

DEMARCATIION OF SCIENTIFIC KNOWLEDGE AND ITS IMPORTANCE

R. A. YARTSEV

rust-66@yandex.ru

Ufa State Aviation Technical University, Russia

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Abstract. The problem of demarcation of scientific knowledge, its criterion and value for human practice are considered in this article. We introduce a new criterion of demarcation as a universal rational method which frees skepticism of scientific knowledge from the limitations of falsificationism. This criterion is justified by the traditions of science, common sense and rules and regulations in an organization. The value of scientific knowledge in terms of skepticism is shown, which explains the need for demarcation.

Keywords: knowledge; method; science; truth; criterion; demarcation; skepticism; falsificationism; anarchism; common sense.

1. INTRODUCTION

It is known that science is a universal value and its reputation is very solid. But still, is it impartial? Searching for the answer to this question gives rise to two issues which the philosophy of science studies. The first of them is related to the demarcation of scientific knowledge and finding its criterion: how scientific and non-scientific knowledge as well as relevant forms of knowledge differ? The second issue concerns the value of the demarcation: to what extent is it necessary to separate the scientific and non-scientific knowledge and whether one kind of knowledge has advantage over the other?

This article is devoted to these issues. We draw the reader's attention to the fact that the establishment of the demarcation criterion of scientific knowledge reveals the connection between science and human logical thinking, and thereby contributes to the promotion of artificial intelligence creation.

2. CRITERION

From the classical science efforts have been sustained to find a method of knowledge that would be universally applicable and allowed to establish the truth, freeing our knowledge from error: it is obvious that the search for truth should be carried out at the same time, together with its justification. The presence of such a method would solve both problems of demarcation of scientific knowledge, but only on condition that the rationale for the truth is exhaustive and its reliability, in this way, is beyond doubt.

However, Popper has shown that absolute certainty is not possible to achieve because of infinite regress, because the truth of each found justification in turn is at issue and requires new studies [1]. Therefore, skepticism becomes the only reasonable position concerning any scientific knowledge, including – methods of the scientific knowledge. And such a position would mean that not only the basis for opposition of scientific knowledge against unscientific by reliability disappears, but also the need for appropriate demarcation of scientific knowledge.

To save both, Popper tries to overcome skepticism by falsification, which he considers not only as a means of eliminating disproved hypothesis from science, but also connects with his demarcation criterion requiring the fundamental possibility of its refutation from each scientific theory. However, the first contradicts to the doctrine of the unreliability of scientific knowledge (fallibilism) as a refutation of a hypothesis can be considered a proof of the opposite position, and the second removes a number of hypotheses from the scientific knowledge that claim to be the truth, the very notion that falsificationism uses very reluctantly. Same drawbacks are characteristic for the theory of another major representative of this school I. Lakatos [2].

In our opinion, it is meaningless to deal with skepticism in science, because the circle of arguments involved in each study is limited by experience and capabilities of its members, so that there can be neither decisive evidence, no final rebuttal. But this fact should not prevent from establishing a

relative truth on the issue studied, so the universal scientific method, despite the hypothetical nature of any statement of science should include logically opposite criteria of the truth and falsity of knowledge, thereby serving not only as a criterion of demarcation, but also as a means of rational justification of scientific knowledge.

This is the procedure, we have derived as a universal method of science, which includes the steps of the question formulation, hypothesizing, validity testing and obtaining an answer as new knowledge, as well as methodological doubting the truth of the answer received. From testing, in accordance with the principle of consistency of scientific knowledge, each hypothesis is recognized: a) true, if among the received and not disproved argument there are confirming arguments and there are no disproving arguments during the checking and confirming; b) false, if there are only disproving arguments; c) likely or obvious if there are arguments of both kinds. The answer to the question is generalization of the test results of all hypotheses, and according to the principle of skepticism it should be realized as a temporary, intermediate stage on the way to absolute knowledge [3].

Thus, scientific research is not completed by obtaining absolutely certain knowledge, although it is performed according to the rational intersubjective program: so the philosophical position underlying the scientific knowledge may be designated as a rational skepticism. This position overcomes the disadvantages of falsificationism because the relative character of disproof prevents from removing false positions from science and thereby does not hinder the search for the truth, while the use of a rational method preserves the ranking of scientific knowledge according to their relationship to the truth needed in applications [4, 5]. However, at the same time there is a need to prove the universal method itself, and the value of the demarcation carried out with its help, as skeptical interpretation of scientific knowledge levels the scientific and unscientific knowledge in terms of the reliability of the result: these problems are solved in the following sections.

3. RATIONALE

The main argument in support of the universal method of science that we introduce is that it is the result of synthesis of the scientific knowledge rules that may be considered historically and culturally invariant. Many of these standards are already fixed in the philosophy of science because of falsificationism. Thus, scientific research begins with a problem, and the main place in it is the hypothesizing and testing the hypotheses – in fact the

scientist doesn't have an answer to this question yet at the start of the research and therefore he is forced to guess it first by intuition, and then to justify it rationally.

The role of falsification in scientific knowledge is extremely important since the study cannot be considered complete without regard to the known or suspected arguments of opponents. It only remains to: first, level the force of evidence and disproof, thereby restoring their peculiar symmetry for all testable hypotheses. Second, restore skepticism in respect of disproof, because the rules of science do not allow any statements out of the constructive criticism. We took these improvements into account in the construction of scientific knowledge.

However, why has the formulation of this procedure not been known yet? The fact is that this procedure brings together the academic standards of a very high degree of generality and can itself be regarded as such a rule, and this alone allows us to label it as one of the ethical principles of the search for scientific truth. It is known that ethical principles are rarely rendered in the form of regulations, but mainly distributed implicitly, by means of examples of teachers and mentors [6, 7]. Thus, the universal scientific method may well exist only as an implicit intersubjective knowledge of scientists: in this case it is up to philosophy of science to identify and describe it.

But can a method become so widespread implicitly, to become the intersubjective knowledge of scientists? With the methods of particular sciences in mind definitely no. However, this can be imagined for the general scientific method that is simple, clear and, most importantly, consistent with our nature so that any other course of action other than that seems unreasonable. An analogy with the implicit method of versification is applicable here, based on the selection of rhythmic sound, it spreads everywhere because everyone is easily initiated into this method on numerous examples and doesn't see any viable alternative to it in poetry.

In other words, not only the content but also the provision of universal method of science will get a convincing rationale, if the compliance of this method with human common sense is proven, i.e. with the sustainable human intersubjective notions of immutable truth. Similar studies have already been conducted by philosophers of the Scottish Schools of thought [8], but it was already borne in upon Kant that notions of common sense are contradictory and though he himself often appeals to "common sense," at the same time he warns against referring to the 'judgment of the crowd' [9]. Therefore, the task of universal justification of the scientific method cannot be solved by considering the

common sense as a coherent structure of the basic human knowledge.

The solution that we propose is based on the difference between the cognitive and practical common sense. The main principle or objective of the cognitive common sense – is to achieve truth, free from any error, i. e. absolutely certain knowledge: theoretical reason conducts research guided by this principle, finding more meaningful answers to the question under study. On the other hand the main principle of practical common sense is a useful set of goals at a given time, which practical reason aims to achieve, requiring the certainty of knowledge for this [10].

As can be seen, the cognitive goal is a special case of a practical goal and achieving it is also useful. Therefore cognitive common sense can be considered as part of practical common sense, and the process of knowledge – as a kind of practice: thus theoretical reason is not only subject to practical reason and its main principle, but also acts as this reason for one of the human activity areas. Hence it is clear that, firstly, the relationship between theoretical and practical reason must be built according to the principle that Kant called "the primacy of practical reason" and, secondly, the source of agreement between these two kinds of reason is that the senior of them, obeying its own common sense, understands the importance of obtaining reliable truth for beneficial purposes and considers the necessity to overcome error with the help of argumentation.

However, these relations feature not only agreement: it is well known that the establishment of the truth, as theoretical reason understands it, requires regression to infinite argumentation, and practical reason cannot admit it because of other useful purposes that should be achieved. Therefore, it limits the activity of theoretical reason by introducing "obvious" statements that start to act as a basis for scientific research. In addition, the practical reason "filters" problems that are selected for the study as well as the scientific results, sweeping away all the "impossible" and "useless." Unlike theoretical reason it doesn't consider the accepted knowledge to be a relative truth and attaches absolute value to it, refusing further doubt, and draws on this result in other cases.

Thus, the universal method of science is not a method of theoretical reason only and it is not derived solely from the cognitive sense, it represents a compromise between the different types of human sanity, thereby seeking reliable truth is realized through research as specific actions that are profitable and commensurate with their natural power. The consistent nature of this compromise is provid-

ed by different interpretations of scientific knowledge by two kinds of intelligence: if theoretical reason considers each statement of science as a relative truth, which must be taken in order to make a temporary stop on the way to the completely full and valid knowledge, then on the other hand practical mind sincerely believes in the absolute value of such truth as it is, because it doesn't accept the opposite. Hence it is clear that, subject to practical reason, theoretical reason delays its operation only temporarily, whereas in Kant's doctrine, it is forced to violate the principles of its operation going beyond the experience to expand our knowledge in practical terms [11].

This is confirmed by the fact that the work of various organizations that are responsible for establishing truth is based on the general methodology of scientific knowledge, derived in our methodological procedure. One such organization is the dissertation committee, whose purpose is to verify the qualifications of a researcher through their own collective study on the same issue while the defender of thesis confirms the overall conclusion of thesis, opponents disprove and the final conclusion, which can be further appealed, is formed by all members of the committee based on individual assessments. Another well-known example is the court proceedings, the order of which has a similar structure [12, 13].

Therefore, the universal method of scientific knowledge is applied outside of science, which, in our opinion, can only be explained by its conformity with cognitive common sense of human nature, the principles of which are largely supported by practical common sense as well. We now consider the question of the significance of the scientific method as a criterion of demarcation.

4. VALUE

In our view, in terms of skepticism the demarcation of science from all other cognitive practices is necessary for the following reasons. Firstly, the role of scientific rationality in human life is irreplaceable. Of course, one cannot live on by rational rules only, but it is often useful to follow them and it helps to avoid a great many errors. For example, we owe many achievements of human progress to the rational methodology of science. Secondly, among all cognitive practices, scientific knowledge has the highest human values. The generality of science, in our opinion, determines its exclusive rights in the areas of public education and financing. Thirdly, none of the cognitive practices suffer from the violations of methodology to such an extent as science: the complex structure of logical links within the scientific knowledge leads to the

fact that the "foreign elements" entails causal "infection" of all the knowledge. Thus, the demarcation of science is crucial.

However, the existence of a universal method meets the objection of many specialists in the philosophy of science. The concept of Feyerabend's "epistemological anarchism" carries weight here [14], which blurs the boundaries between scientific and non-scientific knowledge, allowing violation of any cognitive rule and even justifying this need for the progress of science. We try to find out what consequences such a decision leads to.

Establishing its relationship with anarchism in politics will help us to reveal the essence of "epistemological anarchism": if we apply the Feyerabend's principles in this sphere, it becomes clear that he proposes not to abolish the laws themselves, but only their enforceability. At first glance, such a position, indeed, seems to be more moderate than the radical anarchism, that denies the need for legislation, but essentially it leads to the same devastating consequences, releasing from liability for wrongful acts. Permissiveness in any manner is detrimental to the interests of every member of society, so the anarchist ideas in politics are no longer popular: now we discuss them in relation to epistemology.

Our main objection to anarchism is that it destroys the rationalism of science, without offering anything in return. Admitting methods in scientific knowledge, contrary to the accepted standards, it destroys cognitive practice, based on cognitive common sense, as well as its socially significant demarcation, after which epistemology loses the tiniest part that strictly adheres to the rules of rational science. Such actions in the legal system would also lead to its destruction.

Whereby unscientific knowledge doesn't benefit from providing irrationalism with complete freedom either. Firstly, any cognitive practice can evolve freely as it is outside of science. Secondly, these practices also actualize this mixing of scientific and non-scientific methods of cognition proposed by anarchism. Thirdly, the principle of "everything is permissible" does not disclose any new methodology in knowledge besides the already known opposition of rational and irrational.

Thus, the "epistemological anarchism" reduces cognitive capabilities due to the destruction of rational cognitive practice that cannot be compensated. However, the principle of "everything is permissible" is not able to destroy the need for rational knowledge and it will be necessary to introduce a new cognitive practice to meet this need, in which the same rules will be carefully followed, and then bear the costs of organizational promotion

of such a practice. Therefore, a more economical way to maintain the rational tradition is still in the preservation of the existing science.

The second objection is that "epistemological anarchism" justifies pseudoscience. Without rational norms in science there is no other way to bring demagogues and charlatans to justice who not only "mythologize" scientific knowledge, but also easily penetrate into education. So it is not surprising that even in the era of scientific revolutions [15] scientists actively resist the destruction of scientific traditions. And the general conclusion, at which we arrive here, is that the position about the introduction of anarchism in science contributing to its progress is false.

Here it may be noted that the methodology of science, as well as legal legislation is far from perfect, so its rules are also revised from time to time. However, the universal method of scientific knowledge as follows from its content remains as unchanged as the very foundations of legislation – because it reflects the cognitive sense of human nature, the evolution of which in the past millennium is not supported with reliable information. Therefore, the establishment of this method can be considered as part of the program on comprehension of human intellectual activity, and thus, the connection between the problem of demarcation of scientific knowledge with the general direction of the work on creation of artificial intelligence becomes apparent.

5. CONCLUSION

1. Among the issues that philosophy of science deals with can be the search of demarcation criterion of the scientific knowledge and clarification of its meaning.
2. Disadvantages of known demarcation criteria are tied to the limitation of skepticism, acting in scientific knowledge.
3. The procedure that we have derived as a general method of science, implicitly applied in each completed research study is devoid of such drawbacks.
4. This method reflects the intersubjective norms of science of all ages and cultures, and corresponds to cognitive and partly to practical common sense; it is used in the work of state institutions.
5. Its use as a criterion of demarcation of scientific knowledge is of fundamental importance because of the value of rational cognitive practice and the inadmissibility of its destruction by anarchism.

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ABOUT THE AUTNOR

YARTSEV, Rustem Albertovich, Assoc. Prof., Dept. of Automated Systems. Dipl. Systemotechnic (UGATU, 1988). Cand. of Tech. Sci. (UGATU, 1991).

МЕТАДААННЫЕ

Название: Демаркация научного познания и ее значение.

Автор: Р. А. Ярцев.

Организация: ФГБОУ ВПО «Уфимский государственный авиационный технический университет» (УГАТУ).

Email: rust-66@yandex.ru.

Язык: анлийский.

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Аннотация: Рассматривается проблема демаркации научного познания, ее критерия и значения для человеческой практики. Вводится новый критерий демаркации как универсальный рациональный метод, применение которого освобождает скептицизм научного познания от ограничений фальсификационизма. Данный критерий обосновывается традициями науки, здравым смыслом человека и предписаниями в работе организаций. Показывается ценность научного познания в условиях скептицизма, что объясняет необходимость демаркации.

Ключевые слова: познание; метод; наука; истина; критерий; демаркация; скептицизм; фальсификационизм; анархизм; здравый смысл.

Об авторе:

ЯРЦЕВ Рустэм Альбертович, доц. каф. автоматизированных систем управления. Дипл. инж.-с/техн. (УГАТУ, 1988). Канд. техн. наук (там же, 1991). Иссл. в обл. системотехники и ее философских проблем.