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THE INTEGRATION OF SCIENTIFIC KNOWLEDGE AND THE PROBLEM OF INTERDISCIPLINARY SYNTHESIS

Research actuality. The problem of integrating knowledge becomes more relevant in modern philosophy and methodology of science. Progressive differentiation does not turn into chaos do to integrative processes that occur spontaneously or as the result of a conscious systematizing of subordinated philosophical and methodological guidelines. Back at Aristotelian times the classification numbered up to 20 scientific disciplines that also were internally undifferentiated, nowadays there are, according to statistics, over 15 thousand. The integration of the entire array of modern scientific knowledge is actually an extremely complex problem that requires a specific setting and professional solution.

The processes of differentiation and integration are inextricably linked, expressing two main trends of science: attempts to understand the world as a single integrated system and the need for specific study, clarifying the identity of structural elements and connections between them. Most scientists are inclined to think that any particular scientific discipline does not have the means to guarantee to acquire ideologically valuable knowledge, a comprehensive explanation of the world in which we live and our place in it. Hence, the urgent need for understanding the nature of the integration and synthesis of interdisciplinary science, the role of methodological philosophy is of extreme importance.

Potential role of integrative worldview of science is that it defines the style of modern scientific and rational thought in general, considering that under the influence of postmodern theories subjectivism and relativism spreads very intensive. The only truth as the ideal of scientific knowledge is considered fictional and fantastic. Such view became the source of many problems existing today. Not only culture in general, but science has become multipolar. This attitude is very common in intellectual circles, including scientific. Relativists believe that determined universal knowledge does not prove that pluralism is a good thing and that knowledge can be gotten in thousands of different ways [1, 57].

However, today there are many supporters of the "old" ideas of thinkers who try to oppose relativism belief in the possibility of building a universal system of knowledge that can unite all the sciences and provide the key to understanding the humanity and the world as a whole. They are convinced that without the universals of culture which exist as the plurality of truths that conflict with each other, nothing good is promised to the mankind, leading eventually to the moral degradation because any persistent moral principles can be neglected.

The question of the only foundation that would ensure the deployment of integration processes in science is extremely important. Different scholars have different interpretational foundation on which to build a single, integrated system of modern scientific knowledge. Often it is considered to be the same person, which is inextricably linked to material (natural) and perfect (spiritual) that would combine the natural sciences and the humanities. Classical science successfully built a complete picture of the world on the foundations of mechanism. Non-classical science related it by putting the foundation principles of the theory of relativity, quantum physics etc. Post-non-classical science investigates complex systems capable of self-organization based on the idea human dimension knowledge of the world (the anthropic principle, universal evolutionism, etc).

All this requires a thorough study on the integration of scientific knowledge, identification of key trends, methodological principles and forms of actualization of cognitive-value potential.

Essence and types of integrative processes in the field of scientific knowledge of reality "investigates the background and causes of integrative processes, the concept of "integration" and variations of integrative processes. In the most general sense, the term "integration" refers to this trend of science, which manifests itself in bringing together disparate elements into a coherent system in the synthesis of knowledge that differentiated into relatively independent structures in the disciplinary determination.

Integrative trends can be classified differently. The most common approach is diachronic and synchronic. Under the first, the integration of knowledge is studied in historical (genetic) context of science, correlating with its key stages (classical, non-classical, post-non-classical science). Researchers usually distinguish three phases of research consistent implementation as trends shift from differentiation to integration of scientific knowledge: subject-disciplinary (classical science), problem-disciplinary (non-classical science) and interdisciplinary complex approaches (post-non-classical science).

Synchronic approach is beyond historical. It evaluates various aspects of integration, typical for any time period. From this point of view we can distinguish some types of integrating scientific knowledge.

First, scientific synthesis can be divided into an interactive (and multidisciplinary, cross disciplinary), which is researches between disciplines and integrative (interdisciplinary and transdisciplinary), which is reduced to a sustainable interaction between disciplines with the union or correcting their techniques up to the emergence of new disciplines. The first type is a horizontal integration, the second is vertical.

Second, distinguish a) interdisciplinary integration (multi-, cross-, interdisciplinarity), b) the integration of scientific and non-scientific knowledge (trans, para, hyper, metadisciplinary), c) the integration of knowledge outside science (non, post, antidisciplinary).

Third, the synthesis can occur within the humanities or natural sciences (biophysics, economic geography), among natural and human sciences (bioethics, sociobiology), and between scientific and non-scientific knowledge (esoteric, religion, art, etc.).

Fourth, knowledge in general can be represented as an open, non-linear, unbalanced, multifactoral, integrated, capable of self-organizing system that is the subject of synergy.

Fifth, the process of theoretical study of integrative processes in science is progressing, therefore there are always new forms and methods of interaction specificity determined by the new terms (extra-, intra-, infradisciplinary).

In general, the forms and types of integration can be numerous. However, from a philosophical point of view, synthesis, knowledge integration is a process that has its own laws, potential and stable trend of implementation, giving reasons for its comprehensive research on methodological positions.

It is important to bear in mind that the integrative processes in research carried out with one purpose - to reduce to a common denominator the increasing volume of empirical and theoretical knowledge and progressive disciplinary fragmentation and differentiation of science. It is clear that at different historical stages of the integration of knowledge took place differently. The subject to the overall logic of scientific cognitive activity that is evolving from an encyclopedic cummulativism of classical science to modern methodological pluralism [2, 23].

Cognitive-value potential of interdisciplinary integration and synthesis of knowledge is being investigated through synthesis of general evaluation criteria, including cognitive capacity, which is characterized by the concepts of "rationality," "objectivity," "scientific independence" and axiological (value) potential, expressed categories of "morality," "scientific theory of beauty", "practical," "universal significance".

The central problem of modern philosophy of science is the ratio of different methods and synthesis of knowledge and scientific classification. This is due to a partial loss of integrity of the scientific world and to the specific regulatory agencies in various fields of research. Finding ways of unity of science, the problem of differentiation and integration of knowledge acquired axiological color. Modern science is changing rapidly; using new methods, technologies and approaches which

in terms of axiology are not always positive and justified. Therefore integrative processes in the field of scientific knowledge of nature and man are consistent with axiosphere of culture.

Cognitive-value potential integration of scientific knowledge is studied from different perspectives. First, reinvented classical understanding of "objective" science, the role of subject knowledge, questioned the possibility of achieving reliable knowledge "rigorous" science. It refuted the view that socio-humanitarian sciences are less objective than natural. It has become a common notion that all knowledge is based on values and norms. The idea that new approaches must lead to subjectivism, relativism or nihilism was rejected.

Second, the question of true knowledge, on one hand, is the key to science, but on the other, there are different criteria of truth. Scientific truth is not so much related to the external world, but the use of "right" methods in the study. Moreover, truth is no longer a prerogative of science alone, as was the value relevant, that purport morally and aesthetically significant.

However axiosphere of scientific knowledge from the beginning of science cognitive-value potential has given the priority (in full accordance with the traditional dominance of rationality and scientific interpretation of philosophy). Only in the twentieth century, when humanity faced negative implications of value-neutral understanding of knowledge, post-non-classical science was formed by opening a new, more versatile integration processes.

Thus, exploring integrative processes in science, it is necessary to consider cognitive-value potential that is not only highly informative, but also ethical, aesthetic. The processes of integration and synthesis of interdisciplinary become effective and lead to the construction of a single, coherent system of scientific knowledge only if they meet the epistemic criteria of truth and value.

Integrative differentiation processes in the background of "two cultures" in the classical methodology based on the concept of "two cultures" (Ch.Snow) analyzes the concept of general supporters and opponents of integration, especially those who were convinced on the possibility of using a methodology developed in the natural sciences field toward human cognition, and those who insisted on creating a fundamentally different type of science and methodology.

Dichotomous contrast between the "two cultures" had both positive and negative consequences. It contributed, first, in-depth understanding of methodological potential of the natural sciences and the establishment of methodology fundamentally different from that of the human sciences, but at the same time, and secondly, it hardly raised the question of possible integration of "two hemispheres of intellectual globe" on some single basis.

It should be noted that knowledge in the social and human sciences and the sciences of nature has similarities. They both are scientific knowledge. The difference is in the special sense of subject areas: science prevailing attitude in the maximum clearing the object of all subjective values, while the social and human sciences subject can include person’s of conscience, freedom, sensuality. Fixation of the subject and its study involves the use of specific methods, approaches and cognitive procedures, but they still have to be scientific, meet the criterion of truth.

Despite the complexity of the subject of social and human sciences reliable guidance on its study, searching law is a mandatory characteristic of the scientific approach that is not always taken into account by the supporters of "absolute specificity" of humanitarian and socio-historical knowledge. Often such opposition is carried out incorrectly because there is a difference between "social and humanitarian knowledge" and "scientific social and humanitarian knowledge." The first contains the results of not only scientific research, but other non-scientific forms of creativity, while the second includes only scientific research [3,123].

Overall, however, classical science is not rejected the possibility of the creation of a single, holistic scientific knowledge. To come anywhere close to this idea, it was necessary to answer the question: Can the humanitarian ideals meet scientific criteria? There are two possible answers. First, if the humanities always involve the connection between science and other elements of axiosphere of a culture (art, religion, morality, etc.), it inevitably raises the question of their scientific "truths." Secondly, the recognition accuracy of the phrase "human sciences" implies rethinking of the traditional understanding of the nature of science itself.

In addition, despite the dichotomous relationship between "two cultures" actually the enrichment methodologies took place: on one hand, natural science methods penetrated into the economic, social, humanitarian field of knowledge, promoting the growth of their scientific status, on the other, purely humanitarian methodological developments contributed to the formation of new methods in science (systemic, structural and functional, game theory, etc.).

So, classic science recognized the legitimacy of the existence of not only natural but also the humanities, although very skeptical and cautious attitude to the recognition of their academic status. Despite this skepticism, its methodology left a niche for relatively independence of social and humanitarian sciences, and thus made possible their integration into the overall structure of science [4, 145].

Non-classical attempt to integrate scientific knowledge: *the search for the foundations of rapprochement* refers to new approaches to the interpretation of Integration of scientific knowledge developed in terms of non-classical methodological paradigms.

Describing the two previous stages of the (classical) science related to two scientific revolutions (during the rule of the mechanics and the formation of disciplinary science organized). Many historians of science drew attention to the fact that during the second scientific revolution the global problems of integration as a precondition of scientific knowledge emerged. The point is that the mechanistic world view is no longer general; every natural science began to develop its specific picture of reality other than mechanical.

Even more complicated problem in non-classical period of science (late 19^{th} - mid 20^{th} centuries.), when a number of new revolutionary changes (opening divisibility of an atom, the formation of relativistic and quantum theory, genetics, cybernetics and systems theory, the concept of non-stationary universe) radically changed ideals and the rules of science. Now ontological postulate of science is impossible to interpret beyond performing techniques that were used in the process of learning that is to some extent subjective aspects of cognitive interaction. The field of natural science (especially in quantum-relativistic physics) held such transformation.

Non-classical paradigm of science was based on the thesis that one and the same reality can be investigated by different methods. It challenged the idea of classical science about existence of a single method of scientific knowledge. A widespread belief that methods substantially dependent on the object of knowledge, they have historically changed. This relativization made possible methodological bases for humanities to automatically improve their academic status and expand space integration methodological ideas, approaches and principles.

Non-classical methodology somewhat re-imagined the traditional division of natural science and humanitarian spheres of knowledge. A critical review of previous concepts and the classification of varieties historical approaches to this problem changed the nature of the coexistence of natural science and the humanities. It became clear that initially the emphasis was on unscientific humanities, which in turn protects their fundamental difference from natural science (neohermeneutics). There were attempts to direct transfer methodology of science in socio-humanitarian (positivism) sphere, reconsider the function of scientific language, which could be the basis for further understanding and convergence of scientific fields, etc.

Thus, the study assumptions and methodological principles of integrative processes in the context of non-classical type of science has shown that the very possibility of integration and synthesis of interdisciplinary science based on the rejection of absolute opposition of subjective and objective aspects of cognitive activity, the requirement to consider the impact on the specific knowledge.

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Богдана Манчул

Інтеграція наукових знань і проблема міждисциплінарного синтезу

У статті досліджуються проблеми міждисциплінарного синтезу і форми актуалізації процесів інтеграції в науці. Розкрито сутність, історичні різновиди, світоглядні та методологічні засади інтегративних тенденцій, когнітивно-ціннісний потенціал інтеграції та міждисциплінарного синтезу наукового знання. Показано, що незважаючи на жорсткі критерії науковості, розроблені класичною методологією, від самого початку робилися кроки до взаємозближення «двох культур» – природничо- та гуманітарно-наукової. Проаналізовано специфіку некласичних. Доведено, що послаблення критеріїв науковості дало можливість гуманітарним наукам утвердити свій теоретичний статус.

Процеси диференціації та інтеграції нерозривно пов'язані, виражаючи дві головні тенденції розвитку науки: намагання пізнати світ як єдину цілісну систему та потребу в детальному (дискретному) його вивченні, з'ясуванні своєрідності структурних елементів і зв'язків між ними. Більшість учених схиляється до думки, що жодна конкретна наукова дисципліна не володіє засобами, які гарантували б отримання світоглядно повноцінного знання, всеохопного пояснення світу, в якому живе людина, та її місця в ньому. Звідси – нагальна потреба в осмисленні природи інтеграції та міждисциплінарного синтезу в науці, з'ясуванні в цьому процесі методологічної ролі філософії.

Ключові слова: гуманітаристика, дискурс, інтеграція, картина світу, методологія, міждисциплінарність, наука, потенціал, природознавство, синтез, філософія науки.

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