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Tendencies of Coordination and Interpenetration of Cognitive Methods

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Abstract: Today the leading tendency is the tendency of integration of a scientific picture of the world accompanied by the synthesis of different methods of world cognition. There have been considered the main tendencies and aspects of coordination and interpenetration of natural sciences and socio-humanitarian methods of knowledge in the article. There have been shown the necessity of the generalization of methods of natural sciences, humanities and artistic knowledge to work out the basis of the integral theory of cognition taking into account the totality of human cognitive experience.

Key words: Methods of reality cognition · Humanitarian expertise · Type of scientific rationality · Axiological orientation

INTRODUCTION

In 1959 an English writer and physicist Ch.P. Snow in his famous speech "The two Cultures and the Scientific Revolution" [1], formulated a problem which hasn't lost its relevance since, it's about widening gap between the culture of natural sciences originating from scientific and technical progress of the XX century and the traditional humanitarian culture. We should note that the problem of the separation of cultures was already quite distinctly identified by Frances Bacon in his theory of "dual truth". Bacon's ideas were reflected in the Charter of the Royal Society of London founded in 1660. It said that the aim of the society was perfection of knowledge about natural subjects and all the arts with the help of experiments without involving theology, metaphysics, morale, politics, grammar, rhetoric and logic [2]. Systematic reproduction of this interdisciplinary border in the European culture is conditioned by the fact that indeed the "two cultures" are simultaneously the two strategies of the cognitive processes supplementary to each other. The new times bear the new world outlook, the new problems and the new vision of old problems, nevertheless, many researchers believe that even nowadays, at the beginning of the XXI century, the problem set by Ch.P.Snow hasn't lost relevance [3].

Main Part: The specificity of the present day state of humanity is characterized by the reinterpretation of traditional outlook attitudes to the world and humankind, to existing standards of cognition, to paradigms of science, to cultural values, etc. As is noted in the dissertation research of V.I. Sorokina the specificity of social cognition at this stage of transition of science to the post nonclassical stage is reflected in the appearance of the term "sociohumanitarian cognition" which takes into consideration that social cognition contains axiological-meaning element, hence subjectivity characteristic of humanitarian cognition [4]. The consequence of this is the necessity to look for the methods of a sociohumanitarian discourse, providing objectivity and exactness as well as reflexivity. According to the ideas of distinguished researchers the present day level of sciences development demonstrates principle moments of similarity in the natural sciences and humanitarian knowledge and makes it imperative using methods of natural history in the humanitarian sphere [5, 6]. Today, as never before, it has become necessary to generalize the experience of humanities and arts as well and to work out the basis of a holistic theory of knowledge which takes into consideration the whole body of human cognitive experience.

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Of the contemporary stage of the civilizational development it is characteristic the new understanding of the specificity and peculiarities of the natural sciences cognitive process, transition to a new paradigm which is determined by a modern style of scientific thinking – evolutional-synergetic paradigm. The principles of universal evolutionism and globalism applied to the social sphere and the sphere of human creativity demonstrate the perspectives of synthesis of two cultures. Today the leading tendency is integration of a scientific picture of the world accompanied by diffusion of conceptions and research methods of natural sciences into humanities and vice versa. "Train of thought developed in one branch of science can often be applied to the description of phenomena seemingly quite different" [7].

As the natural scientific, humanitarian and artistic types of cognition actively form the integral outlook of a human being they have to coordinate, mutually accord. An outstanding physicist, the Nobel Prize laureate Werner Heisenberg in his philosophic work "Der Teil und das Ganze" pointed out: "Science is made by people. This natural circumstance is very often forgotten; one more reminder about it can promote diminishing the sad gulf between two cultures – humanitarian-artistic and natural scientific" [8, 9].

One of the most important ways of the coordination of sciences is exchange of methods and ways of research, i.e. application of the methods of one science in other sciences. Methodological pluralism is a characteristic feature of modern science thanks to which they create necessary conditions for fuller and deeper exposure of the essence and laws of the reality. The regularities of the development of science was very graphically expressed by a Noble Prize laureate, one of the founders of synergetics I. Prigogin: "The growth of science has nothing to do with even development of scientific disciplines each of which in its turn is divided into even more number of watertight compartment. On the contrary, convergence of different problems and points of view promotes the depressurization of the formed compartments and nooks and to effective "mixing" of scientific culture" [10].

Let us note several more directions in the coordination and interpenetration of methods of cognition of the natural-technical and humanitarian-social sciences.

- One of the most important characteristic features of the human activity is goal-setting: everything that is done by a human being should be filled with meaning, practicability. The system making values of humanities are of vital importance in the goal setting activity of people therefore the setting of the goals of the development of the natural sciences culture is impossible without attracting and accounting the main humanitarian values.
- Now it has been realized the principle unavoidable role of a human being as an observer and interpreter of an experiment, i.e. only the holistic approach is topical today. The exposure of the peculiarities and strategy of scientific cognition (type of scientific rationality) has led to the introduction and realization of a new typology of scientific rationality based on the difference in the interpretation of the relations of a cognizing subject and the object (system) under research – classical, nonclassical, post nonclassical type of scientific rationality. The principle peculiarity of post nonclassical type of scientific rationality is its directive to coordination of knowledge and values, verity and ideals, ethics and technology. Consequently, there is need in the hierarchy of values, setting of priorities taking into consideration the basic interests of the humankind which could be quite different from the tendencies of science. Thus there appears the possibility to speak about the human dimension of science [11, 12].
- To solve ecological and some other global problems arising before the humankind the interdisciplinary cooperation plays an increasing role. In this the objects of modern interdisciplinary researches are more often unique systems characterized by openness and self-development: developing historically self-regulating systems into which a human being is included as a special component. Our civilization treads into a period of progress of a special type when humanistic orientations become a starting point in the definition of a scientific research.
- Many of the modern technologies created on the basis of an intensive development of natural sciences influence deeply the conditions of human existence (up to the threat to the existence of the mankind itself), the natural and socio-psychological environment and at last, the genetic, philosophical, psychological and spiritual-moral constitution. The realization of the importance of moral axiological aspects of global problems has led to the increased attention to the problems of cooperation of natural sciences and socio-humanitarian sciences as a basis of formation of scientific worldview conception adequate to the modern world and of a positive strategy of building a holistic and harmonious

civilization. Therefore it is socially necessary to have a particular systematically organized activity aimed at forecasting the newly arising threats to the human potential. The nucleus of such kind of an activity should become a humanitarian expertise. The humanitarian expertise is considered as a social technology of anticipatory response to possible negative consequences of social and technological innovations under the circumstances of unreduced multiplicity of moral perspectives and expert evaluation; it is intended to give a reasoned response to the threats of the modern historical situation [13, 14].

- One more aspect necessary to account for while analyzing the problem under consideration is motivated by the fact that most of experimental evidences in natural history have become of so complicated mediated character that for the first time in the experiment activity the problem has arisen not only about how to start an experiment but also at what moment it should be stopped and what can be regarded as the final result of an experiment [15]. We should take into account that the essence dominant not only sets the choice of a scientific trend and the limits of its development including the axiological limits of admissibility of an experiment but the character of objective structures marked out by cognition as well. Therefore experiments in a number of branches of natural sciences necessarily should appeal to axiological ideas and get spiritual and moral legitimation. Any axiological-rational action should have spiritual and moral basis.
- If in the first three quarters of the XX century the scientific and technical progress was first of all associated with large-scale (both in direct and indirect sense) achievements on regional and global levels, such as hydro-electric power station, atomic-powered vessel, spaceship, nowadays the most characteristic symbols of scientific-technical-technological progress are more and more oriented at the interests and needs of an individual and are commensurate to a human being. Moreover such technologies as genetic engineering, embryological and the like biomedical researches (e.g. connected with cloning) have come close to the changing and "constructing" both a human being and the surroundings of the local and global environment. When the degree of an exposure of an experiment on the nature is a threat of an unpredictable scale, when a modern human acquires freedom concerning birth and death quite inconceivable before, the new methodology of natural sciences must inevitably include axiological categories.
- A human is a social being, with all the isolation from nature he/she continues being its essential part. That's why in natural sciences an individual is simultaneously both an object and a subject of cognition, realizing the process of cognition and having thinking and other abilities. It is to this objective duality should in principle correspond the coordination and mutual complementarity of the natural sciences' and humanitarian types of cultures.
- Into the sphere of humanitarian and social sciences, particularly during the last decades, there have been incessantly and steadily penetrating the approaches, methodologies and research methods characteristic of the natural sciences' sphere. Moreover, the effective development of the methodology of the humanitarian sciences is impossible without taking into account the achievements of the methodology and philosophy of the modern natural sciences in general and modern physics in particular. Suffice it to recall the complementarity principle of Niels Bohr. The philosophy of science of full value only appears when it equally generalizes the fundamental problems both of natural sciences and the humanitaries and takes into account the methodology of both the humanitarian and natural sciences.
- According to the most widely spread point of view the true nature of the differences between 'two cultures' is in the application of two different strategies in the modeling of the World: in one case ("exact sciences") mainly the analytical approach (logics) is used, in the other (artistic creativity, humanitarian knowledge) – primarily the synthetic, imaginative one. In the latter case they also say about the predominance of intuition. In the framework of modern models of cognitive process any type of intuition as inborn cognitive programme acting on the subconscious level occupies a very important place. A famous physicist, academician E.L. Feinberg, considering from the philosophical point of view general problems of "two cultures" – natural sciences on the one hand, arts and humanities on the other – convincingly demonstrated the fundamental role of intuition necessary in science, in the world cognition and in all spheres of human activity no less than logics [16]. The process of scientific research is not strictly rational even on the theoretical level. Imagination,

creation of images, is important just before the stage of scientific discovery and intuition - on the very stage of discovery. In the algorithms of creative activity for the humanities, arts and natural sciences fields of knowledge there is much in common therefore the arsenal of modern knowledge expands by the inclusion of intuitive, imaginative, artistic elements as well. There is an active adoption of the ideas of the necessity to complement the rationalized structures of science by intuitive-imaginative, artistic components.

- There is one more aspect uniting science and arts – the role of aesthetic criteria in the evaluation of works of art and science which enrich the spiritual world of an individual. The main criterion of the truth of any knowledge is, as is known, practice; however it is sometimes not enough to affirm one or the other hypothesis and then additional criteria of the truth are put forward, e.g. the inner beauty of the theory, its symmetry, harmony, etc.; in such cases natural science willingly uses the humanitarian tools. A famous physicist, academician A.B. Migdal, considering beauty as an heuristic principle wrote: "The most important heuristic notion in physics, as well as in other sciences, is the beauty of a theory, law, conception… Bohr told about the theory of elementary particles of Heisenberg: "This theory isn't crazy enough to be true". … It is more accurate to say that this theory can't be true because it is not handsome enough. The search of beauty, e.g. unity and symmetry of the laws of nature, is a characteristic feature of physics of the XX century and particularly the last decades" [17].
- The establishment of the informational society not only involves the unprecedented expansion of the cognitive abilities of a human but also provokes ecopsychological problems of establishing harmony in the relations of an individual and society and the informational environment. The development of new informational technologies is inextricably linked with the emergence of new threats to the users' security.

CONCLUSION

The realization of the importance of moral-value aspects of global problems has led to the intensification of attention to the problems of interaction of natural sciences and socio-humanitarian sciences as the basis of formation of the scientific-worldview conception adequate to the modern world and positive strategy of the construction of a holistic and harmonious civilization. The principles of the universal evolutionism and globalism applied in the social sphere and the sphere of human creativity demonstrate the prospects of the synthesis of two cultures.

Deductions: The humanitarian approach proceeding from the principle ambiguity of the causes and effects of the processes and phenomena under consideration which is conditioned by the multiplicity of the methods of interpretation used, which presupposes multiplicity of the scientific models or pictures of the world existing in the human mind. The existence of several different pictures of the world, each of which can be actualized in a certain situation, in the mind of a specialist makes him/her more flexible and mobile, capable of functioning in versatile circumstances of life. Therefore it is very important to synthesize natural-technological, social-humanitarian and cultural-historical knowledge, which would be worked out into an integral educational system giving an integral systematic vision of the world in the context of the interdisciplinary dialogue of "two cultures" and providing fundamentalization and integrity of education.

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