International Journal of Humanities and Social Science Invention (IJHSSI)
ISSN (Online): 2319 – 7722, ISSN (Print): 2319 – 7714
www.ijhssi.org ||Volume 7 Issue 05 Ver. I ||May. 2018 || PP.47-50

Indeterminacy of the Individual In The Light Of the Paradigm Shift in Physics

Sabina S
Research Scholar Department of Philosophy University of Calicut Kerala
Corresponding Author: Sabina S

ABSTRACT: *There are various ways of understanding what science is. We can say that science is something which is having a logically ordered system. It carries true, universal statements regarding causes and nature of objects in the universe. Natural science proceeded to give a clearer and wider picture of the material world with its technological development. Human attitude towards nature started to change to a pragmatic one. The necessary object of science is to seek into and explain the unknown domains of reality. The ethical/unethical, moral/immoral, right/wrong distinction depends on the facts and conditions that lie beyond science in the socio cultural domain of human life. The paper focus on the famous 'uncertainity principle' which became a key component in quantum physics and also which marked a real paradigm shift in physics named after Heisenberg. Heisenberg strongly opposed Einstein's attempt which describe a deterministic model of world and presented his theory of quantum mechanics.*

KEYWORDS: *Quantum, Relativity, Uncertainity, Determinism, Classical Mechanics*

Date of Submission: 23-04-2018 Date of acceptance: 08-05-2018

I INTRODUCTION

Science with its theoretical and technological achievements has been widely accepted as the source of inspiration and direction by almost all the modern western Philosophers. Many people take it for granted that science is a good thing, because it has given us electricity, safe drinking water and many other facilities which are undoubtedly beneficial to humanity, but this is only one side of scientific developments namely its technological achievements. Religions are certainly skeptical about this potential of science and technology to take the human being away for the path of God which to be followed requires strict practices of austerity and unconditional devotion to the Absolute. Religions are also afraid of science's potential to disprove the cardinal metaphysical foundations of theology by showing the fallacy of conceiving and worshipping something that remains unknowable throughout.

Majority would accept that a great deal of scientific knowledge has been manipulated for drastic projects of war and environmental exploitation. The enterprise of science as it is not responsible for its unethical consequences, they are created not by the facts of science, but due to the facts of social structure. For many philosophers of science, it is nonsense to talk about the ethical or the unethical aspect of science because it is something that is concerned with facts, and facts by themselves have no ethical significance. It depends on the individuals and social institution that bring these facts into use. Thus science is in itself a 'value-free activity'.

II DETERMINISM IN CLASSICAL MECHANICS

Classical mechanics is generally acknowledged as the paradigm of a deterministic theory. In the Newtonian form, the equations of motion shows that the time and rate of change in the momentum of each mass point belongs to a given system and is not dependent upon any other system. Earnest Nagel referred to this a shaving a sort of 'causal relations' because they assert a functional dependence of the time/rate of change in one magnitude upon another magnitude (Nagel 278). Secondly the position and momentum of a point mass at a given time constitute the 'mechanical state of that point-mass and the variables which define this mechanical state are called the 'state variables'. This mechanical state of any system at any given time is completely and uniquely determined by the mechanical state at some arbitrary initial time. Thus classical mechanics in many of its models illustrates a clear deterministic theory. This view was more accurately presented by La place. He declared that, for an intelligence acquainted with the position of all material particles and with the forces acting between them, "the future as well as the past would be present to its eyes" (Nagel 281)

As Nagel, pointed out , classical mechanics in many of its aspects can be considered to be a deterministic one because "the analysis of internal structure shows that the theoretical state of a system at one instant logically determines a unique state of that system for any other instant: (Nagel 306).

The fundamental feature that distinguishes quantum mechanics from classical mechanics is that in the former the measurement of the observational tools cannot be carried out precisely. Hence we cannot determine the laws of motion regarding certain events in the micro level of subatomic world. This Paradigm shift in physics is brought out by Heisenberg's Uncertainty Principle. This paradigm shifts in Physics can be found to have its congruent counterpart in the realm of individual-society convergence and divergence. The inapplicability and inadequacy of the deterministic patterns at the subatomic level has a correspondence between the laws of macro-social level and the behavior of distinct individual human beings on the micro level. Philosophy as metaphysical inquiry seeks to bring out the being and becoming of man through some determining facts of human life. Theologians place God in the centre and link all reality including human life to this locus of divine determinism.

Modern Western Philosophy, by and large, retained, willy-nilly, the scholastic vestige of divine determinism (Cartesian proof for the existence of God). At the same time, they had a more prominent inclination to discover and project the unique identity of individual human self as the source and sanction of man's epistemic and ethical distinctions. we can observe the avowed determination of modernist to place the human element in the centre of philosophical enterprises, and this indeed is the Renaissance heritage in them. This is the precise locus of the modernists tendency to identify and distinguish the subjectivity of man as the domain of knowledge and moral will.

This tendency has being responsible for considering the individual man as capable of thinking and choosing by and for himself. As Schopenhauer points out, 'Every man, being what he is, he cannot act at the moment which he is placed with strict necessity, but just do what he can at that moment'. This explains the indeterministic nature of human behavior on the individual level. Since individuals have the capability of free-will, strict and rigid deterministic models of explanation cannot be used.

The deterministic theories of physical reality gradually gave way to the principle of uncertainty and probability. When we read this principle within the text of social realm the particles are human individuals. When different individuals make different choices in one and the same context, their causal explanations will certainly vary. So the individual responses and the possibility of conditioning them cannot be predetermined because the possibilities of 'choosing' in 'situations' are as follows:

1. Different individual choosing differently in one and the same context
2. Different individuals choosing identically in one and the same context
3. One and the same individual choosing differently in different instances of one and the same situations.

Hence, the causes and conditions of human choices are too complex to be understood in terms of hard and fast rules and models. A more pertinent point here is that the possible explanations of choices and actions vary from individual to individual and from context to context. This is a situation that is analogous to the perplexities of a quantum physicist who fails to determine the position and velocity of a subatomic particle simultaneously. He means that the dynamics of microphysical domain tends to evade precise quantitative and causal determination. As Werner Heisenberg, points out, "one will not be able to determine the position of the particle more accurately….(Hawking 58). This micro-macro schism in physics when applied to the individual-society bifurcation, the principle of indeterminacy, implies that the law-governed structure of a macro social units cannot necessarily be extended to the micro level namely the individual.

III QUANTUM PHYSICS

Albert Einstein's theory of relativity prompted scientists and metaphysicians to reexamine the absolutistic foundations of classical physics. Yet, the age old notion of causality as the finger-post to conceptualization early in metaphysics and later in physical sciences remained unchallenged even after the publication of relativity theory. Laymen's experiences in daily life and the objects of worship in primitive religions were all based on a taken for granted faith in causation. It is interesting to see that the same notion of cause-effect relation as the precondition of knowledge had been maintained as the necessary postulate of metaphysical as well as scientific theories. The assumed glory of this rather instinctive faith in the causal necessity has been crucial for a wide variety of deterministic theories in metaphysics and physics.

IV QUANTUM PHYSICS AND INDETERMINACY

Albert Einstein's Relativity Theory challenged the absolutistic model of the universe constructed in Newtonian Classical mechanics. History repeated causing much unhappiness in Einstein as Werner Heisenberg in 1927 postulated the uncertainty principle as the crucial component of quantum theory in physics. The developments in quantum physics prompted the new generation physicists to scrutinize the validity of many fundamental principles of scientific investigation and the most affected was the principle of causality as universal and necessary. Hence quantum physics had in effect shaken the foundations of the deterministic world picture central to classical mechanics.

What was detrimental to the formulations of classical theory was the dominant position of the 'noncausal or indeterministic structure' preferred by quantum physicists. Neil's Bohr, for example, referred to Heisenberg's postulate as the indeterminacy principle'. The growing skepticism about the scientific confirmation of the popular notion of determinism produced the most annoying impact of the quantum revolution. Einstein himself disliked this loss of determinism in the measurement of physical phenomena. He argued that there should be a 'local hidden variable theory' underlying quantum mechanics. In the 'Copenhagen interpretation' of quantum mechanics, the uncertainty principle implies the denial of a deterministic form of the universe. In the observation of millions of photons passing through a diffraction slit, the probability distribution can be calculated using quantum mechanics, but the precise path of each photon cannot be predicted by any known method. Einstein questioned this interpretation by saying, " I cannot believe that God would choose to play dice with the universe". He challenged Neil's Bohr and Heisenberg with a famous 'thought experiment'.

V PHYSICS AND METAPHYSICS

Philosophers have been concerned with 'paradigm shifts' in physics marked by the epoch making discoveries of Einstein's Relativity theory and Heisenberg's Uncertainty Principle. The notion of relativity is not new to philosophers as we can find it being applied to human knowledge and morality by Sophists in ancient Greece. What Einstein has achieved in the modern era is the successful means to provide experimental support to the relativistic interpretation of physical reality. The immediate impact on philosophy was the rejection of Aristotelian-Newtonian belief in an absolute space and absolute time. The central importance of the principle of relativity in metaphysics, according to Wildon Carr, "is its negative attitude is the concept of absolute space and absolute time continua". The obvious consequence of Einstein's paradigm shift in physics was to transfer substance (the principle of unity) and cause (the principle of uniformity) from the object to the subject. It is interesting to note that this revolution is reminiscent of what Kant had done in his 'Copernican revolution' that postulated space-time as the 'pure intuitions' of all sense experience.

Einstein's success as a physicist in replacing the absolutistic model of the universe with a picture of the world in terms of subjective experience substantiated Kant's metaphysical anticipations. In classical mechanics, Newtonian mass is an intrinsic property of the body and does not depend upon its velocity. In Relativity theory, the mass of a body is not a constant, but a function of its relative velocity. Einsteinian revolution in physics had a double-edged potential in its impact upon metaphysics. The first aspect implies its potential to stultify the positivist tendency to set aside the arguments of metaphysicians as logomachies. This tendency has been responsible for ignoring the scientific implications of relativism, skepticism and agnosticism developed by Protagoras, David Hume, Immanuel Kant and many others in classical and modern era of Western Philosophy. The intellectual anticipations of earlier metaphysicians cannot be set fully as empty nonsense even though none of them was able to solicit the support of experimental method in such a remote past.

The second aspect of the impact of relativistic theory is its potential to cast a shadow of doubt upon the claims of absolutistic metaphysics such as the Hegelian Idealism. Intellectual entities are conceivable in relation to perceptual entities, and Kant had exposed the problematic status of the 'postulates of faith' created by the 'hyperphysical' application of human reason. The ontological reality of an entity like the *welt-Giest* is more at stake in the light of the relativity theory which is the direct outcome of the application of experimental method. The concreteness of space, time or Idea as absolute entities has been a matter of dispute since Einstein negated the ether hypothesis in his special theory of relativity and proposed a new theory of gravitation in his general theory.

The progress of science at any stage presupposes points of falsification as Karl Popper had warned. Metaphysics with its long history of intellectual debates on the issues later taken up by physicists stands as the repository of concepts and correctives for experimental sciences. The relationality of scientific method can be established only be metaphysical principles such as the postulates of induction. The revolutions in science thus act back upon the realm of metaphysics helping it to abandon its age-old fantasies and absurdities. Physicists and metaphysicians are not enemies in an intellectual warfare, but they are in constant dialogue to ensure the progress of man's quest for truth. Hence there is nothing wrong in saying that, "the new principle of relativity is the triumph of an old principle of philosophy". Classical models in physics have the characteristic potential to predict the occurrence of identical instances (effect) under repeated occurrence of identical circumstances (causal) provided the absence of negating conditions occur. Quantum models do not claim this kind of anticipation potential. Similarly, macro-social structure allows, more or less, predictability as we find the case of election predictions. There probability is the most unwelcome tool of analysis. In the micro-level of choices and decisions involving the individual at the centre, lack of predictability rather than law-governedness prevails. This is a condition that can be well understood with reference to the law of indeterminacy/uncertainty.

VI CONCLUSION

Physics and Metaphysics inspite of any attempt to keep them apart, have been in constant debate that continues to import philosophical issues into physics and inspire philosophers to comment upon revolutions in physics. Yet the recent revolutions in physics widely termed, quantum theory implied the limitations of the theories of classical physics as universally adequate systems of explanations. Philosophy as metaphysical inquiry seeks to bring out the being and becoming of man through some determining facts of human life.

REFERENCES

[1]. Hawkings, Stephen. *A Brief History of Time*, Random House Publishing, NewYork: 2011.
[2]. Heisenberg, Werner. *Physics and Philosophy: The Revolution in Modern Science*, Penguin: 2000.
[3]. Nagel, Earnest. *The Structure of Science: Problems in the Logic of Scientific Explanation*, Hackett Publishing:1979.
[4]. Okasha, Samir. *Philosophy of Science: A Very Short Introduction*, Oxford: 2002.
[5]. Frank, Philipp. *Philosophy of Science: The Link Between Science and Philosophy*, Dover Publications, New York, 2004.
[6]. Kuhn, Thomas. *Structure of Scientific Revolution*, University of Chicago, 1970.
[7]. Bunge, M. *The Critical Approach to Science and Philosophy*, London & New York: The Free Press, 1960.
[8]. Carr, Wildon. *Scientific Approach to Philosophy: Selected Essays and Reviews*, London: MacMillan, 1924.
[9]. Wilson, Fred. *The Logic and Methodology of Science in Early Modern Thought: Seven Studies*, Toronto: University of Toronto Press, 1999.
[10]. Watkins, E. (ed.), *Kant and the Sciences*, New York: Oxford University Press, 2001.

Sabina S. " Indeterminacy of the Individual In The Light Of the Paradigm Shift in Physics." International Journal of Humanities and Social Science Invention (IJHSSI) 7.05 (2018): 47-50.