

It from Bit or Bit from It? Maybe, It Doesn't Matter.

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Abstract

Here, I suggest that whether the fundamental building block of our reality is called an "it" or a "bit" doesn't matter; instead, the essential feature of this building block is that it's an existent state. I further propose that more and faster progress towards a deeper understanding of the nature of existence could be made if we argued less about whether or not to call this state an "it", a "bit" or anything else, and worked more on figuring out what the properties of a generic existent state might be and how these properties could be used to build a model of the universe. Using this "philosophical engineering" approach, a simple physical-mechanical model of an expanding space that displays a symmetry breaking event and energy creation was developed.

What are its and bits?

It from bit or bit from it? Why is there something rather than nothing? As others have pointed out (1), fundamental questions like these are addressing the same issue from different angles: What is the fundamental building block of existence? That is the question we're all trying to answer. Here, I will be discussing the current embodiment of this question, "Is this fundamental building block of existence an it or a bit?", from a different perspective; that, perhaps, it doesn't matter because both are just different names for the same underlying thing. The rationale for this view is as follows.

What "is" information, also known as a "bit"? If information "is" anything at all, it's an existent state, by definition of the word "is". If it doesn't exist, then we don't need to talk about it.

What "is" a physical material object, also known as an "it"? If a physical, material object "is" anything at all, it's an existent state by definition of the word "is". If it doesn't exist, then we don't need to talk about it.

What "is" the fundamental building block of reality, information/"bit" or a physical material object/"it"? If it is either a "bit" or an "it", then it's an existent state. Some may choose to call this state a "bit", and some may choose to call this state an "it". But, arguing about what to call the same underlying state is almost treading into religious territory. Therefore, perhaps, it would be more productive to not go there. One of the main objectives of this essay is to suggest that it doesn't matter what word we use to describe the same underlying existent state and that, perhaps, a better use of our time would be to agree that both words refer to the same underlying thing and move on from there. Based on this, I'm proposing that more and faster progress towards a deeper understanding of the nature of existence could be made if we argued less about what to call the fundamental building block of existence and worked more on figuring out what the properties of a generic existent state might be and how these properties could lead to the development of the universe that we see around us. This will be discussed more in the next section.

Okay, so at the heart of existence is an existent state. Now, what?

Based on the arguments presented in section 1, I'm suggesting that a valuable approach to consider in our efforts to more deeply understand existence is to start with the following statement:

At the heart of existence is an existent state.

and then try to reason out a model of the universe from this and nothing else. Can this be done? In a previous FQXi essay (2), I suggested one possible, and very preliminary, course of action for doing this. Its steps are summarized below.

A. In order to have physical existence and to be the building block of the physical universe we see around us, an existent state must have three dimensions. I cannot conceive of any physically existent state that has either zero height, depth or length. If any of these dimensions weren't just approaching zero but were literally, absolute zero, the state would not be there. Take off your mathematical/abstract hats for a minute and think: Can the building block of our physical existence really be not there in one of the three dimensions? For example, if a line of graphite particles had literally zero height, there wouldn't be any graphite there to compose a line with width or length.

One might argue that an abstract object without any physical dimensions might exist and be the fundamental building block of our reality, but this argument is flawed for the following reasons. First, abstract objects, such as "bits of information" or mathematical constructs can be defined as having no spatiotemporal location and as being causally inefficacious (3, 4), meaning they can't cause anything to happen. Invoking as the building block of existence a causally inefficacious object with no spatiotemporal location that no one can point out, see or test and whose only rationale for existence is because someone said "it is so" is basically a faith-based argument. It may be correct, but it can't be argued or debated in any other than a faith-based way. Second, if all there is at the heart of reality is an abstract object without a spatiotemporal location and without causal efficacy, then by definition of "all there is", there would be nothing else present with causal efficacy to cause this object to change into the concrete objects that are within space and time that make up our existence. The abstract "bit" itself couldn't cause this change because it has no causal efficacy. Paraphrasing Hawking's famous question (5), there would be no outside agent or "fire" to cause the transformation of this abstract object into the concrete objects within space and time that make up our universe. However, because, we exist within space and time, this means that the initial "bit" must also have existed within space and time, and if it exists within space, none of its dimensions can be zero, and it can't be an abstract object. To sum up, an existent state that is the building block of our reality must have three dimensions.

B. Next, there is no other information about this three-dimensional existent state other than that there is a three-dimensional state. What does this imply about its shape? Because there is no information to define corners, angles, asymmetries or size differences in any dimension, the state would have to be identical in all three dimensions. That is, it would be a sphere.

C. Unless our universe is a single static sphere, which seems unlikely, this sphere must have a way to replicate additional existent states in order to produce the space in which we live. While I have previously suggested a possible mechanism for this (2), for now, I will assume one more property of the initial existent state: that it has the property of causing the formation of additional identical spherical existent states to cover its entire surface. Given this one additional assumption, it stands to reason that these additional states, being identical to the first, would also cause the formation of identical existent states to cover their surfaces. Because all the spheres are identical and, therefore, have this property, this process would continue ad infinitum and would cause the formation of an expanding space of existent states from a single initial existent state.

E. If these identical, spherical existent states were totally inflexible and non-changing, the universe would be static and at equilibrium. Nothing would ever happen, and there would be no energy or movement. Because there is energy and movement, there must be some mechanism that provides a way for these spheres to change. What would they change? The only thing available to change would be their shape. One possibility for how this might happen is as follows. So far, what we've got is the initial, spherical existent state and its property of causing the formation of identical, spherical existent states to cover its

entire surface. Now, it has been shown that when twelve identical, tangentially touching, non-overlapping spheres are packed around the surface of another sphere of the same size, there will be some left-over space but not enough to fit in a thirteenth sphere (6). In order to cover the entire surface of the initial spherical existent state, thirteen spheres are needed but, as just described, there is not enough room to fit all thirteen spheres without some overlap. Because we haven't assumed anything about one of these spheres being special, this means that none of the newly formed spheres would be favored, and all would have an equal "right" to be there next to the surface of the initial sphere. But, because there's not enough room for all of them to be there, there would be overlap between some of the spheres. This overlap of otherwise all-identical spheres would be an initial asymmetry in the universe. Such a symmetry-breaking would be needed in any model of the universe in order to provide a non-equilibrium state and, thus, a source of energy and motion. It might also help provide an explanation for the asymmetry seen in the cosmic microwave background radiation and known as the "axis of evil" (7). Now, how could symmetry-breaking lead to energy? Each of the overlapping existent states has a natural spherical shape, as described above. However, if two of the spheres are overlapping, then because of the overlap, each sphere is blocked from assuming its natural, totally spherical shape. However, because each tries to assume its natural spherical shape, just because that's its natural shape, but is being blocked by the overlapping neighbor, it seems likely that the two spheres would push against one another in an effort to be in its natural spherical shape. This would seem to be a natural source of pressure and energy in the universe.

In sum, assuming only the presence of an existent state with one additional property, the ability to cause the formation of identical existent states to entirely cover its entire surface, a simple physical-mechanical model of an expanding space that has a symmetry-breaking event and energy creation in it was derived. Of course, this and all models of the universe will have to eventually make testable and correct predictions in order to gain validity, but the point here is that even if this particular model doesn't work out, I think this type of fundamental, bottom-up, logic-based thinking, which I refer to as "philosophical engineering", may be more productive in thinking about the nature of existence than arguing, in endless mathematical and/or philosophical complexity, what to call the fundamental building block of existence.

Conclusion

In conclusion, I'm suggesting that at base, there must be an existent state at the heart of existence and that it doesn't matter whether that state is called an "it", a "bit" or anything else. Based on this, I suggest that more and faster progress towards a deeper understanding of the nature of existence could be made if we argued less about whether or not to call the fundamental building block of existence an "it" or a "bit" and worked more on figuring out what the properties of a generic existent state might be and how these properties could be used to build a model of the universe. Using this approach, which I refer to as "philosophical engineering", a simple physical-mechanical model of an expanding space that displays symmetry breaking and energy creation was developed.

References

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