessness, tension – relaxation, depression – emotional comfort, self-criticism – self-sufficiency, emotional lability – emotional stability.

The fifth factor is presented as «EXPRESSIVITY». Its essence is a game that allows a person to smoothly «move» from the real world to the unreal, perceive unusual images, thoughts, feelings, symbolism of art and freely enjoy them. On the other hand, «PRACTICALITY» is a trait that manifests itself in a personality in a tendency to correspond to reality, which in its extreme manifestations leads to conformism, cruelty and authoritarianism. The primary components of this factor are: curiosity – conservatism, dreaminess – realism, artistry – unartistic, sensitivity – low sensitivity, plasticity – rigidity [10].

All stimulus phrases are separated by a rating scale. Read carefully the statement at number 1 and determine which part of it is more consistent with your personality. If you think that it is left, then use the symbols - 2 and 1 of the scale for assessment, if you think that it is right, then use the right side of the scale (2 and 1 without a «–» sign).

In numbers, you will reflect the severity of the assessed feature:

2 – strongly pronounced, 1 – weakly expressed, if you doubt the choice, then write 0.

Circle your rating or in any other way so that your answer is clearly visible.

The questionnaire was tested on students aged 20-22. Of these, 53% girls, 47% boys. The obtained results of the questionnaire were processed in the SPSS program.

Conclusion

The five-factor model prevails with a significant advantage over other methods of compactness and brevity. This is currently the consensus that has been reached after decades of research into the taxonomy of personality traits. Based on the analysis of primary factors, it is possible to form a certain idea of the characterological characteristics of the subjects. In each of the primary factors, a personality trait is indicated on the left, which corresponds to high values of point estimates.

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