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LANGUAGE CHANGES ARISING FROM THE NEW PHYSICS IN THE CREDIT-MODULE SYSTEM AND THEIR IMPACT ON INDEPENDENT LEARNING

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Abstract: The purpose of this article is to show the expansion of language with the development of science. The new theories introduced into physics have created very serious problems. In particular, the so-called “new physics” - the theories of relativity and quantum theory - have forced us to search for a suitable scientific language to keep pace with the scientific reality that has opened before us. The new physics, which has undermined the deterministic-mechanistic. The scheme has also changed the perception of the language used by the scientific community. This situation has made not only scientists, but also many people who use this language feel the need to change the everyday language they use to describe scientific reality. In other words, this situation has changed the types and areas of concepts used in physics, along with the new physics.

Keywords: Classical physics, modern physics, language of science

"Words are only needed when something desired is not available; where there is no loss, language does not exist."

Jacques Lacan

Introduction: Until the 20th century, the development of physics in terms of precision was emphasized by expressing a large part of physics in everyday language. Thus, physical facts that required proof could be realized with a small number of mechanical rules [1]. Newtonian physics, which dominated until the beginning of the 20th century, is one of the important evidences in the history of physics. The motion of massive bodies such as the sun, planets, and stars could be easily predicted using this physics. In this sense, Newtonian physics, which has become almost divine, has taken its place in the history of science as the first and most mature example of scientific research that can explain the phenomenon of motion in everyday language that is still used today, without distinguishing between the earth and the sky.20. It is possible to think that the reason for Newton's admiration for physics until the 11th century was perhaps because he was the son of a farming family or because he wrote about three million words about religion and religious history. Of course, it can also be said that his writings, both in the fields of science and alchemy, were originally written with religious motives, which undeniably created a large fan base well into the 20th century [2].

The language that dominated until the 20th century, especially with the "mathematical principles of natural philosophy", painted a completely new picture of the universe and paved the way for the hypothetical deductive universe picture, which was a new method in philosophy and science. Consequently, the language of this century closely influenced not only science, but also the methodology of this century and its people. One of the most important features of this century is the dominance of the language of determinism-mechanism. For according to the

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Newtonian paradigm, science and everything moved from effect to cause. The language used in this view was so powerful that it can still be seen in many philosophers and scientists today [3]. In conclusion, hearing the language from Newton's Principia to the 20th century was one of the stages in the evolutionary process of scientific language. In the 19th century, new ideas and discoveries in the natural sciences brought new scientific debates to the agenda, emphasizing that the accumulation of scientific language from the past was insufficient, and declaring that concepts such as force, mass, velocity, energy, and momentum could also lose their validity, since they only affect large masses.

He described 19th-century physics as a failure in terms of scientific language. The 19th century saw a rapid development of the language of science, opening the way for new ideas and publications, and revealing that science was not the preserve of wealthy amateurs.19. No matter how advanced the new scientific language that emerged in the 19th century was, it failed to achieve the desired results. The Newtonian paradigm was so entrenched that Isaac Newton's laws of motion and gravity were almost 100 years old when Antoine Lavoisier demonstrated the conservation of matter in his quantitative chemistry experiments in 1780. Newton had provided us with the scientific language we needed to understand all of nature. But the limits were still worth pushing [4],[5]. People were interested in learning the appropriate scientific language for matter, light, heat, electricity, and magnetism. To such an extent that this situation continued until the new physics known as relativity and quantum theory were explained.

Method: In the early 20th century, quantum physics, founded by Max Planck's quantum theory, and the special and general theories of relativity put forward by A. Einstein, began to replace Newtonian physics. New physics began after the Newtonian paradigm was replaced by two major revolutions in physics. The special theory of relativity spoke of a new four-dimensional space-time continuum by adding the dimension of time to the three-dimensional fabric of space. According to this theory, it is not easy to claim that time is universal and continuous. Any observed event is perceived by two different observers moving at different speeds at different times. Therefore, while one observer may perceive the same events as occurring at the same time, another observer will perceive the same events as occurring at a different time.

These strange circumstances naturally changed the perspective on space and time, and also changed the belief in its absoluteness. Such a change in the concepts of space-time naturally led to a change in the language of concepts used to explain nature. The language used by the quantum and relativity theories that constituted the new physics changed the way physicists viewed reality, causing a fundamental change in the concepts of space-time, matter, cause and effect. This new language that emerged was described in terms such as organic, holistic, and ecological, and brought a language that was divisible and even changeable, instead of understanding the indivisible, indivisible whole that dominated the Newtonian paradigm [6]. Within this variability, the transformation of the dual form of matter (wave/particle) into energy and its evolution from a two- to three-dimensional space-time texture to a 4- to 5-dimensional space-time can be cited as an example.

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Although the changes in language with the new physics opened new doors to describe the universe and its equations, we also see that it does not achieve the desired effect even today. It has reached such a point that today's physicists still try to explain the theories of quantum and relativity in Newtonian language, which is one of the best indicators of this situation. The new language of physics created a wave of reaction, and this wave expanded and knocked on the doors of all natural sciences. This situation caused the language on which the sciences had been based to slip from under the feet of the supporters of the new physics. In particular, the language of determinism-mechanism used to describe scientific processes was damaged, and physicists realized that experimental results based on cause-and-effect relationships did not create a happy picture. Furthermore, the fact that the language necessary to describe the phenomena arising from the new language was not given to non-physicists also showed that the language of physics, which originated from the Newtonian paradigm, was not the ultimate language to confront the unknown [7], [8].

The changes in language with the new physics created a criterion for explaining and describing experimental results and raised a number of problems in terms of the level of understanding of the relevant topic or topics. These problems left us with questions such as how to define results and how far their boundaries should extend, especially when the results obtained from experiments are expressed in deterministic-mechanistic language.

Language from a general and scientific perspective

Language is a natural means of understanding between people. According to Wittgenstein, language is part of our organism and no less complex than it. In Foucault, language manifests itself differently. In other words, Foucault emphasizes that language first appears in its raw and primitive existence as a simple and material form of writing, a trace on things, a sign inscribed in the world and constituting one of its most indelible images. Noting that he does not have precise information about the formation of language, he emphasizes that language also includes many concepts as a means of expressing the meaning of concepts encountered in everyday life. Since these concepts have been used by humanity for years, we think we know their meaning [9]. Foucault emphasizes that language is one of the three levels of language, that the conceptual layer of language is in a certain sense specific and absolute, and that this layer also gives rise to two forms of discourse that surround it [10].

These forms of speech; These are texts in which the interpretation reinterprets the signs given above in a new form of speech, and the following interpretation includes the primacy of signs that are visible to everyone. For example, we can say a piece of wood or tin. However, if we consider the texts as a whole, we see that they cannot be called a piece of water. Because, according to the hidden primary texts, the word men cannot be used for liquid objects. This ambiguity in the meanings of words has led to the emergence of a new, hitherto unknown problem. Until the 17th century, it was asked what a word means. From the 17th century, it was asked how it is possible to connect what this sign means. While the classical period answered such questions through a representational solution, the modern period answered them by considering the strategy of meaning and meaning-making. . The ambiguity in the meanings of

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words manifested itself as a situation in which words were given different meanings, violating the deep interconnectedness of the world and language.

Heisenberg expresses this situation as follows: “The ability to implement the definitions we have made with the help of other definitions has forced us to rely only on a few basic concepts in which existence takes refuge.” The problem of the concept of language is also found in ancient Greek philosophy. This situation was tried to be viewed from a philosophical point of view, taking into account the connection between being and thought, word and meaning. The word is not a symbol, sign or indicator of being, but its real part; language is considered as the outer covering and basis of knowledge. Plato believed that objective truth cannot be achieved by words. “Thought” should be based only on itself and open to its real objects, that is, its ideas. In the dialogue Cratylus, speaking about the correctness of the names given to objects, Plato says: "When I speak, I communicate through something that is not like what I think. For there is no resemblance between what you call Sklerotês and l (tape)". In Plato's philosophy, the word and the object are connected in such a way that the word represents the thing (object) in thought. However, according to Plato, who believed that thought should be based only on itself and open to its real objects, the word is not a necessary element for thought. Aristotle, discussing the laws and stages of acquiring scientific knowledge, revealed whether scientific knowledge is possible or not [11].

Result: In other words, he tried to understand how apodeictic knowledge occurs in any science. In addition, he revealed the scientific structure inherent in the conclusions we make by solving the forms used in language and solving their consequences. Aristotle's analysis of language led to the establishment of a certain order of expression in our way of thinking. The clarity of language by revealing the first science of logic, known as Aristotle's logic.

Natural sciences and language

Wittgenstein said that “facts are the whole world” and proposed to consider all sentences as languages in order to analyze the structure of the world. The use of language as a means of communication in the natural sciences supports Wittgenstein’s words in a certain sense. In particular, words and their different meanings reveal different linguistic processes generated by facts. Different linguistic processes make logical conclusions more important, especially in scientific matters. In this sense, unambiguous statements that favor logic are not healthy and cause many problems. This creates significant difficulties, especially between particulars and universals [12]. As is known, the desire to derive the universal from the particular is a common reflex in the natural sciences.

In other words, he considers individual phenomena as the cause of simple and general laws. If these individual phenomena are to be expressed by the concept of language, then they seem to be reduced to a few concepts. According to Cassirer, a single, that is , a single and limited being is understood. isolate and explain all other things related to being. In this sense, individual phenomena, which have an origin but are delimited, and the many concepts related to them, must be redefined. To the extent that these phenomena, instead of being formed only qualitatively and without any precision, must be described one by one and with great precision

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down to the smallest details. Attempting to define individual phenomena and their specific concepts with everyday language. which we use, seems to be the mistake we are currently experiencing. We can say that, especially in everyday language, individual phenomena and concepts cannot be derived from general laws by logical deduction.

Discussion: The theories of special and general relativity, as well as quantum theory, were among the most astonishing revolutions of the last century, and they created serious fissures in the natural sciences. The first of these fissures was manifested by the theories of relativity, and in particular the special theory of relativity led to the emergence of speculative ideas about the positional dependence of relations between phenomena.[13] According to Bertrand Russell, the theory of relativity, which was absolute but independent of positions until the classical definitions, made the classical perspective in the study of physics in the 20th century more powerful than the one established by Newton. In this sense, Kant's independent ontological structures such as absolute space and absolute time were nothing more than a priori necessities that were the basis of external perceptions. The theories of relativity undermined Kant's idea that we could achieve inductive knowledge of the laws of nature and brought Huygens' skeptical objection to the fore. This skeptical objection changed the perspective on the concepts of space and time, revealing the language that needed to be used to redefine these concepts as a problem to be solved.

Theories of relativity and language

The year 1905 holds a special place among the miraculous years in the history of science. In 1905, Einstein published five extraordinary papers. All of them are important in their own right. However, two of these papers changed the face of physics. In particular, in the epistemological assessments that arise when velocities are very small compared to the speed of light, the theory of special relativity is closely connected with ancient physics, and the works of leading physicists of both the past and our century have become so. can be discussed together with the intellectual direction of the research being carried out. Theories of relativity are mathematical symbols that arise from their origin. It helps to understand how to interpret, and it also provides a suitable basis for expressing the results obtained from experiments in everyday language.

In particular, the fact that the Lorentz transformations, which express the contraction of the lengths of objects, were known and used much earlier, seemed to be a convenient opportunity for the language derived from the theories of relativity to be expressed in everyday language. If the special theory of relativity were to be expressed in everyday language, there would seem to be no contradiction between the words that make up this theory and their meanings. In other words, when the special theory of relativity is interpreted in everyday language, it leads to the conclusion that this theory can be easily applied to every field in which the concept of relativity is used. Therefore, whether the Lorentz contraction that occurs in the lengths of objects, which is closely related to this theory, is real or an illusion, or whether the meaning of the word synchronization does not depend on facts, but rather on concepts in the subject.

Quantum theory and language

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The term quantum, which refers to the existence of energy in finite packets and the inability to divide it into infinitesimals, was coined in the 1900s to explain the puzzling questions of how light is emitted and absorbed in the far reaches of physics. Two quantum revolutions followed this movement. The first, between 1900 and 1925, when scientists discussed and developed the theory without attracting public attention, and the second, between 1925 and 1927, when the strange results of this theory aroused public interest and became the subject of discussion and called it quantum mechanics. Even today, more than eighty years later, humanity does not know what to make of this second quantum revolution, which is amazing, fantastic, and even shocking [14].

In particular, the lack of any manual to adapt ordinary language concepts to the mathematical symbols of the second quantum revolution revealed a serious pessimism in understanding this revolution from the point of view of language use. With the second quantum revolution, called quantum mechanics. it became clear that the atom and its concepts could not be explained in ordinary language. Although it was clear that with the second quantum revolution we had to get rid of everyday language, it was also possible to see in this revolution a formalistic and axiomatic approach to mathematics. Thus, it seemed that there was no other way than to explain the mathematical scheme of quantum mechanics at atomic scales in terms of classical mechanics. However, unlike classical statistical theory, "attempts at probability" arise only in quantum situations, and we are faced with quantum-theoretical solutions, the solutions of which are not similar to those of classical physics, only on a larger scale. It required us to approach the concept of a classical solution with caution.

The lack of unity between quantum language and everyday language. It can be described as the language problems that the revolution brought. The loss of the right of people to speak clearly, especially in terms of understanding or describing the atom, forced them to ask themselves some questions about this revolution. Among these questions, we see that we are faced with questions about the speech of physicists, especially after the quantum revolution, and about the scientific language that corresponds to the logical structure of the quantum revolution [14].

Summary: In the last century, many new concepts have entered physics. These new concepts, while creating an atmosphere of chaos, also bring many important results that amaze people. In other words, the concepts played a leading role in building what was later called "new physics". In this new physics, especially the concept of the electromagnetic field, Maxwell's facts, relativity and quantum theorems, physicists had the opportunity to ask themselves the question of whether we should use everyday language. Although the new physical phenomena required the use of a language that was suitable for it, this language was used by many physicists much later.

Because the emergence of these concepts depends on changes in our deeply rooted designs in science, such fundamental changes did not actually happen so easily and suddenly. The scope of application of new concepts arising from the new physics not only created a field of application of physical knowledge, that is, new concepts arising from the science of physics. a wide, consistent and closed system, but also created a language that began to be used not only by physicists, but also by technicians and engineers. The transition from a deterministic-

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mechanistic understanding of the universe to a deterministic model of the universe has always been an extension of this language. In particular, the assumptions that the sequence of events in time is independent of the way they are located in the space-time cycle are always accepted among the designs of this new physics. In addition, among the results of this language, one can point out the transition from Euclidean space to Mikowsky space, evolution and Riemannian geometry. The greatest antinomy created by the language of the new physics was revealed by quantum theory [15]. In particular, the fact that the process of observation has a certain influence on the observed phenomenon has led to a one-sided understanding of the whole. This language, by insisting on the need to consider the observer and the observed as a whole, has further increased the difference between the observer and the language of the observer. The holistic relationship between the observed and the observer has shown that the language arising from the new physics is a necessary condition for the realization of the ideal of objectivity, which is the basis of all sciences.

As a result, the language that emerges from the language of new physics, if it is based on facts, that is, experimental results, can be applied in everyday language, freeing it from the axiomatic and symbolic difficulties imposed by logical principles.

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