

## A SPIRITUAL SCIENCE

*'Science without religion is lame,  
religion without science is blind.'*  
Albert Einstein

### Quantitative and Qualitative Reality

Science divides reality into discrete parts or components abstracted from the whole and then analyzes these seemingly independent constituent elements quantitatively. Scientists then construct mathematical models of the world on the basis of measurement, quantification, and the statistical analysis of numbers. But such a process ignores the fact that reality is a unified whole and can never be completely understood by dualistic quantitative analysis. In *Oneness Perceived*, transpersonal psychologist Jeffrey Eisen writes: "The essence of a thing cannot be abstracted from its being without losing its reality. There is but one undistorted reality and that is Oneness, Isness itself." This same insight was also expressed by Lao-Tzu in the *Tao Te Ching*: "The Tao that can be told is not the eternal Tao; the name that can be named is not the eternal Name."

The history of science is largely a movement away from subjectivity and belief to objectivity and empiricism. Ervin Laszlo discusses this important conceptual shift in *The Intelligence of the Cosmos*: "Science gradually morphed into the assertion that only the objective, external world is fully real and all else is subjective interpretation or distortion of reality. Positivism asserted that only that which can be observed materially and studied as an external object is real. All else is not merely subject to preference and prejudice but nonexistent or merely a derivative from material phenomena."

The insistence on pursuing a purely materialistic explanation for life and consciousness is a consequence of the phenomenal success of early science in discovering the processes of material nature. A long, wandering detour over several centuries from the dawn of the Enlightenment to the present day has led us to deny the essence of our own most intimate human experiences. In their first turn away from the sanctity of religious dogma, the thinkers of the enlightenment sought for an external, objective means to determine truths about the external material world in which they lived. They relied on acute observation, repetitive verification, measurement, and mathematics as instruments well suited for the study of objective physical phenomena. They sought to eliminate the intrusion of corrupting influences such as personal preference, prejudice, religious belief, and prevailing social conceptions. As a result, they developed an impartial, impersonal objective scientific method that proved highly effective for the study of external material objects. The method was objective in the sense that it dealt with objects and related phenomena that could be observed and measured through objective means externally. Enlightenment thinkers such as Newton and Descartes did not believe or assume that

all aspects of reality could be studied through the scientific method or ultimately be reduced to a purely material basis. In devising a method to minimize the intrusion of personal preference, they never intended to deny the existence or validity of subjective dimensions of reality and self-experience or to assert that these nonmaterial realms could be adequately studied and explained in purely physical terms. (1)

Descriptive theories and explanations of reality are incomplete unless they include elements of both quantity and quality. This is clearly evident, for example, in the domain of aesthetics: "Beauty is not measurable or provable. You experience it when you let it speak to you. Beauty is neither an assumption nor a statement, but rather an overwhelming experience."

One can deduce several things about the soul of the world. One is that it contains qualities as well as quantities. The world we actually experience is full of colors, sounds, smells, and other qualities known to us through our senses. The procedure of science since the seventeenth century has been to ignore sensory qualities and to consider only what were called the primary qualities of substances, namely, their weight, position, momentum, and so on. These could be assigned numbers and treated mathematically. Reality was treated as colorless, tasteless, soundless, and odorless. It was abstract, objective, and mathematical. Qualities known through our senses had no objective existence outside of the mind of the subjective observer. It seems to me that the imagination of the world soul is going to work, not just in terms of numbers and mathematics, but also in terms of qualities. It's likely to contain all possible tastes, smells, colors, and other qualities that exist in the world, as well as the experience and imagination of these qualities. (2)

Science attempts to explain qualitative phenomena such as thoughts, ideas, feelings and values in terms of quantitative factors – molecules, neurons and nerve cells. This reduction of the immaterial is an attempt to explain higher-order phenomena (such as the inner experience of the colour red) by strictly physical constructs (a specific wavelength of electromagnetic radiation). The same problem arises with the study of consciousness and its relationship with the brain. Neuroscientist Wolf Singer: "We encounter extreme difficulties when we attempt to explain how exactly the *qualia* of our subjective experiences actually emerges from neuronal interaction":

One important feature of any scientific description is that it attempts to be quantitative. Most of the major scientists contributing to the scientific revolution appear to have been self-consciously opposed to the earlier, more qualitative, science . . . Yet even the most apparently quantitative of all mathematical entities, namely numbers, cannot be considered without quality. Unity, duality, and trinity have qualitative aspects that are not exhausted by numerical manipulations. Nevertheless, in general, mathematization in sciences has meant quantification. According to the fathers of modern science, quantity is

the fundamental feature of things, prior to other categories; in the realm of knowledge, quantity is the sole feature of reality. Qualities, except insofar as they can be quantified, do not belong to what is real and cannot be avenues to truth . . . One cannot escape the impression that the prevalent general leveling down of quality and the pernicious reign of quantity – which has been passionately described, is intrinsically connected with the scientific assumption that reality is primarily quantitative. Whatever functions painting, music, and dance may serve, when it comes to the serious business of truth and knowledge as understood by modern natural philosophers, they are essentially frivolous. This is the seed of fragmentation of our sensibilities. (3)

Some contemporary scientists recognize that reality has both quantitative and qualitative dimensions. In *Astrophysics and Creation*, professor of astronomy Arnold Benz writes:

Sometimes I observe stars in a way quite distinct from that which utilizes high-tech instruments and in a way that does not seek to understand them in a scientific sense. On a clear night in the mountains or in the desert the starry heavens are simply overwhelming. The American poet Walt Whitman (1819-1892) described this alternative way of observing stars in the following poem:

*When I, sitting, heard the astronomer, where he lectured with  
much applause in the lecture-room,  
How soon, unaccountable, I became tired and sick;  
Till rising and gliding out, I wandered off by myself,  
In the mystical moist night-air, and from time to time,  
Looked up in perfect silence at the stars.*

Here Whitman refers to two kinds of human experience regarding stars: first the objective, scientific observations and measurements of the astronomer and then the poetic transcendental, or mystical, experience. The latter kind of observation does not permit a person to remain in a passive role. Instead it requires the person himself or herself to become the instrument of observation. Whitman was directly involved in this second type of observation of the stars. He was personally affected by it, and, figuratively speaking, he came into resonance with the universe . . . Even as a professional astronomer, duty-bound to conduct objective science, I have experienced moments as described by Whitman. They are unforgettable moments in which time seems to stand still. They may be life's milestones when all becomes tranquil or where everything changes. Thus, they have a concrete and real effect, and must be considered as part of the reality in our life . . . When emotion meets reason, a direct encounter with the universe is possible in the way that Whitman so vividly described. This conjunction suggests that the sphere of human experience is larger than the realm of science. The perception of "silence" is not a scientific observation. The silence of the stars cannot be explained through

astronomy, and shouldn't have to be. It is not part of astronomy and lies beyond the boundary of science. (4)

The concept of 'quantity-quality' has a direct correspondence to the outer and inner worlds of human experience. Every human being experiences an outer world of physical phenomena common to all (the quantitative dimension) and a private, personal world of thoughts, feelings and perceptions invisible to others (the qualitative dimension). In *Philosophy of Mathematics and Natural science*, professor Hermann Weyl writes: "Scientists would be wrong to ignore that theoretical construction is not the only approach to the phenomena of life; another way, that of understanding from within is open to us . . . Of my own acts of perception, thought, volition, feeling and doing, I have a direct knowledge entirely different from the theoretical knowledge that represents the 'parallel' cerebral processes in symbols." Maurice Nicoll discusses this dual human experience in *Living Time*:

A part of the total WORLD is outside us, the remainder inside us. Where the visible WORLD leaves off, man invisible begins. Where the manifest WORLD, *common to us all* as immediate sensory experience, leaves off, the unmanifested WORLD begins – *individually* for each of us. And at the meeting-point in every man of these two aspects of the total WORLD the phenomenon of passing-time enters. The higher invisible degrees of the WORLD are in us; and outside us, in experiences we share with others, are its lower visible degrees. Outside us is outer truth; within us, inner truth, and both make up All – the WORLD. And as inner truth – supposing that I experience some degree of it – it is seen and demonstrated *within* me, individually. I cannot show it or prove it to others – whatever I may discern of it in my spirit – for it is *within*. (5)

Science deals with measurable quantities and seeks to discover the basic principles of the universe by studying the outer phenomenal world where objects and events are observed, measured and applied to mathematical analysis. Yet human beings are also composed of qualities which do not easily lend themselves to measurement. Pre-scientific thought was primarily concerned with qualities rather than measurable quantities. Nicoll laments this changing focus: "With the increasing predominance of 'external' over 'internal' truth, all that truly belongs to man came to be looked upon as *secondary* and unreal, and the primary and real field for investigation was held to be that which existed independently of man's mind in the external world."

Contrasted with naturalism is the older standpoint which puts man in a *created* universe, part visible and part invisible, part *in* time and part *outside* time. The universe as we see it is only one aspect of total reality. Man, as a creature of sense, knows only appearances and only studies appearances. The universe is not only sensory experience, but inner experience as well, i.e. there is inner truth as well as outer truth. The universe is both visible and invisible. On the visible side stands the world of facts. On the invisible side stands the world of ideas. Man himself stands between the visible and invisible sides of the universe,

related to one through the senses and to the other through his inner nature. At a certain point, the external, visible side of the universe leaves off, as it were, and passes into man as internal experience . . . Man has inner necessities. His emotional life is not satisfied by outer things. His organization is not only to be explained in terms of *adaptation* to outer life. He needs ideas to give meaning to his existence. There is that in him that can grow and develop – some further state of himself – not lying in ‘tomorrow’ but above him. There is a kind of knowledge that can change him, a knowledge of quite a different quality from that which concerns itself with facts relating to the phenomenal world, a knowledge that changes his attitudes and understanding, that can work on him internally and bring the discordant elements of his nature into harmony. In many of the ancient philosophies this is taken as man’s chief task – his *real* task. Through inner growth man finds the real solution of his difficulties. It is necessary to understand that the direction of this growth is not outwards, in business, in science or in external activities, but inwards, in the direction of knowledge of himself, through which there comes *a change of consciousness*. As long as man is turned only outwards, as long as his beliefs turn him towards sense as the sole criterion of the ‘real,’ as long as he believes only in appearances, he cannot change in himself. (6)

In his teachings of inner development, Gurdjieff spoke of harmonizing our inner and outer worlds. He taught that the outer world, the dimensions of time and space, was an involutory descending movement of material creation and the transformation of matter. The inner life of mind and consciousness involves the dimension of intention and possibility. A developed inner life is expressed by conscious choice and action, guided from higher levels of reality. This ascending upward movement is in the direction of greater consciousness and evolution. In *The Enneagram of G.I. Gurdjieff*, Christian Wertenbaker elaborates:

The outer and inner worlds are reciprocals of each other. From the point of view of the outer world, I, like any individual person, am nothing, a tiny speck on a tiny planet in a remote solar system, one of billions in a galaxy, which itself is one of billions. But from the point of view of the inner world, I am everything: everything I am aware of, perceive, know or remember – others, the immediate environment, the planet, solar system, galaxy, and universe – are in me, contained in my inner life.

*The brain is wider than the sky  
For – put them side by side  
The one the other will contain  
With ease – and You – beside.  
Emily Dickinson*

The reciprocal of the abundant profligacy of the creation of the outer world is the gathering back of all into a universal consciousness . . . Similarly, man’s role

in the universe is to unite the outer and inner worlds to form the 'third world of man' (Gurdjieff, *Life Is Real Only Then, When "I Am"*), which is the world of unity in multiplicity, symbolized by the number 1 and by the triangle of the enneagram. This involves a growth in the emotional part, which must evolve from self-concern to true consciousness and conscience, from isolation to participation, ultimately, according to Gurdjieff, resulting in the development of a soul that can participate in maintaining the consciousness of the universe. (7)

## The Nature of Science

The term 'science' is derived from the Latin *scire*, meaning "to know." Its essence is the *scientific method*, which is an extremely powerful tool for investigating phenomenal reality:

Science has been defined as "accumulated knowledge systematized and formulated with reference to the discovery of general truths or operational laws, especially when such knowledge relates to the physical world." This is not a complete definition, however. The essence of science is its method, not its data. The accumulated knowledge of science is obtained through trained observation and is empirically verifiable. Scientific method requires that research be presented for validation by the scientific community. A clear description of the techniques and materials used is necessary in the presentation. Then the procedures are carefully repeated by others. If the same results are obtained, the findings become scientific "fact." This definition follows Aristotle's division of all knowledge into science and metaphysics (which deals with those aspects of reality "beyond" the physical). (8)

In a sense, there is no such thing as the *one* scientific method, as different sciences employ different technical methodologies appropriate for their discipline. And even within the same scientific field, there are different theoretical and conceptual underpinnings and approaches to scientific research. The power of the scientific method is also determined by the vision, depth of curiosity, intuitive ability, and level of consciousness of the experimenter.

At its best, science provides reliable and pragmatic information about physical reality. In the words of Ervin Laszlo: "We trust science because it possesses the tools to explore, measure, and explain happenings in the physical world – the world of things we need for surviving and thriving. We have very good reason for putting a lot of epistemological weight in what we learn and know through our senses. Science makes sense because it is based on what the senses reveal, and it is tested by rigorous experimentation."

What is it about science that enables it to produce such pragmatic and practical knowledge – knowledge that empowers us to change our world (for good or ill)? Well the most distinctive mark of science is not merely that it tests its theories, but that it tests by *measurement*. Science works because it uses a methodology

that extracts information from the world by measuring it. And measurement removes guesswork. If done with precision and accuracy, it yields repeatable, reliable, reusable knowledge. What does it mean to measure something? Basically, it is a process of assigning numbers to physical quantities by using a standard for comparison (for example, a ruler, or a scale). Science is a method for quantifying and measuring physical reality; equipped with such data we are empowered to manipulate the world, to adapt it to our needs and desires. In short: we trust and value science because it works. (9)

One of the cornerstones of the scientific method is the repeatability of experimental results. "The methodology of science begins with the practice of measuring or observing a certain phenomenon. The measurement must be made in a way that can be repeated by anyone at any time. Such a result is said to be objective." The customary method of validating any research outcome is for several researchers to replicate it by following the same experimental protocol.

Science is based upon certain underlying philosophical assumptions and a worldview which are often unrecognized and unacknowledged by scientists. It is important to identify and understand the limitations of both the methodology of science and the body of scientific knowledge, which is always being updated and modified by new discoveries. Arnold Benz: "For scientific study, only phenomena that can be measured objectively may qualify. Reducing the field of investigation to objectively measurable perceptions limits science quite critically at its outset."

The limits of any branch of science are defined at the beginning by its methodology, assumptions, and procedures. Measurements are made and observations are selected according to these rules. Given these constraints, it is not possible to judge scientifically the existence or character of any reality beyond a given field of science. Only human perception and experience, not scientific theory and method, can access the full range of reality open to humanity. Perceptions are externally related influences that have become part of our consciousness. They include but are not restricted to scientific measurements and observations. Different kinds of perceptions together constitute our window onto reality. Forms of perceptual reality beyond the limits of a given branch of science must not, however, be denied on principle. Refusing on narrow methodological grounds to consider the full scope of reality threatens, ironically enough, to subvert the scientific ideals of the Age of Enlightenment. After all, a major virtue of the modern scientific method is its unbiased perception of the world. (10)

Renowned physicist Sir Arthur Eddington recognized that science has its limits in terms of understanding reality, noting that "what is found beyond its limits is in no way less real or important just because science has little or nothing to contribute to our understanding." John Spencer, a specialist in the philosophical foundations of quantum physics, concurs: "The totality of all known objective scientific facts does not constitute the limit of reality. The totality of all

reality will forever remain beyond the potential for complete and final scientific elucidation, which is precisely what makes it possible for our scientific understanding and knowledge to increase." In *The Eternal Law*, he elaborates:

Any logical system is forever limited by its own starting assumptions and, therefore, cannot be of much help once we begin to seek something deeper than those assumptions. We can never allow ourselves to forgo the importance of logical reasoning and scientific methodology but, equally, we must not allow ourselves to be fooled into believing that the limits of logic and science are the limits of reality. Scientific knowledge is capable of growing precisely because our current knowledge is always limited. Just as there is no logical starting point with which to begin logic, so too is there no scientific method with which to begin science. Both logic and science are ultimately dependent upon insight, intuition, or direct knowing or understanding, coupled with a tremendous amount of hard work. We need to have faith in logic and use logic to understand faith. (11)

The scientific process itself imposes certain restrictions on how much knowledge we can gain about reality through the experimental methods underlying science. John Spencer: "The very nature of theorizing and the constantly dynamic changing universe, coupled with our cognitive and perceptual limitations, necessarily implies that we are limited in our ability to represent physical reality with absolute accuracy."

The experimenter imposes the distinctions, limitations, and boundary conditions for the practical purposes of the experiment. However, they are not logically defensible demarcations, because there is no logically necessary reason to exclude any potential variable in any experimental situation. Given the holistic nature of reality, every part of the universe must necessarily be considered as part of every experiment. In practice, we obviously have to limit our variables to the few that are most immediately relevant to our purposes, but there is still no logical necessity to such limitations. Many philosophers and scientists have believed that reality could be known with absolute objectivity by an impartial experimenter, which is a false metaphysical assumption. Quantum theory has emphatically shown that physicists, in their capacity as physicists, cannot know physical reality with absolute objectivity, not if such objectivity implies that the discovered aspects of reality have absolutely no relation whatsoever to the experimenter. (12)

The scientific worldview has been characterized as materialistic and reductionistic. At its extreme, science seems to describe a universe that is impersonal and devoid of any meaning and purpose: "The universe is assumed to consist only of physical matter. It has no 'spirit,' no principle of vitality beyond the physical. All phenomena are finally reduced to an explanation in terms of fundamental energies (electromagnetism, gravity, the weak and strong nuclear forces)



and physico-chemical mechanisms acting in random fashion without purpose, meaning, or direction from any higher intelligence.”

Science generally disregards any phenomena or evidence that suggest the idea of a spiritual dimension to the universe. For instance, most scientists have difficulty accepting the possibility of psychic or paranormal experiences, despite their widespread acceptance in many traditional cultures. Futurist Willis Harman: “Why don’t we assume that any class of experiences or phenomena that have been reported, through the ages and across cultures, has a face validity that cannot be denied?”

Another feature that must be part of the restructuring of science is a broadening of the definition of what constitutes scientific evidence. Psychic and spiritual phenomena have played a significant role in human history and have helped shape some of the most fundamental aspects of our culture. But because they are not easy to rope in and scrutinize in a laboratory setting, science has tended to ignore them. Even worse, when they are studied, it is often the least important aspects of the phenomena that are isolated and catalogued . . . But when vast numbers of people start reporting the same experiences, their anecdotal accounts should also be viewed as important evidence. They should not be dismissed merely because they cannot be documented as rigorously as other and often less significant features as the same phenomenon can be documented. As Ian Stevenson states, “I believe it is better to learn what is probable about important matters than to be certain about trivial ones.” (13)

## The Role of the Scientist

Science is not only an epistemological methodology and a body of empirical knowledge, but also a human activity. The truly amazing discoveries of scientists over the last few centuries is a testament to the power of the scientific process, and the determined labour and creative insights of scientists themselves. Modern science has conferred a vast, ever-growing body of knowledge of the natural world and has been the wellspring of unprecedented technological advances in our modern world:

Science in its best form is a powerful means of probing the universe and testing the nature of reality. That in turn feeds back into the processes by which we humans seek to know ourselves and the world, thereby clarifying our understanding and refining our awareness. As we examine our existence ever more deeply, gaining knowledge and power, the scientific process helps take us beyond ourselves – our limited egoic selves. Rightly understood, then, science is part of the process by which Spirit is shaping humanity and helping it ascend to godhood. Science is both an expression of evolution and a means for furthering the evolutionary process. That process has now reached a point where, for the first time, humanity has the power to begin directing it . . . Science can buffer nature’s

influence on evolution while enhancing our own capabilities and choices. Yet science is a mixed blessing. It offers tremendous potential for human betterment but is not consistently used for that purpose. As always, it is consciousness which is of primary influence. If the consciousness of scientists and those who apply science were expanded beyond ego, the world situation would change radically. The power of science would remain, but its use would be purified. (14)

Science strives to be objective and value-free in its mission to discover the true nature of reality. However, scientists themselves may sometimes be narrow-minded, dogmatic, and arrogant: Psychologist Hans Eysenck: "Scientists, especially when they leave the particular field in which they have specialized, are just as ordinary, pig-headed and unreasonable as anybody else, and their typically high intelligence makes their prejudices all the more dangerous." Some may even hold extreme positions that reflect an underlying ignorance and hubris. For instance, noted atheist and evolutionary biologist Richard Dawkins even claims that religious faith is "a kind of mental illness."

Philosophers of science acknowledge that science cannot provide a unified, comprehensive picture of reality: "We cannot really know or understand or even explain anything, simply through the method of science – all our explanations are nothing but descriptions of processes that remain a mystery."

The worldview of scientists is shaped by the underlying assumptions and tenets of science. "Even though there is a popular misconception that science deals with incontrovertible facts, many scientists know that science does not and cannot reveal absolute truth because any and all of scientific theory is capable of an infinite number of applications throughout the universe and no theory can be proven in all possible situations. Thus, all science and its theories are only provisionally "true" until a violation of the theory can be demonstrated. In this sense the theories of Newton and Einstein raised as many new fundamental problems as they solved."

According to the paradigm of modern materialistic science, matter is the only reality, and all phenomena can be explained in terms of the actions and interactions of matter. Consciousness can be explained in terms of brain activity (or as a cognitive illusion), evolution can be explained in terms of random mutations and natural selection, and all human behavior can be explained in terms of genetics and neuroscience. The world is a fundamentally inanimate place, and we're nothing more than biological machines. It's impossible to conceive of any form of life after death because our seeming identity and consciousness are just products of brain activity. When the brain dies, our consciousness disappears into nothingness. This worldview is a philosophical projection of the sleep state. And inevitably, when people make value judgments based on this worldview, these tend to be very bleak – for example, that the universe is fundamentally without purpose or direction, that life is fundamentally meaningless, that human beings are essentially selfish, and so on. (15)

It is crucial for the future development of science that scientists recognize the role that basic assumptions play in science by delineating the limitations inherent in the scientific method, as well as acknowledging the crucial factor of human consciousness and experience:

Many scientists feel no discomfort in the fact that science by its own rules is a self-limiting epistemology. It is a philosophical system with a particular method of validating evidence which does not include the quality of the scientist's own being, his consciousness, or his wisdom, in any of the results and therefore can only be applied to a limited part of human experience. If we are to take scientific research any further than bare phenomena and try to include the depths of creation as well as its surface, we must invent or extend the method or rules to create a new science or at least show where these new rules overlap with proven consensus opinion. (16)

Materialistic science believes that the rational mind and scientific methodology are capable of attaining a complete knowledge of the laws and nature of physical reality. But, such a comprehensive knowledge may require the presence of a higher quality of consciousness on the part of the scientist in order to acquire such an understanding:

Is the sole mode of experiencing or understanding life by way of the method of science? Is not science merely one mode of experience? And are we to believe that the quality of our ordinary consciousness is so fine that further states of consciousness are inconceivable? Are not further states of consciousness most likely to be the key to the understanding of the complexities and contradictions that have arisen in the realm of physics? The synthetic power belonging to our ordinary consciousness may well be of such a kind that it is unable to assimilate into a *whole* the various separate findings of scientific research. If we argue in this way, it would mean that scientific materialism is limiting to the psychological development of man simply because it takes the consciousness of man for granted and therefore does not concern itself with problems as to how man can reach a higher state of development in himself – by what methods, by what kind of knowledge, work, ideas, efforts and attitudes . . . *Man cannot understand more because he is in a state of inner disorganization.* The quality of his consciousness is too separative and coarse. Yet he starts out in his investigations of the universe without any idea that he will be unable to penetrate beyond a certain point because he himself is an unsuitable instrument for this purpose. He thinks only that he is limited by a lack of scientific instruments of sufficient precision, or by a lack of data. (17)

Jeffrey Eisen argues that the realization that unity or oneness is the first principle from which secondary phenomena arise will lead to a new form of scientific thought which transcends the dualistic perspective which conceives of the universe as composed of discrete, independent entities and energies. "If, instead of consisting of numerous things, existence consists of one

thing ever changing in the eternal present, all seemingly independent variables are really aspects of one thing. Every isolated thing or event is just an isolated perception of a transient phase of Oneness. The misconception that reality consists of independent variables corresponds to the perceptual dualization of Oneness into separate things and separate events occurring in separate moments of time."

We need to become open to the non-dual, nonlinear, nonquantitative nature of reality. We should not only know ourselves and the universe in perceptual terms, we should also try to envision reality directly, both the inner and outer realities, and then figure out how they are translated into appearance by perception. This entails breaking our addiction to the scientific method, overcoming our epistemological materialism and going back to investigating reality through *knowing* itself. It requires rigorous introspection, impeccable inference, intuition, concentration, and meditation. We need, in fact, to develop a new wisdom tradition. Previous wisdom traditions were prescientific and not only devoid of means for establishing the validity of hypotheses, they were not even aware of the concept of validating hypotheses. The next wisdom tradition will be post-scientific. While throwing off the mesmerisation of modern science with illusion, it will retain its emphasis on validation. In fact, it will reinforce the validation process by rigorously incorporating the philosophy of science into the doing of science and the validation process into metaphysics. (18)

## Consciousness and the Human Observer

Scientists are beginning to realize that in experimental situations the experimenter is an integral part of the outcome of the experiment and not a neutral detached observer. In *The Holographic Universe*, Michael Talbot stresses the importance of this fact: "A shift from objectivity to participation will also most assuredly affect the role of the scientist. As it becomes increasingly apparent that it is the *experience* of observing that is important, and not just the act of observation, it is logical to assume that scientists in turn will see themselves less and less as observers and more and more as experiencers."

Most crucial of all, science must replace its enamourment with objectivity – the idea that the best way to study nature is to be detached, analytical and dispassionately objective – with a more participatory approach. The importance of this shift has been stressed by numerous researchers. In a universe in which the consciousness of a physicist affects the reality of a subatomic particle, the attitude of a doctor affects whether or not a placebo works, the mind of an experimenter affects the way a machine operates, and the imaginal can spill over into physical reality, we can no longer pretend that we are separate from that which we are studying. In a holographic universe, a universe in which all things are part of a seamless continuum, strict objectivity ceases to be possible. (19)

The role of the observer in scientific endeavors has generally been downplayed by most scientists, and even characterized as “anti-scientific and therefore meaningless.” But not all scientists agree with this stance. John Spencer writes in *The Eternal Law* that “if empirical evidence is essential to the sciences, then observation is also essential, which places the observer – the one who perceives, interprets, and understands the empirical evidence – in the spotlight.”

Without the experimenter/observer there is no experiment, since the experimenter is integrally involved in postulating the hypotheses, designing the experiment, taking the measurements, analyzing the data, and interpreting the results. The experimenter is the central focus of the interconnected relationships among all aspects of the relevant phenomena being studied:

It is quite astonishing that we have been able to pretend that we – the observers, experimenters, and theoreticians – can be excluded from the scientific enterprise, while simultaneously believing that we are being objective and giving as full an account as possible of whatever aspect of reality we are investigating. It is true, nonetheless, that we can still produce theoretical and practical feats while ignoring ourselves (or pretending to be able to do so), as if we had no role to play and were merely mindless automatons following some program. But as soon as we begin to analyze rationally what is really happening in any experiment, we cannot help but include that we are center stage in the entire scientific enterprise. To the degree that we ignore this fact, we are not being logically or rationally consistent. (20)

The ‘observer effect’ was discovered by the quantum physics pioneers of the early twentieth century. In *The Field*, Lynne McTaggart offers a succinct definition of the observer effect: “One of the fundamental Laws of quantum physics says that an event in the subatomic world exists in all possible states until the act of observing or measuring it ‘freezes’ it, or pins it down, to a single state.” This implies that certain aspects of the quantum world can only be determined at the precise moment of observation. The quantum reality was a realm of pure potential and immense possibilities until the appearance of an observer and the involvement of human consciousness. In other words, the so-called phenomenal world of objects and events only emerged in the presence of a human observer:

Perhaps the most essential ingredient of this interconnected universe was the living consciousness that observed it. In classical physics, the experimenter was considered a separate entity, a silent observer behind glass, attempting to understand a universe that carried on, whether he or she was observing it or not. In quantum physics, however, it was discovered, the state of all possibilities of any quantum particle collapsed into a set entity as soon as it was observed or a measurement taken. To explain these strange events, quantum physicists had postulated that a participatory relationship existed between observer and obser-

ved – these particles could only be considered as ‘probably’ existing in space and time until they were ‘perturbed,’ and the act of observing and measuring them forced them into a set state – an act akin to solidifying Jell-O. This astounding observation also had shattering implications about the nature of reality. It suggested that the consciousness of the observer brought the observed object into being. Nothing in the universe existed as an actual ‘thing’ independently of our perception of it. Every minute of every day we were creating our world. (21)

The implications of the ‘observer effect’ discovered by the pioneers of quantum physics were profound, and revolutionized our understanding of the world by affirming that the external universe did not exist independent of human consciousness:

According to the most widely held interpretation of quantum mechanics, human consciousness participates in the edition of reality that meets our eye. In fact, without an observer the concept of “reality” simply has no currency. For at the level of individual subatomic events, because of their inherent random, statistical, and probabilistic nature, several outcomes for each event are always theoretically possible. It is the act of actually observing that causes these possibilities to cohere into what we perceive as a single event in the world. Without the participation of an observer, what we refer to as reality simply does not unfold. Thus, the strictly objective status of the physical world has been transcended in the new view, and is replaced by a version of reality which attributes central importance to human consciousness. (22)

Science has generally viewed consciousness as an epiphenomenon which can be explained through materialism and reductionism. The immaterial and intangible quality of consciousness cannot be accounted for by classical science:

Until very recently, science concerned itself with defining the universe’s attributes as objective processes. Little attempt was made to consider subjective processes as they are. As we near the end of the twentieth century, science is again attempting to define consciousness as a phenomenon emerging from simpler physical processes. The greatest effort seems to be aimed at answering what I consider to be the foundation of all the wrong questions, namely, how does the self-aware entity emerge from deeper and more elementary physical processes? The answer is that it doesn’t, and that is very difficult to deal with in today’s reductionistic science . . . Present science, based on models generated from Aristotle’s vision and later developed with the aid of Newtonian mechanics, led us on the wrong reductionistic and materialistic path. It incorrectly reduced the soul and consciousness to purely physical and mechanical energy. At best the soul appeared as an epiphenomenon generated by material processes. When we bring quantum physics into the mix, the error becomes apparent (23)

Some scientists have recognized the importance of consciousness in any description of reality. For instance, Nobel prize-winning physicist Wolfgang Pauli believed that “a new conception of reality had to include spirit and matter as complementary aspects of one totality.” And, physicist John Wheeler argued that it was a fallacy that there is an objective universe existing independently from a conscious observer. He suggested that the word “participator” replace “observer.” He wrote: “In some strange sense the universe is a participatory universe. Nature is not objective because we are not separate from it.” Larry Dossey, in *Space, Time & Medicine*, concurs: “The ordinary idea of an objective world unaffected by consciousness lies in opposition not only to quantum theory but to facts established by experiment. What we consider the objective world depends, in some measure, on our own conscious processes. There is no fixed external reality.”

In a famous dialogue in 1930, Albert Einstein and the great Indian philosopher and poet Rabindranath Tagore shared their worldviews about the nature of reality. Einstein held that the objective world is real and exists independent of human beings – the cornerstone of science. Tagore disagreed: “The infinite personality of man comprehends the universe. There cannot be anything that cannot be subsumed by the human personality. The truth of the universe is human truth. The entire universe is linked up with us, as individuals. It is a human universe.”

Einstein: There are two different conceptions about the nature of the universe – the world as a unity dependent on humanity, and the world as a reality independent of the human factor.

Tagore renounced this either/or proposition.

Tagore: When our universe is in harmony with man the eternal, we know it as Truth, we feel it as beauty.

Einstein: This is the purely human conception of the universe.

Tagore: There can be no other conception. This world is a human world. The world apart from us does not exist. It is a relative world, depending for its reality upon our consciousness. (24)

Many of the pioneers in the development of quantum theory and their successors stressed the importance of consciousness as a “hidden variable” in any description of physical reality:

- Max Planck (1858-1947): “I regard consciousness as fundamental. I regard matter as derivative from consciousness. Everything that we talk about, everything that we regard as existing, postulates consciousness.” (*Where is Science Going*)
- Sir James Jeans (1877-1946): “All those bodies that compose the mighty frame of the world, have not any substance without the mind. So long as they are not actually perceived by me, or do not exist in my mind, they must either have no existence at all, or else subsist in the mind of some Eternal Being.” (*The Mysterious Universe*)
- Sir Arthur Eddington (1882-1944): “It is difficult for the matter-of-fact physicist to accept the view that the substratum of everything is of mental character. But no one can deny

that mind is the first and most direct thing in our experience." (*Science and the Unseen World*)

- Erwin Schrödinger (1887-1961): "All our scientific investigations are silent toward our questions concerning the meaning and scope of the whole display. The show that is going on obviously acquires a meaning only with regard to the mind that contemplates it." (*Mind and Matter*)
- Eugene Wigner (1902-1995) proposed that consciousness itself is the hidden variable which decides which outcome of a wave function event actually occurs. The decisive outcome occurs at the point of the experiment when human observation intervenes. He concluded that it is impossible to give a description of quantum processes without "explicit reference to consciousness." (*Symmetries and Reflections*)
- John Wheeler (1911-2008): "May the universe in some strange sense be 'brought into being' by the participation of those who participate? The vital act is the act of participation." (*Gravitation*)
- Menas Kafatos (1945- ): "Consciousness makes all experience possible. Attempts to exclude it from 'objective' experiments cannot elude this fact. Consciousness is fundamental and without cause. It is the ground state of existence. As conscious beings, humans cannot experience, measure, or conceive of a reality devoid of consciousness." (*You Are the Universe*)

These perspectives are strikingly similar to the assertions of mystics throughout the ages that matter and consciousness are intrinsically related: "A pristine purity of consciousness allowed the ancient Vedic seers to see reality as a whole; and in the scale of matter, force, and spirit they could discern only a process of gradual illumination occurring in some ineffable Being of universal extension and infinite potentiality. It is this integral vision wherein matter was as easily spiritualized as spirit was materialized."

The views of physicists are changing. It has been more than fifty years since Heisenberg delivered his monumental statements concerning observations; slowly, the tremendous mass of the scientific establishment begins to feel the first tremors of a radical and awesome new age. For centuries the mystic has asserted that matter and consciousness are different aspects of the same *something*. For all those who have spent their lives trying to penetrate the secrets of matter, the new physics has a message, not a new one, but one that may well turn out to be the most important rediscovery humankind has ever made . . . The message of the new physics is that we are *participants* in a universe of ever-increasing wonder. We have penetrated matter and found a glimpse of ourselves. (25)



## The Integration of Science and Spirituality

The founders of modern science, Copernicus, Galileo, Kepler and Newton, had a spiritual sensitivity that was the foundation of their scientific work. For instance, Kepler's "faith in the existence of the eternal laws of creation" allowed him to recognize the inherent order of his astronomical observations of the sun and planets. Many of the twentieth century pioneers of quantum physics were strongly influenced by both Western philosophy and Eastern spiritual teachings: Niels Bohr (Taoism and Chinese philosophy), Erwin Schrödinger (Vedanta), Wolfgang Pauli (Jungian archetypes and the Kabbalah) and Werner Heisenberg (Platonic philosophy).

These eminent physicists emphasized the role of faith, intuition and creative imagination in revealing and understanding the underlying order of the phenomenal world. "It required a direct personal experience (the flash of understanding, a direct perception) transcending simple discursive reasoning in order for Heisenberg to understand Plato's notion of unifying order and nonphysical geometric forms as the basis of physical reality. This he knew with 'utter certainty.' Moreover, it was this experience that profoundly affected his later thoughts, deeply influencing his way of understanding quantum theory."

Other scientists have described their personal mystical experiences of the ultimate nature of reality and the self. The fruits of their experience is the attainment of a fully developed and coherent heuristic viewpoint where mystical insight is integrated with scientific empiricism:

Deep metaphysical reflections and mystical experiences do not usually get discussed in scientific journals. But even if 99% of all scientists never have such experiences, it is still a fact that some do, and these experiences and metaphysical ways of thinking have shaped or informed their understanding of, and approach to, science. This fact is enough to provide scientific and logical justification for further inquiry into these domains. By ignoring such facts, we are left assuming that every aspect of scientific methodology can be reduced to nothing more than to postulating and experimentally testing a hypothesis, a misleading image to which many scientists cling as well . . . This mystical aspect of pioneering foundational physics is not at odds with empirical evidence or logical analysis, for we must always aim for logical coherence and rely upon empirical data so far as possible, but mysticism does underpin both logic and our data. The creative and intuitive aspects of the scientific enterprise cannot be ignored without forsaking genuinely novel scientific advancement. (26)

Both science and spirituality seek to understand the true nature of reality. One approach is based on empirical data and logic, and the other on intuition and mystical experience. Science employs instruments to measure the physical aspects of reality, while spirituality uses human consciousness to penetrate the subtle levels of existence.

Some spiritual teachers recognize the common ground uniting science and spirituality. In *Inner Yoga*, Sri Anirvan writes: "If the root impulses are taken into consideration, science and

religion do not seem to vary much in their objectives. The methods of obtaining their aim will be fundamentally related to the same spirit of enquiry, powers of reasoning, and utilitarian motive common to the human mind, but they will be worked out in apparently different fields with different assumptions." However, the common pursuit of truth must be qualified with the recognition that there are fundamental differences in their approach:

In recent years, there has been an increasing interest in recognizing, or at least understanding, the relationship between science and spirituality. Neuroscientists are tackling the question of the neural correlate of consciousness, after avoiding the subject for a long time. Philosophers are seriously studying the sciences. Physicists find themselves pondering the relationship between their theories and age-old spiritual questions. Understanding the nature of the world and our place in it has always been the goal of both the study of the external world and the inner search for meaning, but in modern times these two approaches became artificially separated, almost as if to give the powerful methodology of science a chance to develop. Now, however, it seems time for attempts at reunification. This has by no means been achieved . . . Science is an outer pursuit, dependent on objectively verified experiments on the material world, while spirituality is an inner pursuit, consciousness being inherently subjective. Science is not concerned with meaning, or values, or even the question "why?" These variations are all related, and reflect the difficulty of finding the intersection of spirit and matter, of the inner and outer worlds. Science regards everything as being on the same level, made of the same stuff and subject to the same laws, whereas spirituality recognizes a hierarchy of levels, from the fine to the coarse, from spirit to matter, from God to humankind. (27)

Many of the perceived differences between science and spirituality are based on incorrect beliefs, false assumptions and misunderstandings:

At present, many of the discussions surrounding the relations between science and religion are full of historical misrepresentations, philosophical errors and scientific misunderstandings. We all need to slow down and take a long, hard look at our own assumptions. Not everything we believe to be true is actually true, and at least some of what our opponents believe to be true is probably true, so let us learn from one another . . . If we want to discover truth, we have to be prepared to question our own assumptions and abandon them when we realize that they are false. For example, if you are an atheist, you will need to admit that many of the most important pioneering theoretical physicists in the last several centuries have believed in God or a supreme unifying power. You will also have to acknowledge those metaphysical beliefs that both science and religion share. If you are religious, however, you are going to have to relinquish those beliefs that are no longer amenable to contemporary knowledge. (28)

The interplay between rationality and intuition energizes scientific discovery, while logic is inherent in some intuitive knowledge. "Genuine insight is attained beyond the limits of reason and empirical data. This mystical moment of insight is not just for artists and spiritual aspirants, but is also fundamental to create progress in the sciences. Rational mysticism reveals the foundation of science."

The fundamental motivation of both science and spirituality is to understand reality, to know *what is*. Scientists are increasingly concerned with questions that have belonged to the domain of spirituality: What is the nature of the universe and the place of humanity in the cosmos? Is there a meaning and purpose to existence? Swami Kriyananda: "The aim of spiritual research is to withdraw to the center of one's being, at the heart of one's own energy and consciousness, and there to discover one's Self as the heart of all reality. From one's own center it is possible to reach out and understand the meaning of existence itself."

Spirituality is based on timeless intuitions about the deeper or higher spheres of reality and it is essentially unchanged over the ages. Science, however, is – or should be – essentially an open enterprise. At its best it is not only a collection of abstract formulas, and not just a wellspring of technology; it is a source of insight into *what* there is in the world, and *how* things are in the world. By this token science is a part of the perennial human quest for meaning and understanding. It is capable of change and renewal, and indeed it has changed fundamentally in the course of the twentieth century. In the first decade of the twenty-first century it is giving birth to an integral worldview. It is reenchanting the cosmos. (29)

Science and spirituality approach reality from different perspectives and ask different questions. The former addresses questions of function and form, while the latter poses questions of intention and purpose. The difference between them is not in the end they seek, but in the way they seek it. Ervin Laszlo: "The investigation of the spiritual dimension of reality is also within the scope of science, because – just like reality's physical dimension – it, too, reposes on the testimony of human experience. The experiential evidence for reality's spiritual dimension is our own consciousness."

The difference between science's concept of physical reality and explorations of spiritual reality is not in the conceptual superstructure through which we seek to comprehend the world, but in the starting point. Science's concept of physical reality takes off from the content and reference of sensory perception; it takes the world we perceive as a physically real domain situated beyond our perception of it. Explorations of spiritual reality, on the other hand, take off not from the content and reference of perception, but from the very *fact* of perception. We take off from the givenness of conscious experience – in one word, from *consciousness*. (30)

A new perspective is emerging in which the spirit of science is leading to a true science of the spirit. In *The Meeting of Science and Spirit*, educator John White proposes that consciousness is

“the meeting ground for inner and outer – the common denominator of objective scientific knowledge and subjective religio-spiritual experience. The world’s major religious and spiritual traditions have an aspect which is indeed scientific. That aspect is entirely empirical and centers around consciousness-altering disciplines, techniques, and procedures aimed at giving the practitioner direct spiritual experience. Sacred traditions display an intriguing ability to integrate scientific and religio-spiritual experiences in order to objectively demonstrate the super-sensible aspects of the universe which has been described and mapped by centuries of spiritual explorers.”

Important thinkers such as Goethe, Rudolph Steiner and Pierre Teilhard de Chardin recognize that science and spirituality are complementary and not antagonistic. “When the human species is conscious of matter and spirit as differing aspects of the Whole, of Ultimate Reality, rather than seeing them as opposites, we will have arrived at a crucial point in our celestial voyage.” Perhaps the greatest discovery of both science and spirituality is the reconciliation and integration of phenomena that were previously believed to be independent and even contradictory to one another.

Insightful scientists such as Arnold Benz view science and spirituality as complementary modes of knowledge, mutually supportive rather than antagonistic. “Our greatest achievement may lie in total integration of the spiritual and the physical – in realizing that the spiritual and the physical are not two aspects of ourselves, but one.”

As an active scientist I assume that science and religion start from different perceptions: quantitative observations and measurements on the one side, religious and existential experiences on the other. I do take seriously these religious experiences, intuitions, and visions, always aware that they are not measurable and contain a subjective element. Based on different perceptions, the methods and languages of the two differ completely from each other. Experiments and mathematical modeling are indispensable for science; metaphoric language is necessary to express the essence of religion. Disregarding these fundamental differences has resulted in unfortunate misunderstandings. The perceptions from which science and religion originate must remain distinct but should be brought into a common view and relation. They are the results of different perspectives on one reality, which at a deep, unfathomable level constitute, I believe, a unity. (31)

Jeffrey Eisen proposes a new scientific paradigm that includes both the perception of phenomena and the ground or noumenon from which they arise: “The aperceptual viewpoint completely abandons the effort to reduce to perceptual terms, to dualize, quantify. Instead, it recognizes that there are two parallel realms of reality, the perceptual and aperceptual, and that each realm is subject to different natural laws. Any description, any explanation of reality, has to take both realms into account.”

Science needs to begin by studying the basic processes by which something emerges from no thing. It must study genesis at all levels: how duality arises out of Oneness, how phenomena arise out of noumena or materiality arises out of immateriality, how experience arises out of the void, how life arises out of nonlife. These *first principles* need to be understood before we can be on solid ground. This is the paradigm shift that is needed in order to move from an illusion-based science to one based in reality. Most if not all of the correlations that today's science is finding, reveal not linear causation but rather an underlying unity . . . Science needs to refocus its attention. It has been looking at phenomena and needs to start looking at noumena instead. We can look at the processes by which things emerge from the void. We can study the basic processes of emergence by which the world as we know it self-creates. These are the processes fundamental to the emergence of the cosmos, the evolution of life, the development of an organism, the synthesis of qualitative experience by perception and the way all these processes interplay to create ecological hierarchies . . . A science that does not acknowledge the role of perception in creating phenomena from noumena is philosophically naïve and its findings cannot help but be limited and circumscribed. (32)

Ervin Laszlo also believes that it may be possible to reconcile the apparent divisions between our inner subjective world of experience and the outer world in which we live and act: "It requires us to discover the knowledge of the correspondence between our inner consciousness and outer circumstances, which is the hallmark of wisdom. That knowledge reveals to us the great discovery of the direct power of consciousness over life and the means by which changes in our consciousness can result in change in our lives and in the life of the world around us."

Life is the testing ground on which science and spirituality meet. By life, I refer to the field of conscious experience by which human beings strive to survive, grow, develop, and evolve. We need a knowledge that will enable us to make the right decisions and achieve the right results in all our actions, great and small. We need a knowledge that gives us the right sense of timing, measure, and proportion. We need a knowledge that leads to fullness of inner being and effective power of outer action. The efficacy of our knowledge is not ultimately to be demonstrated in a laboratory or a factory or in the meditations of spiritual contemplation, but in our capacity for mastery in the field of life in which the inner and outer, objective and subjective, material and spiritual meet in our awareness, experience, and actions as conscious beings. The conscious individual is the point of reconciliation between matter and spirit and the pioneer of evolving consciousness in the universe. The possession of that knowledge and power will be the climax of humanity's ascent from the animal and the fulfillment of the human aspiration for inner spiritual perfection and perfection in outer life. The destiny of science and spirituality is to achieve a reunification of inner and outer knowledge in a living synthesis. (33)

A fully engaged life is consonant with both a scientific and spiritual outlook. For instance, Socrates encouraged his pupils to engage in meaningful dialogue focused on the higher levels of reality while remaining firmly grounded in everyday practical life:

We all have different capacities, abilities, and so forth, and we must aim to discover and unfold them in the most beautiful ways we can. While we focus on the higher aspects of reality, we cannot forget our embodiment, and that even matter owes existence to the One, and so matter, too, is intrinsically good in its own way. By turning our attention to the higher metaphysical principles, we will be in a better position to develop the sciences *and* produce a just, harmonious way of life. We must not forget, however, the importance of those powerful moments of trans-rational intuition, the flash of insight or direct understanding, and even divine ecstasy. While there are many spiritual paths and ways of life that we may choose to explore, we are all bound by the same objectively real laws. Our technological power is only possible because we have discovered, and found unique ways to express, an extremely small portion of these laws. In a similar way, profound inner power and the highest form of personal freedom become more available to us as we discover our own unique way to live in accordance with the higher metaphysical laws, enabling us to understand and appreciate objective truth and reality. (34)

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