AN ENERGY/AWARENESS/INFORMATION INTERPRETATION OF PHYSICAL AND MENTAL REALITY

by Copthorne Macdonald

Abstract. Interpreting the universe as a medium-message process has explanatory value in both scientific and philosophical/spiritual contexts. From this perspective, reality is seen to comprise an enduring medium modulated by transient information. Physically, the medium is energy. Mentally, the medium is awareness. Algorithmically, the medium is an information generator, a programmatic entity that generates temporary informational patterns which modulate the medium's energy aspect in space and time to produce matter and physical phenomena and modulate the medium's awareness aspect to produce subjective experience, mind. In philosophical terms, the medium is Being; the medium modulated by the message is existence.

Keywords: awareness; Being; energy; existence, information; reality.

There are many ways of looking at the universe, many possible perspectives and interpretive stances. They differ greatly in their explanatory value and power, but most are narrow in scope. Historically, interpretations of reality that helped answer scientific questions have not shed much light on philosophical issues and vice versa.

An exception to this rule now seems to have surfaced. Recent work in disparate corners of science, taken together, helps illuminate an exceptionally wide range of issues. The interpretation emerging from this work has explanatory value in both the scientific and philosophical/spiritual spheres. It spotlights, for example, some promising paths for future research in neurology, psychology, and the nature of scientific law. It also explains, using contemporary concepts, the

Copthorne Macdonald is a writer, independent scholar, and communication-systems engineer. His address is P. O. Box 2941, Charlottetown, Prince Edward Island, Canada C1A 8C5.

[*Zygon,* vol. 29, no. 2 (June 1994).]
 ISSN 0591-2385

"Perennial Philosophy" view of reality that appears (with slight variations) in Christian mysticism, Buddhism, Sufism, Taoism, and Vedanta (Huxley 1945)—a view which holds that underlying the transient, ever-changing realm of manifest existence is an eternal unmanifested Ground, a protophysical, protomental oneness that interpenetrates existence and enables it to be.

The approach here is to first present the interpretation without elaboration and then add detail and explanation as I discuss its compatibility with both science and the Perennial Philosophy.

THE MEDIUM-MESSAGE INTERPRETATION

Reality consists of an enduring medium modulated by transient informational patterns.

- The medium has a physical aspect, a mental aspect, and an algorithmic aspect.
- Physically, the primal medium is energy or protoenergy—the ground of the physical universe.
- Mentally, the primal medium is awareness or protoawareness—the ground of mind and subjective experience.
- Algorithmically, the medium is the home of "laws of nature" algorithms which, during the life of the universe, allow mental/physical potentials to become actualized. These algorithms, these laws, are the intrinsic rules that guide physical, chemical, geological, and biological change. It is the moment-to-moment functioning of these algorithms that forms, patterns, and modulates the primal medium with information—creating, as it does, that hierarchy of systems we call the universe. In information-processing terms, the universe is equipped with built-in recursive algorithms which repeatedly take the informational situation that exists at this instant and transform it into a new informational situation in the next.

In philosophical/spiritual terms—as these terms are often (but not always) used:

- The medium is Being, Noumenon, the One, Brahman/Atman, Tao, the unmanifested, the implicate, the Real, the Eternal, God, the Godhead.
- The message is form, appearance, the temporal, the illusion, that which passes away.
- The medium when formed/shaped/modulated by the message is existence (physical and mental), phenomena, duality, the many, manifestation, the explicate.

The Nature of Information and Algorithms

Most of us, in recent years, have come to understand that information is more than just news, facts, ideas, and knowledge. With Claude Shannon's formulation of information theory basics in the 1940s (1948), information became something concrete and quantifiable, and his observations revolutionized the way engineers went about designing communication systems. DNA research in the 1950s made it clear that all biological structures are informational structures; that through the magic of biochemistry, information encoded in DNA molecules helps guide the creation of such complex informational patterns as protein molecules, cells, organs, and complete organisms. As a result, the idea of looking at *all* material objects as encodings of immense amounts of information no longer seems strange to us. Mathematician Rudy Rucker went this far: "It is now considered reasonable to say that, at the deepest, most fundamental level, our world is made of information. . . . For postmodern people, reality is a pattern of information, a pattern in fact space" (Rucker 1987, 31).

The informational reality that Rucker speaks of is the space-time reality of everyday life, the explicate reality we call existence. Unlike Plato's ideal forms, this information is not a disembodied abstraction. Bateson (1975) and others have defined information as a pattern of significant differences, and to exist in our universe that pattern must exist as differences in *something.* Real-world information requires a real-world medium to form or modulate or encode. The primary medium, the one that underlies the physical world and enables it to exist, is energy; and in one sense or another, all physically expressed information involves the space-time patterning of energy. This is not, of course, a shockingly new way of viewing things. Matter and specific forms of energy are often described as quantum field modulations (see Pagels [1983, 241] and Polkinghorne [1988, 59], for example). Whitehead put it this way:

> Matter has been identified with energy, and energy is sheer activity; the passive substratum composed of self-identical enduring bits of matter has been abandoned, so far as concerns any fundamental description. . . . The modern point of view is expressed in terms of energy, activity, and the vibratory differentiations of space-time. (Whitehead [1938] 1958, 188)

Space-time is information's frame of reference, its home, the realm in which it exists. The form or shape of a physical object represents information in a very direct sense, but human beings and biological processes also depend on *encoded* information. The information embodied in the structure of a building, for example, also

appears in encoded form in the blueprints that guided its construction. A book written in English and its French translation are two different encodings of an informational construct that appeared in the author's mind. Sometimes the same information appears in many different guises: The same core information exists in the imagination of the composer, the musical score, the performance, the wavy groove of the vinyl record, the electrical signal going to the loudspeaker, the sound in the room, the vibrations of the eardrum, the pattern of neuronal firings in the brain, and the subjective perception of the sound.

A number of researchers have been working on the problem of relating natural law and the functioning of the cosmos to data processing and computer functioning. The emerging view is that not only is existence an informational construct, but the universe is an information processor—though very different from computers of human design. The typical desktop computer runs one program at a time in serial fashion. You put information in. The information gets manipulated or "processed" in accord with the program's algorithm, its intrinsic plan. And the computer sends the changed information out.

In the information-processing cosmos, each physical situation, regardless of location, is input information. And behind each law of nature is a program, a functioning algorithm. Unlike the desktop computer that processes its data in serial fashion, the programs that guide the universe all function at the same time, in parallel. These laws-of-nature algorithms operate everywhere, simultaneously, continuously. It is parallel data processing in the extreme.

Because of this ongoing activity, the informational pattern of the universe constantly changes. An informational situation inherited from the previous instant gets turned into a new informational situation by the operation of various laws of nature. The process never rests. In the next instant the *new* pattern is once again subjected to that whole matrix of algorithms—and to the extent that the algorithms dictate, again the pattern changes.

I do not see, as Edward Fredkin has, anything necessarily on/off, digital, or computerlike about these algorithms, nor do I envision the universe as a giant digital computer as he has (Wright 1988). I am simply pointing out what to me and researchers like physicist Stephen Wolfram (1984) is obvious—that behind our human descriptive "laws of nature" are intrinsic, functioning actualities. Our laws of nature describe, at least to some extent, embedded operating algorithms, built-in rules of universal functioning. These algorithms

are ceaselessly applied to what is now, turning it into what will be.

The universe may or may not be holographic—as David Bohm (1980) and Karl Pribram (1982) have proposed—but Bohm's observation that reality involves separate explicate and implicate orders seems clearly true, as well as a helpful way of looking at things. The informational, explicate order of the universe—its *messagelike* aspect—arises from an internal implicate order, an algorithmic, programlike order intimately associated with the universe's *mediumlike* aspect. Physics, chemistry, geology, and biology tell us many things about the space-time informational patterns of explicate reality, and evolutionary theory tells us much about how that order came to exist. Through the language of mathematics, these and other scientific disciplines tell us about the nature of the recursive algorithms which continuously transform this instant's informational patterns into the next instant's patterns. This implicate realm is the realm of medium and algorithmic activity, not the realm of explicit informational patterns. It is the realm of the processor and patterning process, not the explicit pattern itself, the product. For the past 15 or 20 billion years, the algorithms that underlie and define the laws of nature have been applied again and again and again to every informational situation, everywhere in the universe—and it's still happening.

The Evolution of Physical Systems

In this emerging view, the term *evolution* is applied to an "informationizing" process, occurring within the framework of space-time, in which the primal medium is overlaid with, or modulated by, various informational patterns. Table 1 incorporates data from J.D. Barrow and Joseph Silk (1980), Stephen Weinberg ([1977] 1988), and others and attempts to put the informationizing of the physical universe in historical perspective. Although the table will not satisfy everyone in every detail, it represents, I believe, the generally accepted scientific view of key events during the last 15 or 20 billion years.

In the beginning all was formless energy—though almost immediately, energy began to show informational structure. Increasingly, energy turned into matter, and as Ervin Laszlo has made so clear (1972a; 1972b; 1987), ordered complexity gradually emerged, level by level, as a hierarchy of natural systems. Under the guidance of the cosmic algorithms, quarks associated with each other to form elementary particles; particles associated to form atoms; atoms associated to form molecules; molecules associated to form crystals, living things,

TABLE 1

SOME KEY EVENTS IN THE INFORMATIONIZING OF THE UNIVERSE

Time	Event
$t = 0$	Start of our present universe.
0 to 10^{-43} sec	Presumably energy-only, no structure. Temperature extremely high (above 10^{30} degrees K). Dimensions of universe near zero. Electromagnetic, weak, and strong forces undifferentiated.
10^{-43} sec	First particles appear.
10^{-24} sec	$T = 10^{20}$ degrees K. Density $> 10^{50}$ g/cm^3.
10^{-6} sec	Protons and anti-protons annihilate each other.
10^{-2} sec	$T = 10^{11}$ degrees K. Soup of matter and radiation.
1 sec	Electrons and positrons annihilate each other.
3 min	$T = 1$ billion degrees K. Stable particles exist: Protons, electrons, helium nuclei.
10,000 years	Universe shifts from being energy-dominated to being matter-dominated.
700,000 years	$T = 3000$ degrees K. The first atoms form: hydrogen and helium.
$1\text{-}2 \times 10^9$ years	Galaxies begin to form.
2.5×10^9 years	$T = 300$ degrees K. Density $= 10^{-20}$ g/cm^3.
4×10^9 years	First stars form.
5 to 10 billion years then pass	New stars and new galaxies form. Within stars complex atoms are created. Stars explode. Dust clouds form that contain heavy, complex atoms.
4.7×10^9 years ago	The sun forms.
4.6×10^9 years ago	Earth and the other planets form.
Between 4.6 and 3×10^9 years ago	On Earth, increasingly complex chemicals evolve.
3×10^9 years ago	Microscopic life appears on Earth.
2×10^9 years ago	Oxygen-rich atmosphere develops.
1×10^9 years ago	Macroscopic life appears.
450×10^6 years ago	First fish appear.
200×10^6 years ago	First mammals appear.
300,000 years ago	First *Homo sapiens* appear. $T = 2.7$ degrees K. Density $= 10^{-30}$ g/cm^3.

Source: Data from Barrow and Silk (1980), Weinberg ([1977] 1988), and other sources.

and other macrostructures; and living things associated to form ecosystems and, in some cases, societies.

As Jacques Monod (1972) and others have pointed out, it is through the interplay of chance and programmatic determinism ("necessity") that evolution proceeds. Evolution is *program guided,* but it is not totally deterministic in the "clockwork universe" sense. Computer programs sometimes call up random numbers to introduce chance and serendipity into otherwise lock-step processing. Similarly, true randomness appears to be built into the programmatic operation of the universe at the subatomic level. In addition, the vastness of the universe and the large number of things going on insures additional serendipity through the intersection of countless largely independent chains of cause and effect. Chance sets up certain informational situations—information *inputs* in computer terms. The cosmic computer continuously monitors those situations and, through its laws-of-nature programming, creates new informational situations—new information *outputs*.

Evolution does not appear to have specific design goals in mind. There was no built-in plan to create robins or people. What happens in biological evolution is that a large base of solid pretested information on how to build various living things is passed along from generation to generation. Through genetic mutation and recombination there is enough randomness introduced into the process to allow change and novelty to occur. The principle is simple enough:

OLD INFORMATION + RANDOM CHANGES → NEW INFORMATION

If the new organism survives long enough to reproduce, the new information is passed on. If not, it is a failed experiment and the information is lost. Survival and reproduction are dual filters that eliminate some information and allow other information to continue to exist. The information that makes it through this filtering or editing process is a fairly reliable plan for building an organism. It doesn't guarantee the survival of that organism, but it brings decent odds with it.

Compared with human design procedures, evolution's trial and error technique has advantages and disadvantages. Its biggest disadvantage is the extreme length of time required to bring about major changes. Human, mind-directed design is much, much faster. Balanced against this is evolution's great advantage: it can produce sophisticated results without a sophisticated prior plan.

When human beings design complex systems they try to minimize trial and error or eliminate it entirely. The human designer knows in advance what the system is expected to do and envisions the design

of the new watch, or bridge, or computer in great detail before starting to create it. Evolution, on the other hand, accomplishes amazing things without a detailed plan just by applying its modest set of algorithms over and over again. Somehow, the universe takes into account everything that is going on, and appropriate things happen automatically—where "appropriate" is defined by those laws-of-nature algorithms. Evolution does its thing, blindly but effectively creating and optimizing.

As complex new systems emerge from the process, new system-specific rules of behavior emerge with them—rules that describe the behavior of the system-as-a-whole under various circumstances. The laws of physics and chemistry still operate at the subatomic, atomic, and molecular levels, but "high-level" or "whole-system" laws now exist as well. The why and how of this are not yet understood in detail, but it seems that the new informational complexity has algorithmic implications as well as structural and functional ones. Higher-level laws appear to come into existence through the mutual interaction of fundamental cosmic algorithms and emerging complex informational patterns.

In data processing terms it is as though some of the frequently needed program subroutines (the fundamental algorithms) are built into the processor itself but at least part of the external information with which those built-in algorithms interface also has algorithmic implications. This is the situation with computers. Some algorithms are built into the processor, but the computer looks to the external world for both application program code and input information. In the two situations, the effective overall algorithm is a function of both the built-in (implicate) algorithms and the algorithmically active part of the external (explicate) information. This would seem to be an area ripe for research. Is it possible to make a definitive list of the built-in cosmic algorithms? Is it possible to show experimentally just how built-in algorithms interact with situational information to create higher-level laws?

Although there is no way of knowing in detail where evolution is going, like other algorithm-guided processes, evolution tends to have its behavioral predispositions and preferences. Evolution's algorithms, in concert with the informational patterns that evolution has already created, work together in ways that impart a certain observable directivity to the process. In the early days of the universe, evolution's only clear predisposition was a general upward thrust toward informational complexity, toward system. This early process created new environments, and in the particularly favorable environment of earth the evolutionary process has produced systems

of extreme complexity and sophistication. From the history of this systemic progression we can infer behavioral tendencies of the process itself. Particularly during the last half-billion years—the period during which vertebrates evolved—evolution has taken some clear directions and has leaned toward certain types of consequences. Among the many things that the process appears to prefer at this time and place in evolutionary history are:

- Organic complexity
- High-level perceptual capabilities
- Intelligence and increasingly holistic kinds of understanding
- Richness of subjective experience
- Mind-enabled decision making and creativity

This informationizing of the universe and the earth continues. Daily, energy from the sun reaches our atmosphere and activates processes that create new information. As Myron Tribus and Edward McIrvine have pointed out (1971), much of this information creation happens within meteorological and biological processes. Energy is neither created nor destroyed in these processes, but the decrease in biospheric entropy is "paid for" by an increase in the entropy of the universe as a whole. Putting this another way, in creating new information, energy's potential for doing more of the same decreases.

The Evolution of Functional Mentality

During the early part of this century the credo of materialism, "Everything that is is material," was also a fundamental axiom of science. Whether or not this assumption is true was irrelevant in the highly physical sciences like physics and chemistry. The assumption did, however, distort and slow neurological and psychological research. Roger Sperry has written at length about the shift in paradigm that has been occurring in neurology and psychology since the mid-1960s (1987). It is a shift from that strict materialism which denied mentality outright or considered it a purposeless epiphenomenon to a variety of "cognitive" or "mentalist" views that recognize consciousness and mind. There is almost unanimous agreement that the informational content of the human mind originates in the brain, but there is still controversy about how complex a system must be before it displays mental characteristics and whether or not mind has a causal effect back on brain processes. Although several theories of mind still vie for acceptance, observations from various scientific disciplines can help us rank the plausibility of competing views.

Perhaps because our only firsthand experience is with the

sophisticated human mind, many people assume that only very complex systems can have mental characteristics. There is, however, no empirical evidence that this is so. Basing their determination largely on evidence from biology and the way evolution works, an increasing number of respected scientists have concluded that awareness (like energy) is fundamental and that mind appears at all levels of systemic complexity. Included in this group are Nobelists George Wald and Wolfgang Pauli, Gordon Globus, and Bernard Rensch. Globus (1973, 154) has said, "Mind is but one aspect of a fundamental neutral reality with matter being a second aspect, both aspects having equal importance, as two sides of a coin." Wald (1988, 9) put it this way: "[Consciousness] is not some iffy phenomenon that we just project on reality; it is at the base, at the foundations." Wald also quotes Pauli:

> To us . . . the only acceptable point of view appears to be one that recognizes *both* sides of reality—the quantitative and the qualitative, the physical and the psychical—as compatible with each other, and can embrace them simultaneously. It would be most satisfactory if *physis* and *psyche* (i.e., matter and mind) could be seen as the complementary aspects of the same reality. (Wald 1988, 11)

Bernard Rensch said, "There is no contrast between mind and matter. We must recognize that all 'matter' is protopsychical in character" (1971, 297–98). In this view, all systems have both an objective and a subjective nature. When you look at a system from the outside you see a physical process, but each system also has an inherent subjective nature (however limited) and "sees," in some sense, to some degree, its own functioning from the inside. Laszlo (1972b, 170) believes that even systems as simple as atoms would experience their own major events—such as an electron jumping from one orbit to another, or nuclear fission. In his view, just as an atom embodies a tiny bit of energy it also embodies a tiny bit of awareness. It is an elemental mind as well as being an elemental physical building block. Laszlo put the argument this way: "The boundary of the inorganic is imperceptibly transcended, without encountering a similarity-dissimilarity gap sufficiently wide to warrant the assertion of mind-events on this side of it, and their denial on the other" (1972b, 169).

The way evolution works, and the mental-physical nature of some of the systems that evolution has created, provide strong empirical evidence that primal reality is a monism having both subjective (mental) and objective (physical) aspects. Despite their numerous attempts, those who adhere to the tenets of a strict materialism have, in the view of many, failed to satisfactorily explain subjective

experience. if we assume, instead, that primal reality is a monism having physical, mental, and algorithmic aspects, then what we see around us immediately starts to make sense. Evolution, because it operates on a *mental-physical* medium, not just a physical one, had a second degree of freedom to play with as it created new systems and subjected them to its survival and reproduction tests. This evolutionary design process actualized both mental and physical potentials of the cosmic medium in a cooperative, integrated way. It maximized the likelihood of survival and reproduction in each instance and laid the groundwork for further evolutionary advances. Physicality does some things best; mentality does other things best. Whenever systems emerged which had physical characteristics that enhanced survival and reproduction, they were passed on. Whenever systems emerged which had mental characteristics that enhanced survival and reproduction, they were passed on.

Here on earth the evolutionary process selected brain arrangements that give important operational roles to mentality. Mentality, for instance, seems particularly valuable where complex situations must be assessed and decisions made. And in mammals, strong emotions such as anger, fear, and lust helped species after species make it through evolution's survival and reproduction filters.

Despite our not yet knowing, in detail, how mental-physical systems actually work, we can grasp the principles by which they could work. Roger Sperry, who won the Nobel prize for his split-brain work, has a theory of brain/mind functioning that he calls *emergent interactionism*. Sperry (1969; 1976; 1985; 1986) sees a variety of neuronal systems functioning within the cortex and sees the elements of mind as emergent properties of these systems. These emergent entities then "interact causally with each other at their own level." Since system emergents can have a top-down influence on system components and their functioning, the emergent mental events can affect physical brain processes. The mind—being a complex of system emergents—has a controlling effect on the physical functioning of the brain systems that gave rise to it. Those systems, in turn, control bodily actions.

The assumption that awareness is fundamental suggests a somewhat simpler and more direct explanation of brain/mind relationship. We know that various perceptual systems (vision, touch, hearing) produce neurological messages related to specific percepts and that these percepts eventually appear in awareness as mind-content artifacts or "qualia." Let us entertain the idea that awareness arises in relatively simple neuronal systems as an intrinsic aspect of system functioning and that data arriving from sensory neurons (and

other brain processes) modulates this awareness to produce whole or partial qualia. Each quale or quale element would have a physical correlate in the information-modulated physical situation that gave rise to it. But research indicates that qualia also have physical correlates related to such characteristics as color, form, motion, and location in the sensory field. Selective attention to a quale activates one or more of these correlates (Corbetta et al. 1990 and Wurtz et al. 1982). The correlates represent physically embodied information about the attended-to quale and are available for use in unconscious "computational" processing—perhaps to initiate behavior, or to flag (by creating an emotion) a danger or opportunity. I am suggesting that mind and its informational content play a functional role in situation evaluation—that qualia are generated in relatively simple neuronal systems and that selective attention to these qualia produces neuronal data that are used in the computational phase of the evaluation process.

Evidence from two other quarters supports the view that mind plays a causal role in brain-mind functioning. First, Benjamin Libet (1985) found that a characteristic brain-wave pattern preceded a conscious intention to act. He also found, however, that for a fraction of a second after the intention appeared in consciousness, the subject was able to veto it. The implication here is that even though conscious intentions may arise from unconscious sources, if one is sufficiently alert it is possible to make a conscious choice to abort the intended behavior before it actually begins.

Second, because of the way evolution works, it seems very unlikely that the human level of mind would have evolved if it did not play an active role in determining human behavior. While the views of John Eccles on brain-mind process differ from those outlined here, he made an important point about the evolution of mentality that applies to all theories of mind.

> Evolutionary theory holds that only those structures and processes that significantly aid in survival are developed in natural selection. If consciousness is causally impotent, its development cannot be accounted for by evolutionary theory. According to biological evolution, mental states and consciousness could have evolved and developed only if they were causally effective in bringing about changes in neural happenings in the brain with the consequent changes in behavior. (Eccles and Robinson 1985, 37)

MIND-DIRECTED EVOLUTION

Chance and algorithmic necessity are the primary mechanisms that have guided evolution to this point. Now, with the arrival of sophisticated minds, the evolutionary process has entered a new era—an era

of mind-directed, mind-managed evolution. Our intelligence allows us to synthesize, to create, with a speed orders of magnitude greater than evolution driven by chance/necessity. Already, in fields such as genetic engineering and silicon microelectronics, we are taking evolutionary steps that could never have been taken via the chance-and-necessity route.

That's the good news. The bad news is that in many ways our high-tech capabilities are being inappropriately applied. As Robert Ornstein and Paul Ehrlich (1990) and Sperry (1985) have eloquently pointed out, outmoded genetically and culturally acquired person-centered values are now deciding what happens. The person-centered, short-term perspective is endangering the future of humanity and other forms of earthly life.

THE PERENNIAL PHILOSOPHY

Let us turn now to some philosophical/spiritual implications of the medium-message interpretation of reality. Scientists have traditionally shown little interest in differentiating between the enduring and temporary aspects of phenomena, but this is not the case with philosophers and spiritual teachers. Many have found this distinction interesting and important—though somewhat difficult to conceptualize and talk about. Today, the medium-message interpretation brings new explanatory power to this domain of philosophical inquiry—power that was not available before the current scientific conception of information crystalized in the 1940s and 1950s and became common intellectual currency in the 1970s and 1980s.

In particular, this perspective on reality renders much more understandable an ancient way of looking at things that has arisen independently at different times and places during the past several millennia and, for that reason, has been called "The Perennial Philosophy." The term was popularized by Aldous Huxley in his book by that name (1945). As previously mentioned, the essence of the Perennial Philosophy worldview is that underlying the transient, ever-changing realm of manifest existence there is an eternal unmanifested Ground—an enduring oneness that interpenetrates existence and enables it to be. This Ground appears to be both protophysical and protomental, though various statements about it often emphasize only one of these aspects.

The ancient seers who articulated the Perennial Philosophy did not have concepts like information, algorithm, and medium to incorporate in their explanations, but it is my sense of things that the medium-message view is very much what they were getting at.

Hindu and Buddhist teachers called the transient, ephemeral aspect of existence *maya,* which is usually translated as "illusion." Taoist teachers, in a similar vein, referred to the "ten thousand things." Zen teachers talked about "forms" and "appearances." These Perennial Philosophy teachers also recognized that human attention and allegiance tend to become attached to this transient, insubstantial aspect of reality, and they attempted to redirect their students' attention to the underlying, interpenetrating, enabling oneness which they labeled *Brahman/Atman, Tao, Mind-essence,* or *Godhead.* This was the real, the eternal, the One—and the source of "the ten thousand things."

Despite their focus on the importance of the One, the ancients concluded that the One could not be described. In today's terminology, they recognized that no set of words can capture the essence of a noumenal, unmanifested, informationless reality. We come to know things intellectually by setting up mental analogs of aspects of reality (Jaynes 1982, 54–59). The brain creates an informational structure in the mind that in some sense and to some degree parallels the informational structure of the situation we are trying to understand. When it comes to understanding primal, noninformational reality, however, this process fails us. Information belongs to the realm of difference, duality, the many. Difference, in fact, is the very essence of information. Where difference does not exist, information cannot exist—it is outlawed by definition.

Because there is no such thing as an informational parallel of the inherently noninformational, the best we can do is to beat about the bush of truth. We can perhaps choose a metaphor to stand for and symbolize the noumenal reality—the word *medium,* for example. We can talk about what the thing *does,* the informational *effects* it produces. We can also talk about what might be done *to* it. We can talk about the informational modulation or shaping or "waving" that could be applied to it without its own nature being changed. But we can say little about what it *is.*

The Perennial Philosophy holds that our normal human identification with body and with mind contents is an error that induces us to fear death, suffer, and cause others to suffer. The remedy, variously called *enlightenment, liberation,* or *Self-realization,* involves a deep shift of identification to the Ground itself. Huxley put it this way:

> The ground in which the multifarious and time-bound psyche is rooted is a simple, timeless awareness. By making ourselves pure in heart and poor in spirit we can discover and be identified with this awareness. In the spirit we not only have, but are, the unitive knowledge of the divine Ground. (Huxley 1945, 29)

(In the Theravadin branch of Buddhism, simply losing the identification as a person is seen to liberate; no new identification is attempted.)

The medium-message interpretation of reality is rooted in contemporary science, but it is also a postmodern statement of the Perennial Philosophy interpretation of reality. Through the explanatory power inherent in concepts like information, algorithm, and medium, the present statement seems to address the heart of the matter with new clarity. For me, it has helped illuminate many of the traditional statements; I read them now and say, "Aha! Yes. Of course."

Compare for yourself a few of the classic Perennial Philosophy quotes from Huxley's book:

Though One, Brahman is the cause of the many. There is no other cause.

The Atman is that by which the universe is pervaded, but which nothing pervades; which causes all things to shine, but which all things cannot make to shine. . . .

It is ignorance that causes us to identify ourselves with the body, the ego, the senses, or anything that is not the Atman.

—Shankara (Founder of Vedanta)

Do not ask whether the Principle is in this or in that; it is in all things. It is on this account that we apply to it the epithets of supreme, universal, total. . . . All proceeds from it and is under its influence. It is in all things but is not identical with beings because it is neither differentiated nor limited.

—Chuang Tzu (Taoist)

When is a man in mere understanding? I answer, "When a man sees one thing separated from another." And when is a man above mere understanding? That I can tell you: "When a man sees All in all, then a man stands beyond mere understanding."

—Meister Eckhart (Christian mystic)

The two exist because of the One;
But hold not even to this One.
When the mind is not disturbed,
The ten thousand things offer no offence.

When the Ten Thousand things are seen in their oneness, we return to the Origin and remain where we have always been.

—Sen T'sen (The Third Patriarch of Zen)

As the one ocean appears in its waves, so universal energy and awareness appear in the "ten thousand things." Moreover, if we understand that those "ten thousand things" are simply informational modulations of the one enduring reality, then seeing our true

identity as that enduring One makes rational sense. From that perspective, naturally, "the ten thousand things offer no offence."

Beyond rational acceptance of the idea of oneness is the actual experience of it—a powerful psychological event involving intuition and identification, two mental mechanisms that are able to deal with noninformational aspects of reality. In the typical first stage of this process there is a deep intuitive realization that the noninformational realm *really is* a distinct reality. In the second, the basic sense of identity shifts from the body/mind to that reality. For some people the two occur as separate *Eureka!* experiences; for others they occur together in a single experience. On rare occasions, experiences of this kind come upon people serendipitously (Bucke 1969). They happen more frequently among people who have undertaken meditation or some other practice designed to foster them. We humans crave informational explanations of our experiences, and this is especially true of an experience that involves such fundamental shifts in perspective. It is my hope that the science-based "explanation" presented here will be of value to people who have such experiences in the future or who may wish to reevaluate past experiences.

Many scientists reject mysticism out of hand—and considering all of the misconceptions about it in the popular culture, perhaps that is not surprising. I'm hopeful, however, that this will change and that science will turn its attention more directly to this area. All so-called mystical experiences are in fact psychological experiences and are therefore legitimate objects of scientific investigation. It is readily apparent that world problems caused by person-centered values would disappear if large numbers of people managed to make a gestalt flip of reidentification and truly saw themselves as the one process and its Ground (Macdonald 1993). In the context of multiple personality disorders, some research is already being conducted on identity shifts. Perhaps studies that focused on the identification mechanism itself would someday lead to more rapid and reliable techniques for making the kind of identity shift discussed here. As those who have tried traditional "enlightenment" practices know, even in an intensive monastic environment, they work slowly.

REFERENCES

Barrow, J. D., and Joseph Silk, 1980. "The Structure of the Early Universe." *Scientific American* (April): 118–28.

Bateson, Gregory. 1975. *Steps to an Ecology of Mind.* New York: Ballantine Books.

Bohm, David. 1980. *Wholeness and the Implicate Order.* London: Routledge & Kegan Paul.

Bucke, Richard Maurice. [1901] 1969. *Cosmic Consciousness.* New York: E. P. Dutton & Co.

Corbetta, Maurizio; Francis M. Miezin; Susan Dobmeyer; Gordon L. Shulman; and Steven E. Petersen. 1990. "Attentional Modulation of Neural Processing of Shape, Color, and Velocity in Humans." *Science* 248: 1556-59.

Eccles, John, and Daniel N. Robinson 1985. *The Wonder of Being Human: Our Mind and Our Brain.* Boston: New Science Library.

Globus. Gordon G. 1973. "Consciousness and Brain: I. The Identity Thesis," *Archives of General Psychiatry* 8 (August): 153-60.

Huxley, Aldous. 1945. *The Perennial Philosophy.* New York: Harper & Brothers.

Jaynes, Julian. 1982. *The Origin of Consciousness in the Breakdown of the Bicameral Mind.* Boston: Houghton-Mifflin.

Laszlo, Ervin. 1972a. *A Systems View of the World.* New York: George Braziller.

———. 1972b. *Introduction to Systems Philosophy.* New York: Gordon & Breach.

———. 1987. *Evolution: The Grand Synthesis.* Boston: New Science Library.

Libet, Benjamin. 1985. "Unconscious Cerebral Initiative and the Role of Conscious Will in Voluntary Action." *The Behavioral and Brain Sciences* 8: 529-66.

Macdonald, Copthorne. 1993. *Toward Wisdom: Finding Our Way to Inner Peace, Love & Happiness.* Toronto: Hounslow Press.

Monod, Jacques. [1970] 1972. *Chance and Necessity.* New York: Vintage Books.

Ornstein, Robert, and Paul Erlich. 1990. *New World, New Mind: Moving Toward Conscious Evolution.* New York: Simon & Schuster.

Pagels, Heinz R. 1983. *The Cosmic Code: Quantum Physics as the Language of Nature.* New York: Bantam Books.

Polkinghorne, John. 1988. *Science and Creation: The Search for Understanding.* Boston: New Science Library

Pribram, Karl H. 1982. "What the Fuss Is All About." In *The Holographic Paradigm and Other Paradoxes: Exploring the Leading Edge of Science,* pp. 27-34. Boulder, Colo.: Shambhala.

Rensch, Bernard. 1971. *Biophilosophy.* New York: Columbia Univ. Press.

Rucker, Rudy. 1987. *Mind Tools: The Five Levels of Mathematical Reality.* Boston: Houghton Mifflin.

Shannon, Claude E. 1948. "A Mathematical Theory of Information." *Bell System Technical Journal* 27: 379-423, 623-56.

Sperry, R.W. 1969. "A Modified Concept of Consciousnes." *Psychological Review* 76: 532-36.

———. 1976. "Changing Concepts of Consciousness and Free Will." *Perspectives in Biology and Medicine* (Autumn): 9-19.

———. 1985. "Changed Concepts of Brain and Consciousness: Some Value Implications." *Zygon: Journal of Religion and Science* 20 (March): 41-57.

———. 1986. "The New Mentalist Paradigm and Ultimate Concern." *Perspectives in Biology and Medicine* 29: 413-22.

———. 1987. "Structure and Significance of the Consciousness Revolution." *The Journal of Mind and Behavior* 8, no. 1: 37-66.

Tribus, Myron, and Edward C. McIrvine. 1971. "Energy and Information." *Scientific American* (September): 179-88.

Wald, G., 1988. "Cosmology of Life and Mind." *Los Alamos Science: Fellows Colloquium,* no. 16.

Weinberg, Stephen. [1977] 1988. *The First Three Minutes: A Modern Version of the Origin of the Universe.* New York: Basic Books.

Whitehead, Alfred N. [1938] 1958. *Modes of Thought.* New York: Capricorn Books.

Wolfram, Stephen. 1984. "Computer Software in Science and Mathematics." *Scientific American* 251: 188-203.

Wright, Robert. 1988. *Three Scientists and Their Gods: Looking for Meaning in an Age of Information.* New York: Times Books.

Wurtz, Robert W.; Michael E. Goldberg; and David Lee Robinson. 1982. "Brain Mechanisms of Visual Attention." *Scientific American* 246 (June): 124-35.