Eponyms in science terms (Epistemological aspect)

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Abstract. The paper is devoted to eponyms used in scientific discourse. The concept of the eponym is borrowed from linguistic research. The term is understood from epistemological standpoint. It is stated that eponyms realize two functions in the language of science – cognitive and communicative. It is also stressed that to some extend eponyms connect two worlds – the world of ideas and the world of people, or, more specifically, the world of abstract concepts and the world of scientists, who study these abstract concepts. Historical examples (cases) demonstrating some features of functioning eponyms are given and discussed. The main historical example for the study is the history of discovering Lorentz's transformations, which had a significant impact on forming the theory of special relativity. In addition, the paper gives the analysis of some other examples, in particular, related to such terms as Halley's comet, L'Hospital rule, Russell's paradox. It is noted that the fact of discovering some scientific object by one or another scientist in general is not the only reason for forming an eponym containing the name of this scientist. The formation of eponyms is influenced by many other factors, including social and political ones.

1 Introduction

The purpose of this paper is to try to consider the phenomenon of eponyms used in the language of science from the standpoint of epistemology (Cabanac, 2014; Garfield, 1983). A significant problem in this field is that eponyms related to scientific terms are mostly studied from a linguistic standpoint, and are quite rarely analyzed in epistemology. In this regard, we intend to focus most on the epistemological aspects of eponyms in science terms.

Let us say a few words about the methodology of our study. In fact, it includes three parts, which can be called linguistic, epistemological and historico-scientific. Accordingly, the basis of the study consists of:

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- existing in linguistics ideas about eponyms used in scientific discourse;
- propositions of epistemology and philosophy of science concerning the language of science and ways of its development;
- information from the history of science (mainly physical and mathematical knowledge).

The paper based on the case study methodology considers the history of the term 'Lorentz's transformations', as well as some other examples of eponyms.

The urgency of this study is proved by the need to understand the processes of science terms functioning due to the fact that the language of science can be considered as one of the most significant foundations of scientific knowledge. The study of historical, social and cultural features of science terms functioning can contribute to a deeper understanding of scientific cognition and its methodology.

2 Linguistic Propositions

The concept of the eponym is borrowed from linguistics, which is understood as denoting a scientific concept of the term that satisfies at least one of the following conditions (Kakzanova, 2011, p.3):

(a) it contains a proper name or a common noun;
(b) it is a result of metonymic transfer from a proper name by means of non-affixal way;
(c) it is an affixal derivative of a proper name.

Most often in eponyms anthroponyms are used as proper names, rarely – toponyms and names of other types.

In fact, the above conditions form three types of eponyms. Let us give examples of each of the three types.

Examples of terms of (a) type: *Russell's paradox, Monte-Carlo method, Gaussian method, Minkowsky space, Hilbertian space, Riemann's geometry;*

Examples of terms of (b) type are units of physical quantities such as *Newton, ampere, volt, ohm*;

Examples of terms of (c) type: *pasteurization, roentgenology, einsteinium, Confucianism, neo-Marxism* (Kakzanova, 2011).

3 Epistemological Standpoint

Eponyms, as well as the language of science, to which elements they belong, have two main functions: communicative and cognitive (Karnap, 2013, p.127). On the one hand, eponyms serve as means of effective communication, and, on the other hand, stimulate cognitive process (Kakzanova, 2011, p.18). At the same time, this cognitive process concerns not only the content of the discipline, but also the history of its development, as well as the social and cultural aspects of this development, to some extent (Whitworth, 2007, p.425). At least, eponymous terms expand connotative meanings of the term, giving these meanings historical and cultural content and providing an opportunity to use this content as a means of deepening and stimulating cognitive activity. Thus, speaking of fundamental theorem of integral calculus in Russian (the Russian version of this term contains the names of the scientists who introduced it – formula Niutona-Leibnitsa), a competent user implies not only the basic formula of integral calculus denoted by this term, but also the historical and cultural contexts of its introduction into mathematical circulation, perhaps even the controversy of I. Newton and G. Leibniz about the priority in making

integral calculus. In this sense, eponyms encode not only the concepts of a particular science discipline, but also some part of scientific history as well as history in general.

Eponyms imply a significant historical and cultural component in their semantics; thereby stimulating the expansion of the user's cultural horizons (Kakzanova, 2011). Eponyms focus our attention on the fundamental antropologism and sociality of special realities studied by various branches of sciences and science disciplines (Kakzanova, 2011). In this sense, the world of mathematics is not just a world of abstractions, but the world of abstractions generated by man. Mathematical abstractions in this regard appear to be dual objects in the sense that, on the one hand, they are the products of the human mind, social constructs, and on the other hand, they are entities, which can be used according to some sustainable patterns. All this proves objectivity and at the same time constructability of mathematical objects. In this case, a well-known in epistemology dilemma associated with the opposition of object and subject (as well as objectivity and subjectivity) is actualized.

Eponyms transfer the world of people into the world of ideas, the world of suprapersonal entities. Thus, we can talk about ambiguity (or semantic bidirectionality) of eponyms. On the one hand, they address us to the world of abstractions, and on the other hand, to the world of concrete entities. Often it happens that the eponym addresses both to the world of ideas and to the world of people. In a sense, eponyms connect these two worlds, not allowing them to break away from each other.

Communicative function of eponyms shows itself well because in some cases they transfer a part of its meaning from abstract concepts to iconic scientists related to these concepts. As a result, it is easier to use an eponym (for example, Fermat theorem, Laplace transformation, Cantor paradox) than the corresponding description. This is very important for particularly important and frequently used scientific concepts.

4 Case Study of Scientific Knowledge

A well-known Russian mathematician V.I. Arnold pointed to the eponymous principle, which is, perhaps, better called eponymous paradox and which consists in the fact that the man whose name is used to call an object of scientific knowledge and the discoverer of this object are generally two different people (Arnold, 2008, p.12, 48). Indeed, the fact of discovering an object by some scientist is not the only reason for developing an eponym with the name of this scientist. Thus, in the case of Halley's Comet, astronomer E. Halley did not discover the existence of this comet, but rather accurately predicted the date of its next appearance (Arnold, 1989, p.54).

H.A. Lorenz, Dutch physicist, never studied the transformations that received his name (Lorentz's transformations) and had a great influence on forming the theory of relativity (Arnold, 2008, p.43). Lorenz investigated Maxwell's equations of electrodynamics, but interpreted some problems making some mistakes (Logunov, 2004, p.26-52). These mistakes were corrected by a French physicist, mathematician and philosopher H. Poincaré. As a result, transformations were obtained, which H. Poincaré called Lorentz's transformations, and this name eventually settled and became conventional (Arnold, 2008, p.43).

In fact, Lorenz's ideas led H. Poincaré to the problem of transformations that would ensure the invariance of Maxwell's electrodynamics equations and H. Poincaré solved this problem (Logunov, 2001, pp.10-12; Logunov, 2004, p.144). Moreover, in his paper of 1914 'Deux Memoires de Henri Poincare sur la Physique Mathematique' H. Lorenz noted that he considers the term 'Lorentz's transformations' introduced by H. Poincaré to be erroneous,

since these transformations had already been used in the paper by W. Voigt, published in 1887 (Logunov, 2004, pp. 28-29).

H. Lorenz came quite close to developing the theory of special relativity, but failed to make the last and decisive step in this direction (Logunov, 2001, p.13). In parallel, H. Minkowski, H. Poincaré, and A. Einstein worked on this problem, and they were more successful (Logunov, 2004). In any case, a complex chain of attemps and errors eventually led to developing the theory of special relativity.

Here we can try to catch one of the most significant difficulties in forming perfect eponyms. From our point of view, its essence is that, as a rule, a number of scientists work on scientific problems, and there can be a complex exchange of knowledge, ideas, arguments between them. In the end, to form a perfect eponym is extremely difficult, as we see in the case of Lorentz's transformations (Woywodt & Lawrence, 2007, p. 424). Perhaps, they could be called transformations of Voigt–Lorentz–Poincaré, but this option is not only heavy (or rather multi-word), but there is also a problem in the sense that Voigt (unlike Lorentz and Poincaré) did not become a symbolic and well-known figure for our (human) ideas about developing the theory of relativity. Because of all this, the problem of priority in the authorship of Lorentz transformations and, accordingly, the priority in the right of using the name of a scientist in the eponym becomes complex and confusing.

The problem of which scientist name to associate with a particular term, concept and object is solved contextually and at the same time according to the circumstances. Because of this, competition between different eponyms is possible. An example is the competition of two eponyms, essentially related to the same rule of evaluation of indeterminate forms in the theory of limits. We are talking about L'Hospital rule and Bernoulli rule.

The competition of different eponyms for the right to denote the same concept, is influenced by the competition of scientists, their supporters and students who make up scientific teams (including invisible colleges). The competition of this kind is one of the factors in scientists' struggle for influence and attention (Collins, 1998). Quite often the competition of eponymous terms is influenced by politics, because the problem of which country deserves the priority in developing certain scientific concepts is extremely important for the image of the country and its national science. Thus, the argument of I. Newton and G. Leibniz on the issue of priority in the development of integral calculus can be interpreted in terms of the confrontation between the Anglo-Saxon and German worlds, that is, to give it a geopolitical status.

Various scientists, fields of study they represent, intellectual traditions they develop, concepts they use, as a rule, have different weights, different degrees of fame both in society and in the scientific community. That is why, claims of different scientists are given different weight, paid more or less attention (Collins, 1998), even if they actually make the same statement. Thus, historians of mathematics state that the paradox called Russell's paradox was known to E. Zermelo a year before (Tselishchev, 2002, pp.100-101). However, for various reasons, including those we mentioned above, the problem of priority in the authorship of an idea is uncertain, so that eponyms are often like a lottery: the winner is not the one who spent the most money and bought the most lottery tickets, but the one who was lucky enough to buy a winning ticket. Similarly, in the history of science, the term is often associated with the name of not the one who before others received a significant scientific result or spent on its achievement more forces, talent and mind than others, but the one who was lucky enough at the right time to make some particularly significant statements that were perceived, were in demand, and attracted widespread attention.

5 Conclusion

The size of a small article does not allow us to expand the range of historical examples (cases) and diversify the perspectives of their consideration, but we can already say that the study of eponyms functioning in the scientific discourse can bring to the discussion serious problems of epistemology, as well as the history and philosophy of science.

In the future, it makes sense to supplement the study with phenomenological analysis aimed at a deeper understanding of the competition for attention between scientists (Collins, 1998). It should be specially noted that different groups of scientists for one reason or another can be in different research teams, within which the issues of author's priority in a particular scientific achievement can be seen in different ways, which can serve as a significant source of competition of different eponyms, denoting the same concept.

The main conclusions of the study presented in this paper are as follows. Due to the complexity of the mechanisms of scientific creativity and the influence of various social (including political) factors on it, the formation of eponymous terms in the language of science is not always simple. As a result, appearance of eponyms is accidental and lottery like (lottery tickets are bought by many, but only some win). In particular, many people participate in the achievement of scientific results, but only some of them are imprinted in eponyms.

Many eponyms interconnect two worlds – the world of ideas and the world of people, in other words, the world of abstract concepts and the world of scientists who deal with these concepts. Eponyms encode not only concrete abstract concepts, but also certain fragments of the history of scientific knowledge, which, on the one hand, expand the horizons of the cognitive process and stimulate it in a certain way, and on the other hand, simplify communication and at the same time bring additional sense to it.

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