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Finality and the Demystification of Entanglement

William A Dunkley
Independent Researcher, USA
wdunkley9975@gmail.com

Abstract: *This paper presents the thesis that the concept of finite quantized (not infinitely subdividable) spacetime is the missing element of reality, the hidden variable that can provide an explanation for so-called nonlocality that is simple and plausible. Furthermore, it can furnish a view of this action at a distance in a manner that preserves the principle of locality. In addition, this work explores some of the otherimplications of this view of spacetime.*

Keywords: nonlocality, entanglement, finality, quantized, gravitation

Introduction

While it is only part of a broader and very ambitious theory, the basic thesis presented in this work is that finite quantized (not infinitely subdividable) spacetime can provide the mechanism behind the so-called nonlocality, furthermore, it can do so while conserving the principle of locality.

Einstein, Podolsky, and Rosen (1935) Einstein, Podolsky and Rosen (EPR) argument which described, using a thought experiment, the nonlocality implied by quantum theory. "EPR prove a general lemma connecting such strict correlations between spatially separated systems to the possession of definite values. On that basis they argue that one cannot maintain both an intuitive condition of local action and the completeness of the quantum description by means of the wave function". Furthermore, they states "entanglement", determining either position or momentum for one system would fix (respectively) the position or the momentum of the other.

Nonlocality refers to the capacity of objects to instantaneously interact even as they are separated by large distances. This apparently contradicts the "principle of locality," the concept that an object is only directly influenced by its immediate environment. Einstein never accepted the existence of nonlocality and regarded itas evidence that quantum theory was false or at least incomplete lacking in some key element of reality. It was, apparently, Einstein's abhorrence of nonlocality that supplied the motivation for his radical conception

of gravitation, as he held that Newton's concept of gravitation violated the principle of locality.

In 1972, however, an actual experiment (Clanser, 1972) was conducted by John Clauser and Stuart Freedman. Despite Clauser's sympathy with Einstein's position, the experiments confirmed the existence of this action at a distance. However, this writing will point out a key missing element of reality and show thisso-called nonlocality is not inexplicable.

Some ideas on finality theory

Finite geometry theory, the theory of finality is metaphysically grounded and inspired. It could be accurately described as a metaphysical approach to theoretical physics and as such, constitutes interdisciplinary research. It brings to bear an originative hypothesis to address the issue of entanglement and other conspicuously neglected mysteries of physics. Comprehendible only in a broader context and constituting nothing in and of themselves, the theory of finality is founded on the postulate that the physical universe is reducible to fundamental dimensionless objects in relative position, finite quantized spacetime. Fundamental objects achieving a position in accordance with this finite geometry is held to be the basic causation of the physical universe.

The absurdity of divorcing science, especially physics, from first philosophy will not be addressed here. However, finality theory is unapologetically grounded in metaphysical convictions, one of which is the impossibility of infinity. As the greatphilosopher of ancient Greece, Aristotle noted, an actual infinite thing must be more than itself. Infinity is a mathematical notion of non-identity. Existence, in all its components, in all respects, must be finite. Finality is, in fact, identity; finalityis self-sameness comprehended as a part of the quantity. Finality may be correctly defined as the mathematical or quantitative understanding of identity. The acceptance or embracing of the possibility, let alone the existence, of actual infinity, is a demonstration of the foundationless, metaphysical void that exists in science and the collective mind of humankind.

Aristotle recognized the absurdity of the notion of an actual infinity (Bowin, 2007)but did not correctly implement that recognition into his metaphysical view of existence. Aristotle embraced a steady-state cosmology, which clearly implies an infinite regression; it implies an infinity of prior moments.

Aristotle also maintained that matter was potentially, but not actually, infinitely divisible. Holding matter to be potentially infinitely divisible is different from the hypothetical infinity of numbers, which never constitutes an actual infinity. Numbers are human creations. The actual numbers that exist, all that humankind can create may be incalculably large, but nonetheless, finite. An actual infinity of numbers is not out there.

The matter that, according to Aristotle, is supposed to be infinitely divisible is out there, and that would constitute an actual infinity, whether it is actually physically divided or not. If it were potentially infinitely divisible, it would possess infinite parts. Infinitely divisible or separable matter and also, most importantly here, infinitely divisible spacetime, is an

irrational expectation. Parts, while they may be only mentally divisible, exist and must be finite.

In quantum mechanics, one has empirically based evidence of this. Scientists say what they are encountering on the quantum level is the ultimate graininess of reality. What this means is that the physical universe is not infinitely divisible. Reason tells us this as well; infinity is an irrational expectation.

Matter is multifaceted; it constitutes more than one thing. That matter may not be physically reducible to such fundamental objects, objects with no intrinsic extension is irrelevant to the fact of their existence. As G.W. Leibniz (1712) correctly reasoned, matter, something that takes up space and possesses intrinsic extension, must be, in principle, mentally reducible to something more fundamental. The notion that multi-faceted objects cannot be reduced to component parts is logically absurd. Fundamental objects exist as part of, and are never apart from reality. No parts of existence exist independent of other things. Nonetheless, parts exist and can be mentally abstracted from reality.

Two can be mentally reduced to one. Even if the thing and the other thing that constitute two things are physically inseparable, this does not negate the fact of the existence of two things. This mental reduction only requires the recognition that there must be many things. Matter constitutes a multitude of things.

Fundamental objects and relative positions exist in mutual causation and are regarded as equally basic in finality theory. It holds them to be the only basic constituents of the physical universe. There are no other known things that are so intrinsically featureless and monistic. Therefore, they should potentially provide a fundamental explanation of the forces of the universe such as gravitation.

The concept of fundamental objects may be similar to the concepts of point particles or the monads of Leibniz, but it is noteworthy that they are dimensionless including the dimension of time, essentially points of reference in spacetime.

Common sense would tell one that a chair and a table sitting in a room are in relative position to one another. However, finality theory holds this assumption to be a loose approximation of the actual relative position of objects. Relative position exists between and is unique to, the most fundamental constituents of such larger objects. Relative position, spacetime only exists between the most fundamental irreducible objects. A fundamental object may or may not be in a direct relative position with another given fundamental object. If, however, they are in a direct relative position with one another their position will be affected; the position must concur with the finite quantized structure of spacetime. This, according to the finality theory is what is known as entanglement.

The finality view of spacetime holds that spacetime is not continual and all-embracing. One might metaphorically compare this view to a roadmap. The map contains dots representing cities and lines representing roads connecting them. The dots may be thought of as primary objects and the roads as spacetime. The empty portion of the map is only hypothetical spacetime and need not concur with finite quantized spacetime. If no roads

directly connect two cities, if there is not a road, a direct connection, then there is no actual spacetime between them. If these fundamental objects had acquired a direct relative position to one another, their position would be altered. The position would need to concur with the finite structure of spacetime.

It should be noted here that the finality thesis acknowledges and embraces the special theory of relativity (Einstein, 1905.) Basic constituents of spacetime are irreducible but measured relative to velocity. This is to say that the quantity of the irreducible parts of spacetime between objects remains the same, but the perceived size of those parts would be a relative measurement.

Employing another analogy, if one had a piece of paper and decided to put dots on the paper with a pen if one assumed space was infinite, then one could put dots anywhere. On the other hand, if one decided space had to be finite and the dots hadto be positioned in a manner that did not contradict this finite geometry, then the dots could no longer be placed anywhere.

Geometric limitations would emerge as a result of this spacetime finality. The finite structure of fundamental objects in relative position affects and determines relative location. This thesis asserts that the limitations of fundamental objects in finite spacetime emerge as what we know as the basic physical forces of the universe.

Illustrating the means by which quantized spacetime affects position and could cause what we understand as electromagnetic attraction, one could sit at a table with a quantity of sticks of equal length, representing the fundamental constituents of quantized spacetime, and line them up, end to end, in a straight line while making another such line of sticks in a direction so they intersect. When they do intersect, it is unlikely they will come to a point in a straight line. They can, however, be made to come to a point by altering the direction of the converging sticks. As this happens, it causes a spacetime disparity. This would have the effect of drawing objects closer.

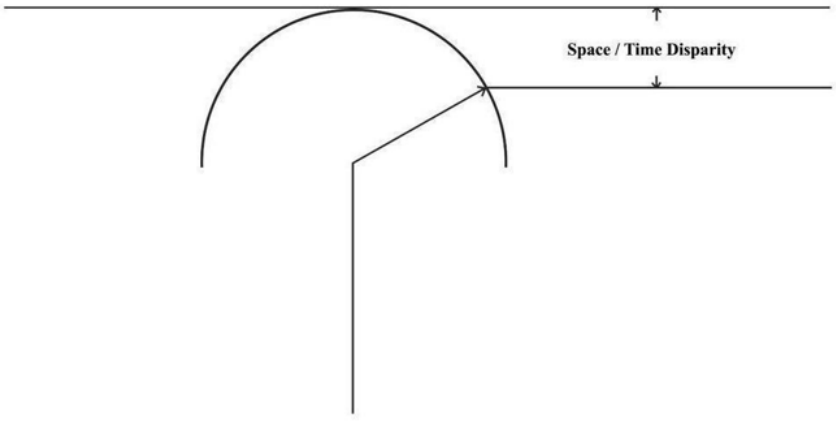

Figure 1. Spacetime disparity

Gravitation could also be the result of this spacetime disparity resulting from the finite structure of the universe. Quantized spacetime and the spacetime disparities it creates concurs impressively with Einstein's (Einstein, 1915) conception of gravitation. Einstein's vision of gravitation is four-dimensional in its conception. Itholds that gravitation is inherent in the nature of spacetime itself and that the presence of matter causes a curving or warping of spacetime essentially creating a hole in spacetime. This is consistent with the finality thesis.

The finality thesis embraces the concept of gravitation provided by the general theory of relativity and provides an explanation as to why the presence of matter causes the spacetime disparity, the curving of spacetime, asserted by the general theory of relativity. When fundamental objects are created by achieving a relative position in concurrence with finality, with quantized spacetime, spacetime disparities are created caused by the bending necessary to correspond with this finite geometry.

The gravitation of matter, a given collection of fundamental objects in relative position, is equal to the sum of all the disparities caused by the bending of spacetime to agree with the finite, quantized structure of spacetime, the finite geometry of the universe. The total spacetime disparity, the depth of the hole in spacetime caused by the presence of a quantity of matter, such as the earth, is equal to the sum of all the disparities caused by all the fundamental objects that comprisethis given piece of matter.

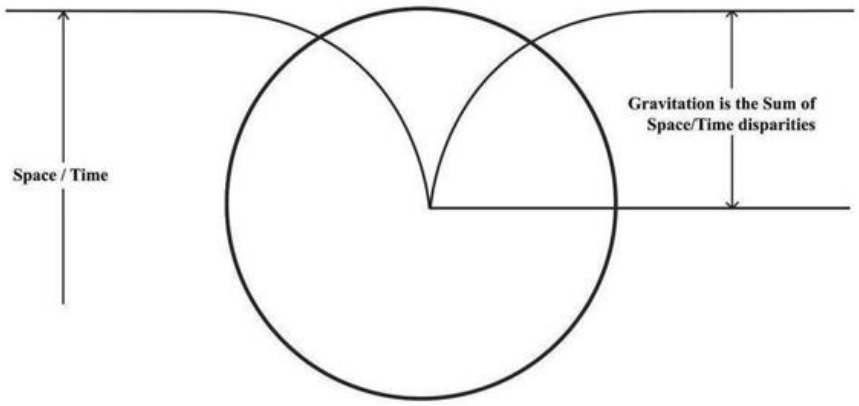

Figure 2 Gravitation is the sum of spacetime disparities

Finality and so-called nonlocality

Spacetime is the relative position of fundamental objects. It exists in mutual causation with the fundamental objects it unites. It is not just out there, existing in and of itself. There may, or may not, be a direct spacetime connection between two fundamental objects. If there is

such a direct relative position between fundamental objects, then they are "entangled." According to finite geometry theory, this is what is known as entanglement. If fundamental objects are so entangled, having a direct spacetime connection, it is the finite, quantized, structure of spacetime that provides the mechanism for what Einstein referred to as "spooky action from a distance." It can provide a simple, straightforward, non-mystical, explanation of so-called nonlocality. It is really not "spooky" at all.

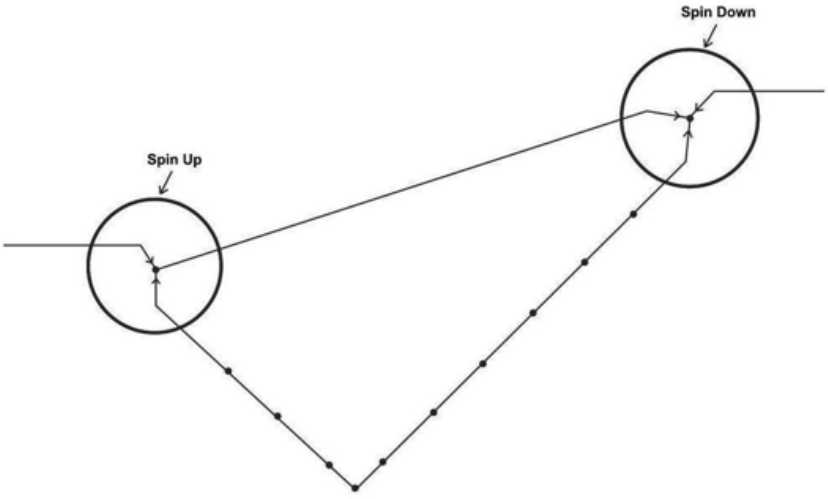

Figure 3 Effect of quantized spacetime on position

When fundamental objects have a direct relative position, when they are entangled,the finite quantized structure of spacetime provides the means of interaction and so-called spin. If such measurements are possible, (Riegler, 2011) it would certainly seem to follow from the finality theory that there would be a difference in weight and energy found in fundamental particles. As spin down is said to be weightier, having more energy, it should have a greater spacetime disparity as whatis known as weight or gravitation is the result of the spacetime disparities that result from fundamental objects in relative position concurring with finality. Quantum theory indicates how interconnected the universe is on a fundamental level; the finality thesis, the finite geometric structure of the universe, explains whythis is the case.

The principle of locality is a reasonable assumption but not a true axiom; not a necessary truth. Therefore, one's hold on it may not need to be as intransigent as Einstein's. However, since the finality explanation of interaction at a distance maintains that it is the specific constituent parts of quantized spacetime that are in proximity with the fundamental objects entangled that cause the interaction, one can maintain that it conserves Einstein's cherished principle of locality.

Conclusion

The theory of finality is a metaphysically rooted reductionist theory that attemptsto reduce the physical universe to the most rudimentary fundamentals and seeks to provide substantially meaningful explanations for the basic physical characteristicsof the universe. In contradistinction, we find a contemporary physics that presents an increasingly convoluted and inexplicable view of the physical universe dogmatically resisting truly fresh ideas and approaches, even as it is acknowledgedto be in a state of stagnation (Lev, 2020) and will not relinquish the absurd notion of infinity. However, if the finality thesis is correct, the notion of infinity is not only wrong, it has served as an intellectual barrier to a most essential element in the understanding of physical reality.

It is dubiously predictable that the rationalistic approach that this work takes will be met with the misology that prevails in contemporary science and the pathetic postmodern mentality. Nonetheless, the fundamental premise of finite quantized spacetime accepted as speculation rather than a metaphysical deduction from logical truth can emerge on its own merit as it provides a simple comprehensible solution to the mystery of "spooky action at a distance". For those who still seek and expect rational explanations, there may be no other known rationally plausible explanation. The very existence of so-called non-locality is evidence that the finite quantized conception of spacetime is true. An explanation of non-locality, however, is just one of the implications of the finality thesis. The relative position of every object in the universe and the basic forces of the cosmos may well be the result of the finite structure of spacetime, a result of finality, which is the identityof quantity.

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