

**THE UNIFIED FIELD THEORY, THEORY OF EVERYTHING
AND MORE ABOUT NATURE**

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Abstract

This paper takes a look at the formulating of the unified field theory and the theory of everything. It shows how a unified field theory and theory of everything may be obtained. It also brings up a number of new and controversial concepts relating to nature.

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Introduction

The paper proposes a practical way to arrive at a unified field theory and theory of everything. Having only a beautiful theory and beautiful equations to model nature are insufficient for affirming the characteristic of the universe. The affirmation has to be ultimately carried out by physical experiment. However, in lieu of physical experimentation, computer simulation is proposed, simulation with powerful software having been effectively utilised in areas such as aeronautical, electronic, mechanical and marine designs, wherein it now becomes unnecessary to produce costly prototypes. It also touches on some new and controversial ideas and forces one to think more deeply about nature.

Forces Of Nature And Unification

Our views of nature may be modified in the future. For instance, superstring theories, which had been neglected in the past, are now the "in" thing, being regarded by many scientists as beautiful, or, elegant, and a possible theory of everything.

Einstein had attempted to unify the four forces of nature, i.e., gravity, weak nuclear force, strong nuclear force and electromagnetism, but had failed. As in the past, he was unable to derive the electromagnetic field equations, even for the weak-field approximation. He was to live to the end of his life without any success with the unified field theory.

Einstein had thought that David Bohm would be the first scientist to solve the unification problem. But ironically the latter regarded the concern with the unified field theory problem as merely an unnecessary fuss, dismissing it as an "illusion of parts" and simply relegating the problem to the logical

constraints of topology; he resorted to the metaphysical way of interpreting the universe, calling it the "looking-glass" universe.

A researcher by the name of Townsend Brown had succeeded in combining the electromagnetic and gravitational force-fields to produce what was called a "gravitator", a flying-saucer-like sort of contraption that flew by "electric wind"; when electric current passed through it, it allegedly gave a humming noise, emitted a bluish light and sailed through the atmosphere. Brown had been attached to the U.S. Naval Research Department, and had headed a team of researchers. Unfortunately, his invention met with little support from the scientific community, except for a Professor Paul Alfred Biefeld, a former class-mate of Albert Einstein, and a professor of physics and astronomy, with whom he collaborated on the so-called Biefeld-Brown Effect. It is a pity that his contraption which seemingly had electromagnetic-gravitational force-fields as the motive power failed to draw attention and interest from the world at large. However, it is evident here that gravitation and electromagnetism can be linked and the result can be anti-gravitational force and/or torsion in space-time. There is also the belief that there is an anti-gravitational force for every gravitational force, just as there is an anti-particle for every particle. Nobel Laureate Richard Feynman had suggested that anti-particles are like ordinary particles moving backwards in time, which implies that anti-particles should have anti-gravity.

Gravitation has always been thought of as a pulling or attracting force, just like the force of attraction between two magnets. Gravitation and magnetism may be different manifestations of the same thing. And, gravity may be a pushing force instead, a force that presses down on all objects in the direction of the centre of the earth. In fact, a push is equivalent to a pull, the former originates at the back of an object while the latter originates at the front. So far, gravitational forces are seen as forces of attraction only, while magnetic and electric forces are forces of attraction and repulsion. There may be a gravitational force of repulsion. All this will affect our approach towards the unified field theory.

There is evidently a "looking-glass" characteristic in the universe. David Bohm, the British scientist whom Einstein had once hailed as being the person who would one day solve the unified field theory problem, had postulated that our universe is a vast fluid nothingness or no-thingness in which everything is. He had spawned a surprising relationship between maps and terrains. According to him, in the "looking-glass" universe, our mapmaking changes the very terrain, and the terrain in turn changes our map; maps, mapmakers and terrains intertwine to form an integral whole. In other words, different things are really one thing. Heisenberg's Uncertainty Principle postulates that the

experimenter affects the experiment and vice versa, and the experimenter is also part of the experiment. Accordingly, all things are relative, how things are really depends on how or from what angles we look at them; there is a "yin" to every "yang", and the "yin" and the "yang" combine to make the "yin-yang" which is an integral whole - so good cannot be distinguished from bad for they belong to the same whole, the "yin-yang". Regarding Einstein's unified field theory, Bohm maintained that it is based on the illusion of parts (gravity, strong nuclear force, weak nuclear force and electromagnetic force) and that it is a futile problem. The observer is the observed, the part is the whole - all this seems more metaphysics than physics, but nevertheless this has evidently been the state of physics. Bohm believed that unification could be expressed by using the logical relations of topology, as is stated above.

Strong Force

Consciousness is evidently a potent force in nature. The mind is actually a part, an indispensable part, of nature. Scientists such as David Bohm and Werner Heisenberg, as well as many other scientists, evidently understood this fundamental aspect. Classical philosophers such as Berkeley and Hume had wondered whether the existence of any object was independent of the existence of the mind or consciousness: If I had never seen (never been aware of) an object, does that object exist? Can consciousness be therefore regarded as another force of nature (this evidently applies at the quantum level - recall that according to Heisenberg's Uncertainty Principle the experimenter affects the experiment and vice versa and the experimenter is part of the experiment as well, and, in David Bohm's "looking-glass" universe, the observer is the observed, the part is the whole and different things are really one thing)?

Failure

The failure in deriving the unified field theory is the failure to derive an equation which will link our visible macro-world with the invisible micro-world of the quantum particles, which will link the gravitational force with the weak nuclear force, strong nuclear force and electromagnetism, an equation which should encapsulate the totality of information about the universe. If Bohm's interpretation were correct, all these four forces are actually one and the same force, being different manifestations of the same force. Can any of these four forces exist without the others? They are all evidently essential parts of our universe, making up the whole.

Gravity

Gravity, which is crucial in the formulation of a unified field theory, can be described by the following formula:-

$$F = G \frac{M_1 M_2}{R^2}$$

where F is the gravitational force of attraction, G is the gravitational constant, M₁ and M₂ are the masses of two objects and R² is the distance between masses.

Before Newton discovered gravity, nobody had known it existed or had thought that there was such an attractive force. Einstein in his General Theory of Relativity interpreted it as a curvature of the space-time continuum, a geometrical form. Can gravity be the fifth dimension, in addition to the four dimensions of General Relativity comprising of the three physical dimensions and the time dimension, as Theodor Kaluza had suggested, which impressed Einstein greatly?

Hilbert Space

Can the physical world be considered infinite-dimensional, i.e., a Hilbert space, instead of four-dimensional, a commonly held view? It depends on how we look upon the physical world, on our mental inventiveness, and is thus subjective. Quantum particles in the micro-world, unlike the objects in the macro-world, are comparatively unpredictable where their actions or movements are concerned and can only be predicted if at all in a probabilistic fashion. We will never be able to know for certain where a quantum particle will turn up next. Moreover quantum particles are capable of being at two different places at the same time, and, also capable of instantaneous travel or teleportation, which is "spooky" and incomprehensible, and evidently in defiance of gravity. We can have a quantum field equation involving infinite dimensions. According to modern quantum mechanics, all possible physical states of a system correspond to space vectors in a Hilbert space. An infinite-dimensional Hilbert space will also fit in with the theory of the existence of an infinite number of parallel universes which are connected with each other through worm-holes.

Uncertainty And Consciousness

In quantum mechanics, the following Schrodinger equation can be applied to any physical system in which the mathematical form of the energy is known:-

$$\frac{\partial^2 \Psi}{\partial x^2} + \frac{8\pi^2 m}{h^2} (E - V) \Psi = 0$$

where ∂^2 is the second derivative with respect to x, x is the position of the particle, Ψ is the Schrodinger wave function, or, the probability amplitude for an electron in the state n to scatter in another direction, m is mass, E is energy and V is potential energy.

The Schrodinger equation is a deterministic time-symmetrical description of nature. In classical mechanics, when we say that a quantum system is in a particular "state", we mean that the state is a point in phase space. It is here described by a wave function whose evolution over time is expressed by the following equation:-

$$i\hbar / 2\pi \partial\psi (t) / \partial t = H_{op} \psi (t)$$

This equation identifies the time derivative of the Schrodinger wave function ψ with the action of the Hamiltonian operator on ψ . It is not derived but assumed at the start, and can thus be validated only by experiment. In quantum theory, it is the fundamental law of nature. Here, ψ is the probability amplitude for an electron - it is only an abstraction (a function of consciousness, having no physical reality). ψ is also, in a sense, the electron's own intensity wave. When it is squared and the absolute value is taken, it turns out to be a physical probability of the associated particle's presence.

Born later stated that the probability of the existence of a state is given by the square of the normalised amplitude of the individual wave function (i.e. ψ^2). This was another new concept, i.e., the probability that a certain quantum state exists. Born had said there were no more exact answers in atomic theory, but just probabilities. The wave Ψ determines the likelihood that the electron will be in a particular position, and, unlike the electromagnetic field, has no physical reality.

According to Dirac, light can be treated as waves or particles. In fact, in quantum mechanics, particles are regarded as waves. The behaviour of these particles can be predicted, as it were, and, they are thus known as probability waves or Dirac wave particles. There is a wave/particle duality here. When the particle is not observed (when consciousness is not present), it remains a wave (a probability wave), but upon being observed (when consciousness is present) it becomes a particle.

The formal solution of the Schrodinger equation is:-

$$\psi (t) = U (t) \psi (0)$$

where $U (t) = e^{-i\hbar t}$, $U (t)$ is the evolution operator that links the value of the wave function at time t to that at the initial time $t = 0$. Both future and past play the same role, since $U (t_1) U (t_2) = U (t_1 + t_2)$, whatever the sign of t_1 and t_2 . This property defines a dynamical group.

Hence, the evident importance of the part played by consciousness in quantum mechanics. A number of scientists had postulated that there must be a "cosmic consciousness" pervading the universe;

objects spring into existence when measurements are made, measurements which are made by conscious beings, which implies that there must be cosmic consciousness that pervades the universe determining which state we are in - some scientists, e.g., Nobel laureate Eugene Wigner, had argued that this is proof of the existence of God or some cosmic consciousness. Wigner had remarked that it was not possible to formulate the laws of quantum theory in a fully consistent way without reference to consciousness.

Thus, even if the above-mentioned field equation were obtained, it will still not give a complete picture of nature if consciousness were excluded. There should therefore be a complementary General Theory of Consciousness. This General Theory of Consciousness will be a very important aspect in our search for the ultimate truth. Many scientists, e.g., David Bohm, Wolfgang Pauli, John von Neumann, Arthur Eddington, Roger Penrose, George Wald, etc., had declared that the universe is mind-stuff. The capabilities of the human mind are so unique that no intelligent machine or artificial intelligence can ever fully duplicate them, according to Sir Roger Penrose, who had authored the books, *The Emperor's New Mind*, and, *Shadows Of The Mind*. Could a Supreme Being have created a mind which is capable of questioning its creator, the Supreme Being itself? Will one ever be able to find a computer questioning its creator, the human being (there will be a communication problem here)?

Supersymmetry

According to Einstein's theory of gravity, the hypothetical quantum of gravity, the graviton, which is a spin-2 boson, interacts extremely weakly with other matter, far more weakly than neutrinos; it is so weak that no instruments so far have been able to detect it. In the supergravity extension of this theory of gravity, the graviton finds a superpartner, the gravitino, which is a spin-3/2 fermion. Under local supersymmetric transformations these two particles transform one into the other. When quantum calculations were carried out using supergravity theory, it was discovered that the infinities which plagued the earlier gravity theory with only the graviton were now being cancelled by equal and opposite infinities produced by the gravitino. This is evidently the result of the deeper consequence of the presence of supersymmetry. Though it is not certain whether the supergravity theory is completely renormalisable, this "softening of the infinities" appears to be a step toward a viable theory of quantum gravity. As simple supergravity theory includes only the graviton and the gravitino, this hardly corresponds to the real world with its many particles. Most of those who have worked on supergravity feel that some crucial idea is still missing. Without this crucial idea the theories simply do not describe the real world.

How do we make supergravity theory realistic? If we can solve this problem, we can have supergravity theory as a completely unified field theory. It has been shown that the principle of

local supersymmetry is so restrictive that only eight possible supergravity theories exist, which are each labeled by an integer $N = 1, 2 \dots 8$. Supergravity theory shares the same features with its progenitor, the Theory of General Relativity, namely, conceptual power and mathematical complexity. Perhaps, by postulating the existence of a single master supersymmetry we can have a unified field theory that accounts for the whole universe.

General Relativity And Curved Space-Time

The following is Einstein's equation for General Relativity:-

$$G_{im} = -K(T_{im} - 1/2g_{im}T)$$

This beautiful equation expresses the curvature of space-time. The left-hand side refers to a set of terms which characterise the geometry of space, while the right-hand side refers to a set of terms which describe the distribution of energy and momentum, i.e., the left is the geometry side, while the right is the matter side. Reading from left to right is space-time telling mass how to move, while reading from right to left is mass telling space-time how to curve. In General Relativity, there is neither absolute time nor space and gravitation is not a force, or, pull between one object and another but a property of space and time. All this represents a great conceptual leap by the theory's creator, Einstein. As for the coordinate system of Einstein's General Theory of Relativity it has no basis in reality and is only a mental construct used to describe the space-time continuum of the General Theory of Relativity.

A suggestion is to change the left-hand side of the equation, the geometry of space, which is here a four-dimensional space-time continuum, into an infinite-dimensional space, a Hilbert space, which is as follows:-

$$G_{imH} = -K(T_{im} - 1/2g_{im}T)$$

What kind of geometrical form can represent this infinite-dimensional space? One geometrical form of this nature can be an infinite number of Moebius Strips which are intricately intertwined and linked with each other (with each Strip being cut lengthwise into several narrower strips that are connected together at narrow points, which represent parallel universes). It is thought that since we are only able to move around in the three large, observable spatial dimensions comprising of length, breadth and height, and one of time, all other dimensions must be very small and thus invisible to us, being curled up in a multidimensional space (which may be construed as representing the invisible micro-world of the quantum particles). This is in keeping with the concept of the unified field theory which Einstein had attempted to formulate by combining General Relativity and quantum theory.

Success

One may wonder when a unified field equation will be discovered. However, without a good understanding of gravity, this unified field equation will not come by easily. This unified field equation will of course link both the macro-world and the micro-world (through gravity, which will be the common denominator for both). Once the experimental confirmation of the existence of the graviton, the hypothetical quantum of gravity, is achieved, we should be surer of obtaining a unified field equation that accounts for the whole universe, which may be supported by the existence of a single master supersymmetry. Superstring Theory now appears to pave the way towards achieving this difficult goal.

Creation Or Spontaneity

Can there be some yet to be discovered universal laws which govern everything that exists in the universe? It is difficult to tell but it will be very useful to know these laws. This then will really be the theory of everything.

To many, including scientists, even Einstein, the laws of nature had been created by a Supreme Being, a God (whom Einstein believed does not play with dice). Alternatively, can all of nature be a computer simulation carried out by a very advanced race of beings? In 2001, a philosopher called Nick Bostrom had begun circulating a paper titled "Are You Living In A Computer Simulation?" This has been considered a good possibility. If all this is really true, we can of course seek out these advanced designers or programmers and learn the physics from them. The unified field theory or the theory of everything is thus possibly a computer program created by an advanced race of beings. There will be serious consequences resulting from all this. Should we be really living in a computer simulation, it implies that our destiny or future is pre-determined, programmed, and that we will have no or little if any control over our destiny, and that our destiny can only change if our master(s)-programmer(s) modify their computer program(s), which we can of course entreat them to do so only by praying to them as the religious have prayed to their respective Gods. (Note: Our DNA's with their error-correcting facility, which determine our physical and mental make-up, are like our computer programs with their error-correcting facility; this gives credence to the "computer simulation" concept here). And, we may be a part or parts of a computer game or games played by these advanced, superior beings. Such advanced, superior beings may even be regarded as Gods. All this will evidently be all the more plausible to those scientists or philosophers who conceive that our universe is the result of intelligent design. We may be just virtual reality to these advanced, superior beings, much as computer games are virtual reality to us. There is a parallel in that like us the objects of artificial intelligence in the virtual world appear to have a life of their own, which may be scary; as a matter of fact, computer scientists have found that computers have, surprisingly,

performed tasks that they had not been programmed to perform (which might, of course, have been lucky coincidences - similarly, life and existence in the universe might also have been lucky coincidences). If true, all this should constitute the theory of everything. This may solve the mystery of life and existence in our universe. But is this really so? We should next ponder what is stated in the following.

Though believers of intelligent design may find the idea that life and existence in our universe are the handiwork or creation of an advanced, higher race of beings (or, Gods) plausible, they should also consider whether this creation should be limited to, or, stop at, this level. Is there a good reason for it to be limited to this level? The important questions are: Is this advanced, higher race of beings (or Gods) the creation of an even more advanced, higher race of beings (or Gods)? Is the latter also the creation of an even higher race of beings (or Gods)? And so on ad infinitum. Another important question is: Could life in any form, whether high or low, advanced or backward, have existed spontaneously, without having been created by a more advanced, higher form or forms of life? Consider a pond which has just been formed by nature. Sooner or later it will be mysteriously populated by marine life such as fishes (without anyone planting them there), an apparently spontaneous existence. The mystery seems to deepen instead.

Practical Affirmation

All these are important matters to explore if we were to really understand nature, life and existence. But how about the unified field theory and the theory of everything? It appears a good idea to get some computer game designers and/or computer programmers to collaborate with the scientists to produce a simulation of life and existence in the universe. This is probably a mammoth if not impossible task. These programming experts and scientists have to sort of play God. What will be the parameters involved, the coordinate system to be utilised (e.g., three-dimensional, three-and-a-half dimensional, four-dimensional, etc.), the algorithms or mathematical formulas to be used for governing the movements of virtual objects (which will be important as they may be equivalent to the field equations of the unified field theory), and so on? With such a simulation, we may be able to understand better how the forces of nature, e.g., the mysterious but all-important gravitational force, behave. In this manner, which can be considered a kind of reverse engineering, success with the unified field theory and the theory of everything may be achieved.

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