

The Notion of a Scientific World-view

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The view of a person about the life, the universe and his place in the world depends on personal beliefs, attitudes, values. Two world views scientific and religious are discussed.

Introduction

World-view, according to the Shorter Oxford Dictionary (S O D), is a set of fundamental beliefs, attitudes, values determining a comprehensive outlook on life, the universe, etc.

The term deriving from the words *Weltanschauung* or *Weltbild*, is perhaps more common in the German than in the Anglo-Saxon literature. It is rarely found in philosophical dictionaries in English, while German lexicons provide a fair coverage with ample bibliography. German philosophers Dilthey, Husserl, Scheler, Jaspers and others have written at length on it. Scheler (1874-1928) argued that we cannot avoid a world-view but we should choose it reflectively and by a valid method. Originally used by Kant (1724-1804), the word referred to a total view of the origin,

nature and aims of the world and human beings in it. A world-view was not a mere description of the world, but included a meaning, a final explanation and a purpose of the world as a whole. Kant formulated the following four fundamental questions. Answers to them, one could say, defined a world-view :

1. What can I know ?
2. What should I do ?
3. What can I hope for ?
4. What is a human being ?¹

The American philosopher M K Munitz writes² in connection with the central, most basic questions about the world that move us : *The use of the expression "world view" exemplifies a type of preference increasingly found not only in everyday speech, but in the discourse of many philosophers and scientists.* In his book "The Question of

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Reality', Munitz uses the terms world view, metaphysics or ontology interchangeably when discussing the world at large. Referring to the inquiries of twentieth century science like quantum mechanics and cosmology, he writes : *we find that some basic questions of a metaphysical sort (now perhaps relabelled under the neutral sounding heading of "world view") are encountered at the very frontiers of these inquiries as well.*

How many world-views are there? Can I pin-point my own world-view and label it? Are we sure about what we believe and how strongly we hold our beliefs? How do we acquire our beliefs?

In this article, we will confine ourselves to two points. First, one can distinguish between two contrasting approaches to truth leading to two types of world-views which we may call **scientific** on the one hand, and **religious or spiritual** on the other. Secondly, the revolutionary progress in physics, the most fundamental of the sciences, in this century due to Relativity and Quantum theories, does not appear to have bridged the gap between the two world-views, nor can the new concepts of quantum theory, such as uncertainty principle, wave-particle duality, offer any scientific support to a religious/spiritual world-view based on faith.

We should, however, clarify at the outset

that we do not wish to suggest that one world-view is superior to the other. Also, we believe that the same person can hold the two world-views at different times, eg, a scientist in the laboratory and in the temple.

World-view of a Scientist

To find out what special features a *scientific* world-view might have, let us examine how a scientist, *as a scientist*, carries out his work. Science is a branch of study dealing with a connected body of demonstrated truths or observed facts systematically classified, and more or less comprehended by general laws. Science also refers to a theoretical perception of a truth as contrasted with moral conviction (SOD). For a theoretical scientist, construction of theories is the primary task. Theories have only to be empirically adequate, some say. How far the theories represent an ultimate reality, is a stock question of philosophy of science. Let us leave this aside for the moment and think of a theoretical physicist. He assumes in the first place that the world is lawful, ie, there are inviolable laws of nature which he has to find out. Secondly, he uses a model, such as a picture of the solar system for the atom, or of a spinning top for an electron, to represent the world under study. Thus, belief in the existence of Laws of Nature and adoption of a

simplified, working model to represent the problem at hand, constitutes the world-view of the scientist, classical or modern.

Quantum World-view

Relativity and Quantum theories introduced far reaching changes in our conceptions of space, time, causality arising mostly from quantum mechanics of the micro-world. Many of these features, such as wave-particle duality, Heisenberg's uncertainty principle, superposition of quantum states, measurement problem in quantum theory, locality (separability) problem in EPR thought experiment, are examples of the highly counter-intuitive, ie, difficult to visualise, nature of quantum mechanics. This counter-intuitive nature of quantum mechanics led R P Feynman to write : *I think I can safely say that nobody understands quantum mechanics*³. The same is true for concepts like **curvature of space-time, expansion of the universe** (expanding into what?), **Big Bang** origin of the world 15 billion years ago (what was there before the Big Bang?).

Notwithstanding what we have just said, scientists even in the quantum age assume the same two preconditions mentioned in the previous paragraph, viz.

1. Nature is lawful and not haphazard.

The laws may be statistical rather than deterministic.

2. A simplified, working model, of course different from an older, classical version is adopted to explain and predict results of observation.

The counter-intuitiveness of modern physical theories is perhaps more striking than in the case of classical physics, but one should remember that visualisation of concepts in classical physics too is not always unproblematic. Classical concepts like mass, fields, potentials, forces cannot be grasped from our experience of the everyday world, leaving aside the eternal ubiquitous problems of space and time.

Summing up, we can say that a scientist too, pursuing either classical or quantum mechanical physics, has a certain framework of basic beliefs, which marks him out from others, such as followers of a religion. This framework of beliefs we can call a scientific world-view, with its emphasis on rationality and inter-subjective verifiability. When we move from classical to quantum physics we give up a mechanistic picture of nature with a clock-like regularity. Many new concepts are introduced, but these are all theoretical concepts found useful to describe the micro-world, the world of atoms and elementary particles. But still there is no

departure from the belief that Nature is governed by laws. There is no appeal to supernatural final causes.

It is not proper to extrapolate the results of quantum theory (or for that matter, results of important mathematical theorems, such as Godel's Theorems) to the world of everyday experience. Theories of a fundamental science like physics, when dealing with the unobservable micro-world or the universe as a whole refer to these worlds, not to the world we observe with our senses. Of course, there must be some relationship between the theoretical world and the observed world, otherwise how would one interpret and verify the predictions of theory.

A historical digression — The Vienna Circle

Between the great wars, a philosophical movement was in motion, with its centre in Vienna, which the proponents of the movement called a **scientific world view**. The school was called the Vienna Circle and its philosophy Logical Positivism or Logical Empiricism. Some of the famous names associated with it were Schlick, Carnap, Neurath, Hahn. Other celebrities who influenced the Circle were Wittgenstein, Russell, Goedel. The common ground shared by the members of the Vienna Circle, was a

belief that philosophy should be scientific in nature. Clarity and logical rigour combined with adequate justification, were to be the hallmarks of the new philosophy. The new movement was directed against dogmatic, speculative metaphysics of the day. With the murder of Schlick in 1936 in Vienna, the rise of anti-Semitism and annexation of Austria by Hitler in 1938, the Vienna Circle came to an end and its supporters scattered to different parts of the world. Two recent publications give an excellent account of the philosophical movement which preached a scientific world view.^{4,5}

The Nature of Philosophy — different views

It was a fundamental tenet of the Vienna Circle and some other philosophers that philosophy should be scientific in nature. Many philosophers, including Kant, have expressed the view that philosophy should emulate science in its search for objective knowledge. For example, Bertrand Russell writes in his inimitable style in some of his early writings : *The overarching goal of philosophy is the attainment of a theoretical understanding of the world ... The most that can be claimed for a philosophical thesis is that it is a hypothesis which systematizes a vast body of facts and never leads to consequences which there is any reason to think false.*⁶

Wittgenstein, on the other hand, held that science and philosophy were entirely different in aims and method. Philosophy was an activity, not a body of statements and hypotheses or theories. This activity was a logical clarification of thought.⁷ (TLP 4.112) Moritz Schlick was sympathetic to this view, while Rudolf Carnap held an opposing, anti-metaphysical view.

According to GE Moore, quoted by Strawson, the *philosopher's main task — the metaphysical task — is that of answering the question, what are the most general concepts or categories in terms of which we organise our thought about, our experience of, the world.*⁸

With the predominance of science, the discipline of **the philosophy of science** has come into existence. It examines critically the concepts and statements of science.

Role of Philosophy of Science

In the seventy years or so, since the advent of quantum mechanics, a vast amount of literature has appeared on the **interpretation** of what exactly the new theory says. One could work with the equations and rules of quantum theory and obtain excellent agreement with experimental observations but a clear-cut interpretation of the various counter-intuitive results, cited

above, eg, measurement problem, superposition principle, etc, is still not available. Various suggestions have been offered but none has proved to be a definitive interpretation. May be one day, with increasing familiarity, people will accept without questioning all the curious results (and interpretation) of quantum theory, as they have done in the case of special relativity. All these interpretations of quantum theory can be thought as part of current philosophy of physics; but a very special type of philosophy founded, not by professional philosophers but mainly by successful physicists. As a caveat to scientists wearing a philosophical hat; E P Wigner writes : *We (scientists) may say things which appear dilettantish to true philosophers. ... We may unnecessarily invent a new terminology flaunting well-established custom and neglecting to establish connection with past thinking.*⁹

We might record in passing that many scientists do not think kindly of philosophers of science. Stephen Hawking writes : *Philosophers do not have enough mathematical background. ... Philosophers of science mostly are failed physicists who found it too hard to invent new theories. They took therefore to writing about the philosophy of physics instead. They are not in touch with the frontiers of physics. Physicists don't think in the categories that philosophers invent for them.*¹⁰

In the philosophy of physics or science, there are different positions taken about our knowledge of the world through scientific theories : realism, anti-realism, positivism, conventionalism, constructivism, pragmatism, relativism, instrumentalism, etc. Each of these school of thought have been exhaustively written on. Very briefly, the realism/anti-realism debate can be characterized as an oppositions between those who affirm and those who deny the real existence of some kind of thing or some kind of fact independently of the observer.

The standard set of postulates of quantum theory, together with a particular philosophical position, such as realism or anti-realism, could be called a **quantum world-view**. We believe that a quantum world-view is only a special case of a **scientific world-view**. We see no merit in drawing sharp distinction between classical and quantum **world-views**, although we realise that there is a great difference between classical and quantum physics. As already mentioned, we would guard ourselves against unjustified generalisations and sweeping extrapolations from results of modern physical theories to the world of our experience, eg, we should not say citing Heisenberg, that there is no certainty in anything or that knowledge is always incomplete, citing Goedel.

In philosophy of science, as in general

philosophy, one relies on clarity of exposition and force of argument. Unbiased rationality, rather than absolute certainty, is a hallmark of both science and philosophy as we see it. Anybody dedicated to basic beliefs which are justified by science, in our opinion, holds a **scientific world-view**. It is important which theories of science dominate at a particular time, classical or quantum mechanical. The world-view of a person with a rational, critical, scientific attitude remains scientific.

A scientist is not 24 hours a scientist

We have multiple facets to our personality. A scientist outside his laboratory may hold non-scientific beliefs. At times of distress it is quite common to see a non-believer turn to a religious world-view.

Summary and Conclusion

Neither science nor philosophy, in a narrow sense, are primarily concerned with questions of world-view.¹¹ A world view is a part, perhaps the most important part of a religion or set of beliefs that guides a person. In these days of interdisciplinary studies, however, there will always be areas of overlap between what we call science, philosophy and religion and world-view

would be a legitimate subject for discussion, among intellectuals of divergent persuasions. We have tried to explain what we understand under the name of a scientific world-view. This is a view to which we feel most attracted.

As there are a number of philosophical positions, so are there a number of world-views. These can be grouped into two categories: Scientific and religious-spiritual. A scientist at work follows a scientific world-view, but at other times he may seek a meaning of life or need solace. In such a situation he would turn to a religious/spiritual world-view of his choice.

Scientific theories change with time, sometimes dramatically, as happened in physics seventy years ago, with the advent of quantum theory. Many new, strange concepts were introduced which people are still trying to interpret meaningfully. Although today the quantum picture is very different from the older classical, mechanistic, deterministic picture, we believe that the scientific **world-view** has not changed, because of changes in the theories of physics. Scientists continue to believe in the lawfulness of Nature. These laws may change with time. The scientists know that they are working with models which may

change. Those with a philosophical bent, will choose a particular philosophical position, such as realism, anti-realism, etc.

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