

## A Comparison between Carnap and Popper: Defense of Carnap

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### **Abstract**

Rudolf Carnap and Karl R. Popper are very prominent personalities of twentieth century in philosophy of science. Certainly, their contribution to this field is immense. Methodological problem in scientific research is a serious issue in both science and philosophy. In effect, both the philosophers had different opinions regarding this issue. They have had debates at times and wrote number of essays on this problem. This present work has been intended to bring back the issue again to understand the real feature of their problem and Carnap's proposal has been defended. The argument put forward is rather very close to Carnap but to make it more clear some other issues have been brought together. The method which is followed in this paper is heuristic and the documents are mostly collected from their own writings. Besides, some more critical analysis has been used which centered round the problem.

### **Introduction**

A high-rate philosophical debate between Rudolf Carnap (1891-1970) and Karl R. Popper (1902-1994) is supposed to be well known to the twentieth century's reader as an important issue of philosophy of science. It is believed that this issue is still very important because most part of the discussion had been centered round the question of philosophy and metaphysics. Many later philosophers speak up on the problem and involve themselves in the necessary debate over the critical issue of scientific thoughts as well as the problem of demarcating principle between science and non-science. Alex C. Michalos of Guelph University and some others have had important discussions with critical notes over the controversy of Carnap and Popper which virtually ended up by 1950s. But, the issue which is likely to be concluded by this time didn't come to an end due to its gravity of content. As a result, this debate is now discussed as an essential element to the case of probability and falsification in scientific philosophy. I intend to be wielded as part of the discussion here. In this thesis there is an attempt to defend Carnap at many strategic points with hope to unsettle the approaches of Popper.

In 1928 Carnap and Popper first met together at a seminar and then in 1932 at Tyrolese hill in a holiday tour along with their wives where

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Herbert Feigl also accompanied them in a very rare moment. There had been very fascinating talks from their parts as appeared to be very uncompromising mood from respective side. As a matter of fact, in this paper there is no attempt to go for the arguments of Popper regarding the issue of demarcation between science and metaphysics. Besides, this discussion will be propelled round the nature of scientific knowledge and its method of development. Here it must be conceded that Carnap's view was much convincing than Popper though there had been many arguments for or against. In addition, for better understanding, Moritz Schlick and Carl C. Hempel have been both referred to. First of all it needs to enter into the content of their discussion: what makes them induced in the brawling.

### **1. Major contending issues**

- a) Demarcating principle between science and metaphysics;
- b) Carnap's naturalistic or essentialistic or absolutistic view of the problem of meaningfulness;
- c) Carnap's amended versions of principle of confirm ability, and reducibility;
- d) Popper's unconformable tactic in rejecting science;
- e) Popper's principle of falsifiability; and
- f) Views on science and non-science.

### **The meaning of language**

Carnap argues, '[t]wo chief problems of the theory of knowledge are the question of meaning and the question of verification. The first question asked under what conditions a sentence has meaning, in the sense of cognitive, factual meaning. The second query asks how one get to know something, how one can find out whether a given sentence is true or false.'<sup>1</sup> In his argument two questions seriously asked for a sentence, one is about cognitive or factual meaning and another is how it is ascertained to be true or false. These two questions are highly interlocked since he agrees "...the meaning of a sentence is in a certain sense identical with the way we determine its truth or falsehood; and a sentence has meaning only if such a determination is possible."<sup>2</sup> Here, it is important to notice that, according to the sense of Carnap, meaning of a sentence depends upon its method of verification i.e. the way it is being verified or confirmed. Meaningful sentences are categorized, according to the merit, in two ways: synthetic and analytic. Suppose there is no problem for the

later categories since the certainty of such kind are confirmed as tautology or it makes the contradiction if it is denied. So, the question regarding the issue of synthetic is serious one. In this paper such condition has been discussed here as both Carnap and Popper had been in an uneasy mood in greeting each other. Popper describes his colleague as such: "I found Carnap not only one of the most captivating person I had ever met but also a thinker utterly absorbed in, and devoted to, his problems, and eager to listen to criticism."<sup>3</sup>

To Carnap, the nature of justification of a sentence is of two kinds: *testable* and *confirmable*. A sentence should be *testable* if the method of testing is known for it and *confirmable* implies the condition of a sentence in which it is confirmed. To remember, Carnap says, a sentence may be confirmable without being testable<sup>4</sup>. Here, Carnap slightly opposes the older<sup>5</sup> requirements of verifiability in which it is said that a sentence is meaningful if and only if it is taken to be verifiable and its meaning depends upon its method of verification. This is very clear that this too simple formulation makes serious difficulties to the empiricists as its un-sophistication may exclude many meaningful sentences including scientific. So, Carnap believes that the older version of empiricist criterion should be amended in order to keep its spirit up.

Further, the early Viennese positivism was too conservative, he claims; but he demands new formulation with the advent of some serious criticism exhibited by Popper, Reichenbach, Lewis, Nagel and Stace<sup>6</sup>. Interestingly, Carnap claims himself *liberal* than early empiricists e.g. Schlick and others. Carnap is convinced with the criticism made by those critics yet he doesn't accept their proposal altogether. Besides, he doesn't accept even Schlick's proposal to define the term verifiability because of its incomplete justification. Schlick, he claims, doesn't explain the term verification in a proper sense because the process must include not only the way of logical justification but also the method of its practical or physical possibility of confirmation. However, except some minor differences Carnap doesn't deny the way of justification of sentence made by Schlick. As a result, Carnap tries to settle a serious objection brought against him that he was likely to be a methodological solipsist in regarding to the issue of positivism. Carnap as a matter of fact brings another serious issue of methodological solipsism which should be regarded as simple and logical. When one observe the same thing on a table different man may claim to have different perception at the same time but finally nobody accepts to have any experience other than of his own since "he cannot use the results of other people's observation unless

he has become acquainted with them by his own observations, e.g. by hearing or reading the other man's report."<sup>7</sup> Perhaps to avoid the terminological complication Carnap promises not to use the term further since it creates some confusion among the colleagues.

So, obviously, Carnap turns to the opinion of confirmation instead of verification. His idea is very clear to us because it is not possible to verify any sentence conclusively but possible to taste single instances. He unhesitatingly agrees with the fact that if verification is understood to be the ultimate confirmation of truth and falsity of statement then many issues regarding physics or biology would have been rejected without question. If any negative instance is not perceived and if number of positive instances increases step by step then the confidence will grow up and herewith build the strength of sentence. Carnap thinks that it might be the right way to be confirmed about a sentence. So, the question may arise about the degree of possibility not the meaninglessness of sentence. The debate between Carnap and Popper had taken place regarding the conformability of principle of justification. This will be discussed in the later section. Presently it will be seen how Carnap furnishes up the formula to strengthen his argument in favor of confirmability.

For example, just follow the sentence, "there is a black cat on the table." If anyone claims to have the experience of that cat and in order to be ascertained it needs to follow the process that might be given below: i) the first question, whether the animal is cat ; ii) whether the cat is black; iii) whether there is any animal on the table which is supposed to be cat. Yes, the questions are really very important as long as we want to see and verify the claim about the animal just sat on the table. If one examines the sentence it remains in doubt there, and then a biologist may be called to ascertain about the animal and also a color-expert to make sure of his genuine color whether it is black. Then, a typical skeptic may ask further about the knowledge of the expert regarding the issue of his color blindness and also the proper knowledge of biologist about his intellect in recognizing animal. What follows then? Truly, it is rather unending process because nothing in the world could be genuinely verified conclusively. Carnap concedes with the fact and writes, "therefore here also no complete verification is possible but only a process of gradually increasing confirmation."<sup>8</sup>

Therefore, the process of confirmation must be concluded up with a discomfort feeling not to finish up the whole process entirely. For example, 'cats have tail' is supposed to be an undisputed sentence in our everyday experience. But, this sentence is logically flawed as long as it is

taken to be certain. Naturally, it is not possible to be confirmed about the veracity of the content fully because no absolute verification is possible in practical life. This is the point which is marked by Popper, Lewis and Negal. The logical problem of induction will be discussed here which creates much discomfiture to the inductivists. This problem still suffers number of philosophers in history who have a close affinity to inductive logic. Carnap himself accepts the probability as a degree of confirmation. An empirical evidence which is given to a statement can confirm its probability. For example, “the score is two” – is a statement made by a dice-player which signifies that its degree of confirmation is one sixth. The case of probability always arises within a sphere of confirmability but not outside of the network. Carnap very clearly proposes that the probability of a statement depends upon the logical relationship between statement and evidence. We will never, he concedes, be sure about the absolute certainty of an hypothesis but only evaluate the degree of confirmation by mathematical model of evaluation. And, inductive logic would give us sufficient method of reliability.

Carnap asks the situation and agrees with fact that “there is no general rule to determine our decision. Thus the acceptance and the rejection of a (synthetic) sentence always contains a *conventional component*.”<sup>9</sup> Although this part of the decision is not completely satisfactory from Carnap’s side; nevertheless, for obvious reason, we have nothing to accept the proposal. His *conventional component* is practically justifiable but theoretically susceptible. Here, the most important part of the argument is taken by Reichenbach and Lewis and describes that every sentence is probability-sentence.<sup>10</sup> We know from the empiricists’ explanation that the degree of confirmation of sentence depends upon its degree of probability or “as the limit of relative frequency”.<sup>11</sup> Perhaps, this is the position of Reichenbach. It should never be denied that the degree of confirmation of every universal law is always zero because factually it is undeniable truth.

Accordingly, this view is much closer to the doctrine of Pragmatism which reveals that truth can be ascertained by its acceptability i. e. person who intends to accept it according to the position of the person. It also identifies the case that all synthetic sentences are hypothesis or not the case of complete verifiable. What should be the next with regard to scientific theory or the case of our daily-life assumption? The logical skepticism of Hume and Russell has not been discussed here but obviously it creates new spaces in scientific as well as our practical assumption in daily life.

Now, justify the case of Carnap as he approaches to the logical analysis of confirmation and testing.

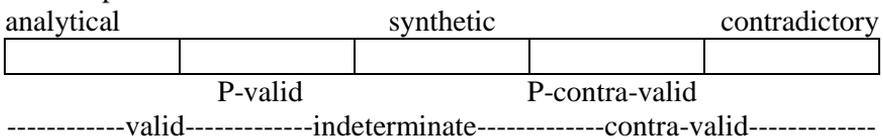
ii) Logical analysis of language

The most important factor of Carnap’s argument is to understand the difference between logical and empirical investigation as it creates trouble and misunderstanding to the readers without knowing its distinction, he claims. So, to verify or to test a sentence, one need to be careful about its methodological investigation. For logical system, the term ‘L’ has been taken which is supposed to be given by a system of rules. This ‘L’ is given by the rules which may be classified into two kinds: formative and transformative. Formative rules say how ‘L’ is constructed out of the symbol of L. And, transformative rule says how to deduce a system from the premises and which sentences are chosen to be true without any reference to the class of sentences. This transformative rule then divides into two kinds: Logical rules or *L-rules* and physical rules or *P-rules*. Logical rules concerns about logico–mathematical nature and physical rules about natural science e. g. physics or biology etc.

Here, some sentences have been taken like S, S<sub>1</sub>, S<sub>2</sub> etc. and –S as the negation of S. According to the rules of L, S can be deduced here from the class of sentences which is marked as C ---this S is called the *consequence* of C. Again, if the L-rules are support then it is called L-consequence; if that doesn’t support then it is P-consequence. Accordingly, S<sub>1</sub>, S<sub>2</sub> are called equipollent if it does follow the rule as the consequence of other.

Now, if the S is taken to be true according to the logical analysis, then S should be called *valid* in L; where L is analytic; if it is true on the basis of L-rules alone. If that doesn’t follow, then it is called P-valid. On the contrary, if S can be shown to be false S can be termed as S is called *contra-valid*. And, if the L-rules are taken alone then L is called *contra-valid*. Besides, if S is shown to be neither valid nor *contra-valid* then S should be called *indeterminate*. If S is taken neither analytic nor contradictory then it S is called *synthetic*. It implies that its truth or falsehood cannot be determined by logical rules alone. The whole language system is classified here by Carnap as follows:

L-concepts<sup>12</sup>:



Now, any sentence suppose  $S_1$  is called to be incompatible with  $S_2$  when the negation- $S_1$  is a consequence of  $S_2$ . Here, we need to see through Carnap's project on confirmability and testability in the following section.

## 2. Confirmability and testability

Accordingly, just to understand the meaningfulness of a sentence, according to Carnap, it needs to explain two terms *observable* and *realizable* respectively which in great respect belong to the behavioristic theory of language. Explanation 1: in any language L, predicate P will be observable for a person N if for a argument b; N will be able to come to a decision by the help of few observations about a full sentence e.g. P(b). Confirmation about of either 'P(b)' or '-P(b)' of such a high degree, he will either accept or reject P(b).<sup>13</sup>. To understand observable and non-observable predicates one has to depend upon a given person who is assigned to determine its observability. For example, there is a blue paper-weight on the table. If someone examine the sentence thoroughly he needs to be sound about color sense; after few observations he will be ascertained about its color. But, if the predicate is non-visible e.g. electric field or non-observable particle then an instrument can make it happen. Carnap depends upon a very simple way to be confirmed about the acceptability of a sentence in his explanation (1). Of course, Popper and others contrive means to reject the simplicity of the tactic. They don't want to depend upon the *senses* because it may lead to wrong hypothesis. But, importantly, all wrong perceptions are confirmed by further perceptions or repeated observation in a given circumstances. So, Carnap is not incorrect in all senses.

Again, Explanation (2): A predicate 'P' of a language L is called '*realizable*' by N, if for a suitable argument, e.g., N is able under suitable circumstances to make the full sentence 'P(b)' true i.e. to produce the property P at the point b.<sup>1</sup>. Let us explain the  $P_1(b)$ ; if we understand the sentence 'water boils at 100° c' we need to realize the boiling point of water.

Now, the proposed theory of confirmable made by Carnap is to be discussed at length. It needs to remember that his theory is also called reducibility. The main point of the reducibility is to deduce a sentence S from the class of observable predicates C. 'This shirt is white' is a sentence that is confirmed by various test and if the test leads to the positive result then S is taken to be confirmed and if it fails to be confirmed then it -S is confirmed. It is supposed that this is also very

simple tactic to be ascertained about its confirmation. Of course, anti-empiricists raise the question from the beginning about the reliability of human senses and its given circumstances that compel us to perceive differently. This is why, it is certain Carnap asks the person who use to confirm the language L needs to check out vigorously. Moreover, the reduced sentence which necessarily comes down from the class of predicates, as it is called molecular sentence, is very easy to make it out. He says ‘all molecular predicates are completely confirmable.’<sup>14</sup> Now, to focus in the following section about Popper’s objection in it.

### 3. Popper on Carnap’s thesis

Truly, Carnap doesn’t accept the proposal of Wittgenstein’s *Tractatus* in eliminating metaphysics in the later period. With the amendment, the new formula says, an expression is said to be meaningful in a given sentence if and only if it supports the rules of formation in the language. It is the transformation from naïve or naturalistic theory to the more sophisticated doctrine, according to Popper. And, the changes had been praised by Popper in his article ‘Demarcation between science and metaphysics.’<sup>15</sup>

However, this position of Carnap is further criticized in the article. Popper says, Carnaps’ anti-metaphysical position is finally subdued by the actual facts which finally ‘destroy’ the theory of meaninglessness of metaphysics. According to the Wittgenstein, a sentence is said to be meaningful if it satisfies the conditions given below:

- a) all words which occurred in it had meaning *and*
- b) all words which occurred in it fitted together properly .<sup>16</sup>

As per the above conditions, if any individual word of a sentence is supposed to be meaningless then the whole sentence will lose its meaning. And, of course, all the words used in the sentence must follow the rule of grammar and logical syntax of language. Condition (b) is supposed to borrow the idea from Russell where it is suggested that “certain ‘combinations of symbols’, which looked like propositions ‘must be absolutely meaningless not simply false’”<sup>17</sup> Here, the term ‘meaningless’ is meant to have the quality of being observational or perceptual. Carnap says, “all concepts used in the sciences could be defined on the basis of observational or perceptual experience.”<sup>18</sup>. But, for obvious reason, Popper added another condition to cover all sides of verifiability criterion.

- c) an alleged proposition ( or sentence) is genuine if, and only if, it is a truth function of, or reducible to, elementary ( or atomic) propositions expressing observations or perceptions.<sup>19</sup>

Popper's objection against the aforesaid criteria (a, b, c) is very unsound. He says, 'thus criteria of meaning leads to the wrong demarcation of science and metaphysics.'<sup>20</sup> It is further criticized that Carnap doesn't understand the difference between science and non-science. And, also, to make the demarcation he is likely to be in logical trapped; as a result, his proposed doctrine completely fails to satisfy the demand of logical positivists. Finally, Carnaps' has thrown the baby along with his dirty water to the scrap-heap.

#### **4. Reply to the critics**

The basic point, for which Carnap and Popper were debating upon, as it is early mentioned, is the demarcation line between science and metaphysics. Before Carnap, Moritz Schlick, as a member of Vienna circle, perhaps is the first to make the way in keeping up the spirit of positivism in Vienna. Schlick, an orthodox positivist, becomes the centre of the circle makes all possible venues for eliminating metaphysics and so-called transcendental reality. He categorically advocates that 'the meaning of a proposition is the method of verification.'<sup>21</sup> So, according to Schlick, nothing can be accepted as science and philosophy if it devoid of anything which doesn't correspond to the fact. Accordingly, metaphysics is never acknowledged with any fact of our known world and hence it is meaningless. This simple equation is not supported by metaphysicians or some positivists as well. For obvious reason, the debate continues.

Metaphysics is meaningless because it is impossible to verify the sentences which are purported to express the reality that is beyond of the phenomena. It is clearly adjudicated from their part that metaphysics has no epistemological significance, if it has something that is nothing but emotional import. That is way; metaphysics can never be accepted a part of philosophy. In turn, philosophy should only be a part of cognition which ultimately refers to something that is verifiable or confirmable by test at least in principle. Popper is not a metaphysician<sup>22</sup> nevertheless he doesn't compromise with his position of non-positivist. Science and scientific knowledge differs from metaphysics by its method of verification. Metaphysics unlike that of science is wholly non-experimental because it claims transcendental knowledge which is neither verifiable nor reproducible. It is supposed that Popper in a true

sense is not a metaphysician. I think he doesn't have little confidence on metaphysics but anguish against the way of metaphysician: how they approach to demolish metaphysics. Besides, his (Popper) attitude towards the method of science is very negative. In Carnap's famous book *Testability and Meaning* the demarcation line has been slightly changed and verifiability is replaced by testability for more accuracy. He writes,

It seems to me that it is preferable to formulate the principle of empiricism not in the form of assertion –“all knowledge is empirical” or “all synthetic sentences that we can know are based on ( or connected with) experiences” or the like but rather in the form of a proposal or requirement. As empiricist, we require the language of science to be restricted in a certain way; we require that descriptive predicates and hence synthetic sentence are not to be admitted unless they have some connection with possible observations, a connection which has to be characterized in a suitable way. By such a formulation, it seems to me, greater clarity will be gained both for carrying on discussion between empiricists and anti-empiricists as well as for the reflection of empiricists.<sup>23</sup>

Carnap thus proposes the *principle of empiricism* instead of principle of verification not as an assertion but as a *form of proposal or requirement* for a language of science precisely. Now, it should be considered four possible requirements of Carnap proposed in framing out elimination project of metaphysics in his book *Testability and Meaning*. These are: RCT (Requirements of complete Testability), RCC (Requirements of Complete Confirmability), RT (Requirements Testability), RC (Requirements Confirmability). For the case of RCT, Carnap says, “all synthetic sentences must need to be completely testable,” RCC, “all synthetic sentences must need to be completely confirmable”, RT, “all synthetic sentences must need to be testable.” RC, “all synthetic sentences must need to be confirmable”. It follows that RC is supposed to be most liberal requirement among four. However, he claims that RC has the full-merit to provide all conditions in sustaining the basic principle of empiricist criterion. In his words, “it seems to me that RC suffices as a formulation of the principle of empiricism.”<sup>24</sup> He claims that RC can never allow transcendental metaphysics to be in the cognitive bundle or it doesn't mean that, for its liberal mode, scientists is not finally allowed to make their choice within very restricted area of their respective method.

Now, what happen there if Popper claims, in spite of a new formulation, that he is able to prove a sentence like “there exist an omnipotent, omnipresent, and omniscient personal spirit,”<sup>26</sup> a

physicalistic language. Popper admitted that Carnap's new formulation regarding the principle of empiricism is too liberal; so that many sentences like the above one may fall into the trap of metaphysical triangle. Now, go back to the arguments of Popper<sup>1</sup> which is logically flawless but materially unsound. Carnap does not wish to include all sentences into his proposed category. It is supposed that he (Carnap) means to apply his formula to only "all synthetic sentences" not the sentences of metaphysical like. If we fail to make discern of the character of sentences i.e. synthetic or metaphysical it may lead to destroy the content of discussion or, more precisely, the agenda of debate. Here, the case happens like that. What do we understand by synthetic sentence? Or, what is nature of the sentence that we call metaphysics? It is very clearly stated, according to the positivists, that sentences which recognizes the fact that finally refer to our experience are called synthetic sentence. In his essay 'The Elimination of Metaphysics Through Logical Analysis of Language' Carnap proposes<sup>27</sup> a word used in a sentence must be significant and its significance is assured if it follows the rule of syntax and the word which occurs in a sentence must follow the stipulation.

- 1) What sentences is S *reducible* from, and what sentences are reducible from S?
- 2) Under what condition is S supposed to be true, and under what conditions false?
- 3) How is S to be *verified*?
- 4) What is the *meaning* of S?

So, Popper's proposed sentence doesn't fit with his intention here. Furthermore, in Hume's *An Essay Concerning Human Understanding* such kind of sentences had been identified with the sentences concerning matter of fact. So, 'omnipotent', 'omnipresent' or 'spirit' are the terms which are not easy to define on the physicalistic basis. "There is a very stout-hearted man in the garden" or, "There is a supreme being in the universe" are the sentences which are almost alike in the structural configuration but the mistake arises when we level it out. That is why; it needs to be careful before making any distinction between metaphysical and non-metaphysical sentences. There is no scope to mess up the difference.

Importantly, this is a very important issue in science that science must differ from non-science. This issue is much trivial or it is an issue

in science that must need to ignore. Popper ignores this problem by saying that “the problem of how to construct a language of science which includes all we wish to say in science but excludes those sentences which have always been considered as metaphysical is a hopeless one. It is a typical pseudo-problem.”<sup>28</sup>

Now, take some discussions from Popper in which he criticizes Carnap in different angles and its possible reply from my part. Popper takes at least three approaches of Carnap: a) The Physicalistic Language, b) the Language of Unified Science, c) the Language of the ‘Logical Syntax’ etc.

### **a) The Physicalistic Language**

It has already been discussed about the earlier position of Carnap in which he abandoned methodological solipsism and takes thesis of physicalism. According to his new theory, everything in the world can be expressed in this language. Even psychology which is very difficult to define has been brought under behaviouristic approach. So, all languages concerning the problem of natural science or social affairs must have the quality to be expressed in physical language, he argues. Popper criticizes the argument and demands ‘the broom of the anti-metaphysicist sweeps away too much, and too little.’<sup>29</sup> He further says, “The point is that all physical theories say much more than we can test.”<sup>30</sup> It is a very common but trivial objection against scientific method that science never follows scientific method. By scientific method it is meant ‘observation’ and ‘experiment’ however; it is not clear what does Popper mean by ‘more than we can test’. Popper also claims Einstein to be a long time believer in metaphysics. There is no reason to make a judgment over a personal belief of a particular scientists’ e. g. Einstein or Mach etc in order to discuss the nature of scientific hypothesis. This will never be fairly judged when we approach someone to bring his personal belief rather than the method he follows. Here, the reference given by Popper is incomplete because Einstein and his theory of relativity express the science of empiricism. Theory of relativity and the definition of space and time overthrow the *a priori* mode and show that space and time can never be defined without the reference of others. Modern geometry which is often called Riemannian geometry stands on the basic principle of relative space-time mode. It is strongly oppose that Popper’s argument against his anti-scientific conjecture in a view to overthrow the thesis of physicalism.

All statements should be finally reduced to protocol-statements to justify its truth-value. Carnap says, all words used in a statement should reduce to other words and conclusively it occurs in a observation sentence or protocol sentence. This process is seriously objected by Popper and argues against it as saying that it is an attempt to construct an external world of science out of my own experience. It is a prejudice, he claims. We never trust our own experience, he says, unless we are sure that my experiences conform with others as a inter subjectively testable views. It is good to see the argument. Of course, one doesn't accept a perceptual view of others unless we are much confident about its truthfulness. He claims a bird 'crow' and shouts to show others on a roof but actually it was 'cuckoo'. Nobody takes his claims to be true. One experience over here is very personal but at the same time it has an objective value which is confirmed by others. So, the term *my experience* can never be objected by saying that it is methodological solipsism.

#### **b) The Language of Unified Science**

It seems to be absurd at the first sight that all sciences including natural and social should bind together and a unified language can be made to explain the nature. Very roughly, it is called unification of science. Popper flies in the face of such attempt and rejects by saying that, it is rather non-sense. It was a dream of most of the positivists in 1930s, excluding Godel.<sup>31</sup> that all sciences in spite of having different routes explain an undivided nature. And, if it is possible to find out a single language to explain the whole nature then the unification can be made up. Schlick has also something in his mind to make the unification of all sciences and reduction to physics.<sup>32</sup> It is really very hard to believe any attempt of the scientists like that but, strangely Einstein had a strong belief of that and he was an optimistic to unite all sciences in a single bundle. But, the physics was immature of his time. Stephen Hawking after long days nourishes the same hope to the grand unification of science. The process and probability of grand unification theory is not to be discussed here but many scientists still believe that it is very much possible for them to invent such theory. Carnap and others argue that if a unified language is likely to operate in science then metaphysics wouldn't have any scope to be operative in philosophers mind.

#### **c) Logical syntax**

Popper concedes the difficulty in *Logical Syntax* of Carnap. He also expresses his satisfaction because Carnap has 'accepted' some of his

criticisms in *Syntax*. Actually Carnap didn't accept his criticism properly. Logical syntax examines the formal properties of sentences. Carnap includes two rules in his book: formative and transformative in order to justify the language used in sentences. Firstly, formative rule determines, how the symbol of a language can be combined together to form a sentence and secondly, transformative rule specifies the deductive process from which a sentence is deduced from others. Popper again raises his claim here to be naturalistic theory of meaninglessness, which has been discussed previously.

As a criterion of meaning or the true demarcation principle of science--non-science, principle of verifiability or confirmability or testability, according to Popper, is not convincing. Popper sees the term 'testability' or 'confirmability' is a general version of verifiability. Accordingly, he demands, "*acceptability in science depends, not upon anything like a truth-surrogate, but upon the severity of tests.*"<sup>33</sup> The last section of Popper's discussion on probability and induction as a part of criticism against Carnap can now be considered.

## 5. Probability and induction

It is the major intention of Popper to exclude pseudo-science from science; astrology, for example, is believed to be pseudo-science although the list is hunched to be very long but he mentions only one. He opines that pseudo-sciences are dis-confirmable whereas metaphysics is non-confirmable. For obvious reason, according to Popper, the principle of confirmability appears to be a wrong demarcation, he claims. It is also claimed that Carnap's principle of confirmability excludes many interesting scientific statements and also universal laws of nature and scientific theories. It is rather interesting to make a note of Popper's false-cry on scientific laws and universal laws. He doesn't have faith on scientific laws let alone universal laws, so, it is not very good to see such statement from him. He says, "our science is not knowledge, we do not know we can only guess."<sup>34</sup> Besides, it is not quite clear how many sentences are branded with *interesting scientific statements* according to Popper? Perhaps, Popper indicates some interesting story behind scientific invention, how they came across a long interesting way to make a genuine scientific theory. I am not sure an interesting story of a particular scientist can ensure a statement to be interesting. It is undeniable that many scientists, August Kekule for example, made some intuitive process to find out a real scientific hypothesis. Nevertheless, such an un-sophistication in scientific procedure didn't destroy the

experimental method of science which is undeniable fact in human knowledge.

The important question to Popper is, what does he mean by science or pseudo-science? If he doesn't believe the difference between science and non-science or pseudo-science, it wouldn't have been possible to make the demarcation between these two or three. In principle, this demarcation line is overshadowed by Popper and plainly rejected any possibility to draw the line of divide. Let's follow the chart:

**Line of demarcation**

Sentence	Status [Analytic/ Synthetic]	Meaningful/ Meaningless
a) $(A+B).(A-B)=A^2-B^2$	Analytic[ mathematics]	Meaningful
b) $T.T= T$	Analytic[ Logic]	Meaningful
c) All cats have tail	Synthetic[ natural science]	Meaningful
d) All Copper conduct electricity	Synthetic [ physical science]	Meaningful
e) Absolute is the supreme spirit	Metaphysics	Meaningless
f) Soul is the disembodied entity	Metaphysics	Meaningless

Just follow the chart and try to make a distinction between meaningful and meaningless sentences. What is the difference between this two? If we, for our argument sake, take a scientific sentence which is likely to be mixed up with metaphysical fragrance, what takes it natural shape? I am sure that sentences which are believed to have mixed up with metaphysics must lose its character of scientific stature. Popper claims that Carnap's proposed version of meaning criterion 'did not exclude obvious metaphysical statements'<sup>35</sup> 'All swans are white' or 'arsenic is poisonous' are not metaphysical sentences by any standard although those are conclusively unverifiable. It should be unjustifiable to draw the level out conclusive unverifiable sentence with minimum unverifiable sentences that is supposed to happen for metaphysics. It is absolutely taken to be granted that "all universal laws have zero confirmation"<sup>36</sup>. It obviously doesn't mean that *all metaphysical sentences have no minimum confirmability however its significance can never be denied.*

In fact, Popper's falsifiability principle which was made only to destroy the principle of verification suffered from the same miscarriage, for which Popper himself used to do, by many including Carl G. Hempel along with Carnap. In his famous essay<sup>37</sup> C. G. Hempel criticizes both the approaches of Carnap and Popper and proposes an alternative. And, that is the way of translability into an empiricist language. In brief, several defects of falsifiability criterion made by Hempel<sup>38</sup> will be mention here.

- i) Principle of falsification rejects existential hypothesis such as "there is at least one unicorn in the universe". This sentence is of a mixed quantification namely universal and existential. Truly, none of these can be falsified by number of observations however long the exploration is.
- ii) Any sentence S is supposed to be completely falsifiable and N is not then their conjunction turns to be falsifiable according to the rules of truth-function. If the denial of S is confirmed by some observations then the denial of S. N should be confirmed by the same class. As a result, this theory virtually allows empirical significance to many sentence which an adequate empiricist criterion should rule out, such as, say "All swans are white and the absolute is perfect".

## Conclusion

The debate between Carnap and Popper is not a small issue in any sense rather it creates a huge space in philosophy of science particularly in scientific philosophy as an unresolved problem between science and non-science. Metaphysics, the most trusted ally, of theosophy, always suffers from its non-cognitive stigma. Carnap ran against metaphysics or speculative philosophy of all kinds whereas Popper although is not a metaphysician however stands against the principle that is supposed to demarcate between philosophy and metaphysics. Through the arguments given above it is intended to show that Popper's position is vulnerable because his theory of falsification is unjustified and fruitless effort to make the demarcation. Carnap, on the other hand, argues mostly through logical operation that the principle of confirmation may be the well and satisfactory effort to sunder philosophy from metaphysics. Metaphysics can never be a part of philosophy since it devoid of sense. It may have emotional values or moral justification but finally speaks nothing.

**Notes and References**

1. Rudolf Carnap, 'Testability and Meaning' in *Philosophy and Progress*, Vol.3 No.4, 1936, p. 420 [Henceforth 'Testability and Meaning']
2. *Ibid.* p.3
3. K. Popper, *Conjecture and Refutations, The Growth of Scientific Knowledge*, London, Routledge, p.254 [Henceforth 'Conjecture and Refutations']
4. *Ibid.* p.420 Older forms of verifiability actually comes from M. Schlick during the time of Vienna Circle's first phase.
5. Rudolf Carnap. 'Testability and Meaning,' p. 422
6. *Ibid.* p. 424
7. *Ibid.* p. 425
8. *Ibid.* p. 426
9. *Ibid.* p. 426
10. *Ibid.* p. 427
11. *Ibid.* p. 433
12. *Ibid.* p. 455
13. *Ibid.* p. 456
14. *Ibid.* p. 17
15. K. Popper, *Conjecture and Refutations*, p. 259
16. *Ibid.* p. 259
17. *Ibid.* p. 260
18. *Ibid.*
19. Popper, p. 261
20. *Ibid.*
21. *Ibid.*
22. Rather empiricist.
23. Rudolf Carnap. 'Testability and Meaning,' p. 33
24. *Ibid.* p. 35
25. K. Popper, *Conjecture and Refutations*, p. 275
26. Popper proposes four physicalists predicates here.

27. Rudolf Carnap, 'The Elimination of Metaphysics Through Logical Analysis of Language,' in A. J. Ayer (ed.), *Logical Positivism*, Michigan, Free Press, 1966, p. 981
28. K. Popper, *Conjecture and Refutations*, p. 277
29. *Ibid.* p. 266
30. *Ibid.* p. 266
31. Godel was a member of Vienna Circle. He didn't have faith on completeness of theory, although he has had an extensive conversation with Carnap on this issue. Carnap replies about the attempt of Godel to limit his language of unified science. He writes, "These results [ i.e. the results of Godel and Tarsky referred by Popper (M. B.) are certainly of the greatest importance. But they show only that no fixed language can be logically and semantically complete; every language can be further strengthened by the addition of new logical forms of expression and new logical means of deduction. The thesis of the unity of science, as Neurath and this is maintained it has nothing to do with the question of completeness." P. A. Schilpp, (ed.) *The Philosophy of Rudolf Carnap*, Schilpp Volume, Open Court, 1991, p. 880
32. M. Schlick, 'Die Probleme der Philosophie in ihrem Zusammenhang' Suhrkamp, 1886, [Chapter "Das sytem der Wissenschaften" [This information has been taken from an article 'Carnap, Popper, Godel: Can Unify be refuted by Incompleteness?' written by Matyas Brendel, Budapest University of Technology and Economics.]
33. Rudolf Carnap, 'Demarcation between Science and Metaphysics' in *Conjecture and Refutations*, p. 279
34. K. Popper, *L. Sc. D.*
35. K. Popper, *Conjecture and Refutations*, p. 281
36. *Ibid.*
37. Carl G. Hempel, 'Problems and Changes in the Empiricists Criterion of Meaning,' A. J. Ayer (ed.), *Logical Positivism*, Michigan, Free Press, 1966, p. 108
38. *Ibid.* p. 114