

To the theory of the systemic organization of the brain psychic activity

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Abstract

This paper is devoted towards the origin of a human subjective state, and presents a methodology for studying of the nature psychic brain activity. We have established the existence of physical phenomena unique for the living brain so-called “psychogenic field”, which reflects the psychic state of human brain. The subjective state of a human being was shown to affect remotely the physicochemical properties of the blood. The interaction of neurophysiological and psychic processes is described in the context of systemic organization of a goal-directed behavior during wakefulness and sleep. An original schematic diagram is presented to describe the formation of the brain psychic activity. This approach is based on the feedback influence of a psychogenic field on neuronal molecular processes (self-induction in the brain). We propose a paradigm for the origin of psychic state and possible existence of the fields, which are unique for the brain.

Keywords: Mentality, Consciousness, Subjective state, Brain, Psychogenic field, Paradigm of a subjective state origin.

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Problem of knowledge of the brain psychic activity

The brain is a unique organization in nature, having the mental activity, which is expressed in thoughts, feelings, emotions, i.e., in the subjective perception of the man himself and the world. Knowledge of the nature of mental activity of the brain is the most urgent and the most challenging task of physiology [1-4].

K. Popper (2008) wrote: We live in the world of physical bodies and we ourselves are physical bodies. When I speak to you, I do not address your bodies, rather than your minds. Here arises the question of interaction between these two worlds, the world of physical states or processes and the world of mental states or processes. This question is a psychophysical problem [5].

The appearance of subjective states serves as a major evolutionary factor of living beings, which determines the self-development of life. Subjective states are a strong intrinsic stimulus, which induces active efforts of the body to achieve a specific goal. It characterizes all sides of world perception in the life. These states serve as a directing force in survival and self-preservation of each animal and strain as a whole. Generally, the subjective state reflects a strategy vector, which suggests the avoidance of harmful events and achievement of beneficial results.

Initially the subjective states in the brain were manifested as sensations and emotions, which gained the properties of bearings for existing vital demands and their satisfaction. At

later stages of brain development, they also comprised mental processes which reflect extrinsic relations in the environment. The reasonable intellectual activity, as a major mean in adaptation and survival, was formed on the basis of this intellectual function of the brain during the follow-up period.

The simplest forms of behavior, including those fixed at the genetic level, are developed with no involvement of a subjective state (unnecessary in this case). These instincts are based on a reflex principle and appear as the actions strictly specified for certain stimuli and conditions.

More complex forms of behavior which suggest the freedom of choice were made possible with the appearance of a subjective state, which provides a strategy of activity under constantly varying conditions. A further evolutionary process could not be realized without the development of a subjective self-perception and perception of the surrounding world. A subjective evaluation of the environment and internal state was a determinant factor of evolution.

A large amount of data exists on the problem of subjective activity of the brain. They include philosophical manuscripts; psychological works describing the exterior forms of mental activity; clinical reports for mental disorders in various diseases; and neurophysiological data on the correlations and mental codes, cognitive, and sensory functions of the brain (e.g., results of functional magnetic resonance tomography [fMRI]). However, the nature (origin) of subjective activity of the brain received little attention.

The subjective state really exists. In this meaning, the subjective is objective too, though it takes place only in the living organization of matter. The brain activity is dual in nature. On one hand, there are neurophysiologic processes. On the other hand, there are subjective states, characterizing all facets of the world-view [5,6].

The neurophysiologic processes can be observed and registered by various methods and devices developed based on laws of physics and chemistry. The processes on the subjective level are perceived as self-sensations, which cannot be registered directly by physical and chemical methods based on the phenomena in the abiocoen. In living organism and in particular in the brain, such physical phenomena and processes may occur, which in principle, do not exist and cannot exist in inanimate nature. This thesis is of fundamental importance for understanding of the very core of the subjective in the activity of the brain. The subjective state is intrinsic to the living organization only, and does not exist in inanimate nature. Therefore, it is impossible to explain the origin of mental functions of the brain in view of the laws of inanimate nature only.

The achievements in modern neurophysiology based on structural, morphological, electrophysiological, neurochemical, molecular, genetic research, computer tomography, etc. do not allow identifying of the brain psychic functions. Whatever processes are registered, the electroencephalogram (EEG), neuronal activity, neurochemical and molecular reactions etc., they do not show the internal experiences like thoughts, emotions, senses, etc. The computer tomography of a brain, mapping of gene expression in various brain structures, multichannel record of neuronal activity, multichannel electroencephalogram allow revealing only participation and interaction of various brain structures in the organization of behavior, training, memory, emotions and thinking. However, these studies do not bring us closer to understanding the origin of subjective states.

Several researches inspired by the achievements in neurophysiology, molecular biology, nanotechnologies, predict the possibility of deciphering of thinking codes, consciousness and image visualization of neuron pulse activity [7]. In fact, it is possible in some cases to see certain correlation between the activity of certain brain structures or neurons and the content side of thinking, speech, etc. This however does not mean that in these processes, one can understand the subjective state.

Among the billions of brain neurons, one can always find neurons whose activity will correlate with a particular function of the body. At the same time, the information encoding may differ among individuals and social groups. Each neuron registered in the brain is individual and different from the others. The investigator will never find this neuron in this or any other individual.

The brain activity has two facets, visible, characterized by registered neurophysiologic parameters; and hidden or spiritual, manifesting in human subjective perception of

oneself and the world around him/her. No doubt, these two facets are interrelated. However, we cannot explain how the code of nerve impulses, the interaction of various brain structures, the electrophysiological processes, the molecular transformations result in the self-perception of subjective state.

In other words, it is impossible to analyze the origin of the subjective basing on the contemporary neurophysiologic methods, and all speculations are counterproductive and are unrelated to the understanding of the nature of the subjective state.

There is a huge gap between modern knowledge about brain neurophysiology and understanding of its mental functions. This is due to the fact the brain was studied with the morphological, physical and chemical methods based on the knowledge, phenomena and laws discovered in the investigations of the abiocoen. The origin of a subjective brain state is beyond the field of hi-tech analytical research.

Principally, it is impossible to explain the origin of a subjective brain activity only on the basis of neurophysiological investigations. It is a fundamental delusion when the researchers believe that they guide to the nature of a thought, sense, and other subjective states by studying the electrophysiological processes.

In this regard, N.P. Bekhtereva (1990) wrote: It is doubtful that the full code of the mental processes will be deciphered only by analyzing the pulse activity of neurons and neuron population. The solution of the task lies no in the sphere of the physiology and biochemistry of a living object, but also in the finest branch of biochemistry: the biology of molecular processes. It is very important to keep reasonable attitude to the material basis of phenomena and to conduct goal-seeking and deeper search towards its deciphering. At the same time, one should try to imagine what the ideal is without putting it into "reinforced concrete" bed of materialism? It is noteworthy that sticking to the primitive materialism resulted that biologists worked in a corridor limited by invisible barbed wire [8].

When analyzing the problem on the origin of a subjective state, T. Nagel (2001) wrote: Describing mental phenomena, "subjective reality" and coupling them with the neurophysiologic processes faces the "explanation gap" because the mental processes are physical and cannot be referred to spatial and time coordinates. On the other hand, there are no grounds to say that the physical does not accompany the mental, but the question is how? The parallel description of the neurophysiologic processes and mental states caused by them (?) or accompanied by them (?) does not help answering the question how the behavior of a neuron network produces the subjective states, feelings, self-reflection and other phenomena of high order. Without the change of the fundamental concepts of the consciousness, the explanation gap can not be overcome [9].

There is a skeptical opinion among neurophysiologists

about studying the subjective activity of the brain. It arises from the fact that the origin of a subjective state cannot be evaluated on the basis of modern neurophysiological approaches. All reasoning's on this subject are nonproductive and do not explain the nature of the subjective state. Moreover, this basic problem is misunderstood and even "factor out" from the area of scientific studies. The subjective brain activity fell outside of scientific researches. This question seems to not exist for neurophysiology. In this regard, a Nobel Prize winner F. Crick and C. Koch, told that "among neurophysiologists, all attempts to speak about consciousness were interpreted as the first signs of oncoming senile dementia" [10].

A way by which the brain generates the inner subjective world remains one of the greatest mysteries in nature. Modern science does not have even hypothetical logic constructions to explain the origin of subjective states in neurophysiological processes.

I. P. Pavlov (1951), R. W. Sperry (1952), P. K. Anokhin (1968), N. P. Bekhtereva (1990), and K. V. Sudakov (2010) were optimistic about the possibility of understanding of the psychic activity brain. They urged us to determine a possible origin of unique brain function, the subjective mental activity [8,11-15].

According to I. P. Pavlov (1951), "Marching forward and pressing onward, the natural and unavoidable approach and final fusion of the psychological with the physiological, the subjective with the objective is achieved the actual question so long disquieting to human thought! And any further facilitation of this fusion is a great goal of the near future in science" [11].

The same thought was expressed by a Nobel Prize winner R. Sperry (1952): "Subjective states and properties, which were driven away from scientific explanation for a long time, should, figuratively speaking, take a driver seat in the theory of brain activity as a crown of evolution" [12].

The question how the brain generates its inner psychic state remains one of the greatest secrets of the nature. The general purpose of our research is to reveal molecular and psychophysical mechanisms of mental activity of the brain [6,16].

In our research, we try to find basic approaches to understanding the origin of the subjective in the brain activity, without going into the details of particular subjective state manifestations, consciousness, emotions, etc. This research is based upon the methodological principle that we formulated "the mental processes can directly register and study only with the help and participation of the living structures" [6,16,17]. Using this principle, we carried out a variety of series researches, and we for the first time established possibility of direct remote registration of a subjective condition of humans.

The remote field influence of the human brain psychic activity

A human subjective state can be registered objectively and remotely used the subjective state indicator [6,18,19]. It is important to note that the subjective state indicator shows his/her subjective attitude towards somebody or something. An expert examination of our findings was organized with the participation of leading experts in physiology and physics, which is included in the monograph [6]. These reviews highlight the reliability and repeatability of our findings.

While the credibility of our findings does not raise doubts, we wanted nevertheless to have additional evidences of a direct objective registration of in blind tests eliminating skeptical attitude towards our findings.

In our research, we hypothesized that the human subjective state may manifest itself in different forms. For registration of a human subjective state we used blood as a biological multicomponent substrate containing cell elements, protein-colloid and electrolyte solutions.

This series was designed to evaluate whether the subjective state of an investigator can remotely and directly affect the blood, specifically the erythrocyte sedimentation rate [20,21]. The investigator promoted his own expressed subjective state using imaginary-cogitative method [6. 16-18]. When conducting this subjective test, the investigator was maximally focusing and concentrating his attention on something emotionally significant, whereby he induced in himself an expressed emotional stress.

The erythrocyte sedimentation rate (ESR) of blood is determined by complex physical and chemical interactions of electrostatic potentials of red blood cells, as well as protein and colloidal properties of blood plasma.

When carrying out experimental tests, the investigator five times one after another, within 30 seconds, approached the experimental rack with blood in his expressed subjective state, during which time the rack with capillaries was placed horizontally and oriented so that the upper end of capillaries was directed towards the investigator. Control racks at this time were located at a distance, in the other room. Change of position of experimental and control racks to a vertical one was performed simultaneously.

In previous experiments, it was found that remote influence of the subjective state of a person on ESR takes place only when the investigator is located no more than 80-100 cm away from the capillaries with blood [16].

In the first series, we studied the effects of the direct subjective influence on blood in capillaries of the Panchenkov apparatus. All tests were conducted under constant conditions and at the same time. Within each experiment, blood of the same person was used for all tests. ESR readings performed one hour after setting of racks in a vertical position.

The results for ESR readings were compared between control and test blood using data from capillaries with blood

from different racks. In total, 31 subjects were carried out, including 135 tests. Statistical significance of the results was determined by Student's test.

Figure 1 shows ESR values registered in control and experimental tests after expressed subjective influence of the investigator on the blood in capillaries of the experimental rack. It should be noted that variations in ESR values in each of the control and experimental tests were either absent or minor, compared to changes which took place in experimental tests.

The results demonstrate highly significant ($p < 0.0001$) differences in ESR between experimental and control tests across the entire set of data. In some tests, the values differed 2-fold or even more. It was found, that significant differences in ESR between control and experimental tests were not associated with blood group.

There were significant differences in ESR changes in experimental tests compared with control, which depended on the presence of Rh factor.

Exposure of Rh-positive blood to subjective influence lead to highly significant ($p < 0.0001$) decrease in ESR in experimental tests compared to controls (Figure 1).

Conversely, when Rhesus-negative blood samples were exposed, highly significant ($p < 0,0001$) increase in ESR rate was observed in experimental tests compared to control (Figure 1).

There was a 100% correlation between the Rh factor and the direction of ESR changes in experimental tests compared to control.

These data indicate that regardless of the presence or

absence of the Rh factor, there was always the reaction of blood to remote influence, leading to significant changes in ESR in response to expressed subjective state of a person. However, in the presence of the Rh factor, the direction of changes of ESR reverses. It can be suggested, that such effect occurs due to the combined remote-field action of the subjective state of a person on various molecular structures of blood. Apparently, in the absence of the Rh factor, the effect of the subjective state of a person on ESR is shown through other molecular structures of blood.

It is important to know, whether the effect of the remote subjective influence of a person on human blood is maintained after blood mixing?

In the present study, after exposure of the blood in a test tube to the subjective influence and subsequent transfer of this blood into capillaries for ESR determination, blood mixing occurs inevitably and this can affect or eliminate the detected effect of remote influence of the subjective state of a person on ESR for blood in capillaries.

Figure 2 shows the results for ESR values registered in control and experimental tests after remote influence of the expressed subjective condition of a person on blood in a test tube. It can be observed that in each control and experimental test variations in ESR were either absent or minor compared to the changes observed in experimental tests.

The results demonstrate (Figure 2) highly significant ($p < 0,0001$; $p < 0,001$) differences in ESR between experimental and control tests on the entire data set. In contrast to the first series of experiments, in this series the ESR changes in experimental tests in comparison with the control were unidirectional both for Rh-positive and Rh-negative blood. This effect cannot be attributed

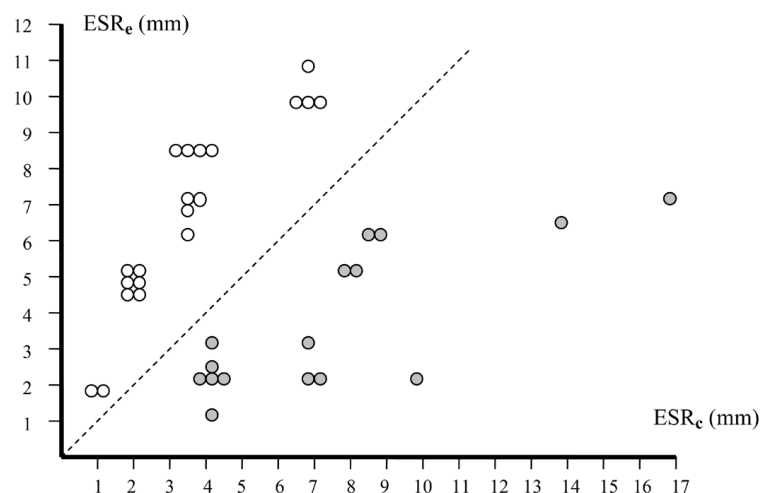


Figure 1. Changes in erythrocyte sedimentation rate (ESR) after exposure of blood in Panchenkov apparatus capillaries to expressed subjective remote influence of the investigator.

Legend: x-axis: background values ESR_c (mm) in each individual test in the control; y-axis: experimental values ESR_e (mm) in each individual test after subjective exposure, relative to the background value in the control – ESR_c ; n – total number 86 of measurements in 31 subjects; healthy men aged 19-30 years with different blood groups and Rh.

Blood: Rh - ○ , Rh + ●

Significance of the difference in ESR in the control and after subjective exposure in Rh + blood $p < 0.0001$, in Rh - blood $p < 0.0001$.

-- an imaginary line on which experimental values ESR_e would be located, if they were equal to control values ESR_c : $ESR_c = ESR_e$. Above the line: $ESR_e > ESR_c$, below the line: $ESR_e < ESR_c$.

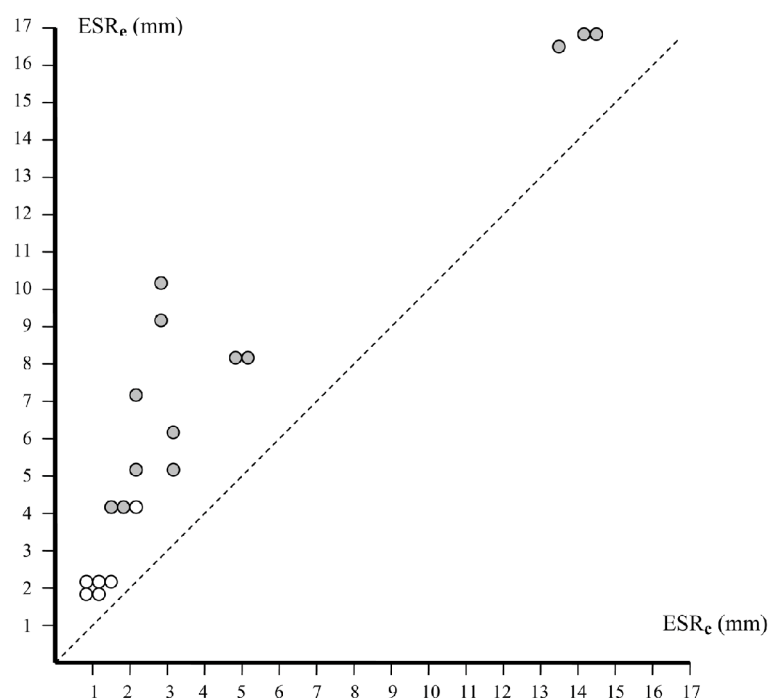


Figure 2: Changes in erythrocyte sedimentation rate (ESR) after exposure of blood in a tube to expressed subjective remote influence of the investigator.

Legend: x-axis: background values ESR_c (mm) in each individual test in the control; y-axis: experimental values ESR_e (mm) in each individual test after subjective exposure, relative to the background value in the control – ESR_c ; n – total number 49 of measurements in 31 subjects; healthy men aged 19-30 years with different blood groups and Rh.

Blood: Rh - ○, Rh + ●

Significance of the difference in ESR in the control and after subjective exposure in Rh + blood $p < 0,0001$, in Rh - blood $p < 0,001$.

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to the difference in blood groups, as from the results of the first series of experiments we see that the direction of ESR changes does not depend on a blood group.

The main outcome of this series of experiments is the finding that after mixing of blood, the effects of remote subjective human influence on ESR do not disappear.

After mixing, molecular structures present within blood, maintain the changes caused by the previous influence of the subjective state of a person. At the same time, significant differences in ESR between control and experimental tests present in different blood groups.

These findings provide a reference point for further research. Apparently, significant changes in ESR are not related to the structural orientation of cellular elements and molecules in the blood, but rather are determined by intramolecular rearrangements.

Unidirectional changes of ESR in both Rh-positive and Rh-negative blood also indicate a possible combined remote-field effect of the expressed subjective state of a person on various molecular structures in the blood, which we have already mentioned above. We can speculate that after mixing the blood, an effect of one of the factors associated with Rh-positive blood on ESR disappears, while there is still an effect of another factor on this parameter.

Everything, caused by expressed subjective remote

influence of the investigator, changes of ESR remain within normal values, characteristic for the healthy person. When in experiences blood of sick people with high value of ESR (30-40 mm) was taken, subjective exposure on blood didn't cause any changes of ESR.

There are statistically significant results obtained which demonstrate contactless remote influence of the subjective state of a person on erythrocyte sedimentation rate in different blood groups, Rh-positive and Rh-negative blood, and under different conditions of exposure.

Our findings indicate the existence of certain molecular factors present in the blood, which respond remotely to mental state of a person. We do not know yet, where the molecular structures of the blood, which are responsive to expressed subjective state of a person, are located - in erythrocytes or in plasma. We hypothesize that these molecules may be proteins that change their conformational properties under the influence of expressed subjective states [21].

These results have defined a new area of research, which is focused on search and isolation from the blood of specific molecules, which are remotely sensor of the psychic state of a person.

A hypothesis on the field mechanism of the brain psychic activity

The results of the present investigations clearly

demonstrate the existence of the remote-field effect of the subjective state of a person. We called this brain field a “psychogenic field”, because it reflects mental, subjective state of a person [6,17,22]. It is now known that the psychogenic field of the brain causes the force acting on arrows of indicators; provides remote influence on physical properties of the blood and can be detected only by means of living structures. It is further possible that there are still some other, yet unknown to us, manifestations of this field.

The remote impact of the subjective state can be originated by the field generated by the biological object by the human brain itself [17,22]. These findings pose question about the origin of psychogenic field, about the substrate that generates it, and about biological infrastructures it affects? These questions necessitate further research.

The nature of any field is determined by its action on the matter and by its influence on the processes. This is a common feature of all the known physical fields. There is no other way to detect the field and to describe its nature. All known field effects occur with maximum probability, which is reflected in our experiments.

In the field of subjective brain activity, the major question arises: how the brain, which serves as a unique living structure, can in principle generate the subjective state or self-sensation? In other words, which should be the psychophysical organization to reproduce a subjective attitude to itself?

In literature, there are a lot of works on the problem of subjective human brain activities. This includes philosophical articles; psychological in which external forms of mental activity are described; the clinical works considering violation of mental functions at various diseases; neurophysiological in which authors try to reveal correlates and codes of mental cognitive, sensory functions of a brain including by means of fMRI. However, among them there are no articles on experimental studying of the nature (origin) of subjective brain activities.

Hypothesis connecting the emergence of the subjective state with the structure and function of neurons microtubules was proposed by S. Hameroff (2007) [23]. The author suggests that subjective state of a brain arises at quantum level of its organization, and the brain is the quantum computer. According to the author “brain processes relevant to consciousness extend downward within neurons to the level of cytoskeletal microtubules. An explanation for conscious experience requires (in addition to neuroscience and psychology) a modern form of pan-protopsychism in which proto-conscious quails are embedded in the basic level of reality, as described by modern physics” [23].

However, these theoretical views aren't supported with pilot studies and the evidence of their communication with subjective brain activities isn't produced. They don't allow to understand, how the brain, unlike computers and other lifeless systems, creates the internal subjective state, i.e., itself feels?

To understand the nature of a subjective state, it is necessary to imagine a principal circuit of the brain organization that can reproduce subjective self-perception.

We believe that this brain organization should generate specific field processes in the molecular structure, which produce a secondary effect on its neurophysiological mechanisms.

It is a well-known fact that the electromagnetic field has a reverse effect on the generation and conduction of excitation in excitable cells (e.g., in neurons, nerves, and muscles). Using the neuron or muscle as an example, it can be shown that primary membrane ion fluxes generate the action potential (synaptic potential). Due to the propagating field (electrotonic effect), they affect the adjacent electrically excitable structures and cause a progressive propagation of excitation. The electrotonic field influence can modulate nerve cell excitability.

Taking into account the notions on physical self-induction (Lents E.Kh.,1833; Faraday M., 1834), data on the electrotonic effect of field on excitable cells (Tasaki I., 1957), and results of our experiment, we proposed an original scheme for the subjective brain state (Figures 3 and 4), which is based on the closed-loop field effects.

The electric physiology of excitable structures suggests that the electromagnetic field generated by a nerve cell affects the excitability and can cause excitation and conduction of a nerve pulse. We think that the fields generated by the brain produce reverse influence on the neurophysiologic mechanisms of the brain.

These processes illustrate a “reverse effect” of the field generated by nerve tissue.

Following the physical analogy, we can call the reverse influence of the field on the structural and molecular processes in the brain as “brain self-induction”. In our opinion [17,22], neuronal brain structures are the “generator” of the psychogenic field and at the same time a “screen” that is affected by this field. It characterizes the closed cycle of the person's self-perception of the processes occurring in neuronal structures of the brain (Figure 4).

System organization of the brain psychic activity in during wakefulness and sleep

The psychic activity of the brain appears during sleep and wakefulness. Sleep and wakefulness-two interconnected natural physiological state, which is periodically constantly living organism [24,25].

During wakefulness, the body carries out satisfaction of vital social and biological needs: nutritious, protective and territorial, cognitive, creative, social, gender and so on, made mental activity of the brain, including the mind, feelings, emotions. Presence awareness allows all forms of active interaction of organism and environment: sensory perception, memory, learning, behavior, and so forth.

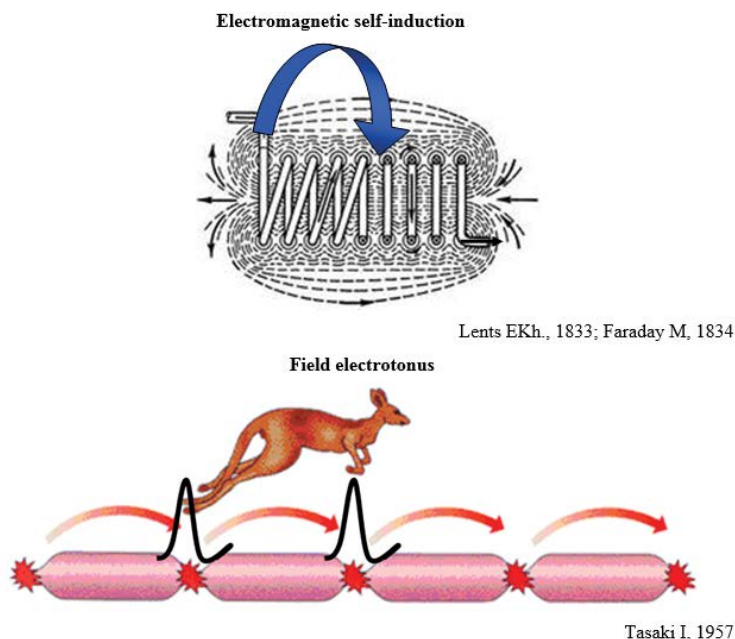


Figure 3: Closed-loop field effects. The signal is transmitted very quickly (400 km/h). Normal nerve, the myelin sheath is not injured.

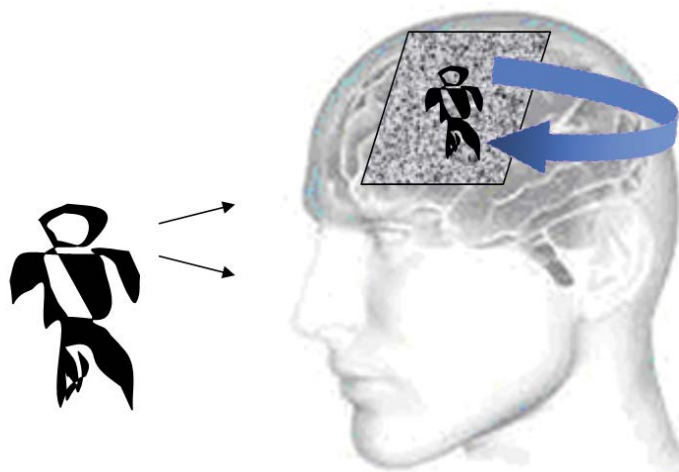


Figure 4. Self-induction in the brain. Hypothetical principal scheme for the formation of a subjective brain state. Reverse effect of the psychogenic field on neuronal molecular processes.

Sleep - the physiological state of the higher animals and humans is characterized by the temporary shutdown of consciousness, lack of active targeted behavioral activity and a general decline in metabolism. However, during sleep keep your mental activity of the brain in the form of emotional states, feelings, dreams, and so forth. During wakefulness formed the motivation that causes sleep, and vice versa, during sleep is the formation of motivation of wakefulness.

Sleep is a vital necessity, determines the mental state of man, his mood, feeling, memory performance. Sleep disorders are often the first symptom of mental illness. Sleep is essential for normal mental activity of the brain during wakefulness.

The theory of functional systems developed by P.K. Anokhin [13] and presented in the works of K.V. Sudakov [15] and many other researchers points at the main mechanisms in the brain activity, which may be associated with origin of

emotions and thinking. However, the central architecture of a behavioral act reflects only neurophysiologic component and fails to represent the organization of the subjective processes.

System organization neurophysiological and mental activity of the brain (Figure 5) has two interconnected and united in a single whole subsystem: neurophysiological and psychological [17,22,26].

All processes in the brain start at the neurophysiologic level and then develop on the subjective level. At the first stage, the afferential synthesis goes on the neurophysiologic level, and then the process of analysis and interpretation continues on the subjective level - “subjective synthesis”, including the sensation of attraction (motivation), situational assessment, memorization and recall. The process is finished by decision-making and goal-setting made on the subjective level.

The further development of the processes in the brain may follow two ways.

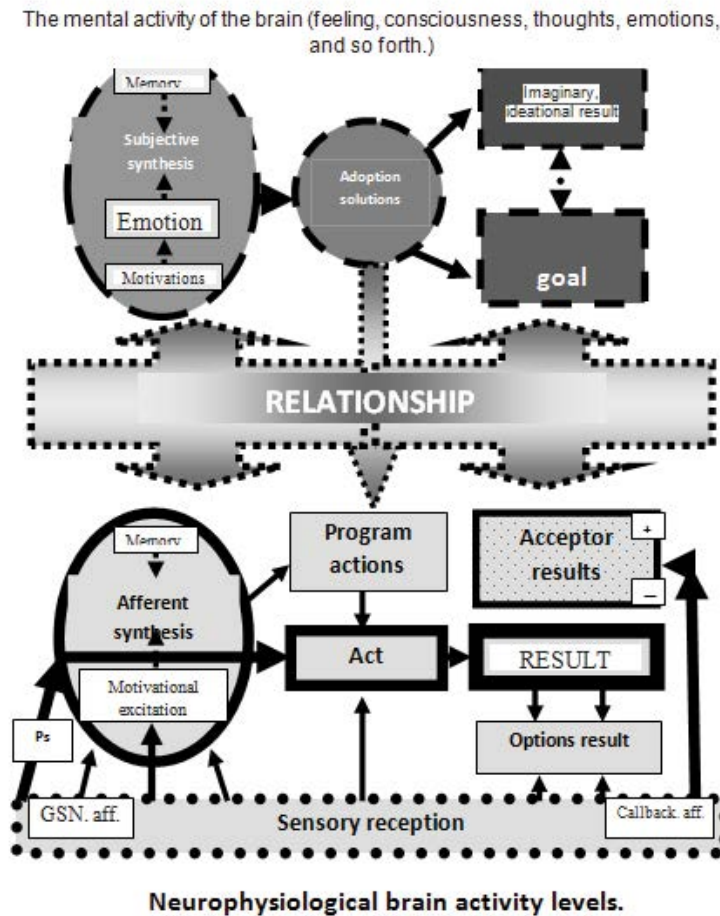


Figure 5. Scheme of the system organization neurophysiological and mental activity of the brain during wakefulness.

In one case, the subjective synthesis finishes with the acceptance of an imagined mental result in the framework of subjective mental functional system.

In the other case, the decision about the goal-seeking behavior and goal-setting returns the processes from the subjective sphere to neurophysiologic level to formulate the program of result-oriented behavior and action results acceptors, in which the parameters of the future result is prognoses in accordance with the set goal.

If the prognoses and achieved results match, the process is stopped and a new stage of goal-seeking behavior without the participation of subjective level of the functional system is started.

If the prognoses and achieved results no match, the result acceptor initiates a “mismatch” or “surprise” reaction. The process goes to the subjective level where negative or positive emotion is generated depending upon the failure or no-failure to achieve the goal.

The positive emotion produces satisfaction and fixation finishing a specific behavioral act. The negative emotion mobilizes the process of subjective synthesis to search another more appropriate decision that will allow achieving the goal.

The emotions are the means of memory fixation of the whole bunch of factors promoting or hindering achieving

the goal. At the neurophysiologic level, new emotions are transformed into emotional reactions of the body. The behavior is oriented along the common vector from a negative reaction to a positive one.

The emotional reactions are formed in the neurophysiologic part of the functional system, while the emotions and thoughts are produced in the subjective part.

Memory has the following two components: the neurophysiological component, and the subjective component. The process of memorization occurs at the neurophysiological level, which involves subjective activity of the brain. The process of data storage in memory proceeds at the neurophysiological level with no involvement of subjective perception. Reminiscence and information retrieval from memory always involve subjective (intellectual) activity of the brain.

In essence, modern studies of memory are limited to the neurophysiological mechanisms. The mechanisms of memory cannot be evaluated without studying the subjective sphere. Hence, the process of information retrieval from memory is yet unknown.

At the neurophysiologic level, the tailored reflex reaction and automatic behavioral acts are performed due to preoperational integration, which is formed earlier [17,22]. In these cases, the behavioral choice takes place without the participation of consciousness.

The major mental functions of the brain, including the freedom of will, goal-setting activity, choice of the behavioral strategy, expected (imagined) result, and assessment of goal achievement, occur at the subjective conscious level.

Falling asleep and sleep are determined by the biological need for sleep. The development of carotid motivation arises from the activation of the neurophysiological processes in the brain in the combined action of a number of factors: the change of the circadian rhythm of the suprachiasmatic nucleus of the hypothalamus, the daily stereotype of the day and night, satisfaction of biological and social needs, fatigue, sensory deprivation, decreased motor activity [25-27]. Driving system organization neurophysiological and mental activity of the brain during sleep is shown in (Figure 6).

Motivation sleep is formed on the neurophysiological level, which then manifests itself in the sphere of the subjective mental feeling of drowsiness, lethargy, fatigue, tendency to sleep, and in severe cases, “falling asleep on the go”. Attraction to sleep there in the mental health of brain activity at the complex participation of different neurophysiological mechanisms.

Psychic state to sleep is sent to the neurophysiological mechanisms for the formation of behavioral and autonomic responses, defining the transition to sleep. After disappears consciousness communicates with the external environment

of the organism is finishing, and together purposeful behavior stops with him.

During sleep, there is a continuous interaction of neurophysiological and psychological spheres of activity, which is expressed by dreams, autonomic and motor responses, changes of phases of sleep. In the dream, a person experiences a subjective feeling. This is different from the dream of unconsciousness caused by anesthesia, coma, during which it is impossible awakening. Lack of consciousness during sleep deprives a person of communication with the surrounding reality and, therefore, derived from the psychic sphere of activity of the brain, dreams are fragmentary, emotional, environmental non-deterministic environment directly. However, emotionally charged dreams occur during REM sleep, are related to the mental activity of the brain during wakefulness. Undoubtedly, there is a link with sleep phases of mental activity of the brain. This remains unexplored part of mental activity of the brain in the formation of each sleep phase and their role in ensuring effective wakefulness.

The origin of a subjective brain state is in the fundamental properties of a living brain, which is a specific type of matter and has its own physical laws and specific brain fields. The psychic activity is a phenomenon, function, state of brain, which, we think, emerges in the interaction of structural and molecular (neurophysiologic) and field processes in a living

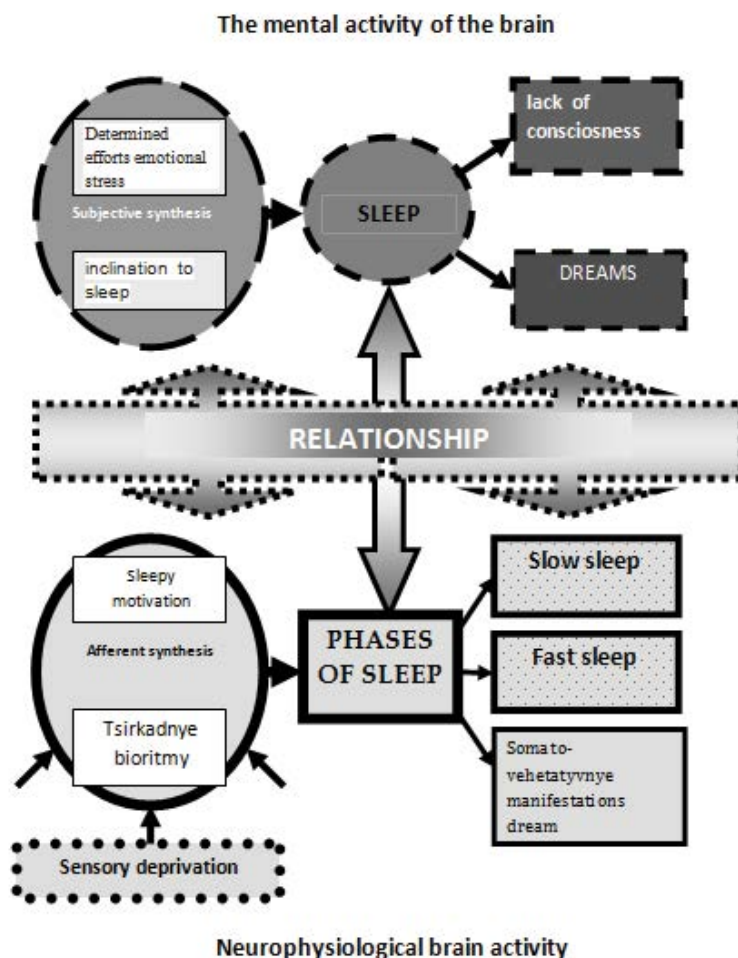


Figure 6. Scheme of the system organization neurophysiological and mental activity of the brain during sleep.

brain. The relationship between the neurophysiological and subjective spheres of the brain activity is carried out in the field form [17,22].

Undoubtedly, without the knowledge of the origin of mental activity ideas about the brain are extremely limited, and very far from the truth.

Conclusion

The paradigm of the “Psychic activity”: basic postulates

The science lacks any paradigm about the origin of a psychic state besides common view that a mental activity is in a way originated in the neurophysiologic processes.

Historically the biological science developed based on the knowledge and achievements of abiocoen physics. As for the physical laws of living brain, these laws were overlooked by the traditional physicists and biologists. Researches into the mental human brain states, we for the first time approached the physical field processes that are possible only in living organisms.

The presented scheme and paradigm of systemic organization of psychic activity of the brain are a prerequisite for the subsequent development of the theory consciousness.

We came to the basic postulates given below, which characterize interrelation of psychic and neurophysiological processes in a human brain [17,22].

- The origins of a psychic state are in basic properties of the living brain, which serves as a particular form of matter and has the proper physical laws and specific brain fields.
- The functional system of goal-directed behavior has two interrelated levels of brain organization (neurophysiological level and psychic level) and represents a united integral systemic structure.
- The psychic state of the brain results from interaction and interrelation of neurophysiologic processes and brain-specific biological fields (“psychogenic field”).
- The psychic states can be perceived only by living structures.
- The biological fields produced by the brain can directly affect the structural and functional processes in the brain (“biological self-induction”).
- Psycho neurologic diseases can primarily occur in the subjective processes and secondarily manifest themselves in various structural and functional disorders.
- Living brain physics is a new field of science analyzing unique physical phenomena characteristic only to a living brain and non-existent in abiocoen.

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