Theoretical

THE UNITY OF CONSCIOUSNESS EXPERIENCE AND CURRENT PHYSICAL THEORY

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ABSTRACT

We in the western scientific culture have just begun, in mass, to explote our inner cosmos. Inner exploration has been an intellectual activity in the relatively recent past, has been associated with psychotherapy. Now inner exploration is beginning to enter the domain of emotional and spiritual development as well. Certainly the nature of our inner being, the nature and structure of our consciousness, shapes and determines our concept of reality. This realization is having a vast impact on the world societies and us, as individuals. One manner in which we internally organize the mental, emotional and spiritual information we receive is by mental system of concepts or categories of information and their causal relations. We address the fundamental nature of conscious perception and how we comprehend existence. Techniques such as yoga, meditation, and processes of spiritual awakening have opened the horizons to the consideration of the attributes of the consciousness. There also appear to be clues as to the nature of consciousness in the structure of physical theory. In fact, the co-called internal journey and external validation system of science may be leading us onto a similar path of knowing. In this paper, we explore some of the basis of the structure and representations of human thought and thought processes. If we can better understand the relationship between our inner thinking, feeling modes on the external world and our universal connections, we will be able to better move to world peace, personal peace and freedom in time.

KEYWORDS: Consciousness, physics, reality, unity

INTRODUCTION: The Role of Consciousness

. . . the wise man looks into space, and does not regard the small as too little, nor the great as too big; for he knows that there is no limit to dimensions.
—Lao-tse

He liked watching the glorious stars, thinking "there must be myriads of worlds out there." Then one night he shifted his awareness toward and into himself. "By God," he whispered, but only to himself, "there are myriads of worlds there, too!"[1]

What should start our discussion of the possible relationship between states of consciousness and modern physics? Let us start from a concept so well expressed by Sir Arthur Eddington (astrophysicist and one of the early researchers in relativity) that, "Physics is the study of the structure of consciousness."[2] It is the mind that is the ultimate instrument for "doing" physics. Not only do concepts in philosophy, psychology, and perhaps neurophysiology lead us to the conclusion that the structure and content of physics may depend deeply on the relationship of physical theory and the structure of consciousness. Also, recent discoveries in physics itself indicate a need to examine this relationship.

Discoveries, and/or creations of new concepts in physics lead to the observer/participant issue. Quantum mechanics, the theory of atomic microcosm, is a description that may imply that the state of the observer affects his interpretation of what one sees. In the context of quantum theory and relativity, we may be able to shed light on the relationship of discovery vs. creation and its validation of the properties of an external reality. In quantum physics, as well as in the structure of *n*-dimensional relativistic models, the implication for a fundamental remote connection of events is deeply implied by the structure of these models, and we can use this property for the experimental verification of these models.

The structure of physical theory, its very fabric, is pointing towards a world view that speaks of concepts which have been considered external to the body of science but yet may be implied by modern physical theory itself. Can light be shed on the seeming paradox from research in the altered or unusual states of consciousness, paranormal and mystical phenomena, and states of medita-

tion, etc.? One of the deepest, most profound discoveries for the western mind is the induced meditative state that is, the discovery of an intrinsic variety of a state of consciousness common to most people who modify their behavior to experience it. Altered or mystical states of consciousness may hold great clues to resolving conceptual paradoxes in science and in life.

We have an unprecedented opportunity in current world society to integrate the intuitive mystical and spiritual with the analytical mode of thinking and being.

A MULTITUDE OF STATES OF CONSCIOUSNESS AND REALITY PRECEPTIVE MODES

We will define "altered states of consciousness" (ASC) for purposes of the present discussion as mental states other than awake, "beta wave," or sleeping, non-dreaming states of consciousness. Therefore, we are including dreaming as an altered state. Note that this is a matter of definition. Also, there is a great variety of subjective reports within the dreaming experience.

The methods for inducing such states may either be chemically or methodology produced, such as in the use of meditation, yoga, self-reflection, "magic mushrooms" (amanita muscaria), or not require an external agent and resorting to meditation or sleep/dreaming. There appears to be a set of relatively well characterized states of consciousness [cf. Charles Tart, University of California, Davis[3,4]] which can be induced and experienced by one's internal self that produce descriptions by individuals of very similar mental/emotional and spiritual experiences.[4]

Visual imagery (audio, etc.) is well known in dreams but is also reported by meditators. One of the primary experiences induced by artificial means such as psilocybin, and hallucinogens is their visual pageantry which excites the imagined, stimulated sense. What is meant by image, hallucination and stimulus? A hallucination is usually defined in terms of an image in the mind which is not prompted by an external source of visual stimulus of light (photons) impinging on one's retina through the lens of one's eyes. We talk

of "imagined," which is associated with not being real, i.e., not having a counterpart in the external physical world.

But then, how real is real? How real is an internal visual image? If it is an experience which is acted upon—it is seen, felt, heard—is it not real? The criterion for reality in the western world (and science) is one of a *consensus reality.* The usual test of an experience (for example, a visual image) is usually made against an assumed external physical reality. But we cannot develop a hard and fast proof of "It Exists," [cf. Rene Descartes', "I think therefore I am! I did not create myself, therefore God did it."]

Meditators also report a consensus reality (more on this later), but where is the image? It's in the mind! Visual imagery that also appears not to be instigated by photons from external sources is the remote perception psychic information imagery. A subject-participant, in a laboratory experiment, describes a randomly chosen distant target location, under conditions in which an agent, termed a "blind judge," can match a target with a subject's description, blind to the correct match, out of many possibilities. We then bridge the gap between external information sources and internal mind imagery without physical light input and yet a correlation of that perception is made to an external target and hence is an objective reality.

We have at least three sources of imagery: first, that prompted by external stimuli; second, that prompted only by internal stimuli; third, that which is prompted by external stimuli but is not connected by any known physical means to the process of perception.[5]

Another example of a checkable reality match for a so-called external imagery is exemplified by Friedrich August von Stradonitz Kekule, 19th century German chemist, who had a dream of six snakes biting each others tails. He had been trying to work out the structure of the molecular form of benzene, C_6H_6, and based on his dream, demonstrated it was a ring structure and not a linear structure.

A resolution of the discussion of the validity of these various information sources which lead to mental imagery may lie in the concept of the existence of states of consciousness. If the model of consciousness is a set of states or its structure has "levels of awareness," this concept might resolve the disagree-

ment about the criterion of internal vs. external validation. Both internal and external experiences and their source of origin may be equally valid, but may involve different distinct levels of consciousness in a vast possible array of states of consciousness being and perceiving.

Perhaps the concept of altered, non ordinary or unusual states of consciousness or levels of perceptual awareness will shed some light on some of the current paradoxes in modern physics. The existence of a paradox implies lack of information or ignorance, as nature does not admit such a paradox. A paradox resolved leads to a new level of awareness and understanding. Perhaps current events are leading to the Kuhnian, (what Thomas S. Kuhn[6] referred to as a) paradigm shift which may involve a shift in understanding that some scientists and non-scientists are in a different state of consciousness as they examine the same event. The lesson of autogenic training and other processes which modify the central nervous system (CNS) may be that there is a host of new horizons, of new unexplored states of consciousness, to experience, and in which one can attempt to explore reality and discover a wider, more vast view of existance.

Then, if we do deal with the framework in which consciousness is "all," or the seat or root of reality, then understanding more about states of consciousness is a vital key to comprehending the nature of reality.

DEFINING SCIENCE AND MYSTICISM: METHODS IN THE SEARCH FOR KNOWLEDGE

There are two dominant methods for gathering information about reality and developing concepts about what one deems reality to be. They are: the scientific method, and the mystical, intuitive or experiential method. Science is defined as accumulated systematized knowledge, ascertained by observation and experiment, which is brought under general rules or laws. At the basis of the scientific method is experience, i.e., in the form of experimental tests. What is crucial to the method is the interplay of observation (experiment) and testable theoretical hypothesis. Reason and logic are fundamental to the construction of these theoretical model.

Mysticism, on the other hand, relates to obtaining information by direct or intuitive experience. Mysticism is the belief that the most reliable source of knowledge or truth is intuition rather than reason or the scientific method.

Perhaps the most fundamental aspects of intuition are not at odds with science but are at the root of both science and mystical experience such as Kekule's dream. The relationship of the scientific and mystical view is rooted in the nature of consciousness. Forms and varieties of the experience of states of consciousness can give us clues as to the relationship and validity of the use of methods of science and mysticism in the search for knowledge. One of the ultimate desires of mankind is self-knowledge, i.e., understanding consciousness itself.

SOME BASIC TENETS OF SCIENCE AND THE WESTERN VIEW: DUALITY, CAUSALITY AND OBJECT GOUPING

The struggle between parts, separatness or duality and unity or whole is seen in many world religions and philosophies. Central to the struggle is an attempt to understand one's connection to the Universe. In physics we examine in more detail the possible relation of the observer and the observed. Often, when the dualistic view is set up, there is an attempt to overcome dualism and reunite that which has been conceptually divided. Socrates, via Plato's dialogues, suggests a model of reality consisting of physical objects and another world filled with a perfect "master plan" of images of those objects, such as a perfect chair or table. The perfect-image world also contains a representation of perfect love, or good, etc. Another model employing a multiplicity of objects, or noun concepts, or ideas is that of Immanuel Kant, who suggested that the mental attribute to categorize objects or concepts (for example, to identify and distinguish chairs from tables or love from hate) is an inborn characteristic of the human mind. These are, in essence, dualistic models (Table I), and the concept of categorization, or object identification and grouping, is also a key tenet of science.

William von Gottfried Leibnitz attempted to reconcile the Greek mind/body dualism by hypothesizing the existence of monads. The monads, or "atoms of

Table I

Immanuel Kant discussed the concept that the ability to define and categorize concepts and objects is innate. This concept has given impetus to the analytical method, a useful but also limited view. There have been a number of attempts to reconcile this multiplicity model with the concept of the Universal.

SCIENCE OR HUMANITY	Mathematics	
	Astronomy	
	Geology	
	Engineering	SCIENCE
	Physics	
	Chemistry	
	Biology	
	Psychology	
	Sociology	SOCIAL SCIENCES
	Economics	
	History	
	Art	
	Music	
	Religion	
	Linguistics	HUMANITIES
	Classics	
	Education	

matter and mind," operate to link up, by a synchronistic mechanism at one's birth, in such a manner as to correlate one's intentions with one's actions. If one intends to raise one's arm, it will move, not because one directly wills it to do so but because at one's birth, mind/matter monads were set up to produce this coincidence! This is Leibnitz's view. Enter the debate over free will vs. determinism. In this view, all events are now definable in terms of causal terms.

A predominant concept of western scientific truths is that of causality. The causality description is the way in which *causes* and *effect* are related and is certainly another dualistic model. Immanuel Kant suggests that causality, like categorization, is also an innate construct of the human mind.

Besides Leibnitz's theory, in which he attempts to reconcile the mind/body duality by introducing the system of monad synchronicity, is the synchronicity

theory of Carl Jung. After Carl Jung's break with Freud, Jung suggested an acausal model in which events are correlated by meaningful coincidence of synchronicities. Not only do these coincidences occur "randomly," but also methods can be utilized to set up meaningful synchronicities which can yield useful information. Jung was particularly interested in the I Ching, in which information is accessed by a "random" process of a set of tosses of three coins or yarrow sticks. Jung describes a mechanism whereby the system of synchronicities are correlated by a universal or cosmic consciousness.[7] Again, we have thrust toward the holistic or universal model (see Table II for a summary of some of these concepts).

We have discussed a number of intellectual endeavors that deal with dualism and try to derive or develop a concept of unity, oneness, or universality. Perhaps the duality vs. unity concepts can be further explored by understanding levels of consciousness. Maybe new awareness states are leading us to be able to experience this resolution in modern physics!

PHYSICAL MODELS OF INTERCONNECTEDNESS

Much of the conceptual framework of western philosophical and scientific thought treats the observer of world processes as an inert and passive agent with respect to the observed "reality." Reality is pictured as something external and untouched by the process of observation by human consciousness. How universal is this view? Are there philosophical systems which hold other tenets about the relationship of the observer of reality and the observed reality? Systems of thought such as physical science or mysticism are based on philosophical precepts. There are realms of physics and mysticism where the observer may not only be linked to the observed by affecting the observed, but may also be, to a degree, the creator of the observed reality.

Once one chooses the view of the observer and observed as separate, one is immediately confronted with a dualistic model (discussed in the previous section). Then the philosophical thrust is towards re-uniting the dualistic aspects. Although dualism is a predominant concept in western science and philosophy, there are also non-dualistic models or conceptual frameworks about

Table II

Some western philosophers and their concepts. It is difficult to summarize anyone's philosophical framework in a few words. In fact, one's philosophical concepts change over time and may explore different points of view, comparing and contrasting them to other's philosophies.

Philosopher	**Some of the major concepts**
Descartes, Rene (1569-1650)	1. Mechanistic view 2. Mind/body duality 3. Importance of pineal gland 4. Acausal 5. Space-time independence 6. "What you see is what there is"
Leibnitz (Wilhelm von Gottfried) (1646-1695)	1. The monad as a fundamental metaphysical unity 2. Synchronistic link of mind/body division 3. Space-time independence 4. Acausal
Kant, Immanuel (1724-1804)	1. Innate categorization 2. Causality (cause-effect relationship)
Spinoza, Benedict (1632-1677)	1. Contingency (like monads) 2. Causality 3. One-world unity 4. Process as primary
Hegel (George Wilhelm Friedrich) (1770-1831)	1. Thesis, antithesis and synthesis: analogy to yin-yang concept
Jung, Carl (1875-1961)	1. Archetype (as in Socrates "world of images") 2. Synchronistic view (analogous to 6th century B.C. view of Lao Tze)

reality, as we shall explore further. Starting with the observer/observed duality, let us explore some ways in which new discoveries in 20th century physics may imply a link between these two and a possible dissolution of this duality into a unity.

At the microscopic atomic level, the position of particles and information about their physical properties, which we are observing and measuring, appear to be altered by our probes. These probes are other particles which collide with the target particles. It appears that we cannot "look" at the world as though we didn't observe it. The apparent effect of the observer on the observed, in the micro domain of the atom, is termed the Heisenberg Uncertainity Principle.

Physicists are also interested in another observation about microscopic quantum phenomena which seems to imply a connection or correlation of systems of particles remote from each other in space. If particles which are juxtaposed in space are correlated with each other; that is, are related to each other by their respective physical properties, they remain correlated even when separated by large distances (several meters, which is indeed large on the atomic scale).[8] This form of "interconnectedness" is not part of the conventional interpretations of physics but was proposed by Einstein and others in the 1930's.[8] The interconnectedness hypothesis relates to the formulation of completeness of the quantum mechanical description of matter and the universal applicability of the Heisenberg Uncertainty principle.[9]

John S. Bell formulated a very detailed description of the behavior of a particle in the microdomain.[8] Bell's work in 1964 is based on the earlier important questions raised by Einstein and others in 1935 about the nature of the completeness of the quantum description of the microscopic behavior of particles. In 1973 John Clauser and others tested Bell's hypothesis in the laboratory and found that the interconnectedness hypothesis formulated by Bell appeared to be valid.[10] The experiment involves the production of a pair of photons (or particles or quanta of light) at a fixed source. These two photons move away from each other in opposite directions. (Photons move at the velocity of light since they are quanta of light.) The relative spins (photons rotate like little tops) are measured. It has been determined that this spinning is correlated even when the photons are separated by up to several meters. This correlation, although somewhat complex, seems to be a manifestation of a fundamental interconnectedness, at least on the microscopic level.[5,10]

This non-local correlation, termed Bell's Theorem, may have implications similar to the Heisenberg Principle. It's as if a spider in its web feels each distant disturbance of the web's far reaches as it sets at the center of the web

waiting for dinner. David Bohm and Karl Pribram, as well as others, have suggested holographic models of events and consciousness.[11,12] This view may be consistent with some of the multi-dimensional models discussed further on.

Perhaps the universe is constructed in such a way that what one does or thinks here on the planet Earth may indeed affect conditions in the far reaches of space. Discoveries in physics do relate to the philosophical precepts constructed by humankind. Volumes of philosophical discourses have been generated on the issue of observer effects, chance and free will, and the uncertainty condition proposed by Heisenberg. I anticipate that volumes will also be generated on Bell's "interconnectedness" theorem and its relationship to cognitive processes generating physics and mystical concepts, as the implications of the theorem seem to relate to the visions expressed by certain mystics.

Do the implications of Bell's theorem (non-local interconnectedness) hold for large-scale processes? Are there other theories that could describe remote or non-local interconnectedness? There are a number of differing views by researcher on the first question and much work may precede its resolution. We shall examine some physical models which may answer the second question.[13-16]

There are other models being examined which involve apparent macroscopic non-local correlations. One such model which I have been examining is a macroscopic interconnectedness model formulated in terms of multi-dimensional geometries.[5,13] Geometries involve more than the four dimensions of three spatial (dimensions) and one temporal dimension. The construction of these dimensions is such that there are condition in which information can be accessed from remote space-time locations such that they appear juxtaposed and not remote from the perspective of the higher dimensional space. A set of these dimensions involve both real space-time and imaginary dimensions which are space-time dimensions multiplied by the imaginary number or $i = \sqrt{-1}$. We examine the possibility that physical effects can be transmitted over a distance, which does not violate our usual concept of the relationship of causes and effects.[14-16] The important point is that physicists are now examining the concept of remote interconnectedness (see references 5 and 13 for further details).

The potential non-local connections of event may demonstrate certain types of unity which we will discuss as a mystical concept. Also, if there are systems

where photons and other particles are non-locally connected, this type of correlation may also involve the observer and the observed. Perhaps also, physical theories will describe certain systems in which the manner is which one looks at something will determine what it appears to be.

The relativity of motion, as described by A. Einstein, implies that one's observational vantage point affects what one thinks one is observing. The relativity theory is, in general, a macroscopic description of causal connections of events and synchronization of time. It is observed in physics that the time recorded on a watch depends on the relative frame of reference of the observer and the observed (such as their watches'). If the timepiece moves very near the speed of light past the observer, the time reading appears to change depending on the velocity of the watch's motion. Although the principle of Lorentz invariance insures that the laws of physics remain unchanged by motion, translation, rotations, etc., one's observational perspective makes things appear different, depending on the way in which they are observed.

From the macroscopic domains it seems that we cannot make a physical observation of the world without affecting the patterns of the observed; that somehow, "the observer is a participator; it is a participatory universe," in the words of physics professor Eugene Wigner formerly of Princeton University.[17]

What is observed? What is reality? We assume (in western thought based on the logic system developed in Greece a few centuries prior to the birth of Christ) that there is an external, solid, "out there" reality; that, in essence this reality is immutable.[18] But is this the case? We discover, more and more, that this "reality" depends on our frame of mind, on our state of consciousness or, ". . . on state specific science," in the words of Charles Tart, U.C. Davis, Psychology Department.[3,4] If one's mood can effect how one views life, can it also effect one's observation of the period of swing of a pendulum bob?

The results of the Clauser (of Berkeley) and Alan Aspect (of Orsay, France) experiment of the test of Bell's theorem appears to require giving up realistic, local models of reality, i.e. objectivity. The ability of the mind to transcend space and time demands giving absolute "Newtonian" objectivity because the interaction of consciousness with physical matter changes and modifies matter

Table III

Existence, Reality, Meaning of Truth (Fall, 1966) Epistemology (let's define existence and truth), theory of knowledge

Word	**Dictinary Definition**
Existence	State of being, life, duration, occurrence – having reality
Real	Existing as or in fact – actual, true
Reality	Fact, actually
Fact	True, reality – really true
True	In accord with fact
Truth	Reality, actual existence, corrections, exactness
Actual	Existing in reality, real
Correct	Not in error, true, fact, exact
Exact	Accurate, correct, precise, no error, measure, determine

and other consciousnesses. The scientific method yields the valid results that it does because there is approximate objectivity, which is more applicable in the classical domain and begins to break down in the quantum domain.

In Table III, I list the Webster dictionary definition of words related to reality and existance and what we have is a tautology or circular argument. We need input from a meta philosopher of paraphysics.

As mentioned before, Sir Arthur Eddington goes further by suggesting that, "Physics is the study of the structure of our conscious minds!"[2] In fact, it is certainly valid to say that our minds are the ultimate instruments for "doing" science; that is back of every telescope is an eye, and back of that is (hopefully) a mind! Eddington's thoughts may lead us to the Buddhistic (Prince Gautama, born about 550 B.C.) concept, that reality is in part, or completely, a construct of consciousness, and that not only is the universe "perturbed" by the observer consciousness, it is created by it! The ultimate question then is: Is what we believe not only creating how the world appears to us (state specific science), but determining how it really does work?

Table IV

Objectivity, Subjectivity, and Reality: Contour Integral Model

1. What we perceive as reality depends on our assumptions and state of consciousness.
2. Barriers are useful but limited and are artificial constructs of the mind.
3. What is real must necessarily include that aspect called mind/reality as well as what is called external reality, to be complete or unified.
4. It is as though we see only the isolated islands above the sea rather than the universal of the whole of the land beneath the sea.
5. In a sense, when we include the mind's knowledge and structure in our description of reality, we find our perception appears to become dynamically "unbounded" with new aspects of possibilites.

One of the major debates in science, and the so-called pure science of mathematics and science itself, is: does the human mind *discover* the workings of an "out there" external reality, or does mind *create* the reality? Do we create ideas, ideas about the workings of an external reality? In fact, do we create the reality through individual and/or collective consciousness? Certainly this hypothesis has been made. Let us term this model a "consciousness ontology:" that being or existence is a creation of consciousness.[19]

Much of western philosophy and science concerns itself with what we may term as theories of knowledge of epistemology. The main concern of such a system is how do we discuss the nature and structure of an external reality. Such a system, consisting of the "discoverer" and the "discovered" in the epistemological approach, necessarily leads to a dualistic model of the observer and the observed. If there is the mind (observer) and the physical reality (the observed), how then are the two (mind-body) linked once dualism is hypothesized? Where does one draw the line in the chain of the observer and observed. This is a major concern of quantum theorists since, as we discussed, it appears that the observer is not passively inert, but a participator. In defining a quantum system it is of major consideration where one decides the "I" ends and the "universe" beings? See some constructs of unity I list in Table IV.

Another example in physics of the expression of a fundamental interconnectedness is a principle formulated by Ernst Mach (1838-1916),[19] we may find another "connectedness" clue and a possible relationship to the absolute "Acashic records." Mach's principle is not tightly formulated like Bell's theorem, but may relate to it. Although one of Einstein's axioms of relativity is that there is no fixed reference frame in space, the structure of his theory does not preclude this possibility. Mach's principle states that a local event, such as the rotation of a bucket of water, depends on the whole of the fixed star system, i.e., the rest of the universe. If one rotates the bucket of water fairly rapidly, the surface of the water forms a parabolic meniscus. The rotation of the bucket and the shape of the water's surface depend on the existence of the universe or some fixed reference frame defined by it.[20] Then it would appear that Mach's principle is also a statement of or aspect of a *principle of interconnectedness* which is more precisely and specifically formulated by Bell's theorem.[5,9] The application of Bell's theorem has been specifically made for quantum systems, although it is more general than the quantum theory. Mach's principle has been discussed primarily in terms of astrophysical applications. In the next section we will discuss the possible interpretation of the incompleteness theorem of Kurt Gödel.

GÖDEL'S INCOMPLETENESS THEOREM AND THE SEARCH FOR TRUTH

"The way that can be described is not the way" from the Book of Tao by Lao Tze, China, circa 6th century B.C. Can we find an expression of this eastern thought in western culture? Prince Gautama Buddha expressed the concept that enlightenment comes to an individual but cannot be taught or explained. The only thing that can be taught or discussed are some of the possible conditions one can practice to make it possible for enlightenment to happen.

Kurt Gödel, an American-German mathematician, developed a mathematical theorem in 1931 which states, in part, that all the truths of a mathematical system do not follow from its axioms. (There are more truths than axioms.)[21] He first applied his theorem to algebraic systems, then to geometric systems, and demonstrated that every mathematical system (algebraic or geometric) was

necessarily incomplete. Since all language systems, mathematics, English, Japanese, Chinese, Russian etc., are based on the logic axioms of arithmetic or algebraic systems, then Gödel's theorem implies that all language systems are necessarily incomplete. Since we communicate thought by the symbolic representation of language, it appears then that a complete thought system can neither be expressed verbally nor written in a language/logic system.[21]

By definition, we believe that in order to construct an *ultimate truth*, this truth should necessarily be complete. Then it appears that in western logic we see a parallel to Buddha's contention about enlightenment. The ultimate truth then will "just come" when the right conditions are met and not *reasoned*; that is to say, one cannot write the ultimate truth as a mathematical equation or set of equations, nor can one even describe it to another. Can one at least suggest the path to take to obtain enlightenment? Or can one suggest the path, or Tao? Yes; this is what Buddha's teachings are about, how to set up the conditions to receive enlightenment.

So it appears that the facts of physics and the scientific method may not yield the ultimate answer to the riddle of the universe, but the scientific endeavor is enjoyable and may be a part of the Tao. Science involves maps or theories which are approximate to the territory or reality. So-called "occult truth" may be irrational, that is, "not of reason," or at least beyond the scope of reason, but maybe, via Gödels theorem, all Truth is "irrational." One interpretation is that it is neither rational nor irrational but a-rational. That is, it is not one or the other but at the root of both. *Reason* and *feeling* may be derived from the ultimate truth and have their roots in it.

Kurt Gödel also entered the search for certainty in mathematics by demonstrating it is not absolute, just as Heisenberg had done for the physical sciences with his Uncertainty Principle developed five years earlier.[21] Whereas Heisenberg demonstrated that the observer is a participator, Gödel formulated the incompleteness of mathematical systems.

It was the completeness concept that led to the formulation of Bell's theorem;[8] the theorem is a quantitative formulation of the Einstein/Podolsky/Rosen Paradox formulate[22] by these three authors in the 1930's as a description of the completeness (or lack of it) and connectedness (and perhaps unity) become

inexorably intertwined. The test of the validity of non-locality was first made by J. Clauser in 1971.[22] If we search for truth, particularly a universal truth, we certainly would consider these two concepts as central.

OBSERVER/PARTICIPANT AND SCHRODINGER'S CAT

We have a variety of thinking modes which we utilize. These bring into question objectivity vs. subjectivity. One of the major tenets of the scientific method is the assumption of objectivity, that is, a consensus reality about external events such that a scientist replicates his own and other scientists' results so that under the same conditions he gets the same results. This is also called Lorentz invariance. Subjectivity, on the other hand suggests that observations are dependent on and unique to a particular observer. Some have thought that internal reality states, such as in meditation are therefore subjective, and yet we do find a consensus reality here also, even though the "objects" observed are in one's head. But then where is the object of "blueness" of the sky (in our head?) and what is "out there" prompting our perception? Psychologists argue about what perception is, our ultimate experience, i.e., internal and external perceptions. Let us introduce a physicist to this discussion in terms of the observer/observed issue. What is the definition of an external/internal boundary? Is the skin (sense), retina (sight), eardrum, anvil and stirrup (hearing)? Is this definition in some sense arbitrary?

When we attempt to define the observer/observed link, we find that the definition affects the manner in which we define a so-called objective system. We have a test then that this boundary between observer and observed is not arbitrary.

In the 1920's and 30's there was much discussion of the interpretation over the newly developing description of microcosmos with the quantum theory. Some said that the theory was just a pragmatic method of predicting the outcome of a specific experiment termed the Copenhagen view, after Neils Bohr's interpretation and one could not build a model of reality from this theory. Others said the purpose of doing physics is to comprehend reality by building testable models of it.

One gedanken (or thought experiment) that pinpoints some of the problems of the interpretation of the quantum theory and the link of the observer with the observed is the "Schrödinger cat paradox," named after one of the developers of the quantum theory, Erwin Schrödinger.[23] A cat is locked in a room where it will eventually be killed by a poison gas pellet activated by a "random" quantum atomic decay process. Before an experimenter looks in the chamber, and after a given time interval, is the cat dead or alive? The theoretical physicist sits down with pen, paper and calculator, and using the quantum theory figures out what will happen after a certain time interval. The solution to the Schrödinger wave equation, used to describe the process of radioactive decay, has two solutions. In one possible universe (solution), or eigenstate, the cat is still alive; and in the other equally possible universe, the cat is dead. The total solution is the sum of these two solutions and the wave function eigenstate only "collapses" to the alive or dead cat eigenstate, after the cat is observed. But if the cat is not observed what is its state? In this sense, the observer's consciousness participates, but then the cat knows if it is alive (and perhaps if it is dead, if there is life after death for the cat).[23] The famous Schrödinger cat paradox brings many concepts into consideration. It basically asks whether our physical models describe the universe objectively or just define the limits of our own knowledge.

As Evan Harris Walker[5,24] suggests, the problem in quantum measurement is not a problem at the microscopic level (which the Schrödinger wave equation describes), but is at the connection of this level, hooked to a macroscopic (classical) measuring device. This is just another way of describing the problem of where and how the observer is connected to the observed. This may be ultimately expressed thus: that the paradox invokes our lack of understanding of our connection to the universe. Can we find unity? Is unity experienced in some state of awareness and not in others? What role do the constructs of space and time play in our confusion over this issue?[25-27] There may be a connection path for the observer and observed in a similar manner to that of the remote connection of the two photons in the experimental result of Bell's theorem as well as the single photon through one or two slits in the Young's double slit experiment where defraction occurs when both slits are open, no defraction when one slit is open when only one photon at a time is emitted from a source through the slits to a screen. It is as if one photon going through one path "knows" the other slit is closed or open.

PARTICLE AND PROCESSES, GEOMETRY AND THE SPACE-TIME INDEPENDENCE OF CONSCIOUSNESS

We can ask ourselves what is the primary essence of the Universe? What is its fundamental building block? The Greeks called it "atom" (indivisible), the Hindus called it "processes." Are there sufficient clues in nature and/or in our minds to suggest an answer?

What are space and time? These apparent restricting aspects of reality appear to be rigid physical constraints and yet are transcended by consciousness. These fundamental concepts appear to be "breaking down" as we probe the elementary particles at the mico level, and perhaps even the macro level. Even the concepts of processes vs. particle are coming under close scrutiny in particle physics. Let us examine these ideas in the following subsections.

PARTICLE AND PROCESS, LOGIC AND REASON

The two main tenets of the scientific process are logic and reason. The origin of these words are *logos*, "the word" (from Greek) and *ratio* (from Latin). As Karl H. Pribram[28] of Stanford University points out, words or noun concepts are the objects of scientific law (such as pressure, momentum, etc.) and ratios of these concepts are incorporated into scientific law. For example, in the ideal gas relation we have $P_1/P_2 = V_2/V_1$, so that the volume becomes smaller, as the pressure of a fixed quantity of an ideal gas becomes larger.[28]

In western culture the primary structures of the Universe are postulated to be objects, particles, noun terms, etc., which are inert and immutable. Suppose the Logos were verbs or other action concepts. Suppose, as Benedict de Spinoza suggests,[26] the God is not Being (existing) but Becoming (or process).[29] This concept is closer to the Hindu Vedic concept where process is primary, not inert objects.[30] He also suggested that the God concept ultimately refers to ultimate nature—nature as all, that is existence of an infinite whole of possibilities (even in a closed universe). We have still the universal in the sense of the

whole containing all the variances, dualities, change, flux and dynamism of the "Universe" or Multiverse, we observe, yet somehow cohere, even by the measure of our comprehensive states to even live in it and with it. It is dynamic, changing the whole as nature, as existence that is many faceted with dynamical forces interacting that I see as nature, as God.

I searched for the ultimate absolute and that absolute is a dynamical process, exciting, with infinite possibilities. This is a fortunate view because it gives us infinite possibilities to achieve a Socretian "good" of his world of abstract images of things of reality. Some have associated Socrate's good with the idea of God.

We relate to these two conceptual frameworks as experiences—the ebb and flow of the tide, or the seemingly immutable community traffic jam. *If we developed a physics around the concept of process and not object, we would be describing the same universe but our theories might look quite different!*

David Finkelstein, chairman of the Physics Department at the Georgia Institute of Technology, Atlanta, suggests a model of quantum phenomena in which process is primary. His theory of "space-time code" suggests that quantum processes are not random, i.e., "God does not play with dice," quoting Einstein.[31] These processes may appear random, due not to some intrinsic property of the Universe, but to our ignorance of it. There is some experimental evidence to support this view to the degree that several experiments have found small (5% or so) deviation from randomness of radioactive decay.

John Archibald Wheeler develops a geometric model of the Universe in which geometrical constructs are utilized to express the fixed, immutable, symmetric aspects of reality. This is also the approach that was taken by the "geometrizing" Greeks.[32] The nature of force and dynamics and the manner in which they originate, from constant constructs in a model, which assumes static geometry as primary, is not well understood. Starting from dynamics to express change or process in the manifold and deriving the constant construct of geometry may be a way to proceed, or putting dynamics and process on an equal footing may lead to a new conceptual framework for physics and for science in general.[33,34] Geometric models are useful for expressing constant constructs in the physical universe.

Intrinsic and Extrinsic Geometry, Mind and the Universe

People have observed, under a variety of conditions, extended before them a detailed and often colorful regular geometric pattern or lattice-work of structure and color. Approximately one person in ten, according to Prof. Roger N. Shepard, a psychologist at Stanford, have such an experience upon awaking, in meditation, in a Lilly sensory-depravation tank, etc. This author has noticed such a phenomenon in meditation, in a Lilly tank and while observing a variable-frequency stroboscopic flash. Many scientists and mathematician have developed models of the Universe based on geometric constructs. Perhaps there is an intrinsic structure in the mind which prompts us to describe our perceptions of reality by means of geometric structures or constraints.[35] Maybe Sir Arthur Eddington has a valid point about the study of physics divulging an aspect of the nature of consciousness.

Space-Time Independence in Physics, Psychic Phenomena and Mental Imagination

Some of the concepts of cause and effect formulated by Immanuel Kant and utilized by the currently defined scientific method are based on space and time as primary constructs of the universe. Now, both recent multidimensional models in astrophysics by E. A. Rauscher[15,16,19,20,27] and earlier geometric models by John Wheeler,[32] as well as recent discoveries in the descriptions of elementary particle processes by Geoffrey Chew[33] and Henry Stapp[34] at Lawrence Berkeley National Laboratory indicate that space and time have lost their central and inert place and are no longer primary!

But it is the subjective aspect of space and time of which mystics, psychics and others speak. Techniques such as yoga, meditation or simple contemplation take us out of the normal space time ego self[35] which perhaps it does, as do other self-referential experimental exploration. Our research in remote perception (clairvoyance and telepathy) seems to imply that conscious perception can access remote information in space and time and transcend space and time.[5,27,36] Also, in the words of Albert Einstein, 1941, "time and space are modes by which we think and not conditions in which we live,"[36] or in the

words of A. S. Eddington, 1923, "time is a mental construct of our private consciousness . . . physicist construct the concept of a worldwide time from a string of subjective instances."[36,37]

We can only detect space-time transcendence of consciousness and we can formulate the relationship between ordinary, real space-time and the complex multi-dimensional space-time domain of consciousness as we have mentioned earlier.[5,13]

Particle physics and psychic phenomena tell us something is wrong with our present formulation of space and time. Since the causality concept is an expression of even connections in space and time, we see that this fundamental concept may bear the brunt of reformulation. Such modifications are afoot in particle physics [cf. G. Chew[33] and as also discussed in reference 5].

Another form of interconnectedness is that expressed in multidimensional geometries is Einstein linking space and time, and matter and energy.[19,36] There now appears to be evidence that a multi-dimensional Universe which relates to matter, energy, space, time, momentum and force having a fundamental link.[19] This concept is termed a Descartes geometry after Rene Descartes (who suggested such a geometry might be possible).[19,20] This is an extension of the relativity theory. In the words of Einstein (1921), "It was formerly believed that if all material things (matter and energy) disappeared out of the Universe, time and space would be left. According to the relativity theory, however, time and space would disappear together with the things."[36]

There is experimental evidence that a so-called vacuum, supposedly devoid of all matter and energy, is not really devoid at all but seething with virtual (not directly physical) energy, which indeed can be observed as affecting observable physical (particle) processes and therefore, in that sense, has a physical reality. This virtual energy makes itself known, for example, in observable modifications of the conductivity and dielectric constant of hot fully ionized gases, called plasmas, consisting of ions and electrons. The energy of this system (of which the Sun is an example) excites and polarizes the vacuum "sea" of energy which in turn interacts with the plasma, affecting its electrical properties.[38]

The type of geometrical picture of the Universe which is multidimensional leads us to the possible existence of a macroscopic remote connectedness which may extend over great distances: thousands of miles. This model may be consistent with the test of the space-time transcendence of consciousness tested in remote perception, at least over terrestrial distances (see *Iceland Papers*).[5,27] This virtual sea of energy could possibly be accessed by consciousness to remotely manipulate matter in the so-called psychokinetic (mind-movement) phenomena which would truly be a measure of the connection of the obersever to the observed![38]

MYSTIC ONENESS: UNITY

What is the experience of oneness from feeling, rather than thinking point of view? Meditators describe their experience as unity or oneness. In the words of Kriyananda, in 1967, we can see the description of this experience.[39] We read, "See how meditation is like a boundless sphere of light. The light has started to grow—light and joy fill the air of the room, the people, the objects nearby. All these in the peacefulness of that blue light of joy, are one with you—this light embraces your country, your continent, the world!—the limits of the solar solar system, to the distant stars, to the galactic fringe. You are boundless, Eternal!"[39] This so well expresses the meditative experience. It is the reality of this experience that leads to the constructions of traditions such as those expressed in the Tantric and Vedic literature.

The "ontological consciousness" concept is not at odds with the view of western science and it is becoming more like this tradition. Science deals with collective agreements about so-called external reality, called external validation realities; for example, in general, people agree the sky is blue. Meditators can agree on internal conscious states of reality such as the so-called "blue pearl" of mediation. Meditators often report seeing a blue-green light when their eyes are closed. I have discussed the color of this light with other meditators and we agree on its form, shape and color. (The normal field of vision for closed eyes in semi-darkness is redish, since one "sees" the blood in the eyelid vessels.)

How different is the discussion of the color blue of the sky from the color of the "pearl" perceived in meditation? Some may "explain" the blue light of meditation as a neurophysical response to the meditative experience. What is the image? Where is it? What is its reality context? Some may call it a hallucination. No matter the explanation, the observation leads us to ask where is the perception of the color or awareness of any reality, which is the basic essence of consciousness?

The basic unity or oneness of the universe is central to the mystical experience, as well as to the present direction of physics, as we have discussed in the interpretation of Bell's theorem. "The world thus appears as a complicated tissue of events in which connections of different kinds alternate or overlap or combine and thereby determine the texture of the whole."[23] Again, we have unity and wholeness expressed by another: "He on whom the sky, the earth, and the atmosphere are woven and the wind, together with all life-breath, He alone is known as the one Soul (unity and God)"[30] (from the Mundaka Upanishad).

To paraphrase Jean Paul Satre the turning point in his own intellectual development with the thought: "Everything we experience is hallucination or illusion, *maya.* Reality is a structural-mathematical-logical principle that we do not see. That is, each person creates his own universe out of his own imagination, biases and belief systems. Science is nothing else but the search for the unseen structural integrities that underline these appearances."[35] This again brings us to Eddington's concept.[2] We all struggle through this maya to truth which we will ultimately find within each of us.

Maya may not imply total falsehood, but just our limited view. The Vedic literature gives a detailed description that may involve moving beyond our present state of consciousness to understand.

In the system of the tantras and in the Vedic literature (Rigveda), all creation is the manifestation of a Supreme Consciousness, which is unbounded. His Consciousness "spreads" itself out into manifestation and this *becoming* does not exhaust It's *being.* Consciousness has two aspects: S'iva is the static and S'akti is the active or kinetic (motion) aspect. These terms are from the Tantra Sastra tradition and the parallel terms in the Vedantic tradition are Sat, as being

and Cit, as action. The *static* state is one of Supreme Unitary experience wherein the "I" and the "this" are without distinction. The active state, the S'akti, negates itself, becoming the object of experience, leaving the S'iva consciousness to become mere "I." Here arises the beginning to dualism of *being* and *doing* (action). By the operation of consciousness, that limits itself, called maya, the united consciousness is severed and from this separation follows the multiplicity of creation. By a series of Tattvas (or steps) the "pure" become "impure;" the entirety of creation becomes the inner and the outer.

It is said that the travesty of the maya of inner and outer, observer and observed, can be overcome by the mantra power which is S'akti in the form of sound, or mandala in the form of light. The earthly striving is to re-unite one's S'akti consciousness to the S'iva of beingness or bliss consciousness and, in so doing, overcome the maya of the divisional reality of the physical world. This model presents us with a possible prescription for overcoming dualism to obtain unity. The true essence of *reality is Universal Consciousness.* The essential feature of this model is an ontological consciousness one. Sir Arthur Eddington alludes to such a model in his earlier quote that it is consciousness that can know only the structure of consciousness and hence dispel the duality of consciousness and matter.[40]

Often the scientific and mystical are thought to be at odds. Perhaps they are not. The methods of science and mysticism or intuition, utilized by conscious minds in the search for truth stand as two paths to find truth, or, in part or in whole, to create truth. Einstein expressed the workings of these two paths together so well:

> The most beautiful and most profound emotion we can experience is the sensation of the mystical. It is the sower of all true science. He to whom this emotion is a stranger, who can no longer stand rapt in awe, is as good as dead. The view of the mystical is my idea of God.[41]

Another quote by Einstein brings us to the whole from the scattered parts we often perceive in our daily lives.

> A human being is part of the whole called by us "universe," a part limited in time and space. He experiences himself, his thoughts and feelings, as something separated from the rest ... a kind of optical delusion of his

consciousness. This delusion is a kind of prison for us, restricting us to our personal desires and to affection for a few persons nearest to us. Our task must be to free ourselves from this prison by widening our circle of understanding and compassion to embrace all living creatures and the whole of nature and its beauty.

CONCLUSION

The experience of unity is a fundamental state of consciousness which can be experienced. It appears to have a universality beyond the manner in which it is achieved, such as by autogenic training, *amanita muscaria,* meditation, or Za Zen. The dynamic, flowing oneness with the Universe, in which the observer *participates* and *creates* reality, is a common experience reported by many throughout yogic and many other practices. These descriptions are often taken to be the subjective babblings of a few, yet the basis for western thought, the methodology of science, yields similar concepts deep within its structure.

Such concepts as the Heisenberg uncertainty principle and relativity lead us to concepts in which the observer is a participant and that the perspective from which he observes from determines what he sees. J. S. Bell and E. Mach have developed concepts which lead to a universal connectedness. Some recent work by this author and others indicate that some multi-dimensional geometries consistent with astrophysical data also lead to the concept of interconnectedness.[5,19,27] Bell[5,7] theorem formulation of interconnectedness originated from the discussion of the completeness of physical theory (in this case the microcosmic quantum theory). K. Gödel also shows us that mathematics is open-ended and not complete, and therefore not absolute—shades of Buddha.

Unity and wholeness are major experience and concept creators in some eastern mystic traditions as well as some westerners who have some experience with a variety of states of consciousness. As more conceptual frameworks of thinking are exchanged throughout the world, we gain new insights in our personal experiences of the world.

The crux of these experiences, and, I think, of the new discoveries in physics, is the multi-level nature of consciousness and the multidimensional nature of reality.

Space and time are no longer hard and fixed absolute constructs, but are themselves becoming fluid, becoming Einsteinian flowing clocks or fluid time. Particle physics also is telling us that time and space no longer are the totality of the arena for the dance of particles but, as particles dynamically interact, the space-time continuum participates and is itself dynamic too. In the words of Geoffrey Chew, theoretical physicist at University of California Berkeley LBNL, particles are no longer isolated entities separated in space-time, but are created out of each other and space-time, or are "bootstrapped" from and with space-time itself. Perhaps space-time is also bootstrappable.

Perhaps in a sense, all we know is "wrong" in the sense that it is incomplete (Gödel's theorem). Science is a dynamic process, in that we continuously add to and modify our body of scientific knowledge. An altered state of consciousness does effect how one feels and how one interprets what one sees or what one actually sees. Observer/participant physics seems to tell us that what we see is determined by how we look at it. Also altered unique states of consciousness may affect the structure of physical theories we create. Examining this question could be a test of Eddington's concept that *the structure of the physical is a reflection of the structure of consciousness.*

Perhaps with the infusion of the recognition of the role of states of consciousness in our observation of reality we will be in a better position to understand the relationship of parts to the whole. The "melting point" of the observer and the observed and the obvious connection of the two will surely lead us to a reformulation of models of physics and a new comprehension of reality.

We have discussed the relationship of the multiplicity of the parts and the universal whole in the tantric literature. There is the universality of the S'iva and the separateness of the S'akti. This is a model which attempts to dissolve the relational philosophy by methods (meditation-enlightenment) in moving from the S'akti to the S'iva. Until there is no more S'akti, there is still a very basic duality in this model; the duality of the universal and the particular. All universal models appear to contain within themselves relational aspects. Unified theories attempt to resolve the relational aspects by explaining the relation.

We can now ask: Does the duality of the mind/body or observer/observed, etc. come about as a fundamental property of reality? Is the relativity of the separate parts *real* or *imagined*? The resolution of the universal vs. particular and the relations of parts may lie in just that—the relational description. Parts and whole may both exist but the key is that they are related and there are methods to describe their relation. *The basic concept of universality is not that there are no parts but that there are no truly isolated entities or parts!* A useful model of reality involves understanding the connections of the parts to each other and to the whole. The Chinese expressed this as the Yin-Yang model.

The observer does not stand aloof and isolated from the world, unconnected from the observed. There is mounting evidence, both physical and mystical that there is this interconnection. The observer, we are participants and connected to our Universe. Perception of this depends on our state of awareness. On our growing living planet we must embrace existance globally.

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