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The Role of Metaphysics: As a Bridge between Science and Religion

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Abstract

Although for a couple of centuries empiricism was prevalent in physics circles , the development of various schools of philosophy of science, during the second half of the twentieth century, made it clear we do not encounter nature with empty minds and that scientists always use some assumptions in their scientific work. In this article. We argue that metaphysical assumptions play an important role at various stages of science activity. But these assumptions are usually taken from various schools of philosophy or religions. Monotheistic religions can provide such principles. Thus, metaphysics works as a bridge between science and religion.

Keywords : empirical sciences, empiricism, assumptions, principles, metaphysics monotheistic religions

I-Relevance of Metaphysics to Science

Originally, philosophy covered the entire field of human knowledge, except technical percepts and practical arts, and it was divided into two main parts:
1 Theoretical Philosophy, consisting of physics (or natural philosophy), mathematics, and metaphysics. Practical Philosophy, related to conduct and the rules of conduct.
Thus, science in its modern sense, did not exist as a separate department, and some of the greatest philosophers were distinguished scientists, and even those who were mainly involved in the so-called "physical sciences" tried to accommodate their findings within some philosophical framework. With the advancement of science and technology, sciences abandoned philosophy and went their own ways. **Helmholtz** describes the situation in 1862 as follows:

> *The philosophers accused the scientific men of narrowness; the scientific men retorted that the philosophers were crazy. And so it came about that men of science began to lay some stress on the banishment of all philosophic influences from their work; while some of them including men of the greatest acuteness, went so far as to condemn philosophy altogether, not merely as useless but as mischievous dreaming* (Brody 1994: 313).

Philosophy is sometimes used in the sense of metaphysics i.e. that department of knowledge that deals with the most basic problems of existence, including such concepts as being, substance, space, time, cause, effect etc. Here, we use philosophy in this sense.
Under the influence of positivism and allied trends, much of twentieth century English-speaking philosophy has reduced the job of philosophy to the analysis of concepts. The empiricists' spirit which has dominated contemporary scientists has taken away the old tradition of trying to extract philosophical implications of one's work, and has replaced it by pragmatism, instrumentalism, etc.
From the early decades of the twentieth century on, philosophy (in the sense of metaphysics) lost its appeal among scientists, and its domain has become very much limited. Thus, most of the contemporary scientists do not pay attention to the philosophical implications of their work, and some of them even consider such activities to be a waste of time. Today, the fashion among theoretical physicists is to give only a description of one's scientific findings, without any concern about its philosophical implications. Also, the aim of scientific research is taken to be the correlation of natural phenomena, prediction and new discoveries. The idea of harmonizing one's manifold of experiences has lost its appeal.
The myth of metaphysical neutrality of science and the strong emphasis on predictability and practical applications of science has led to a strong emphasis on science and technology, and the lack of appetite for the real understanding of nature. This one-dimensionality of scientists ,i.e. dealing only with one's specialty, is a real threat to the future of science, and may cause a serious decline in our deep understanding of nature.
There are several reasons for the decay of physicists' explicit allegiance to the scientific-philosophic tradition. Here, we only mention the most important ones.

(a)The Complexity of Philosophical Problems

The difficulty of understanding and solving the basic metaphysical problems on the one hand and the disagreement of philosophers in handling these problems on the other hand, has been a major factor for the dismissal of philosophical concern.
But despite the difficulty of metaphysical problems and in spite of the vast differences between various philosophical schools, metaphysics is indispensable to our understanding of the world. The immense difficulty of metaphysical problems does not imply that they have to be erased. Rather, it means that due to the wide scope of metaphysical issues, much more effort is needed to handle them. The disregard of metaphysics simply prevents the harmonization of one's ideas to chaos. In H. **Weyl's** words:

> *In spite of the fact that the views of philosophy sway from one system to another, we can not dispense with it unless we are to convert knowledge into a meaningless chaos* (Weyl 1921: 10)

(b)The Success of Physical Theories

The spectacular success of some theories (like quantum mechanics) in accounting for a vast domain of phenomena has led many physicists to be satisfied with experimentation and the available mathematical formalism.

(c)The Excessive Interest in Specialization

The rapid advancement of science and the development of the various branches within each scientific discipline, has led scientists to get involved more and more in their special department of research, to neglect unifying ideas, and to pay less attention to a comprehensive view of physics as a whole. **Heisenberg**, commenting on this point, writes:

> *It is evident from this discussion that narrow specialization is a hindrance for understanding. It is only be looking at the whole field of new phenomena that the correct concepts can be found. Even in a very special problem, understanding can frequently be obtained by referring to a similar problem and its solution in a different field of physics.* (Heisenberg 1985: 338)

(d)The Philosophers' Disinterest in Scientific Disciplines

Many of the contemporary philosophers are not well-versed in physical sciences. Rather, they are mostly concerned with the analysis of language and related subjects. Thus, their work has had little impact on scientists. That is why **Bertrand Russell** warned philosophers that the lack of concern for the problems of modern science makes their activities futile:

> *I do not think that the work of our century in either relativity or quantum theory has had any very good influence upon philosophy, but I regard this as the fault of the philosophers, who, for the most part, have not thought it necessary to master*

> *modern physics. I hope that an increasing proportion of philosophers will, as time goes on, become aware that ignorance of physics condemns any philosophy to futility* (Russell 1997: 594)

(e)The Philosopher's Cold Reception of Physicists' Philosophical Views

Philosophical views of quantum physicists encountered disapproval of some philosophers. This, in turn, distracted physicists' attention from philosophical problems. Thus, Bohr, in an interview with Thomas Kuhn, complained that philosophers had not understood his "complementary description".

(f)The Association of Metaphysics with Religion

From the end of seventeenth century onward, science became increasingly separated from religion. On the other hand, people associated religion with metaphysics. Thus, they extended their distaste for religion to their distaste for metaphysics. This attitude has continued to this day.

(g) The Prevalence of Empiricism

In our view, this is the main cause for the dismissal of philosophical speculations. The doctrine of empiricism, that the senses are the only sources of knowledge, had its roots in Greek and medieval philosophy. But, it gained popularity with the works of the British empiricists of the seventeenth and eighteenth centuries. According to this doctrine all of our knowledge about the physical universe is derived from sense experience. Thus, metaphysical concepts should be excised from any physical theory, as they are not rooted in sense experience. In the twentieth century, empiricism took the form of a doctrine of meaning, asserting that a word or sentence is meaningful only if rules involving sense experience can be given for its application or verification. The doctrine of positivism, operationalism, pragmatism and similar trends are different species of empiricism. The common feature of all these doctrines is that they give primacy to sense experience and reject metaphysics
Here, instead of going into other versions of empiricism, we shall summarize the most important claims of contemporary empiricists:

≠Metaphysical assertions are neither scientific nor philosophical. The sole task philosophy is to analyze the language of science.

≠All knowledge comes from experience, which is itself a succession of sense-data. Thus, all statements about the world are really statements about such experiences (phenomena), and there is no unknowable object lying behind phenomena (phenomenalism). According to this doctrine, entities which are not accessible empirically, are merely mathematical tools that help scientists, and no existence should be attributed to them. Similarly, one is not supposed to talk about what happens between observations.

≠The value of scientific theories lies in their usefulness as tools of predicting phenomena and not their truthfulness (pragmatism). In fact , all scientific theories and laws are merely instruments for predicting phenomena, and not statements referring to a reality behind phenomena (instrumentalism).

The Influence of Empiricism on Scientists

As we saw, the empiricism of the seventeenth and eighteenth centuries developed into various schemes in the twentieth century, all of which had the following ideas in common:

≠ emphasis on the primacy of empirical data.
≠ emphasis on the clarity of concepts.
≠ rejection of metaphysics.

This kind of outlook largely affected the scientists of 1920s' and 1930s' to a large extent, and its ghost is still marching on in most of the circles.

Challenges to Empiricism

Now, it would be expedient to have a critical appraisal of empiricists' claims:
1- It is said that all our knowledge is based on sense-data, i.e., observation is the source of all knowledge. This assertion may be challenged on the following grounds:

♠ We never encounter nature with empty minds, and therefore, there is no such thing as pure experimental data. Our interpretation of experimental data and even our view about the reliability of experimental data depends, to some extent, upon preconceptions and assumptions that are held by the investigator . The reason for this fact is that a theory can be considered to be a direct result of an experiment if we can show that there can be no alternative explanation for that experiment; but this we can never claim, and our past experiences have warned us against this type of mistake. The agreement between a theory and a set of experimental facts does not necessarily mean that it is a correct one, because, logically speaking, a conclusion can be drawn from different premises. Thus, we can never claim that a theory is a direct result of experimental data. The growth of science is, therefore, due to both experimental work and theoretical speculations.

♠ Many concepts are not derived from sense experience. For example, the concept of "causality" is not derived from sensory impressions. For instance, all that we receive through our senses is that ordinarily B comes after A. That there is a causal relation between A and B is judgment of our intellect. Even in the physical sciences, many concepts are not direct byproducts of observations and have been introduced by scientists to explain experimental facts Similarly, our information about distant regions of space and time is not direct.

♠ We often use fruitful concepts, like quarks, that do not seem to be directly observable. Strict empiricism forbids such concepts. Thus, it could block the advancement of science. Had physicists followed Mach's negation of atoms, physics would have not had such impressive progress in the twentieth century.

In the history of physics, we have many cases in which an abstract mathematical concepts was introduced with no physical grounds for it, but subsequently turned out to be essential for the development of some physical theory. When Gauss and Riemann developed Riemannian geometry, there was no physical grounds for it. It was several decades later that Einstein made use of this geometry to develop his

general theory of relativity. Similarly, when Hilbert developed his theory of Hilbert space, quantum theory had not been developed yet and the need for this concept had not been felt. It was von Newmann who subsequently made use of this concept in his formulation of quantum theory. It is due to the important role of theoretical concepts that **R. Carnap**, one of the leading logical positivists, admitted, in one of his later writings, that:

> *The prodigious growth of physics since the last century depended essentially upon the possibility of referring to unobservable entities like atoms and fields* (Schilpp 1963: 79).

♠ The number of experiments that verify a universal law of nature is always limited. Thus in accepting a proposition as a general law one is exceeding experience.
On the other hand, no science can avoid introducing general laws ,as the aim of science is the discovery of such laws. But logical positivists reject such laws on the grounds of limited verification. Thus, strict following of positivistic trends reduces the whole physics to mere restricted prescriptions.

♠ A scientist's work is based, consciously or subconsciously, on some general principles. These so-called ´ guiding (or regulative) principles` are not deducible from particular experiments; rather, they are metaphysical assumptions which establish a framework for scientist's line of research. For **Heisenberg**, ´ mathematical simplicity` was a guiding principle:

> *Mathematical simplicity ranks as the highest heuristic principle in exploring the natural laws in any field opened up as a result of new experiments* (Heisenberg 1979: 58-59).

But the simplicity of nature is not a scientific fact on which all scientists agree, rather it is a metaphysical principle.
The conclusion we want to derive from the foregoing discussion is that experimentation alone, without theoretical reasoning, cannot give us significant information about nature. Thus, even though observation and experimentation are a must for having a thorough picture of the physical world, not all of our knowledge about nature is derived from sensory experiences.

Have Physicists succeeded in Dismissing Philosophy?

1.We saw that under the influence of positivist's antimetaphysical slogans physicists dismissed philosophy. Now, we claim that the lack of allegiance to the scientific-philosophic tradition has been only a pretension, and that in practice physicists have always been under the influence of some metaphysical doctrines and their current attitude towards philosophy is rooted in their following certain philosophical schools. To support our claim, we make use of the following facts:
Many of the leading scientists of our time, including the founders of quantum theory, have admitted that some of their decisions had philosophical roots rather than dictated by the requirements of physics.

Here we cite some examples:

≠ In his letter to Pauli on November 8, 1922, Schrödinger emphasized that their differences were philosophical and that his rejection of causality was a philosophical decision rather than being based on physics alone.

≠ In a paper, on the quantum mechanics of collisions, **Max Born** admitted in 1926 that his renunciation of determinism in the atomic world had been a philosophical decision:

> *I myself am inclined to give up determinism in the world of atoms, but that is a philosophical question for which physical arguments alone are not decisive* (Born 1926: 54).

2. Many of the contemporary physicists claim that they do not believe in any philosophical doctrine, and that they only follow the requirements of experiments. In practice, however, all physicists are under the spell of some supra-physical principles. In fact, no physicist encounters any observation without some philosophical view-points. Here, we mention some of the philosophical doctrines that prevail among contemporary physicists:

≠ Nothing is real until it becomes part of human experience.

≠ The task of physics is to describe and correlate phenomena, and there is nothing beyond phenomena.

≠ Theories are only instruments for the prediction of phenomena, and they do not refer to anything behind phenomena.

≠ Any concept derives its meaning from its operational definition. Thus, electric field is meaningful if we can specify a method for its measurement.

≠ Classical concepts are the only ones to be used. Nature is comprehensible and can be described in mathematical terms.

≠ There is a superforce from which all fundamental forces of nature could be derived.

≠ The law of conservation of energy could be violated in times compatible with the indeterminacy relation.

3. Many of the problems discussed in physics circles are really philosophical in nature, for which physics alone can not provide a solution. Here we mention samples of such problems.

≠ Are space and time coordinates really equivalent?

≠ Does quantum mechanics describe an individual system or an ensemble of similarly prepared systems?

≠ Can every statistical theory be derived from an underlying deterministic theory?

≠ Can we formulate quantum mechanics without reference to any observer?

≠ Does quantum mechanics require a logic of its own?

≠ What is the ontological status of virtual particles of quantum field theory?

≠ Should one give priority to mathematical intuition or to physical intuition?

How Metaphysics Affects Science?

There are several ways in which philosophy can affect scientists.
1. A scientist's philosophical outlook characterizes his goal in his scientific research, and, therefore, his line of work. An empiricist is confined to gather experimental data and to give phenomenological models which could accommodate them. But a physicist with a wider philosophical outlook is not satisfied with a mere phenomenological description. He simply wants to understand nature. As **Heisenberg** puts it:

> *At this point you see the enormous importance of the philosophical background in research. It does not determine the answers when the questions are given, but it does influence the questions. The results of scientific work can be quite different if you either try to find out the plan according to which nature is constructed, or you just want to observe, to describe and to predict the phenomena. The final understanding can depend on this decision.* (Heisenberg 1985: 499)

It is often due to philosophical considerations that a physicist accepts or rejects a new theory or establishes a specific line of research. Here we cite some recent precedents:
- Heisenberg's rejection of Bohm's hidden variable theory was based on aesthetic grounds rather than the requirements of physics.
- In his conversation with the editorial board of theoria, **Heisenberg** attributes different attitudes of his students with regard to quantum theory to their different philosophical background:

> *The Japanese or Chinese pupils I had sometimes found it easier to adapt their thinking to the methods of quantum theory than the Europeans, just because for the European the complete separation of the spiritual world and the material world – expressed, e.g. in the philosophy of Descartes – led to a basis of speaking in which he felt it difficult to get into quantum theory*(Heisenberg 1985:477).

2. Philosophy provides a framework for science. As **Schrödinger** points out:

> *Metaphysics does not form part of the house of knowledge but is the scaffolding without which further construction is impossible* (Schrödinger1964 : 4-5).

In fact, the work of any scientist, whether he knows it or not, is based on some general principles. In **Schrödinger's** words:

> *Science is not self-sufficient, it needs a fundamental axiom, a basic axiom coming from outside* (Schrodinger 1935: 181).

The metaphysical principles act as guiding principles for the scientist and have a fundamental role in his scientific research. Here we cite some examples:

≠ For Galileo the metaphysical doctrine that nature is describable by mathematics was a guiding principle.

≠ For Einstein and Dirac, mathematical beauty was a criterion for the acceptability of a theory.

≠ For Schrödinger the comprehensibility of the external processes in nature was an axiom.

≠ In our time, the unification of the fundamental forces of nature is a hot issue. From Einstein to Witten we see emphasis on this theme. In his 1989 lecture in Treiste, **Witten** asserted that the goal of physicist is to start with generally unifying ideas.

3-The negligence of ontological or logical considerations could lead scientists into serious mistakes. Can we conclude from the mathematical identity of two theories, their physical identity? One can not answer such questions on purely physical grounds. Very often physicists construct a theory on the basis of a general idea and then that theory is falsified by experiment. Then, they conclude that the general idea is refuted. Here, they forget the fact that the refutation of a special manifestation of a general idea does not exclude that idea.

Science often raises some questions for which answers lie beyond its domain. Where do the laws of nature come from? Why are they comprehensible to us? Why is there a universe in which such laws apply and what is its purpose?

The fact that the laws of nature are mathematical needs an explanation. It is true that mathematical theorems are logically true, but they, by themselves, have no empirical content. On the other hand, physical laws have empirical content. Thus, the question arises as to why mathematics, which is a product of human intellect, is so much suitable for the description of the physical world?

Some people have taken science to represent the whole truth about the world. This view, however, is taking for granted that the reality to which science has access is the whole reality, and that there is no way other than science to reality. There is no justification for this assumption. One has to explain why science is reliable? Besides, Gödel's theorem indicates that to explain any axiomatic system, such as mathematics, one has to go beyond it. Thus, to explain science one has to appeal to meta-science (metaphysics).

The Revival of Philosophical Concern Among Scientists

As we mentioned , scientists dismissed philosophical speculations for several decades, and scientism acted like a new religion for the scientists, a trend that is still dominant among contemporary physicists.

In the last three decades, the tide has begun to turn in physics circles, and many eminent physicists have started to question the sufficiency of the current theories and the positivist's doctrine of dismissing metaphysical speculations.

Today, there are many scientists who question the ability of science to answer the ultimate questions of human concern. Here we cite some evidences that confirm the revival of philosophical concern among physicists:

1. In recent years, there have been many conferences about the philosophical aspects of modern physics. For example, in the 25-years period between 1970-1994, more than 45 international conferences, on the foundations of quantum mechanics, were held in different parts of the world.

2.The number of scientific journals dealing with philosophical aspects of physics has increased appreciably, and even some regular physics journals publish philosophically oriented articles.
3. In the last few decades, some physicists of high caliber, such as von Weizsaecker and H. Margenau paid attention to the philosophical aspects of physics and wrote extensively about them. Similarly, some philosophers, such as van Frassen, D. Albert and M. Redhead, have dealt with sophisticated problems of theoretical physics, and have contributed to its enrichment. Finally, we have scholars like A. Shimony and J. Cushing who have got Ph.D.s' in both physics and philosophy and teach in both disciplines.
Thus, it has become clear that the positivistic attitude of avoiding philosophical speculations is a futile one, that the anti-metaphysical current of the recent past was a transient affair, and that we can not dispense with thinking. As **Burt** puts it:

> *There is no escape from metaphysics … the only way to avoid becoming a metaphysician is to say nothing* (Burtt 2003: 227).

In fact every scientist's work is intricately interwoven with philosophical thinking, and his research would be fruitless without ontological outlook, though he might not be aware of it. The dismissal of metaphysics does not solve any problem. It merely replaces an explicit philosophy with and uncontrolled and naive philosophical outlook. In **Heisenberg's** words:

> *I believe that certain erroneous developments in particle theory – and I am afraid that such developments do exist – are caused by a misconception by some physicists that it is possible to avoid philosophical arguments altogether. Starting with poor philosophy, they pose the wrong questions. It is only a slight exaggeration to say that good physics has at times been spoiled by poor philosophy* (Capri 2007: 45).

The important thing is to recognize the real status of metaphysics, and to note that science and metaphysics are complementary rather than contradictory. Thus, any apparent contradiction between them, would merely mean that one or both of them are wrong. The important thing is to avoid being caught by wrong metaphysics, and to note with physicist **John Ziman** that:

> *The divorce of science from philosophy impoverishes both disciplines* (Maxwell 1984: 27).

II-The relevance of religion to science

Science is usually taken to be an objective, value-free enterprise. Thus, when the concept of 'religious science' is brought up, it is said that physics, chemistry, etc. are neutral toward any religion or ideology, and in fact science and religion are two independent human endeavors.
We believe that some interpretations of the concept of religious science are misguided and that this concept is badly interpreted. Our scientists or students of science are neglecting the fact that the selection between various theories depends to a large extent on the metaphysical presuppositions of scientists. In fact, as **Einstein** emphasized, theories are not pure deductions from experiments. Scientists'

metaphysical commitments have a large influence in the development as well as the interpretation of theories. If science was simply based on simple observations, then there would be no difference between Islamic or non-Islamic science. But, the generalizations from simple or limited experiments to general claims always take place within an explicit or implicit metaphysical framework. Consider, e, g. the science of cosmology. One of the difficulties of this science is that we are observing the universe from a specific corner and our knowledge about most of the celestial objects is indirect. Thus, we are forced to extend our local physics and in this extension we are using some assumptions which are not directly verifiable. For instance, we often make the following assumptions in physics:

(i) Local physics is extendable to the whole universe.
(ii) Our location is not a privileged one (Cosmological Principle).
(iii) Our world is a four dimensional space-time continuum.
(iv) The red shift observed for the light reaching us from distant galaxies is due to the expansion of the universe.

Scientific theories are made under the influence of scientists' metaphysical outlook about the nature of physical reality, and this in turn has frequently been under the influence of philosophical or religious commitments.
Recent studies have shown that religious ideas have been influential in the making, selection and evaluation of theories. It seems obvious that if one is not denying other kinds of knowledge besides the scientific knowledge, then there will be room for the revealed knowledge and its effect on scientific knowledge. Here we want to elaborate on the relevance of religion to science and in this direction we make two claims:

(i) Metaphysical presuppositions of science can often be rooted in religious world views.
(ii) Religious outlook is effective in the proper orientation of the applications of science.

The Root of Metaphysical Presuppostions of Science in Religion

Empirical science often starts with experiments and observations. But, in the selection of experiments and observations, the presuppositions of scientists are very important. For example, Heisenberg opposed the indefinite divisibility of atomic objects on philosophical grounds, and so he questioned the advisability of building more powerful atom smashers . It is, however, in the interpretation and extrapolation of experimental results that the presuppositions of scientists are mostly effective. What an experimentalist does could be the same throughout the globe. Even the phenomenological description of phenomena could be the same. But in the making of universal theories, the philosophical presuppositions come into play and these could have religious origin. As **Mawdudi** put it:

> *In all sciences, there are two aspects. One aspect consists of realities of nature, i.e. facts. Another aspect is the human viewpoint which classifies these facts, moulds them into theories and formulates some concepts. These two aspects need to be distinguished. As far as the*

> *facts are concerned, they are universal; they are just facts. But, for instance, the Marxist mentality organizes these facts according to Marxist outlook. You hear such terms as Russian science or Communist philosophy. Communism has a particular view of universe and man; it has its own theory of history as well …Thus, every child in the communist societies learns the science developed according to communist ideology. Similar is the case with Western scientists. They have their own peculiar concept of the universe, God and man … From these examples, we can see that each ideology shapes knowledge and science according to its own point of view. Whenever Muslims learnt different branches of arts and science, they Islamized it in the sense that they contemplated them with Muslim Mind* (Mawdudi 1994: 13-14).

Andre Linde, a celebrated Russian cosmologist, sums up the matter elegantly:

> *When scientists start their work, they are subconsciously influenced by their cultural traditions* (Wertheim 1997).

For example, when we are dealing with the problem of the beginning of the universe and we want to select between the current theories, our previous mentalities are effective in our selection. A theist interprets the available facts within one framework and an atheist sees it in another one. In other words, the worldview of a scientist gives him orientation in theorizing and in the selection of theories. Four examples can illustrate our point.

(1) the unification of the fundamental forces of nature is one of the major occupations of the contemporary particle physicists. For the unification of the electromagnetic force and the weak nuclear force, three physicists received 1979's Nobel Prize in physics jointly (Salam, Weinberg and Glashow). But the motivation of the three was different in following this line of research. Salam believed that the unity of the forces of nature is an indication of the unity of the Ruler of nature, Glashow saw the significance of this effort in its practical utility, and Weinberg was attracted to this idea because of the simplification that it produces.

(2) In recent decades, it has been noticed that the emergence of life in the universe depends upon a delicate balance of certain physical factors such as the strengths of the fundamental forces of nature. For example, had the strength of the gravitational force been slightly stronger than the present value, the expansion of the world would have been stopped and its contraction would have started. Then, there would have not been any opportunity for the formation of galaxies. On the other hand, had the strength of the gravitational force been slightly less than its present value, the world would have expanded too fast, and there would have not been any opportunity for the formation of stars. In either case, the conditions for the formation of carbon atoms, which are necessary material ingredients of life, would have not be met. Thus, it seems that the laws of physics are in such a way that they make the development of life possible. This fine tuning of the fundamental constants and forces of nature is called ***anthropic principle***.
For this principle two main explanations are often given:

(i) There are infinitely many universes. Thus, there is no surprise that one of them has necessary conditions for the emergence of life.
(ii) We have only one universe, and this has had a designer at work.
Theist physicists have favored the second interpretation, whereas atheist physicists have supported the first one. For example, **Peter Atkins** of Oxford University supports the many 0 worlds interpretation:

> *It is possible that this is not only universe, it is possible that universes are falling into existence while we are speaking at the moment…. You can imagine a whole crowd of billions and billions of universes, and it just happens that one of those (many be more than one, but at least one of those) happened to tumble into existence with a particular mix of fundamental constants that allowed life to develop* (Stannard 1996: 24-25).

where as **Roger Trigg ,** an eminent philosopher of the University of Warwick, supports the theistic interpretation of the anthropic principle:

> *I think that it [anthropic principle] does point to something, like an argument from design. It is a modern argument from design for the existence of God. Now I know that it isn't a knock-down argument; other people may see it differently. Some people talk about an immense number of universes and it just happens that we're in the universe that produced us – we wouldn't be in one that hasn't produced us! But, I think if the answer to a question is an infinite number of universes, one's in great difficulties. I think it's much simpler to believe in God who created the one universe, rather than saying there are an enormous number and we just happen to be in the one that's come up in this way* (Ibid, 30).

Of course, the many 0 world hypothesis is itself non-verifiable, as **Jastrow** has put it elegantly:

> *Some scientists suggest, in an effort to avoid a theistic or teleological implication in their findings, that there must be an infinite number of universes, representing all possible combinations of basic forces and conditions, and that our universe is one of an infinitely small fraction, in this great plentitude of universes, in which life exists. Perhaps it is the only Universe within this infinite multitude in which life exists. But I find this to be a rather formal solution to the philosophical dilemma created for scientists by the anthropic principle – a typical theorist's solution. In any case, it is an unstable proposition, because all these other universes are forever beyond the range of our observations; they are outside the borders of the visible universe, and can never be seen. What is forever unobservable and unverifiable, seems to me to be scientifically uninteresting* (Jastrow 1984: 22).

Besides, even the existence of many worlds with different fundamental constants is compatible with theism: God could have created many independent worlds with different characteristics.

(3) Darwin's theory of evolution claimed that all living things have evolved by natural processes from preexisting forms. This process occurred through a mechanism called natural selection. The theory of evolution has been interpreted both theistically and atheistically. In the atheistic interpretation, natural selection alone is enough to cause the evolution of species. As **Richard Dawkins** put it (in a BBC2 program, Jan. 1987):

> *Evolution, the blind designer, using cumulative trial and error can search the vast space of possible structures … blind chance on its own is no kind of watchmaker. But chance with natural selection, chance smeared out into innumerable tiny steps over eaons of time is powerful enough to manufacture miracles like dinosaurs and ourselves* (Poole 1995: 51-58).

But, upon reflection one sees that zoological data alone cannot negate God's role, because from simple experimental results one cannot deduce universal facts. In fact, the evolution could be interpreted theistically. As **Arthur Peacocke** put it:

> *I think the theory of evolution has articulated, unravelled and made clear to us how – to put it theologically – God has been creating life and different forms of life. The evolutionary process is one which enables new forms of life to come into existence. But it does not answer the question why should there be such a process at all* (Stannard 1996: 54).

The assumption of a mechanism for the evolution of species does not imply that there is no designer.

(4) One of the controversial problems of our age is the purposefulness of nature. Modern science has been dealing with the description of phenomena and has ignored teleological considerations in scientific research. The founders of modern science, who were devoted theists, did not deny the presence of telos to the universe, but they did not consider the job of science to deal with teleological considerations. With the development of science and the dominance of empiricistic outlook, teleology was considered as an avenue for theism. Therefore, atheists have been insisting on denying any kind of teleological considerations. In **Atkin's** words:

> *A gross contamination of the reductionist ethic is the concept of purpose. Science has no need of purpose. All events at the molecular level that lies beneath all our actions, activities, and reflections are purposeless, and are accounted for by the collapse of energy and matter into ever-increasing disorder* (Cornwell 1995: 127).

R. Dawkins has the same idea:

> *Natural selection, the blind, unconscious, automatic process which Darwin discovered, and which we now know is the explanation for the existence and apparently purposeful form of all life, has no purpose in mind. It has no mind and no mind's eye. It does not plan for the future. It has no vision, no foresight, no sight at all. If it can be said to play the role of watchmaker in nature, it is the blind watchmaker* (Dawkins 1987: 5).

Can one, on the basis of data obtained from chemistry or molecular biology at the level of molecules or atoms, claim that there is no telos to the nature? The answer is no, because this conclusion is not drawn directly from science, rather it is rooted in the metaphysical prejudices of the scientist. It is in fact, a jump from an epistemological statement to an ontological one, and is a direct result of restricting the whole existence to the material world, and the sources of our knowledge to sense impressions.

The conclusion we want to draw from these examples is that when we are dealing with fundamental problems in science, decision making is difficult within the science

itself. It is here that scientists use their metaphysical commitments. In fact, no knowledge is free from these kind of presuppositions, because in the interpretation of scientific data, scientists always make use of various assumptions and these are full of value judgments and non-scientific considerations. These metaphysical assumptions could be taken from the sphere of religion. For example, **Einstein** considered the idea of the comprehensibility of nature to have been taken from the sphere of religion:

> *To this [sphere of religion] there also belongs the faith in the possibility that the regulations valid for the world of existence are rational, that is comprehensible to reason. I cannot conceive of a genuine scientist without that profound faith. The situation may be expressed by an image: science without religion is lame, religion without science is blind* (Einstein 1954: 66).

Andre Linde, a celebrated contemporary Russian cosmologist, who is not a theist, believes that the idea of searching for a theory of everything is rooted in the monotheistic religions:

> *The whole of modern cosmology has been deeply influenced by the Western tradition of monotheism … the idea that it is possible to understand the universe through one ultimate "Theory of Everything" is an outgrowth of belief in one God* (Linde 1998: b4).

III-The Role of Religion in Guiding the Applications of Science

As we mentioned, scientific activity could be pursued within different metaphysical frameworks. Both a theist and an atheist can do successful scientific work. The difference appears in the goals and results. If scientific work is done within a theistic framework, its practical results is supposed to secure human felicity and welfare. But, if it is pursued within a secular matrix, then there is no guarantee for its being immune from destructive results. The last century witnessed many of the destructive results of science. Dr. **Richard Thompson,** of La Jolla Research Institute in California, has elaborated on this subject:

> *The understanding of nature as a machine has resulted in much technological progress, but now we find people throughout the world abandoning supremacy – a struggle that culminates in the construction of more and more deadly machines of mass destruction.*
> *It can be argued that this trend of modern civilization has been strongly encouraged by scientific theories that appear to contradict any philosophy of life other than materialism. It may be very difficult to change this dangerous trend. But an essential ingredient for such a change could be the wide dissemination of a valid approach to scientific knowledge that allows for tangible spiritual dimension to human life and is compatible with the ancient understanding that mankind is dependent on a transcendental supreme Being. Such an approach opens up the possibility of directly human energy towards higher spiritual goals and of providing a solid ethical basis for the conduct of our material affair* (Singh 1987: 235).

The history of science has shown that value systems affect the orientation of science. In the words of **John Brooke**, an eminent British Historian of science:

> The direction and application of scientific research clearly can be different under different value systems. And since human values are often organically

linked with religious beliefs, the latter can still be presented as relevant to the orientation of science and technology (Brook 1991:336).

Conclusion

We pointed out that scientific work can be done in a religious (theistic) context or in a non-religious context. These two have many common elements (e.g. in experimentation or theoretical work), but in the long rum they are bound to lead to different results both at the practical level and at the theoretical level (e.g. in the construction of universal theories).

Now we want to go one step further and in the company of **Roger Trigg** argue that science can gain proper legitimation only in a theistic context. Our argument goes as follows(Trigg 1998: 80-83).

(i) For doing scientific work, we must accept that the world with which science deals is orderly and lawful. This cannot be deduced from science itself. Rather, we need the philosophical assumption that the unknown is similar to the known and that the data of science are applicable for all times and places with confidence. Without these assumptions we cannot generalize our scientific findings;

(ii) The applicability mathematics to the physical world seems miracluous. Why should the symbols created by human mind be suitable for unraveling the mysteries of the universe and for giving us control over the physical world.

It seems that there is an underlying rational built into the fabric of the universe and that there is a tuning between human mind and the rest of the cosmos which makes the universe understandable to human beings. Without the existence of these two factors there would be no science.

(iii) Now, the question arises as to why the reality has this built in order and why human mind can comprehend it?. One answer would be that this is just the way things are. But, this is not the kind of answer that can give us confidence about the universality of science. A more substantial response is that this is the state of affairs because God made it that way. This is moving on from a metaphysical realism to theism.

(iv) In view of the foregoing considerations, it seems reasonable to claim that science can get its legitimacy in no other context than a theistic one. This is because science requires presuppositions that are only deducible from theism. The history of the development of modern science is a good witness to this fact.

(v) Now ,from the following facts:

- Science is based on some metaphysical principles
- These principles are usually taken from a philosophical school or a religion
- Monotheistic religions provide the metaphysical principles needed for scientific activities.

we can say that metaphysics works as a bridge between science and religion.

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