Space-Time Intervals Underlie Human Conscious Experience, Gravity, and Everything

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ABSTRACT

This short commentary discusses the importance of space-time intervals in scientific study. Space-time intervals underlie special relativity, general relativity, and quantum field theory. In doing so, space-time intervals underlie human conscious experience, gravity, and a theory of everything. Space-time intervals also explain many of the puzzling scientific phenomena: quantum phenomena, dark matter, dark energy, the origin and evolution of the universe, and the life force. The importance of space-time intervals cannot be overestimated. Two articles published in Neuroquantology explain how all this was established from empirical evidence and theory.

Key Words: space-time intervals, conscious experience, gravity, theory of everything

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Commentary

Space-time intervals are largely overlooked in scientific study today. This is unfortunate as space-time intervals may just be the most fundamental objects of the universe. 100 years ago, space-time intervals were the centre of scientific study. They form the foundation of Einstein's Special Theory of Relativity, which is a rather precise model of human conscious experience. Space-time intervals are also the foundation for Einstein's General Theory of Relativity, which is our current most accurate description of gravity. When one looks at space-time intervals, one is struck by how ostensibly they explain many scientific phenomena. It would be a boon to scientific study if space-time intervals made a comeback.

Space and time have little meaning and structure for a single isolated event. However, when more than one event occurs, space and time acquire meaning and structure. Relationships are established naturally between events and it is these relationships which give space and time meaning and structure, creating space-time. Space-time intervals are the most important of these natural relationships and represent the unification of space and time. A space-time interval is the shortest distance between two points or events in space and time. In a four-dimensional frame of reference of space-time, a space-time interval is defined as the difference between the spatial coordinates of two events minus the difference between the temporal coordinates of the two events. This is the standard definition of space-time interval and defines the three basic types of space-time intervals. It is known as the Minkowski metric.

The fundamental nature of space-time intervals can be demonstrated by a simple example. The distance from this podium to the wall is a space-like space-time interval. No matter what units (whether inches, centimetres, feet, decimetres, yards, metres, or any other unit) you use to measure this interval, the interval always remains the same invariant constant distance (space-time intervals are independent of the units used in a coordinate system). In addition, no matter what the frame of reference or observer and

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no matter how fast the observer or frame of reference is moving, a space-time interval always remains the same invariant constant distance in all frames of reference (space-time intervals are independent of the observer). Every space-time interval has this physical constancy that transcends all frames of reference. This physical constancy is called general covariance and represents the fundamental nature of space-time intervals, just like the physical constancy of the speed of light expresses its fundamental nature.

There are three basic types of generally covariant space-time intervals (light-like, time-like, space-like). Human conscious experience appears to be a space-time continuum created by the processing of the three basic types of space-time intervals by the brain "Sieb, RA. Human conscious experience is four-dimensional and has a neural correlate modeled by Einstein's special theory of relativity. Neuroquantology 2016; 14(4): 630-644". Any conscious experience can be accounted for entirely by the three basic types of space-time intervals. Take for example, your conscious experience of this room and its contents. If you look around you, you can see that many conscious events occur at the same time, but in different spatial locations. These events are separated only by space, but not by time. This is known as space-like space-time interval separation of events. Space-like space-time intervals carry "where" information for conscious experience of events (they determine where conscious events occur in space). Other conscious events occur at the same location, but at different times. When I hold one hand up and then replace it with the other hand, the two hands can be seen to occupy the same position in space, but at different times. The speakers and audiences for these sessions also occupy the same position in space, but at different times. These are conscious events separated only by time, but not by space. This is known as time-like space-time interval separation of events. Time-like space-time intervals carry "when" information for conscious experience of events (they carry information about the temporal occurrence of events). Time-like space-time intervals are important in establishing past-future and cause-effect relationships between conscious events and form the basis of our higher cognitive processing. We experience all conscious events because light is reflected from the events to the eyes. An event and the eyes may be considered events separated by the distance light travels or by the speed of light. This is known as light-like space-time interval separation of events; it is also called the electromagnetic interaction. Light-like space-time intervals carry "what" information for conscious experience of events. They are important for establishing the qualities or properties (qualia) of the conscious events. The three basic types of space-time intervals account entirely for the creation of any conscious experience. They account for the way conscious experience appears to us, or in other words, the subjectivity of conscious experience. This is about the only theory I have found that realistically and empirically accounts for the subjectivity of human conscious experience (that is, for the way conscious experience appears to us the way it does). There is abundant evidence indicating that the human brain processes the three basic types of space-time intervals for the creation of conscious experiences. This evidence and a neural correlate for conscious experience are outlined in detail in the paper previously mentioned (Sieb, 2016).

Space-time intervals therefore appear to be the fundamental components of human conscious experience. Einstein developed his special theory of relativity to describe our observed physical reality. What is our observed physical reality, but conscious experience. What Einstein actually developed in his special theory of relativity was a model of human conscious experience. This is supported in that space-time intervals are the fundamental components of human conscious experience and are also the fundamental components of Einstein's special theory of relativity. It is not surprising that special relativity is a model of human conscious experience, as Einstein analyzed his own conscious experiences (through thought experiments, imaginings, discussions, diagrams, etc.) to come up with the principles of his special theory.

Special relativity therefore appears to be a precise model of human conscious experience (our observed physical reality). Since space-time intervals appear to be the fundamental components of our observed physical reality, perhaps space-time intervals are more fundamental than imagined; perhaps they are the fundamental components of everything. If this is so, then space-time intervals would link observed physical reality with actual physical reality. This seems to be the case "Sieb, RA. Space-time intervals underlie human conscious experience, gravity, and a theory of everything. Neuroquantology 2018; 16(7): 49-64". Special relativity has a limitation. It only applies to reference frames in inertial motion, that is, reference frames with constant relative velocity, with no acceleration. Einstein wished to extend the principles of relativity (that is, of space-time intervals) to all frames of reference, including accelerated reference frames, which includes gravitational reference frames. Consequently, Einstein developed his general theory of relativity. General Relativity is also based on the three basic types of space-time intervals (Sieb, 2018). In general relativity, gravity is described, not as a force, but as the curvature of space-time by the local distribution of mass, momentum, and energy. What is it that determines the local distribution of mass, momentum, and energy, but space-time intervals. Consequently, the three basic types of space-time intervals are the source of gravity in general relativity (Sieb, 2018). The relationship is engendered by the Einstein Field Equations. The Einstein Field Equations in effect describe the curvature of space-time by the three basic types of space-time intervals; the Einstein Field Equations in essence describe the gravitational potential of the three basic types of space-time intervals (Sieb, 2018). The Einstein Field Equations actually reduce to the Minkowski Metric (the simple space-time interval defining metric) when gravity (the curvature of space-time) is negligible.

Space-time intervals are thus the source of gravity in general relativity. Space-time intervals therefore link our observed physical reality or conscious experience (as described by special relativity) to actual physical reality (as described by general relativity). The fundamental nature of space-time intervals can be further extended to encompass quantum gravity (Sieb, 2018). Interestingly, in quantum field theory, there are three accepted fundamental quantum interactions or forces (called electromagnetic, strong nuclear, weak nuclear). These three fundamental quantum interactions are responsible for all other known interactions or forces; together, these three fundamental interactions underlie quantum gravity. Each of these three quantum fundamental interactions or forces appears to be carried by one of the three basic types of space-time intervals (the electromagnetic interaction by light-like space-time intervals, the strong nuclear interaction by time-like space-time intervals, the weak nuclear interaction by space-like space-time intervals-Sieb, 2018). Consequently, the three basic types of space-time intervals are the source of quantum gravity. Space-time intervals merge general relativity with quantum field theory. General relativity and quantum field theory are the two grand theories of the universe. Together, they most closely approximate a Theory of Everything. Since space-time intervals merge General Relativity and Quantum Field Theory, space-time intervals underlie a single all-encompassing coherent theoretical framework of physics that fully explains and links together all physical aspects of the universe, a Theory of Everything (Sieb, 2018). This theory encompasses our observed physical reality (conscious experience) as well, linking observed physical reality to actual physical reality. The simple formulation which defines the three basic types of space-time intervals (called the Minkowski Metric) may be considered an axiom or postulate (or simple equation) underlying this Theory of Everything (Sieb, 2018).

Since nature appears to have chosen the three basic types of space-time intervals as the fundamental components of observed physical reality (conscious experience), it is not surprising that the three basic types of space-time intervals may be the fundamental components of everything. Space-time intervals may also be used to explain many other puzzling scientific phenomena. The puzzling phenomena of quantum mechanics (quantum fields, wave-particle duality, entanglement, uncertainty, superposition) may be explained by space-time intervals (Sieb, 2018). Dark energy and dark matter, may consist of space-time interval gravitational fields (Sieb, 2018). The high potential energy of space-time interval fields may explain why the universe is expanding at an accelerated rate (Sieb, 2018). Space-time intervals appear to determine cosmic structure and function (2018). Space-time intervals may also be responsible for our animation or life force (2018). We are animated or brought to life by consciousness. Since space-time intervals underlie conscious experience and all aspects of our conscious life, space-time intervals may provide our life force. When we die, we are no longer animated, or have life, and are no longer conscious, possibly because we no longer process space-time intervals. Similarly, space-time intervals may be responsible for the animation (life force) of plants and animals. How all this was derived in detail can be read in the previously mentioned 2018 published paper.

References

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