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“Computer metaphor”, interhemispherical asymmetry and species (spontaneous) knowledge of Homo sapiens

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Abstract. The *purpose* of this article is to supplement the discussion in the field of research and modeling of the process of cognition first with data from neuropsychology and interhemispheric asymmetry, and second with reflections on species' (spontaneous) knowledge of Homo sapiens. *I. The data* of neuropsychology and interhemispheric asymmetry signify two differently directed and complementary ways of processing information and regulating the functions inherent in the brain. One of these methods is analytical computer-like information processing, which is necessary for voluntary learning, the other method provides holistic-simultaneous, imaginative, unconscious, and involuntary processing. The duality of cognitive strategies is clearly manifested in the psychological analysis of syndromes in the case of brain lesions, as well as various conditions in healthy people (for example, in the case of bilingualism). *II. Biological existence*, which is the basis for all other layers of life, is provided by species-specific behavior and knowledge. Presumably species knowledge manifests itself as *1* – Constant involuntary assessment of the surrounding world and adequate reactions to changes in the world: from ordinary reactions (step aside, add a step, etc.) to the ability to react without hesitation in dangerous situations. *2* – The ability to understand connections between phenomena without scientific calculations. The entire history of mankind speaks of the existence of such an ability. People survived without science and created science along the way. *3* – Deep knowledge (often without the ability to logically explain) of what is natural and useful for us as representatives of the Homo Sapiens species, and of what is unnatural and harmful. There are reasons to assume that species knowledge is the basis that determines the common behavior of people of different eras and cultures in everything related to the continuation of the family and the cultivation of a new generation. Species knowledge merges together in the process of development with the knowledge gained during training.

Keywords: cognition, human behaviour, human communication, metaphor of a computer, species knowledge of Homo sapiens, neuropsychology, brain asymmetry.

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Introduction

Developments in the field of artificial intelligence and neural networks stimulate interest in the nature of the human mind and consciousness, in the organization of human cognitive functions. Recent works summarizing research in the field of the nervous foundations of consciousness (K. Anokhin 2021) [1], cognition and cognitive processes (R. Maffei 2021) [2] show that a person is still very far from understanding his ability to think and feel. Research in the field of cognition, according to R. Maffei [2], turned out to be at an impasse, controversial issues are the relationship

between emotions and reason, the role of the body in cognition, explanatory possibilities of neuroimaging.

Modern cognition studies [3–11] can be divided into two opposite fields, each of which is heterogeneous and is a family of views: 1) cognitivism, which considers the brain as a data processing machine, the central nervous system as the command and control center of the whole organism, and the body as a simple tool of the central nervous system, and 2) various versions of the theory of Embodied Cognition, sharing the idea that the body and its interactions with the central nervous system and with the environment plays a crucial role in human behavior, knowledge and cognitive processes. In the theories of incarnation, the human body is considered as a collective, a living being that uses the brain to mediate interactions. These interactions can occur both inside the human body and between the human body and the environment. The mind appears not as a product of the brain, but as an activity of a living being; an activity that integrates the brain into the everyday functions of the human body. From the point of view of cognitivism, a person is a cognizing system, and the processes occurring in this system are a step-by-step processing of information by analogy with the processing of information in a computer. This analogy has received a special name — computer metaphor. R. Maffei sums up the review of existing views: «...we feel that the computational approach, algorithmic explanations and the metaphor of the computer cannot answer all the questions; we feel that the unciphered aspects really exist... the question of dualism ... this is more of a sensation than an established reality; and a reliable model that is actually an alternative to the cognitive metaphor of the computer has not yet been proposed». The article by M. Falikman [12] talks about the possibility of convergence of cognitive science and approaches that have developed in Russian psychology — cultural-historical psychology and psychological theory of activity. To build an adequate model, it is necessary to bring together the results of observations and studies from many fields of knowledge. In modern works on cognition and cognitive processes, there are no data on neuropsychology and interhemispheric asymmetry. In the first part of this article, an attempt is made to fill this gap. The second part is devoted to the biological component of human existence, analyzes the formation and manifestation in everyday life of spontaneous (species) knowledge of *Homo sapiens*. The question of brain support of these functions is raised.

1. Neuropsychology and hemispheric asymmetry

Neuropsychology is a science that explores the connections of the structure and functions of the brain with mental processes and behavior. Within the framework of this discipline, material has been accumulated on the violation of cognitive processes in various brain lesions. The formation of Russian neuropsychology was based on the study of local focal brain lesions (the works of L. Vygotsky, A. Luria and their followers). The most important characteristic of the organization of the human brain is interhemispheric asymmetry: the right and left hemispheres of the brain differ both morphologically and functionally. In adults, right- and left-sided brain lesions consistently lead to different syndromes, which in neuropsychology are known as right- and left-hemisphere syndromes. In the pre-computer era, the results of neuropsychological tests were used to determine the location of the lesion (right or left hemisphere, horizontal and vertical localization within the hemisphere) during brain surgery. Currently, studies are possible using computed tomography (CT), magnetic resonance imaging (MRI), positron emission tomography (PET), electroencephalography (EEG), etc., etc. These techniques make it possible to identify functional and anatomical correlates of various processes in healthy people.

Understanding the phenomenon of hemispheric asymmetry has a long history [13–24] and it

continues. The left hemisphere, whose lesions often lead to speech, reading, writing and counting disorders, has long been considered dominant, that is, the main one in human mental activity. Lesions of the right hemisphere are usually not accompanied by obvious disorders of oral and written speech and therefore it was considered subdominant, "mute" or even "empty". At the same time, severe and poorly compensated disorders are observed in right-hemisphere lesions: facial agnosia (the central symptom is a violation of face recognition, that is, the patient ceases to recognize the faces of familiar people, but an in-depth analysis of [25, 26] showed that with this syndrome, the ability to remember and recognize the individual characteristics of all visual stimuli is impaired); anosognosia (denial of his disease, that is, a person cannot assess his condition); ignoring the left side of space, etc., etc. The behavior and actions of patients with severe right hemisphere pathology are often inadequate. Right hemisphere syndromes have not been known to a wide range of specialists for a long time and have not always been diagnosed. That is, the specifics of the activity of the left hemisphere — verbal-analytical functions and communication — clearly suffered from the pathology of the left hemisphere, and it turned out to be much more difficult to assess the contribution of the right hemisphere to mental activity. D. Jackson [15] noted the connection of the right hemisphere with involuntary automatic processes. The study of the split brain showed that the right hemisphere specializes in holistic-synthetic, timeless and constructive information processing [27]; with lesions of the left hemisphere, it provides speech comprehension [28]. There is data on the contribution of the right hemisphere in solving creative problems [29]. A fundamentally new and promising view for further research on the functions of the right silent hemisphere on the basis of a literature review is proclaimed by Ian McGilchrist [30] in his work "The Master and his Emissary: the divided brain and the creation of the Western world" (2009): thoughts originate in the right hemisphere, therefore it is the master, the master, and the role of the left speaking hemisphere — communication with the outside world.

The understanding of interhemispheric asymmetry goes from the idea that "the hemispheres process different stimuli, different information" to the understanding that it's not about stimuli, but about processing methods. Each hemisphere has its own specific information processing strategy. All cognitive functions are provided by a dual process. The assumption about the existence of functional systems that have representation in two hemispheres in symmetrical areas and jointly provide some types of visual gnosis (recognition) is contained in the work of E. Kok [31]. In the 1970s, the main provisions of the theory of the system-dynamic organization of higher mental functions were formulated. The founder of Russian neuropsychology A. Luria [32] wrote: «...we must abandon the simplistic ideas according to which some (speech) processes are carried out only by the left (right-handed) the right hemisphere, while the other (non-speech) — only the right hemisphere. Psychological analysis has shown that almost all mental processes are complex in their functional organization, because they can occur at different levels (involuntary and arbitrary, unconscious and conscious, direct and indirect). This allows us to reasonably assume that there is a close interaction of both hemispheres, and the role of each of them may vary depending on the task that mental activity is aimed at solving and on the structure of its organization.». A modern view of the problem is presented in the work of E. A. Azarov, B. S. Kotik-Fridgut [24]: «From the point of view of the system-dynamic approach to the organization of mental functions, the problem of dominance appears not as a question of the advantage of one or the other hemisphere in the implementation of the speech function, but as a problem of the specifics of the "contribution" of each hemisphere to the implementation of the integral function ». Next: «...asymmetry is a side phenomenon of hemispheric specialization, characteristic of the brain organization of the human psyche».

Currently, it can be argued that the brain is a single paired organ, and the activity of each of the hemispheres has its own specifics and makes its own special contribution to the implementation of any mental function. The normal functioning of the brain is possible only with the interaction

of the hemispheres. Each hemisphere has a special way (or strategy) of processing information and regulating functions. The left hemisphere provides verbal-logical, abstract-schematic, analytical, sequential, with the participation of consciousness, arbitrary processing and regulation, the right - visual-figurative, concrete, direct, synthetic, simultaneous, unconscious and involuntary. Both methods of information processing, complementing each other, merge in the development of the psyche and are difficult to separate during normal functioning.

But the interhemispheric organization of functions, like all processes of a living organism, is characterized not only by stability (the organization of functions repeats from person to person and from generation to generation), but also by variability: the hemispheres and their inherent information processing strategies are not absolutely rigidly connected. With the early removal of one of the hemispheres, the preserved one takes over almost all the functions of the remote one, that is, it begins to provide both information processing strategies. It is possible to mirror the organization of functions in left-handers and some individual variations, which were previously designated as "divergence of dominance".

The duality of cognitive strategies is clearly manifested in the psychological analysis of syndromes in the case of brain lesions, as well as various conditions in healthy people (for example, in the case of bilingualism). The duality of cognitive strategies of the human brain has often been talked about and is being talked about as an obvious natural phenomenon without connection with the hemispheres [33–35].

Currently, there is no generally accepted theory explaining the occurrence of hemispheric asymmetry in phylogeny and ontogenesis. There is evidence that the acquisition of cultural skills, especially the mastery of writing, significantly changes the organization of brain functions [36–38]. Neurologists of the turn of the XIX-XX centuries, who often observed illiterate patients, argued that illiterate people do not have severe aphasia or aphasia does not develop at all. It has been suggested that the dominance of the left hemisphere is associated with the development of literacy [39]. Despite the fact that the specialization of the hemispheres is quite stable (repeated from person to person and from generation to generation), it is not strictly defined from birth and unchanged throughout life. Specialization develops as the child develops and acquires cultural skills. There may also be changes in brain lesions due to plasticity.

Let's return to the question that is indicated at the beginning of the article: how do the positions of cognitive scientists and proponents of incarnation theories correlate with the data of neuropsychology and hemispheric asymmetry? For supporters of the "metaphor of the computer computer-like information processing is the only way of action inherent in the brain. At the same time, the data of neuropsychology and interhemispheric asymmetry indicate two multidirectional and complementary ways of processing information and regulating functions inherent in the brain. Analytical, that is, computer-like processing of information by the brain exists and is associated with the activity of the left hemisphere. Thanks to this ability, arbitrary learning and scientific progress are possible. The computer was created by the human mind to a certain extent in the image and likeness of the human mind. Or rather, in the image and likeness of that part of the mind that is logical and accessible to analysis. But this way of processing information by the brain is not the only one and not the main one for a person's daily life. The contribution of the right hemisphere to brain activity has not been sufficiently studied, and the assumption of its most important role, expressed by Ya. McGilchrist [30], is quite plausible. The idea of the brain and mind as a "metaphor for a computer" echoes the idea of the unconditional dominance of the left hemisphere in general brain activity, which has recently been very common. In both cases, the analytical processing of information, which manifests itself vividly and without which learning is impossible, is perceived as the leading or even the only activity of the brain. At

the same time, the second (or the first in importance for a person?) the implicit path of cognition associated with the right hemisphere remains in the shadows. Probably, further development of science will bring clarity to this question. Despite the fact that a computer can be endowed with superhuman memory and information processing speed inaccessible to humans, the human mind is immeasurably larger than the most modern computer. Man is a biological being; however, not all processes and phenomena inherent in living matter can be analyzed. Also, the highest meanings of being, spiritual life are the most important for a person, and in this area the computer is also helpless. Computer-like processing of information by the human brain is not the whole mind, but only one of the tools of the mind.

The idea of the decisive role of the body in cognition, which is developed by the theories of embodiment, is difficult to combine with data on cognitive impairment. Only brain damage leads to cognitive problems, and with the most severe bodily injuries and diseases, the cognitive sphere remains intact, which allows many disabled people to successfully study, work, and participate in the Paralympic Games. Psychological problems of disabled people can overwhelmingly affect the cognitive sphere, but this is a different level of influence, different from the influence of brain lesions. At the same time, the idea that the brain does not command, receiving information, but is used by some other force (in the theories of embodiment, this force is the body) may arise when understanding some phenomena, in particular, the phenomenon of brain plasticity. The ability of the brain to change its structure and function, adapting to changing external and internal factors, creates the impression of a guiding center over the brain itself. But it is also possible that the brain can command itself, remake itself. Currently, little is known about what forces make the brain react in one way or another. It is also important to understand the role of body contact in infancy. Breastfeeding is not only food, it is a natural guarantee of close and long-term physical contact between the baby and the mother. This contact is necessary for the development of the child in the pre-speech period and prepares language development.

2. Specific characteristics of a person (spontaneous knowledge and behavioral features)

The biological component of human existence is most often in the shadow of the phenomena of social and spiritual life. It comes to the forefront of discussions only in connection with diseases and the inevitability of leaving for another world. It makes no sense to list the differences between a reasonable person and our lesser brothers. But no matter how huge the gap between man and beast is, the biological outline of the life of an individual in wild higher animals and in man as a representative of the species *Homo sapiens* is practically the same. We are born, we grow up, we produce offspring, we feed it and take care of it, we grow old. Man, like all animals, is susceptible to diseases and is mortal. The lives of individuals constitute the life of a biological species. Each species is adapted to survive in a certain environment and is endowed with the gift to avoid danger, equip a dwelling, protect offspring, etc., etc., etc., etc. Observing the communication of a cat with growing kittens or adult birds with chicks, it can be assumed that parents teach children to hunt or look for food. Perhaps some of the skills in the animal world are really passed on from parents to children. But it is clear that not all of them: birds build nests before the chicks are born, so mature chicks cannot use the experience of their parents in their independent life. Representatives of many species of living beings do not meet their parents at all, but, having been born (hatched from an egg, from an egg, etc., etc.), they begin to lead a life characteristic of this species. It is logical to assume that there is species knowledge, that is, knowledge that is inherent in all healthy individuals of this species from birth.

An example of such specific knowledge can be the knowledge of food suitable for this type, the assessment of odors as "tasty" or unacceptable. It is known that the same substances by their taste and smell can be attractive to one species and evaluated as inedible by another species. So, in the animal world there is a specific (species-specific) knowledge, which largely determines the life of each individual and contributes to the preservation of this species. Does a person have knowledge that does not need to be taught at a school desk, which is given to us by nature in the same way as, for example, the ability to hear and see? Or is everything we know and know how learned thanks to a computer-like mind?

2.1. E. Lenneberg on the dichotomy specificity of the species — plasticity of the brain. Lenneberg [40] described the fundamental difference in behavioral characteristics observed in higher living beings. This is, on the one hand, a species-specific behavior (that is, mandatory for a healthy representative of the species (author's note — *N. A.*) and, on the other hand, behavior that can be formed on the basis of brain plasticity, it is not mandatory. So, all cats meow and dogs bark. This behavior is species-specific, but it is possible to change individual behavior as a result of training. The acquisition of certain additional skills will not change the species-specific characteristics, that is, dogs will always bark and cats will meow. Plasticity is an evolutionary phenomenon, a product of biological conditions, which in the evolution of living beings replaces the regeneration inherent in the lower species. The dichotomy of species specificity — plasticity can also be traced in the behavioral characteristics of a person. It is especially important, Lenneberg emphasizes, that the language development of the child (verbal communication (approx. auth. — *N. A.*) is species-specific for *Homo sapiens*, that is, the child matures to verbal communication, there are no special exercises for this. Lenneberg compares the language environment around the child with food: food is necessary for the growth of the child, but not food determines the patterns of growth and development. The language environment is also necessary for the formation of a language, but it occurs as a maturation according to its internal laws. Lenneberg associates the diversity of modern languages with the plasticity of the brain. Lenneberg also draws an analogy with the motor sphere: the human ability to walk is a species-specific skill.

The term "species-specific" has two meanings. Sometimes this term is used, emphasizing that the behavioral characteristic is inherent only in one particular species. Thus, the vocal communication of animals (a crow croaks, a dog barks, etc., etc.) is species-specific in the sense that it is unique for each species. In this paper, this term means behavior that is mandatory for a healthy representative of the species. This is the ability to fly for birds, run for hares, dive for ducks, etc., etc., etc., as well as caw for a crow, meow for a cat, bark for a dog. In this context, it is important to emphasize that each species has a set of behavioral characteristics, without which a representative of the species is at least disabled: a duck that cannot fly or a dog that cannot run, etc., As well as a person who cannot see, hear, walk or speak — disabled. Some species-specific characteristics are innate, and before the formation of others, the cubs must mature. For humans, the innate species-specific characteristics are vision, hearing, tactile sensations, etc., etc., and before walking and verbal communication, the baby is maturing. At each level achieved as a result of maturation, plasticity provides the environment with the opportunity to develop and improve speech and motor skills. Children grow up in different social environments. Some are taught foreign languages, music or acrobatics, others do not attend any additional classes, but any healthy child begins to walk and talk at a certain time by nature.

Currently, it is generally recognized that brain plasticity manifests itself as the ability to acquire knowledge and skills, as adaptation and restoration of impaired functions. Brain plasticity can be defined as genetically determined reactions to changes in the internal or external

environment. "The genetic program, along with providing a general plan for the development of the nervous system, as it were, provides and anticipates the likely environmental impacts that the child's body may encounter on the path of its development and prepares adequate behavioral reactions in advance" [41]. Based on Lenneberg's theory, it is logical to assume that the primary goal of plastic rearrangements with changes in the internal or external environment — is to maintain behaviors that are specific to the species [42]. Species-specific are not only such "noticeable" behavioral characteristics of a person as the ability to walk and talk, but also less tangible, such as, for example, the formation of spontaneous (everyday) concepts and adequate behavior.

2.2. L. S. Vygotsky on the dichotomy of spontaneous concepts — scientific concepts. Vygotsky in his works pays a lot of attention to spontaneous concepts that are involuntarily formed in a child before scientific ones, but are realized later. Comparing the logical and natural ways of language acquisition, Vygotsky [33] notes their interdependence and opposite orientation and draws an analogy with the development of scientific and spontaneous (everyday) concepts.

«...there is mutual dependence between these oppositely directed paths of development, just as there is between the development of scientific and spontaneous concepts...». Spontaneous (everyday) concepts are acquired and used in everyday life, and scientific concepts are terms embedded in the knowledge system. Vygotsky emphasizes that the meanings of scientific concepts are realized first and awareness of the meanings of scientific concepts gradually extends to everyday ones. Here are a few quotes: "Scientific concepts grow down through everyday ones. Everyday concepts grow upwards through scientific

, "Analysis of the spontaneous concept of the child convinces us that the child is much more aware of the subject than the concept itself. The analysis of the scientific concept convinces us that the child at the very beginning is much more aware of the concept itself than the object presented in it

. Vygotsky also emphasizes that the development of scientific concepts is part of the overall development process, which is provided by systematic learning: «... the hypothetical path of development of scientific concepts is only a special case of a broader group of development processes related to development, the source of which is systematic learning...» [33].

Vygotsky actually talks about two ways of cognition:

- 1) natural, a natural way that generates spontaneous concepts;
- 2) development processes, the source of which is systematic learning.

The first way is involuntary, it cannot be regulated by a person. On the second way — the processes are arbitrary, conscious control is possible here. Both paths merge in the development of the psyche.

2.3. Adequate behavior. Adequate behavior is an essential condition for survival. It is possible due to the ability of a person to constantly evaluate the world around him and his position in it. In many ways, adequate behavior is brought up in society. A child is introduced to dangerous objects from an early age, taught to behave correctly in different situations. But some diseases (for example, early childhood autism) disrupt the ability to perceive this knowledge. One of the symptoms of the disease is the inability of the child to assess the general context of what is happening, the intentions of other people, etc., etc. That is, there are natural inclinations, a biological basis that is necessary for the formation of adequate behavior, as well as all other species-specific characteristics. We see the species-specific characteristics formed in society. Their manifestations may vary, as they depend on living conditions. Differences to a certain extent mask the biological basis, bringing to the fore the social coloring. It should be recognized that A.,N. Severtsov [43] is right that only «the ability to certain actions is hereditary, but the actions themselves are not predetermined hereditarily and can be extremely diverse».

2.4. Species - specific characteristics. Species-specific behavior (knowledge) is characterized by the following:

1. The formation of species-specific behavior (knowledge) proceeds as maturation (involuntarily), there are no special exercises.
2. Clear terms of formation in ontogenesis. In the sciences that study child development, these terms are defined as the norm. A significant deviation from the usual deadlines indicates ill health.
3. Species-specific behavior (knowledge) cannot be forgotten, a healthy person cannot forget how to walk, talk, react adequately. Only the disease disrupts these functions. Violation of any species-specific characteristic leads to disability.

Let's compare it with skills and knowledge that are not species-specific, that is, mandatory for a healthy person, but are acquired through brain plasticity (for example, learned poems, a foreign language and sports skills).

- are acquired arbitrarily, consciously in the learning process.
- There are no clear deadlines for formation, only a favorable period.
- Formed skills in a healthy person can be lost without repetition or training.

2.5. How does spontaneous (specific) knowledge manifest itself and what does it give us? Presumably, constant involuntary assessment of the surrounding world and oneself in this world,

understanding the intentions of other people, the general context of what is happening, the ability to respond adequately to the changing world: from the most mundane reactions (to step aside, add or decrease step / speed) to the ability to react without hesitation in extreme situations. In the work of D. Kahneman [44] it is noted that in the process of evolution, survival depends more on the ability to react quickly than on the ability to reason, which takes time. Culture and civilization come later and are built on these reactions.

- The ability to understand the connections between phenomena without scientific calculations. The whole history of mankind speaks about the existence of such an ability. People survived without science and created science along the way. Perhaps it is this way of cognition that is effective in contact with the super-complex systems that make up the natural environment.
- Deep knowledge (often without the ability to logically explain) what is natural, useful for us as representatives of the species *Homo sapiens*, and what is unnatural and harmful.

As an example of specific (spontaneous) knowledge in humans, the following observation can be given. Any adult understands that a significant delay in the child's mastering of the native language is associated with ill health, and the violation or loss of the native language is associated with a serious illness. Let's compare: no one will call a person sick on the grounds that he does not speak a foreign language well or has forgotten it. The difference between the cognitive mechanisms of native and foreign languages in science is not clearly formulated. But our species knowledge unmistakably defines this difference.

Spontaneous knowledge probably changes, develops with age in the process of interacting with skills and knowledge acquired during life.

2.6. Procreation and survival of the species. The survival of a species is associated with the ability to produce offspring and raise a new healthy generation. The number of young in different animal species corresponds to their lifestyle and is optimal from the point of view of species conservation. Where only a few can survive, there will be many potential successors of the genus (for example, fish eggs). And if the offspring need to be nurtured, protected, taught, then the number of cubs is small.

A woman most often has only one child. This suggests that the baby in the first years of life requires all the strength of the mother. In order for a child to grow up healthy, he must

have species-specific characteristics (the ability to walk and talk, the ability to adequately assess the world around him, etc., etc.). The baby depends entirely on his parents, he needs feeding, protection, care, guidance. It would seem that all this is a social practice. After all, parents decide with their own mind how best to raise a baby. Of course, the books "for moms" "mom's schools experienced grandmothers, etc., help, but wild animals also successfully raise their offspring. Without books, schools and grandmothers. In animals, as we know, this is called the procreation instinct. And a person does not have it at all? Or does he imperceptibly guide us and determine many of our "own" decisions and actions? It is logical to assume that nature provides optimal reactions of parents in relation to their children. The desire to have children, the desire to protect them from all kinds of troubles at any cost, even at the cost of their lives, a reverent attitude towards babies — all this is absolutely necessary for the survival of the species, therefore, it is inherent in us by nature. It is these personal attitudes that are assessed by society as normal, and the opposite views are not welcomed by the majority in society, since they pose a threat to the very existence of the species. It can be assumed that the biological principle acts as a deep motivation that largely determines human behavior in relation to infants, and social conditions give this motivation one or another color.

Discussion

Is it possible to assume that the right hemisphere plays a leading role in providing species-specific characteristics in humans? Based on the symptoms of lesions of the right hemisphere [17, 18, 25, 25, 26, 31], such an assumption can be made. However, it is necessary to rely on the data of brain lesions with caution. D. Jackson also noticed that localization of a lesion that destroys a function and localization of a function are different things (quoted from memory — *N.A.*). An analysis of the symptoms of lesions of the right hemisphere can help in solving this issue. Today, many right-hemisphere syndromes are described only at the phenomenological level. Also, studies of healthy people using instrumental methods can reveal functional and anatomical correlates. One of the most difficult questions faced by researchers of cognition and cognitive processes is the origins of morality and spiritual life. Is there in the biological foundation that a person receives at birth, the makings of empathy, conscience, a sense of justice?

Conclusion

The data of neuropsychology and interhemispheric asymmetry indicate the existence of two multidirectional and complementary ways of processing information and regulating functions inherent in the brain. At the same time, analytical computer-like processing of information by the brain is only a part of a person's cognitive ability, necessary for arbitrary learning, necessary for scientific progress. But in everyday life, a person does not resort to it often, you can do without it in the same way as they do without a computer in everyday life. The evolutionary goal of species (spontaneous) knowledge is the preservation of the species as a whole through the preservation of each individual. Species knowledge protects us and future generations. Any spontaneous (specific) knowledge is formed involuntarily during the development of a child and is so commonplace for a person that we usually do not notice them. We are in many ways this deep knowledge. Violation of any species-specific characteristic leads to disability.

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