The Inherent Limitation of Model Based Approach of Physical Sciences to Understand Universe

Jivesh Adhlakha

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Abstract

In this paper, through logical and mathematical reasoning, I have shown that the current ways in Physical Sciences, especially Physics, are not only limited but may also be delusional. Moreover, if not corrected, Physical Sciences will always remain as framework for building explanatory models rather than describing the reality. Through a series of arguments, I propose a conjecture theorem – **Dilemma Theorem of Scientific Models**- which¹ essentially implies that it is impossible for Physical Sciences to discover and claim the correct description of Physical World using current model based approach, hence, making them just an attempt to discover probable models and their applications, rather than a way to find true picture of Physical World.

Argument against the Model based approach of Physical Sciences

In Physics, and Physical Sciences in general, we attempt to explain the various aspects of physical world in a specific way, which we call, The scientific method. We build models which try to accurately explain observations and also present testable predictions, which upon verifications, leads to the credibility of these models. While, approaching the physical phenomenas this way has proved to be very successful and useful, this model based approach possesses a very delusional pitfall. When we try to build scientific models that best fit the observations, one might think that they are uncovering how the Universe works. However, just because a model explains the observations successfully does not confirm what is actually happening. If we go on like this, we may never be able to find the true working of the Universe and instead end up with just an explanatory model. To strengthen my claim, I make use of very basic but provocative case. Let's say we make an observation called "**4**" in the universe. In order to explain it, we present a hypothesis that this **4** is made up of elements called "**2**"s and the way it emerges is through an operation on this element **2** - multiplication. Further, we present a testable prediction that it is made up of only two 2s. On experimenting, we indeed verify that

$$\mathbf{4=2\times2}$$

Therefore, we conclude that the way **4** works in Universe is that two **2**s undergo the process called multiplication. As with our models, we make this model better by further testing and explain more complex observations say "**8**". Now **8** is observed to be made up of two **4**s. So, we assert that as per our theory, this **8** shall also be made up of multiplications of **2**s. That as well is

found to be true and as a result, we might end up believing that this is how the phenomenon of **4** in Universe works. However, we never even knew that there is something called addition of **2s** which also perfectly and similarly explains this observation. In this case as well, **4** is made of **2s** and that too two **2s** but with different underlying phenomena altogether. As such a thing might be exceptionally radical to think if we are not acquainted with it already, we may never know of it. Further, one may not even look for alternatives because the proposed model fits so well in all respects. However, it might be the case that the actual way this **4** happens in universe is through this radically different operation of addition of **2s**. Therefore, as one can see in this example, a very thoroughly tested theory that we may consider a description of reality is just one of the two perfect possibilities. However, due its extreme success, the other possibility might not even be discovered due to its radical and unthought-of nature. If we approach Physical phenomena like this, we may never know the truth and end up being in delusion because our theoretical model fits in perfectly in all cases. Similar might be the case with Theoretical Models like *General Relativity and Quantum Mechanics*. They might very well describe the observations to great accuracy and precision and seem to explain how things work. However, one may never know that a radically new explanation is also there which also accounts for observations with equal accuracy and precision and that might indeed be actual explanation. For example, General Theory of Relativity_(Einstein, 1916) asserts that Curvature of Space-time is dictated by density of mass-energy in it. It is represented using the following mathematical equation:

$$R_{\mu\nu} - 1/2 R g_{\mu\nu} = 8\pi G T_{\mu\nu}.$$

However, it might be the case that there is an undiscovered inherent property of space-time instead, such that dynamics in it affects mass-energy present in space-time in a way that

curvature is a natural consequence. Both the approaches may give same result and predictions and be equally successful based upon the measure of scientific method. Therefore, both may lead to the same mathematical description as well. However, we may never even think of, or discover, that such a radical explanation is there and may miss or be hidden from what actually happens. Moreover, even if we do find such a model, there may be no way to assert which model is actually right description of physical world and not just a model.

To further the argument about limitation of current model based approach, let's assume that we end up finding all the ways/models in which the observation can be equally successfully explained, including the radical explanations. This is a big assumption but let's say, we find all the possible explanations, however radical they maybe. Then one more problem arises – Given the similar success of the descriptions on offer in describing observations and the verifiability of their shared predictions, how do you actually distinguish as to which ones are just models and which one is the real description of world? This leaves us in no man's land with no way of knowing what is actually happening, since all the possible, seemingly correct models explain, predict, and testify at same levels of confidence, as per the scientific method. Just like in the case of our example observation **4**, even if we discover the approach based on addition, there seems to be no method to deduce how this **4** does actually happen. In other words, both the models – Multiplication of **2s** and Addition of **2s**- are equally likely candidates for the same phenomena under scientific method.

These arguments expose very concerning limitation of theoretical models in Physics, and physical sciences in general. One may finally find a theory of everything but it might just be an

another good model deluding us to think that this is how world works. And given its success, it may be interpreted as the way Universe works. However, an entirely new radical way may give us equally successful model which might in fact be the true picture. However, as discussed, even if the probable models are found, even then we might never be sure of which explanations are theoretical models and which ones explain what actually happens.

The Dilemma Theorem of Scientific Models

These arguments based on a mathematical example and logical deduction clearly indicate that the way we approach the Physical world in physical sciences is not only limited, but our belief of a very thorough and accurate model being the description of the Universe may be the biggest pitfall in physical sciences. Moreover, the very method of judging our Physical theories for their accountability of Physical world is flawed due to the model based approach. Now, one may argue that this problem might be solved by actually putting the models into action in laboratory and also produce some applications. But again, considering our example of **4**, you will always be able to produce **4** and its related complex systems (**8**, **16**, etc.) through the operations/methods of multiplication and addition on elements **2**s. Further, the more complex variations, say combining four of these **4**s, may give us a real application called “**16**” which again can be explained by **2**s using both models of addition and multiplication. This essentially indicates that no matter how successful a theoretical model of our Universe and its working is, we might not have any way to know if there are other equally successful ways of explanation, and even if found, we may never know what is the real description of Physical World, based upon this Scientific Model approach. This leaves Physical Sciences as a mere attempt to find

different ways Universe can be physically explained and just extract applications out of bits and pieces of probable models. Finding how phenomena actually work is impossible, at least through current approach. Based upon these arguments, I thus produce a conjecture theorem – **Dilemma**

Theorem of Scientific Models. It contains following points:

- I. *There may be n number of theoretical models to explain phenomena with equal success but different approach. It is impossible to estimate the number of such models and actually discover them.*
- II. *Even if all models are discovered, their equal success under the framework of scientific method makes it impossible to claim one model as a description of phenomena.*
- III. *Regardless of success of a theoretical model to explain all observations, produce testable predictions, and repeated verification, it is impossible to assert that it is a true description of Physical World.*

Hence, it may be concluded that it is impossible for Physical Sciences to discover and claim the correct description of Physical World through any scientific model, hence, making them just an attempt to discover probable models and their application, rather than a way to find true picture of Physical World. In other words, the model based approach of Physical Sciences is intrinsically limited to just provide probable explanation and makes it impossible to claim the correct description of any physical phenomena.

Summary

Under the framework of scientific method, the approach of building models to explain and understand the Physical phenomena produce an intrinsic dilemma. There can be n number ways/models to describe a phenomena with same predictions, verifiability, and hence, confidence. Hence, even if by any method, all such models are found, it will be impossible to claim one of them as the description of the Physical phenomena. So, it makes it impossible to find, or at least claim, the right description of physical phenomena, based upon this model based approach.

Conclusion

The Model based approach of Physical Sciences, under the framework of scientific method, to find the right description of physical phenomena is intrinsically limited and cannot be used to actually uncover the working of physical phenomena. This calls for urgent dismissal of model based approach to explain physical world and a new approach, under the framework of scientific method, has to be discovered or developed which is both, verifiable and definitive in its claims.

References

List

Einstein, A. (1916). The Foundation Of The General Theory Of Relativity. *Annalen Phys. (ser.4)* 49, 769-
822.

ⁱ This work has been produced to contribute to scientific community and with the no prior information of such work being produced elsewhere.