

# The Markers of Pseudoscience

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**Abstract.** Science classes require from a person intellectual, volitional and moral qualities, which not all people possess. Therefore, a number of people who do not have the appropriate abilities are tempted to imitate science. Such imitation is called pseudoscience. On the basis of what attributes can pseudoscience be identified? In modern methodological literature, a number of attempts have been made to answer this question. Some markers can be detected relatively easily. Other markers need some substantive text exploration. However it is impossible to limit by the criteria based on the synthesis of practical experience. A guiding idea is necessary to puzzle out not only simple, but also difficult cases. In our view, we should proceed from the principle of the text conformity to the norms of the scientific ethos. We proceed from the classical understanding of scientific activity as a scrupulous search for truth. It leads to the interpretation of pseudoscience as activity pursuing goals lying outside the science limits: material gain, fame, social status, etc. Therefore, if the signs of lack of conscientiousness are detected in the text it can be qualified as pseudoscientific with a high degree of probability. This approach allows to identify a specific type of pseudoscience, that we call "would-be science". Moreover, this approach makes it possible to qualify as pseudoscientific those texts, which are not scientific according to previously proposed criteria. These texts are signed by the authors whose social status clearly does not leave them the opportunity to study science. Consequently, along with institutional, logical, linguistic and methodological markers of pseudoscience, one more marker should be used - sociological.

## 1. Introduction

In the modern world, science has an exceptionally high status in the public consciousness. A person professionally engaged in science, and moreover generally recognized as a scientific authority, is a priori endowed with public opinion with a wide variety of values and virtues. In addition, the attractiveness of science is also explained by its existential value for an individual. (We tried to draw the attention of the scientific community to this side of the issue in one of our publications [11].) Such an extraordinary attractiveness of science serves as a powerful incentive for young people to devote their lives to science and, in the words of Karl Marx, not fearing fatigue, climb the stony paths of scientific knowledge [14, c. 25].

The profession of a scientist imposes very high requirements on the intellect of a person, on his volitional and moral qualities. Not all applicants meet these requirements. Therefore, some people who do not have the abilities necessary for professional work in science, are tempted to replace science with its imitation, to create the appearance of scientific activity while actually neglecting its fundamental principles. In short, in modern society there is a real danger of replacing true science by its simulacrum, the danger of superseding of science with pseudoscience. Very often the term

"pseudoscience" is used instead of "junk science". Along with these terms are used such concepts as antiscience, quasi-science, fake (mock) science. (A review of the literature on this issue is contained in the article by S.A. Iarovenko and A.S. Chernyaeva [1].) The name of the commission at the Presidium of the Russian Academy of Sciences, created to protect true science from counterfeits, contains the word "junk science". In our opinion, the concepts of "junk science" and "pseudoscience" are very close, if not identical, in meaning. The validity of this statement is quite simple to check. To do this you need to specify an antonym for each of them. Then it turns out that they have the same antonym: (true) science. The difference is that the word "pseudoscience" sounds less expressive. The general requirement for the scientific research is to avoid to the fullest extent the emotional coloring of judgments. Exactly this is the reason why we prefer to use the word "pseudoscience".

It should be kept in mind that pseudoscience has the ability to respond to criticism in its address, making changes in the methods of mimicry. If we analyze a significant array of pseudoscientific publications over a sufficiently long period, we can see these changes: the narrative style is becoming more academic, the number of references to the sources is increasing, etc. And with the accumulation of the corps of pseudoscientific texts and the emergence of specific journals publishing such works, pseudoscience takes the form of a full-fledged sphere of spiritual life, indistinguishable from true science. Thus, since the pseudoscience virus tends to mutate, no non-recurrent actions can provide advantageous effect. It requires consistent, systematic and properly organized work. In this article we hope to make a certain contribution to this work.

## 2. The truth and science

To distinguish the pseudoscience from its unauthentic counterpart, you need to understand clearly what is the difference between the first and second on the essence level. Then there is an objective opportunity to identify the specific symptoms of pseudoscience, to catch the signs, which with a sufficient degree of reliability make it possible to draw a conclusion on the issue we are interested in. According to the consensual view the science is a specific form of social consciousness which has the comprehension of objective truth as its goal. Therefore, it is naturally enough to qualify science through the "truth-false" opposition. Such attempts have been actually made. As far back as A.I. Kitaigorodsky wrote that pseudoscience is engaged in inventing facts and composing false theories [8, p. 102]. Outstanding Soviet biophysicist M.V. Volkenshtein, debunking pseudoscience, drew attention to the fact that it put forward the ideas, bereft of serious theoretical and experimental argumentation, apart from the logic of the development of science [20, p. 62]. These judgments are quite fair by themselves, but, so to speak, they are not instrumental enough. This provided a basis for A.G. Sergeev to put into question the validity of this approach. In his opinion the point is that the very concept of truth is internally contentless. We give two statements in this respect. The First: "If to call the truth absolutely reliable, once and for all established judgments, which do not allow any doubt, then such understanding of the truth belongs to rather religious thinking. Since science puts everything in question, there is no such kind of the truth in it"[19]. The second: "Since the meaning of the word "truth" unobviously implies absoluteness and inviolability, its use for designation changeable scientific knowledge will mislead us all the time" [19]. In our opinion, the reason that led A.G. Sergeev to such statements consists in the incorrect interpretation of the ratio of absolute and relative truth. Classical conception, coming from Aristotle, consists in the assertion that the truth is the correspondence of the representations of reality. But there is a special gradation within this correspondence. Absolute truth is full, perfect and exhaustive correspondence. Relative truth is incomplete, imperfect and approximate correspondence. Science recognizes absolute truths and does not doubt them. So, the law of conservation and transformation of energy is the truth, on the foundation of which all modern physics stands. But pseudoscience just rejects this kind of truth and therefore promises to create an engine with the efficiency higher than one hundred percent. Science in reality, unlike religion, is alien to dogmatism. But science, in contrast to pseudoscience, does not accept relativism. Therefore, we consider to be accurate the point of view of A.I. Kitaygorodsky, and the position of M.V. Volkenshtein. A.G. Sergeev takes the other view on this point. He believes that

“it is better not to call scientific concepts truths. Instead, it is more correct to use the notion of “scientific mainstream”, which means the ideas that are the best in the opinion of most specialists” [19]. Well, this is a long-standing and well-known conventionalism, which consists in asserting that truth is a common opinion. The weak points of such an interpretation of truth are well known. We would like to point out one danger, which is in the approach of A.G. Sergeev. Yes, currently science is institutionally separated from other activities. This apartness exists thanks to the state and is supported by the state. But where is the guarantee that the state will protect science from the aggressive and ignorant intervention of pseudoscience? The Russian state has recently introduced theology into the list of scientific specialties. This was done contrary to the opinion of the overwhelming majority of scientists. And what can prevent Russian science officials from doing the same, for example, with a new chronology? And then it will soon turn out that exactly it is the scientific mainstream. It has all the external signs necessary for institutionalization: a large number of supporters, its own circle of “specialists”, rather extensive publishing activity. And the recognition of the public is also rather high.

Our critical attitude towards A.G. Sergeev’s attempt to factor the concept of truth out when discussing the essence of pseudoscience does not mean at all that we consider his concept as a systematic delusion. On the contrary, we believe that this contains an important idea that can become an Ariadne’s thread in a maze of problems considered in this article. But we will discuss it a little later.

### **3. The symptoms and diagnosis**

First, we should formulate a thought that is fundamental for our understanding of the problem: the external attributes of pseudoscience (in other words the symptoms) are not directly connected with one or another interpretation of its essence. Using the medical analogy, one might say the following way. Any disease manifests itself through certain symptoms. It is with them that the doctor deals starting the examination of a patient. The first question a doctor should answer is whether a person complaining is really sick. Whether, for example, a patient has fever, cough, running nose, tachycardia, then we can confidently say that the patient is sick. But what kind of disease exactly it is - acute respiratory disease, bronchitis, pneumonia, or something else - the doctor cannot say yet. To get an answer to this question it is necessary to conduct an appropriate survey.

To illustrate our reasoning we should refer to the concept of E.D. Eidelman [3]. He does not deepen into the discussion of general issues, but simply, on the basis of the life experience, points out to those signs that allow to diagnose pseudoscience.

In the modern world science is a powerful social institution whose activity involves millions of people. This institution functions according to the certain rules, it has developed specific social relations, formed a system of self-reproduction, professional recognition, rewards for success and merit, etc. Since the result of the work of a scientist materializes, first of all, in a publication, the organization of publication activity is the core of this system. There are special journals where scientists submit their works to their colleagues for discussion, these journals conduct internal reviewing. The journal editor is generally recognized authority, he is personally responsible for the quality of published materials. Vast practical experience of the functioning of the institute of science has been accumulated all around the world. It allows to judge on a reasonable basis what is the way of obtaining a proficient result. To acquire the necessary qualifications, a future scientist needs to get a specialized higher education. It is followed by postgraduate study, thesis defense, the inclusion in a research team work in a particular position, etc. This is the standard path leading to science. If the real path of the article author (or work in a different genre) differs from the standard one, it always raises some questions. Why did it happen? Why does, for instance, a specialist in the field of chemistry take up to judge the issues of history? Or a biochemist judges about genetics? Who is presented to us - a genius who is capable of mastering different areas of knowledge professionally, or just an amateur who assesses inadequately his competence? There is evidently a reason to think about.

The merit of E.D. Eidelman is that he developed a simple and easy-to-use test that allows to make a reasonable judgment about the degree of applicant’s for the status of a scientist inscribing in the

scientific environment, about the degree of his socialization in it. This test is presented in the form of a table containing 18 questions. For the answer for each question, a certain number of points is awarded - from zero to two. If the author scores a critical number of points he is referred to pseudoscientists with a high degree of probability. The first two criteria proposed by E.D. Eidelman are the following: whether the author, claiming to be a scientist, has an education in the area of expertise of the article. Whether the author belongs to a scientific school on the topic that he undertook to cover. These questions are clarified the following way - whether the applicant had taken a relevant post-graduate or doctoral studies. As a rule, a scientist rebuked in a professional environment is indifferent to fame among the general public. He appreciates his colleagues' opinion much higher therefore, he aspires to publish his works in specific journals which are read by professionals who can appreciate the obtained results. So it is logical to ask whether the author has any publications in peer-reviewed scientific journals, whether they are reflected in authoritative reviews. Another logical question is whether he has recommendations from high-status scientists whose opinion a priori has considerable weight. The scientist does not create in a vacuum, he is in a certain social environment. The unity of this environment is ensured, in particular, by the availability of universally recognized authorities. So the opinion of these authorities helps to get an idea of the scientific viability of the applicant. Suggested by E.D. Eidelman criteria No. 3-6 provide an opportunity to reveal this side of the problem. The question of the nature of the author's claims has crucial significance. Any scientist claims the novelty of the received result. This is clear because the significance of scientific activity consists in moving beyond the horizon of the known. But he who is really a scientist, claims a revolution in science only in very rare cases. A true scientist is well aware that revolutions in science take place very rarely. That is why the level of its claims is much more modest - clarification of a fact, developing of a concept, solution of a specific problem, substantiation of a new hypothesis with the purpose of solving difficulties in the existing theory, etc. A pseudoscientist, on the contrary, does not suffer from an excess of modesty, and his opinion about the received result is exceptionally high. It is usually combined with a condescending attitude towards the work of predecessors. A pseudoscientist will not say, like Newton, that he was able to achieve much, because he stood on the shoulders of giants. In his eyes he is the first and only giant in science. A classic example of such narcissism is the book of E.N. Ponasenkov with a title distinctive of such works [16]. Suggested by E.D. Eidelman criteria also allow to consider this aspect of the problem.

#### **4. The diagnosis and symptoms**

So, E.D. Eidelman came to his conclusions not from a high theory, but from everyday practice. The result obtained by him, of course, has considerable instrumental value. However, an empirical generalization, even a very productive one, cannot be the final stage of the research. Empiricism should be x-rayed by the theory, and only then, perhaps, new facets of truth will be revealed. This way the doctor, having analyzed the symptoms of the disease, determines its general nature, i.e. makes a diagnosis. After diagnosing there appears the opportunity to understand better the nature of the symptoms, and sometimes even to detect those symptoms that were previously invisible.

Consider the concept of pseudoscience, developed by M.A. Kazakov from this point of view [6]. Referring to the theory of K. Marx, he interprets pseudoscience as a transformed form of science. "This transformed form is a self-sufficient whole, able to function outside of science and without it, like mythology or religion which are qualitatively different types of human consciousness, world view and consequentially human practice" - M.A. Kazakov writes [6, p. 133]. Specifying his position, the author states the following: "Pseudoscience <...> is both a social form of estrangement (from the scientific community) and estrangement from the scientific world view due to its negation or distortion. The factors of this estrangement are, for instance, falsification of scientific facts, free interpretation of scientific theories, inclusion of unscientific attainment of various types in some scientific concept, etc." [6, p. 134]. Based on this interpretation of the essence of pseudoscience, M.A. Kazakov identified specific attributes that it (and other transformed forms of attainment) is inherent in. He found 15 such signs. Let us name some of them. They are "usage of mythological, religious or

political attitudes in academic research work” [6, p. 141]; “An appeal to the personal authority of people far from science, to publicistic writing or fiction” [6, p. 141]; “The impossibility of confuting or confirming the validity of a theory while the author’s assertion about its unconditional validity” [5, p. 141]; “Excessive use of scientific terminology, ascribing to scientific terms meanings that differ from the generally accepted ...” [6, p. 142]; “Claims to be uncompromising, “revolutionary nature”, fast and innovative positive results that science is unable to achieve inherently or at the moment” [6, p. 142]; “Victimization strategy of thinking - attempts by the author of a pseudoscientific theory to present himself as a victim of a conspiracy, envy or conservative attitudes ascribed to science” [6, p. 142]; “An appeal to the media instead of the scientific community” [6, p. 142]. We will not list all the attributes, because the work of M.A. Kazakov is publicly available. While comparing the criteria proposed by M.A. Kazakov, and those that appear in the table of E.D. Eidelman, some matching elements can be found. Thus, section 4 of the table is identical in the meaning to section 11 in M.A. Kazakov's work. Formulated by E.D. Eidelman question whether the author has articles in peer-reviewed journals, is aimed to clarify the publication tactics of the applicant to the status of a scientist. If the author proposes to publishing the results of his research not to specialized scientific journals, but to the mass media this is a sure sign that he belongs to the pseudoscientists. M.A. Kazakov states this circumstance, formulating paragraph 4 of his list of signs of pseudoscience. In fact, section 13 of E.D. Eidelman's table and paragraph 9 of the list in the article by M.A. Kazakov also correspond. In both cases, it is a matter of the fact that a pseudoscientist claims the revolutionary nature of his concept. The situation is the same with paragraph 12 of the table and paragraph 7 of the list. E.D. Eidelman raises the question if it is possible to present the data reported by the author in the terms used in textbooks for secondary schools and first years of universities. The negative answer to this question is a fairly reliable sign that we have detected a pseudoscientist. M.A. Kazakov writes that pseudoscience is characterized by the excessive use of scientific terminology. At the same time, it is evident that the conception of M.A. Kazakov allows you to diagnose those symptoms of pseudoscience that are not touched upon by E.D. Eidelman. The fact is that the conception of E.D. Eidelman is a sociological tool of analysis, and the conception of M.A. Kazakov is philosophical and methodological. Sociological instrumentarium is improper for identifying, for example, such a sign of pseudoscience as “referring to concepts, theoretical schemes or ideal objects, which are speculative constructs, either without a referent, or operationally useless, i.e. not having sufficient grounds for introducing them into scientific theory as ideal objects, algorithms for building a formal system, a model, etc.” [6, p. 141]. The same is true with such an attribute as “Pythagorean syndrome” (ontologization of theoretical schemes). This feature of pseudoscience appears in the proposed M.A. Kazakov list with number 8 [6, p. 142]. The situation is somewhat different with the attribute number 10 - the victimization strategy of thinking [6, p. 142]. In principle, it would be possible to develop such a list of questions, which would allow to find out whether the author sets himself up as a victim of a conspiracy, the subject of envy, the object of the ill-wishers' intrigues, etc. or not. But this would require such a complication of the table, that would make pointless the original idea: to give a simple and reliable test on inhering to pseudoscience into the hands of researchers. Let us refer to paragraph 12 of the list compiled by M.A. Kazakov. It is formulated the following way: “the creation of a “surplus sense”: the search and creation of arbitrary connections between real-life phenomena and processes” [6, p. 143]. This attribute can also be identified only with the help of philosophical and methodological instrumentarium. Thus, the conception of M.A. Kazakov possesses that very undoubted advantage that allows us to identify some of the symptoms of pseudoscience, which, with a different approach, are either captured with difficulty or not detected at all.

The article by famous Russian expert N.I. Martishina is specifically devoted to the problem of searching for pseudoscience criteria [12]. The author develops the ideas formulated more than 20 years ago [13]. Although terminology applied by N.I. Martishina is somewhat different from ours, so it should be clarified that she distinguishes between science and would-be scientific attainments. She refers folk science, extrascience, parascience, deviant science and protoscience. She also credits pseudoscience as the category of would-be scientific attainments that she considers to be identical with

junk science. (By the way, in this paragraph we adhere to the same point of view.) Thus, the subject of analysis in the works of N.I. Martishina is all would-be scientific attainments not just what she qualifies as pseudoscience. We have the full right to believe that her judgments regarding to would-be scientific attainments are valid in relation to pseudoscience, since it is included in would-be scientific attainments. Thus, unlike M.A. Kazakov, who considers pseudoscience as a transformed form of scientific attainments, N.I. Martishina develops the idea that pseudoscience refers to would-be scientific attainments. But this means that a pseudoscientist is guided in his reasoning by a different logic than a true scientist. If we can identify these differences, there will be an objective opportunity to detect markers that allow us to separate one type of thinking from another. Based on these considerations, N.I. Martirina identifies “two connected logical markers of would-be scientific attainments: maximizing the initial assumptions - recognizing as real not only what is found in experience, but also such entities and forces, whose presence is not disproved by empirical data, i.e., identifying what is possible and real while passing from empiricism to theory” [13, p. 66]. Developing her thought, she writes: “This displacement is complemented by the identification of the possible with the veracious in the logical unfolding of the theory: the judgments, which are introduced as permissible assumptions, in the next step are used as accepted ideas and form the basis of further logical constructions. There is a displacement of modality of the statements: a probable statement “it cannot be excluded that ...” does not undergo further substantiation, and the next moment becomes a supporting element in the scheme “and as long as it is so, then ...” [13, p. 66-67]. Along with these attributes she also distinguishes such markers as reference to “radical insufficiency of science”, supplemented by a maxim about “the necessity to rely on the wisdom of the ancients by religious revelations and ethical attitudes” [13, p. 67], and the claim to “global improvement of science” [13, p. 67]. Thus, the conception of N.I. Martishina makes it possible to define 4 attributes of pseudoscience: 1) maximizing of initial assumptions, 2) identification of the possible with the veracious, 3) the idea of radical insufficiency of science, and 4) the claim for its global reorganization. The last two points to a certain extent have something in common with noted by E.D. Eidelman and M.A. Kazakov (and M.V. Volkenshtein before them [20, p. 62]) claim of pseudoscience for revolutionary achievements. As for the first two symptoms, their detection is the direct merit of N.I. Martishina.

A slightly different version of the demarcation of science and pseudoscience (more precisely, parascience as its varieties) is proposed by V.E. Kezin. He views parascience as such an intellectual formation that is fundamentally different from science at the level of a world view [7]. Science unlike parascience does not allow the reality of a miracle [7, p. 166]. Based on this conception, Yu.M. Serdyukov makes the following statement: “<...> The fundamental difference between scientific attainments and all other types of human cognitive activity is the unacceptability of explaining the reasons and nature of the studied phenomena by postulating hypothetical transcendental entities that are beyond the experience.” [18, p. 13]. Thus, science does not accept “any explanations with references to unnatural objects” [18, p. 14]. With all the immutability it leads to the fact, that the one who appeals to some kind of supernatural (unnatural) entities, is not a true scientist. And if he claims to such a status he should be credited to the category of pseudo-scientists. Yu.M. Serdyukov develops similar ideas in his other work [17]. In the conceptions of M.A. Kazakov and N.I. Martishina there are definite parallels to these ideas. The advantage of the position expressed by V.E. Kesin and Yu.M. Serdyukov is its comprehensible nature. They formulated the norm without any exceptions. But what to do when the author, who claims to be a scientist, appeals to the entities that are not supernatural. Let us give the torsion theory as an example. The existence of a torsion field does not contradict the modern physical world views, however, it is quite fair to evaluate the entire torsion theory as pseudoscientific [2]. Therefore, the proposed marker, in all its usefulness, is insufficient for the demarcation of true science and pseudoscience.

So, we have characterized the conceptions of M.A. Kazakov, N.I. Martishina, V.E. Kezin and Yu.M. Serdyukov. Strict requirements for the volume of the article force us to limit ourselves. The theory above confirms our assumption that the initial theoretical position determines the vision of markers of pseudoscience. It is impossible to offer an exhaustive list of such markers, but it does not

mean that science is unarmed in the face of its unauthentic counterpart. And the fact that there is a significant area of agreement between researchers in the interpretation of basic symptoms of pseudoscience serves as a basis for optimism.

Since this problem cannot be solved, it is necessary to look for new approaches to the phenomenon of pseudoscience, allowing to clear out existing criteria and, probably, to formulate new ones. In our opinion, one of these opportunities is associated with addressing to the ethical aspects of scientific activity.

### 5. Ethos of pseudoscience

Earlier we made a promise to return to the article by A.G. Sergeev. Now it is the time to fulfill it. In his conception we would like to emphasize the idea that true science and pseudoscience are *social* (our emphasis - R.L.) phenomena [19]. And any social activity is regulated by certain moral norms. The main moral requirement imposed on a scientist by the society has long been well known, it is conscientiousness. "Scientists receive irretrievable public funding in the form of grants, the construction of institutions and scientific installations. At the same time, scientists are not required guarantee success, but only conscientiousness" as A.G. Sergeev notes quite rightly [19]. It is quite reasonable. The general public has fairly general and sometimes vague notion about science. An outside man does not have the necessary qualifications to understand the essence of scientific disputes. Therefore, the society can control only that can be controllable i.g. a person's adherence of the requirement to serve honestly to the truth. And a true scientist does exactly that. That is why he is modest in his claims, that is why he treats with obeisance the knowledge gained by many generations of hardworking predecessors, that is why he has doubts about the result and presents it to the demanding colleagues, but not to the yellow press. This is the same reason why he carefully thinks out the experiment, forbids himself the ways of thinking that are alien to science. (Like those described by N.I. Martishina.) He studies scrupulously the literature, he diligently collects the information to the problem interesting to him, he tries not to miss anything significant, he is attentive to criticism, he aspires to substantiate his statements as convincingly as possible, he checks and rechecks references, facts, graphs and tables. Before publishing his work a true scientist gives it to experienced reviewers and sensible editors in order to catch all the inaccuracies, errors and misprints in the text. And if, after the publication of the text, he finds some inaccuracies in it, he experiences a feeling of disappointment and shame. All this is completely alien to a pseudoscientist. The main distinctive feature of a pseudoscientist is irresponsibility. His goals are not in the field of science, but beyond its borders. He aspires to the fame, glory, material goods, but not to the truth, no matter how it is understood. Thus, if the ethos of science is determined by the imperative of conscientiousness the pseudoscience ethos consists in ignoring it.

Of course, there is always some kind of vacuity between the ideal and the reality. A true scientist has to make it final and give his work to publishing even when he feels that he has not reached perfection. The necessity to publish a certain number of articles per year, increase the notorious Hirsch index, etc., puts pressure on him. But there are some limits which he will never allow himself to go beyond. Thus, he will not ascribe himself other people's ideas. Of course, he considers it to be beneath his dignity to be engaged in plagiarism. He will not artificially multiply the number of his publications by means of insignificant changes in them.

Our understanding of the problem allows us to reveal certain type of pseudoscience, which is not visible with a different approach. The question is also about imitation of science not rough and open, but camouflaged, hidden, and therefore especially dangerous. To designate it we invented a neologism - would-be science.

One illustrative example. Imagine two monographs. One of 180 pages, the other almost 500. The first with insignificant changes is fully included in the second, but the titles of the monographs have nothing in common. In the first monograph the table of contents does not correspond to the content. The author, having reached the thirteenth page, does not remember what he wrote on the fourth, but when he gets to the seventeenth, he forgets what is written on the thirteenth. Headlines are either

unpronounceable or unrelated to the content. The headline on the cover of the second book does not match the title on the front page. Abstracts are not related to the content. But that is not all. Both monographs (and in fact two versions of one) are written extremely illiterately. The author is phenomenally tongue-tied, not at odds either with stylistics, or with grammar, or even with spelling, and even more so with the syntax. Punctuation marks are placed arbitrarily, the author obviously did not master the school course of the Russian language. He does not reckon with the generally accepted use of words, uses them in his individual sense, invents new words, the meaning of which cannot be interpreted at all, composes exotic terms designed to make a deafening impression on the public. Not to mention such pranks as the distortion of names, ignoring the laws of logics, the mechanical connection of heterogeneous pieces of text, etc. "The pseudoscientific sophistry, which even experts cannot understand", is not alien to the author either. E.K. Gurova writes about it as a characteristic linguistic marker of pseudoscience [5, p. 39]. We have written a whole book about this masterpiece of illiteracy and tongue-tie [10]. But it did not produce the slightest effect. Moreover, the author of the immortal masterpiece was awarded the degree of the Doctor of Science, and now this semi-literate storyteller has the official status of a scholar. But what to do with our criticism of him? Ten years have passed, but no response has been received. The described fact gives us the grounds for some conclusions. First, the list of pseudoscience markers should be extended. A.G. Sergeyev, listing some generally accepted markers, points out to such an attribute as intolerance to criticism [19]. But this example shows that ignoring criticism can also act as a marker for pseudoscience. Secondly, A.G. Sergeyev points out (quite rightly) another attribute that should be clarified: claims for scientific character in the absence of experts recognition. Here we are dealing with a pseudoscientific counterfeit, which is officially recognized as fundamental scientific work by holders of doctoral degrees in the relevant discipline. The members of the Dissertations Board, where this pearl of eloquence was discussed, could not fail to see that the author was totally illiterate. But nevertheless something incited them to close their eyes to the flagrant shortcomings of presented for their discussion, something made them vote for awarding the degree to the author. At this example we can see that the specified marker is valid only for some types of pseudoscience. In that variant of pseudoscience, which we have defined by neologism would-be science, the situation is different. In this situation the author's claims for scientific character are explicitly supported by the authority of official instances, including state ones. Thirdly, this gives opportunity to make a conclusion that pseudoscience in some cases can successfully pretend as true science and receive recognition in the professional environment.

Some texts, functioning in the communicative environment of science, are, in fact, pseudoscientific. What is the way to identify them? In our opinion, to do this, it is necessary to analyze the text from a certain point of view: whether it corresponds to the criterion of conscientiousness. If the text does not stand this test, it can be classified as pseudoscientific without any hesitation. As an example of the text analysis from such point of view we can refer the article by A.Y. Elez [4]. It is a review of the monograph by V.R. Filippov. Let us give an extensive quotation from this review. "Reviewing another work of the doctor of historical sciences V.R. Filippov," A.J. Elez writes, - "it is impossible to follow the usual pattern, according to which a brief summary of the content of the work is followed by banal compliments and an indication of a couple of minor shortcomings, "which, however, do not disparage the values, etc.". The correctness of the attitudes, expressed in the reviewing book, completely depends on whether this or that position was correct or incorrect in the "sources" used by the author absolutely indiscriminately and more often in a secondary way, without even becoming familiar with the object of reference. Therefore, for the correct understanding of the processes supposedly covered in the book the reader is better to turn to serious literature than to spend time, guessing, where exactly V.R. Filippov accidentally tells someone's truth and where he distorts someone's truth or simply repeats others mistakes"[4, p. 217].

But not always dishonesty is manifested so frankly, rudely and visibly. In some cases it is carefully camouflaged and considerable efforts are necessary for its recognition. We entitle this kind of imitation of science sophisticated and elite [9, p. 92]. It takes place when the author wants to conceal

the triviality of the content of his work or the extreme vulnerability of his statements. The author, who has sufficient cultural potential and, especially, who has a literary talent, writes so cleverly that it is rather difficult to understand him. A true scientist writes for his colleagues to understand him. A pseudoscientist disguises the barrenness of his speculations under the tinsel of intricately twisted phrases, exotic terms and imaginary profound maxims.

There is another important aspect of the problem, without addressing to which, our understanding of pseudoscience markers will be incomplete. It is not enough to examine the text by itself, abstracting from the social environment where it was created. If we do not find in the text any attributes of its belonging to pseudoscience this is still not enough to recognize this text as fully corresponding to the requirements of science. In the conditions of modern Russia the question of the author and his social status has significant meaning. Thus, a brilliant career of one scientist was proceeding before our eyes (we will not name him at the moment). In 1997 he defended his thesis, in 1999 - doctoral thesis, in 2001 he was elected as a member of the RAS, in 2008 - as an academician. Such a rapid take-off is the evidence of not just the talent, but true genius. Our admiration will increase even more if we say that at the moment of defending his thesis, the genius was 49 years old. But who is this hero? The time has come to call his name - Viktor Ivanovich Ishaev. He is former Governor of the Khabarovsk Territory, former Plenipotentiary Representative of the President of the Russian Federation in the Far Eastern Federal District, former Minister for the Far East Development, a prominent politician. A natural question can be asked: how he could, with such busyness with important state affairs, find time to write thesis. Yes, the texts, which are signed by his name, are quite authentic. But nevertheless, nevertheless, nevertheless ... And the fact that in March 2019 V.I. Ishaev was under investigation on a charge of fraud, does not add confidence to his works. Scientists live in society, and there is such a phenomenon as corruption. And not all the scientists are able to resist the temptation. Usually a scientist is a man of modest welfare. This welfare can be increased by rendering qualified services to the vain rich. Unfortunately there is a market for such services in modern Russia.

The precedent described convincingly indicates that methodological, institutional, logical, and linguistic markers proposed in the literature should be complemented with one more - sociological.

Let us summarize.

Diagnosing pseudoscience is not a trivial task. There are a great number of forms of pseudoscience, and not all of them have easily distinguishable features. Counterfeiting for science is not necessarily rude; sometimes there are also skillful imitations. In addition, in each case the set of features is individual, each feature varies widely. In some cases the text is so authentic that its pseudoscience identity can be revealed only by analyzing the social context. There is, however, a general principle, guided by which one can unravel the most difficult puzzle. It consists in finding out the most important task that the author sets for himself - a conscientious search for the truth or the acquisition of benefits related to the status of a scientist. If the first is true, we have an authentic scientific text. If the second, it is imitation of science.

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