



THE GENERAL PSYCHOLOGY

Belomestnova N.V.

The natural-system foundations of the psychics organization

In the article it is considered a model of the psychics organization in evolutionary-biological foundations. It is proved the necessity of construction of the natural psychics model, instead of the artificial one. In direct communication with such model there is also a problem of the mental phenomena classification. For the argument it is used the material of neuropsychology, psychophysiology, development psychology, pathopsychology, the physiology of sensory systems, activity physiology etc. It is underlined the methodological value of the natural psychics model's generation.

Key words: *psychics structure, psychics organization, psychics model, mental phenomena classification, artificial systems, natural systems, system approach.*

The problems of organization of the psyche as a natural system

The problem of the psyche organization (i.e. its models) was stated by Aristotle yet. If before him there were specified certain properties of soul, system thinking of Aristotle, who was the founder of the classification of all things in existence, has allowed him to group various psychical "abilities" in the known triad – knowledge, feelings and will, and each block of the triad (a soul subsystem) has own componential structure by a principle of function uniform for this block (knowledge, experience and behaviour). Since then, for two and a half thousand years, this model did not almost change as it was constructed basing on the logical-intuitive discourse of philosophers.

Such a way of cognition is possible, if it was a question of especially artificial system created by the person for decision of his private problems. But even the methodological discussion of philosophers and natural scientist (biologists- digesters) of the XVII-XVIII on criteria and classification principles has generated a concept of artificial, man-made, and natural, created by the nature, classifications. Biologists have successfully shown efficiency of the concept of natural classification in Lamarck-Liney methods of construction of the general classification of animals and plants, reflecting in taxons a degree of species propinquity to each other by a biological criteria (by the community of origin). And even now, answering the questions on possible harm of the genetically modified organisms (GMO), scientists-biologists say that they do not construct new methods of gene combinations, they open them, open that the nature has created, and the nature uses them daily though the philistine do not suspect of that.

Psychologists-system analysts also apply the concept of natural and artificial systems. K.K. Platonov believed that the system is an artificial classification depending



from the learning, for example, the system of psychological sciences. And the structure is a natural model which is not dependent from the learning; it is created by the nature, for example, the mental phenomena [32]. In other words it is necessary to study the psyche structure in its biological determination, and the system of mental concepts is formed artificially by the criteria demanded by a problem.

But here there is a question: is it legitimate to apply the concept of natural classification to psychics, i.e. is it possible the classification, configuration of mental "abilities" in psychics subsystems by natural-system foundations? If psychics is a specially speculative person's construct owing to its intention to transfer all concepts into in a visible image [21], any artificial model would be true by those criteria which were set by an author. If psychics is created by the nature, the model should also be natural and, owing to this, the only true.

Here it is appropriate to consider how the human has considered a spirit – matter parity in the evolution process?

Earlier we have already offered a reconstruction of *the stages of the mental and not mental differentiation* (distinguishing of the ideal, mental world from the material reality) in consciousness of the person [16]. The first stage is the identification of these realities with the psychics materialization ("objectification"). Etymology (soul – spirit – breath), magic practice with body parts (nails, hair) and a person's shade, thin atoms of soul in the before-Socrates atomism testify to this. The second stage is animation of not only the live (the psychics carrier), but also the lifeless. Comprehension of other substantiality of soul starts (it is invisible though it is possible to represent it), but still it is in direct dependence on a body. The same things there also say the phenomena of the consciousnesses ontogenesis discovered by J. Piaget: animism, magic causality, artificialism in thinking of children of the prelogical period. The third stage is the occurrence of opposition of the objective and subjective reality with comprehension of their different substantiality and considerable independence. Objective idealism, the archetype of the World tree with three worlds, the concept of primary and secondary qualities of Democritus, occurrence of monotheistical religions are the displays of such paradigm. And, at last, the fourth stage which practically has become a dominating paradigm during the Modern age is the understanding (or a concept) of relations of the psychics and the body (soma) in their hierarchy – the psychics is a derivative from the matter (a live organism).

In the XIX century all natural scientists, anyhow adjoining to a subject of the nervous (physiological) and the psychical, based their researches on this methodological position. But in psychology such approach has appeared and been realized essentially later. Analyzing the editions devoted to theoretical problems of psychology (text-books and workbooks) for last hundred years, it was possible to trace the historical dynamics of formation of these views. A.N. Gilyarov in 1914 [23] believed that psychics is indivisible (there are no components in it) and incognizable. In modern terminology words it is impossible to construct the psychics model. In 1915 N. Vasiliev [18] considers psychology as a science "additional to natural sciences", attributes the psychics



not only to the human, but also to animals, but thus considers that it is impossible to give definitions to psychics. It is not absolutely clear, whether from such opinion it follows that the psychics organization is absent. G.I. Chelpanov [37] definitely marks the natural-science experimental approach, attributes psychics to the world of animals, since the protozoa (giving reason by the property of irritability). But, besides, there is no conversation about the psychics organization, though in his "Psychology Sketches" there is the evolution of nervous system, CNS anatomy and psychophysiology that indirectly testifies to his intention to derivate the laws of mental life from laws of the nervous system functioning. S.L. Rubinstein [34] directly states that psychics should be studied "in development", offering as an example of such laws a number of principles of the nervous system development. A.Y. Ponomaryov [33] considers the psychics as a special natural system and offers for it not only an informative (reflecting) function, but also a regulative one which was considered as a nervous system prerogative before (the nervism principle – as it is formulated in biology). During the same epoch as its methodological base the Leningrad school of psychology [1] uses the same paradigm, and theoretical developments of L.M. Vekker [21] are devoted to search of both the general laws (for a nervous signal and a mental one), and specification of mental signals of different levels of isomorphism and organizations. Works of A.R. Luriya and his school [30, 36] in a visible and obvious form demonstrate in an explicit form an idea of studying of psychics in its natural-system foundations. V.B. Shvirkov [38] directly declares this thesis. Within the framework of the same problem there is a question on the psychics genesis in an evolutionary aspect. And for a long time psychics is not attributed only to the human, originally it appears among the protozoa [28], or even among the protobionts [26].

From this historical excursus there follows that now the idea of psychics as the matter derivative does not cause doubts among the researchers professing principles of scientific thinking. So, for construction of the natural-system psychics model it is possible and necessary to use principles of organization and functioning of those natural systems which have generated it (mentality).

The problem of classification of the mental phenomena

In direct communication with the problem of the psychics model organization there is a question on classification of the mental phenomena as classification of the psychics components must unite them into groups by affinity (the general genesis and the general function). a classification can be artificial or natural. Artificial classifications can be as much as it is wished depending on private research problems. But the natural classification can be only one – arisen in evolution process.

In any psychology textbook this subject is presented. The mental phenomena classification (mental formations, elements, components, ingredients) on groups is made in different lists: mental processes, functions, properties, statuses; mental images, processes, functions, properties and statuses. Thus usually it is underlined that in view of complexity of the classification objects (the mental phenomena) almost each



phenomenon can appear in two, and even in three groups. For example, attention as a process and as a status; perception as an image and as a process of its construction. But, both in logic, and in natural sciences it is known that one qualitatively original phenomenon cannot be placed within the framework of one classification in different “cells”, groups or classes. This is possible only at different classifications on different criteria bases. But in general psychological classification of all components of psychics there is not even specified a criterion of this classification, except, naturally, specifying of some generality of the phenomena of one class by the nature. And in biology this classification would seem as: “All components of an organism are divided into organs, statuses of illness and health, functions and subsystems”. Such an evident analogy shows essential logic and methodological trouble in a subject of general psychology “Classification of mental phenomena”. At the same time this analogy to the organism structure helps to comprehend and realize by what criteria it would be possible to classify traditionally listed components of psychics.

Each subsystem of the mammal organism (locomotor, nervous, digestive and etc.) includes a number of organs having a general origin and a general function, and this is the general function of the whole subsystem specific only for it. Thus other subsystems carry out other functions in the organism. And till now in general psychology (with rare exception) a reflexion function is attributed to all mental phenomena – cognitions (and it corresponds to a reality), emotions, motility, memory, attention and etc. Such approach is a quite clear logic consequence from the psychics definition as a reflecting (representing) system. But in the organism all its subsystems have their function. Perhaps, in psychics it is necessary to search for a fundamental function for its each subsystem?

Weather such methodological method is possible in general psychology?

At the analysis of a system structure (in this case psychics) the system approach forces to raise the following questions.

1. What are the components (elements, formations, phenomena, ingredients) of psychics?
2. Whether they are classified, whether they are grouped into subsystems after a certain similarity?
3. What is a specific function of each of these subsystems, distinguishing it from others?
4. How do the elements of one subsystem correspond with each other?

It is not the full list of the system approach components, but its very first questions [5, 12, 22, 32].

It is obvious that the list of components is set by a course of general psychology though here there is a number of very essential critical remarks [22]: the list is not established (differs on volume among different authors); the list is not closed (it is an essential defect for classification of the natural system); in the list there co-exist obviously nonhomogeneous components (for example, sensation and personality, thinking and temperament).



At the same time the organism structure sets to us, the general psychologists, a certain paradigm in the form of necessity of distinguishing of any subsystem. In psychics these subsystems are also obviously presented – cognition, emotions and motility. Internal components of the psychics each structural block (“organs” of this block) are also presented (for example, in the cognitive block – sensorics, perception, representation and thinking), and these internal components are united by a general fundamental function: cognitions – the function of reflexion (knowledge), emotions – the function of energy support of psychics, motility – the function of environment transformation.

But outside of these blocks there were such mental phenomena, as attention, memory, speech, consciousness, will. Thus already more than for a century, since W. James and Rubin there arise doubts in the independence of existence of attention. L.M. Vekker [21] transfers attention, memory, speech, imagination and consciousness from the cognitive processes into so-called (in his terminology) “through” ones, V.V. Loskutov [29] describes attention as the integrator of mental activity. Natural scientists-neurophysiologists also come to this conclusion [4]. We have also given numerous natural-scientific arguments in favour of transfer of memory and attention from the cognitive processes category into the category of integrating mechanisms [6].

We have offered a model of the psychics organization [19, 20] in natural-system categories where the psychics structural blocks are cognitions, emotions and a psychomotility, and the integrating mechanisms are attention, memory, speech, consciousness, will. In this model in explicit form it is presented an idea that psychics can be structural and procedural. Continuing the analogy with biology, it would be possible to say that structural components of psychics are “organs” developing in subsystems (blocks), and this is the psychics “anatomy”, and procedural components are “physiological processes” – the psychics “physiology”.

And then, answering the question on criteria of classification of the mental phenomena, it would be possible to respond that the first criterion of division of the mental phenomena on classes is a structural-dynamic characteristic. The mentality phenomena, first of all, are divided into the psychics structural components and the procedure (integrating) mechanisms. And the psychics structural components are divided into the cognitive (informative), emotional (experience-activating) and psychomotor (transforming the environment). And, that is very important for analysis of psychics as the natural system, their (subsystems) fundamental functions are not crossed, differ. The nature does not duplicate the same function in different subsystems.

Classification of the mental phenomena becomes logically consistent and clear.

The natural-system model of the psychics organization

There are already constructed a lot of models of the psychics organization. In our earlier article [12] we have already analyzed these models and those criteria, which their authors have put in the bases. But all these criteria do not take for a basis already found and proved principles of organization, mechanisms and functions of the psychics substratum – the organism in whole and the nervous system in particular.



In our model we apply such conceptual constructions in physiology, neurology, neuropsychology, embryology and other natural sciences [7, 11, 14, 15]. Having entered psychics into a great number of regulator organism systems [14, 15] and having constructed their (the regulator systems) evolutionary hierarchy, we have given a genus-specific definition of psychics: psychics is one of the regulator systems (subsystems) of the organism, carrying out its functions by means of reflexion of properties of external and internal environment and transforming interaction with environment. Each of the regulative systems is specified by a code (the signal form), used by this concrete system and by a material carrier (substratum) of this code. In the psychics these are mental images, and the carrier of this code (signal) are functional systems of a various degree of complexity. In the earlier articles the psychics structure in its natural-system determinants still was based on developments and opinions of the most previous researchers or the traditional model (triad). Working on this question there was composed a definitive model with its biological bases (tab. 1).

Table 1

**The natural-system model of the psychics organization
The structural subsystems of psychics (the psychics “anatomy”)**

COGNITIVE images and processes	PSYCHOMOTOR processes	EMOTIONAL statuses
Information fundamental function REFLECTION of ENVIRONMENT	Effector fundamental function TRANSFORMING INTERACTION WITH ENVIRONMENT	Energetic fundamental function (TONUS REGULATION)
Thinking and imagination	Social activity	Social feelings
Representation (ideas)	Behaviour (biological programs)	Differentiated emotions
Perception	Actions	Base emotions
Sensorics (sensations)	Movements	Global emotions
Neurophysiological and neuropsychological foundations		
The second block of the functional organization of brain after Luriya INFORMATION (the postcentral division of the cortex)	The third block of the functional organization of brain after Luriya PROGRAMMING BEHAVIOUR (frontal division of the cortex)	The first block of the functional organization of brain after Luriya REGULATION of TONUS (vertical organisation and median deep division of the cortex)
The analyzers of CNS (their list and structure, ways)	The levels of movements' organization after N.A. Bernstein and A.R. Luriya	The circle of Peipez and additions
Primary, secondary and associative (tertiary) fields of the postcentral divisions	The motor fields of the frontal divisions of the cortex	Biochemical systems (the mediators of NS)

The integrating mechanisms of psychics (the psychics “physiology”)

Attention memory speech consciousness will
--



It is interesting that if to take only the structural organization of psychics (without the block of integrating mechanisms) it is closest to the traditional triad of Aristotle. But the reason of it is not in the authority of Aristotle. It is the authority of the Nature, and the genius of Aristotle only proves to be true even two and a half thousand years later.

We should consider an organization of each block in its structure and specificity.

The levels – “floors” of the cognitive block have been constructed in such kind in the 70th of the XX century by L.M. Vekker [21]. But till now there are other schemes of a parity of cognitive processes. There are opinions that a mental image is only a percept (an image of perception), and sensory properties grow out of the conscious analysis of a perceptive image structure by the subject [22, 31]. There are positions that only two levels form cognitive processes – perception and thinking. But not only theoretical-methodological constructions of L.M. Vekker, added by our argument [12], prove such four-storey structure of cognitions. The anatomical-functional organization of the postcentral divisions of the cerebral cortex (it is presented in the table) confirms the correctness of theoretical substantiation. Such organization is also supported by the data of the phylogenesis of the psychics representative function – the sensory psychics, the perceptive psychics, intellect (of the complex animals) and consciousness of the person, i.e. a sign-symbolical way of development of the environment mastering [28].

The block of the psychomotor processes is organized by us with the account of that qualitative differences in the subsystem of cognitions should necessarily have qualitative parallels in motoricity. Really, the difference between the action and the movement in the perceptive and sensor psychics were shown by A.N. Leontyev [28] when at preservation of a purpose image in the perceptive psychics there may vary a way of its (purpose) achievement, unlike the sensor psychics where the way to a purpose is unequivocally connected with the sensor image of the purpose. Instinctive or life-generated biological programs of behaviour of an animal as an action acceptor (an image of the near future) have an image-representation (representant in our terminology). This idea was set in 1935 P.K. Anokhin [3] at formation of the concept of functional systems and a principle of advancing reflexion [2]. Social activity of the person is set and regulated by life-sense purposes and a world subjective picture, defined by qualitatively another organization of consciousness – a sign-symbolical activity.

The emotional block, following the same logic, is also hierarchically organized at four levels, each of which has its organizational features and supply mechanisms. The level of global emotions is provided with activity of biochemical mechanisms – catecholaminergics, cholinergics and dopamine systems [39]. Positive emotions provide serotonin, acetylcholine and their derivatives. Negative emotions depend on adrenaline, noradrenaline and their derivatives. The dopamine system is connected both with functioning of cognitive emotions, and with the quality of cognitive activity. As it is revealed in works of the academic N.V. Vesolkin [17], dopamine does not have an excitant or inhibitory effect on the neuron (a matter of argumentation



of biochemists-neurophysiologists). It strengthens the effect of excitant or inhibitory acids (GABA and etc.), already actively functioning in the neuron at a present time. And this mechanism rather successfully explains features of work of cognitive processes in a norm and pathology [8]. The base emotions are provided with subcortical neuronal structures and functional systems (the circle of Peipez and its further additions). The differentiated emotions are provided with activity of the cortex of the right hemisphere [27] and come under influence of lifetime events. Social feelings are the consciousness components.

Now the memory and attention role (attentive-mnemonic processes) as integrating mechanisms (instead of the cognitive processes) is not challenged any more [4, 6, 21]. Other components of the block of integrating mechanisms were never registered as a part of the psychics subsystems, initially they attributed to them a role of integrators of the whole mental activity [10, 21, 25].

Methodological consequences of the natural-system model of the psychics organization

Thus, if to accept such natural-system model of the psychics organization it becomes clear in what points the methodology of its research and the description changes.

First of all, according to the natural psychics organization there will be also organized a training course structure [13, 24]. This methodical mode is known for some centuries as it is applied in medical textbooks. Before works of the outstanding anatomist and physiologist of the XVI century Andreas Vesalius [35] in a human anatomy views, a parity and a role of the body organs there were many disagreements in spite of the fact that the whole organism organization was described since an antiquity epoch (works of the Alexandria library). But for rigorous proof of the organism organization Vesalius has entered not only a criterion of anatomic connectivity of organs, but also a unity of function of organs of this system. Since then a human organism organization (mammals) is considered as a constant in biology. Construction of programs and textbooks on general psychology should follow this general scientific principle.

Construction of the program of experimental-empirical research also appreciably depends on what basic model of the studied phenomenon was chosen by a researcher. In psychological practice such model does not play an essential role (with the exception of an individuality model) as the psychologist needs to reveal and describe the private individual-typological properties of the subject important for a concrete question decision. And in clinical-psychological practice (pathopsychology) diagnostics of the patient starts with description of his psychics, and his personality interests diagnosticians in the second turn [9]. And here a correct representation about the natural psychics organization and a character of mutual relations of its structures appears essential to understanding of mechanisms of etiopathogenesis of a disease [8].

Formation of training programs according to natural laws of organization and development of thinking [11] also is a strategic aim of psychology of development.



Formation of programs of rehabilitation in correctional psychology should necessarily consider natural laws of genesis of mental and psychological abilities.

Thus, generation of the natural-system model of the psychics organization is one of the major problems of theoretical psychology.

References

1. Ananyev B.G. On the problems of modern human study. – M.: Publishing house "Nauka", 1977. – 380 p.
2. Anokhin P.K. Advancing reflexion of reality // Philosophy questions. – № 7. – 1962. – p. 97–111.
3. Anokhin P.K. The system mechanisms of higher nervous activity. – M.: Publishing house "Nauka", 1979. – 453 p.
4. Apchel V.Y., Tsigan V.N. Memory and attention are the integrators of psychics. – SPb.: LOGOS, 2004. – 120 p.
5. Drummers of Century And. The system organisation and mentality development // Psychological magazine. – 2003. – T. 24. – № 1. – With. 29–46.
6. Belomestnova N.V. Attentive-mnemonic processes as integrative mechanisms // The psychology of cognitive processes (materials of the All-Russia scientific-practical conference) / The editors Mazhar N.E., Selivanov V.V, etc. – Smolensk: Universum, 2007. – P. 14–18.
7. Belomestnova N.V. The natural-system approach in construction of psychological models // Materials of the IV All-Russia congress of the Russian Psychological Society: in 3 v. – Moscow – Rostov-on-Don: Publishing house "CREDO", 2007. – V. 1. – P. 93.
8. Belomestnova N.V. On the question of the neural mechanisms of infringements of mental activity at schizophrenia // Modern approaches to the psychiatric support rendering. Materials of the scientific-practical conference devoted to the 140 anniversary of the SPH № 3 of I.I. Skvortsova-Stepanova, on October, 8th, 2010, St.-Petersburg. – SPb., 2010. – P. 130–133.
9. Belomestnova N.V. Clinical intelligence diagnostics. The psychometric and clinical-psychological estimation of a level of development of intelligence in clinical and judicial-psychological expert practice. The workbook. – SPb.: Publishing house "Rech", 2003. – 128 p.
10. Belomestnova N.V. The methodology of the research of consciousness in the paradigm of interdisciplinary system approach // The psychology of consciousness: a current state and prospects. Materials of the I All-Russia conference on June, 29th – July, 1st, 2007, Samara. – Samara: Publishing house "Nauchno-tehnicheskii center", 2007. – P. 29–31.
11. Belomestnova N.V. The modi of thinking in is natural-system determinants // The world of psychology. Scientific-methodical journal. 2 (58). – Moscow-Voronezh, 2009. – P. 37–49.
12. Belomestnova N.V. The system approach in psychology // Bulletin of the Orenburg state university. – 2005. – # 10. – P. 43–54.



13. Belomestnova N.V. The structure of the scientific discipline course of as the reflexion of its object structure // Psychological experts in Russian education. Materials of the International scientific-practical conference. On October, 4–5th, 2007, Armavir. – Armavir, 2007. – P. II. – P. 150–151.
14. Belomestnova N.V. The levels of sign regulation (from the protozoa to the human) // The psychology of the person: integrative approach. Articles col. / Under the edition of d.p.s, prof. V.N. Panferov. – SPb.: Publishing house ANO “IPP”, 2007. – P. 15–35.
15. Belomestnova N.V. The cladogram organism regulator systems // The modern problems of biological psychiatry and narcology. The theses of reports of the Second All-Russia conference with international participation on March, 4–6th, 2008, Tomsk / Under the edition of V.Y. Semke, T.P. Vetlugina. – Tomsk: Publishing house “Ivan Fyodorov”, 2008. – P. 34–36.
16. Belomestnova N.V. The stages of the psyche concept formation in archaic consciousness // Works of the II (XVIII) All-Russia archaeological congress in Suzdal on October, 20–25th, 2008, devoted to the 100 anniversary of academicians B.A. Rybakov, A.P. Okladnikov, B.B. Piotrovsky. V III. – M.: The institute of archeology of the Russian Academy of Sciences, 2008. – P. 152–154.
17. Bukinich A.A., Tsvetkov E.A., Vesvolkin N.P. The feature of dopamine receptors on the membrane of multi-polar neurons of the spinal cord of the niner *Lampetra planeri* // The journal of evolutionary biochemistry and physiology. – 2007. – V. 43. – # 1. – P. 39–45.
18. Vasilyev N. The program on psychology. – Kazan, 1915. – 6 p.
19. Vasilyeva N.V. Some system principles of the psyche structure and brain functions // The psychological-pedagogical problems of personality's development in modern conditions. The theses of reports of the interuniversity scientific conference. St.-Petersburg, on May, 18–20th, 1999 – SPb.: Publishing house of RSPU of A.I. Hertsen, 1999. – P. 23–25.
20. Vasilyeva N.V. Psyche structure as a display of the principles of self- preserving systems' structure // The psychology of the human: integrative approach. The collection of scientific articles. – SPb.: Publishing house of RSPU of A.I. Hertsen, 2000. – P. 18–32.
21. Vekker L.M. Mental processes. – L.: LSU, V. 1, 1974. – 335 p.; V. 2, 1976. – 343 p.; V. 3, 1981. – 327 p.
22. Ganzen V.A. System descriptions in psychology. – L.: LSU, 1984. – 176 p.
23. Gilyarov A.N. The manual to lectures on psychology. – Kiev, 1914. – 168 p.
24. Gorbatenko A.S. The psyche system concept and general psychology. – Rostov-on-Don: Publishing house of RPU, 1994. – 106 p.
25. Zinchenko V.P. Consciousness worlds and consciousness structure // Psychology questions. – 1991. – # 2. – P. 15–36.
26. Klimov E.A. On the ambiflector nature of the mental // The Moscow state university bulletin. – Ser. 14. Psychology. – 1992. – # 1. – P. 51–57.
27. Kolishkin V.V. The functional asymmetry of brain and emotional statuses of the person // The Siberian psychological journal. – Rel. 3. – 1996. – P. 37–40.



28. Leontyev A.N. The problems of the psyche development. 3 ed. – M.: Publishing house of the Moscow university, 1972. – 576 p.
29. Loskutov V.V. Attention as a mechanism of mental integration // The theses of scientific-practical conference “Ananyevsky readings – 2000” / Under the edition of A.A. Krilov. – SPb.: Publishing house of the St.Petersburg State University, 2000. – P. 135–137.
30. Luriya A.R. Functional organization of the brain // Natural-science bases of psychology / Under the edition of A.A. Smirnov, A.R. Luriya, V.D. Nebilitsin. – M.: Pedagogica, 1978. – P. 109–139.
31. Nikandrov V.V. The spatial model of the functional structure of the person’s psyche // The St.Petersburg state university bulletin. – 1999. – Ser. 6. – Rel. 3. – P. 73–80.
32. Platonov K.K. On the psychology system. – M.: Misl, 1972. – 216 p.
33. Ponomarev A.Я. On a question on the nature of the mental // Philosophy questions. – 1960. – # 3. – P. 88–99.
34. Rubinshtein S.L. The foundations of general psychology. – M.: Uchpedgiz, 1940. – 596 p.
35. Ternovsky V.N. Andrey Vezaly. – M.: Publishing house “Nayka”, 1965. – 256 p.
36. Homskaya E.D. Neuropsychology. – M.: Moscow State University, 1987. – 288 p.
37. Chelpanov G. Psychology sketches. – M. – L.: the Moscow joint-stock publishing society, 1926. – 256 p.
38. Shvirkov V.B. Introduction to objective psychology. The neuronal foundations of psyche. – M., 1995. – 164 p.
39. Sheperd G. Neurobiology: in 2 v. Trans. from English – M.: Mir, 1987. – 454 p.