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ARTIFICIAL INTELLECT AND HUMAN NATURE

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Abstract. The article presents the main transformational processes of scientific understanding of the role and interaction of «artificial» and «natural» intellect. The aim of the work is to analyze and summarize the most promising results of modern scientific research in the context of supporting the priority of solving «intellectual» problems by «natural intellect» and the role of «artificial intellect». Attention is drawn to the specifics of the artificial intellect functioning, which is significantly limited by the fundamental incompleteness of semantic information and the absence of axiological information. The article is based on the data of scientific developments in the field of natural and historical sciences. The natural intellect is presented as a social phenomenon that arose from the interaction of individual cerebral structures, the optimal characteristics of which were formed as a result of previous evolution, and therefore these characteristics allow to understand and make any dominant decisions. The material summarized in the article allowed to formulate some conclusions. In particular, that an artificial non-biological structure cannot be «smarter» than a person – regardless of how quickly and according to what programmes it processes the information, since it does not have its own goals. But the artificial intellect is a powerful tool for society in its interaction with the outside world. A tool – but in no case an agent that determines its goals and objectives. The artificial intellect as an auxiliary means is and will be created in future by people to achieve the same goal that «natural» intellect serves – better possible satisfaction of the needs of society as a whole and the individual in particular.

Keywords: natural intellect, artificial systems, human brain, social consciousness, information processing, abstract process, non-biological structure.

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ШТУЧНИЙ ІНТЕЛЕКТ І ПРИРОДА ЛЮДИНИ

Анотація. У статті подано основні трансформаційні процеси наукового розуміння ролі і взаємодії «штучного» та «природного» інтелектів. Метою роботи є аналіз та узагальнення найперспективніших результатів сучасних наукових досліджень у контексті обґрунтува-

ння пріоритетності вирішення «інтелектуальних» завдань «природним інтелектом» та ролі «штучного інтелекту». Звертається увага на специфіку функціонування штучного інтелекту, яке суттєво обмежується принциповою неповнотою семантичної інформації та відсутністю інформації аксіологічної. Стаття ґрунтується на даних наукових розробок у галузі природничих та історичних наук. Природний інтелект представлений як явище суспільне, що виникло із взаємодії індивідуальних церебральних структур, оптимальні характеристики яких сформувалися в результаті попередньої еволюції, а тому дозволяють зрозуміти та прийняти будь-які домінантні рішення. Узагальнений у статті матеріал дозволив сформулювати деякі висновки. Зокрема, що штучна небіологічна структура не може бути «розумнішою» за людину – незалежно від того, з якою швидкістю та за якими програмами вона переробляє інформацію, оскільки не має власних цілей. Але штучний інтелект є для суспільства потужним інструментом у його взаємодії з навколишнім світом. Інструментом – але в жодному разі не агентом, що визначає його цілі та завдання. Штучний інтелект як допоміжний засіб створюється і буде створюватися надалі людьми задля досягнення тієї ж мети, якій служить і інтелект «природний» – повнішому задоволенню потреб суспільства взагалі і індивіда зокрема.

Ключові слова: природний інтелект, штучні системи, мозок людини, суспільна свідомість, переробка інформації, абстрактний процес, небіологічна структура.

Introduction. Currently, the prospects of the interaction of artificial intellect and humans have become one of the most popular areas of scientific research. The process of obtaining and using information by the «human brain» and «the thinking machine – robot» has become the subject not only of scientific developments, but this process is also the object of conspiracy judgments and the storyline of science-fiction works.

The purpose of the presented work is the analysis and generalization of the most promising results of modern scientific research in the context of the "artificial intellect" role and substantiation of the priority of solving "intellectual" problems by "natural intellect" and the role of "artificial intellect".

Historiographical analysis. The article analyzes the data of scientific developments in the field of philosophy, history, technology, natural science. In the works of Anohin P. [1], Vernadskij V. [29; 30], Viner N. [31], Gelvecij K. [11], Ilenkov E. [14], Kolmogorov A. [16], Lorenc K. [19], Fejerbah L. [10], Schrödinger E. [25], different (sometimes opposite) points of view on the prospects of the interaction of "systems of thinking" are traced. In the process of their comparative analysis, the controversy of some positions is characterized and the unconditional dominant of "natural intellect" and the auxiliary role of "artificial intellect" are tested, in an evidential context. In the conceptual range of the authors' accents there is the statement that solving practical problems, "natural intellect" encounters not only "true" and "false" but also "misconception". This is a natural consequence of the fundamental incompleteness of our knowledge, in particular relatively to the applicable general laws in the world. The natural intellect of society copes with this due to the wide autonomy of individual intellects and the use of axiological information. An artificial system fundamentally does not imply a value attitude to the world and, therefore, due to its "excessive logic" will always play a subordinate role.

The main material and the results. The most actively developing in computer sciences are researches in the field of *artificial intellect* (AI). This is the whole area that includes the solution of a wide variety of problems – from the game of chess to the "deserted" management of production processes and even artistic creativity. As a result, according to the definition of the "New Encyclopedia of Philosophy", various programs of "artificial intellect" research arose: 1) the creation of computers capable of performing functions traditionally attributed to the field of human intellectual activity; 2) the attempts to model human intellect itself on the basis of modeling the brain substrate; 3) the creation of artificial self-learning devices capable of evolution.

Despite the huge practical advances in this area, today there is no generally accepted definition of artificial intellect. Among the many known to us, the most common is the definition given back in 1956 by D. McCarthy at the conference at Dartmouth University: "the science and technique of creating intelligent machines, especially intelligent computer

programs", which clearly suffers from tautology. And in general, "from the analysis of the content of the "artificial intellect" term it follows that at present there is no unambiguous definition of the content of this concept" [7]. And many of the current definitions of artificial information are mostly descriptive. For example, in the resolution of the European Parliament, artificial intellect is defined as a smart-robot that has a certain set of features: it acquires autonomy due to sensors and / or by exchanging data; independently studies experience or interaction; has little physical support; adapts the model of behavior to the environment; it is inanimate in the biological sense [9].Quite often, it is generally assumed that "the essence and ideas about artificial intellect … the vision of the ways of its development, approaches to the study and functioning as a whole are constantly changing, transforming" [22].

For example, the Thesaurus of Artificial Intellect defines AI as "the feature of intelligent systems to perform creative functions that are traditionally considered to be the prerogative of a person". In a more or less generalized and expanded form, this kind of definition is as follows: "Artificial intellect is one of the areas of computer sciences, the purpose of which is to develop computer systems capable of performing functions traditionally considered to be intelligent – understanding language, logical conclusion, using accumulated knowledge, learning, actions planning, etc." Or, in other words, "the field of AI includes many tasks that are well solved by a person and poorly by a computer" [4, pp. 15, 22].

Such a formulation of the problem today often forces researchers in this field to focus on human intellect, so-called, the "natural" intellect (NI). In other words, for those who work in the field of artificial intellect the most important goal is to create tools to solve such problems that do not have a solution algorithm. After all, it is the solution of non-algorithmic problems that distinguishes a person from a certain autonomous calculator. For this purpose, AI specialists often try to borrow appropriate mechanisms from humans.

Such borrowings could be understood if there is a more or less acceptable definition of what "natural intellect" is. And without it, it turns out that AI specialists are looking for ways to cope with "insoluble" problems, while trying to somehow copy the elements and mechanisms of NI, without fully understanding what it is.

Turning to philosophers also does not bring practical results. The New Encyclopedia of Philosophy gives such definitions: intellect is "in general sense an ability to think"; and thinking is "the process of problem-solving, expressed in the transition from the conditions that set the problem to the obtaining of the result." We should point out that the "autonomous calculator" also achieves a result – if the algorithm of the solution is known, but if it is unknown, nothing happens. And the man succeeds. Why? And how? That's the question!

It turns out precisely because it is a *person*, not a computer. It would seem: what is the difference? Ultimately, in both cases, it's about *processing information*. Of course, the human brain where the thinking process is carried out, today is incomparably more complex than the most complex computer. But this is a purely quantitative difference. After all, the speed at which information is processed in computer systems is increasing very rapidly. Therefore, more recently, computer scientists believed that with the complication of a computer, it would sooner or later have both consciousness and the ability to think (however, no one dared to guess at what level of complexity this should happen). Over time, this kind of enthusiasm decreased, the euphoria had passed, and since the mid-1970s. researchers began to realize that science and philosophy do not see ways to create a machine analogue of natural intellect capable of reflexive activity.

But somewhere in the back of their minds, someone still hopes that with a computer technology development and using some very ingenious programs, the machine is going to think! Moreover, today in the mass media and sometimes in the scientific literature, the ideas are increasingly replicated, according to which a person will first be surpassed, and then completely replaced by individual (partial) creations of his hands, primarily AI systems. Their power will be incomparable not only with the capabilities of a single individual, but also with all people synergy. Or even more: a person will turn into an animal, become a slave to a machine that will be much smarter than him, losing the opportunity to love, create, experience, that is, will lose his spirituality in about 50 years.

But these are horror stories for the future. And today, on the contrary, AI developers often just try to copy certain features of the "natural" intellect. This area of research in relation to AI is now even considered a priority. In particular, there are many ways to use knowledge about natural intellect to develop and improve artificial intellect – from machine learning and neural networks to cognitive computing. With a better understanding of how the human brain processes and organizes information, the researchers hope to develop more perfect and sophisticated AI systems that more successfully replicate human intellect.

Definitely, aforementioned and many other techniques bring a certain benefit in the development of artificial intellect, in its ability to solve certain problems. But no matter how many such techniques are used, the machine will not begin to think. And not because it will not be able to catch up with the human brain in terms of its capabilities of information processing – sooner or later it will really happen. But the expected result is not going to happen. It will not be possible because the consciousness and thinking of a person, realized, of course, by processes in his brain, nevertheless, are not essentially a *direct* function of these processes. Therefore, "intellect cannot be explained or deduced directly from the properties of the brain" [17, p. 202]. Since in its essence *it has not an individual, but a social nature*. And in terms of goals it is connected not so much with the individual as with society as a system and it is intended *to serve* a certain *social organism* (superorganism) precisely as a kind of *integral* living system, and not only a *separate* individual (as is the case in the animal world) – an elementary "cell" of this whole [12, p. 51–60]. And certainly it is not aimed at some *abstract* process of solving "problems in general".

Thus, the first thing that should be taken into account regarding the use of "natural" intellect to improve the "artificial", this is the *purpose* for which, in the first place, they implement the processing of information. It is believed that there are phenomena that are inaccessible to artificial intelligence at the present stage of its development. In particular, it is motivation, since it is motivational aspirations that give quality to actions. And indeed, the aim for artificial intellect is set by a *person*. And for biological systems, the aim is set by the *nature itself*: it's their survival in the environment. This aim is similar to any living systems – from the amoeba to humanity. Although it is achieved in different ways. Everything depends on the interaction of the system – material education, finite in all respects, and the eternal – both in complexity, time and space – environment.

The intellect of society today is certainly the final outcome of the development of living systems. But from the very beginning of this development, each new organism had to solve the problem of survival over again. The emerging new organism has nowhere to take a sufficient amount of information for its vital activity, which determines the necessary reactions, except for the heritage (experience) of the predecessors. At the initial stage, this is the physiological reaction of a living matter, and then – *instinct* (a complex of unconditioned reflexes), which is the embodiment of the experience of the *species* accumulated through natural selection. But with the complication of the organism and the increase in the "price" of its life from the point of view of the species reproduction, the unconditioned reflexes are not enough to orient themselves in a rather complex environment with which the organism should interact. And here *conditioned reflexes* come into action, they are based on the same instinct, but taking into account the *individual* experience of this organism, which is facilitated by the development of its central nervous system. They do not deny the instinct as the basis of behavior, but depending on the complexity of the organism and its central nervous system, they supplement, clarify and specify it to a greater or lesser extent. And the more complex is the organism and its central nervous system, the greater is the proportion of conditioned reflexes compared to unconditioned ones. But all of this applies to each individual.

With the appearance of human society as a kind of *superorganism*, consisting of individual organisms with a very developed central nervous system, the situation changes significantly. And these changes are mainly determined by the fact that basically the vital activity of each individual is objectively aimed at the preservation and development of not only how much himself, but *the whole* to which he belongs – *society*. This means that neither the species experience of the individual himself as a representative of Homo sapiens, that

is, as a multicellular biological organism, nor the individually formed conditioned reflexes based on it would solve the problem set by biological evolution. It should be solved by the *collective* experience of a new whole – the society which forms conditioned reflexes that determine the behavior of the individual. They are formed on the basis, initially still representing an extremely limited number of unconditioned reflexes.

And every living system must solve this problem, as well as any material formation subjected to the action of the second law of thermodynamics, that is, the process of increasing *entropy* (in other words, the steady spontaneous disorganization of their structure and degradation of energy). But living systems have a special situation. The living remains alive only insofar as, unlike other material formations, it has the ability to *reduce its own entropy* – through its *removal* into the environment. Or, in the words of E. Schrödinger, due to the "negative entropy". Since a living organism remains alive only by constantly extracting negative entropy from the environment [25]. Any biological system can extract it only through *expedient* interaction with the very medium [15]. Whereas at the same time the environment additionally affects the system itself, often adversely disrupting its functioning, so in the interaction with it, the system pursues two interrelated but still quite different goals: *obtaining* negative entropy from the medium and *protection* against its adverse effects. And this is achievable not only due to the certain material capabilities of the system in interaction with the environment, but also if it has *information* about both the nature of the environment and the phenomena occurring in it itself. Only if such information is available and processed from *the point of view of the system needs*, i.e. its i*nformation* support, to successfully solve the problems of its survival and development is possible.

The need for preservation and development is decisive for any *biological* system, and it is expressed in its *will to life*, inherent in all living things which in fact "sets an aim" for all its functioning. But this applies only to living systems, and has nothing to do with artificial ones – precisely because they are *inanimate*. In vain, some pessimistic philosophers are afraid that the technosphere, led by its artificial intellect and artificial biosphere, will develop according to its technospheric-artificial laws and quickly find a way to eliminate the humanity or transfer it to the level of a slave animal existence (i.e., one of the components of the biological substrate for realizing the aims of artificial technical intellect). None of this, of course, is not going to happen, because the artificial intellect that controls all of this is *inanimate* and does not have, and cannot have its own aims.

The environment in which a biological system exists and functions is a set of certain *material objects* with which it interacts. Any interactions between the material formations, that make up the Universe, are expressed in certain material processes occurring between them. At the same time, different processes have different intensity, nature of flow and the radius of action. Those that can significantly affect its functioning, and therefore, in *themselves* require adequate behavior of this system ("strong" influences) are of the immediate value for the system. Those impacts that, by their *own* influence on the functioning of the response system, may not require and *in this sense* they are indifferent for the system ("weak" influences).

But such "weak" influences may also have important consequential significance for the system. After all, they, like the "strong" ones, stem from certain characteristics (and processes determined by them) of an external object and, therefore, even having a different nature, in some cases are correlated with each other in a certain way. For this particular system, the consequences of such third-party objects influence occur (or do not occur) in a certain sequence. If these influences are interconnected by some regularities, then if there is an opportunity to perceive and analyze them according to those phenomena that occur (or are detected by the system) earlier, but are "weak" influences for the system, it is possible to judge in advance about those "strong" influences that may occur later.

Consequently, for a system with the appropriate ability, it becomes fundamentally possible to anticipate those *important phenomena* that will come *for it* later than those that have already occurred. Thus, in fact, the system has the opportunity to judge the possibility of the appearance and nature of the "strong" ones by the "weak" influences that have already

occurred. And accordingly respond to them even before their onset, which significantly increases the effectiveness of the reaction. In this case, it can be said that the "weak" effects of the object used by the system for this purpose carry the "*information*" about this object for *this system*.

Since the fifties of the last century, when problems related to information began to be dealt with closely, the most careful attention has been paid to finding out what this phenomenon is essentially. Many of its definitions have appeared, quite significantly different from each other. However, with all the differences in the currently available ideas about the essence of information, it can still be stated that the existing views regarding its definition are quite reasonably reduced to the main approaches: *attributive* and *functional*. The proponents of the first one consider the information as *an objective feature* of all material objects, considering it *an integral attribute of matter*. The proponents of the second one refers the information only to the *functioning of self-organizing systems*, believing that the information is inseparably linked only with *the higher types of reflection*.

With the attributive approach, there is an unreasonable, although quite common, identification of the matter *organization* (which is really an attribute of the latter) and information that only *reflects* its organization [2]. And for the system, the information is not an independent characteristic of matter like mass or energy as it is often believed. It is inextricably linked with the vital activity of specific living systems and is immanent *exactly to them*. Thus, N. Viner considered that "the information is the designation of the content received from the external world in the process of our adaptation to it and our senses adaptation to it. The process of obtaining and using information is the process of our adaptation to the accidents of the external environment and our life in this environment" [31, p. 31]. Only the "consumer" (a self-organizing system) perceives the external signals as the information. Without the presence of a consumer (at least imaginary) there is no reason to talk about the information. And those who believe that the information exists on its own, repeat the mistakes of the XVIII century chemists, who believed in the presence of caloric – a special material of fire. And it was believed that the combustion process is the *release* of this material, whereas in reality the heat is a consequence of a chemical reaction between *two* substances and depends on *both* of them [27, p. 15]. Similarly, the information is not an *independent* phenomenon of nature, but the result of a special *interaction* of its objects.

It is a certain organization of the material carrier in accordance with the information received (perceived signals) that, due to the information already available in the system (*thesaurus*), represents *the information* used by the system. In other words, the external signals perceived by the system itself are nothing more than *physical* influences. They *do not form* the information, just their *interpretation* by the system provides the information. This means that the information as a phenomenon does not exist "by itself". Any *objectively* existing "information fields" are no more than the "philosophical fantasies" that lead to the actual identification of matter and consciousness [24, p.178–180; 28]. With the consistent development of representations about the substantial nature of the information, they inevitably come to the conclusion that in the Universe, from the moment of its birth, a rational-information mechanism arises – a kind of a living "brain", a special (cosmic) consciousness. That is, in fact, we are talking about the presence of consciousness (reasonableness) in the very foundation of existence, about the impossibility of explaining the presence of rationality in a person without recognizing the global rationality of the universe. At the same time, it is believed that the structure of universal consciousness, the global information field includes many components, in particular, the natural intellect of stars and planets. The Earth's intellect is also an integral part of it, connected with the information field of the Universe by many invisible threads. And even more so the consciousness of a human and an animal, artificial intellect systems are manifestations of a single universal consciousness (the information field of the Universe).

In fact, the organization of the information material carrier correlates with already *available* to the system in a certain way organized information about the environment in relation to the needs of this living system – the *thesaurus*. This information is in one way

or another "imprinted" in the structure of the system as a result of the experience of its interaction with the environment, in relation to the biological system – the experience of either a species or an individual. The obtaining, processing and use of information as the intellectual activity of the system is possible only on this basis. Accordingly, "from the position of the system approach, intellect (in the broad sense of the word) can be considered as one of the essential characteristics of a highly organized system, reflecting its ability to maintain a sufficient degree of adequacy of the structure, functions and aims of the system in its environment, their consistency, or otherwise, the ability to achieve the required degree of coordination of the system with the environment" [32, p. 144].

As for the natural intellect (NI) that implements this process, it is sometimes defined as a product of the Universe evolution, where a human stands out as the only carrier of it at the present time. In this regard, NI is universal, in a sense it is a special knowledge part of reality, capable of complementing and expressing physical reality. AI is a distinct local phenomenon that supposes the involvement of physical components to implement it. But such an approach assumes an acceptable attitude to knowledge as a substance. It suggests the attitude to knowledge (information) as objective not only in its content, but also in *material implementation* as such. That is, as an objective phenomenon and in this respect, which, as it was noted, seems fundamentally wrong. The information is inherently *subjective* – in the sense that any *reflection of reality* by a self-organizing system is subjective. It takes place only *in relation to a self-organizing system* (as a means of this self-organization in accordance with the objectives of the system functioning); in the rest of the nature such a phenomenon (in contrast to the *organization* of matter, the *reflection* of which for the *system* in a certain sense is the information) does not exist. And as for the social natural intellect (mind), all the information (including that processed by artificial systems) is a *product of society*.

So, we repeat that, in fact, the information is a *subjective* phenomenon (and even *pragmatic*), aimed at the reflecting *objective* processes in the environment. It is subjective, because it is peculiar only to *living* systems. And it is pragmatic, because it is aimed on the *survival* of these systems. As noted, in order to ensure their existence in the environment, the living systems had to somehow react to the processes occurring in it that affect its existence and development, from the very appearance. The survival of the organism depended on the correct response to various influences, so natural selection gradually developed the certain means to *analyze* the indicated effects and adequately *respond* to them. And this means that the certain material factors became the particular *signals for the system* from the external environment, the processing of which by this living system (organism) as the information led it to an appropriate reaction.

This happened due to the transformation of these signals by a living system (taking into account species experience) into pragmatic *information*, the internal processing of which formed a response that contributes to the survival and development of the system. For more successful information processing, the natural selection led to the formation of special structures, and then subsystems of organisms intended for this purpose, which eventually turned into a *central nervous system* led by the *brain*. Today, a similar function is performed for society as a living organism by its procreation, which was made by the society for the formal processing of information – an *artificial intellect*, with the corresponding difference that its pragmatic orientation is determined not by *it* as a certain material (but not living) structure, but by *those who created it*. This is a kind of a *tool*, something of a "continuation" of the brain, just as a hand axe is a "continuation" of the hand. They just expand their capabilities.

And the expansion of the assessing the environment possibilities by living systems is carried out both by increasing the opportunities in *obtaining* the information and by expanding of its *processing* possibilities, which is one of the most important directions of the evolutionary development of any biological system. From the point of view of the latter, the information it receives on the basis of signals from the environment, in particular, with the emergence and development of the central nervous system, is clearly divided for *the given system* into two types.

The part of the information makes it possible to establish a tough, strictly defined and unambiguously determined for *the system of a given complexity* the connection between the characteristics of an object or phenomenon and the surrounding world in general, and the given system in particular, and to determine, ultimately, an unambiguous line of behavior of the latter corresponding to the situation. These can be automatic reactions of the simplest organisms to irritations ("stimulus – reaction"); the complex actions of insects in response to the received signals due to the tough programme of instinct; the reaction of higher animals, formed by a conditioned reflex way; and, finally, a detailed diverse reaction of a human on the basis of the information conscious processing with the help of the apparatus of formal-logical thinking. This piece of general information can be defined as *semantic information*.

But the number of signals received by the system, if appropriately interpreted could become for this system the same information about the outside world, is enormous and significantly exceeds its ability to process it. This is a much larger part of the information, since the degree of complexity and the programme of the system do not allow to unambiguously establish the patterns reflected by this information, to accurately determine its value for the system, it can not be used accordingly for the same purpose. And the volume of the available thesaurus does not provide an unambiguous transformation of external signals into *reliable* information for the system. In the animal world, at the lower stages of development, quantitative compensation mechanisms play a role here. At higher levels, the special programs for processing such information were developed on the basis of probabilistic-statistical regularities. As for a human, this part of the information also cannot be used for processing through rational-logical (formal) thinking, as the semantic information, which limits in a certain way the role and importance of the apparatus of formal thinking in a human, that AI systems actually try to reproduce. But this is by no means the most important thing in the process of human thinking. In the middle of the twentieth century, the opinion emerges that "in the developed consciousness of a modern human, the apparatus of formal thinking does not occupy a central position. It is rather a kind of a "supporting computing device", launched as needed" [16, p. 26]. Consequently, the value of this part of the information for the system is also not established with the help of a formal-logical apparatus, but has a *probabilistic-statistical* character.

Both as in higher animals so in humans, the statistically processed (once again we emphasize – with *a pragmatic orientation*) information does not allow to unambiguously determine the reactions of the system, since automatic actions in this case would inevitably lead to errors. Since, firstly, the rational-logical assessment of the statistical information due to its abundance and diversity is difficult, and secondly, due to fluctuations it is not universal, and relying on it, the system cannot develop a tough deterministic line of behavior. Therefore, probabilistic-statistical information cannot serve as a basis for a clearly defined sequence of actions, but only for a generalized (intuitive) determination in general terms of the *value* of a situation or phenomenon for *the given system* from the point of view of its preservation and development, including distracting from the specific nature of this value. And if the semantic information allows to determine a *specific programme of action*, the considered information is used to develop *an emotional stimulus* to action, "indicating" the general direction of action and serving as a motivation for it. This kind of information could be defined as *axiological*.

The emotional reaction, based on the processing of axiological information, is an important compensation mechanism for the probabilistic-statistical effects of the environment for a highly organized animal; it also occupies an extremely important place in human life. "Emotion," said I. P. Pavlov, "is what guides your activity, your life is an emotion" [21, p. 140]. Including a mental activity, for the mind remains inactive until the passions set it in motion [11, p. 264]. Moreover, in terms of the variety and depth of emotions, a human exceeds the most highly organized animal by orders of magnitude. A special role in the life of a human is played, if we may say so, by "social" emotions associated with the fact that he is a social being – *an aesthetic attitude to reality*, through which a person *evaluates* phenomena from the point of view of their *social significance*.

Of course, there are attempts to realize some human qualities in artificial systems. In particular, there is an increasingly relevant problem of the development of technologies for the "humanization" of artificial intellect, providing modern autonomous robots with the ability to identify, imitate and expediently respond to human emotions [20]. More and more technological tools are being developed to ensure the ability of computer systems to analyze human emotions [23]. Such artificial intellect is even called emotional, because it can recognize human emotions, and respond to them accordingly. But not emotionally, because it itself, due to the lack of his own motivation, emotions are not available basically. However, today " the researchers believe that the main functions of emotional robots are as such: the ability to recognize the emotions of a person-interlocutor, interpret them, and also appropriately express their own synthetic (?) emotions" [6]. But there are no latter, not even synthetic ones. Therefore, as a consolation, they argue that although, conscience is an essential difference between human intellect and artificial intellect, the intellect itself can be neither ethical nor immoral [26]. The intellect can't, but what actually can?

It is impossible to understand what is the "natural intellect" without taking into account these points. But no less important in this context is the above-mentioned not individual, but *social* nature of thinking. Despite the fact that the "brick" of the living is considered to be a species, the last *irreducible* whole in relation to the environment is a *biological organism*, which is a direct subject of functioning and development. Currently, the living is represented by a huge number of various organisms that are at different stages of its evolution. But in qualitative terms, there are three clearly distinguished stages: 1) an organism-cell, 2) a multicellular organism consisting of plenty of cells, and 3) a collective organism consisting of many multicellular organisms (superorganism).

In all these cases, there is a certain *cohesion* of the elements that make up the organism as *a whole*, exactly this integrity opposes the environment. But if in the first two of them the cohesion has primarily a structural (morphological) character, then in the latter it is provided mainly functionally. And since the behavior of an organism with a central nervous system is determined by the program "recorded" in it, so it precisely provides this cohesion of the superorganism, in relation to the environment functioning in it as *a whole*. An example can be the so-called "social insects", in which each such "collective" organism consists of many individuals that perform different functions and often differ morphologically (polyethism). Apparently, the first who imagined a colony of ants as a single organism, in which each individual is no longer an independent unit in relation to the external environment, was the American entomologist W. M. Wheeler (1911). In the future, the wide recognition received the point of view that the family of social insects is an organism. It is laid, grows, matures and reproduces. It is as isolated and as well regulated as any other living system [5].

But we have fundamentally the same situation – having, however, very significant differences – in relation to human society. And the main difference is the incomparably higher development of the human central nervous system. It still ensures the preservation of the functional cohesion of the superorganism by its programme, but thanks to this development, it makes excessive the morphological diversity of its included individuals (this occurs in animal superorganisms), replacing it with a functional variety. At the same time, this program is inherited not as the certain structures of the central nervous system, but it is formed "in lifetime" according to the stage of social development as a result of the individual mastering of *culture* which is created by society in the process of its development.

In this case the changes in each individual brain due to the perception of even the same objects, "whatever they may be, are created on the basis of a unique neural structure that already exists, and each of which has evolved throughout your life, filled with unique experiences … Each of us is truly unique – not only in our genetic code, but even what changes occur over time with our brains… because the process of change is different for each individual brain". The information is not stored in the brain as in a computer in the form of some separate "files", the contents of which can be deciphered "from the outside"; it *changes the structure of the entire brain*. Having received the new information, the brain does not "add" it in the form of a certain part to the one already existing in it, but *the whole* passes

into a new information state. The information received has entered the general thesaurus, and it can no longer be removed (that is, deleted as a file from the computer's memory), returning the brain to a previous state. This is one of the most important structural-functional differences between the artificial (computer) intellect and the naturally functioning brain. As a result, we have "the uniqueness of each brain, created in part due to the uniqueness of each person's life path" [8]. And the brain itself as a "computing device" at the same time is in no way similar to a computer – a standard "von Neumann machine" with the separation of the operating system, processor and memory. The concept of "mind" is associated specifically with such a brain, which makes a human the "higher order" being.

But the fact, that the mind is the "highest value", is our subjective assessment. For nature, this is only a tool for achieving the aim of life at a certain (social) level of its development. As mentioned, the individual information process in the human brain in the form of the mind has a *social* character and is peculiar to the individual *only* as an integral part of society. And in general, the information processes in a biological system are not an end in themselves, but a means for its preservation and development. Objectively, they are valuable precisely in relation to the preservation of the *coherence* and development of the certain biological system, which is externally expressed in its needs. Such coherence is both a human *society* as a superorganism in general, and a human as an *individual*, as a *relatively* independent multicellular organism in particular.

Artificial systems created by the society and included by it in the process of *their* functioning in order to contribute to the achievement of the same (in relation to them *externally* set by the society) aim, *on their own*, do not need such coherence as the aims of their functioning. And not only because of the presence of an *external aim already set* by the society, but also because the problem of coherence (in the biological sense) is not paramount for them. The artificiality of such systems in principle implies the possibility of regeneration of their any individual subsystems (which in a certain sense also applies to the controlling subsystem) without loss of the quality. This external "replacement" in the "natural" biological systems is very limited due to their, as biologists sometimes express it, "limitless heterogeneity" – again in contrast to the fundamental homogeneity of artificial systems. This cannot but create in the functioning of the "artificial" intellect rather significant differences from the "natural" one.

In the brain of each human, as well as any animal, taking into account the already existing thesaurus and the external signals received by the receptors, the information about the environment is formed on the basis of individual internal codes, and this information is subject to the *appropriate* processing with further signals to the effectors for the external reaction. But in an animal, the process is limited by this. The animal as a separate organism is a holistic formation in relation to the environment, and it primarily interacts specifically with this environment. The other animals of even this species also primarily represent the elements of the environment for it. Accordingly, it has nothing to "say" to another animal, and there is no need for it. Therefore, according to the famous ethologist K. Lorenz, animals do not possess language in the true sense of this word. All sounds and body movements of the animals express only their emotional state and do not depend on whether there is a creature of the same species nearby [19].

For a human who is an *element* of the society as a whole, the situation is completely different. The part of the information "circulating" in his central nervous system is additionally transcoded according to some "external" codes formed in the individual on the basis of his life experience and having a *universally significant* character for a certain community. This allows him to embody the information available in his mind in an ideal form into a certain system of "external" *material* carriers of it – *signs* that creates the possibility of its perception in this capacity by *another* individual. "A person cannot convey to another person the ideal as such … The ideal as a form of subjective activity is assimilated only through the vigovous activity with the object and product of this activity, that is, through the form of its product, through the objective form of the thing, through its active disobjectification"

[14, p. 205]. This is why the human intellect cannot be explained or removed directly from the properties of the brain.

All this provides a *connection* between the individual mental structures, including the information mental process of the individual in *a single information process*, forming a kind of "neural network" of the society (with a specific "social thesaurus" – *culture*). With the introduction of the universally significant "external" codes (regardless of their expression form), the human brain, remaining an individual organ, becomes *a social organ*. Even the individual mental processing of the information from the *individual* (for each person) turns into *social* (for a coherent social superorganism). All this happens primarily on the basis of a natural language; but gradually a number of specialized sign systems are emerging. However, it is not about the way the exteriorization of information is carried out, i. e. its introduction into the *social* information process (through the effectors) by means of "external" information channels, but in this fact itself. *This is what formally distinguishes a human from an animal*. As a result, at the superorganismic level, a *social consciousness* appears, and at the individual (as its particular being) such specifically human phenomena as *thinking* and *consciousness* arise.

In the interaction of any biological system with the environment, the vital importance for the system has only the part of the latter that is actually or potentially in the material connection with it. Accordingly, the processing of the information about the environment is limited only to these connections: everything else is "not interesting" for the system, firstly, because it "does not concern" the system, and secondly, it is inaccessible for the processing, since it exceeds the "analytical" capabilities of the system (due to its limited complexity). As a consequence, "the animal "sees" just what is directly related to its physiologically innate need, to the organic need of its body. His 'gaze' is controlled only by the physiologically inherent need of its species" [10, p. 34]. Therefore, "the animal is indifferent to the stars", said L. Fejerbah.

However, this limitation does not apply to society as a biological system, which is a *superorganism* – an organism consisting of the elements that form a whole through *functional* connections, and in *morphological* terms they are separate organisms themselves with a relatively independent localization. That is why for each individual as a *separate organism*, the situation is practically no different from any other animal organism. But as for *the element of society*, it differs dramatically. The processing and transformation into internal system information of knowledge about the processes in the environment in this respect is also carried out by him in the interests of the *entire social organism*, the environment for which (because of the functional nature of the connections, and consequently, the possibility of significant dispersion in space and in time by localization) is significantly different from the "personal" environment of the individual. And therefore, as such, his interests cannot even be practically limited to the immediate environment and basically are not limited by anything.

As for the possibilities of information processing, they are significantly (potentially almost unlimited) expanded due to the inclusion of the individual brain in the above-mentioned mental "neural network" of the developing society, that is, at expense of the functioning of *social consciousness*. In view of the "duality" of human nature, the human consciousness also has a dual character. The consciousness in its *particular* manifestation is possessed by a separate individual. But consciousness is not a property of the individual inherent in him from birth. Only the *ability* to form consciousness, which is carried out as an individual being of social consciousness, is inherent in the human.

Society is undoubtedly the original reason for the consciousness appearance. However, such a position, which is true in general terms, gives as little for understanding the *essence* of consciousness as the representation (in general form also true) of its function of a developed brain. Only *the interaction of two coherences* – a human as a biological being and society as a superorganism, "cross-cutting" on *one common object – the individual* – causes the need for consciousness. The fact is that the individual, as we have already noted, on the one hand, is a coherent system in *himself*, an organism that has its own highly developed adaptive mechanisms, and on the other hand, is an *element* of another coherence (society),

which, in order to maintain its coherence as an organism, must also have appropriate adaptive mechanisms, but *does not have* a special separate organ for their formation, and therefore "uses" for this purpose *the same thing* – the brain of each human. And therefore, a human *in one brain simultaneously has two multidirectional adaptive systems* – the individual, aimed at the preservation and development of a multicellular organism (each separate person), and the social, aimed at the preservation and development of the "superorganism" (an element of which is this human) – society.

In humans, this is manifested by the ability of *rational-logical thinking*, called *mind*. In other words, the mind is a cognitive "mechanism" for processing (consciously or not) information *in accordance with the objective laws of logic*, since only in this form can they be adequately perceived also by *another* human. In accordance with them, the mind carries out synthesis (generalization), the transition from the particular to the general, the subordination of particular phenomena to the general principle. The transition to the abstraction level is carried out, which allows, on the basis of the selection of many elements having the same type of characteristic (i.e., the general totality) and the choice of the unit of analysis, to study the arrays (systems) of these elements, ensuring the suitability of the analysis results, as obtained by a *generally significant* algorithm, for *another* individual. The process of forming a judgment or making a decision applicable to a certain *class* of objects or phenomena is based on it. This, in turn, allows to have a judgment about a *particular case* a priori if there is a generalized information.

We again pay attention to the fact that rational-logical thinking itself does not lead to action, but only prepares its programme. And the action is performed on *the influence of emotions*, which are directly related to the *preservation and development* of the coherence that they represent, which also impact on the very rational-logical solutions of the problems that arise in this case. To illustrate this, we consider the problem of "thinking machines" – the robots, which are quite often the storylines of science-fiction works.

The problem was most clearly, apparently, presented in the famous work of Isaac Azimov "I, robot" [3] with its no less famous "three laws of robotic technology". And this problem arises *only* due to the predetermined in advance anthropomorphism of the alleged robots, for which this creates the possibility of comparing them with a human and by functions. But the fact is that such robots, about which Azimov wrote, never existed, do not exist now and will never exist. And those that seem to be there are no more than toys, the capabilities of which will never be comparable to the capabilities of a human. This is unfeasible, but, above all, no one needs it.

The main thing here is that a human, being an element of society, represents himself a coherent and structurally unified biological formation. All his structural-functional components-subsystems – from those intended for locomotion to the controlling central nervous system – are structurally combined in *a single coherence*, having a functional relationship and harmonious combination with each other and common life-supporting subsystems. Serious disturbances in any of these subsystems lead to the death of the whole organism. At the same time, the "spare parts" are not provided by nature. Therefore, the actions of the individual are largely *directed by the desire to preserve this coherence*, which also determines the specifics of the controlling central nervous system functioning.

An artificial device that simulates this functioning in a certain way is also, to some extent, represents a unity of constituent parts and elements, the interaction of which allows the coherence to perform certain functions. But the compliance of these requirements is not at all compulsory for it. Firstly, the purpose of the functioning of such a device is not *internal*, but is set *externally* when it is created. Secondly, the replacement of the failed parts and elements does not cause fundamental difficulties. But, equally importantly, the control subsystem does not necessarily have to be *spatially* combined with the executive subsystem. It may constitute a disproportionately large part of the overall device and control sensors and actuating mechanisms remotely, being in all cases reliably protected, still having the required number of such mechanisms of various types and different localizations, also interacting if necessary, including *by means of control subsystem*. And the need to preserve each of them

is determined not by the necessity to maintain the coherence of the *entire* system, but only by technical and economic feasibility, that is, it does not significantly affect the nature of the functioning of the control subsystem as a whole.

The external aim and the unity of any number control of executive mechanisms that do not have (or have limited) own aims do not lead to those *internal contradictions* that occur in the coherent components (individuals) of a higher order whole (society), resolved by the appearance of consciousness. The exclusion, as a rule, of direct exposure to the actions of the probabilistic-statistical environment also eliminates the need for the control subsystem in emotions, there is no independent from the *externally given* aim *stimulus* to action. In other words, an artificial system does not simply need the constitutes of *the most essential points* of "natural intellect". But this very circumstance also limits its functional opportunities.

Thus, the functioning of artificial intellect is significantly limited by the fundamental incompleteness of semantic information and the absence of axiological information. Without having its *own* requirements that "interfere" in the solution of the "intellectual" tasks, the artificial intellect is based on "too correct", black-and-white logic – "true-false". But in real activity, such logic is not fully applicable. For the natural intellect in the process of solving *practical* (as also a large extent of scientific) problems deals not only with the true and the false, but also with *delusions* – that being false under certain conditions performs the role of the true. The delusions are not errors in logical constructions, but a natural consequence of the *fundamental incompleteness* of our knowledge – both those that specifically relate to their practical side and the general current laws in the world.

And then it is not so rare that the fact turns out to be wrong when from the formal logic point of view it is completely correct. And sometimes vice versa. But society as a whole, and each individual personally, are forced, nevertheless, to solve vital tasks even if there are delusions. And if they were directed solely by the "correct" logic, many problems would be fundamentally unsolvable. But both individuals and society persistently do not want to recognize the result obtained on the basis of formal-logical thinking in a number of cases. Some individuals *pay for* it with their destinies, and the society with failures. This is quite often a natural consequence of such "persistence". However, in other cases, they are ultimately right, and the society as a result takes another step in its development.

As mentioned above, the artificial system fundamentally does not imply a *value-oriented* attitude to the world. And it, as we tried to show, is extremely important in the functioning of "natural intellect". In fact, *not a single* rather complex and important task that actually arises before people (except for artificially formalized ones) is solved in a completely "reasonable" way, that is, purely on the basis of formal logic, if only because, it is infinitely complex *in its entirety* due to its practical reality, and the vast majority of information, as a rule, is inaccessible. When a problem is solved in a rational-logical (scientific) way, as a result, we receive an answer containing both truth and delusions. Further scientific research will iteratively eliminate the delusions, increasingly approaching the "absolute truth" without ever reaching it. And yet, our brains encourage us to take the action aimed at achieving final results, because "the moment our brain carries out the very beginning of the action, it is already charged with waiting for results … the action that has not been implemented yet captures the brain, adjusts it to expect the upcoming results and subsequently valuate these results" [1].

Our true knowledge of the external world (as well as of ourselves) has always covered only a small part of the object essence. As V. I. Vernadskiy correctly noted, "the unchanging scientific truth is the distant ideal to which science aspires and on which its workers are constantly running. Only some, still very small, parts of the scientific worldview are incontrovertibly proven or fully correspond to formal reality at this time and are scientific truths" [29]. Scientists, through their activities, more or less successfully strive to eliminate the delusions, but inevitably go into the new ones. That is, the information at our disposal that guides us has never been true *in its entirety*. And, nevertheless, the society lives and develops in this informationally far from mastered environment – and all this is due to the nature of the processing of the available information by its "natural intellect". Despite the

fact that the most part of the world explanations were incomplete and even incorrect, we were somehow satisfied with them. L. Leonov has a wonderful phrase: "At all times, there was enough available information to explain everything in the world." And in general, the actions based on them, due to the nature of the public consciousness functioning, really led mainly to positive results. But if the processing of the available information was carried out by some "artificial intellect" with its "iron logic" even at the highest level, then the humanity, entangled in the delusions, would probably have disappeared from the face of the Earth long ago. It also lives and develops exactly because of its "illogicality" – despite the importance of logic.

The scientific thought has overcome and is overcoming this incompleteness of knowledge, gradually approaching the truth. But in constant practical activity, such an approach cannot suit the society, because, due to the delusions, it does not lead to a result usable for practical application. And that is what we need, and one way or another we get it. However, here additionally the laws not related to rational-logical (semantic) information, but to axiological information, take effect. And the latter is organically related to the needs of a person, subjectively reflecting the objective needs of both the society and the individual. In particular, the solution of problems includes the aesthetic attitude of a person to reality in addition to logic, the purpose of which is not truth, but *the value* (that is, the compliance with the needs of the society). But without a subjective component related to the needs of a particular system, the value-based judgment is basically impossible. With regard to the artificial intellect, it makes no sense to talk about needs, and, consequently, about values, because it does not have its own purpose and the material carrier of it does not have its own coherence in relation to the external environment.

In other words, the vital tasks of the society are successfully solved due to its special organization as a system. Such a system is sometimes called chaordic, because it seems to combine chaotic and orderliness – as two sides of one coin. Its positive qualities are caused by the fact that with a high level of orderliness and organization as a whole, there is an autonomy, a certain freedom and flexibility of its constituent parts, which effectively prevents the disintegration of the system as a coherent formation. The adaptation of both the individual and the society to any environment in the biosphere is provided thanks to the capabilities of the human brain, which, "conditioned genotypically, enhances phenotypic adaptability" [18, p. 123]. Therefore, during a social evolution, the individual did not undergo compulsory morphological changes in biological evolutionary processes. At the expense of the relevant organization, the society took them upon itself. With its structural changes, only a *social consciousness* (culture) changed, and accordingly an *individual consciousness*: "the whole history of "homo" was the history of culture, which eventually replaced the history of biological evolution" [13, p. 22].

Finally, we will touch upon another issue concerning the problems of "extraterrestrial intelligence" and our possible relationship with it. When it is said of a hypothetical multiplicity of the worlds, inhabited by intelligent beings, it is taken for granted that such beings may most likely be smarter than we are. And why smarter? That is why, they have passed a longer way of development. Yes, a longer historical way will inevitably increase the amount of knowledge, as today's human knows incomparably more than his distant ancestor. But does that mean that he is smarter? By no means – just because over the past 35–40 thousand years, a human has not changed biologically, including his "organ of thinking" – the cerebral apparatus. And if it increased and became more complicated, would a person become smarter? He wouldn't.

First of all, the mind is determined by logic, and logic, as we have noted, is not a function of the individual brains, but of their interactions. Only it develops the logical criteria of thinking. Of course, the development of the individual "thinking apparatus" is important, because these processes are possible only at some level. But, secondly, the development of a specific structure is a consequence of "exercises in thinking", and as for quantitative characteristics, the Neanderthal brain exceeded the mass of the Cro-Magnon brain, and nevertheless the latter "won the survival competition". And the dolphin's brain is more massive than the human brain, which doesn't make it smarter. Thirdly, the brain is the most

important organ of survival, but it consumes a disproportionate amount of resources. This is a general law of life – the higher the level of organization, the greater the specific energy consumption. The human brain, which makes up only 3 % of the body mass, accounts for from 10 to 25 % of total energy consumption, so some "big-headed creatures" would not have evolutionary advantages.

Apparently, the human brain as a result of the previous evolution was objectively formed *optimal* in its characteristics. *In interaction with others*, it is able to understand everything without exception. In other words, as Vernadskij said, "the evolutionary process is inherent only in living matter" [30]. No biological (and we cannot even imagine others yet) creatures, whatever they turn out to be, can be smarter than a human. Nor can an artificial non-biological structure be "smarter" than a human – no matter how fast it processes the information: it is basically impossible to resist against "objective" logic. In general, the concrete realization of opportunities is determined by education and training. There is a case when a French ethnographer adopted a two-year-old girl lost in the Amazon jungle from a local "wild" tribe that was running away from the strangers. The girl grew up and successfully continued the professional activities of her stepfather. This completely refutes the "inferiority complex" in comparison with other possible civilizations. No matter how much more information they possess, no matter how far they have advanced in their scientific and technological development, this advantage can only be situational.

Conclusion. Consequently, the natural intellect, based on the capabilities of the human brain to process information, is not a direct consequence of its functioning. It is a result of the *social nature of information processing* by the totality of the cerebral structures of the individuals who make up the society. To do this, they are combined into a certain, universal "neural network" through special material agents – signs. This structure is based on a universal thesaurus – culture, in the process of its functioning.

Regarding the artificial intellect, we state that it is now and will be in future for the society a powerful tool for interacting with the surrounding world. *A tool – but in no case an agent that determines its aims and objectives*. The artificial intellect as an assistive mean is created, and will be created in the future by people to achieve *the same aim* that "natural" intellect serves – to meet the needs of the society in general, and the individual in particular.

In such a format, in our opinion, it should be thought over how (and for what) the features of the "natural intellect" will be embodied in the artificial intellect. Not being professionals in this field, we do not consider it possible to give any recommendations to the specialists. But, nevertheless, we hope that the above observations about the human nature (and his "natural" intellect) will touch up on new thoughts about the techniques and methods of implementing more effective approaches to the development. of what is called now the *artificial intellect*, someone who works in the field of computer science.

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