

## Vibrapsychology as Independent Branch of Science

Viktor A. Minkin

Elsys Corp., St. Petersburg, Russia, minkin@elsys.ru

**Abstract:** *The analysis of vibrapsychology correspondence to the principles presented by independent branches of science is carried out. The science branch of vibrapsychology is proposed to consider as interdisciplinary and unifying concepts from the formal, natural and social sciences. The additional possibilities of vibrapsychology are investigated in relation to the well-known scientific areas of psychophysiology, neurophysiology and cybernetic psychology. The analysis of the achieved results is carried out and the goals of the further development of vibrapsychology are determined. The advantages and disadvantages of the main applications of vibraimage technology as the main basis for vibrapsychology development are analyzed.*

**Keywords:** *vibraimage, vibrapsychology, psychology, psychophysiology, science.*

It is known that science is the field of human activity aimed at the development and systematization of objective knowledge about reality. This activity is carried out through the collection of facts, their regular updating, systematization and critical analysis. On this basis, a synthesis of new knowledge or generalizations is carried out, which describe the observed natural or social phenomena and indicate causal relationships, which allows it prediction. Those scientific hypotheses supported by facts or experiments are recognized by the laws of nature or society (Wilson, 1999). Science is constantly evolving and changing, there is no generally accepted division of scientific areas, in many countries approaches to scientific areas depend on philosophy, morality, ambiguous concepts, if considered from a scientific point of view. Consider the most famous classification of sciences with their division into formal (exact), natural and social. Using this classification and the definition of science given earlier, let us try to analyze any human action, for example, the movement of the hand, as an object of study. Norbert Wiener gives a classic example of such action analysis — to take a pencil (Wiener, 1948). In order to do this, we will have to resort to at least a few sciences, for example, mathematics (formal science) to calculate motion, biology (natural sciences) to understand the physiology of motion and psychology (social sciences) to explain the reasons that caused a person's movement or gesture. There is no doubt that 'too many cooks spoil the broth' and that such an approach to describing a relatively simple phenomenon can hardly be called scientific, since it does not allow establishing causal relationships. For scientific progress, it is necessary to investigate the object within the framework of one scientific direction, only then can we expect to obtain adequate results. However, at present, there is no such science or scientific branch that could objectively study the psychology and behavior of a person.

Of course, there are such scientific areas as neurophysiology, psychophysiology and cybernetic psychology, which are quite similar in essence, to the tasks that vibrapsychology can solve. However, these sciences have its own limitations. For example, neurophysiology is a branch of physiology that studies the functions of the nervous system, the work of the vestibular system is not included in the scope of neurophysiology. Psychophysiology, in principle, is the closest science that is able to study the psychological and physiological aspects of human behavior, but has recently been associated more with lie detection and the work of contact sensors that analyze known physiological signals. Cybernetic psychology makes a clear bias towards cybernetics and tries not to delve into physiological processes. The task of vibrapsychology as an interdisciplinary science branch is to study the factors that determine human behavior, including at the level of conscious and unconscious reactions. The physiological basis of vibrapsychology is the functioning of the vestibular system and the vestibular-emotional reflex (Minkin&Nikilaenko, 2008). The technical basis of vibrapsychology is vibraimage technology (Minkin, 2017) based on software processing video images of the human head.

One of the modern scientific principles is the principle of simplicity, sometimes referred as Ockham's razor (Thorburn, 1918) named for the Franciscan friar, in the short form that reads «Entities should not be multiplied without necessity». Using the principle of simplicity (the simplest solution is most likely the right one), it can be stated that if vibrapsychology is self-sufficient for studying human behavior, then it can be perceived as an independent science branch.

## 1. From homeostasis to homeokinesis

The term homeostasis was proposed by the American physiologist Walter Cannon (Cannon, 1932) to characterize the processes of self-regulation or for coordinated physiological processes that support most stable conditions of the body. When considering the homeostasis of biosystems, the main focus is on stability, but later physiological studies have shown that variables in the body are subject to regular cyclic changes (Novoseltsev, 1978), although the mathematical modeling of human PPS was limited by homeostasis. Franz Halberg called the system of regulation through fluctuations of chronobiological signals — homeokinesis (Halberg et al., 1987).

If we move away from the desire to assign a new term to well-known phenomena, then we should pay attention to the work of the Great Russian physiologist Ivan Mikhailovich Sechenov, who wrote the following back in 1860: Now, let's look at the regulation of income with outcome. There are many mechanisms supporting the equilibrium between these two values in the body (Sechenov, 1952). I want to pay attention to the next interesting moment. One of the main points at the 1st vibraimage conference was Sechenov's thesis that «every thought has a muscular manifestation» (Minkin, 2018). At the 2nd conference, most of the reports (Minkin, 2019) were devoted to reflex movements and continued Sechenov's thesis that «thought is 2/3 of the reflex». At this conference,

we advanced to the study of equilibrium states. Most likely, everything that modern psychophysiology studies and a dozen of our conferences will also be based on the development of Ivan Mikhailovich Sechenov theses.

Vibrimage technology and vibrapsychology have shown unique capabilities in the study of the equilibrium and dynamic states of a person (Minkin, 2020), which made it possible to revise the mechanisms for regulating human PPS, create mathematical models of homeokinesis, and decompose the behavioral characteristics of a person into separate elements that make up the whole system.

## **2. Measurement of behavioral parameters by vibrimage technology**

The main element of cybernetics is the amount of information (Wiener, 1948). The main element of vibrimage technology is video streaming converted into inter-frame difference (Minkin & Shtam, 2000; Minkin, 2007). Each point of vibrimage carries information about the temporal and spatial components of the movement of the object, and depending on the time constant and spatial characteristics, vibrimage at each point can be represented as an innumerable set of temporal and spatial characteristics.

The restriction in obtaining the initial and processed information about the object is only real equipment and processor power. In terms of the volume of initial information about the measurement object (with the existing level of hardware), vibrimage technology is orders of magnitude superior to all known psychophysiological detection technologies, for example, contact polygraph, magnetic resonance imager, EEG, etc. An IT expert can object — what an advantage, a large amount of initial information is not an advantage, but a disadvantage, because it needs to be processed, and even in real time. I can partially agree with this statement, of course, it is easier to get a small amount of information and use it correctly. In terms of processor costs, the technology of vibration imaging is the most difficult to process among the well-known technologies of psychophysiological detection. This limitation markedly impedes its widespread adoption. But if the information is superfluous, then you can always get rid of it and compress the information flow. If the necessary information is missing, then it can no longer be filled. Therefore, in cybernetics for solving complex problems there cannot be a lot of information, it may just not be enough to solve the tasks. In the technology of vibration imaging, you can always extract additional information about the measurement object, if it is not enough.

Now about the informativity of vibrimage technology. Vibrimage transforms information from the vestibular system. The vestibular system provides the human mechanical balance and is functionally linked to all human physiological systems (Minkin & Nikolaenko, 2008). Any changes in the physiological or mental state make their own unique impact on the functioning of the vestibular system and affect the maintenance of the vertical state and movement of the human head. Any movement of a person's arm or leg makes a change in head movement; this is one of the rules of biomechanics (Bernstein, 1967). In addition, human movement is an uniquely behavioral

characteristic. Freud claimed that a person has no random movements (Freud, 1926). Those. Assessment of human reflex movements by vibraimage technology combines physiological and behavioral characteristics into a single whole, which is not available to other technologies (Meiselman, 2016).

Vibraimage is non-contact, user friendly and allows you to explore a person without violating his usual activities. In this way, it differs significantly from most contact technologies that require the placement of sensors on the human body, especially since it is far from computed tomography, which requires placing a person in special closed equipment.

These properties allow vibraimage technology to become basic in vibrapsychology and measure not only individual parameters of emotions, but also determine the totality of known human behavioral characteristics. The developers of vibraimage technology have proposed a unified algorithmic approach to all parameters of emotions and psychophysiological states, which allows determining the change in each parameter in relative units from 0 to 1, or in percent from 0 to 100% (Minkin, 2017). The greatest severity of each psychophysiological parameter is characterized by a value close to unity (or 100%).

Moreover, we do not see the need to normalize the value of all parameters in such a way that in norm each parameter is equal to approximately 50%, as the developers of MMPI questionnaires (Schiele&Baker&Hathaway, 1943) achieve for T parameters. Artificial double reduction of parameters (initially a range from 0 to 100, then nom 50) to a single value does not have mathematical meaning. The analysis of dependencies and correlations the dynamics of change and the density of distribution of the measured parameters are important, and the range from 0 to 100 is sufficient for a single perception and joint processing of psychophysiological parameters.

The psychophysiological meaning of vibraimage technology is to consider the physiology of the reflex movements of the human head at the micro level, at the level of movements invisible to the eye. The fact that the physiology of visible reflex movements reflects the emotional and psychophysiological state was previously known (Sechenov, 2001; Darwin, 2001; Lorenz, 1963).

The invisibility to an eye of head micromotion does not change anything in the theories of past scientists, the movement remains a movement, even if it occurs with a micron amplitude. Moreover, any repeating and oscillatory process is easier to convert into information than non-repeating macro-movements; it is easier to measure and normalize. The principles of the analysis of reflex movements remain approximately the same as in the analysis of human macro movements.

There are short theses discovers by vibraimage in PPS analysis:

- The rhythm (period from 30 to 200 seconds) of brain activity that determines the behavioral characteristics of a person (Minkin, 2020) was highlighted.
- Classification of the table of elements that determine human behavior based on mathematical principles, primarily correlation among themselves, is proposed.
- Proved the absence of a correlation between the parameters of consciousness and the unconscious characteristics of the person.

### 3. Psychometrics as the part of metrology

Fundamentally important (to obtain an unambiguous and objective result) is the approach to the emotional and psychophysiological parameters of a person, as to various qualities of a physical object under study that have quantitative characteristics. That is, the standard metrological approach to measuring physical quantities (JCGM 200, 2008) can be applied to measuring the emotional characteristics of a person. Psychometrics cannot be a separate science based on the analysis of only the conscious reaction of the subjects, self-testing and self-esteem. An analysis of only a person's conscious reaction when testing using questionnaires, even if it is carried out using the most modern mathematical methods (Schiele&Baker&Hathaway, 1943), cannot give an objective and complete characterization of the person, since the processes of consciousness and the unconscious do not replace, but complement each other (Minkin&Myasnikova&Nikolaenko, 2019).

At the same time, I do not deny, but rather confirm that the conscious information obtained by passing the questionnaires can be effectively used to obtain a complete personality profile. The combination of conscious and unconscious information in one test allows you to determine the character traits of a person, or, for example, his abilities and multiple intelligence (Gardner, 1983).

So that the measurement of the emotional and psychophysiological parameters of a person is objective, it should be carried out on the basis of measuring physical quantities (or physiological parameters). An open algorithm for calculating parameters and statistical processing of measurement results are standard approaches to solving metrological problems.

Minimization of behavioral characteristics, measured by the results of a conscious reaction, and an increase in human behavioral characteristics, measured as physical parameters, increase the accuracy and uniqueness of determining the general characteristics of a person, since the physical measurement is more objective than the measurement of the characteristics of consciousness. The proposed approach brings vibrapsychology closer to the natural and exact sciences, and one should begin by agreeing on exact definitions of the personality's behavioral characteristics. As noted earlier, there are currently no clear distinctions between emotions, psychophysiological parameters and personality traits. The separation of the behavioral characteristics of a person according to their stability over time (Spielberger et al., 1983) does not hold water, since all human behavioral characteristics change under the influence of various factors.

For an objective characteristic of a physical object, it is necessary to study the physical characteristics of this object, and not the subjective reaction of consciousness to subjective stimuli. Therefore, the inclusion of the results of processing a conscious reaction in the behavioral characteristics of a person should be minimized, and for measuring emotional and psychophysiological it should be excluded, since all the information necessary for measuring emotions and psychophysiological parameters should be obtained on the basis of physical measurements.

## Conclusion

The use of vibraimage technology in the framework of a new scientific field — vibrapsychology allowed us to develop a universal classification of the behavioral characteristics of a person (Minkin, 2020). The proposed classification of human behavioral characteristics uses the correlation between behavioral parameters as the basis for constructing a table of personality elements, similar to atomic weight in a periodic table of chemical elements.

I hope that the conclusions about the existence of vibrapsychology as an independent scientific field will be confirmed not only by its developers, but also by independent researchers. To verify the data, we place the resulting database of behavioral parameters in the public domain.

I do not agree with the approach to the uniqueness of consciousness, most pronounced by Roger Penrose, who argued that the development of new physics is necessary to study the processes of consciousness (Penrose, 1994). In my opinion, the processes of consciousness can be successfully investigated within the framework of vibrapsychology, and this direction should be the main one in further developments. Perhaps in the future, the scientific directions of vibrapsychology, vibramedicine and vibrabiology should be combined, for study the functioning of the vestibular system in a single scientific direction, depending on the biological and psychological characteristics of a person.

In the attachment given link to extended databases of emotional and psychophysiological parameters. The general database, including 12494 measurement results (file 12494All.xlsm), the database for measuring the free state of a person by VibraMed (file 12494MED.xlsm), the database of passing questionnaires by VibraMI and PsyAccent (12494MI.xlsm and 12494PA.xlsm). I invite researchers of emotions and psychophysiological parameters to conduct their own research and develop their theories based on the data.

### Attachment

Databases of measurements of emotional and psychophysiological parameters are given in the files on the link <http://www.psymaker.com/downloads/CyberVibraV2.zip>

### References:

1. Bernstein, N. A. (1967). *The Co-Ordination and Regulation of Movements*. Oxford, Pergamon Press.
2. Cannon, W. B. (1932). *The Wisdom of the Body*. New York: W. W. Norton.
3. Darwin, C. (1872). *The Expression of the Emotions in Man and Animals*. London, John Murray.
4. Freud, S. (1900). *The Interpretation of Dreams*. Science Odyssey: People and Discoveries. PBS. 1998.
5. Gardner, H. (1983). *Frames of Mind: The Theory of Multiple Intelligences*. New York: Basic Book.

6. Halberg, F. et al. (1987). Perspectives of chronobiologic engineering, NATO ASI Series, Vol. 120, pp. 1–46.
7. JCGM 200 (2008). International Vocabulary of Metrology — Basic and General Concepts and Associated terms (VIM).
8. Lorenz, K. (1963). Das Sogenannte Böse zur Naturgeschichte der Aggression. Original edition, Verlag Dr. G. Borotha-Schoeler.
9. Meiselman, H. R. (2016). Emotion Measurement, Navigating the Science of Emotion, Woodhead.
10. Minkin, V. A. and Shtam, A. I. (2000). Method and Device for Image Transformation, US7346227.
11. Minkin, V. A. and Nikolaenko, N. N. (2008). Application of Vibraimage Technology and System for Analysis of Motor Activity and Study of Functional State of the Human Body, Biomedical Engineering, Vol. 42, No. 4, pp. 196–200. DOI: 10.1007/s10527-008-9045-9
12. Minkin, V. A. (2017). Vibraimage. St. Petersburg: Renome. DOI: 10.25696/ELSYS.B.EN.VI.2017
13. Minkin, V. A. and Nikolaenko, Y. N. (2017). Vibraimage and Multiple Intelligences. St. Petersburg: Renome. DOI: 10.25696/ELSYS.B.EN.VIMI.2017
14. Minkin, V. and Myasnikova, E. (2018). Jung was Right. Vibraimage Technology Proves the Different Directions of Energy Distribution for Extraverted and Introverted Psychophysiological States, Proceedings of the 1st International Open Science Conference, Modern Psychology. The Vibraimage Technology, Saint Petersburg, Russia, 28–29 June 2018, pp. 137–146. DOI: 10.25696/ELSYS.VC1.EN.3
15. Minkin, V. A. (2019). Psychology VS Biometrics and Consciousness VS Unconscious. Are Consciousness and Unconscious the Additive Parameters? Proceedings (English Edition) of the 2nd International Open Science Conference, Modern Psychology. The Vibraimage Technology, Saint Petersburg, Russia, 25–26 June 2019 [online], pp. 5–11. (Access: 17 March 2020). DOI: 10.25696/ELSYS.VC2.EN.10
16. Minkin, V., Myasnikova, E. and Nikolaenko, Y. (2019). Conscious and Unconscious Responses as Independent Components of a Person's Current Psychophysiological State, Proceedings (English Edition) of the 2nd International Open Science Conference, Modern Psychophysiology. The Vibraimage Technology, St. Petersburg, Russia, 25–26 June 2019 [online], pp. 47–80. (Access: 17 March 2020). DOI: 10.25696/ELSYS.VC2.EN.20
17. Minkin, V. (2020). Vibraimage, Cybernetics and Emotions. St. Petersburg: Renome. DOI: 10.25696/ELSYS.B.EN.VCE.2020
18. Novoseltsev, V. N. (1978). Cybernetics and Biosystems. M.: Nauka. (In Russ.)
19. Penrose, R. (1994). Shadows of the Mind. Oxford University Press.
20. Sechenov, I. (1952). Selected works. V. 1. Physiology and Psychology. USSR, SA. (In Russ.)
21. Spielberger, C. D. et al. (1983). State-Trait Anxiety Inventory for Adults. Sampler Set. Manual, Instrument and Scoring Guide, Consulting Psychologists Press.
22. Thorburn, W. M. (1918). The Myth of Occam's Razor, Mind.
23. Wiener, N. (1948). Cybernetics: Or Control and Communication in the Animal and the Machine. Paris: (Hermann & Cie) & Camb. Mass. (MIT Press) 2nd revised ed. 1961.
24. Wilson, E. O. (1999). The natural sciences. Consilience: The Unity of Knowledge (Reprint ed.). New York: Vintage.