# MODERN SCIENCE & EASTERN INTUITION: COEXISTENCE OR COMPLEMENTARITY?

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Perhaps no other revolution in the history of science has transformed the worldview of science so radically as did the relativistic–quantum mechanical revolution. According to several recent scholars, it not only revealed novel truths about the universe but also made it possible for science to relate to other sources of knowledge. They believe that, thanks to these developments, today it is possible to have a mutually enriching meeting between Western science and Eastern wisdom, with far reaching consequences. This paper is a critical study of this claim and some of its important implications.

## *Some Findings of Modern Science*

### *The Interrelatedness of the universe*

Recent developments in science have led to a paradoxical situation: on the one hand, science is coming up with more and more evidence for the immensity of the universe. On the other hand, modern science has come up with the most exciting discovery of the interconnectedness of the universe. New evidence is pouring in to show that the different parts of the universe are linked to each other intimately. It is getting more and more clear that the universe can no longer be considered merely as a gigantic machine whose parts can be tinkered with without affecting the rest. The vastness of the universe poses no threat to its interconnectedness.

This awareness of the inter–relatedness of the universe emerged gradually as a consequence of scientific developments over scores of decades. A quick look at the history of science reveals that the onward march of science is directed very much towards the goal of greater unification. In a way, it can be said that the level of scientific growth in a particular branch of science is

measured in terms of the level of unification it has attained. This progressive trend towards greater unification enabled science to transcend several apparent contradictions or pairs of opposites. For instance, "Force and matter, particles and waves, motion and rest, existence and non–existence — these are some of the opposite and contradictory concepts which are transcended in modern physics."[1]

This interconnectedness is a pervasive one manifesting itself at many levels: ontological, epistemological, and cosmic.

## *Interconnectedness at the ontological level*

Classical or Newtonian physics with its commitment to the mechanical philosophy of nature, emphasized distinctness, definiteness, clarity and exactness, thanks at least partly to its Cartesian heritage. Hence the four fundamental concepts of the mechanical philosophy of nature, viz., space, time, mass, and force, were kept distinct from each other. In this view space was absolute, always at rest, and unchanging. It was the stage in which the cosmic drama of moving bodies was enacted. Time too was absolute and existed independent of the material world. It flowed smoothly from the infinite past to the infinite future through the present. Changes in the material world were related to time since they all took place in time, and were made possible by time. The material particles which were the actors were treated as mass points, reminiscent of the atoms of the Greek atomists. These were essentially passive although they possessed inertia by which they could resist any change in their state of motion. Force was responsible for giving these particles motion, and depended only on the masses and the mutual distances between them. Thus all the four basic concepts of space, time, mass and force had specific functions to perform, and quite zealously guarded their individuality and distinctness.

However, gradually this individuality and state of isolation began to erode, giving way to gradual and greater unification. Some instances of this progressive march towards greater unification are the fusing of electricity and magnetism, the unification of the forces of nature, the welding of space, time, and matter. Certain developments in quantum theory also revealed a basic interconnectedness in the subatomic world.

1 Capra (1977), p. 139.

## *Interconnectedness at the Epistemological Level — The Uncertainty and Complementarity Principles*

In its relentless quest for clarity and distinctness, classical physics gave rise to a sharp distinction between the observing subject and the observed object, which was a necessary condition to ensure complete objectivity. But soon important developments in quantum theory revealed that such a sharp distinction was an impossible dream. Instead, this world revealed an essential interconnectedness. The uncertainty principle of Werner Heisenberg and the complementarity principle of Niels Bohr challenged the traditional claims of a subjectivity–free scientific knowledge, and admitted that a certain intrusion of subjectivity could not be avoided. The uncertainty principle rendered futile any attempt to banish all influence of the observing subject, while the complementarity principle argued that progress in knowledge and understanding can be achieved by unifying incompatible concepts in a complementary fashion. This inextricable linkage between the observer and the observed has led to a redefinition of the role of the observer as participator. According to John Wheeler, "Nothing is more important about the quantum principle than this, that it destroys the concept of the world as 'sitting out there,' with the observer safely separated from it .... It is up to the scientist to decide whether he shall measure position or momentum. To install the equipment to measure the one prevents and excludes his installing the equipment to measure the other. Moreover, the measurement changes the state of the electron. The universe will never afterward be the same. To describe what has happened, one has to cross out that old word 'observer' and put in its place the new word 'participator.' In some strange sense, the universe is a participatory universe."[2] Heisenberg believes that "natural science does not simply describe and explain nature; it is part of the interplay between nature and ourselves."[3] As Capra points out, "in atomic physics the sharp Cartesian division between mind and matter, between the observer and the observed, can no longer be maintained. We can never speak about nature without, at the same time, speaking about ourselves."[4]

The principle of complementarity redefined what can be known by science in the subatomic world. According to Bohr's view, what science comes to know is not the "raw reality," but the phenomenon, which includes the experimental setup in an essential way. This introduction of the phenomenon as the object of scientific investigation has far–reaching consequences. Since

2 Quoted in Capra (1977), 127–128.

3 Heisenberg (1958), p. 81.

4 Capra (1988), 77.

the experimental setup is determinative of what observational results are obtained, it follows that *what* we know is determined, at least in part, by *how* we know it. Another important implication is that a system, even after having ceased to interact with another system, cannot be considered an independent seat of "physically real" attributes, since no system can claim to be fully free of outside influences and the attributes assigned are dependent partially on the experimental setup. Again, acceptance of the concept of phenomenon eliminates the possibility of any sharp distinction between the object observed and the subject (which includes the instruments) observing.

## *Interconnectedness at a Cosmic Level*

It is widely believed that the big bang theory, especially in its recently modified form, gives the best explanation for the origin and development of our universe. According to it, in the beginning the whole universe was in a super condensed state and it exploded with a gigantic bang. It then expanded, setting in the various processes that gave rise to the myriad of beings found in the universe. Since it advocates a common origin of all items in the universe, this theory obviously supports a deep underlying unity among the numerous items in the universe.

The world around us is closely linked to the distant parts of the universe. Ernst Mach had long ago spoken about this in connection with his well-known principle. According to Mach's principle, material bodies not only determine the structures of the surrounding space but are also influenced by their environment in an essential way. For instance, he does not believe that inertia is an intrinsic property of a body. Rather it is a measure of its interaction with all the rest of the universe. According to this view, a material body has inertia only because it is related to the rest of the universe. "When a body rotates, its inertia produces centrifugal forces ..., but these forces appear only because the body rotates 'relative to the fixed stars.'... If these fixed stars were suddenly to disappear, the inertia and the centrifugal forces of the rotating body would disappear with them."[5] A similar view is expressed by the well-known cosmologist Fred Hoyle: "Present-day developments in cosmology are coming to suggest rather insistently that everyday conditions could not persist but for the distant parts of the universe, that all our ideas of space and geometry would become entirely invalid if the distant parts of the universe were taken away. Our everyday experience even down to the smallest details seems

5 Quoted by Capra (1977), 195.

to be so closely integrated to the grand–scale features of the universe that it is well–nigh impossible to contemplate the two being separated."[6]

## *The Universe as Intrinsically Dynamic*

Unlike in the past, contemporary science is getting more and more convinced that our universe is intrinsically dynamic and constantly changing. In the presocratic times, there were two dominant schools of thought: the Parmenidean and the Heraclidean. For Heraclitus change was a fundamental property of the universe, whereas for Parmenides immutability was the characteristic mark of the universe. In the centuries that followed the Parmenidean view became the dominant one, glorifying permanence and stability as the mark of perfection.

The Aristotelian worldview that dominated the world for almost two thousand years was basically static; all forms of change were considered an indication of deficiency. With the development of modern science the static perspective gradually gave way to a dynamic one. Today there is an overwhelming and growing mass of scientific data in support of an intrinsically and all pervasively dynamic universe. This dynamic and changing feature manifests itself in the micro–world and in the mega–world, in the animate and inanimate world.

Our world is teeming with activity, moving restlessly around. For instance, in thermodynamics it is found that heat is nothing but atoms and molecules in random motion. Electricity is found to be electrons in motion along a conductor. Light is nothing but electromagnetic waves in motion. Sound is explained as vibrations in a medium.

In the quantum world too this dynamic and active nature is very evident. Atoms in a molecule move and vibrate. It is known that the elementary particles in atoms are in constant motion. This is explained in terms of a "quantum effect," according to which an elementary particle, when confined to a small region, reacts to its confinement by moving around. The narrower the region of confinement, the faster it moves. Since the electrons are confined to a small region around the nucleus, they move fast inside the atom. The nucleons move even faster, being confined to a much smaller region. The old idea of Heraclitus that the universe is in a constant flux could not have received a better confirmation.

The findings of the theory of relativity provide further evidence for an inherently dynamic universe, by revolutionizing our concept of matter. Ac-

6 Bohr (1961), 21.

cording to this theory mass or matter and energy are inter–convertible: matter can be converted into energy and vice versa. These two are two aspects of the same reality. In this view dynamism becomes the very essence of matter. Matter *is* energy, not just *has* energy.

The dynamic character of the universe is equally conspicuous in the mega–world of astronomy also. The planets and satellites are in constant motion. So are the stars in the galaxies. The galaxies themselves are never at rest. In the 1930s it was discovered that our universe itself is expanding, as a result of the galaxies moving apart from each other. Indeed, ours is an inherently restless universe, a constantly changing universe. As has been mentioned already, the big bang theory of the origin of the universe confirms this dynamic nature of our universe on a cosmic scale.

The theory of evolution, despite its hitherto unexplained elements, has become a widely accepted scientific theory to account for the origin and development of both the inanimate and animate world. This theory takes the dynamic character of the universe as fundamental.

Even vacuum as understood in quantum science[7] is extremely active. The "empty space" is not at all empty. It is a perfectly fertile ground for the quantum mechanical phenomenon called quantum fluctuation. Basically this consists of minor fluctuations in the energy of a system over very brief moments of time, "a wobbling a bit toward the positive and negative sides of zero so as never to *be* zero."[8] Usually it results in the spontaneous creation and annihilation of pairs of particles like an electron and a positron. Such pairs appear suddenly, move apart, come together again, and get annihilated, all within an incredibly infinitesimal time.[9] Quantum fluctuation is this dance between being and "nothingness." All these considerations have led John Wheeler to remark very aptly: "No point is more central than this that empty space is not empty. It is the seat of the most violent physics."[10]

In the past it was thought that a static state guaranteed stability, whereas motion was a threat to stability. However, modern scientific understanding of the universe reveals that in many cases it is motion that guarantees stability. For instance, planets are kept in stable orbits because of their motion. If a planet stops moving, it will collapse onto the sun and be destroyed. The sta-

7 For a discussion of the understanding of vacuum or nothingness in science see Job Kozhamthadam, "Creation without a Creator: Reflections on Contemporary Scientific Cosmologies." In Michael Heller, William Stoeger, S. J., and Jozef Zycinski, eds. *Philosophy in Science*, vol. 6. Tucson, Arizona: Pachart Publishing House, 1995, pp. 9–46.

8 Ferguson (1992), 77.

9 For example, an electron–positron pair has a mass–energy of just over one MeV and lives for a mere 103–213 second or less.

10 Misner (1973), 1202.

bility in the atomic world also depends on the continuous motion of the particles constituting the atoms. As we have seen already, the electrons and nucleons react to their confinement by whirling around at an enormous speed of thousands of kilometers per second. Thanks to this enormously fast motion, the atoms remain stable and appear as rigid spheres.

## *A New Understanding of Scientific Reality as Transcending the Spatio–temporal*

Although we humans move and have our being in the real world, there have always been controversies concerning what this real is. In fact, over the centuries the meaning of reality has undergone revolutionary changes. For Plato and the other idealists the real was the ideal, and the world of spatio–temporal realities of everyday experience was the shadow universe. Aristotle, on the other hand, was a realist who considered the world of everyday experience as real. Copernicus, Kepler, Descartes, Galileo, and above all Newton introduced successfully the mathematical view of reality. This mathematical understanding of reality pushed further the boundaries of the domain of reality to cover more territories. Developments in contemporary science are demanding a further extension of our notion of reality.

The old view was that matter being bound by three dimensional space and one dimensional time occupied a definite place at a definite time. Also it existed with certainty in a definite state. However, the phenomenon of wave–particle duality, which says that matter has a wave nature and a particle nature, has forced us to reconsider this traditional understanding of matter and its existence. "At the subatomic level, matter does not exist with certainty at definite places, but rather shows 'tendencies to exist,' and atomic events do not occur with certainty at definite times and in definite ways, but rather show tendencies to occur.'"[11] Thus the idea of reality in the subatomic world is quite different from the traditional understanding of the real. Quantum theory has overturned the classical understanding of solid definite objects that obey strict deterministic laws of nature.

Furthermore, in the past, observability was considered a fundamental criterion for material reality in the scientific world. But the quark theory challenges this criterion because of the curious property of the strong nuclear force called "confinement." Because of this property of confinement particles are bound together into combinations that have no colour. "One cannot have a single quark on its own because it would have a colour (red, green, or blue)."[12]

11 Capra (1977), 56.

12 Hawking (1989), 77.

Because of confinement quarks can be observed only in combination, not in isolation. Thus at normal energies the criterion of observability cannot be applied to individual quarks. This could question the very reality of quarks. However, another property of the strong nuclear force called "asymptotic freedom" comes to rescue its reality. Asymptotic freedom means that at very high energies the strong nuclear force gets weakened and allows quarks to behave almost like free particles.[13] The tracks left behind by such quarks can be observed.

The theory of relativity also has forced a rewriting of our idea of the real. The abstract four dimensional space–time continuum is presented as absolute and real, whereas the three dimensional space and one dimensional time of our everyday experience are shown to be relative and fleeting. Scientific reality seems to refuse to be confined to the world of our sense experiences alone.

## *Shift from the Determinate to the Indeterminate*

Developments in quantum theory have brought to light the inherent limitedness of scientific knowledge. The world of classical science was determinate and definite both metaphysically and epistemologically: metaphysically since the beings were supposed to be in a definite state under the purview of definite laws of nature, epistemologically because we could have definite and certain knowledge about them, at least in principle. However, developments in contemporary science have shown that this hope was misplaced. The dual nature of matter forbids the existence of matter in a definite and determinate state. This is best illustrated in the case of the electrons inside an atom. Since electrons have a wave nature also, the atomic orbits inside an atom are very different from the planetary orbits. Because in an atom probability waves are arranged in different orbits, when we make a measurement, we can only expect to find the electrons somewhere in the orbits, not at any exactly predictable point. Incidentally, this exposes the linguistic inadequacy of the often–used statement "the electrons go around the nucleus."

The uncertainty principle tells us that the knowledge science yields can never be fully certain and exact. There will always be a certain irremediable uncertainty. This principle bans for ever all hopes of getting certain and exact knowledge in science. The complementarity principle also exposes the inherent limitation of scientific knowledge. Science can extract from nature only partial knowledge at a given time: if we ask nature a particle–related question,

13 See Pagels (1985), 220 & 246.

it will give a particle–related answer. If, on the other hand, we ask a wave–related question, it will give a wave–related answer. One has to organize both these results in a complementary relationship to obtain a more adequate answer.

## *Some Findings of Eastern Wisdom*

Scholars like Capra see a remarkable parallel between several important findings of contemporary Western science and the intuitive insights of ancient Eastern wisdom. What the mystics of the East came to realize about our universe ages ago seems to be getting confirmed by the recent theories of science, especially by relativity and quantum theory. In this section I discuss some of these insights of the East.

## *The Universe as Interconnected*

The ancient mystics came to realize that the myriad of things and the innumerable phenomena in the universe are all interconnected, being different aspects or manifestations of the same ultimate reality. We are accustomed to divide the world of our experience into distinct and separate items, treating ourselves as agents operating independently. The mystics believed that this tendency to divide and isolate arose from ignorance or *avidya*, being part of the state of illusion we humans were in.

According to Capra, modern science has come to see the universe "as an interconnected web of physical and mental relations whose parts are defined only through their interconnections to the whole."[14] A very similar view is found in Buddhism. For instance, Lama Anagarika Govinda, a tantric Buddhist says: "The Buddhist does not believe in an independent or separately existing external world, into whose dynamic forces he could insert himself. The external world and his inner world are for him only two sides of the same fabric, in which the threads of all forces and of all events, of all forces of consciousness and of their objects, are woven into an inseparable net of endless, mutually conditioned relations."[15] As Joseph Needham, the well–known Sinologist remarks, "while European philosophy tended to find reality in substance, Chinese philosophy tended to find it in relation."[16]

It is claimed that the sages of the East had ideas of space and time very similar to what is held in relativity. Relativity affirms the relativity of space

14 Capra (1977), 129.
15 Quoted in Capra (1977), 129.
16 Quoted in Capra (1977), 190.

and time. While exhorting his disciples, a Buddhist teacher states: "It was taught by the Buddha, oh monks, that... the past, the future, physical space,... and individuals are nothing but names, forms of thought, words of common usage, merely superficial realities."[17] Ashvaghosa is even more articulate: "Be it clearly understood that space is nothing but a mode of particularization and that it has no real existence of its own .... Space exists only in relation to our particularizing consciousness."[18]

Relativity also teaches us that the three dimensional world of our everyday experience is not the truly objective world, and so we need to transcend it. The mystics claim to transcend the world of three dimensional space and one dimensional time, and are able to experience a higher multidimensional reality. In this connection Aurobindo talks of a "subtle change which makes the sight see in a sort of fourth dimension."[19]

One of the revolutionary findings of relativity was the welding of space and time to form a space–time continuum. According to D. T. Suzuki, the Buddhists have a similar view: "We look around and perceive that... every object is related to every other object... not only spatially but temporally.... As fact of pure experience, there is no space without time, no time without space; they are interpenetrating."[20] Capra concludes that "the refined notions of space and time resulting from their mystical experiences appear to be in many ways similar to the notions of modern physics, as exemplified by the theory of relativity."[21]

We have seen that the many developments in science in recent times have led to the fusing of many important concepts which were thought to be independent. In the Eastern worldview force and matter seem to be fused. This comes about because of its fundamental view that motion and change are essential properties of matter. In this perspective forces which are responsible for causing motion are not outside of matter, but are thought to be intrinsic properties of matter. While talking about rotational motion, Chang Tsai says: "All rotating things have a spontaneous force and thus their motion is not imposed on them from outside."[22] In the *I Ching* we find the following statement: "[The natural] laws are not forces external to things, but represent the harmony of movement immanent in them."[23]

Capra and others go to the extent of claiming that some Eastern traditions have developed ideas very similar to the scientific concept of field. In particu-

17 Quoted in Capra (1977), 149.
18 Quoted in Capra (1977), 150.
19 Quoted in Capra (1983), 11.
20 Capra (1983), 12.
21 Capra (1977), 150.
22 Quoted in Capra (1977), 208.
23 Quoted in Capra (1977), 208.

lar the Neo–Confucian idea of ch'i bears the most remarkable resemblance to the concept of the quantum field in modern physics. Capra believes that the Chinese view that forces represent the harmony of movements within things is particularly similar to quantum field theory where "the forces between particles are seen as reflecting dynamic patterns (the virtual clouds) inherent in these particles."[24]

Furthermore, we have seen that according to the Copenhagen interpretation of quantum theory, the two natures involved in the wave–particle duality are not contradictory but are related in a complementary way. In the Eastern perspective opposites are not looked upon as contradictory, but as having a polar relationship. "The Taoists saw all changes in nature as manifestations of the dynamic interplay between the polar opposites *yin* and *yang*, and thus they came to believe that any pair of opposites constitutes a polar relationship where each of the two is dynamically linked to the other."[25]

## *The Universe as Dynamic*

The world of modern science is dynamic and constantly changing. The Eastern worldview is inherently dynamic since time and change form an integral part of it. The Buddhists in particular emphasize the constantly changing, non–permanent character of the universe. In this connection Capra remarks: "Greek natural philosophy was, on the whole, essentially static and largely based on geometrical considerations.... The Eastern philosophies, on the other hand, are 'space–time' philosophies, and thus their intuition often comes very close to the views of nature implied by our modern relativistic theories."[26]

The well–known philosopher Radhakrishnan too subscribes to a dynamic worldview characterized by change. According to him, ignorance is at the root of the belief about permanent things in the universe. "It is an artificial attitude that makes sections in the stream of change, and calls them things.... When we shall know the truth of things, we shall realize how absurd it is for us to worship isolated products of the incessant series of transformations as though they were eternal and real."[27]

Capra and others point out that the Eastern idea of the dance of Shiva conveys the mystics' intuition of the complex activities constantly in progress in the universe, especially those of creation and destruction, growth and death. "For the modern physicist, the dance of Shiva is the dance of subatomic matter. As in Hindu mythology, it is a continual dance of creation and de-

24 Capra (1977), 208.

25 Capra (1977), 102.

26 Capra (1977), 159.

27 Quoted in Capra (1977), 268.

struction involving the whole cosmos; the basis of all existence and of all natural phenomena. The metaphor of the cosmic dance thus unifies ancient mythology, religious art, and modern physics."[28] This obviously sounds like poetry, but according to Coomaraswami, it is "nonetheless science."[29]

## *The Universe as Inexplicable and Indeterminate*

Recent developments in science have exposed the inadequacy of scientific language to describe nature, and have revealed the indeterminacy of nature. These findings also show a remarkable agreement with the intuitions of the sages of the East. To quote Capra once more: "Modern physics has confirmed most dramatically one of the basic ideas of Eastern mysticism; that all the concepts we use to describe nature are limited, that they are not features of reality, as we tend to believe, but creations of the mind; parts of the map, not of the territory. Whenever we expand the realm of our experience, the limitations of our rational mind become apparent and we have to modify, or even abandon, some of our concepts."[30] Like in contemporary science, the Eastern tradition also recognized that a fully satisfactory explanation of many important natural phenomena is impossible. Ashvaghosha expresses precisely this point when he says: "All things in their fundamental nature are not namable or explicable. They cannot be adequately expressed in any form of language."[31]

## *Comments and Evaluation*

The pioneering work done by Capra and others is an attempt to accord Eastern wisdom the respect and honour it deserves. It affirms that any attempt to respond responsibly and adequately to the human quest to apprehend reality cannot limit itself to Western science alone, but has to take seriously Eastern intuitive wisdom as well. These two, far from being contenders, are collaborators in the mission of providing a fuller and richer vision of reality.

Gary Zukav in his well–known book *The Dancing Wu Li Masters* arrives at a similar conclusion. According to him, "the development of physics in the twentieth century already transformed the consciousness of those involved with it. The study of complementarity, the uncertainty principle, quantum field theory, and the Copenhagen Interpretation of quantum mechanics pro-

28 Capra (1983), 16.
29 Capra (1983), 16.
30 Capra (1977), 147.
31 Capra (1977), 281.

duces insights into the nature of reality very similar to those produced by the study of Eastern philosophy."[32] Recently, Dr. Murli Manohar Joshi in his paper "Science and Religion" arrives at a similar conclusion: "Scientists today are discussing questions like 'reality,' 'being,' 'non–being,' etc., in almost the same language which the Upanishads and other schools of Indian philosophy have done."[33]

However, dissenting voices are also heard in scholarly circles. Perhaps the most articulate criticism against the view of Capra came from Ken Wilber, the renowned scholar in Eastern thought, especially Eastern mysticism, and Jeremy Bernstein, professor of physics at the Stevens Institute. For convenience sake we will refer to their view as Wilber–Bernstein view. Wilber has scant sympathy for the claimed strong parallel between many important findings of the new science and the mystical intuitions of the Eastern sages. He considers this claim as a "wild generalization."[34] According to Bernstein, the claim is based "on the use of accidental similarities of language as if they were somehow evidence of deeply rooted connections."[35] Wilber does not rule out the claim altogether since he concedes some limited similarity. While Capra sees modern science uncovering a remarkable interconnectivity at the cosmic level, Wilber finds mutual interconnectivity of the elements in the world of non–living matter only. In his own words, "I suggest that the new physics has simply discovered the one–dimensional interpenetration of its own level (non–sentient mass/energy). While this is an important discovery, it cannot be equated with the extraordinary phenomenon of multi–dimensional interpenetration described by the mystics.... To put it crudely, the study of physics is on the first floor, describing the interactions of its elements; the mystics are on the sixth floor describing the interaction of all six floors."[36]

Here Wilber is referring to the so–called perennial philosophy which in his view underlies all Eastern philosophical tradition. The perennial philosophy looks at the cosmos in terms of a hierarchy of six levels, arranged in an order of superiority. The higher one contains the lower, but not vice versa. The different levels are physical, biological, psychological, subtle, causal, and ultimate. Mysticism belongs to the sixth and last level and hence is superior to all others and pervades all levels, whereas science belongs to the first level only, and hence is at the lowest level and least pervasive. Clearly, Wilber's point is that any claim to equality or close similarity between the new science and mysticism goes against the perennial philosophy, and hence is wrong-

32 Zukav (1989), 330–331.
33 Von Welck (2000), 62.
34 Wilber(*1979*), 47.
35 Wilber (1979), 47.
36 Wilber (1979), 47.

headed. In fact, such a claim commits "a violent fallacy known as category error."[37]

The conclusion follows that the interconnectedness of the universe discovered by the new science is, at best, applicable only to the first level. Being the first level, it can never hope to reach out to any higher level, much less to the all–superior and all–pervasive sixth level of mysticism. The physicist "tells us, and can tell us, nothing whatsoever about the interaction of non–living matter with the biological level, and of that level's interaction with the mental field... ."[38] Of course, since the sixth level of the mystic comprises the first level, a very limited level of agreement is possible. However, further considerations show that "even the agreement between mystic and physicist on level–one must be looked upon either as somewhat tenuous or as a fortunate coincidence."[39] This comes about because the new science is very much limited to the micro–world only. It doesn't seem to be applicable to the macro world of every day experience.

According to Bernstein, any attempt to equate the findings of modern science with the intuitions of the East, will be a disservice to the latter. In his own words, "if I were an Eastern mystic the last thing in the world that I would want would be a reconciliation with modern science."[40] His main argument is that science and scientific knowledge are built on the shifting sands of change and hence subject to revision, whereas the truths given by the sages of the East are religious truths which are immune to revision and change. It also cannot claim any consensus among its practitioners. Naturally, "to hitch a religious [transpersonal] philosophy to a contemporary science is a sure route to its obsolescence."[41]

Many may be inclined to see a relationship of complementarity between modern science and Eastern mysticism. Wilber is of opinion that this betrays an incorrect understanding of what such a relationship is. As Niels Bohr has articulated it, two items A and B are complementary if they are mutually exclusive and jointly necessary. Wilber thinks that science and mysticism are not mutually exclusive since one and the same person can be a scientist and a mystic.

Wilber concludes his well–thought out and clearly–written critical remarks with a few words of warning: "Take Bernstein's warning with you: thank the new physics for agreeing with you, but resist the temptation to build your transpersonal models upon the shifting sands of changing level–one theories."[42] His final parting message is even more indicative of his dissatis-

37 Wilber (1979), 49.
38 Wilber (1949), 47.
39 Wilber (1979), 47.
40 Wilber (1979), 48.
41 Wilber (1979), 48.
42 Wilber (1979), 53.

faction: "Unwarranted and premature marriages usually end in divorce, and all too often a divorce that terribly damages both parties."[43]

## *Comments and Critical Remarks on the Wilber–Bernstein View*

These critics do well in waving the red flag at modern–day zealots of Eastern wisdom. It is seen too often that such zealots fail to pay sufficient attention to data and facts before jumping into exaggerated and irresponsible conclusions. Wilber is a well–established scholar in the area of science and mysticism, and his knowledge of Eastern philosophy and mysticism is widely recognized. His scholarly and well–articulated remarks need to be taken seriously. He seems to be very supportive of the dialogue between modern science and mysticism. As he puts it, "let them appreciate each other, and let their dialogue and mutual exchange of ideas never cease."[44] He seems to be against excessive enthusiasm leading to hasty generalizations and unjustified conclusions.

However, a number of remarks need to be made on the Wilber–Bernstein view. First of all, it seems to me that this view is very much built on an absolutization of the so–called perennial philosophy. The six levels of this theory seem to be permanently fixed and the overall perspective seems to be insulated against any revision. This view seems to assume that this so–called perennial philosophy is universally accepted by all mystics and sages of the East. All these assumptions and presuppositions are highly controversial, to say the least. Eastern philosophy is notorious for its diversity of opinions. No one philosophy is accepted by all.

Wilber says that "an individual can be, at the same time and in the same act, a physicist *and* a mystic" since "the latter transcends but includes the former, not excludes it."[45] Can we say that mysticism includes physics as we know it? A unidirectional hierarchical approach to levels of being and of knowledge seems to be flawed.

Again, can the world of contemporary science be reduced to the level of "non–living matter/energy?" First of all, the subject matter of this science is not confined to mere dead matter. According to the special theory of relativity, the four–dimensional space–time continuum is absolute and real. Can this be relegated to the dead material world of level–one? The material world of every day experience is the three dimensional world of space and one dimensional

43 Wilber (1979), 55.

44 Wilber (1975), 55.

45 Wilber (1979), 47.

world of time, which is not the same as space–time continuum. Not only that, today many scientists talk of going far beyond the four–dimensional world. As Bernstein himself points out, string theory seems to go for a ten–dimensional world.[46] One may say that this theory is still in the speculative level. But the fact that this has been taken up seriously by science reveals that science can and does go beyond the merely tangible and visible. The world of contemporary science simply cannot be reduced to the naïve world of everyday experience.

The argument to rule out any possibility of a complementarity relationship between mysticism and modern science seems to be unconvincing. Bohr who proposed this principle of complementarity himself held that this relationship could be extended to biology and other fields. The main argument is that since one and the same person can be a mystic and a physicist, these two are not mutually exclusive and so cannot be complementary. However, if strict boundaries are observed, then a mystic as mystic cannot be a physicist; a mystic can be a physicist only during his/her non–mystical moments.

The remark that any attempt at closely linking Eastern intuitions with the findings of modern science will be a disservice to Buddhist or Hindu religious philosophy is also unconvincing. The reason given is that the religious philosophy runs the risk of being supported by a changing and unreliable science. This can be said of any discipline or system receiving support or confirmation from science. Yet all of them seem to be eager to be supported by scientific views. It can hardly be the case that a religious philosophy will lose its credibility today because it is supported by scientific evidence.

## *Towards a New Vision of Reality*

The works of Capra, Zukav, and others are admirable attempts of a new kind, calling for a non–traditional perspective to appraise and appreciate them. Capra's books have received world–wide and long–standing acclaim. V. V. Mansfield of *Physics Today* called *The Tao of Physics* "a pioneering book, " while according to some others, it is an outstanding effort at reconciling "Eastern philosophy and Western science in a brilliant humanistic vision of the universe."

A novel attempt of this type can rightly expect strong negative criticism since it certainly has its pitfalls and deficiencies. But it must be borne in mind that it is a pioneering attempt which needs to be followed up by other competent and open–minded experts. It is a new vision which remains in need of further clarification.

46 See Bernstein (1989), 152–153.

The parallel or similarity proposed by Capra and others is remarkably insightful. It deserves to be taken seriously and studied further. At times the parallel seems to be vague and unclear. For instance, Capra talks of the four–dimensional continuum which is not accessible to our ordinary sense experience, and then remarks: "A similar situation seems to exist in Eastern mysticism. Mystics seem to be able to attain non–ordinary states of consciousness in which they transcend the three–demensional world of every day life to experience a higher, multidimensional reality."[47] It is not clear whether the world of the mystical experience can be considered the space–time continuum of relativity. It seems to me that one could say that often mystics seem to be taken to a dimensionless world.

At times the parallels pointed out are far–fetched and unconvincing. For instance, Capra writes: "The structures and phenomena we observe in nature are nothing but creations of our measuring and categorizing mind." This is found in Eastern philosophy also: "The Eastern mystics tell us again and again that all things and events we perceive are creations of the mind, arising from a particular state of consciousness and dissolving again if this state is transcended."[48] The first part of the quote is supposed to represent the position of science. This view seems to be highly controversial, to say the least. A more unconvincing case is when he talks of the theory of relativity revolutionizing the classical concept of absolute space and time. He says: "Our notions of a three–dimensional Euclidean space and of linear flowing time are limited to our ordinary experience of the physical world and have to be completely abandoned when we extend this experience."[49] In this connection to show the parallel he quotes Chuang Tzu: "Let us forget the lapse of time; let us forget the conflict of opinions. Let us make our appeal to the infinite, and take up our positions there."[50] The view described by this mystic does not seem to be a close parallel to the view of relativity. Furthermore, Capra's claim that mystical experiences like scientific experiments are repeatable is also unconvincing. Mystical experiences are usually considered unique and highly personalized. It seems to me that even if at times they recur in some form, they are not open to repetition as in the case of scientific experiments.

These few somewhat minor areas of controversy should not distract us from the new vision Capra and others are proposing, a vision that sees a meaningful linkage between certain important findings of modern science and the intuitive insights of the Eastern sages and thinkers. It is important to note that

47 Capra (1983), 11.
48 Capra (1977), 266.
49 Capra (1977), 165.
50 Capra (1977), 166.

this new vision does not subscribe to any wholesale parallel or similarity between the two items. The similarity refers mostly to certain *cosmic or general characteristics* of the universe rather than to local or particularized ones. For instance, it talks of the interconnectedness of the universe, the dynamism of the universe, etc. The Eastern mystics have not come up with local or specific laws like Boyle's laws of gases or Kepler's laws of planetary motion. Rather they talk of the universe as a web of relations or the universe being in a flux. These are general features that are generally applicable.

This point also explains why scholars began to talk of this parallel so confidently only in the twentieth century, with the advent of the new science. One of the principal characteristics of the new science and related developments is their special interest in wider and deeper issues, in universal and ontological questions. Classical physics mostly dealt with the macro world of everyday experience, whereas the new science is particularly interested in the mega–world and micro–world. Classical science confined itself very much to the world accessible to the senses (it also made use of certain aids to the senses, like the microscope and the telescope, etc.) On the other hand, certain aspects of the new science go far beyond the merely observable world. Since classical science remained to the limited world, the insights of the sages which went well beyond the merely observable did not have much relevance to that science. Today science is ready to transcend the mere sensory world, just as the sages were in the past. Hence, areas of commonality and similarity of views have become manifest in our day.

## *Complementarity between Western Science and Eastern Wisdom*

The parallel seems to be too striking to be deemed a mere linguistic coincidence. It asserts itself in several important aspects with so many instances. Again, the similarities in question refer to views which were long–considered unpopular, since they seemed to go against common sense. The history of science tells us that right from ancient times the static worldview of Parmenides dominated the scientific and intellectual world. Even the worldview of classical physics with its doctrine of absolute space, absolute time, absolute mass, and absolute frame of reference, was very much a static one. On the other hand, the Eastern thinkers consistently emphasized both the dynamism and interconnectedness of the universe. With the advent of the new science the old static view gave way to a dynamic one, and the old view of distinctness and separation to an interrelated one. The Eastern thinkers had long held that our universe was indefinite and indeterminate, and our language could not capture fully the richness of reality.

Classical science with its adherence to the mechanical philosophy of nature had believed that the universe was determinate, and exact knowledge about it could be obtained, at least in principle. Developments in the new science exposed the mistaken position of classical science and vindicated the Eastern view. It seems to me that this kind of convergence of important conclusions could not have come about by mere chance.

We also need to keep in mind that the Eastern sages and thinkers responsible for these insights were no ordinary persons. They were geniuses like Thales and Socrates: highly gifted, widely learned, and keenly observant of nature and persons. True, they lacked the modern–day laboratories or research institutes, but they were gifted with extremely sharp and highly disciplined minds with an uncanny ability to engage in deep and prolonged reflection. Concentrated and consistent efforts of such geniuses could not but bear lasting fruits.

Perhaps another reason why many may hesitate to see the linkage between the findings of modern science and those of Eastern intuitive wisdom is the huge time gap between the two. This time gap can be easily explained. Intuitive knowledge relies heavily on a keen and perceptive mind and can be obtained quite fast, but scientific knowledge relies on the senses and moves systematically. Furthermore, for anything to be scientifically accepted it has to be empirically validated, which depends heavily on technology. It is well–known that technology lags far behind theory.

I am inclined to believe that there is a kind of complementarity relationship between the above findings of modern science and the intuitions of Eastern wisdom. This relationship is between two important aspects of human knowledge: the rational and the intuitive. Western science refers mainly to the rational and Eastern wisdom to the intuitive. Of course, the intuitive does not fully exclude the rational, and vice versa.[51] Rational knowledge is discursive, moving step by step through a chain of reasoning process. Intuitive knowledge is direct, without any noticeable mediation, taking place suddenly as it were in one swoop. Rational knowledge usually proceeds by a definite plan, while intuitive knowledge usually comes unexpectedly in a flash as it were. Rational knowledge is very much analytical and logical, while intuitive knowledge is very much synthetic and follows no identifiable logic. Rational knowledge compares, classifies, divides and distinguishes, whereas intuitive knowledge interlinks and unifies. Rational knowledge is highly selective, while intuitive knowledge tends to be holistic. Rational knowledge is characteristically deliberate, definite, accurate, clear, and objective. Intuitive knowl-

51 As I have said earlier, strictly speaking complementarity requires that one aspect excludes the other and vice versa. We take a less strict view here.

edge is characteristically non–deliberate or subconscious, indefinite, inaccurate, vague, and subjective. Rational knowledge is for the most part articulate and communicable, whereas intuitive knowledge is often inarticulate and incommunicable. Obviously, here I am not claiming a complementarity relationship in a very strict sense. However, it is clear that these two are highlighting two distinct polarities of human knowledge.

Our discussion leads us to conclude that a more complete and richer knowledge about our universe requires both these aspects. One alone leaves our knowledge impoverished and incomplete. This is to be expected since nature is far richer than either reason or intuition alone can capture. The human mind is also far richer than what reason or intuition alone can reveal. The human mind's reach seems to be unimaginably wide. A harmonious meeting of the East and the West is a sure and healthy way to derive the maximum benefit from the vast resources of nature and the wide capabilities of the human spirit.

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