Relevance of Digital Physics

Written for FQxI 2013 essay contest 'It From Bit or Bit From It?'

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Abstract: 'It from bit' doctrine suggested that laws of physics can be presented in terms of information, and hence, information is more fundamental to physics than reality. Reality is about existence, and information is about existing objects. An object has to exist before information can be gained about it. Hence, reality is more fundamental than information. 'It from bit' doctrine is not much different from many other modern theories in physics, which consider human faculty above reality. All of them strive to impose human supremacy over nature.

The quest for absolute knowledge is the result of human inquisitiveness. From time immemorial, civilizations have been in pursuit of true natural philosophy. Whenever prevailing knowledge and logical deductions based on it were insufficient to explain certain phenomenon, supernatural powers and their mystical involvement were accepted as logical explanations. This method was very simple and gave reasonable explanations that the great majority could agree with. Those who disagreed were prevented forcibly from questioning the magical nature of supernaturalism.

In the past, great physicists were able to discover and decipher many complex physical phenomena. However, even at this juncture of immense scientific wisdom, we are nowhere near the absolute truth about the physical world, where we exist. We know very little about the fundamental character of existence and reality, that too by contradictory theories.

Most of the past discoveries that led to contemporary theories were prompted by practical necessity. At most, they are all ad hoc developments based on numerous assumptions. As long as mathematical analysis gave desired results, the rationality of assumptions used for their derivation was not questioned. Often, newer theories were based on illogical assumptions and mathematical treatments used for past theories. This practice led not only to a proliferation of irrational assumptions, but also removed physics far from its conceptual base.

Mathematical analysis superseded conceptual thinking during the development of modern physical theories. To those who were frustrated by the inability of science to provide a logical concept that suits all physical phenomena, the emergence of mathematical analysis as a major factor in determining the validity of newer theories was a boon. They became free to indulge in imaginary theories that could be proved by mathematical treatments alone, despite their irrationality and conflict with common sense.

In formal or abstract logic that is used in mathematics, we have the advantage of being able to decide whether an interpretation is valid or not without being psychologically influenced by statements. Notations given in mathematics have no specific meanings. They may be given many different meanings. Thus, it becomes much easier in mathematics to tell good reasoning from bad, when arguments are exhibited in their skeleton form in notations. In this form, they are just 'propositional functions'. However, conclusions reached in mathematical treatments cannot be considered 'assertions' until meanings are assigned to the notations used. Only then do they become 'propositions'. Resulting statements may be true, false, or nonsense. Consequently, similar conclusions reached mathematically (using propositional functions) in two sets of arguments do not guarantee similar conclusions when propositions are used. This fact is often overlooked by those who insist on mathematical treatments as the sole criterion for a good theory.

The inability of contemporary physics to provide logical explanations for fundamental truths prompted the development of many modern branches of physics, advocating numerous mathematical concepts about the universe and its working. In effect, the scientific community has returned to the old method of relying on mystical powers to enlighten otherwise unexplainable phenomena. The difference is that we currently use irrational assumptions and mathematics instead of assigning responsibility to supernatural beings and their involvement. Digital physics is one of the modern branches of natural philosophy. It assumes that the universe is fully describable by information, and as the information is computable, the universe itself is a vast computer. Further, since the information can describe a material object, digital physics asserts that information is the basis of reality.

A computer is programmed by intelligent beings to operate in a certain manner. A computer definitely requires creator(s). It gives specific output for certain input. A computer is incapable of producing outputs that are not programmed into it. But nature works in quite a different way. It is capable of producing different outputs for the same input. Yet, nature appears to obey definite laws like a computer. This is only because all those outputs that do not conform to the logical laws of physics are destroyed and removed from the scene immediately on the development. No one can observe them. Only those phenomena that obey definite physical laws are observed. This does not mean that the universe works like a pre-programmed computer, which can only produce selective outputs. Spontaneous mutation and natural evolution cannot take place in a programmed computer. In nature, every development is by error and trial. The winner is the survivor. The fallacy is due to the difference between reality and information.

Information helps us to distinguish one thing from another. Information is about something, and when applied in the proper way to an able mind, leads to knowledge. Both information and knowledge are attributes of the mind. Knowledge is inferred from sensory input and logical deduction by the perception of the mind. Sensual inputs are information. Perceptions are formed in the mind from previous experience. Rational beings gather information by sensory input that is then combined with information previously stored in the mind from past experiences to infer knowledge about material objects and their apparent interactions. In order that new information may be of any use, the mind should have ample stored information to comprehend new information.

Information describes the material properties of real entities. It is a representation of an entity or interaction. It is about entities. It can neither be entities nor their interactions. Mere description of material properties does not produce real entities or their interactions. An entity may be real or functional. Real entities have objective existence in space. They have material substance. Functional entities exist only in the minds of rational beings. They have no material substance. They cater to the functions they are intended for by rational beings. Information describes both real and functional entities.

The observer is the agent who determines the type, quantity, quality, and details of information to be gained about an entity. An observer can gather information only about objects that he is aware of. This does not prevent other objects from being in existence, of which the observer is unaware. Reality exists even without an observer. The observer may accept or ignore the presence of a real entity. Real entities exist whether the observer is present and aware of them or not. No other conceived ideas, including time, can affect reality. Information is not reality. Information has nothing to do with being real. Reality is an absolute and ultimate objective state. No entity can acquire more or less reality than the reality it already has. Deriving information about an object does not reduce its parameters or the existence of the object. Information does not add to, reduce from, or change an object's reality. It makes no change in the objects, unless physical actions on them do so.

Information about an entity or interaction supplies means to represent them for the benefit of others, who can comprehend the entity or interaction from the information provided. An entity, about which information is available, has to exist before the information can be gained about it. The availability of information presupposes entities from which an observer can deduce information. An observer is required to assimilate sensory input and elicit information from it. The observer then transmits it in some form of language. On receiving the transmitted language, the receiver infers information in their mind. Therefore, information has no fundamental character. Information has no role in the creation or existence of objects.

Objects do not store or offer information. Information is inferred by the observer in his mind. Information about an entity is gained by observation. The fundamental nature of information depends solely on the observer's perspective. The observer determines what, when, and how to observe. Information, gained by an observer, is

never complete. An observer can only derive information about an object. No information can be added to real objects. Information about identical objects is the same. Hence, a set of information (with the exception of location in space) can represent any number of objects. The same object in different states or locations can provide different sets of information. This does not multiply objects.

A painter may express his ideas in a beautiful painting. Appreciation of a painting by another person depends on many factors, like their experience with the subject of the painting, the appeal of the painting to their senses, their mood to appreciate it, etc. Information gained by the viewer may or may not be the same as intended by the painter. On the other hand, information gained by a technician may be the structure of the canvas and the texture of the paint on it. However, the real entity of painting consists of only paint and canvas. Transferring visual information about the painting alone can do justice to its beauty. Similarly, a technical drawing may transfer all the information needed to construct a complicated machinery. Yet, if the receiver has no technical background, he will receive no information at all. In this case, real entities are paper and ink. They transfer no worthwhile information to the receiver.

During the transfer of information, objects are not transferred from one place to another or from one person to another, but only information about it is transferred. Information is transferred by transmission of language or codes, from which the receiver may deduce information in his own mind. Mathematics is a language where ideas are expressed in notations, instead of common language. The binary system, used in computation, is similar to any other language or code. Its purpose is to transfer information by transmission of sequential codes. It does not substitute for the object or its real nature. It transfers information obtained about an object by one rational being to another rational being, who understands the same and can form identical information in his mind.

Either language or codes are transmitted, not information. Language or codes are stored and transmitted in the form of different states of certain objects. The receiver then infers information in his mind from the states of particular objects he received. A binary system uses only two states of certain objects as codes. This makes it very convenient and simple to use in relation to computers. This does not confer codes or computers (which use binary codes) with mystical powers to represent the universe or reality. Received codes or languages are interpreted as information by their receiver. Information is derived from his mind's own faculties by analyzing received codes or languages. If the receiver knows the same code or language, he can recognize the object. Otherwise, the received information is meaningless and has no worth. It does not represent anything. It cannot stimulate the receiver's mind to infer information.

The statement, "*The past century in fundamental physics has shown a steady progression away from thinking about physics, at its deepest level, as a description of material objects and their interactions, and towards physics as a description of the evolution of information about and in the physical world*." is quite true. 'It from bit' doctrine suggested that laws of physics can be presented in terms of information, and hence, information is more fundamental to physics than reality. This line of thought is not much different from many other modern theories in physics, which consider human faculty above reality. All of them strive to impose human supremacy on the whole of nature. Nature and reality are treated as handouts of physical laws promulgated by humans, however outrageous and illogical these may be.

Human appeal towards puzzles and mystery produce awe towards bewildering theories, which are not readily comprehensible. This is very much like the attitude of believers towards their mystical deity. Modern theories, which are nothing but intelligent jugglery of imaginary ideas to create mysterious phenomena, depend on human appeal for their success rather than logic or common sense. These theories are not readily comprehensible by common men but are supported by a select few, who presume to understand them. Therefore, digital physics is more relevant to human vanity rather than to reality or the true essence of physics.

However, if we are ready to humble ourselves and sacrifice numerous illogical assumptions used in contemporary physics, which have already become infallible and true scientific principles, this situation can be redeemed. We may have only one assumption to avoid the possibility of falsification. This assumption should be logical and nearest to absolute truth as everyone can agree to.

Existence is something everyone will agree to as truth. Everything, including us, exists in some form or other. Hence, 'existence' can be used as a basis for a foundational assumption. To exist is to have objective reality (in

space). To have objective reality, an entity should have substance (stuff). As far as we know (and by definition), matter alone provides substance to all real entities in the materialistic universe. Therefore, the basic assumption can be somewhat like: 'Substance is fundamental and matter (that fills the entire universe) alone provides substance to all real entities'. Based on this single assumption, it is possible to develop a viable concept to explain all physical phenomena regarding the development of material entities with diverse properties and their interactions in the universe. No other assumptions (including 'action at a distance through empty space') or imaginary particles are required. Reality will be based only on matter and its interactions.

Since real entities exhibit diverse properties, foundational 3D matter-particles (derived from the above assumption and which constitute all real entities) cannot have any sort of definite properties except the ability to maintain their existence (integrity). Structural arrangements of foundational matter particles can produce whole scenario of the universe, without any other assumptions or imaginary particles.

Conclusion:

Material objects are made of substance. Substance provides objective reality and positive existence in space. Information is not substance. It is about substance (objects). It exists in the minds of rational beings. It cannot provide objective reality (to an external entity). It can only stimulate the mind to gain knowledge about objects and their interactions. In this sense, 'it' is substance and 'bit' is a foundational matter particle from 'it'.

Reference: https://www.matterdoc.in

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