

## **The Role of the Mind in Einstein's Epistemology: It's Kantian Source**

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### ***Abstract***

*This paper examines the pivotal role given to human mind by Albert Einstein in his scientific reasoning. The paper argues that Einstein's idealism was highly influenced by Immanuel Kant's Transcendental Idealism. Before the wake of Kant people focused more on the objects found in nature, thinking that the mind has no contributions in the way we perceive the world. But the demonstrations of Kant brought about what could be rightly considered as the second Copernican Revolution. This Kantian Copernican revolution has a whole lot of influence on Einstein who categorically denied any such influence. Therefore, this paper is a direct rebuttal to this Einsteinian denial. Using the method of critical analysis, this paper drives home its argument.*

### **Introduction**

The fact that Albert Einstein gave a pivotal role to the human mind in his scientific reasoning remains incontestable. The only problematic issue that has generated some controversy is whether this Einsteinian thought is free

from Kantian influence or not. Scholars have argued back and forth on this issue following Einstein's denial of any indebtedness to Kant. But in this paper we try to establish some level of indebtedness by simply looking at the nature of the role Einstein has assigned to the human mind in any scientific investigation.

As regards methodology, we are not focusing on the totality of intuitions that guided Einstein in his scientific reasoning. We are interested in whatever role he assigned to the mind in bringing about theoretical postulations in science.

In what follows, we shall look briefly at Einstein's general scientific reasoning. This is followed by an exposition of the role given to the mind in science by Einstein. This is then followed by what we considered as the Kantian source of Einstein's view. The conclusion then restates our stand.

### **Albert Einstein's Scientific Reasoning**

Einstein's fundamental philosophical position is as a result of age-long philosophical problem of how concepts relate to facts. This is to say that it emerged from the philosophical question that goes thus: how do abstract scientific theories relate or represent empirical reality? Einstein's philosophical interest thus begins with his dissatisfaction with Newtonian physics as a fundamental theory. This is so, because Newton had regarded it as necessary to introduce the notions of 'absolute space' and 'absolute time' into his mechanics so that his laws of motion will hold sway. This view became part and parcel of classical physics, and also considered as part of thought necessities.

Einstein when dealing with problems of knowledge starts from the recognition of the external world, and not sensations, as the object of knowledge. He holds "the sensory raw-material (as) the only source of our knowledge, through habit"; he goes further to buttress that, the material in a logically untreated form, "may lead us to belief and expectation but not to ... knowledge and still less to the understanding of lawful relations" (Einstein 285). This is why, for him, knowledge is based on the formation of

scientific concepts and discovery of the regularities of nature which could be arrived at through rational analysis of sense data. Einstein in his famous article, 'On the Electrodynamics of Moving Bodies', of 1905, being influenced by the negative outcome of experiments performed for the determination of relative velocity of the earth with regards to ether, made a revolutionary proposal in a general hypothesis that affects all laws of physics, thereby setting physics upon its modern course. He gave a new definition to space and time which leads to the emergence of a new relativity theory known as Einstein's special theory of relativity (Mbenu 43). Einstein's special theory of relativity is simply an attempt to conserve two basic principles of physics viz: The principle of relativity and light principle. He shows that these principles that have been considered commensurable is not intuitively so. Thus, for him, in order to save the two principles, he introduced the electromagnetic insights of Lorentz and Maxwell as not valid only for electromagnetic phenomena, but as generally valid for all moving bodies (Anderton 48). This theory gave a new turn to the perception and understanding of the universe. This Einsteinian theory, thus, overturned the concept of motion that was prevalent in Newton's day. It was in this theory that the necessity for a change in the fundamental principles of physics was recognized for the first time (Heisenberg 110).

The experiment of Michelson-Morley carried out in 1887 was designed to demonstrate the existence of the special frame of reference, called the ether frame, and to determine the motion of the earth with respect to this ether. The result showed that the velocity of light is the same when measured along perpendicular axes in a reference frame which is moving relative to the ether frame in different times of the year (Alozie 78). Einstein, thus, in his 1905 paper points out that since we cannot detect whether or not we were moving through the ether, he decides to annul the notion of the ether frame and to see it as irrelevant, redundant and inapplicable to theorizing in modern physics. Einstein from the foregoing posits that, "the velocity of light is independent of the motion of its sources, the indication of the invariance of the speed of light" (13). He goes on to aver that the laws

of science or nature should appear the same to all freely moving observers. The above postulation up-turned two absolutes of the 19<sup>th</sup> century science, namely, the notion of absolute rest as represented by the ether, and the idea of universal and absolute time that all clock would measure. The special theory of relativity which applies to systems in uniform motion is based on two postulates. The first postulate holds that the laws of physics are the same in all inertial frames. An inertial reference frame is a coordinate system to which the law of inertia applies. By this law, mass and energy are equivalent. The equivalence of mass and energy is summarized in Einstein's famous equations  $E=MC^2$ , which is energy equal mass multiplied by the speed of light squared. The result of this view is that energy and matter are merely different phases of the same thing. The second postulate of the special theory of relativity, stipulates that the speed of light in vacuum is always measured to be the same no matter how fast the source or observer may be moving (Einstein 13). This means that, the special theory of relativity deals with problems involving frames of reference in uniform relative motion. With the theory of relativity the problematic concept of ether was seemingly brought to a logical conclusion. There are two theories of relativity, the special theory of relativity, which Einstein's formulated in 1905, and the general theory of relativity which he completed in 1915.

### **The Role of the Mind in Einstein's Epistemology**

Einstein when studying the works of the founders of mechanics (classical) fascinated by such epistemological problems as the possibility of obtaining knowledge solely through pure thoughts, independent of sense data, the relation of the sensory and rational in knowledge. He saw that the empiricists were mainly interested in sense data; as such, the empirical aspect of cognitive process was therefore made an absolute in the philosophies of the seventeenth and eighteenth centuries. The role of abstract thought in the process of cognition was therefore criticized by the empiricists. Einstein also drew attention to the deficiencies of the rationalist's view that had also made absolute man's cognitive process. The

proponents of rationalism like their empiricists counterparts also criticized the role of sense perception in cognition. Einstein could not agree with these one-sided notions of man's mental activity. Hence, Einstein while paying his due to logical thought in cognition did not divorce it from the objective world. He categorically avers that, "all knowledge of reality starts from experience and ends in it" (Einstein 271).

Einstein therefore in his quests for philosophical ideas, adequate to the nascent non-classical physics, turned to the analysis of some philosophical thoughts. He brings this fact to bear when he re-echoes Kant's question thus:

In the evolution of philosophic thought through the centuries the following question has played a major role: what knowledge is pure thought (mental activity) able to supply independently of sense perception? Is there any such knowledge? If not, what precisely is the relation between our knowledge and the raw material furnished by sense impression? (Einstein 284)

The thoughts that attracted Einstein most in Epistemology were those that pointed out the rationalist and the empiricist nature of the cognitive process. In line with the above, Einstein argues for the idea of the active mind, when in his 1950 speech to the International Congress of Surgeons holds thus:

But there are two more requirements for the surgeons: unusual reliability of the senses and of the hands, and an unusual presence of mind. If, after opening the body, an unexpected situation presents itself, a quick decision has to be made as to what to do and what to omit (46).

Einstein argues the fact that the mind as an active formative agent brings its 'categories' to bear for the possibility of human knowledge. No wonder, he emphasizes that, 'if an unexpected situation comes up or presents, a

quick decision has to be made as to what to do and what to omit'. That is to say, for Einstein the importance of the mind which in its nature is active cannot be downplayed or relegated to the background. Don Howard lends credence to this Einstein conviction and acknowledgment of the active nature of the mind when he extensively postulates thus:

Schlick, Reichenbach, and Einstein on the other hand, agreed that the Kantians were right to insist that the mind is not a blank slate upon which experience writes: that cognition involves some structuring provided by the knower - mind (37).

Even Henry Stapp also attests to the above Einstein position as Howard states above, when he categorically states that, "the physical world ... is a structure of tendencies in the world of mind" (375). He goes on to explain further that mind, in Einstein's view, "is nothing other than an aggregate of 'creative act', each of which is a grasping or prehension of all that has been created by prior acts in a novel but unified way (Stapp 375).

Einstein in his discussion on the active nature of the mind, in the work *Geometry and Experience*, extensively argues:

Geometry treats of entities which are devoted by the words straight line, point, etc. These entities do not take for granted any knowledge or intuition whatever, but they presuppose only the validity of the axioms, such as the one stated above, (the axiom that; through two points in space there always passes one and only one straight line), which are to be taken in a purely formal sense, i.e., as void of all content of intuition or experience. These axioms are free creations of the human mind. All other propositions of geometry are logical inferences from the axioms (190).

It is obvious from the above, going by Einstein's statement, that, the mind is active in nature and has both the ability and capacity to create or know a priori. To buttress the view still on the role of the mind of the observer in *Einstein's Remarks on Bertrand Russell's Theory of Knowledge*, Einstein avers:

Thus, for example, the series of integers is obviously an invention of the human mind, a self-created tool which simplifies the ordering of certain sensory experiences (287-288).

This is to say that Einstein in arguing for the active role of the mind, sees the mind in possession of tools that bring about order in sense experience. The above quote reveals that, for him, scientific concepts, that is, a priori categories of pure understanding are the results of the mental work and not of the sense organs. Einstein no doubt believes in the power of human reason, that is, the active mind, which is capable of going beyond everyday consciousness and leading to knowledge of the substance or essence of the object under study. In fact, as regards the origin of concepts, axioms and propositions, he holds that they are the outcome of the free activity of man's reason and, from the logical aspect, not strictly connected with empirical data. Einstein claims thus:

*As a matter of fact I am convinced that even much more is to be asserted: the concepts which arise in our thought and in our linguistic expressions are all - when viewed logically - the free creations of thoughts which cannot inductively be gained from sense-experiences. This is not so easily noticed only because we have the habit of combining certain concepts and conceptual relations (propositions) so definitely with certain sense experiences that we do not become conscious of the gulf - logically unbridgeable - which separates the world of sensory experiences from the world of concepts and prepositions (287).*

What Einstein in essence is saying is that our knowledge of reality is the result, not of passive perception of sense data, but of their active reconstruction in the human mind. Thus, Einstein's postulation of the active mind, that is, the role of the mind, had a profound effect in the way he did physics. This is seen in a practical manner in Einstein's theory of relativity which are essentially only the results of Einstein's mental invention or creation.

### **Kantian Source of Einstein's Idealism**

Einstein's epistemology emerged from the philosophical question that goes thus: How does abstract scientific theories relate or represent empirical reality? Einstein studying the works of the founders of mechanics became interested in such epistemological problems as the possibility of obtaining knowledge solely through pure thought (the mind), independent of sense data. For him, the single process of cognition was artificially broken down into its separate aspects. Einstein, following Kant, could not agree with a one-sided notion of the cognitive process. Hence, while paying his dues to logical thought in the cognition process, Einstein does not divorce it from the objective world. Thus, like Kant, Einstein writes that 'all knowledge of reality starts from experience and ends in it' (271). Consequently, Einstein like Kant wages a struggle on the question of the empirical and the rational against those philosophers who down-played or denied the role of empirical data and made an absolute of the rational moment in cognition, and against the positivists who neglect rational thought. Like Kant, Einstein considers that analysis of the creative process should inevitably presuppose allowance for both these factors, namely experience and thought (Einstein 680). In spite of his clear denial of Kantian influence, he attests to the idea of the active mind of the observer thus:

I did not grow up in the Kantian traditions but came to understand the truly valuable which is to be found in his doctrine.... It is contained in

the sentence: the real is not given to us, but put to us (Einstein 680).

Einstein's Kantian source is seen brought to bear when he re-echoes Kant's question thus:

In the evolution of philosophic thought through the centuries the following question has played a major role: what knowledge is pure thought (mental activity) able to supply independently of sense perception? Is there any such knowledge? (284).

The above question evidently runs through Kant's *Critique of Pure Reason* and his *Prolegomena to any Future Metaphysics*. Einstein emphasizes the role of the mind in his speech to International Congress of Surgeons.

Einstein no doubt believes in role of the active mind of the observer which is capable of going beyond everyday consciousness and leading to knowledge of the essence of the object under study. He sees the mind in possession of tools that bring about order in sense experience. Einstein avers that "the series of integers is obviously an invention of the human mind, a self-created tool which simplifies the ordering of certain sensory experience" (287-288). The mind in Einstein's view is active in nature and has both the ability and capacity to create or know. Einstein therefore in his notion of the role of the mind has a Kantian source as he reiterates and re-echoes Kant. Hence, in his scientific reasoning (epistemology), Einstein emphasizes the use of the mind in human intuition. He is of the view that theories must be created first before they are verified. That is why, he speaks to experimental scientists that beautiful theories are killed by ugly facts.

### **Conclusion**

This study reveals that Einstein's conceptualization of the mind of the observer, as he puts it, is to a high degree an influence from the rationalist Kantian persuasion. Thus, Einstein explains that the apparent characteristic of reality is due to the mind of the knower. He did not mean to say the mind

creates objects, nor did he intend to accept the rationalists' innatism. His view consists in the saying that the mind which is active brings 'something' to the object of experience. That is to say, in the cognitive process, according to Einstein, the human mind plays a very active role. It imposes itself, its own categories on the objects and restructures them, so that it conforms to its own structure.

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