

MEANINGFULNESS OF METAPHYSICS A REFLECTION ON THE LOGICAL POSITIVISTS' REPUDIATION OF METAPHYSICS

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Abstract

There has been a controversy on the status of metaphysics in the field of scientific knowledge. The logical positivists are of the view that metaphysics is meaningless as its object of study cannot be given a cognitive status. The logical positivists have claimed that any knowledge outside science is dubitable and unfounded. This is informed by the contributions and achievements of science and by extension, technology in the alleviation and eradication of humans' problems. The task of this paper is to defend the status of metaphysics against the verification principle as the standard of what is scientific. Metaphysics is the study of the totality of reality, while every other science is concerned with the study of one aspect or the other of reality. Unlike metaphysics, the natural (physical) science like physics, chemistry and biology are specific. In the justification of the existence of metaphysics and its defence, this writing complies with the view that the construction of scientific theories is based on the metaphysical ideas. Though there might be demarcation in operation, both complement each other. The quarrel with logical positivists is not that the demarcation is not possible rather it is the way they rejected metaphysics as meaningless and insignificant. Researches and experiences have shown that metaphysics is indispensable even in the activities and operational methodology of science. On this exemplary basis, the unobserved theoretical entities (e.g. electrons, atoms, molecules quark, and so on) are utilised by science and in the final analysis provides a systematic and coherent account of the phenomena we encounter in experience. So, the programme of elimination of metaphysical thesis from science is unjustifiable on the ground that metaphysics is the foundation of all disciplines including the assumptions of science.

Keywords: Metaphysics, Logical Positivism, Science,

Introduction

Over the years there has been controversy on the demarcation between science and metaphysics. It is noticed that the main aim of the logical positivists was the elimination or rejection of metaphysics in

the quest of knowledge and to extol science, and using science as the standard of genuine knowledge. The logical positivists have claimed that any unscientific statement is dubitable and unfounded and should be regarded as

meaningless.

Following the achievements of science - the elevation of human over and above his environment, the subjugation and subjection of nature to human's will, science deals most explicitly with the observable, the logical positivists saw it as the most spectacularly successful epistemological enterprise ever. They, therefore, believed that science can answer all questions (both philosophical and otherwise). For the logical positivists, any knowledge claim outside science is not knowledge and is meaningless. So metaphysical claims and or questions were regarded as meaningless and must be rejected. Metaphysics, for the logical positivists is the enterprise of blind people in a darkroom looking for a blind cat that is not there. According to them, metaphysics is the attempt to demonstrate that there are entities which lie beyond the reach of any possible experience, that is Kantian "things in themselves".¹ For them only what is experimentally verifiable is valid, and all references to entities which are not accessible to observation is meaningless-metaphysics, then, could be dismissed out of hand as nonsensical. In arguing against metaphysics one metaphysician says "Reality is the Absolute" and another says that "Reality is a plurality of spirits" the empiricists needs not trouble themselves to reply to their arguments.²

Some have argued that going by the objective metaphysics sets out to grasp, it becomes impossible to dispense with metaphysics. In the light of its object of study, the structure of any field of knowledge is embedded in the foundation

of metaphysics. This is manifest in the assumptions and presuppositions upon which any discipline thrives: science and logical positivism (and its attack) are not exception.

The task of this paper is to determine whether metaphysics is indispensable or not. In the course of this work, logical positivism and its rejection of metaphysics will be critically analyzed. I will determine the foundation upon which the claims of science are made (built). If science cannot validate its foundational principles, then there are some nonscientific justifiable bases for accepting science. This means that science cannot be the only basis for its beliefs.

The analysis of the logical positivists' activities will determine whether they were not involved in metaphysical speculations. If they were, then the rejection of metaphysics is based on a naive and shaky footing.

As the main task of this paper, exposition will be made on the major antagonistic concepts (metaphysics and logical positivism) with a view to understanding their status in the field of knowledge. A critical evaluation will also be made on the position of positivism, justifying whether their claim is tenable or not.

As a refutation of the positivists attack on metaphysics, a defence will be made for metaphysics as the justification for every field of knowledge including science. This is the position that every discipline presupposes metaphysics. In the final analysis, an appropriate picture of

¹ John Passmore, *A Hundred Years of Philosophy*, (London: Cox and Wyman Ltd, 1966), p. 370.

² Passmore, p. 370.

metaphysics will be given to erase the ignorance and epistemological naivety from the attackers of metaphysics.

What Is Logical Positivism?

Logical positivism was the philosophical movement initiated by a group of thinkers who converged in Vienna in the 1920s. This group later became famous under the name "Vienna Circle". According to Antony Flew, logical positivism is "the range of ideas characteristic of the Vienna Circle in the 1920s and 1930s".³ Its distinctive feature was its attempt to develop and systematize empiricism with the aid of the conceptual equipment furnished by modern research on logical and mathematical theory, in particular the early works of Russell and Wittgenstein.

Among the notable members of the logical positivists were Moritz Schlick (Leader), Hans Hahn, Otto Neurath, Phillip Frank, Victor Kraft, Herbert Feigl, Friedrich Waisman, and Kurt Godel.

Logical positivism, involves the elimination of much of the traditional philosophy, in particular, metaphysics and also theology as literally meaningless. What this amounted to was the view that the investigation of any substantial facts about the world was the province of science alone, not philosophy which could be concerned only with conceptual elucidation and the linguistic task of precise definition showing some statements to be scientific, some to be mathematical and some (including most so-called philosophical statements) to be non-sensical.

The views of the logical positivists, put briefly, were that every significant statement either is a statement of formal logic or is a synthetic statement. According to Jerrold L. Aronson, the logical positivists used powerful mathematical and logical systems as the major tools of analysis in order to achieve the above two objectives".⁴

From the position of logical positivists, metaphysical claims are part of neither science nor philosophy. If philosophy is not concerned with metaphysics, what is left for the philosopher to do? The answer according to the logical positivists, is to analyze the language of science, that is, semantics is the legitimate domain of philosophers; anything else is to be avoided. How is the philosopher to analyze the language of the Scientist? By systematically transforming the syntax of scientific propositions in terms of symbolic logic or mathematics along with the task of reducing the meanings of the theoretical terms which occur in these propositions to those of observables. Analysis is a branch of logic and consists of giving precise definitions of concepts; or presenting the logical consequences of definitions of terms used in science and common sense, Thus, all the propositions of philosophy is to translate talk of one sort into logically equivalent talk of any sort, an activity which has purely linguistic significance.

For Ayer, any proposition concerning the nature of reality would be factual or common-sense proposition whose truth or falsity could be established only by the

³. Anthony Flew, *A Dictionary of Philosophy*, (New York: St Martin's Press, 1984), p.315.

⁴. Jerrold L. Aronson, *A Realist Philosophy of Science*, (London: The Macmillan Press Ltd, 1984), p. 14.

test of experience and not by philosophy (metaphysics) as such.⁵ Ayer in his *Language, Truth and Logic* stated that philosophy itself can produce no new factual knowledge about the world but only deduce the logical consequences of propositions. The main objectives of the logical positivists are to:

- i Identity the differences between the formal and the empirical sciences, and to note the character of the "formal truths" which is derived from the former sort of sciences (including logic and mathematics) as against the "factual truths" of the empirical sciences.
- ii Formulate the principle of verification, or the verification criterion of meaning which would serve as a means of distinguishing genuine and pseudo-statements or sciences.
- iii Be able, following Ludwig Wittgenstein's "Tractatus", to eliminate metaphysical language from philosophy.
- iv. Determine the function of language in ethical discourse.⁶

Although, it must be noted however, that there existed among the logical positivists wide range of differences in the method of achieving their objectives. The rallying point is the elimination of metaphysics from philosophy. As this is the case the exposition of the concept of metaphysics is the next port of call.

The Concept of Metaphysics

It is an incontrovertible fact that the results of our scientific reflection sometimes seem to be in disagreement with our deepest and most cherished aspirations and purposes, and we cannot avoid the question of which of the two has the better title to credit as witnesses to the innermost nature of reality. This brings us to the point that there is that yearning to give a comprehensive and systematic account of reality which is apparently due to lack of in-depth understanding of reality which makes such impossible. But metaphysical inquiry appears to remove the conflict and bring everything into a unified and coherent scheme. That is to say, what is discrete and unrelated, what is rich and variegated can then be systematically connected. Everything can be seen to be fundamentally the same stuff or related to a single scheme.⁷ Hence, one can say that metaphysics is the comprehensive study of reality. But the question is, does the original and etymological definition of metaphysics meet this requirement?

The origin of and the use of the word "Metaphysics" came by accident and was first used by Andronicus of Rhodes, the editor of Aristotle's work, around 70 B.C when he edited Aristotle's Work. It is a word derived from two Greek words "meta" which means "after" and "physika" which means "physics" (or nature). Thus, the word "metaphysics", literally means "after physics" or "after the things of nature"

⁵ John Shand, *Philosophy and Philosophers: An Introduction to Western Philosophy*, (London: ULC Press Ltd, 1993), p. 265.

⁶ Jack A. Aigbodioh, *Philosophy of Science: Issues and Problems*, (Ibadan: Hope Publication, 1997), p.117.

⁷ F.H. Bradley, "Objection to Metaphysics" in *Introductory Philosophy*, Frank Tillman and others (Ed.), (New York: Harper and Row Publishers, 1971), p.734.

Andronicus noticed that Aristotle had some treatises which bore the title "physics" while some other treatises dealing with non-physical matters bore no title. In his arrangement of Aristotle's works while editing them for publication, Andronicus placed the treatises dealing with non-physical matters after those dealing with physics. He did not know what to call them, so he simply called them "after physics"- "metaphysika, that is, the treatises that come after those dealing with physics".⁸

Eventually, metaphysics came to be understood as the discipline dealing with realities beyond the physical world. This has been the popular understanding of the word down through the ages. But this popular understanding of the word is not quite accurate because it is not only realities that are beyond the physical world that metaphysics deals with. Rather, as a branch of philosophy, it is the study of the totality of being, that is, the nature and structure of being as a whole. The scheme of metaphysicists down through the ages is to give a comprehensive account of the whole of reality, its nature, its structure and the place of humans in the totality of reality. According to B.C. Collingwood, what differentiates this particular concept from those studied in other branches of philosophy is their generality. Part of the truth underlying the common traditional characterization of metaphysics as dealing with what is most general, most

comprehensive or most fundamental in a frequent phrase is this generality of the metaphysicians' concepts

Concepts such as existence, reality, substance, truth, similarity, difference, identity, contradiction, necessity and causality are common to our thinking in every area, whether it be in ethics, science, politics, or art.⁹ Given the generality of metaphysics, Alfred North Whitehead defines metaphysics as "endeavour to frame a coherent, logical necessary system of general ideas in terms of which every element of our experience can be interpreted".¹⁰ In the same vein William H. Walsh and Bruce W. Wilshire define it as the philosophical study whose object is to determine the real nature and principles of whatever is in so far as it is".¹¹ On the same trail, A. E. Taylor states:

The understanding of a systematic and impartial inquiry as to what we really mean by the familiar distinction between 'seems' and 'is', that to say a scientific inquiry into the general characteristics by which reality or real being is distinguished from mere appearance, not in someone special sphere of study but universally. Now, such an inquiry into the general character of reality, as opposed to more or less unreal appearance, is precisely what is meant by metaphysics.¹²

⁸. Joseph Omoregbe, *Metaphysics without Tears: A Systematic and Historical Study*, (Lagos: Joja Educational Research and Publishers Ltd, 1996) p. ix

⁹. Alan Ryan, *Methods of Metaphysics*, (London: Croom Helm, 1987), p. 174.

¹⁰. Alfred North Whitehead, "Speculative Philosophy" in *Introductory Philosophy*, Frank Tillman and others (Eds.), (New York: Harpers and Row Publishers, 1971), p. 741.

¹¹. William H. Walsh, and Bruce W. Wilshire. "Metaphysics", in *The Encyclopedia Britannica*, Vol. 12. (London: Encyclopedia Britannica Inc. 1981), p.10.

¹². A.E. Taylor, *Elements of Metaphysics*, (London: Methuen and Co. Ltd. 1946), p.4.

From this definition, it could be seen that metaphysics sets itself, more systematically and universally than any other science, to ask what, after all, is meant by real, and to what degree our various scientific and non-scientific theories about the world are in harmony with the universal characteristics of real existence. Hence, metaphysics has been called "an attempt to become aware of and to doubt all preconceptions" So long as we cannot avoid asking these question as to what "is" and what only "seems", it is clear that the attempt to dispense with metaphysical speculation altogether would be futile.¹³

n view of the holistic nature of metaphysics, it consists of a principle or set of principles which are used to organize the data of experiences (all experiences) into a coherent scheme. This raises some questions: Is it possible to bring everything into relation? How is it possible to choose between alternative and apparently competing frameworks? Are there any criteria of success? Can there be a principle or set of principles (like the theorems of geometry, which follows from accepted axioms and postulates) anyone would assent to?

Scepticism already posits that principles based on sense experience (as suggested or held by the positivists) clearly would not suffice, because our observations are often mistaken. Apparently, criterion of metaphysics does not assent to a principle about which we might be mistaken. This means that the kind of principle that would

serve as the basis of a philosopher's scheme must be known with complete certainty. It was in search for certainty and to remove dubitable schemes and or principles that made Descartes attempted to construct a principle to serve as the basis from which he could then derive an orderly scheme about the world. His search ends (and his system begins) with the famous "Cogito" "I notice that while I was trying to think everything false it must be that I, who was thinking, was something".¹⁴

Descartes thought that his "cogito" was necessarily true and that any reasonable person on hearing it must give his assent to it. However, the status of the cogito principle was fraught with problems and like any other metaphysical scheme fails to meet up with complete certainty. It was for the search of certainty that metaphysics was central to philosophers like Parmenides, Plato, and Aristotle, although they did not make use of the term "metaphysics". This, for them was the heart of philosophy, the central theme of philosophy. Aristotle called it "First philosophy" or "the science which studies Being qua Being". According to Aristotle, "this science is not the same as any of the so-called particular sciences, for none of the others contemplate Being generally. They divide off some portion of it and study the attributes of this portion, as do for example, the mathematical sciences".¹⁵ What Aristotle meant here, is that while other sciences study an aspect or certain aspects of reality,¹⁶ metaphysics studies reality as a whole.

¹³. Taylor, p.5.

¹⁴. Rene Descartes, "Meditation I and II" in *Philosophy: Paradox and Discovery*, Arthur J. Minton and Thomas A. Shikpa (Eds.), (New York: McGraw Hill Inc. 1982), p. 98.

¹⁵. Omoregbe, p. x.

¹⁶. Bradley, p. 737.

Metaphysics for Plato is called "Dialectics" and it is the core of Plato's Philosophy. For him metaphysics is the study of reality as distinct from appearances. Reality for him, lies beyond the material world which is only an imperfect reflection or shadow, and it is metaphysics (dialectics) which takes us beyond this reflection or shadow and brings us to reality itself. In answer to the question, where is reality itself, Plato said, it is the world of forms (world of ideas) which is accessible only to philosophers who make use of dialectics (metaphysics) to get there.

Bradley combined both the Aristotelean and the Platonic concepts of metaphysics when he said:

We may agree, perhaps, to understand by metaphysics, an attempt to know reality as against mere appearance, or the study of first principle or ultimate truths, or again, the effort to comprehend the universe not simply piecemeal or by fragment but somehow as a whole.

In view of these definitions and descriptions of metaphysics by both ancient and contemporary metaphysicians one can say that metaphysics is not the study of unseen or spiritual realities alone, but an attempt to understand the whole of reality both seen and unseen and the place of individual entities, within the total scheme of things. And as Aristotle pointed out, metaphysics is the only discipline that does this, and it is what distinguishes it from other disciplines. Thus, unlike other sciences that are concerned with particular beings, metaphysics is concerned with the totality of being. The metaphysical

horizon is therefore very broad and all-embracing, since it encompasses the whole of reality.

Going by this understanding of metaphysics it is taken that the structure of any field of knowledge is built on the foundation of metaphysics. This is manifest in the assumptions and or presuppositions upon which any discipline thrives, science not being an exception. In view of this, the logical positivist scheme is part of metaphysics as it sought to establish an indubitable scheme of arriving at knowledge. So the rejection of metaphysics by the logical positivists is the destruction of the foundation upon which all other sciences are built including logical positivism itself.

Metaphysics in Relation To Science: A Critique of Logical Positivism

The task of this paper is to justify whether the rejection of metaphysics by the logical positivists is tenable or not. This section critically argues that the positivist principle is self-defeating by the application of the principle to itself. The questions arise: Is there any clear-cut demarcation between metaphysics and science? Is there any relationship or connection between the two?

Jacques Maritain states that metaphysics is the foundation of all sciences. Because metaphysics is the study of Being as the totality of reality, and every other science is concerned with the study of one aspect or the other of Being. The study of one aspect of Being obviously presupposes Being and therefore presupposes metaphysics, the study of Being qua being indeed, metaphysics underlies every

academic discipline.¹⁷

This being the case, science is part of the object of metaphysical study. Since science is dependent on metaphysical principles (e.g. universality, empiricity and rationality, and so on,) the latter are not subject to empirical support (as supposedly claimed by logical positivism but are a priori truths, i.e. the claims, whose truth are established independent of experience. One of the most important aspects of Popper's critique of the logical positivists was his insistence that metaphysics can be meaningful and even be positive to science. Though he acknowledged that metaphysics is different from science, but the demarcation between science and metaphysics is not a demarcation between sense and nonsense.¹⁸

It is claimed that some of the metaphysical principles help science to develop such principle as every event has a "cause". The effect resembles the "cause", "The future resembles the past", "space and time are absolute", "space must be Euclidean" and so on. These principles tend to have a ring of necessity going beyond the evidence of science itself. Some of these claims noticeably are laws of necessity. With regard to the general character of laws of science, Jacques Maritain maintains that "The universality of the object of knowledge is the condition of its necessity, itself the condition of perfect knowledge or science. Exactly as knowledge can only be of what is by necessity, there can only be knowledge of

knowledge".¹⁹

But, as Kant has rightly pointed out universality and necessity cannot be found in the empirical realm. Here, Kant and Hume agreed that universality and necessity are not part of humans' empirical experience. They belong to the metaphysical realm, yet their usefulness is presupposed by modern science.

However, the reaction of the logical positivists was to replace necessary connections with that of correlations. For them laws of nature do not refer to necessary connections or power but instead generalizations concerning the ordering of events. Correlations are the strongest possible relation expressible in a scientific theory and in philosophy.²⁰

And if many scientists and philosophers believed that scientific theories hold answers to the question of reality, then science is embedded in metaphysics. Yet, the legitimacy of even this enterprise was denied by the positivists. There are some philosophers and scientists who believe that the truth of scientific theories has ontological implications, that the truth often entails the existence of observed or even unobserved entities. The unobserved theoretical entities (e.g. electrons, atoms, molecules, quarks, and so on) are utilized by science and in the final analysis provide a systematic and coherent account of the facts, of the phenomena we encounter in our sense experience. The relationship of science and metaphysics is clear regarding the explanatory

¹⁷. Omoregbe, p. 94.

¹⁸. Shand, pp. 177-178.

¹⁹. Jacques Maritain, *Degree of Knowledge*, (New York: Charles Scribner's Sons, 1969), p. 35.

²⁰. Aronson, p. 27.

assumptions of these theoretical entities in science. These entities are metaphysical assumptions that go essentially behind the phenomena of experience and are at best useful devices.

The statement by Karl Popper that metaphysics might even be positively helpful to science is informed by the explanatory function played by theories in science. Popper held that theories may begin as metaphysical, but then come gradually to be transformed into scientific hypotheses. The implication of this is seen in any experimental observation being carried out. According to Popper, "ideas previously floating in higher metaphysical regions may sometimes be reached by the growth of science, and thus make contact with it, and settle".²¹ He cited examples of such ideas as atomism, the idea of a single physical 'principle' or ultimate element (from which the others are derived), the theory of terrestrial motion (opposed by Bacon as fictitious); the age-old corpuscular theory of light, the fluid theory of electricity (reviewed as the electron gas hypothesis of metallic condition). All these metaphysical concepts and ideas may have helped, even in their early forms, to bring order into man's picture of the world, and in some cases they even have led to successful predictions. For an idea of this kind acquires scientific status only when it is presented in falsifiable form; that is to say, only when it becomes possible to decide empirically between it and some rival theory.²²

Using atomism as a striking example of

metaphysical background of scientific theories, Popper traced the origin of atomism to Ancient times. Atomism was first introduced in the West by Pre-Socratic thinkers Leucippus and Democritus. It continued as a powerful trend in the ancient world with Epicurus in Greece and Lucretius in Rome. It was still a metaphysical rather than a scientific hypothesis when it was reviewed and discussed by leading scientists of the day in Western Europe. Atomism only acquired a scientific status at the beginning of the 19th century, when Dalton reintroduced it to solve some problems in chemistry. Following the trail, Maxwell brought atomism into mathematical physics in connection with the kinetic theory of gases. By the end of the 19th century, atomism could definitely be considered as a scientific hypothesis.

In his defence, Popper stated that anyone who maintains that metaphysics is always meaningless is faced with some difficult choices. One option would be to say that atomism was always scientific, and so meaningful; but then it has to be maintained that the atomism of the ancient Greeks was scientific, and this is hardly plausible. The other option would be to say that atomism was meaningless from ancient Greek time until some point in the 19th century, when it was held that a perfectly meaningless theory was somehow used by Dalton, Maxwell, and others in order to formulate their scientific and meaningful theories. This again, according to Popper, is an absurd and untenable position. Thus, I hold that there is no escape from the conclusion that

^{21.} Popper, quoted by Donald Gillies, *Philosophy of Science in Twentieth Century*, (Oxford: Blackwell Publishers, 1993), p.189.

^{22.} Karl Popper, *The Logic of Scientific Discovery*, (London: Hutchinson, 1972), pp. 227-228.

metaphysics can be both meaningful and useful for scientific progress.

In his *Realism and the Aim of Science*, Popper developed his view on metaphysics by introducing the “concept of a metaphysical research programme” for science. Thus, he said: “Atomism is an excellent example of a non-testable metaphysical theory whose influence upon science has exceeded that of many testable scientific theories”.²³ After giving further example of metaphysical theories like Aristotelian doctrine of forms and matter, Cartesian theory of Cogito, Locke's Material Substance, which have influenced science, he continued:

Each of these metaphysical theories served, before it became testable, as a research programme for science. It indicated the direction of our research, and it made possible something like appraisal of the depth of a theory.²⁴

In the light of the role of metaphysics in theory formation and research programme, I can say that metaphysics plays a heuristic role in guiding the construction of scientific hypotheses. These hypotheses almost always emerge in the course of a scientist or a group of scientists pursuing a research programme, and such research programmes are usually guided by some metaphysical principles and ideas which indicate the kind of specific hypothesis which should be devised to explain existing facts and to be tested against further observations and experiments.

It was the fundamental influence of metaphysics on science that made Duhem to say:

By the almost universal assent favouring these theories, by the enthusiasm they raise, and by the discoveries they incite or attribute to them, they would undoubtedly be regarded as prophetic forerunners of the theory destined to triumph in the future. Anybody would judge that they reveal a first draft of the ideal form from which physics will resemble more each day....²⁵

Given the position of Popper and Duhem, it could be said that without metaphysical ideas like atomism that guide their research programme, it is doubtful whether Dalton and Maxwell could have devised their specific hypothesis.

Conversely, science can influence metaphysics. According to Popper, an obvious example is the debate between determinism and indeterminism. For him, the adoption of a strong version of determinism by Laplace was clearly influenced by the success of Newtonian mechanics. Conversely, the discovery of limitations on Newtonian mechanics and the adoption, as a fundamental theory in physics, of quantum mechanics with its probability and uncertainty, has led to a revival of indeterminism. So, it could be argued that the recent philosophical position on indeterminism is undoubtedly influenced by the success of quantum mechanics.

²³. Karl Popper, *Realism and the Aim of Science*, (London: Hutchinson, 1983) p.192.

²⁴. Popper, pp. 192-193.

²⁵. Duhem, quoted by Gillies, p. 198.

Though Duhem had written his works before the emergence of logical positivism and their demarcation, he presupposed that metaphysical systems exist and that these systems, though distinct from those of science are nonetheless meaningful. In his demarcation, he said science has its own sphere and its own method. Scientific theories have their subject-matter and their general character. The same can be said of metaphysics, but the sphere and method of metaphysical theories are quite different from those of science and of scientific theories.

However, he said that theoretical physics should not be subordinated to metaphysics but rather admit that metaphysics can influence science. His reason for holding this position is if theoretical physics is subordinated to metaphysics, the divisions separating the diverse metaphysical systems will extend into the domain of physics. That is to say a physical theory reputed to be satisfactory by the sectarians of one metaphysical school will be rejected by the partisans of another school.²⁶ He went further to consider an example; namely, the theory of the action of a magnet on iron. Going by his background, Duhem was a man well versed in the history of both philosophy and science, and was familiar, therefore, with considerable number of different metaphysical systems which would have appeared to him as obviously both meaningful and distinct from science.

Metaphysics according to him, lays a theoretical foundation for take-off of

science. In another striking example, Duhem discussed at some length the surprising fact that unscientific astrology had, at one stage, a beneficial influence on the mainstream sciences. In his words:

Discovery is not subject to any fixed rule. There is no doctrine so foolish that it may not someday be able to give birth to a new and happy idea. Judicial astrology has played its part in the development of the principle of celestial mechanics.²⁷

By this he noted that 'Judicial astrology' proved helpful in the development of the Newtonian theory of Universal gravitation, and in particular, of the theory that the tides are caused by the attraction of the moon. Metaphysically, astrology is based on the idea that heavenly bodies influence the fate of mankind here on earth; so astrologers would naturally be sympathetic to the view that the tides are caused by the Moon's attraction, since this would appear to them as just one instance of their general idea that the heavens influence events here on earth. According to Duhem:

Morin fell back on principle of judiciary astrology in order to affirm the role played by the sun in the variations of tide, and it is indeed to the undisputed credit of the astrologers that they prepared all the materials for Newtonian theory of tides, whereas the defenders of rational scientific methods, Aristotelians, Copernicans, atomists and Cartesians, have in emulation fought its advent.²⁸

^{26.} Gillies, p. 199.

^{27.} Duhem, quoted by Gillies, p. 196.

^{28.} Duhem, quoted by Gillies, p. 197.

Conversely, many of the more standard schools of science rejected the doctrine of the Moon's attraction as occult and superstitious. So, in this instance, the idea of the less rational astrologers proved more successful than those of their rational contemporaries. This was how Duhem described the development:

The virtue that the tides manifest was, on the other hand, made to order for the astrologers who found in it the undeniable proof of the influences that the heavenly bodies exert on sublunar things. This hypothesis was in no less favour among the physicians who compared the role played by heavenly bodies in the tidal phenomenon with the role attributed to them in crises of disease; did not Galen attach the critical days of pituitary diseases to the phases of the moon?²⁹

Drawing the influence of astrology on scientific theory, a Copernican, Kepler held that the moon attracts the water of the sea by a magnetic action.

From the above influence of metaphysics on science, it could be extrapolated that so long as a certain explanatory schema continues to meet its usefulness, it is regarded as scientific but when it cannot meet up certain demands of explanation and a better one does it, the former is regarded as metaphysics. It is understood that from numerous examples that metaphysics exerts a beneficial influence on the progress of science, but it should

also be noted that metaphysical ideas can obstruct, as well as help science.

On the basis of these differences, Gillies has pointed out that there are two approaches to the construction of scientific theories based on different metaphysical ideas: They are (1) Concrete models; Popper's example of atomism comes in handy. (2) Abstract mathematics e.g Duhem's Cartesiansim.³⁰ According to Gillies, the two approaches or models continue today in different branches of science.

On the relation between metaphysics and science, Quine did not see any need for drawing a demarcation. Quine has argued vehemently that the dichotomy which the logical positivists alleged between theory and observation, metaphysics and science, like those of value and fact, analytic and synthetic are untenable. According to Quine, "Both dogmas, I shall argue, are ill founded. One effect of abandoning them is, as we shall see, a blurring of the supposed boundary between speculative metaphysics and natural science".³¹ His reasons are expressed as follows:

Within natural science there is a continuum of gradations, from the statements which report observations to those which reflect basic features, say of quantum theory or the theory of relativity. The view which I end up with, is that statements of ontology or even of mathematics and logic form a continuation of

^{29.} Duhem, quoted by Gillies, p. 196.

^{30.} Gillies, p. 200.

^{31.} W.V.O. Quine, *From the Logical Point of View*, (Cambridge: Massachusetts Harvard University Press, 1961), p. 20.

this continuum, a continuation which is perhaps yet more remote from observation than the central principles of Quantum theory of relativity. The differences here are in my view differences only in degree and not in kind. Science is a unified structure, and in principle it is a structure as a whole, and not its component statements one by one, that experience confirms or shows to be imperfect. Carnap maintains that ontological questions, and likewise questions of logical or mathematical principle, are questions not of fact but of choosing a convenient conceptual scheme or framework for science; and with this I agree only if the same is conceded for every scientific hypothesis.³²

By this, Quine simply meant that knowledge is interwoven into one schematic framework but are apparently seen from different dimensions. Implicitly, Quine was confirming that metaphysics cannot be detached from science and that science is another dimension of knowledge in its explanation of natural phenomena. For Quine, there is no pure observation statements which are absolutely immune from value or theoretical content. This conforms with Kant's analysis of perception. Kant believed that conscious perceptions consist of judgments which are formed by bringing intuitions under concepts.³³ Aligning with this continuum, Quine said there is only what we could regard as a

continuous gradation of statements, from those which seem to report raw observational matters to those which seem more abstract and untouched by experience, but are at bottom all equally infused with value judgment.

The extrapolation from this is that all knowledge belongs to one framework. The issue of demarcation between metaphysics and science is a false one, both complement each in the continuum of knowledge. Besides, the issue of demarcation is a human factor and therefore is value laden. Conforming to this, Quine wrote:

The totality of our-so-called knowledge or beliefs, from the most causal matters of geography and history to the profoundest laws or atomic physics or even pure mathematics and logic, is a man-made fabric which impinges on experience only along the edges.³⁴

From Quine's analysis, metaphysics appears to be implied and there is no difference between metaphysics and science, at least the boundary is not entirely sharp. The distinction is nonetheless perfectly viable and useful. This aligns with the following analogy: in everyday life we can easily enough distinguish between those who are bald and those who are not, even though it is hard to say how many hairs a man must loose before he becomes bald.

Following this analogy, I can say that the fact that people belong to a particular

^{32.} Quine, quoted by Aigbodioh, pp. 135-136.

^{33.} Gillies, p.148.

^{34.} Quine, p. 42.

community does not mean that they do not share other views. This does not make it the totality of the so-called knowledge or belief. When we consider a group (community) of theoretical physicists, one will notice that this group might contain a devout Roman Catholic, an orthodox Jew, a protestant, a Marxist-Leninist and so on. Anyone familiar with the theoretical physics community will recognize that this example is quite realistic. As against Quine, the point one is making, however, is that the various beliefs of the group do not form a totality shared by the group as a whole. There will, of course, be a core of physical theories which nearly everyone in the group will agree on accepting at least provisionally, but there will also be a host of religious and metaphysical beliefs about which different members of the group will disagree most strongly. These religious and metaphysical differences may have effects even within physics itself and will very likely, as already argued, influence the way in which the various physicists carry out their research.

This apparent complementarity is properly understood in the light of Kant's statement. According to Kant, it is possible to state that metaphysics is a battle field on which the human mind battles for justification of its own assumptions with which it approaches research. But for Stefan Amsterdamski:

... it is also possible to reverse the metaphor and argue that science is a battlefield on which metaphysical systems which provide the empirically untestable justification for

particular manners of research procedure and which create the frameworks for their critical analysis, have to demonstrate their usefulness as regulatory principles for the construction of internally consistent systems of knowledge which conform to experimental data.³⁵

From all these arguments, it is very difficult to draw out a clear-cut distinction. However, the general situation is almost impossible to describe without making the science/metaphysics distinction. Given this understanding, Quine's picture of knowledge or belief as forming a seamless garment does not accord at all well with the realities of the situation. For it is not true that rational criticism in science is limited to criticism by experiment and observation.³⁶

Another remark of Amsterdamski about the global heuristic programmes with which metaphysics provides science concerns the fact that these programmes postulate only some of the qualities which are to characterize scientific theories concerning particular domains of phenomena. In other words, no such programme univocally designates a theory which would fulfill all its requirements within the given field of inquiry. Therefore, it is possible to build various non-contradictory and mutually competing research programmes within the given discipline on the grounds of the same global heuristic programme. By the same token, the concept of global heuristic (metaphysical) programmes by no means

^{35.} Stefan Amsterdamski, *Between Experience and Metaphysics*, (Dordrecht, Holland: D. Reidel Publishing Co. 1975), p. 171.

^{36.} Amsterdamski, p.175.

implies such a vision of normal science as accepted by the scientific community. This was also the case with the verification principle as advocated by the positivists, yet they were unaware of its metaphysical implications. Since the verification principle is itself not verifiable in experience.

Conclusion

In the light of the exposition of the concept of the relationship of science to metaphysics, the conclusion seems to be inescapable that metaphysical ideas are not only meaningful, but necessary for science. For if metaphysical statements are to fulfill their functions within science, then it is for the reason that they are meaningful statements, that they express something about the universe. If this were not so, then they could not serve as a foundation for the formulation of heuristic programmes.

On this pedestal I say metaphysics provides an indispensable framework within which specific scientific theories can be constructed and compared with experience. But while a metaphysical guide is necessary to move in any direction at all, such a guide can just easily lead in the wrong if not tendered with experience. What is also incontrovertible is that there are many metaphysical positions that experience fails to controvert. By this reasoning, Amsterdamski said:

No one ever experimentally refuted either the Aristotelian doctrine of form and matter, or

the Cartesian Cogito, Locke's conception of the tabularasa or Kant's idea of apriori forms and categories of cognition. And nevertheless, each of these conceptions was in a certain sense falsified within science, rejected as it ceased to fulfill its heuristic function in relation to science, and ceased to be useful.³⁷

According to Collingwood metaphysical presuppositions are not rejected on the ground that they are false - the notions of truth and falsity do not apply to them, since they are not propositions or answers to questions; they are merely dropped.³⁸

The area which is metaphysically beyond the validation of science is the foundational principles of science (i.e, accepting those foundations as legitimate or rational). Here the justification rests on something, other than scientific method. If science cannot justify its foundation (within its method), then there are some nonscientific justifiable bases for accepting science. This means that science cannot be the only basis for beliefs. For there to be a well established system, there must be recourse to metaphysics. It is in this regard that Nicholas Rescher argued: "only through metaphysical presupposition can systemic uniqueness be assured"³⁹

On the issue of the ultimate purpose of our existence or of the universe, science is lacking. The belief in purposes cannot be observed, and therefore cannot be

^{37.} Amsterdamski, p. 171.

^{38.} Passmore, p.308.

^{39.} Nicholas Rescher, *Induction: An Essay on the Justification of Inductive Reasoning*, (Oxford: Basil Blackwell Publishers, 1980), p. 165.

addressed by the methods of natural science, which are tied to observation. Outside science, It has been taken that observables are linked to purposes. In human relations, observations are connected to human purposes, intentions and so forth. These, science cannot legitimately validate within its own domain. It has been argued that, the fact that science does not make use of the concept of ultimate purpose in any way suggests that the concept is not meaningful or important.

In conclusion, it can be said that metaphysics always provides a framework to meet certain epochal scientific expediency. And where it could not live up to its function, such framework is dropped and another adopted. This is confirmed by the role different metaphysical systems played at different times in history. So the rejection of metaphysics by the logical positivists is a spurious one, as metaphysics is presupposed by every discipline as its foundation. Metaphysics, in other words, is the foundation of scientific knowledge and of all academic disciplines. The justification of metaphysics as the foundation of science and every other field of knowledge presupposes a complete refutation of logical positivists' misconception of metaphysics.

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