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Mehmet ARSLAN

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Editors

Assoc. Prof. Dr. Hülya YALDIR

Pamukkale University
Faculty of Science and Arts
Department of Philosophy
Denizli, Turkey

Assoc. Prof. Dr.

Elżbieta ZUZANŃSKA-ŻYŚKO

University of Silesia
Faculty of Earth Sciences
Department of Economic
Geography Katowice, Poland

Prof. Dr. Recep EFE

Balikesir University
Faculty of Arts and Sciences
Department of Geography
Balikesir, Turkey

Asst. Prof. Dr. Mehmet ARSLAN

Al-Farabi Kazakh National
University, Department of
Geography, Land Management and
Cadastre
Almaty, Kazakhstan

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Chapter 12

Falsifiability as a Demarcation Scale of K. R. Popper

Mustafa KAYA*

1. INTRODUCTION

K. R. Popper is one of philosophers who lived in 20th century and whose views were understood in quite different ways from each other. According to some of philosophers, he is one of our age's most important science philosophers. For example, Lakatos thinks that Popper is one of most brilliant minds in our age and he has made important contributions to twentieth century philosophy with his views. On the other hand, one who say a small pot of knowledge for Popper but not philosopher is Feyerabend. Feyerabend (1995) ridicules with Popper's views that he says "*our young Kant*" on his book named as *Three Dialogues on Knowledge* (Feyerabend, 1995: 140). But whatever it is considered, Popper about whom such a different thing has been claimed is one of philosophers who has had important effects in our age (Güzel, 2014: 90).

Although Popper reflected his views on works that he wrote about policy philosophy and science philosophy, he has been known mostly with contributions that he has made on science philosophy. His political philosophy is like his philosophy of science's reflection and a way applied on this field.

The first problem that an experimental science methodology will try to solve it is to describe the science and is to separate it from non-experimental sciences and thinking systems. It finds that a normative science description which is expected from a methodology will be a scientific scale which will provide to separate proposition or proposition systems which have got empirical quality, namely which are in experimental science field from those which are not empirical and so need to be kept out of the concept of experimental science. The problem to find such a criterion which will separate experimental science from formal disciplines such as logic and maths and also from pseudo-science and metaphysic is a first procedural problem which requires to be solved by an empirical methodology. It is seen that the main goal of Popper in science philosophy is to find a criterion for being scientific. He seeks answers for questions "when should be a theory accepted as scientific?" and "is there a criterion for that a theory is accepted as scientific?" (Popper, 1981: 33). What can it be to take Popper to seek such a criterion? Popper states that the answer of this question underlies on approach of Vienna Circle philosophers named as Logical Positivism towards science and underlies of scientific method perceptions:

Recently, everyone knows that logical positivism ends up. But nobody brings to mind that there would be question to ask 'who is responsible for it? Or who did it?' I dread to think that I should accept the responsibility. But I did not do it on purpose: my purpose is to reveal things which seem to be a series of basic

*Assoc. Prof. Dr., Department of Philosophy, Afyon Kocatepe University, Afyon, Turkey.
mustafakaya1976@gmail.com

mistake (Popper, 1976: 88).

2. LOGICAL POSITIVISM AND VERIFIABILITY PRINCIPLE

It will be useful to consider views of logical positivists and criticisms that Popper provided in these views in terms of understanding *falsifiability* that Popper presented it as a scientific criterion. Logical positivism is not a new consideration exactly but it reveals as a continuity of 20th century's positivism which was established by Comte in 19th century. This is the reason why neo-positivism is said to it. Logical positivism becomes outstanding with a science envision that had quite great effect on world during nearly first half of 20th century and with a scientific world view that he developed through this science understanding (Cevizci, 2012: 177).

It is correct to say that the science philosophy with its real or technical meaning started with Logical positivism. Logical positivism states more specifically views of science philosophy and generally science and philosophy understanding which their base was founded by philosophy discussions of a few scientists and philosophers such as mathematician Hans Hahn, economist Philipp Frank in 1907 and science and philosophy understanding of a group of scientists-philosophers which consisted of the participation of Moritz Schilick, Fredrich Waismann, Edgar Zilzel, Felix Kaufmann, Viktor Kraft, Karl Menger, Kurt Godel and so Rudolf Carnap in 1920's. As they made all meeting and studies in Vienna and also sometimes Ludwig Wittgenstein and Karl Popper participated in discussions of the community named as "Vienna Circle". Wittgenstein's work named as *Tractatus Logico Philosophicus* which was described as peak point of English empiricism or final result of English empiricism especially by Circle's members had great effect on views of aforementioned logical positivist philosophers. The goal of this circle what most of them consisted of physicists and mathematicians is to develop a scale for relevance and being scientific so their goal is to define science and philosophy again as separating remainders of metaphysic which has been an obstacle against human mind (Demir, 2014: 38).

On the other hand, logical positivism is a reaction against philosophic speculation and especially against metaphysic from Hegel. They believe that philosophic speculation does not have a scientific function and they opposed scientific experiment to it. They think that there were not seen such a development on metaphysic as against constant development on physical sciences from Galile and Newton until now. As it is a science which is developing and utilising from experiments, there might be an important difference in science and metaphysic. This difference may be revealed as the criterion of being scientific is found and doing science may be removed unnecessary metaphysic, from science (Bal, 2004: 13).

Briefly, philosophers who adapts logical positivism developed the famous principle which is known as "verifiability principle" especially in order to indicate that scientific information is empirical, to draw a scientific line, or rather to separate science from non-scientific one or scientific one from metaphysic one. According to this principle, whether a proposition is correct or not is based on whether the proposition's context is supported or not by facts. It can be determined by speculations on whether it is supported or not by facts. Thus, if a proposition involves a context out of facts which would be determined by facts, it cannot be determined on whether it is correct or not (Ayer, 1984: 16).

Moreover, its main great difficulty of logical positivism which defends that science

starts with observation, observation creates a stable base which it will be established on scientific information and scientific information is obtained by induction from the point of observation propositions occur from an induction problem which mentions whether the pass to hypothesis, scientific rules and theories being unrestricted generalities from single observation proposition is a true pass logically in any way. Accordingly, those who reveal induction problem mention that induction principle referring that the result would deduce as "all of X have Y feature from the point of the observation of X in many numbers under very different conditions and from the point that all of X have definitely Y feature" is valid or not logically and they mention that it will not be verified in any way (Ladyman, 2002: 37).

Indeed, the induction problem is a problem primarily related to daily life. Because people use inductive arguments in their life's at all moments. For example, thing that they lead us to a belief about that future will be like past is induction. Milk that I have drunken many times has not poisoned me. On this basis, I conclude through induction that milk will not poison me in the future. I observe that night will follow immediately day always, sun will always rise from east and I accept that these will always occur in the future. All of them are samples of induction. Indeed, if there is not the principle of induction, our relation with environment gets a chaotic situation (Cevizci, 2008: 132).

What is more important that induction provides main ground that it raises on modern science and the most important tool of secularisation. Because the most basic tool of information during middle age was deduction; information which is obtained from sacred text and religious dogma constitutes standard of information. By contrast with it, induction that science understanding of logical positivism is based on it has been accepted as a power or tool which is useful to separate science from metaphysic. That induction is not verified as being unique way to restrict science and to access information in terms of logical positivism creates a significant problem by means of positivist view (Lecourt, 2013: 67).

There are resultless two ways to verify induction. Accordingly, induction is verified by applying either to logic or experience. When the way of logic is discussed, it should be known that logical arguments reflect a deductive nature; that is, they are arguments that their results are correct and result reveals from premises as necessity if their premises are correct. When it is considered from this point, inductive argument is not an argument way which is valid by means of logical. Because inductive argument is lack of deductive argument's necessity feature. The result asserts a claim which will be valid for all times on a place the premises asserts claims which are valid for past and now in an inductive argument. It means that premises of an inductive argument are correct but its result is possible to be incorrect and there is not any contrast also. For example, let's accept that I have observed many crows in quite different conditions up to now and all of crows that I have observed are black ones and on the base, I have concluded "All of crows are black ones". Of course, it is a true inductive conclusion. Moreover, there is not any logical guarantee about that first crow which I will observe from now will not be yellow one. The result which needs to be concluded from this point is clear: whatever is done, there is not a logical way to transmit anything -being specific to deduction- to induction (Chalmers, 1994: 50; Black, 2006: 639).

We encounter with a similar way when we attempt to verify induction through experiment. Because such an experimental verification indicates cases that the principle of induction was successful in the past. From the experimental samples that the

principle of induction was successfully used in the past in the frame, it is concluded that the principle of induction works successfully always. Moreover, it is unacceptable to ground induction in the way through experience. Because induction is a cyclical argument as the argument which is suggested to verify induction uses the inductive argument which is accepted to need to be verified or be grounded, that is, as induction is verified by an inductive argument. It means that we will not have world information by scepticism or that we have accessed world experience, namely world information which is based on observation and experiment. So Popper selects this way. Namely, he refuses the idea that science is based on induction. The problem of induction is a problem which is concluded from a science perception and which is understood incorrectly.

Another criterion is "meaning analysis" that logical positivists uses it depending on verifiability. The principle of meaningfulness which was developed by logical positivists is used as a demarcation criterion. According to verifying demarcation criterion which is a significant scale that is revealed for sentences on its base, scientific propositions are propositions which create meaningful propositions group and which are not incorrect. In another saying, correct meaningful propositions will enter under the scientific statute. This criterion gets its base from the view of Wittgenstein "total of correct propositions are total nature science. (or total of nature sciences)" (Wittgenstein, 2013: 59).

According to meaningfulness criterion of logical positivism, it is a necessity that a statement should be stated in either directly factual language or abbreviation of a factual language at a result in the case that the statement is to have the concept of information or to be meaningful. Claims which do not have these conditions are metaphysical and they are meaningfulness as metaphysic has not got a significance (Ayer, 1984: 28). Separation of tautological statements and synthetic statements should be mentioned herein. As it is known, tautology is a statement which does not have an information concept which separates verb from subject. The sentence "All of those who are not married are singles" is a tautology as its verb is "be single" and it does not give a new information related to "those who are not married " which is subject. In the same way, consider the sentence "Ahmet is a human". This sentence's subject is "Ahmet" and its verb is "human". This sentence is also tautological because the word "Ahmet" involves to be human and the predicate doesn't give a new information related to the subject. But on the sentence "Ahmet is a black person", the predicate is not involved by the subject and the predicate presents an additional information related to the subject. Thus, it is a synthetic sentence. Namely, it is possible that it is observed whether Ahmet is a black person or not. Accordingly, the principle of verifiability mentions that perceiving the meaning of a sentence requires to perceive under which conditions the sentence is correct, under which conditions the sentence is incorrect. Namely, that a statement, a proposition or an expression should be stated directly in a factual language or it should be verified through an observation and experiment in the event that it has an information concept or it is meaningful. Propositions or claims that they do not these conditions, that is, they are not verified by experiment or observation are metaphysical claims or propositions and they are lack of meaning.

These views of logical positivists are ones which lead Popper to seek a new criterion. While he criticises views of Vienna Circle, their most important error is that they tried to find a criterion which will make metaphysic meaningfulness, absurd and

exactly useless. Popper thinks that there is not such a scale. Because metaphysic propositions are not exactly insignificant and contrast, they are mostly pioneers of scientific views. Popper's second criticism is related to the discrimination of meaningful-meaningfulness. He thinks that such a discrimination is only useful to determine on problem. Because such discrimination requires another criterion between meaningful one and meaningfulness one as Vienna Circle accepted it. Logical positivists adapted the criterion of verifiability for it that they assumed that it is the same thing with "verifiability through factual propositions". Whereas Popper thinks that it is only to mention induction in different way. He thinks that the method of scientific research is not induction but it is deduction (Popper, 2006: 110-111).

Consequently, we can say that Popper's seeking scientific criterion is an opposition against logical positivists. He calls Vienna Circle's dilemma of criterion as "the problem of demarcation". Solving the problem develops a new criterion. This criterion's base is on critical rationalism. Accordingly, Popper presents falsifiability instead of verifiability which is first oppose's source against Vienna Circle and presents deduction instead of induction. We can start to review *the problem of demarcation* that Popper presents and *falsifiability* as a solution for this problem after the information which is introduction to the principle of *falsifiability* that Popper presents a criterion of demarcation.

3. THE PROBLEM OF DEMERCATION

First and the most important thing which forms Popper's philosophy of science became the demarcation on science and alternative solution that he provided it to the discrimination generally from so-called science and specifically from metaphysic. Popper focuses firstly on how to discriminate scientific and non-scientific ones, like logical positivists. He needs a criterion of demarcation in order to discriminate scientific-non-scientific ones. Logical positivists stated the criterion as verifiability which states to support propositions by observation or speculation. It is a unique criterion which discriminates scientific-non-scientific ones and also meaningful-meaningfulness ones from each other. So meaningful and being scientific cover each other.

While Popper puts falsifiability instead of verifiability; he defences that this criterion discriminates only scientific and non-scientific ones from each other but it does not discriminate meaningful and meaningfulness ones from each other. Namely, Popper accepts that the discriminating scientific and non-scientific ones is a necessity and also objects that it is considered within the frame of significancy and insignificancy dilemma. He thinks that the allocation of meaningful category only to scientific information was incorrect. Being metaphysic does not mean being meaningfulness. Because logical positivists got from an incorrect assumption which correlates meaningful with facts by doing like that. Whereas Popper thinks that meaningful occurs as a result of conventions which occur among persons.

Popper says that he started to deal with the problem of demarcation between scientific and non-scientific ones which had been discussed and could not have been elucidated from Bacon's time, firstly in 1919. He states this problem briefly that:

The problem of finding a criterion which would enable us to distinguish between the empirical sciences on the one hand, and mathematics and logic as well as 'metaphysical' systems on the other, I call the problem of demarcation

(Popper, 2002: 11).

He defines "the problem of demarcation" as a problem to find a criterion that would discriminate experiment sciences' propositions from non-experimental one, at his work named as *Objective Knowledge* (Popper, 1972: 12). Popper says that this problem was known to Hume who attempted to solve it. With Kant it became the central problem of the theory of knowledge (Popper, 2002: 11).

Popper criticises verification that takes science as a total of verifying propositions from different aspects by evaluating the position of a set of theories which are asserts as science against the criterion of verifiability that logical positivists defence it, while he explains reasons to lead his demarcation criterion. Theories that Popper reviews are Marx's "history theory", Adler's "individual psychology", Freud's "psychoanalysis theory" and Einstein's "relativity theory"(Popper, 1981: 33).

Popper thinks how could be real science discriminated from Marxist history theory which occurred in guise of science or from Freud's psychoanalysis theory and similar so-called sciences? He saw that the criterion of verifiability did not discriminate science from so-called science. He thinks that the discrimination of real science from so-called science, the demarcation on science are problem related to reveal logical form specific to scientific theories. From this point, Popper starts to put a new criterion which will work to discriminate scientific and non-scientific ones from each other.

During this period, Popper criticises intensely on approach of logical positivists towards the problem. He thinks that positivists interpret the problem of demarcation in a "naturalist" way. They consider the problem as not a purposeful determination, as accepting difference existing between empirical science and metaphysic as a "natural". They are constantly trying to prove that metaphysics by its very nature is nothing but nonsensical twaddle 'sophistry and illusion', as Hume says, which we should 'commit to the flames' (Popper, 2002:12). Whereas, Popper thinks that it is great mistake. Because in fact I was not concerned with the problem of meaning, but with the problem of demarcation (Ibid.: 313).

First philosopher that Popper criticises about meaningfulness of Wittgenstein. He thinks that Wittgenstein tried to indicate on *Tractatus* that all so-called philosophic or metaphysic propositions are not propositions in reality and so they are meaningless. For Wittgenstein, meaningful propositions are propositions which can be reduced and verified to elementary propositions (Popper, 1981: 52). Popper says that the effort of Wittgenstein to reduce each "meaningful proposition" logically to "elementary proposition" is the same to induction and the effort to demarcate with the way will fall through the problem of induction. He thinks that this approach cannot be reduced to "elementary propositions" like metaphysic proposition. If consistently applied, Wittgenstein's criterion of meaningfulness rejects as meaningless those natural laws (Popper, 2002: 13).

Indeed, the main reason that Popper criticises Wittgenstein is that his method makes metaphysic insignificant and invalid science. Whereas, Popper thinks that nearly all of scientific theories come from metaphysic and myths and myths provide important pre-information for scientific theories (Popper, 2002: 51). For this reason, metaphysic is not accepted exactly as worthless. It cannot be denied that along with metaphysical ideas which have obstructed the advance of science there have been others which have aided it. And looking at the matter from the psychological angle, I am inclined to think that scientific discovery is impossible without faith in ideas (Ibid.: 16).

Another person which was exposed to Popper's criticisms about the problem of demarcation is Carnap. Popper says about why he focuses so much on this problem is to indicate that Carnap is in the wrong on the criterion to restrict between science and metaphysic (at the same time between meaningfulness and meaningless) (Popper, 1981: 264). The starting point of his criticism towards Carnap is about function of language on science and about the position of metaphysic, similar to criticisms that he made towards Wittgenstein. Carnap thinks that the goal of science logic is to search "form of scientific language". This logic is matter of words but not "objects" and matter of propositions but not "cases". Carnap compares formal expression which is definitely correct in a way of usual conceptual expression. When he wants to avoid from uncertainties, formal expression should be used instead of conceptual expression. This approach provides the conclusion on Carnap's science logic that propositions are tried as being compared with other propositions but not with "cases" or "experiences" (Popper, 2002: 77). According to this view, there are causes to describe experience but there are not experiences or facts on science so that these are called as "protocol sentences". Protocol sentences are based on real cases and it describes direct experience concepts, that is, the simplest cases which would be perceived (Ibid.: 76-77). Carnap thinks that empirical science is based on these protocol sentences and these are irrefutable propositions which invalidate other propositions on their own. Whereas, Popper thinks that these kinds of irrefutable propositions' existence are not possible; even if these kinds of propositions exist, these cannot be criterion of being science. Popper thinks that the following case is criterion of being scientific: "*if a theory contradicts only with experiences, is falsified by them, they are in the concept of experimental science*" (Popper, 2005: 31). Thus, Popper proposes that *falsifiability* is taken as a criterion for demarcation but a system's verifiability is not taken.

4. FALSIFIABILITY AS A DEMARCATION SCALE

The main problem of science methodology which has been up to Popper's period is how verification of scientific assumption, hypothesis or propositions would be made. Differences of opinion reveal about methods which will make to do this verification fact. For this reason, discussions related to the use area of both induction and deduction and related to their problems have been made on a platform that verifying assumptions are accepted as data. The attempt that Popper made to solve the problem of induction at the beginning caused a transformation which changed all discussions' direction. Popper puts falsifiability as a new principle against science view of logical positivism and against the principle of verifiability that this view defences.

That falsifiability started a discussion agenda on quite wide area from science philosophy to social sciences sources from that it enlarges and enriches the base of discussion rather than its positive attempts towards solving problems of science philosophy or science methodology. Therefore, everyone who engages in methodology has to make terms with Popper in any way. Popper is among philosophers that those who defence falsifiability and also criticise it refer mostly to them (Demir, 2014: 53).

One which is mostly affected by that Popper assumed the principle of falsifiability as a criterion of demarcation is definitely Einstein's relativity theory. Popper states on the conversation that he made with Bryan Magee (1971) that his main idea of his work named as *The Logic of Scientific Discovery* which he revealed science design formed Einstein's relativity theory. He thinks that Einstein's theory indicated that usual science

understanding or scientific process is incorrect (Magee, 1971: 69).

Popper compares Einstein's relativity theory with Marxist history theory, Freud's psychoanalysis theory and Adler's individual psychology in terms of testability. Because he thinks that a proposition's getting scientific feature is based on testing its logical fiction and on whether it provides opportunity to falsifiability as result of these testings. Einstein's theory presented the view which light needs to be pulled by heavy masses (for example, sun) like physical substances, as a hypothesis. As its result, stars which are close to sun would seem to be separated from sun and also each other. As shine of sun makes stars invisible in day, this case does not seem as normal. But this foresight which would be tested when an eclipse occurs was tested by eclipse which occurred in 1919. As a result of measurements which were made, correctness of foresight or conjecture was tested. Popper who focused on methodological opportunities which experience created rather than verification of prediction concluded that relativity theory has necessary logical opportunities or form. If the foresight had not been correct, either the theory would have been refused or it would have been reformulated in a way to create a new testing (Popper, 1981: 36).

Popper thinks that the case related to Einstein's theory did not valid for Marx, Freud and Adler's theories. He thinks that there is not any way to falsify these theories. Namely, supporters of these three theories never stated under which conditions they would give up supporting their theories while they indicated easily how certain concrete case or events are appropriate for their theories. According to those who support Freud, Adler and Marx's theories, these theories have got a maximum explanatoriness power on all of fact mass which are reference areas. Each of these theories has got power to explain any event on the fact area that they consider and so each event reflects a verifying sample for this theory. Each case which would come into mind would be applied in theories and would be interpreted by these views. Popper gives the following sample to support these views:

A Marxist could not open a newspaper without finding on every page confirming evidence for his interpretation of history; not only in the news, but also in its presentation -which revealed the class bias of the paper- and especially of course in what the paper did not say. The Freudian analysts emphasized that their theories were constantly verified by their 'clinical observations'. As for Adler, I was much impressed by a personal experience. Once, in 1919, I reported to him a case which to me did not seem particularly Adlerian, but which he found no difficulty in analysing in terms of his theory of inferiority feelings, although he had not even seen the child. Slightly shocked, I asked him how he could be so sure. 'Because of my thousandfold experience,' he replied; whereupon I could not help saying: 'And with this new case, I suppose, your experience has become thousand-and-one-fold (Popper, 1981:35).

But that these theories have got maximum explanatoriness power and they are easily applied in each possible fact indicates that there is an error basically. Because theories with these features are similar to astrology, primitive myths and tales but not similar to gravitation theory of Einstein. These kinds of superstitions can indicate evidence in unlimited numbers to verify them also. For example, an astrologer rehearses many facts to support his/her predictions (Popper, 1981: 37). Moreover, theories of Adler, Freud and Marx can be applied in facts which are definitely contrast to each

other and they would explain these facts. Popper gives the following sample related to it:

That of a man who pushes a child into the water with the intention of drowning it; and that of a man who sacrifices his life in an attempt to save the child. Each of these two cases can be explained with equal ease in Freudian and in Adlerian terms. According to Freud the first man suffered from repression (say, of some component of his Oedipus complex), while the second man had achieved sublimation. According to Adler the first man suffered from feelings of inferiority (producing perhaps the need to prove to himself that he dared to commit some crime), and so did the second man (whose need was to prove to himself that he dared to rescue the child) (Popper, 1981: 35).

Thus, Popper concludes that Einstein's gravitation theory is applied in some of facts and it has got a low verifiability degree and contrastly, theories of Freud, Adler and Marx which would be easily applied in nearly all factual cases are correct in any way when it is evaluated by verifiability criterion which is taken as a criterion of demarcation between scientific and non-scientific ones. Popper who realizes that it is very easy to find data to confirm correctness of a theory; starts to defend that stating on which conditions there will be falsification will provide scientific feature but not to defend what will verify it. It suggests that a system's *falsifiability* is taken as a criterion of demarcation but verifiability is taken (Popper, 2002: 40).

According to the solution that Popper suggests it, a system needs to be negated by experience in the event that it can be accepted as empirical scientific one. A theory which can be verified by each fact and cannot be negated by any facts as it adapts to each experience should be elected by being accepted as so-called scientific or metaphysic but not as scientific indeed. But a theory which is negated by some facts or which is designed will gain right to involve in empirical science.

If we compare criteria of verifiability and falsifiability as applying in theories that Popper reviews them above, we see that it will get different results from each two demarcation criteria. According to the principle of verifiability, in the case that a theory is accepted as scientific, it requires to be verified by single observation and experience proposition. Whereas Einstein's theory has a form to propose a universal rule. But it is logically impossible that a universal proposition is verified by single proposition. No matter how many the number of single propositions is increased, these propositions cannot have a logical power in a way to involve any universal rule proposition. So a rule proposition cannot be verified by a single proposition or single proposition group in unlimited numbers. Thus, according to the criterion of verifiability, as Einstein's gravitation theory has not got quality of verifiability, it will have excluded from empirical science. Furthermore, many theories such as Newton dynamics, quantum mechanics that we accept them as scientific will have the same destiny with Einstein's theory. Thus, as a result that the principle of verifiability is applied in empirical science, a single observation and experience propositions' collection which is sorted out of all general proposition systems will remain at the end.

Whereas, Einstein's theory is competent when the criterion of falsifiability is taken as gauge. Because Einstein's theory would have been falsified as being negated clearly, if Eddington's observations had not informed that the effect from the theory did not occur, namely, there was not any deviation due to sun's gravity force towards light which comes from distant stars. It shows that Einstein's gravitation theory which has a

general rule proposition form can be falsified logically only by a single proposition even if it is not verified by single proposition group in any numbers. So this theory which is seen that it has got a falsifiability feature will gain right to take a place in an experimental science according to Popper's demarcation criterion.

Each two criteria will meet with different results when they are applied in other theories. According to the criterion of verifiability, Adler, Freud and Marx's theories have got quality of verifiability as it is seen on gathering verifying samples in unlimited numbers. But as it is logically impossible that general rule propositions are to be verified by single probative propositions and these three theories have general rule form, how are these theories accepted as factual? Furthermore, as general rule notices can be falsified by single propositions, do not they require to be accepted as refutable? (Işıklar, 1987: 29).

Popper thinks that it is possible that these theories' being admissible as verifying and unrefutable is based on tactics which immunize against various falsification that they share with legendary mythos and astrological theories. In order that an oracle or astrology provide the verifiability and irrefutability of an estimation and comments, they can apply in many ways. If the oracle puts his/her theory into indefinite and fuzzy form and states in uncertain terms, the theory will get flexibility to adapt in each fact which occurs and so it would be verified by each fact or process. Thus, the oracle would easily explain single propositions which are falsifying to be sample against ones which occur in real that they state in more definite and clear way and as a result, they will get an irrefutable statute (Popper, 1981: 37).

Popper thinks that views of Marx, Adler and Freud that they assumed with the claim of scientific share protective mechanism against some refutings that are encountered in astrology and mythos. Although Marx's history theory includes predictions which would be ordered at the beginning, his followers have adapted in protective tactics against refuting in order to take predictions of the theory which are refuted by facts and to adapt the theory in contrast samples. Thus, falsifying in oppositions have been turned into favourable supporting samples as they make the theory in a flexible form not to be refuted by any possible facts (Popper, 1981: 37).

Theories of Freud and Adler have a worse situation than Marx's theory. Popper thinks that these theories were revealed as non-testable or irrefutable in first formulations. Thus, even behaviours of people which are exactly counter to each other can be explained by these theories with terms "suppression" or "inferiority complex". It is also impossible to design people's behaviours which would contradict with these theories. Popper thinks that it does not mean Freud and Adler were not seeing certain things correctly:

I personally do not doubt that much of what they say is of considerable importance, and may well play its part one day in a psychological science which is testable. But it does mean that those 'clinical observations' which analysts naively believe confirm their theory cannot do this anymore than the daily confirmations which astrologers find in their practice. And as for Freud's epic of the Ego, the Super-ego, and the Id, no substantially stronger claim to scientific status can be made for it than for Homer's collected stories from Olympus. These theories describe some facts, but in the manner of myths. They contain most interesting psychological suggestions, but not in a testable form (Popper, 1981: 38).

Thus, all of these theories became unrefutable case as a result of protection mechanisms from falsifying which are made to avoid from counter samples which are seen at beginning or at the later times. So aforementioned theories can involve in ideal science systems from the point of verifiability demarcation criterion. According to the criterion of verifiability, claims of Adler, Freud and Marx have got necessary conditions to be involved in experimental science. But these theories' maximum verifiability degrees and universal explanatoriness powers approach them to primitive mythos or astrologies rather than Einstein's theory which has less and restricted explanation power. So the principle of verifiability provides a statute of being scientific to mythic and astrological systems and involves them into science area as being failure at distinguishing science from metaphysic. Whereas, that Adler, Freud and Marx's theories have feature to explain everything and to be verified by everything put them into so-called scientific position and take them out of science, in terms of Popper's falsifiability criterion. When these theories are considered by falsifiability demarcation criterion, a contrary to Einstein's gravitation theory, they are non-scientific doctrines and they should involve in metaphysical doctrines beyond science (Rosenberg, 2015: 285).

According to Popper's falsifiability criterion, a theory needs to provide a set of restricts in experimental facts' group but it does not require to have a universal explanation power with all facts' verification. Falsifiability criterion accepts necessary condition that a set of falsifying facts are possible for a theory which is applicant to have a scientific feature. Lakatos states that a theory can be so called scientific one even if there is not least evidence piece in favour of the theory and all of evidences in hand are to be in its favour. Namely, that a theory is to be scientific or so called scientific one can be determined as independent from facts (Lakatos, 2014: 19).

Popper thinks that single proposition in finite number does not give opportunity to base a general proposition in any way. Conversely, it is possible to invalidate a general proposition by a single counter proposition. This is reason why the problem of induction occurred. Because no matter how many observations have been made in favour of a hypothesis which is made through induction, it is possible that a further first sample falsifies it. If a theory has not got a feature to be refuted in any way, if it protects its immunity against a base testing, it is not said as a scientific theory. A theory to be scientific one needs to have condition of testability firstly. If a theory is clear to that one or more than one proposition which would be concluded in deductive way is compared by facts at the end of difficult testing, the theory can be defined as "testable" (Baudouin, 2015: 39).

Popper thinks that there is not definitely grounding opportunity towards a general proposition in hand for a scientist. But conversely, they would prefer an idea which replies experimental testing in better way, instead of another one. In other saying, Popper's criterion towards being scientific needs to be understood as a "preference" rule but not a justification rule.

On the other hand, Popper thinks that a theory is only an assumption and a test which tried to understand world. A scientist needs firstly to suggest a hypothesis related to how world is and then to test this hypothesis. In order to test a hypothesis, it needs to apply a deductive logic in terms of creating observation propositions to refute this hypothesis, mistake. In another saying, real and scientific testing is only to try to find counter samples which will falsify hypothesis. Some of hypothesis is mostly falsifiability; as they prohibit much more things, they have much more opportunities to

able to refute. Popper thinks that a hypothesis says much more things about world as it is much more falsifying one; Thus, it has got greater empirical concept.

According to the principle of falsifiability, giving up incorrect theories and making theories which resist falsifyings instead of it provides advance in science. Theories which are clearly stated should refute easily or resist in falsifyings. As theory's empiric increases, the theory's feature to be scientific increases. Because how much a theory has an experimental concept, the theory's falsifiability possibility increases. There is a reciprocity connection between the advance of science and the increase in falsifiability possibility (Stroker, 2005: 117).

Popper thinks that a theory can never be verified, but it can be supported. He uses the word supporting instead of verifying. Because he thinks that supporting correctness does not mean to prove correctness. A supported theory has passed successfully all difficult exams that it has had up to now and it is a theory which has not been changed by an opponent theory which is more sufficient than it. A supported theory is an assumption which is accepted temporarily by science environment and its destiny is to be invalidated by new facts in a day. (Baudoun, 2015: 40). For example, Newton physic has verified by a creative use and also by observations for nearly two centuries. These rules have serviced to estimate many facts from the existence of new planets to acts of tides as grounding West's science and technology. Successively, these have been thought to West's people as definite and unchanging facts. But Einstein falsified Newton's theory by a new theory at the beginning our century. Consequently, mankind was mistaken to believe that all of proofs in unlimited numbers verified the theory of Newton. Therefore, the most successful theory is not a verified theory for Popper but it is only theory which its mistake has not been showed yet (Magee, 1990: 26).

So within this scope, Popper who says that the falsification of most powerful scientific theories is always possible thinks that science gets advance in the separation of mistakes. This advance is not an increasing or cumulative process as it is in inductive view. Science gets advance by mistakes, it develops by finding more resistant theories instead of them as falsifying. The reason why science develops is that a new theory which is obtained is more stable than others. A theory which is absolutely correct and which is never falsified cannot found but the obtained theory will resist much more in falsifyings rather than previous ones (Yaldir&Üner, 2009: 63).

That is way, Popper thinks that "science is not proposition system which is definite or which is fully proved. We mean that science is not information in the meaning of *episteme*. It is never claimed that it has accessed reality or likewise. We must confess that we do not know anything indeed; we can only guess" (Popper, 2002: 278).

When it is compared with verifiability, it can be said that falsifiability has quite a different quality in terms of method and what science is. According to verifiability, the goal of science is to approach to reality and method is to formulate propositions in a way to be falsified. Consequently, Popper defends that the method which he asserts does not guarantee to reach stable and definite information and it provides opportunity for us to approach to reality and to know that our explanations are similar to reality.

5. CONCLUSION

First demand that an experimental science methodology needs to meet it is to give an appropriate definition of science. In another saying, it is to propose a solution towards determining on characters which discriminate scientific one from non-scientific

opinion systems. The problem to find a criterion which would provide us to demarcate between science and fake -science has been said "the problem of demarcation" since Popper up to now. The problem of demarcation is the base problem of science philosophy and while solution propositions related to this problem replies the question related to what science is, it confronts us ad an attempt to make it as showing the difference between scientific events and non-scientific events.

The point which needs not to be forgotten is that the problem which is said as the problem of "demarcation" is not a scientific problem, it is the problem of philosophy. There is not disagreement among scientists about whether theories which are told in science are not scientific or not, whether scientific improvements are rational or not. Disagreement reveals among philosophers mostly about what are criteria of being scientific or rational; in this sense also, the problem is not the problem of science but it is the problem of philosophy. This problem is the problem that science philosophy reveals it to solve. After it is revealed to be solved on this problem as it is on most of problems belonging to philosophy, other problems seen problematic by means of each one's viewpoint from possible solutions which are suggested. From the point of view that the principle of verifiability which is presented as a demarcation criterion between scientific and non-scientific ones by logical positivists is not a valid criterion, Popper suggests the principle of falsifiability as a new demarcation criterion.

According to the criterion of falsifiability, if a proposition is only refuted by experience, it gets a value of being scientific. That a proposition is refuted by experience means that there are potential falsifying propositions which are factual propositions which are inconsistent with the theory that occurs from this proposition or proposition system. A theory which has not opportunity to be refuted, namely, which a factual proposition as inconsistent with it cannot be designed will not be accepted as being scientific. The demarcation criterion of falsifiability accepts the theory as a falsifying sample, namely, as a necessary condition that refutation criteria which states that it would be accepted as a contrast fact against the theory is possible in the case which ever potential facts occur for each proposition which demand for being scientific. A theory which its refutation criteria is not given and so it has not opportunity to be falsified will not be accepted as being scientific.

Popper focuses on that the principle of falsifiability is not linguistic significant standard, there is a demarcation criterion which is applied on language from a methodological platform from the outside and he criticises that logical positivists have attempts to assimilate significance and demarcation criteria which are sourced from that they make difference between meaning and correctness as indefinite. Lastly, Popper does not aim at a final refutation of non-scientific view areas and especially metaphysic in the sense of the demarcation problem, contrastly, he identifies metaphysic as an auxiliary legal function towards science. Because metaphysic has accompanied with science on its each process besides that it is a raw material store and method of a pre-science that theories and methods come from it. "Inspiring" role of metaphysic plays important role on those scientific theories reveal during all of science history.

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