

# **“Buddhism and Science: Confrontation and Collaboration”**

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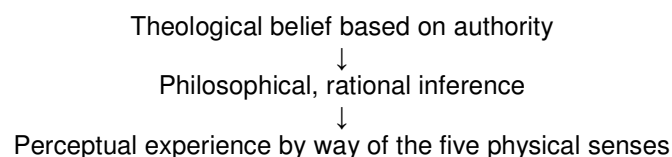
## **Introduction**

### **Confrontation**

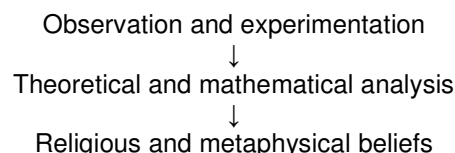
After 2500 years of being assimilated into multiple, diverse, traditional societies of Asia, in the twentieth century for the first time Buddhism began to spread throughout the rest of the world. By and large, Buddhism's first exposure to modernity was through its encounter with European imperialism as it spread through much of South and East Asia during the eighteenth and nineteenth centuries. Then, in the twentieth century, it was subjected to what was tantamount to a holocaust at the hands of multiple communist regimes, which waged war on religions of all kinds. The conflict between Buddhism and communism is not rooted in the economic principles and ideals of communism, which are, on the whole, quite in harmony with Buddhist ideals. Rather, communists have waged an ideological war against Buddhism in large part because of its fundamental incompatibility with the basic tenets of scientific materialism, which many Marxist regimes have militantly promoted with extreme intolerance and brutality.

While some materialists rail against religious creeds of all kinds, many embrace their own dogma with all the closed-minded intolerance of religious fanatics. By “dogma” I mean a coherent, universally applied worldview consisting of a collection of beliefs and attitudes that call for a person's intellectual and emotional allegiance. A dogma, therefore, has a power over individuals and communities that is far greater than the power of mere facts and fact-related theories. Indeed, a dogma may prevail despite the most obvious contrary evidence, and commitment to a dogma may grow all the more zealous when obstacles are met. Thus, dogmatists often appear to be incapable of learning from any kind of experience that is not authorized by the dictates of their creed. Dogmatism is the primary obstacle to fruitful collaboration between Buddhism and science, and the antidote is the restoration of an authentic sense of empiricism and a willingness to put one's own most cherished beliefs and assumptions to the test of experience.

Galileo, the father of modern science, revolted against the dogma of medieval scholasticism, which insisted on the following hierarchy of belief and types of knowledge:



With regard to understanding the objective physical world, he insisted that the above hierarchy needed to be reversed:

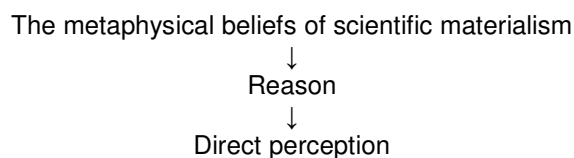


With the rise of modernity, natural scientists took on the role of authorities regarding the objective, physical world; philosophers were regarded as authorities regarding the mind; and theologians retained their authoritative status regarding the supernatural dimensions of existence, such as the nature of God and the

immortal human soul. By the closing decades of the nineteenth century, natural scientists had made tremendous progress in understanding the objective, physical world, while philosophers had come to no consensus regarding the subjective world of the mind, and theologians were on the defensive, as an increasing number of their central beliefs were discredited by science.

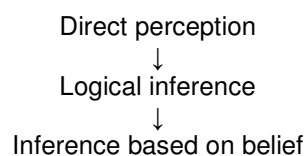
Thus, three hundred years after the beginning of the Scientific Revolution, scientists turned their attention to the study of the mind by way of its behavioral expressions and its neural correlates.

The modern disintegration of the unified worldview of medieval scholasticism has given rise to a series of conflicts between science and religion. Such conflict began in the sixteenth century with the revolution in the physical sciences, it dramatically increased in the nineteenth century with the Darwinian revolution in the life sciences, and it has now intensified in the twenty-first century with the rise of the behavioral sciences and neuroscience. The cognitive sciences are particularly dominated by the metaphysical beliefs of scientific materialism, which center on the belief that the only things that exist in nature are physical phenomena and their emergent properties and functions. Consequently, a new hierarchy has come to dominate science as a whole:



In other words, the dogma of scientific materialism has now replaced the dogma of medieval scholasticism, and advocates of this new creed insist that those who do not exclusively embrace their metaphysical beliefs and methods of inquiry are irrational, and all experiential evidence that contradicts their metaphysical beliefs is deemed invalid. While the great progress of the natural sciences has been fueled by sophisticated, precise, replicable observations of natural phenomena, when it comes to the mind, scientists have developed no rigorous means of observing mental phenomena themselves, such as states of consciousness, thoughts, emotions, desires, dreams, and so forth. This is a fundamental reason why there has not yet been a true revolution in the mind sciences. Researchers have never empirically or rationally demonstrated the truth of their belief that the mind is nothing more than a property or function of the brain; they have simply taken this as an unquestioned assumption underlying virtually all of their research.

The metaphysical views of materialism are in fundamental conflict with the Buddhist worldview, for if materialism were correct, then the Buddha's claims of direct knowledge of past lives, karma, and *nirvāna* would be invalid. Thus, Buddhism refutes the current materialistic hierarchy of knowledge and proposes instead a hierarchy that is much more in accordance with that of the pioneers of the Scientific Revolution:



Buddhism therefore challenges the scientific establishment to question its own dogma of scientific materialism and to return to and broaden its earlier commitment to direct experience. The challenge is for science to go beyond the realm of experience of the five physical senses and the objective measurements of instruments of technology and to incorporate into its methodology perceptual knowledge by way of mental awareness. For it is only by way of such observation that the origins, nature, and potentials of the mind as well as its relation to the rest of the universe can be fathomed.

## Collaboration

In light of the preceding discussion, it is crucial to note that not all assertions or beliefs of scientists are scientific, nor are all assertions and beliefs of Buddhists thoroughly based on and corroborated by valid experience. Science began with a primary emphasis on direct experience, but over time it has become entrenched in the dogma of materialism. Buddhism likewise began with the direct experiences of the Buddha,

but dogmatic elements have crept in, making it at times strikingly similar to medieval scholasticism and therefore incompatible with science. Especially since the beginning of the twenty-first century, there has been a rapidly growing interest among scientists to conduct research into Buddhist theories and practices, especially pertaining to the effects of meditation. Likewise, a growing number of Buddhists, both Asian and Western, are expressing interest in learning more about science. As such cross-cultural exchanges continue, it is important to be sensitive to both the common ground and legitimate differences between the starting assumptions, methods of inquiry, and conclusions of the scientific and Buddhist traditions.

## Buddhist Ethics and Modern Science

### Confrontation

All the great pioneers of the Scientific Revolution were devout Christians, so their inquiries into the nature of the physical world were imbedded within the Christian worldview. Men such as Francis Bacon (1561-1626), Galileo Galilei (1564-1642), and René Descartes (1596-1650) all believed, in accordance with Christian doctrine, that salvation is granted by an act of divine mercy, which one receives by faith, by surrendering oneself to the will of God, and by applying oneself to a life of virtue in accordance with God's commandments. According to Bacon, scientific inquiry is a means to understand Nature in order to gain power over it and exploit it for human purposes. This goal, he believed, was divinely sanctioned and was to be accomplished with religious zeal.<sup>1</sup> Descartes, too, predicted that by knowing the forces and the actions of material bodies, we can "make ourselves the masters and possessors of nature."<sup>2</sup> Thus, faith was seen as the key to inner happiness, and scientific knowledge was seen as the key to outer success and prosperity. While many advocates of science continue to believe that science is value-free, this has never been true and can never possibly be true. The kinds of research scientists conduct have always been guided by their values. Moreover, especially since the twentieth century, such research requires significant funding, so money is granted to issues that are valued by governments and business, largely for economic purposes. Therefore, nowadays the values that determine the goals and methods of scientific research are largely materialistic, whereas at the dawn of the modern era they were largely Christian. Science—despite its claims and attitudes—has never been value-free.

Looking back on the impact of science on the modern world, the German physicist Carl Friedrich von Weizsäcker (1912 – 2007) has argued that the scientific and technological world of modern times is the result of man's seeking knowledge without love.<sup>3</sup> This approach to scientific inquiry, largely devoid of ethics and altruism, has played a major role in the great enigma of the twentieth century. On the one hand, this century has produced an unprecedented growth of scientific knowledge and technological power, but it has produced the greatest inhumanity of man against man and the greatest degradation of the natural environment in human history.

The lack of correlation between scientific progress and human flourishing stems in part from the belief that the domains of science and religion do not overlap: science deals with the world of objective facts, while religion is concerned with the world of subjective values.<sup>4</sup> Albert Einstein (1879-1955), however, expressed a much deeper insight when he proclaimed, "Science without religion is lame, religion without science is blind."<sup>5</sup> Facts and values have never existed independently of each other, and the domains of science and religion have always overlapped, especially when it comes to the nature of the mind and human identity. Because Buddhism has both scientific and religious elements to it, and because these elements are thoroughly integrated, Buddhism may provide a vital and much needed role in mediating between science and the world's religions in the modern world.

Today ethics plays a marginal role in modern science, and it focuses primarily on two themes: scientists must be honest regarding their collection and reporting of data, and they must abide by ethical norms in their treatment of human subjects and, to a lesser extent, animals used for research purposes. In contrast, ethics has always been of fundamental importance in Buddhism, and is indispensable for social and environmental flourishing in this and future lifetimes. On an individual level, living an ethical life provides an essential foundation for the cultivation of *samādhi*, and that, in turn, is a necessary prerequisite for realizing the wisdom that results in *nirvāna*. While science has historically been aimed at knowledge as a means to power, Buddhism

has always emphasized integrating the pursuit of understanding, virtue, and genuine happiness. Knowledge, therefore, is not viewed as an end in itself, but is seen as a means to the ultimate bliss of liberation through the cultivation of virtue. Without ethics, there is no Buddhist path to enlightenment, but history has shown that science and technology have developed, especially since the twentieth century, within a materialist framework that is virtually devoid of ethics. The contrast between the two could hardly be stronger.

## **Collaboration**

With the rapid growth of technology, scientists and the general public have been forced to grapple with ethical issues such as stem cell research, cloning, the artificial prolongation of life, and genetic engineering. Many seek answers to these questions based not on religious authority, but on empirical evidence and sound reasoning. Ethics has always played a central role in Buddhism, and direct experience and logical reasoning have always been strongly emphasized, together with reliance on the authority of the direct knowledge of the Buddha and other enlightened sages in the Buddhist tradition.

The mistaken belief that there is an absolute divide between facts and values has influenced all branches of science, including clinical psychology. Especially over the past sixty years, it has focused primarily on understanding and treating mental illnesses, rather than exploring the relation between behavior and mental health. During this same period, depression has increased tenfold, especially among young people, while many medical treatments for mental imbalances target only the symptoms of the diseases, without addressing their underlying causes. This situation highlights the importance of seeking out behavioral and psychological causes of mental distress, and this requires that ethics be introduced into the understanding and treatment of mental illness. With the introduction of ethics into science, two criteria may be used for evaluating any scientific research: (1) What is its potential value in terms of alleviating physical and mental illness, and how might it contribute to the development of exceptional degrees of physical, psychological, and spiritual well-being? (2) To what extent is the knowledge yielded by the proposed research for development likely to be useful in cultivating human virtues such as wisdom and compassion?

Over the past ten years, a growing number of psychologists have begun asking: How can we understand mental health in positive terms, and not simply as an absence of mental disease? This has given rise to the new field of positive psychology, which seeks to better understand mental health and to devise methods to increase psychological wellbeing beyond levels that are considered to be normal. Some researchers in this field recognize the importance of ethics in this regard, and this opens up the possibility of a rich collaboration between scientists and Buddhists for developing an evidence-based science of ethics focused on understanding what kinds of behavior of body, speech, and mind are conducive to our own and others' genuine happiness and what kinds are detrimental.

Our global community is now beset with unprecedented environmental, economic, and social crises, and the sources of many of these problems can be traced to the three root mental afflictions of attachment, hatred, and delusion. While it is vital to seek solutions to these problems by means of scientific and technological advances, the underlying causes within the human mind must also be addressed. Science has contributed greatly to our knowledge of the universe and to our material well-being, while the cultivation of virtue and genuine happiness has largely been left to religion.

Buddhism, on the other hand, focuses primarily on knowledge that contributes to the cultivation of virtue and genuine happiness. The collaboration between scientific and Buddhist approaches to healing our world may prove to be vital to our human survival and flourishing. As long as societies adopt materialistic views of reality and human existence, they are bound to seek happiness and security through the insatiable exploitation of natural resources. With the rapidly growing human population and the equally rapid depletion of natural resources, this has proved to be a formula for global conflict and disaster. Clearly, our global community must embrace a richer and deeper understanding of the roots of suffering and of genuine happiness so that as a society and as individuals we can learn to be content with moderate degrees of material prosperity, while seeking ever greater happiness by drawing from our inner, spiritual resources, instead of through ever increasing consumption of external, material resources. Given the interconnectedness of today's world, it is equally imperative that we move away from an ego-centered view of reality to embracing a sense of universal responsibility, which His Holiness the Dalai Lama has been championing for many years.

# The Buddhist Concept of Mind and Modern Sciences

## Confrontation

Since the time of Galileo, science has progressed by observing and experimenting on objective, physical phenomena that can be witnessed by multiple individuals. After three hundred years of great success at using this “scientific method,” researchers then turned their attention to the scientific study of the mind. But instead of developing means to carefully observe and experiment on mental phenomena—which cannot be observed objectively with the instruments of technology—they have confined their inquiries to the study of behavioral expressions of consciousness (including verbal reports of other people speaking about their mental experiences) and the neural correlates of the mind. Moreover, virtually all scientific research on the mind has been focused on the minds of ordinary individuals or those who are psychologically ill or brain-damaged. This means that the methods used by scientists for studying the mind are confined to physical phenomena associated with ordinary states of consciousness. Because of the materialist limitations of this methodology, scientific thinking about the mind has been overwhelmingly materialistic. That is, most cognitive scientists assume without question that all possible states of consciousness are nothing more than functions or emergent properties of the brain. Many neuroscientists go so far as to assert that the mind is nothing more than the brain, although they have no evidence to verify this hypothesis. While the study of the mind began very late in the evolution of modern science and is still largely focused on the brain and behavior, in Buddhism understanding the mind has always been a central concern. Moreover, Buddhist methods for investigating, transforming, and liberating the mind rely heavily on the refinement and utilization of *samādhi*, which in terms of carefully observing the mind may be likened to an inwardly focused telescope. The Buddhist experiential investigation of the mind has not been confined to ordinary states of consciousness but rather has probed to the level of a subtle mind-stream that carries on from one lifetime to another and beyond that to a very subtle dimension of consciousness, known as the innate mind of clear light, that transcends all conceptual frameworks.

Although Buddhists acknowledge that there are invariably physiological correlates to every mental state of a living human being, and that ordinary mental and sensory processes are heavily dependent on physical processes, this does not imply that mental processes *are* physical processes or that all possible states of consciousness depend on the brain. It is important to recognize that when objective neural correlates of mental processes are observed, they display no mental characteristics; and when subjective mental events are observed, they exhibit no physical properties. Moreover, observing the brain alone yields no knowledge of the mind, and observing the mind alone yields no knowledge of the brain. Indeed, if brain scientists could not consult anyone’s first-person experience, they would have no idea that brain processes were correlated with mental states. And if contemplatives, carefully observing the mind, did not consult brain scientists, they would not likely identify specific brain activities that contributed to their mental experience. During the course of a human life, specific brain functions are necessary for the generation of specific mental states, and it is also clear that certain mental processes influence the brain.<sup>6</sup> However, there is no compelling evidence that the mind and brain are identical or that mental events are physical properties of the brain.

The materialistic methods and theories of modern science stand in stark contrast to the experiential methods and non-materialistic theories of Buddhism. Scientific methods of inquiry include the careful observation of physical phenomena only, whereas Buddhist contemplative methods of inquiry include the careful observation of both physical and non-physical phenomena. Given the materialistic methodology of science, it was inevitable that scientists would take a materialist view of the mind. But since Buddhist methods of inquiry are not confined to observing physical processes only, its interpretations of the mind-body relationship are not confined to materialistic hypotheses. This is a fundamental incompatibility between scientific and Buddhist views of the mind.

## Collaboration

Cognitive scientists are rightly proud of their discoveries about the mind gained by studying it indirectly on the basis of behavior, neural correlates, and interrogation of others regarding their subjective experience. Such sophisticated, quantitative measurements and analysis have yielded many important insights into the nature of

a wide range of mental processes. A growing number of cognitive scientists, however, are recognizing the importance of observing the mind directly, by way of first-person experience. Recognizing that this is not a strength of the scientific tradition, they are open to the possibility that the mind and brain (and indirectly the rest of the body) may be transformed through rigorous, sustained mental training, and that the ability to observe the mind may be enhanced through specific forms of meditation, such as *śamatha* and *vipaśyanā*. Moreover, a rapidly growing number of clinical psychologists are recognizing the value of Buddhist meditative practices involving mindfulness, introspection, and the cultivation of loving-kindness and compassion for overcoming mental problems, enhancing positive attitudes, and realizing genuine happiness. Although many sophisticated methods of *śamatha* and *vipaśyanā* meditation are taught in multiple schools of Buddhism, relatively few Buddhists are familiar with the classic literature on *śamatha* and *vipaśyanā*, and fewer still put these into practice with the same dedication that is common in scientific research. By collaborating with mind scientists, Buddhists may be inspired to take a much more experiential approach to their own meditative traditions, moving away from scholastic approaches to more empirical approaches to their own tradition. Thus, the engagement with science may revitalize the truly scientific elements that are already present, but often overlooked, within Buddhism.

Many psychologists and neuroscientists have come to the conclusion, based on their empirical research, that there is no independent self in the mind, the brain, or anywhere else inside or outside of the body. While there is widespread agreement among cognitive scientists regarding the nonexistence of such an unchanging, unitary, autonomous self that controls the body and mind, there is little agreement among them as to how the self *does* exist. Some believe the self does not exist at all, while others believe it is simply a function of the brain; but there appear to be few therapeutic benefits from these theories of the self as formulated within science. The disadvantage of such nihilistic and materialistic views of the self is that they undermine any sense of moral responsibility, and this is bound to have a profoundly detrimental effect on societies that adopt such beliefs. As Buddhists collaborate with scientists, they may find further evidence that the self does not inherently exist within or apart from the body and mind. And as scientists collaborate with Buddhists, they may find a middle way between the materialistic and nihilistic views of the self. Such a middle way, of asserting the conventional nature of a relatively existent self, may provide a scientific foundation for moral responsibility. The original theories and practices taught by the Buddha and the early masters of the Buddhist tradition have gradually been adapted to a wide range of cultures throughout Asia over the past two millennia. Over this long history, distinctive forms of Theravāda, Mahāyāna, and Vajrayāna Buddhism have developed and evolved in the process of being assimilated by different Asian civilizations. Especially during the past century, these Buddhist traditions have suddenly confronted the views, values, and way of life of the modern world, and this process of globalization is increasing at a growing rate. This means that if these diverse Buddhist traditions are to remain vital and relevant to their host societies and to the world at large, they must adapt to this rapidly changing social environment.

For Buddhism to retain its own integrity and vitality, its core principles and practices must be preserved, and for that to happen, they must be practiced in ways that are effective in the modern world. The primary responsibility for seeing that Buddhist practices remain effective lies with Buddhist teachers and students, but objective methods of scientific inquiry may also be useful for determining what methods are most effective for bringing about the results for which they were designed. For example, scientists may employ their measurements of behavior and brain activity to determine what meditative practices are most effective in the modern world for counteracting destructive emotions, for stabilizing the mind through the practice of *śamatha*, and for cultivating virtues that are the heart of the Buddhist path to enlightenment. Over time, such collaboration could give rise to a true revolution in the mind sciences and to a renaissance in the Buddhist tradition.

## **Buddhist Philosophy and Physics**

### **Confrontation**

By the late nineteenth-century, the scientific principle of the conservation of mass and energy implied that it was impossible for any nonphysical processes to exert any influences in the physical world: only physical entities could influence other physical entities. This, together with the nineteenth-century formulation of the theory of evolution, has resulted in a materialistic view of humans as being nothing more than biologically programmed robots, whose behavior is entirely determined by physical causes. This view is fundamentally incompatible with Buddhist views of causality, karma, and dependent origination.

However, such mechanistic materialism has been in decline since the late nineteenth century, and twentieth-century physics has questioned the absolute conservation of mass and energy. This is evident in the Heisenberg energy-time uncertainty principle, which allows for short violations of energy conservation. On the quantum level, unknown causal agencies may be posited without violating the conservation principle if, for any given system of measurement, (1) one does not specify the complete, exact initial conditions of the system to be measured; and (2) one allows for non-local influences. The Heisenberg uncertainty principle, together with the physical impossibility of absolutely isolating any finite system of measurement, make it impossible to determine the complete initial conditions of any system; and there are now strong empirical grounds for asserting the reality of non-local interactions.<sup>7</sup>

Many physicists believe that at the quantum level, effects occur without any preceding causes. This view is incompatible with the Buddhist view that all effects arise in dependence on prior causes. However, the only kind of causes that physicists can measure are physical, so when they declare that physical effects may occur without prior physical causes, this leaves open the possibility that nonphysical influences are at work. Consequently, it is possible in principle for a nonphysical mind to influence matter. Whether there such non-local, nonphysical quantum effects occur in mind-matter interactions remains an open question, but it is unscientific to assume without question that they do not exist.

The metaphysical realism of classical physics, which was initially based on the biblical belief of a God who created an absolutely existent objective world, continues to dominate the life sciences and mind sciences. According to metaphysical realism, (1) the world consists of mind-independent objects; (2) there is exactly one true and complete description of the way the world is; and (3) truth involves some sort of correspondence between an independently existent world and a description of it.<sup>8</sup> Although this view is compatible with the Vaibhāsika and Sautrāntika views, it is incompatible with the Cittamātra and Madhyamaka views of Buddhism.

A fundamental problem of metaphysical realism is that it assumes that invisible physical entities in the objective world, existing independently of any system of measurement, can be inferred on the basis of their measured effects. But according to Buddhist epistemology, it is impossible to infer a specific cause on the basis of an effect in cases where the cause itself and its production of the effect are undetectable. For instance, if one could never perceive fire, one could never infer that smoke must be caused by fire or that fire must always precede the appearance of smoke.

According to metaphysical realism, the entire objective universe consists of causes that produce the effects that are measured by human beings, but contents of the objective world as they exist independently of all measurements are invisible. Therefore, one can never infer the contents of the absolutely objective world, which are invisible, on the basis of perceived measurements, which always arise relative to systems of measurements. So the belief in metaphysical realism, which underlies much of modern physics, biology, and the mind sciences, is incompatible with a central tenet of Buddhist epistemology. And the belief that the whole of reality consists only of physical entities and their emergent properties and functions is incompatible with Buddhism as a whole.

## **Collaboration**

It is widely accepted among both cognitive scientists and physicists that the appearances to our physical senses—such as colors, sounds, smells, tastes, and tactile sensations—do not inherently exist objectively but only in relation to our sensory experiences of them. Such appearances do not inherently exist in external objects, in the space between those objects and our sense organs, or inside the sense organs themselves. Some physicists have concluded that such interdependence holds true for all of scientific knowledge: the subjective researcher and the objective field of research are always interrelated and exist only relative to each other. Especially on the basis of discoveries in quantum physics, some leading scientists have concluded that physics says nothing about the world as it exists independently of our methods of inquiry.

The renowned experimental physicist Anton Zeilinger, for instance, commented, “One may be tempted to assume that whenever we ask questions of nature, of the world there outside, there is reality existing independently of what can be said about it. We will now claim that such a position is void of any meaning... This

implies that the distinction between information, that is knowledge, and reality is devoid of any meaning.”<sup>9</sup> All configurations of mass and energy as measured by humans are empty of any objective existence independent of the systems by which they are measured; and the very categories of mass, energy, particles, and fields are empty of objective existence independent of the minds that conceive of them. In this regard, the measured objects, the system of measurement, and the observer-participant who designs and uses the system of measurement are all mutually interdependent. This suggests that not only our ordinary experience, but all scientific observations of the physical world are illusory in the sense that the objective world appears to be inherently existent, independent of all modes of observation and conceptualization, whereas it actually exists only relative to our methods of observation and ways of conceptually making sense of experience.

According to classical physics, space, time, matter, and energy are all thought to exist absolutely in the objective world. A growing number of modern physicists, including the eminent theoretical physicist John Archibald Wheeler, have recognized that scientific definitions of each of these entities are creations of the human mind, not discovered in the pre-existing, objective world of nature. Wheeler claimed that the universe consists of a “strange loop,” in which physics gives rise to observers and observers give rise to physics.<sup>10</sup> According to his view, the conventional view of the relationship between observers and the objective world is that matter yields information, and information makes it possible for observers to be aware of matter by way of the information produced by measurements. Wheeler, on the contrary, proposes that the presence of observers makes it possible for information to arise, for there is no information without there being someone who is informed; and that matter is a category constructed out of information. Succinctly put, the traditional view is: matter - information - observers, and Wheeler inverts this sequence: observers - information - matter. This interdependence between subjects and objects is a central theme in the Middle Way (Madhyamaka) philosophy, despite the great differences in methodologies of physicists and Buddhists. Such parallels suggest that meaningful theoretical collaboration could take place between physicists and Buddhist philosophers and contemplatives, and in fact such collaboration has already begun.<sup>11</sup>

Some physicists have taken the principles of quantum physics and applied them to the universe as a whole, creating the field of quantum cosmology. According to this mathematical description of the cosmos, the observer-participant plays a fundamental role in the very creation and evolution of the universe. Without such an observer-participant, time is said to be “frozen,” implying that the universe does not change or evolve without the intervening role of the observer. The past—including the 13.7 billion years since the big bang—does not exist independently of the observer, and the same is true of the present and future. The universe evolves only when an observer-participant divides it into two parts: a subjective observer and the rest of the objective universe, and the mathematical description of the rest of the objective universe depends on the time measured by the observer. In short, the evolution of the universe and everything in it, including life itself, is possible only relative to an observer-participant.

This implies that time itself has no inherent reality of its own. John Wheeler wrote in this regard: “It is wrong to think of that past as ‘already existing’ in all detail. The ‘past’ is theory. The past has no existence except as it is recorded in the present. By deciding what questions our quantum registering equipment shall put in the present we have an undeniable choice in what we have the right to say about the past.”<sup>12</sup> Stephen W. Hawking likewise declares that every possible version of a single universe exists simultaneously in a state of quantum superposition. When you choose to make a measurement, you select from this range of possibilities a subset of histories that share the specific features measured. The history of the universe as you conceive of it is derived from that subset of histories. In other words, you choose your past.<sup>13</sup>

According to contemporary cosmology, empty space throughout the universe now has much less symmetry than the original, high-temperature vacuum shortly after the big bang, much as ice is much less symmetric than liquid water. Physicists believe that as the universe cooled down, transitioning from the state of the “melted vacuum” to the current “frozen vacuum,” the initial symmetry was broken in various ways. The Nobel Prize winning physicist Steven Weinberg declares in this regard that the vision of the world we see around us is “only an imperfect reflection of a deeper and more beautiful reality.”<sup>14</sup>

The metaphor of the universe shifting from a “melted” to a “frozen” state finds a striking parallel in the teachings of the Dzogchen (Great Perfection) tradition of Tibetan Buddhism. The nineteenth-century Dzogchen master Dūdjom Lingpa, for instance, wrote, “This ground is present in the mind-streams of all sentient beings, but it is



tightly constricted by dualistic grasping; and it is regarded as external, firm, and solid. This is like water in its natural, fluid state freezing in a cold wind. It is due to dualistic grasping onto subjects and objects that the ground, which is naturally free, becomes frozen into the appearances of things.”<sup>15</sup> Likewise, H. H. the Dalai Lama recently commented in the context of the Dzogchen view, “Any given state of consciousness is permeated by the clear light of primordial awareness. However solid ice may be, it never loses its true nature, which is water. In the same way, even very obvious concepts are such that their ‘place,’ as it were, their final resting place, does not fall outside the expanse of primordial awareness. They arise within the expanse of primordial awareness and that is where they dissolve.”<sup>16</sup> A number of other similar themes between the Dzogchen school and quantum cosmology suggest that this, too, may be a fruitful area for collaborative research.

A major difference between the above theories of distinguished physicists and similar Buddhist theories is that Buddhism presents methods of meditation for putting its theories to the test of experience. The insights gained through such contemplative inquiry liberate the minds of those who become accomplished in these advanced practices, and such realizations also profoundly transform the body as well. These are extraordinary claims from the Buddhist side, and the collaboration with scientists in the exploration of these practices and their related theories could be of great benefit to humanity.

## Conclusion

One of the greatest potentials of the interface between Buddhism and science is that Buddhists may encourage scientists to question their materialistic assumptions and incorporate sophisticated systems of contemplative inquiry within the scientific community. This may give rise to the first true revolution in the mind sciences, which is bound to have profound repercussions for the rest of science and humanity at large. Likewise, scientists may encourage Buddhists to question their own assumptions, to revitalize their own traditions of contemplative inquiry, and to integrate them with the empirical methods of modern science. In short, Buddhists and scientists may help each other in overcoming their tendencies to dogmatism and replace this with a fresh and open-minded spirit of empiricism.

The twentieth-century disengagement of ethics from scientific inquiry, based upon an illusory division between facts and values and the myth of value-free science has been disastrous for humanity. Not only for the sake of human flourishing, but for the very existence of human civilization, we are now faced with the challenge to evolve spiritually so that we can adapt to the rapid changes in the social and natural environment so that we may survive and possibly flourish as never before in history.

A growing number of scientists are open to Buddhist claims about the nature and potentials of consciousness, but they wish to see empirical evidence of the truth of such claims. This requires collaboration with expert Buddhist contemplatives who are able to demonstrate by means of their own experience the truth of Buddhist assertions about such themes as past-life recall, extrasensory perception, other paranormal abilities, and the realization of emptiness and Buddha nature.

To help train such contemplative scientists who are expert in Buddhist theory and practice and are willing and able to collaborate with modern scientists, it is important to establish contemplative research centers, where intensive training is offered that integrates Buddhist theory and meditative practice. In the spring of 2010, such a center, called the Phuket Mind Training Academy (one of three facilities in the Phuket International Academy), will begin operating on the island of Phuket, off the west coast of Thailand. This will be a forty-room retreat center where a series of eighty-day intensive retreats will be offered each year. These will cover basic training in three phases: (1) the cultivation of renunciation, the four immeasurables, and *śamatha*, (2) the cultivation of the *bodhicitta*, namely, the altruistic motivation to achieve perfect enlightenment for the sake of all sentient beings, and mind training (*blo-sbyong*) (3) practices of *vīpaśyanā*, specifically the four applications of mindfulness (*dran pa nyer gzhaḡ bzhi*) according to both the Śrāvakayāna and Mahāyāna traditions of Buddhism. The central aim of this series of trainings is for students to achieve the Mahāyāna Path of Accumulation (*tshogs lam*), thereby setting out on the Bodhisattva path to enlightenment.

On that basis, more advanced training will be offered in Vajrayāna theory and practice, including Mahāmudrā and Dzogchen. Obviously, eighty days is generally too short a period to master any of the above practices, we

who are developing this retreat center are in correspondence with individuals and groups around the world who are establishing long-term retreat centers where people who already know how to meditate can continue in full-time, single-pointed practice for months or years on end for only the cost of their food and utilities. So people may come to the retreat center in Phuket for intensive, eighty-day trainings, then move to one of these “satellite centers” for as long as necessary to master the practices they are following. Eventually, we hope that the Phuket International Academy will also be able to provide accommodation and guidance for contemplatives to continue their training for months and years on end.

This center will also have a scientific laboratory where scientists will conduct research on the psychological and physiological changes that take place as a result of such intensive, sustained, meditative practice. Scientists will also be welcome to participate in the meditation courses, just as Buddhists will be encouraged to learn as much as they wish about scientific theories and practices. In this way we hope to train a new generation of “contemplative scientists” who are well versed in both science and Buddhism. Such individuals may take a seminal role in bringing about a renaissance in Buddhism and a revolution in the mind sciences.

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## Notes

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