

## SOME ISSUES ON STRUCTURE OF THE HUMAN BRAIN

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**Annotation.** The article considers the issue of the functioning of the human brain, provides an analysis of the functioning and the algorithm of the work of artificial intelligence. Applying the theory of similarity, in a certain logical structure of the human brain system. 16, biblog. 1-fig.

**Key words:** Brain, spinal cord, control, hindbrain, epithalamus, thalamus, metathalamus, operator, tact, DBMS, OS, black hole, structure, behavior, sensory communication, construction, cybernetics, logic.

Any intellectual activity is inextricably linked with the work of the human brain. [1]

Is it possible to create thinking artificial intelligence when we do not know what natural intelligence is - the human brain? Of course not. First of all, we must learn the structure of the human brain, the mechanism of the human brain, the functional system of the human brain, the internal and external connections of the human brain system, the control processes of the human brain system, the self-governing system and control systems of the human brain, as well as other behaviors, limitations and details of complete information and knowledge.

The human brain is a natural system, super complex and unique, with many subsystems, subdivisions at various levels.

The human brain is unique in its capabilities, functioning, control of the brain, control of the entire human body, in receiving information, both internal and external, in regulation, in distribution and redistribution in structure. The human brain is a highly complex and dynamic system. The dominant system of the whole organism and outside the human body as a whole and separately, controls the process in parallel, multi-tiered, functionally accurate in every detail of the

processes [15]. All this is performed by an automated control system, which in the system has many automated control and regulation systems.

All listed operations are performed accurately, in a timely manner, consistently, and monotonously. Determining the structure of the human brain as a complex system is not very simple.

Studying the centuries-old scientific results, scientific approaches from various points of view such as: physiological, psychological, medical, philosophical, biological, biophysical, neurophysiological, biocybernetic, neurocybernetic and cybernetic directions.

I will use the results of the research on the human brain [2, 3, 4], paying tribute and respect to these scientists and from the point of view of cybernetics and logic, we will concentrate in the study and definition of the structure of the human brain.

This means the structure of an automated control system with a multitude of automatic control and regulation systems.

In 1906, the physiologist Sherrington put forward a hypothesis that explained the properties of the brain by the fact that structures are created in it corresponding to new experience, new knowledge. Sherrington discovered that the places of contact of neurons - synapses - sometimes cease to transmit stimuli, change their permeability and thus provide creation to the structure. And so, the ideas of these physiologists, the brain looks like an accumulation of hundreds of billions of moving switches, some of which over time are closed throughout life. And so, despite the sophisticated efforts of the mind, despite the huge amount of research covering the structure of the brain, its anatomy and its work - behavior, science has not yet revealed the secrets of the brain.

It was even suggested that it was impossible to do this, since a complete description of the work of the brain system requires a larger system than the one described and the work of the brain can only be understood by a more powerful device than itself.

I suppose - says the American scientist Maroll - that no psychologist will ever be able to give such a complete description of the brain should include a description of how the brain tries to include a description, how the brain tries to understand another brain, and so on ad infinitum. [7]

But there is no serious reason for this bleak conclusion. Of course, to completely and unchanged rewrite the information stored in 100 trillion brain memory cells, you need at least the same number of cells. It is usually said and written that the brain is "constructed in the highest degree of complexity." What does it mean - difficult? The meaning of this word is as follows: the amount of information that determines the structure of a given system is large. [8]

The brain is a complex multilevel system. Psychological, physiological, cellular, molecular, atomic - the levels that are involved in different sciences or different areas of the same science. And on each of which it is possible to more or less satisfactorily understand the principles of the functioning of the brain, its individual regions and structures. [12]

Over time, we will learn to accurately calculate any complexity in bits. The interest in human brain research is too great. Dedicated to numerous monographs and articles "The Brain and the Computing Machine", "Cybernetics of Natural Systems", "Sensory Communications", "The Construction of the Brain", "Is It Possible to Model the Work of the Brain", "The Brain and Cybernetics", etc., etc. etc. [9].

In the book of W. Ashby, more than half of the disclosure of those logical structures of the mechanism of adaptation, which differs the organism from a mechanical automaton.

Not the usual approach of W. Ashby to the construction of the logic of the mechanism of the phenomena observed in the body and to teach logical structures where it would seem possible to do with one direct analytical study.

Using the ideas of W. Ashby "Construction of the Brain", as well as the axioms that the human brain is a natural, intelligent biological computer with very, very large capabilities.

Let's assume that an artificial intelligence machine is a model of a naturally intelligent mechanism (an organ producing intelligence), a human brain. How is an artificial intelligence machine developed, what is its structure, primary supporting decisions, decisions, what blocks (sections) the system consists of. The von Neumann architecture was adopted, and so the development of a modern super computer with this architecture continues to this day. What are the capabilities of a computer system in relation to artificial intelligence, what kind of structure functions and works. It operates on the basis of a pre-compiled algorithm, on the basis of algorithms the solution of the problem is controlled. A framework that provides implementations for these algorithms. [10]

The digital computer operates on the basis of the following algorithm: Central control system, local control system, local control system, control system operators, actuator control operators, system control system command operators, clock control system control operators. All these algorithms are developed artificially, for a specific purpose, in accordance with the laws and rules of natural nature, physically, mathematically, biologically, chemically, etc.

The development of the science of discrete technology, binary technology, computing technology, physics, electronic technology and logic developed both the science of cybernetics and computer systems. The control system is developing,

operating systems are being developed, as a result, computer networks and network systems are being created.

Network technologies are being developed, both functional and technical support. And the natural intelligent human brain realizes all these algorithms at a high level, or the human brain consists of these algorithms, which are carried out by an automated control system with a virtual structure of each algorithm or the entire system algorithms.

The logic of the brain is considered as a set of logical necessary conditions that must be satisfied by the information processes of the brain. [11]

The human brain is a living organism - it is a self-regulating, improving, self-learning and self-programming system.

A living organism does not have a goal to constantly improve, its main task is to maintain homeostasis, integrity, harmonious coexistence with the environment. [3; 13]

Based on these two statements, one can guess about the algorithm of the human brain (nervous system), as the main governing body. The neural network is the body's communication system through which all parts of the body, organs and cells are able to send nerve impulses. The brain is a kind of central processor in which all these signals are processed and output data (sensation, emotions, commands for action) are formed.

Let's say the nose (the organ of smell) has caught the content of certain chemicals in the air. The brain processed signals from the olfactory organs and gave us not a chemical formula, but a certain assessment (pleasant aroma, specific, undefined smell, nasty smell). The question is, what is the brain's algorithm for evaluating information from the senses? What criteria is he guided by, dividing odors into pleasant and unpleasant? If we can answer this question, then we will understand the mechanism of the human brain. There is a huge amount of operations in the human brain every second, but only a very small part of them is realized by us only in the form of thoughts. [13]

All other signals that are neutral come past our consciousness, since the brain itself perfectly understands them in an automatic mode.

The questions of the functioning of the human brain surfaced such concepts as "system", "structure". Elements of a structure is an object that is indivisible in the context of a given problem. [20, 16]

1. Any set of elements on which the union (or relationship) operation is defined is called a structure. [20, 16]

2. A system is a functional set of compatible elements, on which the operation of combining intersecting (compatible) elements is defined.

And, if a structure is a set of elements, it turns out that there is a structure within a structure and an element within an element. Such structures are usually called structures, but it would be preferable to define them as structures of the second (third, etc.) order, and for elements - as an element of the second (third, etc.) order. Expanding the structure sequentially into structures of higher orders, in the study of the structure of the human brain we arrive at a representation of the structure in the form of a sequence. [16]

$$S, S^1, S^2, \dots, S^n.$$

S - the initial structure, and Sn is called the initial elements of structures of lower orders.

Taking the theory of similarity, we first present the structures of an artificial intelligence machine, a central processor with a central control system, input and output systems, random access memory, permanent, external, control panels. All these elements of the structure of the computer works with the operating system, the database with the control systems. This is the structure of an artificial intelligence machine - a digital computer.

The structure of the human brain is a rather unique, hierarchical, dynamic system with a virtual structure.

The structure of the brain consists of the following sections: Brain: 1) the terminal brain (cerebral hemispheres and corpus callosum); 2) diencephalon - epithalamus, thalamus, metathalamus, hypothalamus; 3) the midbrain and the roof of the midbrain; 4) hindbrain - cerebellum and pons; 5) the medulla oblongata; 6) the spinal cord.

The functional human brain - controls, controls, regulates, memorizes, processes, creates, decides, transmits and receives information and signals, the general work of the human brain performs and guides the process associated with human life and related phenomena. The structure of the logical block diagram of the human brain is shown in tab. one.

tab.-1a.

Human brain system				
DBMS	Human brain			OS
	Ultimate brain	Large hemispheres and corpus callosum		
	Diencephalon	Epithalamus		
		Thalamus		
		Metathalamus		
		Hypothalamus		
	Midbrain	Tectummesencephalicum		
	Pedunculicerebri			

	Hind brain	
		Ponscerebri
		Medulla
	Spinal cord	
	Local control systems (LCS)	
	Managing the executive body (MEB)	
	Operator management systems (OMS)	
	Clock cycle control systems (CCCS)	

tab.-1b.

DBMS		Database		
OS	HB		SU	Dark hole
	Diencephalon			
	Midbrain			
	Hind brain			
	Spinal cord.	Ponscerebri		
	LCS			
	MEB			
	OMS			
	CCCS			

The structure of the logical block diagram of the human brain system consists of the following: the cerebrum of the terminal brain, diencephalon, midbrain, hindbrain and spinal cord, with a local control system (LSC), local control systems (LSU), management of executive organs, (MEB ), operations management systems, (OMS), tact control systems, (TCS), data bank (DBMS), operating system (OC - OS) and black hole (BH). All these functions are performed dynamically by intelligent automated control systems (IACS) with a variety of automatic control and regulation systems (ACSupR).

The system operates in real-time time-sharing in a variety of microprocessors and firmware.

And also the system is dynamic and vertical, based on a clearly developed algorithm and an absolutely accurate program. Each management process changes its structure in accordance with the tasks to be solved. The logical structures of the human brain are presented by exploring all the possible theoretical conclusions of the researchers came from the point of view of cybernetics.

The main goal of human brain research is interest in the development of machine artificial intelligence and the science of cybernetics.

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