PSYCHOLOGY VS BIOMETRICS AND CONSCIOUSNESS VS UNCONSCIOUS. ARE CONSCIOUSNESS AND UNCONSCIOUS THE ADDITIVE PARAMETERS?

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Abstract: *The study of dependencies and the analysis of correlation between consciousness and unconscious responses to stimuli upon presentation of the line-opposite and complementary questionnaires was done. The absence of correlation between consciousness and unconscious responses to the presented stimuli has been established. A hypothesis was developed to explain the lack of correlation between conscious and unconscious responses. The algorithm was proposed for calculating of personality characteristics including the summation and averaging of conscious and unconscious parameters.*

Keywords: *vibraimage, physiology of consciousness, psychophysiology, psychology, biometrics, consciousness, unconscious.*

Modern science, that studies human, is becoming increasingly narrow specialization, while the physical and physiological processes in the human body are interrelated and regulated by many feedbacks [Wiener, 1948; Bernstein, 1967]. In the last century, some scientists tried to look at a person as a single mechanism studied by various sciences and tried to find common patterns for its characteristics [Pavlov, 1927; Wiener, 1948; Bernstein, 1967; Anokhin, 1966; Simonov, 1986], however in most modern scientific publications this approach is for some reason considered almost indecent. All this was previously said by Wiener in the preface to his classic work on cybernetics [Wiener, 1948], and over the past 70 years, specialization in science has only worsened. However, such process cannot last forever, the accumulation of information in highly specialized scientific areas should lead to a qualitative leap in the development of science. The first Nobel laureate from Russia, Academician Pavlov, wrote: "It is often said, and not without reason that science moves by impulses depending on the success of the methods. With each step of the technology, we as if rise up a step above, from which a wider horizon opens, with objects invisible earlier" [Pavlov, 1951]. Such a method that combines the processing of conscious and unconscious responses when conducting various studies is the vibraimage technology [Minkin, 2007; 2008; 2018; Minkin, Nikolaenko, 2008]. The vibraimage technology combines the capabilities of biometrics and psychology, allows for joint processing of consciousness and the unconscious human parameters and characterizing its joint processing with uniform mathematical parameters reflecting the psychophysiological state (PPS) of a person. The parameters of vibraimage technology make possible to determine the abilities and predict human behavior in the near and distant future [Minkin, 2018; Minkin et al., 2019]. These advantages give vibraimage technology a competitive advantage over competitors, which concentrate on measuring only the biometric or psychological characteristics of testee.

Many researchers came close enough to understanding the relationship between the consciousness and the unconscious [Darwin, 1872; Sechenov, 1965; Anokhin, 1966; Simonov, 1986; Polonnikov, 2013]; the term physiology of consciousness was introduced in far 1933 [Boring, 1933], but without testing data the theory cannot go beyond unproven assumptions in their research. The aim of this work is practical proving of hypothesis about consciousness and unconscious human characteristics additiveness.

Method and participants

As an example of interaction of the conscious and unconscious, let's consider the results of group testing of 855 high school students and university students from St. Petersburg (age 15–25 years) on questions from VibraMI programs with the Gardner12T questionnaire [Minkin, Nikolaenko, 2017; VibraMI, 2019] and the group of 210 senior students SPb school classes (age 15–17 years) on questions from PsyAccent programs with the T12 questionnaire [PsyAccent, 2019], conducted in 2017–2018 [Minkin, Myasnikova, Nikolaenko, 2019].

Testing was conducted on computers with an IntelCore I7 processors, with a Microsoft LifeCam Studio webcams with an image format of 640 × 480. The illuminance of the testees was within (500–700) lux, the head size of testee was at least 200 horizontale pixels, quality indicator in the VibraMI and PsyAccent programs exceeded 80%. The duration of each test was approximately 380 seconds.

Testing results

The results of testing with line-opposite and complementary questionnaires have been described in detail by the number of papers [Minkin, Nikolaenko, 2017, Minkin, Myasnikova, 2018; Minkin et al., 2019]. However, the issue of lack of correlation between conscious and unconscious responses in all the tests carried out was not given enough attention. In this paper, we will analyze data from more than a thousand tests carried out by various vibraimage technology systems [VibraMI, 2019; PsysAccent, 2019] over the past 2 years. Since it is incorrect to mix the results obtained for different questionnaires, the results of the correlation matrix for 855 tests of the VibraMI program are given as the first example. The results of the correlation matrix between conscious and unconscious responses upon presentation of stimuli by VibraMI program are shown in table 1.

From table 1, it follows that the maximum Pearson correlation coefficient between conscious and unconscious responses does not exceed 0.11, which is negligible compared to the correlation coefficients obtained inside the conscious and unconscious responses and reaching values of 0.8–0.9 [Minkin, Myasnikova, 2018; Minkin, Myasnikova, Nikolaenko, 2019]. A similar picture is observed for almost all the studies conducted with a significant number of people tested, exceeding 200 people. Table 2 shows the results of the correlation matrix between conscious and unconscious responses upon presentation of linearly similar stimuli by PsyAccent program.

Table 1

Correlation matrix of conscious and unconscious responses according to the results of 825 subjects testing by VibraMI program

	IA	ET	LM	BM	VS	NL	BK	MR	AS	VL	AB	IE
IA					-0,06				-0,08			
ET					0,05							
LM	-0,07			0,05		-0,07	-0,06				0,11	
BM									0,06			
VS			0,06					0,08	0,06			
NL		0,05	0,06	-0,07				0,06				
BK								-0,05	0,05			
MR				0,07								
AS					-0,06							
VL							0,05		-0,06			
AB				-0,05	-0,07							
IE				0,05					-0,05		-0,08	

Table 2

Correlation matrix of conscious and unconscious responses according to the 210 subjects testing by PsyAccent program

	SZ	AN	SS	PS	CC	CF	US	LB	EP	HS	HT	HC
SZ					0,11	0,17	0,17		0,07			
AN			0,07			-0,13		-0,07				
SS	-0,08		0,06			0,06		0,06		-0,15	0,07	
PS	-0,06		0,05				-0,09	0,08		0,07	-0,11	
CC	0,09			0,07	0,17		-0,13		-0,10		0,15	
CF				0,06	0,09	-0,10		0,12			-0,06	
US	-0,10	-0,07	-0,05	0,09		-0,07	-0,08	-0,10	0,05			0,14
LB		-0,19		0,08	0,05	0,05	0,11		-0,11			
EP						0,17		0,07	-0,08			0,13
HS		0,05		-0,06			0,09	0,08	-0,21	0,06		
HT					-0,06	0,17		0,14		-0,05		0,05
HC		-0,13	-0,11	0,08			0,08		-0,07		0,14	0,06

When conducting research, it was noted that increasing the number of testee in the sample leads to an increase in significant correlations and a decrease in random correlations. Therefore, the presence of correlation coefficients (between conscious and unconscious responses) level (0.17–0.19) in a sample of 210 subjects decreases markedly with an increase in the sample to 800–1000 people. For the contrast of the lack of correlation between the conscious and unconscious responses of the testees, I present data on the correlation between the parameters within the conscious and unconscious responses in tables 3 and 4, respectively.

The average level of negative correlation (Pearson coefficient) between neighboring questions is -0.46 according to the test results of 210 testee in table 3.

The correlation matrix of conscious reaction according to the test results of 350 tested by the VibraMI program shows the presence of a negative correlation

for opposite centrally symmetric types of MI located on opposite sides of a linear opposition questionnaire (table 4).

<div align="right">**Table 3**</div>

Correlation matrix of conscious and unconscious responses according to the 210 testing results by PsyAccent program

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
1		-0,38277																						
2	-0,38277		-0,44639																					
3		-0,44639		-0,54147																				
4			-0,54147		-0,4069																			
5				-0,4069		-0,53241																		
6					-0,53241		-0,44862																	
7						-0,44862		-0,46365																
8							-0,46365		-0,46134															
9								-0,46134		-0,42592														
10									-0,42592		-0,46355													
11										-0,46355		-0,41459												
12											-0,41459		-0,42794											
13												-0,42794		-0,48078										
14													-0,48078		-0,44861									
15														-0,44861		-0,38785								
16															-0,38785		-0,46673							
17																-0,46673		-0,59772						
18																	-0,59772		-0,47366					
19																		-0,47366		-0,41611				
20																			-0,41611		-0,41791			
21																				-0,41791		-0,51536		
22																					-0,51536		-0,5415	
23																						-0,5415		-0,39433
24																							-0,39433	

<div align="right">**Table 4**</div>

Correlation matrix of the conscious responses based to the 350 testing by VibraMI program

	IA	PH	LM	BM	VS	NL	BK	MR	AS	VL	CR	IE
IA												-0,30
PH											0,31	
LM										-0,67		
BM									-0,34			
VS												
NL												
BK												
MR												
AS				-0,34								
VL			-0,67									
CR		-0,31										
IE	-0,30											

The reduced number of testee in the sample to 350 people is associated with the change of stimuli in the VibraMI program and the replacement of the opposition pair (2–11) of MI types to the philosophical-creative, explained in the study [Minkin et al., 2019].

Discussion

What does the lack of correlation in the conscious and unconscious responses to stimuli show? First, about the independent functioning of human physiological systems, responsible for the conscious and unconscious responses to the presented stimuli. At the same time, the work [Minkin, 2019] showed that the existing significant negative correlation of the unconscious responeses upon presentation of

neighboring stimuli, practically does not depend on the semantic load linked with the corresponding stimulus. In another work [Minkin, Myasnikova, 2018], it was shown that for a conscious reaction there is also a positive correlation to similar stimuli that are separated in time. Since there was a single technical and methodological apparatus in the processing of conscious and unconscious reactions, showing the correlation in the samples, if it was present, the lack of correlation between the conscious and unconscious responses should be considered an objective and proven phenomenon. A conscious response, following Pavlov [Pavlov, 1951], should be considered as a function of higher nervous activity and the work of an independent physiological system responsible for conscious processing of information or a conditioned reflex. Then the operation of all human physiological systems, aimed primarily at performing the functions of each physiological system separately, and the vestibular system in particular, responsible for supporting mechanical equilibrium, should be considered as an unconditioned reflex. Let us consider the same question somewhat on the other hand, having formulated it in the form of a simplified physical problem. Is it possible to characterize global properties of an object by measuring its individual characteristics? For example, is it possible to measure the resistance if we take an electrical resistance of 1 ohm, but not knowing its value, and measure the electrical current flowing through it many times at different applied voltages, but not measuring this voltage? Each schoolchild will answer that, in accordance with Ohm's law, resistance cannot be measured, even if the electric current is measured a thousand times, in order to determine the resistance value, it is necessary to measure electric current and voltage drop on the resistance.

Measuring a personality characteristic, emotions, PPS, abilities are probably more difficult than measuring the electrical resistance of an element. However, for some reason this does not stop the majority of researchers who determine the portrait of a person by the same parameters, for example, associated with his conscious responses in psychology [Eysenck, 1981] or its biometric parameters, such as the genome, in genetics [Deary et al., 2006], or fingerprints in dermatoglyphics [Dholiya, 2017]. At the same time, after Freud's fundamental work on the unconscious [Freud, 1900], no one doubts that the unconscious is important in a person's behavior, determining his abilities and predicting his actions. Darwin's theory of evolution [Darwin, 1872] proves that nature for species survival cannot provide the same functions with different physiological systems. Suppose that nature has given man a consciousness, balancing it with an unconscious (autonomous) physiological algorithm, endowing them with naturally different functions for a more objective assessment of any events taking place. It is possible to call these processes reflexes (conditional and unconditional), is possible to call these processes physiological (physiology of consciousness and physiology of the unconscious) — this is the question of terminology. In my opinion, the results obtained allow us to draw the following conclusion: a separate analysis of conscious or unconscious information can NEVER provide objective and complete information about the behavior, abilities, and significant characteristics of personality. A personality relies on the totality of the addition of his conscious and unconscious characteristics.

According to Table 3, the unconscious response of a person is the most rapid and decisive in making decisions on fast stimuli. The response of consciousness is decisive for making decisions on stimuli distant in time. Both of these psychophysiological mechanisms determine a person's personality, the use of only one component cannot characterize a person; it is impossible to solve a system of equations in which the number of unknowns exceeds the number of equations. The VibraMI, PsyAccent, and other vibraimage programs with biological feedback carry out a simple mathematical averaging of consciousness and unconscious characteristics and at the moment, I am convinced that this approach is the most correct for personality characteristics assessment. How correct is this operation and whether these parameters are additive should be confirmed or disproved in further studies. The proposed processing algorithm is the simplest, so it used for joint processing of consciousness and unconscious parameters.

Conclusions

Vibraimage technology is psychophysiological measurement technology, offering automated algorithms for processing conscious and unconscious human responses to stimuli. The proposed algorithms allow more accurately assessing and measuring the abilities, capabilities, personality, behavior and psychophysiological parameters of a person. The study carried out prove that consciousness and unconscious parameters are additive and subject of joint mathematical processing for the correct characterization of a personality. The proposed principle of additivity of conscious and unconscious parameters shows a good match with the expert assessments ones used to characterize the personality. At the same time, automated measurement of personality parameters (multiple intelligences profile, psychological accentuations) is a more objective method of personality assessment than expert assessment.

The development of vibraimage technology with conscious and unconscious parameters additive processing can be used in education, security and allows achieving better results in HR, recruiting, career guidance for staff, team compatibility and personal success in various fields.

References:

1. *Anokhin P. K.* (1966). Cybernetics and Integrative Brain Activity // Vopr. Psychology. № 10. P. 10–33.
2. *Bernstein N. A.* (1967). The coordination and regulation of movements. Oxford: Pergamon Press.
3. *Boring E. G.* (1933). The physiology of consciousness // Science. Vol. 75, Iss. 1932. P. 32–39.
4. *Darwin Ch.* (1872). The Expression of the Emotions in Man and Animals. London: John Murray.
5. *Deary I. J. et al.* (2006). Genetics of intelligence // European Journal of Human Genetics. Vol. 14. P. 690–700.
6. *Dholiya K., Dholiya A.* (2017). Dermatoglyphic Multiple Intelligence Analysis // International Journal of Memory and Intelligence. Vol. 1, Iss. 1. P. 24–26.

7. *Eysenck H. J.* (1981). A model of personality. New York: Springer.

8. *Freud S.* (1900). The Interpretation of Dreams, Science Odyssey. People and Discoveries. PBS.

9. *Minkin V. A., 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. P. 196–200. DOI: 10.1007/s10527-008-9045-9.

10. *Minkin V. A., Nikolaenko Y. N.* (2017). Vibraimage and multiple intelligence. St. Petersburg: Renome.

11. *Minkin V. A.* (2017). VibraImage. St. Petersburg: Renome. DOI: 10.25696/ELSYS.B.EN. VI.2017.

12. *Minkin V., Myasnikova E.* (2018). Using Vibraimage Technology to Analyze the Psychophysiological State of a Person During Opposite Stimuli Presentation // Journal of Behavioral and Brain Science. Vol. 8. P. 218–239.

13. *Minkin V., Myasnikova E., Nikolaenko Y.* (2019). Conscious and Unconscious Responses as Independent Components of a Person's Current Psychophysiological State // Current Psychiatry Reviews. Vol. 32, Iss. 3.

14. *Pavlov I. P.* (1972). Conditioned Reflexes: An Investigation of the Physiological Activity of the Cerebral Cortex / Transl. and Ed. by G. V. Anrep. London: Oxford University Press. P. 142.

15. *Pavlov I. P.* (1951). Complete Works. Ed. 2nd, add. Moscow: Publishing House of the Academy of Sciences of the USSR, 1951–1954. (In Russian)

16. Patent US 7346227, IPC G06K 9/36. Method and device for image transformation / *V. A. Minkin, A. I. Shtam*, ELSYS Corp. Filed 19.12.2000; Publ. 18.03.2008.

17. Patent RU 2017109920, IPC A61B 5/11. A method for assessing a person's psychophysiological state / *V. A. Minkin*, ELSYS Corp. Filed 24.03.2017; Publ. 24.09.2018, Bul. № 27.

18. *Polonnnikov R. I.* (2013). Selected Works: In 2 vols. St. Petersburg: Anatolia.

19. *Sechenov I. M.* (1965). Reflexes of the Brain. Cambridge, Mass.: The MIT Press.

20. *Simonov P. V.* (1986). The emotional brain. New York: Plenum Press.

21. VibraMI (2019). Psychophysiological profiling system. Version 10 [Electronic resource]. St. Petersburg: ELSYS Corp. URL: http://www.psymaker.com/downloads/VibraMIEng10.pdf (access date: 06.05.2019).

22. VibraPA (2019). Diagnostic Program of Personality Accentuation [Electronic resource]. St. Petersburg: ELSYS Corp. URL: http://www.psymaker.com/downloads/PsyAccentEng.pdf (access date: 06.05.2019).

23. *Wiener N.* (1948). Cybernetics: Or Control and Communication in the Animal and the Machine. Paris: Hermann & Cie; Cambridge, Mass.: MIT Press. (2nd revised ed. 1961).