

# The Historical Epistemology as a Philosophical Reflection of the History of Science: the Normative and Descriptive Approaches

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**Abstract**—The following article deals with three problems of the historical epistemology in the context of distinction of the normative and descriptive approaches. The first problem concerns the configuration of descriptive and normative vectors within the single conception. Their possible combinative variants are studied. The second problem is the relationship between descriptive approach and relativism. The third one is the problem of revealing the specifics of research positions in the historic-scientific analysis, the essence of descriptive and normative approaches in each of them, definition of textual sources of their formation.

**Keywords**—*philosophical reflection; history of science; descriptive and normative approaches; relativism; realism; research positions; meta-epistemology*

## I. INTRODUCTION

Understanding of normative and descriptive approaches was formulated in the decision theory, economics, political science and other disciplines. In the historic epistemology it is used by E. Agazzi, B. Latour, and etc. In terms of Agazzi, the normative approach is the preliminary one and fixes the initial concept of knowledge, "it amounts first to some determination of the concept of knowledge, that is, to making sufficiently precise what is knowledge, and this secondly also determines what requirements something must satisfy in order to deserve being qualified as knowledge. The descriptive aspect consists in scrutinizing how knowledge comes about, through which steps, under what conditions and according to what criteria it can be believed to obtain"[1].

## II. CONFIGURATION OF NORMATIVE AND DESCRIPTIVE APPROACHES

The study of historic epistemology in the given context supposes a number of problems. The first one is possible combinations of descriptive and normative moduses within the single conception. Agazzi emphasizes that these two aspects can be distinguished only analytically, but they are interconnected particularly. However, is the descriptive approach possible in a pure form, without any normative contributions? The study of such kind seems to be possible.

E.g. T. Kuhn in his "The Structure of Scientific Revolutions", on the one hand, describes the work of a scientist in the period of normal science as puzzle solving and clarification of problem solving within the common paradigm. "At one time or another, these significant factual determinations have included: in astronomy — stellar position and magnitude, the periods of eclipsing binaries and of planets; in physics — the specific gravities and compressibility of materials, wave lengths and spectral intensities, electrical conductivities and contact potentials; and in chemistry — composition and combining weights, boiling points and acidity of solutions, structural formulas and optical activities" [2]. On the other hand, he presents discoveries as realization and interpretation of anomalies and describes, to say, experiments by Priestley and Lavoisier having resulted in oxygen discovery, Roentgen and Maxwell experiments contradicting physics paradigms of their time, Copernican research breaking Ptolemaic paradigm in astronomy in course of time, etc.

Is the research a descript in a pure form? In my opinion, it is not, because the given description is carried out within the theoretical discourse preceding the empirical research and including such concepts as paradigm, normal science, and anomaly. The considered discourse determines selection of the actual material for analysis and its interpretation. E.g. in contrast with history of science realizing the cumulative model, Kuhn includes researches within Ptolemaic theory and Black and Shelly experiments, having being carried out to confirm the phlogiston theory, and other scientific practices outside the corpus of modern science, in his description. The same refers to selection and interpretation of scientific events having led to scientific revolutions.

A more difficult case from my point of view is the analysis of scientists' activities carried out by Bruno Latour and Steve Woolgar in their work "Laboratory Life. The Construction of Scientific Facts". [3] The work describes everyday life of the particular biological laboratory as it was examined by an anthropologist. The first layer of the observation is the trajectory of movement and communication of scientists from one sector of the laboratory to another and inside them. It is shown that at the end of each day the employees transfer documents from a

technical sector to the office one. The second layer is a description of the content of their activities. The distinguish is made between manipulations with animals and production of texts. It is shown that the results of the manipulations processed on computer are presented in the form of graphs and diagrams. They are used for further argumentation in discussions and papers. Then the scientists compare the things which were made in their laboratory and other laboratories. Thus, "the pure" description of research practices seems to be evident. Nevertheless, based on the interpretation of descriptive and normative approaches by E. Agazzi, taken by me as initial ones, it is not so. After all, in the given research the normative component is present implicitly, that is some model of knowledge and methods of its obtainment, and, partly, the model of knowledge and methods of anthropology — field research, examination of written and oral sources. As well as the net analysis developed in social psychology and communication theory is of great importance. It is this method that orients towards on the study of communication links and movement trajectories of the group members.

The role of the normative component within the descriptive approach is clearly visible, to say, in the analysis of evolution of natural and social history undertaken by M. Foucault [4]. So in the field of natural history he describes the structure and development of Cuvier and Lamarck views, in the field of economic knowledge - works of Ricardo and Marx. Differences between these conceptions are clearly marked in the traditional methodological analysis. Thus, Cuvier is commonly considered to be a supporter of classification approach, and Lamarck is referred to evolutionists. But the author of archeological analysis aims to reveal the similarities not differences between these theories. After all, they both were created within the single episteme - the classical one, and this defines invariance of forms, a quantity and spatial relationship between elements of the language in which the description of living things are made. The same can be referred to the similarities not to the differences between conceptions of Ricardo and Marx. "For both scientists the main theme is the relationship of anthropology and history", we can read in "The Philosophical Encyclopedia", "where history is considered as possibility of liberation from the power of anthropologically limited ultimate being. Only Ricardo understands history as leading to the ideal balance between production and consumption and then fading away, on the contrary, according to Marx, history speeds up, leads to expansion of economic production and increasing of number of working people, deprived of basic necessities and therefore able to abolish old history and start the new one. And so idyllic stabilization of history and its revolutionary destruction are two answers to the same question resulting from commonality of archaeological soil" [5]. It is evident that ideas about episteme serve as the theoretical frame which determines selection and interpretation of theories, just as in natural science theoretical constructions determine selection of empirical facts and the structure of the experiment. Thus, no historic description is possible — if we refer to epistemology, the conclusions which it draws for other sciences — without theoretical models having regulatory

character, whether it is a model of historic research or a model of scientific knowledge.

Another aspect of the considered problem is the impact of the image of historically understood science on the society in general and on the science in part. This impact called the political one (in terms of the given paper - regulatory) is studied, for example, by S. Fuller. The most interesting in the given context are the studies revealing how the relativism recorded in the epistemology impacts (or does not impact) on the ethos of a scientist. Apparently such impact exists. We can quote the outstanding philologist F. F. Zaliznyak. "Nowadays for regret", he said, "two old banal ideas went out of fashion: 1) the truth exists and the aim of science is its search; 2) in any issue under discussion a professional is more right in the normal case than an amateur. Today they are resisted by new, much more fashionable positions: 1) there is no truth, there are a lot of opinions; 2) nobody's opinion weighs more than the opinion of anybody else" (quoted by [6], [7]). But the impact of historic epistemology on the ethos of a scientist, partly on the idea about the truth as a value, is indirect, on my opinion. The most important factor of corrosion of ideas about the truth as a value of the scientific research is revolutionary events in the science itself, and the conclusions of historic epistemology are only on the second place (being to a large extent a reply to revolutions in science).

### III. RELATIONSHIP OF THE DESCRIPTIVE APPROACH AND RELATIVISM

The second problem is the relationship of the descriptive approach and relativism. The descriptive mindset representing, for example, in the works of sociologists of science T. Kuhn, B. Latour, A. Koyre and others seems to lead to relativist conclusions definitely. But such relationship is not so immutable. Let us to consider the proper solutions of the problem of relativism (and relating to it the problem of realism) in their combination with the descriptive (historic) approach. So, in the works by G. Bachelard we find the mindset of combining the rationalism and realism. He remains a rationalist as he defends the idea of the scientific progress associating it with mathematization of science. However, the definition of rationalism is revised by him that is why this is about "new scientific spirit". He puts forward a concept of "the applied rationalism" according to which the object of the rational science is a construct, "the second reality" which is different from the reality given in the sensual experience. Thus, a new concept of reality as a construct is introduced signifying the movement to relativism. At the same time, he formulates the requirement to appreciate the past from the point of view of "new scientific spirit", believing that the knowledge realizing new bases does not reject previous knowledge but allows covering "the dark places of incomplete knowledge with feedback light". In the given mindset the acceptance of possibility of obtaining the objective knowledge is evident [8].

A. Koyre continues the rationalist tradition combining it with historicism. On the one hand, he reveals the hidden axiomatics of science (philosophical ideas about space, time,

movement, etc.) and shows their temporal, historic nature. Moreover, he interprets the revolution of the New Age in the pure anti positivist and anticumulative spirits, showing that creation of "new science" is not resulted by revealing the new facts but Galileo's addressing to Plato's tradition and rejecting of Aristotelian ideas. Thus, A. Koyre distinguishes philosophical and scientific theories, for example, Pythagorean-Platonic ideas and the theory of motion of Galileo, from the point of view of "the scientific" and "the non-scientific" as well as the degree of accordance to reality. The given interpretation can obviously be the argument in favour of relativism, but Koyre himself is far from such radical conclusions. After all, on the other hand, he interprets science as mathematical knowledge about nature, free from the influence of social, psychological and aesthetical factors.

Accentuation of the descriptive approach is found out in G. Canguilhem's conception, the former being manifested in critics of cumulativism and theologism, the requirement to take in the account "the cultural framing" of science, ideological loading of ideas and conceptions [9]. There can be fixed the moving to relativism, we mean the very strict distinction between science and reality and fuzzy distinction between science and scientific ideology. At the same time Canguilhem does not reject the idea of objectivity and assessment of knowledge from the point of view of genuine science. This apparently follows from the purpose of sociology formulated by him - to reveal the conditions for forming the notions and theoretical positions from the point of view of retaining the status of science for the active past and abolishing of false ideas. The presence of an assessment component is manifested by the statement about consistency of the model of a school or a court as a methodological basis for the historic epistemology.

The relativism is not so unambiguous in the works of B. Latour and S. Woolgar referred to the follows of the strong version of social constructivism by a number of scientists. Latour and Woolgar state that historic conditionality and variability of scientific knowledge do not mean recognition of all statements as equally hopeless. Also, on their opinions, initially scientists deal with the statement about an object, but in the process of stabilization of the fact they begin dealing with the object itself. Thus, they say not about ontological but scientific reality. According to the correct remark by Y. S. Morkin, the constructivism and relativism presented in the works of Latour and Woolgar are methodological not ontological [10].

Certainly, there are a number of works where the relationship of descriptivism and relativism is presented more evidently. It is about H. Metzger conception. To her mind, the change of theories is based, first of all, on the change of metaphysical conceptions, as well as the impact of scientific disciplines, social and social-psychological factors - features of scientific communication, education, etc. Metzger considers historical types of knowledge (including alchemy, mechanist chemistry etc.) from relativist positions as the equivalent ones [11].

However, it should be stressed that a number of researchers realizing the descriptive approach simply leaves

the issue of the truth of scientific knowledge behind brackets. So, M. Foucault wrote about neutrality of "an archaeologist" in the issues of knowledge assessment and his disinterest in this sense in description of epistemes. As a matter of fact, the problem of relativism is left behind brackets of historic research in T. Kuhn's "The Structure of Scientific Revolutions"<sup>1</sup>.

#### IV. RESEARCH POSITIONS WITHIN THE DESCRIPTIVE AND NORMATIVE APPROACHES

The third problem is the issue of distinction at least of three positions of historic-scientific analysis, i.e. the position of a researcher fixing the scientific practice and its reflection; the one of historic epistemologist reflecting the history of science development and finding out the sources and factors of theoretical and ideological conclusions of a scientist and their changes; the position of a meta-epistemologist solving the issue of the features, development conditions, status and tasks of historic epistemology itself. In spite of the actual synthesis of positions in the certain conceptions, these distinctions make it possible not only to consider the issue of relativism and realism (as it was done in the quoted work of Y. S. Morkina), but also define the features of tasks, methods and textual sources which are adequate to each position. Herewith the normative and descriptive approaches can be identified in each position. So the descriptive approach of the first position is characterized by description of activities of scientists and their results reflected in scientific theories, as well as by scientist's etos and reflection. The method of research is rather ethnographic than epistemological. The work of such kind was done, to say, by Bruno Latour and Steve Woolgar in the work considered above "Laboratory Life. The Construction of Scientific Facts". Describing the etos and reflection of a scientist, it is not possible to do without the analysis of epistolary heritage, communications and discussions of scientists. The regulatory part of the first research position supposes as a minimum the availability of factors for material selection based on the knowledge of scientific events and understanding of their importance, as well as the selection of research methods. A descriptive research in the position of an epistemologist is the analysis of evolution of scientific activity and its results in their historical variability. Here revealing and representing of factors of this variability occur. It is the position that most authors considered in the given article take. They are A. Koyre, H. Metzger, T. Kuhn and M. Foucault. Some of historic epistemologists give a picture of historical variability of scientific research not covering the issues of causes of this variability (e.g. T. Kuhn and M. Foucault), some of them reveal the given factors and logic of varieties (e.g. A. Koyre and H. Metzger). The given studies are certainly not free from regulatory component. As it was shown above, they can be different concepts (e.g. episteme, paradigm), models of historical changes (e.g. alternation of normal and revolutionary periods) or a model of scientific research (e.g. mathematization as a sign of scientific knowledge). As for textual sources, they are scientific theories, texts on the history of science, history culture, etc. The position of a

<sup>1</sup> This discourse appears only in the course of further discussion.

meta-epistemologist is presented, for example, by the discussion in the journal "Epistemology and history of science" dealing with the history of formation of epistemology, collisions and problems arising in the course of its development, the impact of the given philosophical discipline on science, philosophy and culture, etc. [12]. This article is nothing but a meta-epistemology.

## V. CONCLUSION

It seems that the distinction of the normative and normative approaches is heuristic enough. It made it possible to identify or at least to specify the methodology for analysis of such important issues of epistemology as relativism and realism, to reveal the influence of epistemology conclusions on the ethos and behavior of a scientist. The distinction of the given approaches and research positions within each of them allows, on the one hand, to systemize the current conceptions, and, on the other hand, to create the methodology and meaningful attitude when constructing one or another variant of the history of science or a version of historic-epistemological analysis.

## REFERENCES

- [1] E. Agazzi, *Epistemology and the Social: A Feedback Loop*. Poznan Studies in the Philosophy of the Sciences and the Humanities, 2008, 96 (1), pp. 27-28.
- [2] T. S. Kuhn, *Structure of Scientific Revolutions*. International Encyclopaedia of Unified Science. Foundations of the Unity of Science (Volumes I—II of the Encyclopaedia), Volume 2, Number 2. 1970 by The University of Chicago, p. 25.
- [3] B. Latour., S. Woolgar, *Laboratory Life. The Construction of Scientific Facts*. Princeton, New Jersey, 1986, 294 pp.
- [4] M. Foucault, *The Order of Things: An Archaeology of the Human Sciences*. Routledge Classics, London and New York, 2002, 422 pp. M. Foucault. *Les mots et les choses. Une archeologie des sciences humaines*. Callimard, 1966, 404 pp.
- [5] "The Words and the Things". Interpretations, Philosophical Encyclopedia. URL: [https://dic.academic.ru/dic.nsf/enc\\_philosophy/9092/](https://dic.academic.ru/dic.nsf/enc_philosophy/9092/) Слова (accessed 12.10.2018).
- [6] T. A. Varkhotov, *Against Relativism: Historic Epistemology in Search of Universals*, *Epistemology and Philosophy of Science*, 2017, Vol. 51, № 1, pp. 33–38.
- [7] A. V. Markov, *The Birth of Difficulty. Evolution Biology Today: Unexpected Discoveries and New Issues*. Moscow, Astrel, 2010, p.347.
- [8] G. Bachelard, *The New Scientific Spirit*. Beacon Press, Boston, MA, 1984, 190 pp. G. Bachelard, *Le nouvel esprit scientifique*. Paris, Les Presses universitaires de France, 10 édition, 1968, 181 pp.
- [9] G. Canguilhem, *The History and Philosophy of Sciences*. Paris, J. Vrin, 1968, 395 pp. In French: G. Canguilhem, *Etudes d'histoire et de philosophie des sciences*. Paris, J. Vrin, 1968, 395 pp.
- [10] Y. S. Morkina, *Constructivism of B. Latour and S. Woolgar - on the Crossing of Scientific Disciplines*, *Epistemology and Philosophy of Science*, 2010, Vol. 24, №2, p. 146.
- [11] H. Metzger, *Chemical Doctrines in France From the Beginning of the 17th Century to the End of the 18th Century*. Paris, 1933, 452 pp. In French: H. Metzger, *Les doctrines chimiques en France du debut du XVII si ècle a la fin du XVIII si ècle*. Paris, 1933. 452 pp.
- [12] Panel Discussion, *Epistemology and Philosophy of Science*, 2017, Vol. 51, №1, pp.18-54.