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The conventionalism attitude of the philosophy of science according to Henri Poincaré

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Summary:

This article aims to explain the concept of the conventionalism attitude in the philosophy of science, represented by Henri Poincaré, and to clarify the explanations that this attitude has provided to science and the method, because the conventional attitude has tried to find Logical explanations for scientific transformations in the 19th century, especially after the scientific revolutions that occurred in mathematics and physics. Consequently, Poincaré believes that scientific laws and theories are conventions chosen by scientists, and that the selection criterion is ease and convenience in this way, it is not possible to speak of a correct theory and A false theory, but we can only say that a theory is more convenience than the other.

Keyword ; conventionalism ; mathematics ; convenience ; attitude.

I- Introduction :

Poincaré showed from an early age a keen interest in epistemological practice, particularly in relation to problems in the philosophy of science, as evidenced by his regular collaboration with the Revue de metaphysique et de morale. Poincaré showed a keen interest in epistemological practice very early on, particularly with regard to problems in the philosophy of science, as evidenced by his regular collaboration with the Journal of Metaphysics and Ethics. Since its foundation, he is the author of numerous articles on "scientific philosophy", collected in four books: the Science and Hypothesis (1902), The Value of Science (1905), Science and Method (1908) and Last Thoughts (posthumously, 1913). These works, characterized by the clarity of their presentation and their ease of reading, have become classics of the philosophy of science of the 20th century. Without adopting a particular philosophy, Poincaré develops critical thinking, centered on the nature and factors of scientific knowledge, in which he simultaneously insists on the role of experience and facts and on the role of the work of thought in the formation of scientific theories. However, this philosophy, which reflects his contemplation of mathematics and its relationship to the real world through "mathematical physics", comes from his thinking in geometry and his own experience of non-Euclidean geometries. The most important thing presented by Poincaré was the conventionalism of the 19th century afterward, which attempted to provide an objective interpretation of science in terms of methodology and the construction of theories and laws. We are therefore entitled to ask ourselves: What is the concept of the attitude conventionalism? What were the circumstances of his education? What new thing did she add? For the philosophy of science?

II– The concept of conventionalism:

As for the terminological notion: in general; For some thinkers, convention designates the fundamental principles of science: Postulas and axioms are particularly important conventions because they are based on the decision of knowledge; In other words, scientific principles are just simple language that scientists choose for convenience. In particular, the concept of conventionalism is linked to Henri Poincaré's vision of everything related to science, whether laws, theories or principles. We find this notion in the Lalande dictionary; Who defines convention as a term used by Poincaré to indicate that the foundations of science are not axioms, nor generalities, nor hypotheses put forward to verify their

validity, but rather conventions chosen by scientists and the criterion of choice is simplicity and convenience.

This concept is somewhat questionable; This is because Poincaré did not seek to establish a doctrine in the classical sense of the term; As much as he sought to find a clear vision to explain the transformations occurring in the field of science, and to deny the absolute dogmatism which characterized science in the 19th century.

This is what Jean Ullmo underlined in his definition of conventionalism where he says:

"We say attitude rather than doctrine, because Poincaré was the least doctrinaire of men; it is to defend himself from dogmatism, to refute a new dogmatism based on science which has been called scientism (and which goes beyond the framework of strictly scientific thought...), that he put forward his ideas, which have been often misunderstood. They can be summed up by the famous expression of convenience: we cannot say that a theory is true, we can only say that it is convenient"[1].

This view is more correct than the previous definition; Because most dictionaries describe conventionalism as a tendency; That is to say, it is an epistemological tendency. It shows that the terms and discourses of scientific theory are neither a priori (Kant) nor empirical assertions, but are convenient terms for describing phenomena.

Lakatos describes conventionalism as the tendency to establish arrangements, organizing facts into a homogeneous whole, and that the job of the conventionalist is to decide to preserve this arrangement as much as possible. But what happens when unusual difficulties arise and disrupt the system? In this case, modification of orders is used. Since the dogma of scientism focuses heavily on the idea that true knowledge is that acquired through experience, considering that it is the absolute and objective truth, and that the inductive tendency depends on experience as its source of scientific proof, either by focusing on specific observations or by deducing generalizations based on the facts of observation, Believing that the results it arrives at are a form of certainty that represents concrete reality as an objective world conventionalism s is interested in the results, laws or scientific theories that it arrives at. These are only conventions on which scientists humiliate themselves, and they do not have the quality of absolute that scientists, led by the inductive tendency, affirm. As such, the conventionalist does not believe in the truth of any system as being proven proof. does, but rather believes that it is only correct by convention; This means that it may be neither true nor false[2], In other words, any scientific theory is correct for one consideration, which is its ability to guide scientific research in the right direction. What we call scientific laws or theories are just scientific formulas. Newton's theory, for example, does not represent an exact picture. of the world; Rather, it is a simple relative mathematical formulation for understanding reality, and it cannot be true or false, but only convenient or inconvenienced.

Theories and laws are not judged by experience, which is no longer a valid reference for judging them. The frame of reference consists of logical standards that specifically boil down to convenience, consistency, beauty and simplicity associated with the principle of economy in thinking, because reality is complex and the task of scientific laws is simplistic. Simplicity therefore expresses, according to them, the function of science, and scientific law is similar to a geographical map which guides and directs the traveler in his relationship to reality without claiming that the map is an exact image of reality. It cannot constitute an image of absolute and always valid truths. When the system loses its usefulness in a way that cannot be restored or corrected, or another simpler system is discovered, it becomes necessary to replace it, and in this, according to Lakatos, it is a revolutionary act : "One of the revolutionary characteristics of conventionalism is that it is not necessary".[3] Being fully involved in a given system of arrangement, one can leave it if it becomes unbearably inappropriate, and if a simpler system can be found to replace it.

This is what makes conventionalism, from a logical point of view, much simpler than inductivism: it does not need correct inductive reasoning. Legitimate progress in science is considered cumulative and occurs at the level of the basis of proven facts, while changes that occur at the theoretical level are purely instrumental. Theoretical progress lies only in convenience and not in content validity. Since conventionalism views scientific theories and concepts as the product of agreement among scientists rather than as a reflection of an objective reality, it is related and close in one way or another to instrumentalism, which which requires clarifying the relationship between them: "Convention is based on the idea that recognizing that false hypotheses can have true results. Thus, false theories can have

enormous predictive power, but conventionalists may need to do faced with the problem of comparing competing false theories.The majority of them therefore combined honesty with its characteristics, and ended up supporting one of the pragmatist versions of honesty. Especially the Popperian theory on the content of truthfulness, similar to veracity and confirmation, which managed to lay the foundations for a philosophically impeccable version of conventionalism"[4].

We must not forget that conventionalism was born, or not, as an epistemological attitude, and that it carried within it in particular: freedom of will and the capacity to be creative, particularly in the way of using the language in scientific research, and with regard to thinking and developing hypotheses isolated from the evidence, which plays a leading role in the philosophy of conventionalism. The conventionalist sees no objection or risk, which makes him less strict than his inductive counterpart. For example, J. S. Mill, a proponent of inductivism, rejected the assumptions, arguing that they led to excessive and undesirable interference with reason, which could lead to leaving the realm of science and entering the realm of metaphysics and theology. more than that; The conventionalist does not declare that far-fetched systems are unscientific, but rather that they are inappropriate.

The conventionalist considers a very large part of the history of science as rational, "internal", which the inductivist does not accept[5]. Since simplicity is the focus of the conventionalist's interest, it becomes for the conventionalist historian that scientific discoveries are primarily inventions of new, simpler systems of arrangement. This is why he compares them in terms of ease: replacing the systems of arrangement full of complications with simpler systems constitute the backbone of the internal story. Always relying on the idea of simplicity, the typical case of the scientific revolution according to the conventionalist's point of view is the Copernican revolution, and perhaps this choice found support in the introduction given by the theologian " Osiander" to the "Book of Copernicus". : The rotation of celestial bodies", in which it is stated that the astronomer creates hypotheses by which, according to engineering problems, we can accurately calculate the movement of celestial bodies. It is not necessary that these hypotheses be true in reality, or even capable of being true, but it is simply sufficient that they provide us with calculations compatible with observation. Which means that the Copernican theory is not an exact image or a false image of the world, but simply: "a mathematical machine which makes it possible to link a group of observable planetary positions to another similar group. The calculations are easier if the planetary system is considered as if the sun were its center.

The problem with the history of conventional science remains its inability to provide a rational explanation for the motivations that primarily lead to the selection of certain facts or the preference for certain ordering systems over others, at a level where their specific details are not yet clear. Thus, conventionalism moves away from the understanding of internal history, to harmonize its position is that of inductivism, with several complementary external empirical programs. When it comes to the problem of false consciousness that the conventionalist historian, like the inductive historian, encounters, most scientists, he argues, arrive at their theories through their imagination. Why, Lakatos wonders, do they often claim to take their theories from the facts? He responds: "The rational reconstruction proposed by the conventionalist often differs from that proposed by great scientists, and the conventionalist historian attributes these problems of false consciousness to factors external to science"[6].

III- the emergence of conventionalism :

Conventionalism is an intellectual movement that emerged in the context of the crisis in science between the 19th and 20th centuries, which led many scientists and philosophers to reconsider the conditions governing the development of scientific knowledge, focusing on convention or scientist's decision. The advancement of science at the end of the 19th century; Feeling dissatisfied with the different theories of knowledge that have been proposed. Conventionalism therefore does nothing other than draw attention to the choice between the different formulations presented for the same phenomenon, and follows the equivalence of the different formulations to explain the phenomenon instead of saying that they are contradictory and different, as is the case in different geometries, or what is linked to different theories of modern physics.

Conventionalism is therefore an epistemological attitude and a trend created by scientists in physics and mathematics, who were interested, in addition to their specializations, in philosophical questions, especially those related to science, and they were similar in their related answers to the scientific method and nature of scientific theories. Although it is attributed to Poincaré; However, it is difficult to determine who this movement belongs to, but most sources refer to Poincaré, Duhem and Gaston Millau. It is also possible to distinguish two types of conventionalism: the first is conservative and represented by Poincaré; It seeks to preserve scientific principles, laws and theories because it is a convenient language to describe reality. The second type of revolutionary conventionalism is represented by Duhem; It seeks to modify scientific theories to adapt them to scientific development, and Duhem specifically refers to Newton's theories[7].

Poincaré's conventionalism has a particular character that actually reflects the major scientific transformations witnessed by his time, transformations that destroyed many old perceptions and created new ones in their place. Poincaré first invented conventionalism in order to justify the revolution in mathematics, particularly in geometry, and then applied it to other disciplines of science. He frankly rejects the philosophy of geometry as proposed by Kant, and this position is based on the revolution that occurred in mathematics with the discovery of non-Euclidean geometry, because Kant's philosophy of geometry is based on two types of distinction:

- The first: concerns the distinction between a priori knowledge and a posteriori knowledge.
- The second: concerns the distinction between analytical judgments and synthetic judgments.

Concerning the first distinction: Kant says: “We will then understand later by a priori knowledge, not those which are independent of this or that experience, but rather those which are completely independent of all experience, and their opposite is empirical knowledge , or those which are possible a posteriori”[8]. In other words, a priori knowledge comes from reason and a posteriori knowledge is acquired from experience.

As for the second distinction: it concerns the relationship between the subject and the predicate, whether in analytical judgments or synthetic judgments. Kant says: “But the relation is possible in two ways: either the predicate (b) belongs to the bearer (a) as something included in the concept (a), or That (B) is outside the concept (A) even if it is linked to it. In the first case I call the judgment analytical, and in the other I call it synthetic”[9]. According to Kant, analytical judgment is a predicate that adds nothing new to its subject. As for the synthetic judgment, its meaning adds something new to its subject.

Concerning mathematical questions, Kant considers them to be synthetic, a priori judgments. He says: “It must first be noted that mathematical propositions in their particular sense are always a priori judgments and are never empirical, because they do not contain any necessity which can be deduced from experience”[10]. Just like Euclid's proof that the sum of the angles of a triangle is equal to two right sides, Euclid deduced it from the proof principles of classical mathematics (axioms, postulas and definitions). Proof is therefore a necessary matter, and as long as it is, it is not drawn from experience, because what follows from experience is not characterized by necessity and certainty. This is what pushed Kant to try to prove that geometric questions are also synthetic, as he says: “Not every axiom of geometry is analytic. » Saying, for example, that a straight line is the closest dimension”[11], between two points is a synthetic rule. because this adds a new qualitative concept, which is the sense of straightness which is an even closer quantitative perception. It is a vision in which Kant starts from the postulates of Euclidean geometry, the issues of which combine theory and practice, or between thought and reality. This, in turn, convinced Kant that Euclidean geometry is an a priori structure and that the question of truth in it is linked to reality. However, the revolution that appeared in mathematics in the 19th century, represented by non-Euclidean geometry, led to transcending this point of view, which prompted Poincaré to reject Kant's point of view and before addressing Poincaré's criticism of the philosophy of Kantian geometry, it is necessary to mention, albeit briefly, non-Euclidean geometry.

Until the 19th century, Euclid's geometry remained the only and correct one, but after that Lobachowski established a geometric system different from Euclid's system. In terms of principles and results. It was assumed that the locus is a concave surface with a degree of curvature less than zero. Thus, the Euclidean axiom, which says: From a point exterior to a line, only one parallel passes, is modified by

the axiom, which says: From a point exterior to a line, an infinity of parallels pass , and the sum of the angles of the triangle becomes less than two right angles. We note that Riemann also considered a new system, unlike Lobachevsky's system, concerning it from a point located outside a straight line through which no parallel passes, because space, for him, is a convex surface with a degree of bias greater than zero. When these geometries appeared, a lot of work awaited them to strengthen and support their discoveries and expand them.

Poincaré was instrumental in supporting non-Euclidean geometry (1880-1890); He pointed out that rejecting Euclidean geometry is not a strange thing, because it can be transcended to construct appropriate geometries. But defending the logic of non-Euclidean geometry requires undermining Kant's philosophy of geometry, which is why Poincaré questions the nature of geometric axioms. Are these synthetic judgments, a priori, as Kant said? He responds by saying: "If this were the case, these axioms would impose their certainty on us so strongly that we could not imagine the contrary case nor establish a theoretical construction of it, which means that there would be no hypothesis non-Euclidean. Geometry[12].

Based on this criticism, Poincaré believes that non-Euclidean geometry refutes the Kantian view, making it logically possible, and this was later confirmed by the theory of relativity by recognizing that physical space is the place envisaged by Riemann, which prompted 20th century physicists to recognize the logical possibility of non-Euclidean geometries, whatever their physical appearance. Poincaré continues his defense of geometry and emphasizes in this context that the question concerns the validity of Euclidean geometry, saying: "What then should be our opinion on this question: is Euclid's geometry correct? This is a completely meaningless question, because its geometry is no more correct than any other geometry, but all that matters is that it is more correct than others, and Euclidean geometry is the most appropriate geometry and will remain so"[13]. The bottom line is that the question of what truth can be attributed to questions of geometry has come to mean only that these propositions do not contradict each other, and here Kant's philosophy of geometry collapses after Euclidean geometry does not is more than one of an infinite number of questions. logically possible geometries.

In view of these historical circumstances which led to the emergence of conventionalism, in particular the transformations evidenced by the concepts and principles of geometry, we can say that the birth of conventionalism in the writings of Poincaré at the end of the 19th century was the most important event in the history of conventionalism. the history of philosophy, which is similar in certain respects to Kant's Copernican revolution: The problem of a priori and necessary truth (Kant) indicates a great slumber of modern epistemological analysis. For the first time, certain truths (geometric axioms) are not studied through objective reality or the nature of thought, but rather in the scientist's decisions about the use of language[14]. This is what Poincaré emphasizes when he says: "These are not synthetic a priori judgments, nor empirical facts. They are rather conventions, and what we choose among all the conventions is a choice which takes into account the empirical facts, but it remains free, limited only by the need to avoid any contradiction[15]. But what is striking is that conventionalism was not limited to justifying non-Euclidean geometry, but rather extended to other scientific disciplines, notably with the emergence of the crisis in physics which led to the destruction of the principles and foundations of classical science. Physics (Newtonian). Because its inductive laws are incapable of explaining phenomena precisely and completely. It was necessary for conventionalism to address these questions, particularly those related to the scientific method. Therefore, the question that arises is: what is conventionalism's view of the scientific method?

Poincaré is considered one of the mathematicians interested in the scientific method. Mathematics is credited with establishing his ideas about this method and, therefore, the results of his scientific research determined his mathematical attitude. Poincaré's work is evident in his struggle against the experimental method; It emphasizes the need for generalization and hypotheses, indicating the insufficiency of pure observation and naive experimentation. This work can be justified because Poincaré was influenced by certain results obtained by the mathematical method instead of questioning the results of the experimental method. Poincaré believes that it would be a misunderstanding of the truth of science to be content with an abstract experience; Because it is not possible to discover the laws of nature by naive experimentation, it is because the results and laws of experimentation are approximate, If we consider as a special law whatever this law, we can be sure in advance that it will only be an

approximation; It is in fact derived from experimental tests which were not and can only be approximate. He therefore believes that the induction adopted in the natural sciences is not reliable because it is external to us. as he says: “ We could not fail to recognize that here there is a striking analogy with the usual processes of induction. However, a fundamental difference remains. When applied to the physical sciences, induction is always uncertain because it rests on the belief in a general order of the Universe, an order that lies outside of us”[16].

In this respect, Poincaré's scientific induction differs from mathematical induction, which relies on direct intuition of the power and capabilities of the mind. On this basis, Poincaré concludes that experiment does not represent the correct basis from which the scientist formulates his hypotheses for a law or for a theory, because the hypotheses contain other theoretical considerations which do not derive directly from the experience. Therefore, focusing on experiment ignores the reality of science and the nature of scientific practice, and the scientist is forced to organize and arrange the facts. If science needs facts, then facts without organization and arrangement will only give us random accumulation and irregular accumulation. This is despite the fact that Poincaré believes that external facts in themselves are organized and that this order is hierarchical, and therefore the facts which have the greatest value are those which "can be used several times and which have the property of repetition, because the most general for the law is represented by its increasing importance[17], he says: “ The scientist must organize. Science is made with facts, like a house is made with stones, but an accumulation of facts is no more a science than a pile of stones is a house”[18]. Just as building a house requires giving order and organization to the stones used in its construction, so establishing science requires giving order to its facts, and in this sense it is possible to speak of good and bad experiences. Bad experiences are those in which experience and experience data are accumulated randomly. As for the good experience. It is one that informs us of something besides an isolated fact, one that allows us to make predictions; that is, that allows us to generalize[19]. Certainly, generalization is the basis of interpretation. What we mean by interpreting an observed fact is including that fact in a general law. Therefore, it is not surprising that the successful explanation of many natural phenomena leads to the formation of a tendency to increase generalization in the human mind, because the observed facts, despite their abundance, do not satisfy our desire. To acquire knowledge, the search for knowledge goes beyond observation and requires generalization (). Accordingly, generalization can be the basis of knowledge, and the art of discovery is the art of generalization, which is therefore the origin of knowledge. For science to be able to fulfill the functions of prediction and generalization, it must recognize principles that Poincaré considers to be postulas. What are these principles?

1- Determinism

Determinism is defined as the idea that every event has a set of conditions and that if they are met, only that event and nothing else can happen. In the concrete sense, it is the set of conditions necessary to determine a particular phenomenon.

Au sens abstrait : c'est la caractéristique d'un système de faits, ou de choses dans lequel chaque élément est lié à d'autres éléments, de telle sorte qu'il est possible qu'ils se produisent, ou que nous puissions les empêcher de se produire avec certitude selon notre connaissance, car nous avons provoqué l'apparition de ces éléments.

Belief in the principle of determinism means that phenomena are subject to a precise system from which they do not deviate. This means that the phenomenon only occurs if certain conditions are met, and that it is impossible for this phenomenon to occur if these conditions are not met. In this regard, two types of determinism can be distinguished: the first is absolute classical determinism, and the second is moderate or relative determinism: As for absolute determinism, it was represented by Newton and the naturalists of the 18th century who believed that the changes occurring in the world at any time depend solely on the state of the world at that time. According to Newton's laws, for example, anybody in the world (x) is exposed to forces that affect There are other particles in the world (r), (p), (f), some or all of them. These forces can affect distance through attraction, just as the moon and sun cause tides in the oceans. In both cases, the amount of force acting at any time depends on the position of the particles in the world at that time. at any time, it is easier to accurately calculate the behavior of this second state. Then it depends on that as a transition step, and the state is calculated after that, and so on without limits.

This tendency is expressed by the French scientist "Laplace" (1812): We must consider the current state as the result of a previous state, and a cause of the state which immediately follows it. If human intelligence were capable of knowing instantly all the forces which mechanically move nature, and the subject of each... One of the beings who compose it could have expressed in a formula the movement of the largest bodies of the universe, and the movement of the lightest atoms, and the future would have become present before it, just like the present, because of the inevitability which makes us see the future as governed by the laws of science. This is, in short, the classic concept of determinism; However, Jean Ullmo, in his book "Modern Scientific Thought", criticizes absolute determinism; because the totalitarian affirmation of universal determinism, like any position on the whole, goes beyond the framework of the scientific method (this is a new example after that of universal entropy); it is foreign to science and it is useless to it. It is strictly a metaphysical hypothesis. Its only credit is the confusion between determinism-method and determinism-dogmatism[20].

From this sense arises the second perception of moderate determinism or relativity, which is the assertion that the probabilistic statistical laws that explain the phenomena of nature are those that express regularity and are close to certainty, and are not simply a recording of what happens by chance and at one time or another. This is what Poincaré emphasized in his criticism of the thesis of determinism in the classical sense, and he considers it as an incomplete formula of the law: if the same conditions are met, the phenomenon will fall into incompleteness, it is therefore worth better that he be aware of all the conditions sufficient for the phenomenon to occur, so that the formula of the law becomes complete, as he says: "Moreover the statement of any law is neceaaariiy incomplete. This enunciation should comprise the enumeration of *all* the antecedents in virtue of which a given consequent can happen. I should first describe *all* the conditions of the experiment to be made and the law would then be stated: If all the conditions are fulfilled, the phenomenon will happen"[21]. Provided you are certain that you have not forgotten any of the prerequisites for the appearance of the phenomenon, and this only comes with knowledge of the components and phenomena of nature, because they are the ones that can affect the phenomenon that we predict. occur, and since we cannot be aware of all the components of nature during the prediction process, we cannot be sure that all the conditions have been met, so the previous formula is not applicable. Until we can be sure that we have not forgotten any essential conditions, we can only say that if these conditions are met, then this phenomenon is almost likely to occur. Probability plays a major role in scientific knowledge, and introducing possibility does not mean eliminating scientific truth. Indeed, the state of a phenomenon depends on two things: the state from which it came and the law which changed its state. With this new conception of determinism, Poincaré gives a role to probability and chance, particularly when it comes to standard facts, that is to say those which are subject to measurement. This is not to say that probability and chance are in conflict with determinism, but rather the opposite. They are compatible: we cannot object to methodological determinism the reality of chance, because it is possible to reconcile them by giving an operational definition of chance, which reaches all the observable characteristics, while opposing its current conception. -above recalled. We can say that there is chance when experimentally indistinguishable initial conditions result in separate effects. To begin with, what is chance? The ancients distinguished between the phenomena which seemed to obey harmonious laws, established once for all, and those that they attributed to chance, which were those that could not be predicted because they were not subject to any law. In each domain the precise laws did not decide everything, they only marked the limits within which chance was allowed to move. In this conception, the word chance had a precise, objective meaning ; what was chance for one was also chance for the other and even for the gods[22].

Statistical laws are based on generalizations about the occurrence of certain phenomena, and these generalizations are guided by hypotheses, and these phenomena can be calculated in a specific quantitative way according to probability theories.

However, the principle of determinism includes a hypothesis which precedes it and determines its content, namely the order in which natural phenomena take place. This system requires choosing a specific system of phenomena on the assumption that it gives science a sense of reality. The system is what allows the creation of experimental facts, and therefore the system is necessary to establish science and organize its facts. The scientist is also obliged to organize and arrange the facts. If science needs facts, then facts without organization will only give us a random, cumulative and irregular accumulation.

Poincaré compared the postulate of order to beauty. The order of nature is a type of beauty, and the man of science, according to him, accepts the study of nature only for the pleasure he experiences in studying it. He finds this pleasure because he sees nature as beautiful, and its beauty is that which results from the order, from the compatible and harmonious thing of its parts, which the mind can capture. This beauty is that which gives to changing appearances a body and a great structure which attracts our senses. It is a beauty which is sufficient in itself and which calls the man of science to choose the most convenient facts to contribute to the agreement and harmony of science.

2- Relativity of truth

In the conventional concept of relativity, this corresponds to the absolute, because it means imperfection or total uncertainty. This is a characteristic of relationships, and the relativity of knowledge is a relationship between a self and an object that makes each of them conditioned and limited by the other.

Relativism, or the relative doctrine in general, is an attitude in the theory of knowledge that denies the possibility of knowing the objective world on the basis of the subjectivity and relativity of human knowledge. Relativity arises from the fact that it is not possible for a person, at this or that stage of his development, to obtain complete, correct and absolute knowledge, not about reality, as a whole, nor about a concrete subject of research, and that after a certain time our knowledge is not complete, but rather it is limited by the level of development of production and science as well as by the cognitive abilities of individuals.

Relativity, according to Poincaré, means that scientific knowledge does not remain constant, because it is constantly evolving and renewing, just as scientific theories are not completely confirmed. He says: “At the first blush it seems to us that the theories last only a day and that ruins upon ruins accumulate. Today the theories are born, to-morrow they are the fashion, the day after to-morrow they are classic, the fourth day they are superannuated, and the fifth they are forgotten. But if we look more closely, we see that what thus succumb are the theories, properly so called, those which pretend to teach us what things are.”[23]

It can be said that the basic idea on which conventionalism is based; These are scientific questions that we wrongly theorize as descriptions that we have extracted from partial experiments that we have carried out for this purpose; In reality, they are just man-made means of understanding and exploiting nature. Scientific facts are signs and conventions that only have an instrumental and pragmatic value to the extent that they help us to form an approximate idea of the world.

Scientific laws and theories are therefore working rules whose criterion of validity is not experience, but rather its convenience. It follows from this consideration that the crucial experiment in the Baconian sense does not exist in science, that is to say that it is impossible for an experiment to conclusively refute a hypothesis or confirm it conclusively. This means that there is no absolutely correct hypothesis, but rather one that we are constantly correcting, in order to meet the demands of simplicity and convenience. Poincaré showed that the three geometries are logically equivalent even if they contradict each other in terms of principle and results. In this sense, relativity does not fall into skepticism and deny the existence of truth, but rather means that truth appears in multiple aspects – axioms or mathematical postulates are hypotheses – and this has become clear after the emergence of non-Euclidean geometries such as "Riemann" and "Lobachevsky". After geometric axioms and postulates were synthetic a priori judgments, they became subjects that cannot be judged with certainty or lack of certainty only under two conditions: 1- absence of contradiction, 2- simplicity and convenience. From this point of view, scientific theories are relative and subject to evolution and renewal: they are hypotheses and the criterion of their validity is their simplicity and their convenience.

In this sense, science has only temporary value. They provide us with the means to classify phenomena, calculate them and use them. They inform us of the truth in the full sense. according to Poincaré, convenience lies in the principles from which the scientist starts are arbitrary principles, the development of which has not been controlled by any standard. It is necessary and objective, especially since the scientist presents it in the light of fundamental axioms and postulates, working with all his means so that experience confirms it.

Thus, Poincaré rejects that scientific theories are the source of scientific certainty in knowledge or natural phenomena, when a scientific theory claims to teach us what heat, electricity, or life is, it is condemned to advance ; all it can give us is a crude image. It is therefore provisional and obsolete[24]. This confirms the relativity of laws and theories. However perfect they may be, the theories of natural science should not be regarded as mere convenient means of speaking. These are ways to imagine things that are beneficial for our minds or innovative tricks to control nature.

To better understand Poincaré's relativity, we must not forget that the idea of harmony occupies a fundamental place in him. For example, when he says: Science is above all a classification, or science is a system of accumulation and addition of knowledge. For him, relativity is rather synonymous with the word harmony. Objectivity must therefore be sought in additions, which means that it is absurd to seek it in objects considered in isolation from each other. In this sense, Poincaré opens the way to Einstein's theory of relativity.

This relativity, which represents the development and renewal of theories, is not a negative point of science, quite the contrary: it is an accumulation of facts produced by theories, these facts which reveal relationships to us, so to speak. say Poincaré, who believes that "Changing theories only generates superficial suspicion. Yes, every theory is ephemeral, but despite the speed of its change, it leaves behind certain facts, and we collect these facts and add them to science... Each theory reveals certain relationships to us, so if the theory disappears, these relationships remain within the domain of science.

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3. Objectivity

Objectivity is The characteristic of being objective, that is, the attitude of the mind to see things as they are in reality, so as not to distort them with a narrow or biased vision. This contrasts with the subjective, the apparent and the unreal, which constitutes an objective object. An autonomous truth, that is to say independent of any subjective knowledge or thought in the individual sense, valid for all minds and not just for this or that individual. This means that when a scientist is engaged in scientific research, he uses his mind and senses to record the facts and all the various facts that exist in nature as they are.

Objectivity in science means the exclusion of subjective experience in the knowledge of phenomena as they really are. And not as the researcher desires and hopes. Thus, the task of the scientist is to describe things and determine their state in reality. This means that scientists take it upon themselves to carefully examine all the subjects available to them. The mind of the scientist must be aware of the reality of these subjects and their scientific value, so that they can be combined in the final result without forgetting any of them, and thus the group of scientists will arrive at a result, which is the scientific truth objective. Objectivity in science does not have a single meaning, but rather it takes on various meanings, including:

Axiological meaning (i.e. value), psychological meaning, cultural meaning and epistemological meaning. At the forefront of these connotations is the well-known axiological connotation which considers objectivity as abstract and impartial, avoiding any value judgment, as long as the man of science is only confronted with a world independent of his opinions and of his various wants and desires. private interests, and he must therefore separate them from his personal prejudices, and The epistemological meaning is one of the most important meanings of objectivity. Indeed, he is interested in the relationship that exists between the researcher and the subject.

Poincaré's objectivity appears clearly in his insistence on the impermanence of concepts. Noting that it constantly changes and renews itself, he does not fall into extreme subjectivism, even if he affirms that theories and concepts are arbitrary. However, he sees on the other hand that there is something which

always remains present and constant, and whose existence is objective and imposes itself on everyone, these are these relationships between natural phenomena. In other words, scientific laws. While only the names change, while the relationships always remain constant. Poincare says:

"…what should we understand by objectivity? What guarantees the objectivity of the world in which we live is that this world is common to us with other thinking beings. Through the communications that we have with other men, we receive from them ready-made reasonings; we know that these reasonings do not come from us and at the same time we recognize in them the work of reasonable beings like ourselves. And as these reasonings appear to fit the world of our sensation, we think we may infer that these reasonable beings have seen the same thing as we; thus it is we know we have not been dreaming."[25]

Objectivity in this concept is achieved through agreement and communication between various thinking beings. Since the thinking scientist receives from others different ideas and data that are applicable to the world of his sensations, even if he has taken them from others, this suggests that there is a common world through which all thinking minds agree, and this means that the objective is what has been accepted by everyone.

In this way, it becomes clear that objectivity is no longer the reflection of an original reality with which the man of the world identifies and with which he is in harmony, but rather of the conditions to which he must adhere. according to Poincaré: what is objective must be common to several minds, and therefore be able to be transmitted from one to the other. This means that what can be truly shared and transferable is not just sensations, or various entities isolated from each other, but rather everything that can be formulated in the form of relationships and theories, but everything that this What theory can do is provide us with an incomplete picture, which makes it temporary, and therefore not permanent. As a result, this paves the way for scientists to complete these tables and modify theories and various concepts within the framework of "objectivity". Which is linked and conditional to a specific situation. Indeed, it is necessary that those who work with the scientific method participate in a single system and on the basis of the unity of their pictorial system and their conceptual system, and they can do this through the common world available between them in the field. of research, discussion and scrutiny, so that they ultimately lead to the same results. In this sense, the true meaning of "objectivity" is formed, which suggests agreement and convention on the norms and concepts that prevail in the intellectual world when studying various topics.

The concept of objectivity was therefore linked to agreement, also known as conventionalism, and Poincaré used it to indicate that the principles of science, particularly the principles of geometry, are neither obvious nor obvious. experimental generalizations, nor simple hypotheses. the validity of which depends on experimental research, but in reality they are conventions which have been humiliated and which scientists have chosen by consensus. This under the pretext that their choice has no other justification than the fact that the human mind includes a priori forms which control its perception of this world and its choices. Hence Poincaré's criticism against the exaggerations of nominalism. He also rejected the theory that all science is conventional. He particularly rejects anti-rationalism. This is evident through his position on subjectivity and nominalism according to M. Le Roy: « Science consists only of conventions, and to this circumstance solely does it owe its apparent certitude; the facts of science and, a *fortiori*, its laws are the artificial work of the scientist; science therefore can teach us nothing of the truth; it can only serve us as rule of action."[26]

The apparent paradox of Mr. Le Roy's opinion is that he affirms that the scientist is the one who created the scientific fact, and in return he considers that science does not deviate from the status of purely conventions and that certainty which characterizes science is due to the fact that the facts and various scientific laws are artificial constructions. They are created by the scientist, so that any science can provide us with scientific recipes characterized by scientific effectiveness, and not the truth itself, and therefore it only provides us with rules of action. This view leads us to ask whether we have reason to trust science and the objective value of science? Or in other words, does not the assertion that scientific principles and theories are conventions entail an absolute denial and a denial of the objective value of science? when we ask what is the objective value of science, this does not mean: does science make us know the true nature of things? but that means; Does it make us aware of the true relationships of things?[27]

"Objective truth", according to Poincaré, is completely independent of thought. It is the analysis of what is common to many thinkers, and it can be common to all. Poincaré, in this aspect, also rejects the pragmatism of the extremists, and believes that as long as science is able to predict, it can be useful. This is proof that science is not without value to the extent that it constitutes an important means of knowledge. We cannot even say that action is the goal of science; Should we condemn the studies carried out on the star Sirius, under the pretext that we will probably never exercise any action on this star?[28] Poincaré thus underlines that science is an end in itself and can only be a simple practical means. Also, the value of science appears in the revelation of the truth of the relationships existing between phenomena and not in the simple knowledge of their nature.

In addition to this, we can speak of Poincaré's ideal pragmatism, because although he rejects the role of the nominalists' point of view in science, he does not deny seeking the applied benefit of science, but on the condition that the benefit either in its elevated and honest sense. Science is useful because it teaches us how to build machines. Rather, I say that machines are useful because they work for us, giving us more time to engage in science. instead of doing so, which would be reasonable, with a view to practical applications. Scientists, on the contrary, believe that certain facts are more interesting than others, because they complete an unfinished harmony, or because they predict a large number of other facts. If they are wrong, if this hierarchy of facts that they implicitly postulate is only a vain illusion, there cannot be Science for Science's sake, and consequently there cannot be Science. As for me, I believe that they are right, and, for example, I showed above what is the high value of astronomical facts, not because they are capable of practical applications, but because they are the most informative of all[29].

IV- Conclusion:

In the end, it can be said that the conventional tendency represented a stage in the development of science and the philosophy of science, with the explanations it provided that contributed to enriching the epistemological field. This is on the one hand, and on the other hand, it can also be said that Poincaré is considered one of the philosopher-scientists who was interested in issues of the philosophy of science, so he had a role. It is fundamental in developing it, whether in terms of theorizing, criticism, or transcendence.

The interpretation and explanation of the crisis, as well as the transformations that science experienced in the nineteenth century by the terminological tendency, specifically by Poincaré, represents a new view of the concepts and principles that are considered confiscations that science recognizes, from that belief in the inevitability that was seen in the occurrence of phenomena, in addition to this view. It changed with Poincaré, as he gave a role to probability in the occurrence of phenomena. Added to this is Poincaré's explicit acknowledgment that scientific knowledge is relative and is not fixed on a specific condition, as it is in continuous development. He also believes that scientific theories do not have the absolute value that the realist doctrine claims, so scientific theory exists. There is always some degree of hypothesis, and the theories that are said to be true are only the most useful theories. This is because they are abstract symbols arranged by the mind to express the observed relationships between phenomena.

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