The General Theory of Information
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Abstract - The purpose of this article is to articulate a general theory of information, and to define its two key concepts: nonlocal information and nonlocality. The scientific validity of the theory is derived from the Einstein-Podolsky-Rosen (EPR) experiment, and the fact that time equals zero at the speed of light. An analysis of information processes in the EPR-experiment reveals properties that serve as the basis of a novel nonlocal mindset. A nonlocal paradigm allows thinking the unthinkable, and speaking, or developing a language for, the unspeakable, beyond the paradigmatic scope of normal science, unimpeded by established concepts and unconstrained by local reality. Suspension of previous knowledge may be necessary to allow growth of new knowledge about nonlocal aspects of reality that lie outside of our experience of an observable local reality.

Keywords: Nonlocal information, nonlocality, information singularity, nospacetime, EPR experiment, locality, relativity, absolute knowledge and truth.

From a novel information-perspective, we may view experiments as information systems for the purpose of identifying and understanding phenomena and processes that have gone unrecognized because they lie outside the traditional scope of “normal science” [1]. This study provides the foundation for a new discipline that will be focused less on prediction and control than explanation and understanding. We arrive at our definitions by interpreting the Einstein-Podolsky-Rosen (EPR) experiment in a new light and by seeking to answer two questions, namely: is there experimental evidence that might provide a sense of what can be considered as absolute scientific knowledge; and, does absolute knowledge let us understand the absolute truth about ourselves?

The Einstein-Podolsky-Rosen (EPR) experiment provides conclusive scientific proof of the fundamental inseparability of reality. Our new theory of information solves the paradox of nonlocality, which has been defined erroneously as instant-action-at-a-distance, and requires information to travel faster than the speed of light. A reconsideration of the notion of instant-action-at-a-distance from a new information perspective leads us to conclude that the phenomenon of “nonlocal information” constitutes an inseparable nonlocal reality. Our general theory of information defines nonlocal (inseparable) reality as inseparable nonlocal information, which can be limited by finite information processes that generate local (separable) realities. Nonlocal information is defined as an “infinite amount of inseparable information”. Nonlocality is thus defined as inseparability, or more precisely, the inseparability of reality. Our theory is intended to complement rather than replace existing scientific theories and frameworks. We call attention to the limitations imposed by language and preconceived ideas regarding reality, absolute knowledge and truth.

Our line of reasoning is based on the observation that the EPR experiment seems to allow instant-action-at-a-distance and, thus, that information travels faster than the speed of light. Since existing theories cannot fully explain this phenomenon, it is necessary to look at instant-action-at-a-distance (= events affecting each other instantly) and related notions from a different, information-based perspective and reevaluate existing conventions and experiments.

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The following inquiry focuses on information phenomena and processes that are evident in modern scientific experiments but lie outside the traditional scope of normal scientific inquiry. We employ a radically new perspective from which we may reevaluate experiments, observations and the world in general. At first glance, our methods may appear to be surprisingly simple or even trivial. However, our theory has far-reaching implications, because it provides a coherent explanation of the nature and origin of reality and develops new and unique concepts.

Formation of an Information Singularity at the speed of light

We use the example of light to illustrate properties that exists beyond space and time. When traveling at the speed of light, time and space do not exist. Imagine “distance” as a straight line between the sun and the earth, and a light-photon traveling along that line at the speed of light. Now envision the light-photon as a cannon ball on which you are sitting. Your perspective would differ from that of an observer on earth. The observer sees the cannon ball crossing the distance along a straight line, which requires time. From your perspective, however, things look quite different. The cannon ball on which you are sitting does not have the properties of speed (momentum) and location. It does not seem to be traveling at all, because the distance between the sun and the earth is created by the observer’s measurement of movement relative to the “position of observation”. Unfortunately, this thought experiment is subject to the severe limitations of language. The notions that “because time is zero, it takes zero time to get somewhere” and “because space is zero, there is no distance” are descriptions of local events (local means at a point in spacetime). Here, they are used to describe nonlocal processes in a nonlocal reality where spacetime does not exist. The words “somewhere”, “time”, “space” and “distance” are meaningless, because, in a nonlocal reality, everything is in one place. “Place”, similarly, has no meaning in a nonlocal reality and there are no words to express nonlocal nature [2].

From the equation \( E=mc^2 \), it follows that the mass of an object becomes infinite when it reaches the speed of light, the corollary of which is that no object can actually reach the speed of light. Therefore, because no observation can be made beyond the speed of light, normal science cannot explain reality; it remains scientifically impossible to define. In this sense, the speed of light is a barrier beyond which reality is inexpressible and beyond the paradigmatic scope of normal science. This conclusion is refuted by the fact that photons apparently do travel at the speed of light and can be observed doing so. There is, however, no theory available which can satisfactorily account for this observation.

In order to exist at the speed of light, photons (corpuscular light in the form of a particle or object) must have no mass and exist outside of spacetime (nonlocal properties) but must also be present in both the local and nonlocal reality. A photon’s information is present at a certain point in space and time, and at every point in space and time. This implies that the omnipresence of information is not disturbed by the act of observation.
Local information cannot be transmitted faster than the speed of light. Nonlocal information (mass) does not “travel” in spacetime. No mass is a nonlocal property of light that requires an existence in nospacetime.

Light travels at the speed of light because it has no local properties (mass) and does not “travel” in spacetime. No mass is a nonlocal property of light that requires an existence in nospacetime.

Light cannot have any mass, because of $E=mc^2$ its mass would be infinite at the speed of light. At nospacetime no distance exists, everything is simultaneous, no violation of special relativity theory.

When it reaches the speed of light an object’s mass becomes infinite [3]. If the mass of an object is infinite, its information content at the speed of light must also be infinite. Both properties behave in a similar fashion. Information content increases as the object moves. Space and time, however, behave differently. The faster the object travels the more space contracts and the slower time goes. This leads to the paradoxical outcome in which an object increases in mass while shrinking in size. This underscores the fact that the words “object”, “mass”, and “size” become meaningless when taken outside of the experimental context in which they have been created and defined. Such terms have neither “independent properties” nor “values” nor “existence” as Einstein argued. In sum, the faster an object travels, the more its mass increases and its size decreases while space continuously contracts until the object vanishes at the speed of light.

A solution to these contradictions lies in the inseparability requirement of reality in the EPR experiment, i.e., information about the past, present, and future is inseparable and constitutes an indivisible local spacetime continuum. In the indivisible continuum, the hypothetical time vectors of past, present, and future remain inseparable and affect each other. Suppose an object accelerates to the speed of light. The special theory of relativity predicts that the greater the speed, the more time slows and space shrinks, thus the time vectors in Figure 4 move toward zero and time and space vanish. Information, however, does not vanish, but collapses into a reality beyond spacetime and forms an inseparable information singularity. The illustration in Figure 4 shows that when the speed of light is reached, spacetime collapses into its converse, nospacetime, and forms an inseparable singularity. Thus, from the information perspective, reality becomes nonlocal beyond the speed of light and forms a nonlocal reality, which might be viewed as a singularity in nospacetime. The behavior of information differs from that of time and space, because information can travel faster than the speed of light. Accordingly, an information-based reality can...
exist beyond the speed of light. Information from the past, present, and future does not vanish at the speed of light, but collapses into an information-singularity of nonlocal information.

**The Einstein-Podolsky-Rosen (EPR) Experiment**

The following section is based on Davies’ description of the EPR experiment (Davies & Brown 1986). It depicts instant influence on a wave function at a substantial distance and provides a glimpse of what is meant by nonlocality and instant-action-at-a-distance.

In Davies’ account, the EPR experiment consists of three ingredients: one “particle”; a dividable “box”; and a “probability wave function”. Let us say the particle is a billiard ball. As long as we can see the billiard ball we know the ball’s exact location in the box. If we close the box, we cannot look inside but assume that the billiard ball becomes weightless and floats, we cannot know exactly where the ball is. The only thing we can do is assume a “probability” as to where the ball could be at any given moment. Nevertheless, we can assume a 100% probability (quantum wave or probability wave) that we will find the ball in the box if we open it. If we divide the box into two halves, A and B, there is a 50% probability that we will find the ball in A and a 50% probability that we will find it in B. However, it is important to note that dividing the box into sections A and B gives us two 50% probabilities but that there is still only one probability wave function, which remains undivided. If we take A and B to the opposite sides of the universe, the probability wave remains undivided. If we open one box, the probability will become certainty and the wave function will disappear. The question is, if we open B and find the billiard ball, how long does it take for the probability wave at A to learn about the observation that we have found the ball at B and disappear (collapse).

To illustrate, in Figure 2 a particle (1) is placed inside a box (2). The sealed box (3) represents a closed system, that is, no communication with the outside is possible. Because the exact location of the particle cannot be known, it could be anywhere in the box with equal probability. This probability is expressed as a wave function (4) that uniformly spreads throughout the box, representing the probability that the particle will be or will emerge at a certain location at a certain time. The box (6a) is then divided into two halves (A and B). Apparently, the particle is either in A or B.

In Figure 3, A and B are separated in space and time and brought to opposite sides of the universe. The probability wave in (6b) remains inseparable and undivided, i.e., nonlocal, representing the probability that the particle is in either A or B. Unless observed, the wave will remain undivided.
Figure 2: One particle (1) is placed in a box (2), when closed (3), its associated probability wave is spread uniformly throughout the box (4). A divider separates the box into two isolated boxes A and B (6a). It is unknown whether the particle is in A or B (6b).

Figure 3: A and B are brought to opposite sides of the universe. The single probability wave remains undivided.

An act of observation will determine whether the particle is in B. According to the rules of quantum mechanics, at that instant, the wave abruptly disappears from A (see Figure 4); even so, there is a spatial distance to B at the other side of the universe. If the inequalities are not violated, no information has been instantaneously transmitted and the wave in A would remain intact until a signal from B arrives at A. This would corroborate Einstein’s locality argument and the separability of reality and demonstrate that local events and things with local properties have an independent existence and do not influence each other. If the inequalities are violated, A would have been influenced by or known about an observation occurring at B and would vanish accordingly. This would corroborate nonlocality and the inseparability of reality and demonstrate that information about local events is instantaneously known throughout the universe.

With regard to locality, the essential assumption promoted by the EPR experiment is that when an observation happens at one of the locations (A or B), the other location or anything in it cannot have instant knowledge of this event, because information cannot be transferred faster than the speed of light. With regard to nonlocality, it is possible that, as soon as an observation occurs at one box, the properties of the other one change instantly. As illustrated in Figure 4 the EPR experiment shows that the inequalities are violated and thus seems to contradict Einstein’s principle of locality and the notion of local realities. Therefore, changes induced in one physical system can have an immediate effect on another system separated by time and space.
The result of violating Bell’s Theorem is that the unobserved wave in A instantaneously knows when the act of observation occurs in B, which, in turn, would result in instant-action-at-a-distance. Yet, instant-action-at-a-distance cannot be explained simply by assuming that information about an event at B can travel through spacetime infinitely fast (red arrow from B to A in Figure 4) in violation of the special theory of relativity. This would also violate Einstein’s locality argument, which posits that, if there is a “distance”, there must be a time lapse to bridge that distance.

So why is Einstein correct despite the EPR experiment’s results? There is no distance! It is the word “if” that makes the prerequisite “distance” unessential. In this sense, Einstein’s argument remains valid, because if there is a distance, it would take time to bridge it. The fact that no time is measured indicates that there is no distance. The special theory of relativity offers a partial solution, given that, under certain circumstances, time and space equal zero. Space and time vanish and any distance disappears. Accordingly, the nature or reality that exists at the speed of light has something to do with a spacetime-independent reality, which causes the EPR experiment’s result and which exists next to or beside a spacetime-dependent reality. It might be noted that Einstein did not comment on the nature of reality at the speed of light. Arguing that photons and tachyons have no mass at or beyond the speed of light is stating the obvious and does not explain anything [4].

How else might one describe the EPR experiment? We believe that the EPR may look different if we reorient our perspective and think about how the experiment applies to information. We contend that information is omnipresent and undivided throughout space and time. In Figure 4 this is indicated by the gray background, which extends beyond the local universe. We believe, therefore, that information can exist beyond the local universe even if space and time do not.
The General Theory of Information

The EPR experiment provides experimental evidence that underlying instant connectivity is an information-related phenomenon. The properties of this phenomenon have escaped the attention of normal science [1], because the standard theoretical frameworks well as the dominant philosophical and methodological perspectives are inattentive to certain phenomena, particularly information-related ones [4]. For this reason, we have developed a novel theory of information, which focuses on the nature of information, the characteristics of which include non-localizable, omnipresent properties independent of spacetime. The phenomenon of instant transmission of information in the EPR experiment is explained through the omnipresence of spacetime-independent nonlocal information.

The EPR experiment shows that information about a local event is known instantaneously throughout the universe. From the perspective of local spacetime-based theories, this requires that information travel infinitely fast and that objects cannot have an independent existence, even though they are localizable. The physical localizability of objects does not imply that they exist beyond observation; even when localized, they have an independent existence. The underlying instant connectivity is invisible and does not constitute a physical process that can be described fully by a theory based on local spacetime. A local theory assigns properties to enduring physical objects at each point on their trajectory through space [5]. Traveling through spacetime requires a time lapse and, therefore, the instant transmission of information in the EPR experiment cannot be explained by theories that depend on local spacetime. In the information perspective of a nonlocal nospacetime theory independent of observation, the phenomena of nonlocality and the omnipresent existence of information in the EPR experiment provide evidence of an inseparable information-based reality that has the property of instant connectivity.

A complete theory must be able to define: both local and nonlocal reality; nonlocal processes and phenomena; and the locality and localizability of observable objects and their properties.

The General Theory of Information

Based on the phenomena of nonlocality and nonlocal information derived from the EPR experiment, the general theory of information defines the fundamental nature of reality as consisting of inseparable nonlocal information, where everything about anything is instantaneously known everywhere. Nonlocal information is defined as an “infinite amount of inseparable information”. Because of the inseparability of reality, perceiving this information requires the capacity to process an infinite amount of information simultaneously. Localizability is a finite information process that limits information and causes the creation of local realities.

Definition of the General Theory of Information

Taking local and nonlocal phenomena into account, a complete theory must include two criteria: an assumption regarding the existence of nonlocal reality and an explanation for the creation of local realities. The General Theory of Information addresses these issues in the following statements:

1. Nonlocal information constitutes a nonlocal reality of an “infinite amount of inseparable information”.
2. Finite information processes limiting nonlocal information create local realities.

This definition is not meant to be exclusive or definitive. Indeed, the word “information”, as in the phrase “infinite amount of inseparable information”, can be replaced with many other synonyms and yield the same result. An “infinite amount of inseparable mass”, for example, would lead to the same conclusion. The result is still “everything”. What can be observed is determined by the viewer’s relative point of view and capacity to process information, not by the nature of an elusive object or phenomenon [6].
Implications

The general theory of information depicts the *creation of reality* as an information process through the limitation of nonlocal information (an infinite amount of information) by an observer with a limited information-processing capacity. According to this information-based perspective, reality is the product of the limited information-processing capacity of finite minds. The general theory of information supports the position that there is an objective reality that exists beyond the human mind in the form of nonlocal information and that an individual is never separated from this reality. This challenges the demands of inseparability, i.e., that there is no reality “out there” to be discovered. The general theory of information is meant to bridge the gap between animate and inanimate objects. An inanimate object contains the same undivided information as an animate object and they need not be differentiated.

The implications of the general theory of information are far-ranging. The nonlocal perspective allows researchers and thinkers to identify and articulate new phenomena that have not previously been identified because they lie outside the paradigmatic realm of normal science [1]. The general theory of information should lead to practical social improvements as it is designed to bridge the gap between life, nature, environment and technology.

Conclusion

The general theory of information asserts that reality consists of an “infinite amount of inseparable information” as envisioned by John Archibald Wheeler, who argued that “Information is Everything” [7]. This contradicts the commonly accepted assumption that elementary particles and matter constitute the foundation of reality [5]. In contrast to the natural sciences’ concern with prediction and control [4], the general theory of information is concerned with explaining and understanding that which cannot be readily observed. Inseparability, however, is the essential factor that breaks down the barriers that have separated humanity from nature and human beings from one another. The general theory of information is based on the premise that science should fully serve humanity by enabling genuine collaboration and ensuring inclusivity. Inseparability implies that responsibility is indivisible, that we are collectively responsible for the state of the world and that we are individually responsible for making the world a better place.

References

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