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Theoretical and Practical Thinking in Social Development

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Abstract. In order to control person's actions in relation to natural objects by means of thinking, he developed the most powerful cerebral apparatus among living beings. But it also became the basis for an incomparably more powerful informational phenomenon – social consciousness, which runs (through individual consciousnesses) the activity of society as a whole. It is carried out by means of individual cerebral structures interconnected by material sign systems. Therefore, the single process of thinking of each person includes two different components: thinking on the basis of ideal images of objects of the surrounding world (practical thinking), and on the basis of abstract signs denoting them (theoretical thinking). Practical thinking directly runs the practical activity of the individual to create consumer goods necessary for society from natural objects, while theoretical thinking is aimed at understanding the essence of the objects of this activity and, respectively, the development of its specific goals and tasks. Accordingly, society has formed two operational subsystems for communication with the environment: material (material and energy), which includes individuals who make up society in

their productive function together with supporting material devices – tools of production (technosphere) and informational – the same individuals, but in the cognitive and controlling functions (noosphere). The interaction of the operational subsystems of society ensured its existence in the form of an egalitarian primitive tribe for about twenty thousand years. But the development of the noosphere gradually led to the fact that the theoretical thinking of each individual could no longer fully master all its achievements in cognition and the technosphere could no longer fully master the developing means of production. And then a new social phenomenon arose – the division of labor, which led to its specialization first between individuals and then between their groups, the connections between which determined the relations of production. So, it made the social structure of society dependent on the achievements of both theoretical and practical thinking. As a result of the development of productive forces, more and more production functions previously performed by man were transferred to technical systems, changing the nature of labor and, reciprocally, the social structure of society. And, finally, nowadays, there have appeared and are developing technical systems which take on more and more functions no longer in the material implementation of the production process, but in their management (artificial intelligence systems). As a result, there is gradually no need to apply practical thinking in production processes, and consequently in the division of labor. And this means that social groups with different interests are also disappearing, and society in the future will again acquire egalitarian unity, but on the scale of all mankind.

Keywords: Society as an organism, social consciousness, noosphere, technosphere, division of labor, productive forces, social structure, scientific and technological progress, artificial intelligence

ТЕОРЕТИЧНЕ ТА ПРАКТИЧНЕ МИСЛЕННЯ У СОЦІАЛЬНОМУ РОЗВИТКУ

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Анотація. Щоб керувати діями людини по відношенню до природних об'єктів за допомогою мислення, вона розвинула найпотужніший серед живих істот мозковий апарат. Однак останній також став основою для незрівнянно потужнішого інформаційного феномену – суспільної свідомості, яка керує (через індивідуальну свідомість) діяльністю суспільства в цілому. Цей процес здійснюється за допомогою окремих церебральних структур, пов'язаних між собою матеріальними знаковими системами. Тому єдиний процес мислення кожної людини включає дві різні складові: мислення на основі ідеальних образів предметів навколишнього світу (практичне мислення) і на основі абстрактних знаків, що їх позначають (теоретичне мислення). Практичне мислення безпосередньо керує конкретною діяльністю особистості по створенню з природних об'єктів необхідних суспільству предметів споживання, а теоретичне спрямоване на розуміння сутності предметів цієї діяльності і, відповідно, розробку її конкретних цілей та завдань. Відповідно суспільство сформувало дві оперативні підсистеми зв’язку з навколишнім середовищем: матеріальну (речовинно-енергетичну), що включає індивідів, які складають суспільство у своїй виробничій функції разом із допоміжними матеріальними засобами – знаряддями виробництва (техносфера), та інформаційну – тих самих індивідів, але в когнітивній та керуючій функціях (ноосфера). Взаємодія операційних підсистем суспільства забезпечила його існування у формі егалітарного первісного племені протягом приблизно двадцяти тисяч років.

Але розвиток ноосфери поступово привів до того, що теоретичне мислення кожного індивіда вже не могло повністю оволодіти всіма її досягненнями в пізнанні, а практичне мислення не могла повністю оволодіти засобами виробництва, що розвиваються. І тоді виникло нове суспільне явище – поділ праці, що призвело до її спеціалізації спочатку між індивідами, а потім між їхніми групами, зв'язки між якими визначали виробничі відносини. Ця обставина поставила соціальну структуру суспільства в залежність від досягнень як теоретичної, так і практичної думки. У результаті розвитку продуктивних сил все більше виробничих функцій, які раніше виконувала людина, передавалися технічним системам, змінюючи характер праці і, відповідно, соціальну структуру суспільства. І, нарешті, в наш час з'явилися і розвиваються технічні системи, які беруть на себе все більше функцій вже не лише в матеріальній реалізації виробничого процесу, а й в управлінні ним (системи штучного інтелекту). У результаті поступово відпадає необхідність безпосередньо застосовувати практичне мислення у виробничих процесах, а отже, і в розподілі праці. А це означає, що зникають і соціальні групи з різними інтересами, і суспільство в майбутньому знову набуде егалітарної єдності, але вже в масштабі всього людства.

Ключові слова: Суспільство як організм, суспільна свідомість, ноосфера, техносфера, розподіл праці, продуктивні сили, соціальна структура, науково-технічний прогрес, штучний інтелект

Introduction. Our time is characterized by a sharp acceleration of social processes in the world which causes increased interest in their driving forces. It is rightly believed that the main engine of social processes is scientific and technological progress. The latter, on the one hand, depends on the increase in the volume of scientific knowledge achieved, the emergence of new scientific directions, the development of research methods and the expansion of their experimental base,

which deepens our understanding of natural and social processes. On the other hand, the practical use of scientific achievements in industry and other areas of social life plays an extremely important role, creating new opportunities for social development. At the same time, there are sometimes tendencies to use scientific and technological achievements not for the benefit but to the detriment of humanity, which causes ever-growing public concern.

But both positive and negative trends in social development are generated by the activity of people guided by human *mind*. Thanks to it, according to academician V.I. Vernadskij, "mankind, taken as a whole, becomes a powerful geological force. And before him, before his thought and work, the question of *the restructuring of the biosphere in the interests of free-thinking mankind as a whole* arises" [1, p. 30]; "the scientific thought of mankind ... in the course of its manifestation it eventually turns it into the noosphere" [2], that is, the sphere of mind which determines and ensures all processes in the nature of the Earth – the biosphere. However, today noospheric research is mainly associated with some abstract mind, while the latter actually has a completely material embodiment that determines its real functioning.

Purpose and subject of research. At present, a large number of both scientific and journalistic works are devoted to issues related to this problem. However, their authors, paying tribute to the social consequences of the public and natural processes taking place today, generated by *human thinking*, practically do not pay due attention to the features of the latter in connection with the social functions it performs. And today, these issues are even more relevant due to the intensive development and expansion of the practical application of what is commonly called "artificial intelligence". This work is devoted to these issues, the purpose of which is to study the features of human thinking in connection with his social functions, and the subject is the structure and nature of cognitive processes that ensure the implementation of these functions.

Research methods. Methodologically, this study is based on two main preconditions. First: the functioning of any biological organism in the environment is determined by its interaction with it in order to bring into the surrounding the entropy "generated" by the organism. This circumstance determines both the survival of a given organism and its evolution. Second: in this sense, a human differs from all other living beings in his duality. Like any animal, the individual interacts with nature as a physically separate being, but he is not the subject of this interaction to the full extent. As such, *society* acts as an association of individuals who together make up an integral self-organizing biological system – a kind of superorganism. These circumstances, in our opinion, determine the main structural and functional features of human society, including such a phenomenon as thinking.

Historiography and the sources. The essence and features of human thinking have long attracted the attention of researchers. Thus, Plato imagined thinking as a process of searching for eternal ideas in the world of form and he considered mind to be a link between them and the world of sensorial experience. From Aristotle's point of view, mind acts through abstraction, extracting universal principles from sensorial experience. Pythagoras (mathematical structures as the basis of reality), Heraclitus (thinking as an understanding of truth through synchronization with the "logos" that runs the world), Socrates (approaching the truth through dialogue), and others paid tribute to these questions. In medieval times the idea of thinking had a theocratic character and was associated with an attempt to reconcile the human mind with divine revelation, as well as with the development of logical methods for cognition of the divine order. The basis of the scholastic philosophy of that time was Aristotle's doctrine of logic and metaphysics. However, philosophy itself was seen as the handmaiden of theology (Thomas Aquinas).

Subsequently, mind and thinking became the subject of research by philosophers and scientists. For example, Immanuel Kant in his Critique of Pure Reason (1781) examines the nature of knowledge and the possibilities of human

reason, distinguishing between theoretical (cognitive) and practical (ethical) thinking. Martin Heidegger considers theoretical (thinking about being) and practical (interaction with the world) thinking as different ways of human's existence in the world (Being and Time, 1927). Karl Popper in "The Logic of Scientific Discovery" (1934) examines the problems of theoretical thinking associated with the possibility of testing and refuting scientific theories. In his work "Truth and Method" (1960), Hans-Georg Gadamer considers theoretical thinking, which can also be applied for practical purposes, from the standpoint of hermeneutics as the interpretation and understanding of the text.

Psychology and cognitive sciences pay special attention to the issues of thinking. Lev Vygotskij (“Thinking and Speech”, 1934) believed that thinking develops through language and social interaction, while practical thinking associated with the solution of everyday problems and theoretical thinking with abstract tasks. Jean Piaget, studying the development of cognitive abilities in children in his work "The Psychology of Intelligence" (1947) also distinguishes between practical and cognitive thinking. In his work “The Act of Learning” (1966), Jerome Bruner considers theoretical and practical thinking as interacting forms of cognitive activity, where the former helps to construct abstract models of the world and the latter serves the solution of practical problems. These thought forms are considered in a similar way by Vasilij Davydov (“The Theory of Developmental Learning”, 1986) and Herbert Steinberg (“Cognitive Psychology”, 1999). These issues have also been addressed by a number of other researchers, including those mentioned in this article.

Basic material and results. *The social superorganism* (human society) was formed on the basis of multicellular organisms of a certain species. As a certain integrity, it also had to form certain general mechanisms that ensured it. However, since the components of the social organism – individuals – are not physically connected with each other and have a certain autonomy regarding important functions related to survival in the environment, the corresponding mechanisms

formed earlier in higher animals did not lose their necessity. And those features that were useful in them were preserved and in the process of the formation of the social organism they received further development.

This applies to many systems of the human-individual as a multicellular quasi-organism (suborganism). For example, this applies to the elements of the subsystem of material interaction with the environment: to locomotion (upright posture) and others and especially to the main executive organ of the individual – the hand. This also applies to the information subsystem of the individual. It was preserved and developed on a more perfect material basis – the human brain and further ensured the physical activity of the individual, that is, it *involved* his subsystem of material connections with the environment. The latter, as in animals, are carried out by means of the above-mentioned and other executive organs – effectors, the activity (functional state) of which is determined by reflexes as the final elements of the reflex arc (muscles or glands).

However, due to the "collective" organization of the social organism as a whole, its operational subsystems of communication with the environment carried out by individuals were nevertheless formed as *social phenomena*. Due to the absence of significant morphological differences (except for sex and age) which are biologically irrational at a high level of complexity of individuals, the latter were formed as *universal* elements of the whole. They could carry out any activity necessary for society to interact with the environment, differing only in its programmes. In general, *in this aspect*, they constituted a subsystem of society aimed at direct material interaction with the environment.

However, the latter differs from the corresponding subsystems in higher animals not only in the level of development of its elements, but also in two fundamentally important points. Firstly, in interaction with the environment, the individuals, included in it, used not only their own organs, but also certain *supporting material objects* taken from nature and appropriately adapted to the

performance of certain necessary functions – *tools of labour*. Only *together with them* (as well as other *technical* devices) in this function the individuals constituted an operational subsystem of material (material and energy) interaction with the environment, as if separating society from nature, at the same time connecting it with it – the *technosphere of society*.

Secondly, the production process carried out by this subsystem which actually realizes the interconnection of society with the environment (nature), in order to ensure the existence of society as a whole, in the final analysis had to be directed not so much by the personal needs of each individual as by satisfying the needs of society as a whole. Like the needs of the individual, they had to be realized under the control of his individual brain, but at the same time directed by society *as a whole*. For this purpose, on the basis of the *interaction* of cerebral structures of individuals, the second (informational) operating subsystem, forming *social consciousness,* was created. Its task was to obtain and process information about the environment of society, as well as about the society itself, in their interaction. This operating subsystem has informationally divided society and the environment of its existence, creating a kind of *information* "shell" that separates and at the same time connects society and nature in this respect – *the noosphere of society*. It is the latter that is "responsible" for the social orientation of the activity of individuals and provides it with information about the environment.

However, the formation of an integral social superorganism from individuals, which in this capacity forms its own (common) subsystems that unite its informational and material activity, was based on the evolution of their animal predecessors. First of all, this applies to the information subsystem. The information, coming from the outside through the sense organs, is processed in the animal brain. This information comes in the form of *images* of objects of the external world, which are recoded into signals of the neural networks of the brain of this animal. As a result of processing the information received, on the one hand, on the basis of these signals,

a command to action is formed, transmitted to the executive organs (effectors), and on the other hand, due to repeated perceptions of similar objects, a certain *generalized* image of the object is created, which is included in the information "stock" (thesaurus) of the individual.

This process is also carried out in the central nervous system of the animal individual. Basically, it is not related to other animals of this species. If there are such in the vicinity, then, as the well-known ethologist K. Lorenz asserted, in this case the reaction is carried out to "some behavioral acts that *one or more individual creatures cause in others* of the same kind" [3, p. 144]. And there is no *purposeful transmission* of signals (that is precisely as information) between separate individuals in the animal world. Therefore, "animals do not possess language in the true sense of the word. ... All sounds and body movements of animals express only their emotional state and do not depend on whether there is another creature of the same species nearby. ... There are also innate ways of responding to these signals, and the reaction occurs whenever an animal sees or hears another member of its species" [4, pp. 88, 89]. But the animals simply have nothing to purposefully "say" to each other – because there is no need.

In society, the formation of general consciousness is carried out precisely on the basis of *information links* between its constituent individuals. In the brain of each person, in his direct interaction with the environment, there is also a process similar to that which takes place in the brain of an animal. And "brain activity is a reflex activity, conditioned by the influence of the external world," and is also based on the formation of *images* of real objects in the subject's psyche. "But the image of an object is not its sign. An image in general, regardless of the object of which it is a reflection, does not exist... the image of a thing is *not the thing itself and at the same time not a sign of the thing, but its reflection*" [5]. But it has to be processed in the cerebral structures of a given individual, in his *personal codes*. These codes are formed on the basis of unconditioned reflexes inherent in an individual from birth,

developing as he acquires his own life experience. As a result, like inherent to an animal, the images of objects and their interrelations are *generalized*, and on the basis of their analysis, commands to the effectors to interact with external objects are formed. This whole process, considered as the process of human thinking, is usually called *practical thinking* [6].

However, unlike an animal, the processing of the information received by humans does not end there. A certain part of information is transmitted through the same effectors in some *external* codes (developed by an individual in the process of *social practice*) to *other* people who have the same codes due to communication between them. Thus, the powerful reflective apparatus of man is not only an instrument for a more complete analysis of the environment (practical thinking) than the brain of any animal allows, but, what is much more important, it serves as the *basis* for the creation of an incomparably *more powerful general analytical structure* consisting of *interrelated individual cerebral structures*, which governs (through individual consciousnesses) all the activities of society. And as a *connecting link* society uses *material* objects of a special kind – *signs* [7], which form certain *sign systems* [8] that *externally* connect the *internal* information processes in the brain of an individual with similar processes in other individuals. In human communication, various sign systems are used, but first of all, this applies to *the system of sound signals – speech*. This led to the emergence of a completely new phenomenon that did not take place in the previous biological evolution – *social consciousness*.

A further generalization of the image of the object is carried out (already in communication between individuals) in the *sign* that leads to its *generalization*. In psychology, generalization is a process in which a person allocates common characteristics from different situations or objects and applies them to new situations or objects, believing that these characteristics will also be true for them. Generalization makes it easier to adapt to new situations and simplify the understanding of the world around us. Generalization (overgeneralization) is a

thinking error in which a particular person draws generalized conclusions based on limited data which results in a tendency to see patterns where there are none.

But in this context, we are talking about a *social* process – the formation of a conditional *abstract sign to designate* an equally *abstract* generalized object. And this generalization is carried out not by an individual, but by *society* in the process of communication. A sign replaces the concrete image that functions in their minds as a *material* analogue of an *ideal* generalized (generalized) image in communication between individuals. Being conditional, it is (as far as possible) the same for different people and different situations. And so, its operation is carried out (consciously or unconsciously) in accordance with the objective abstract laws *common to all – the laws of logic*. And these "laws do not tell about what it should be but first about what exists, about what conditions is met by a thought, adequate to its object." For this reason, "thinking, in order to be true, must follow the laws of logic" [6]. Respectively, they are common to all people. This became the basis of *theoretical thinking*, aimed not at the direct action of a particular individual, but at *cognition*, that is, society's *understanding* of the *essence* of objective phenomena. Its results are presented in a generalized (sign) form.

Practical thinking, on the other hand, is carried out in images and is usually not connected with signs. L.S. Vygotskij even believed that practical thinking, rational action and the earliest form of intelligence have nothing to do with speech [9]. But today the most important characteristic of practical thinking is that "the work of the practical mind is directly woven into practical activity and is subjected to a continuous test of practice" [10], that it actually "merges with the practical actions of the worker" [11, p. 50]. "The motivation of the thinking process is also specific in both cases; one thing, if the stimulus for the thinking process is a practical, effective situation, the immediate need for the subject to immediately get out of the difficulty in which he finds himself; quite another one, when it comes to solving a

theoretical problem that is not directly related to the practical situation in which a person finds himself at the moment" [12, p. 367].

However, theoretical and practical thinking, being aimed at the performance of different functions, are nevertheless carried out in one and *the same* cerebral structure of each individual. Therefore, despite its various types and forms, thinking itself as a mental process is one [13]. There is a "penetration" of information in figurative form into theoretical thinking, and in sign form - into practical thinking. In general, any mental process, including theoretical thinking, begins with the figurative form of information representation, and "in terms of content, the theoretical concept acts as a reflection of the connection between the universal and the individual, and in terms of form, as a way of deducing the individual from the universal" [14]. And in the sphere of practical thinking use, the results of theoretical thinking, especially in the interaction between individuals, are used in sign form (mainly through their verbalization).

The objective knowledge obtained by the noosphere is the basis on which practical thinking also functions: "Depending on the level and content of our knowledge, we not only reason differently, but also directly perceive what is given to us in a different way. Our knowledge is reflected in our contemplation." At the same time, "visual elements are included in the very operations of thinking in concepts," and "thinking in concepts itself is rooted in visual sensory content; it is connected with it and cannot be completely torn away from it" [12, pp. 335, 331]. It is due to this *interaction* of practical and theoretical thinking [15] that the interconnection between the operational subsystems of society – the noosphere and the technosphere – is realized.

These two types of human thinking, having developed within the framework of two social subsystems (material – technosphere, and informational – noosphere), provide a connection between *society* as a self-organizing (living) system and the environment of its existence – nature. In fact, they are the ones who govern this

interaction which ensures that society receives everything necessary for its existence from the materials of nature [16]. This is carried out by the individuals entering society through the production process.

Initially, each individual *simultaneously* (but through his different properties) enters both the noosphere, with which he is connected by social consciousness, and the technosphere through tools and objects of labour. On the basis of the analysis of the external environment and the internal state of the social organism by means of *theoretical thinking*, *social consciousness* forms a corresponding *task* (setting) for its constituent individuals. And they, thanks to *practical thinking*, realize it in the purposeful physical activity of their executive organs (effectors) in relation to the object of labour taken from nature, transforming it into an *object of consumption* necessary for society. To increase the effectiveness of such an impact, the individual uses special supporting objects – *tools*. The resulting *consumer goods* enter society for use by both the given and other individuals. The same applies to the instruments of labour themselves as objects of *productive consumption*. After the obtained consumer goods (as well as tools) are used with the loss of their properties necessary for society, they *return* to the environment in the form of *waste with increased entropy*.

Thus, from the point of view of the interaction of society with nature, "we have in action two elements of production – nature and man, and the latter, in turn, with his physical and spiritual properties" [17, V. 1, p. 555]. But at the same time, it should be borne in mind that actually "the subject, humanity, and the object, nature" interact in production, "and consequently the individual who produces, acts as a non-independent, belonging to a larger whole" [17, V. 12, pp. 711, 710]. The purpose of production is to obtain *consumer goods* necessary for the existence of society from the material of nature. But despite the *social* character of the production process, the *main active beginning* in it is still *human as an individual* acting through his organs.

Thus, *the goal* of the production process is set by *social consciousness*. To achieve it, the individual must: a) remove from the environment a suitable *object of labour*; b) select (or manufacture) the *tools* of labour necessary for the given transformations; c) *achieve* the appropriate *technology* for implementation of the required transformations, using their biological capabilities and production skills. The main moment in the production process is, of course, the very *transformation* of the object of labour into an object of consumption. In order to get this transformation, it is necessary to make some *changes* in the external and internal structure of the subject of labour, that is, the composition and connections of its material components. They can be implemented by: a) dividing them; b) uniting them; c) changing their external forms; d) changing their internal structure.

The very transformation of the object of labour into an object of consumption, carried out by the technosphere of society in the process of production, actually includes *three moments* necessary for the material substance of the object of labour to turn into the material substance of the object of consumption (or instrument of labour). And for this it is necessary to organize and implement: a) *direct impact* on the subject of labour, carrying out the required transformation; b) *supplying* the subject of labour with *energy*, due to which the transformation is carried out; c) purposeful *management* of the transformation process and control over it. All this was initially carried out by the individual at the expense of his own abilities.

At the same time, each individual was able to perform any set of operations necessary to create consumer goods required by society. In primitive times, "the simplicity and scarcity of primitive technology lead to the fact that the actions associated with it can be performed by all members of the community, i.e., everyone makes fire, makes bows, arrows, etc." [18]. But then, thanks to what is now called scientific and technological progress, technical products gradually became more complex, tools became more numerous and diverse, and the technology of their manufacture and application became more and more complex. Correspondingly, the

information necessary for the manufacture and use of tools of labour became more complicated, and the technological methods of their use required more and more thorough training. The situation was aggravated by the still weak structuring and systematization of the accumulated information. All this hindered the increase in labour productivity necessary for the further development of society. As a solution to this contradiction in society, at some point *a completely new* social phenomenon arises – the *gradual division of the entire set* of various labour *functions* required to achieve the desired result between *different* individuals.

With the "*horizontal*" division of labour between its participants (i.e., with their technological specialization), labour productivity increases, but the problem of coordination of actions arises. With an increase in the number of participants, sooner or later, there is a need for *another link* in the production chain that performs *coordination* functions. Namely, in the individual, located in it *between* the general (social) consciousness and the individual consciousness of the direct executors ("*vertical*" *division of labour*). Here the difference between the participants in the process acquires a qualitatively different character, since it concerns not only the differences between the *types of technologies*, but the division of the fundamental types of activity themselves: labor, conventionally called "physical", controlled by *practical thinking* (related to the technosphere), and labour, also conventionally called "mental", realized by *theoretical thinking* (related to the noosphere).

And this also divides the participants of the general production process into those who mainly belong to the technosphere and others to the noosphere. Now they occupy a *qualitatively different* position in production relations which violates the former *egalitarianism of production relations,* since one controls the other. The noosphere and the technosphere continue to operate in interconnection, but the latter is now carried out not through the common cerebral apparatus of *each* performer, but through the interaction of *various* individuals belonging to *different* operational subsystems of society.

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Such were the consequences of the emergence of this new social phenomenon in society – *the social division of labour*. It marked the end of the primitive period of human development and marked the beginning of cardinal changes in social life. And the development of *productive forces* further under the influence of *scientific and technological progress* correspondingly changed the nature of *the social division of labour*. Therefore, this social phenomenon became the main social instrument of *the internal evolution (development) of the social organism* for a long time and also correspondingly changing the nature of production relations in it.

As noted above, the production process presupposes that its subject has a direct *transforming effect* on the object of labour, *the supply* of the *energy* necessary for this transformation, as well as *control* over the process and its *management* for its *expedient* course. It was also noted that all three of these functions were performed by individuals in that part of their activity that related to the technosphere. But the constant development of productive forces led to the fact that both individual technical devices and certain technical systems, that partially replaced man, were involved in the performance of an increasing part of these functions. In this way, "in all formations at certain stages of their development, a technical revolution took place, expressed in the transfer to technics of new production functions, previously performed exclusively by man" [19, p. 12].

First of all, this affected the direct impact of human organs on the subject of labour. At the time of the formation of society and man of the modern type, mechanical tools of labour were already used (for example, a hand axe, which made it possible to concentrate the supplied energy on a certain area of the object of labour). Further, these tools became more and more diverse and improved both in terms of functional properties and ease of use. These processes, which continue to this day, lead to very significant results in the transfer of more and more technological functions of man to technical devices.

From time to time, they generally caused *revolutionary changes* in one or another sphere of productive forces, thus exerting a significant impact on the nature of the social division of labour due to the constant reduction of the use of manual operations in production. At first, it was a gradual transfer to technical systems (mechanisms) from the individual of the function of the working body *direct control*, which transforms the object of labour into an object of consumption. Quite complex kinematic systems with a manual and then mechanical drive, which made it possible to provide the desired trajectory of the working body and the required concentration of the supplied energy, were invented. Chemical, thermal and other technologies were developed. Development in this direction continues successfully.

As for the *energy expenditures* for the transformation of the object of labour into an object of consumption, initially their source was exclusively the muscular energy of the performer himself, the human being. A revolutionary breakthrough was its replacement in many technological processes with energy attracted "from outside" (conditionally speaking, the creation of "machines"). At first, it was the use of the muscular power of animals for various purposes, then the energy of wind and water. Next, it became steam energy (the converted energy of chemical bonds in organic energy storage devices of the sunbeam). An important task of *transmitting and distributing* energy flows was solved with the help of electricity. A fundamental point was the beginning of the use of energy *that does not ascend from the energy of the sun's ray*, for example, geothermal or tidal. But, of course, first of all, this applies to the energy of *nuclear fission and fusion*. However, the need for energy supply is still relevant, moreover, it is constantly growing. And a significant part of the scientific and technical efforts of society, and above all its *theoretical thinking*, is aimed at this. Direct control of the production process was still retained by practical thinking.

But recently, the main revolutionary changes in production relate to the third component of the production process – *management and control*. Actually, this

component is connected not so much with the transforming object of labour as with the *subject of this transformation*, although in a certain way it is also included in the process of material transformation by feedbacks. But it is mainly connected with *information* processes, that is, not so much with the action of human effectors as with the processing of information about the object being transformed by him in the process of this transformation (that is, with his *practical thinking*, which directly controls the production process). And although for thousands of years *only the human brain* could actually process information, in ancient times there were already attempts to automate some production processes. As an example, we can give various kinds of traps, crossbows, etc., when one or another material factor associated with the object of labour (for example, the object of hunting) "triggered" the action of a weapon (tool) that "independently" functions at the expense of pre-accumulated energy in accordance with the direction of the process *predetermined by man*.

Later, many rather ingenious devices of this kind were invented, but in principle they remained the same, although the introduction of technical *feedback* made it possible to significantly expand their capabilities. The situation began to change dramatically only with the *development of electronic devices* which made it possible to automatically perform *formal processing* of information *outside the human brain*. Thanks to this, in a number of cases, it was possible to control the production process without the impact of man on the tools of labour. In these cases, the production orientation *developed by the public consciousness* is laid down in the *programme* of the control device by specialists in *the field of management* – workers who are not so much "physical" as "mental" workers, i.e., connected not so much with the technosphere as with the noosphere which makes certain *changes* in the connection between these subsystems.

Advances in this direction have marked the beginning of *technical systems* performing functions, previously performed *exclusively by humans*. Expanding

advances in information processing are leading to the creation and rapid improvement of what is commonly referred to as *artificial intelligence* (AI), which is a revolutionary step in the use of computer systems in this field. It began with the imitation of human functions by artificial information systems [20]. It is the development of artificial intelligence that is now primarily associated with hopes for the further scientific and technological progress of society – thanks to the opportunity *to transfer human functions to technical devices* also in the field of *management and control* of the production process. Artificial intelligence systems have already become quite widespread in industrial production, which expands its capabilities and increases labor productivity [21]. However, they are also associated with all the growing fears.

And they are not unfounded. Each new invention, either in the field of transformative effects or in the field of energy, expands the possibilities of society regarding production, but can both get out of control for various technical reasons and be used by *people* in an undesirable way, including dangerous ones for humans. A knife is an ancient tool that has made a significant contribution to the development of society. But you cannot just cut yourself carelessly, but also deliberately kill a person. Nuclear energy has not only opened up new prospects for social development, but also created potential threats, up to the possibility of destroying humanity. Artificial intelligence is the same *tool*, the use of which will positively change society. But it can certainly be used to harm people. It all depends on the *people themselves*. But, of course, there are also very significant features that distinguish this tool from all the others.

All other technical systems have always (not counting accidents) been *under the direct control of man* (that is, public consciousness). In this case, the control function is carried out by the *technical system*. That is, in some areas of the technosphere, the control over the processes in it is already partially transferred from *natural* intelligence (NI) to *artificial* intelligence (AI). And not only the expected

result depends on how it will be carried out, but also the possibility of additional, including unfavorable, effects. And the possibility of their occurrence grows as the capabilities of AI expand. It is clear that this also applies to other areas of technology (in emergency situations), but there the problems are solved by safety measures [22]. Here, as control over technical processes is transferred from NI to AI, the situation changes fundamentally, creating certain dangers to society.

Naturally, it should be borne in mind that in general "the experience of using complex technologies convinces that no design, technological and organizational measures are able to completely eliminate emergency situations. Only the likelihood of their occurrence can be significantly reduced. Therefore, the concept of "security" can be defined as the presence of the system in conditions of risks that can be neglected or acceptable risks. Acceptable risks are those risks of man-made activities that society is ready to tolerate for the sake of economic and social benefits. Of course, the interests of different groups may differ and the choice of acceptable risks will vary" [23]. But in the case of artificial intelligence, it seems that there is a possibility of "conscious" use of this or that process not in the direction set by public consciousness, but in the direction that *artificial intelligence itself* chooses – up to opposing it to the interests of society.

However, it should be noted that to carry out any action, you need not only its *opportunity*, but also an *incentive*. The stimulus to action of both society as a whole and a particular person is formed by social consciousness, which ultimately fulfills the dictates of the mysterious *will to life*, which is inherent in *any* living formation. *And only to the living*. Determinism and teleology seek to explain the causes of certain events. But determinism tries to answer the question "why?" and teleology tries to answer the question "for what?" they happen. In nature, every event has its own *cause*, but the answer about the *purpose* for which it occurs can only be given *in relation to living organisms*. Accordingly, "in order to understand the actions of living beings, one should know why (!) they do this. … The goal is ahead." And this

goal, directly or indirectly, ultimately consists in preserving and continuing life [24]. There cannot be a question of any goal-setting actions without this.

In society, goal-setting is carried out by public consciousness. Accordingly, no *artificial* (i.e., ultimately *created by a living organism*) formation has – and cannot have! – *its own* goal; its functioning is determined by *external* (for it) circumstances, primarily by the tasks for the solution of which it was created. This fully applies to AI. Therefore, artificial intelligence, precisely as *artificial*, belonging to *inert* matter and only as if "revived" by man, *does not and cannot have* any of *its own* stimuli for action. They are formed in the noosphere by *public consciousness* for the sake of satisfying *people's needs*. Of course, artificial intelligence *is already being used* in the noosphere and will also become increasingly important in it. But it enters the noosphere of society not "by itself", but as a *tool* that fulfills *only* the directives of social consciousness. That is, in fact, it is a kind of *technical analogue of practical thinking*. Another thing is that these can be attitudes, set as if "on behalf" of society by some intruder or an ignoramus, but here we return to internal social processes or even to the usual problems of safety. And, naturally, issues related to the security of the artificial intelligence systems themselves must be taken into account [25].

So, all the concerns that in the future artificial intelligence may not only *independently* and *consciously* get out of public control but also surpass humans intellectually, including imposition of its (?) will (where can it come from?) on society, have no grounds. And, by the way, not only because of the fundamental impossibility for AI to have this will of its own, since it is not able to "want" something on its own due to the lack of need for survival, but also because of the very problematic future superiority of artificial intelligence over natural intelligence. There is hardly any doubt that artificial intelligence will sooner or later surpass the human brain in its technical parameters. But it is difficult to imagine that someday some *artificial structure* will be able to surpass *the united humanity* – especially not

in *the speed of information processing*, that is, not in "technical", but in truly *intellectual power*. It is not even a matter of quantitative characteristics but of the *essence* of what we call the information.

For any self-organizing system, *information* is not some *independent characteristic of matter*, like a mass or energy, as it is often believed. It is inextricably linked with the vital activity of specific living systems and is immanent in them. According to N. Wiener, "information is a designation of the content, received from the external world in the process of our adaptation to it and the adaptation of our senses 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 activity in this environment" [26, p. 31]. Only the "consumer" (a self-organizing living system) *perceives* external *signals* as *information*. Without the presence of a consumer (at least an imaginary one), there is no reason to talk about information – these "signals" remain the same as they were when they appeared, i.e. simply *material consequences of processes in the environment* – and nothing more.

All material processes in the world are accompanied by some material phenomena, the external manifestations of which are determined by these processes and can be recorded externally in the form of material manifestations (signals). But the fact that we have somehow recorded some of them does not mean that we have received the *information* about these processes. Their fixation itself does not carry any information about them, nor does it give us any information, because it has not yet been *interpreted* as such, not inscribed *in the context* of either the processes that served as the source for this signal or our life. And in order for such a "fitting" to occur, the parameters of this signal must be compared with the information *we already have* about both one thing or another. This "stock" of information is usually called a *thesaurus*. Such comparison is the process of information *treatment* carried out in the cerebral structures of the brain. Now it can be done by a computer – "mechanically" by means of a programme (goal) *given to it* (directly or indirectly).

The results of such processing are *vital* for *our* living activity, since they directly or indirectly contribute to the fulfillment of the super-task of any self-organizing (living) system – to continue life. Regardless of this task (no matter how complex it may be mediated), it is just a set of certain physical and other *material* signals that have no informative content. So, the interpretation of signals as information is a *function of a person* (more precisely, society). And even for the most advanced "artificial intelligence", this set is and will always remain just a set of signals with which it is called upon to operate in a certain way, nothing more.

Therefore, information is *subjective* in nature – in the sense in which any *reflection of reality* by a self-organizing system is subjective. It takes place *only* in relation to a self-organizing *living* system that *interprets it* in accordance with the *goals of its* functioning and on the basis of the "stock" of information it already has. In inanimate nature, such a phenomenon (in contrast to the *organization* of matter, the *reflection* of which *for the system* in a certain sense is information [5]) does not exist. As for natural intelligence (reason), *all* the information (including that processed by artificial systems) is *a product of society*.

The effectiveness of the functioning of both natural and artificial intelligence is significantly limited by the fundamental incompleteness of the information about the surrounding world. The world is infinitely complex, people have been striving for centuries to expand the boundaries of knowledge, but at each stage of social development they remain limited. Our true knowledge of the external world (as well as of ourselves) has always embraced only a small part of the essence of the object. As V.I. Vernadskij rightly noted, "immutable scientific truth is that distant ideal to which science strives and on which its workers are constantly operating. Only some, still very small, parts of the scientific worldview have been irrefutably proven or fully correspond to formal reality at a given time and they are scientific truths" [27].

And, nevertheless, society lives and develops in this informationally far from mastered environment – due to the nature of the available information processing by

its "natural intelligence". As a result of the fundamental incompleteness of knowledge, building an "information model" of reality, the natural intellect of society in the process of solving *practical* (and, to a large extent, *scientific*) problems deals not only with the true and the false, but also with *delusions* – that is, being essentially false, in certain conditions performs the role of the true.

Misconceptions are not errors in logical constructions, but a natural consequence of the above-mentioned *fundamental incompleteness* of our knowledge, both those that specifically relate to their practical side and regarding the general laws operating in the world. It is not uncommon that what appears to be perfectly correct from the point of view of formal logic turns out to be in fact wrong. And sometimes vice versa. But both society as a whole and each individual are nevertheless forced, even in the presence of delusions, to solve vital problems. And if they were guided exclusively by the "correct" logic, many problems would be fundamentally unsolvable. And the needs of life require action, even if they are not sufficiently substantiated. Therefore, natural intelligence encourages us to act aimed at achieving *the final results*, and "at the moment when our brain carries out the very beginning of the action, it is already charged to expect the results... an action that has not yet been realized already captures the brain, tunes it to the expectation of the upcoming results and to the subsequent evaluation (!) of these results" [28].

However, the other laws come into play here, which are not related to rational-logical (semantic) information but to axiological information. The latter is organically connected with the needs of a human, subjectively reflecting the objective needs of both society and the individual. Accordingly, in addition to logic, the solution of problems includes *emotions*, in particular, the *aesthetic* attitude of a person to reality, the purpose of which is not truth, but *value* (i.e., the degree of compliance with the needs of the individual and society). And without a subjective component associated with the needs of a particular system, a value judgment is basically impossible [29].

According to Kant, we judge subjective purposiveness aesthetically, by means of the feeling of pleasure, while objective, i.e., natural, purposiveness according to concepts and consequently logically. It is precisely "that which is purely subjective in the representation of the object, that constitutes its relation to the subject, that is the aesthetic property of the representation" [30]. Regarding the artificial intelligence, which does not have its *own* goal, the material carrier of which does not have an independent internal organic *integrity* in relation to the external environment, it makes no sense to talk about needs, and, consequently, about values (as well as about the feeling of pleasure) [31].

But the *technical* use of artificial intelligence for the further development of mankind is extremely important and will lead to its radical transformations. That is, in fact, artificial intelligence really implements *a technical model of practical thinking*, which allows it in some cases to replace humans in practical activities in various fields, primarily in material production now. Therefore, it is quite reasonable to pin great hopes on AI in replacing humans with their practical thinking in various fields of activity, as such a replacement has been carried out so far in terms of material influence. But this will not be just another technical revolution with the transfer by man of some of his production functions to newly created technical devices. Potentially, this means *the complete exclusion* of a human from the sphere of *practical implementation* of the tasks set by social consciousness, due to *the disappearance of the need* for his practical thinking in *the implementation of the production process*, and, consequently, *the complete elimination* of what was called *the division of physical and mental labour*.

As for *theoretical thinking*, it in all cases remains the prerogative of *natural intellect* as the realization of social consciousness. But, of course, artificial intelligence will increasingly be used as a *supporting* tool here. The speed of information processing, working with large amounts of data, building complex models, summarizing scientific achievements, etc., will significantly change the

nature of scientists' work, transferring scientific activity to a much higher, *qualitatively new* level. But *innovation* and *goal-setting will be left* entirely to the human mind, although it is becoming more and more "socialized".

Conclusion. These circumstances will also lead to revolutionary changes in the social sphere. The replacement of human *practical thinking* by artificial intelligence in the field of production, and the wide socialization of *theoretical thinking* due to it, directly lead to the complete *elimination* of the vertical social division of labour and the formation of *unified and directly interconnected world noospheres and technospheres* (that is, according to Marks, the actual transformation of the production process into a *natural* process). Thus, the changes in the nature of theoretical and practical thinking, ultimately caused by scientific and technological progress, inevitably lead to fundamental changes in social processes. Relations between people in the production process change fundamentally. Society itself will acquire an egalitarian character, since with the elimination of the vertical division of labour, the division of individuals according to functions between the noosphere and the technosphere, and, consequently, its division into various *production groups* with their own *special interests*, disappears. And, accordingly, it will lead to the final transformation of mankind into *a single, integral world social organism* with an infinite *individual variety* of constituting *people*.

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