# THE SELF-AWARE UNIVERSE

## HOW CONSCIOUSNESS CREATES THE MATERIAL WORLD

*Amit Goswami, Ph.D.*

WITH RICHARD E. REED
AND MAGGIE GOSWAMI

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*To my brother the philosopher*
*Nripendra Chandra Goswami*

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# ILLUSTRATIONS

# PREFACE

When I was a graduate student studying quantum mechanics, a group of us would spend hours discussing such esoterica as, Can an electron really be at two places at the same time? I could accept that, yes, the electron can be at two places at the same time; the message of quantum mathematics, although full of subtlety, is unambiguous on this point. Does an ordinary object, however —a chair or a desk, things that we call "real"—behave like an electron? Does it become a wave and start spreading in the wave's inexorable way whenever no one is looking?

Objects found in our everyday experience do not seem to behave in the strange ways common to quantum mechanics. Thus, subconsciously, it is easy for us to be lulled into thinking that macroscopic matter is different from microscopic particles—that its conventional behavior is governed by Newtonian laws, which are referred to as classical physics. Indeed, many physicists stop puzzling over the paradoxes of quantum physics and succumb to this solution. They divide the world into quantum and classical objects—and so did I, although I did not realize what I was doing.

To forge a successful career in physics, you cannot worry too much about such recalcitrant questions as the quantum puzzles. The pragmatic way of doing quantum physics, I was told, is to learn to calculate. I therefore compromised, and the tantalizing questions of my youth gradually shifted to a back burner.

They did not, however, disappear. Circumstances shifted for me, and—after my umpteenth bout of the stress heartburn that characterized my competitive-physics career—I began to remember the exuberance I once felt about physics. I realized that there must be a joyful way of approaching the subject, but I needed to restore my spirit of inquiry into the meaning of the universe and to abandon the mental compromises I had made for career motives. A book by the philosopher Thomas Kuhn that distinguishes paradigm research from scientific revolutions that shift paradigms was very helpful. I had done my share of paradigm research; it was time to move on to the frontier of physics and to think about a paradigm shift.

Just about the time of my personal crossroads, Fritjof Capra's book *The Tao of Physics* came out. Although my initial reaction to the book was jealousy and rejection, it did touch me deeply. After a while I could see that the book

broaches a problem that it does not investigate thoroughly. Capra delves into the parallels between a mystical view of the world and that of quantum physics but does not investigate the reason for these parallels: Are they more than coincidence? At last, I had found the focus of my inquiry into the nature of reality.

Capra's entree to questions about reality was through elementary particle physics, but I intuited that the key issues are most directly confronted in the problem of how to interpret quantum physics. This is what I set out to investigate. I did not anticipate initially that this would be such an interdisciplinary project.

I was teaching a course on the physics of science fiction (I have always had a soft spot for science fiction), and a student commented: "You talk like my psychology professor, Carolin Keutzer!" A collaboration with Keutzer ensued that, although not leading to any major insight, did introduce me to a lot of relevant psychological literature. I eventually became familiar with the work of Mike Posner and his cognitive psychology group at the University of Oregon, which was to play a crucial role in my research.

Besides psychology, my subject of research demanded considerable knowledge of neurophysiology—brain science. I met my neurophysiology teacher through the mediation of John Lilly, the famous dolphinologist. Lilly had kindly invited me to participate in a week-long Esalen seminar that he was giving; Frank Barr, M.D., was also a participant. If my passion was quantum mechanics, Frank's was brain theory. I was able to learn from him just about everything I needed to begin the brain-mind aspect of this book.

One other crucial ingredient for my ideas to gel consisted of the theories of artificial intelligence. Here, too, I was very fortunate. One of the exponents of artificial intelligence theory, Doug Hofstadter, began his career as a physicist; he earned his degree at the University of Oregon graduate school, where I teach. Naturally, when his book came out, I had a special interest in it and learned some of my key ideas from Doug's research.

The meaningful coincidences go on and on. I was initiated to the research in parapsychology through many discussions with another of my colleagues, Ray Hyman, who is a very open-minded skeptic. Last but not least of the important coincidences was my meeting with three mystics in Lone Pine, California, during the summer of 1984: Franklin Merrell-Wolff, Richard Moss, and Joel Morwood.

In a sense, since my father was a Brahmin guru in India, I grew up immersed in mysticism. At school, however, I started a long detour through the

conventional training and practice of a scientist with a compartmentalized specialty. This direction pointed me away from my childhood sympathies and resulted in my believing that the objective reality defined by conventional physics is the only reality—anything subjective is due to a complex dance of atoms waiting to be deciphered by us.

In contrast, the Lone Pine mystics talked about consciousness as being "original, self-contained, and constitutive of all things." Their ideas led to considerable cognitive dissonance for me in the beginning, but eventually I realized that one can still do science even if one assumes the primacy of consciousness rather than of matter. This way of doing science, moreover, routs not only the quantum paradoxes of my teenaged puzzling but also new ones of psychology, the brain, and artificial intelligence.

Well, this book is the end product of my roundabout journey. It took ten to fifteen years to overcome my bias for classical physics and then to research and write the book. I hope that the fruit of my effort will be worth your while. To paraphrase Rabindranath Tagore,

*I have listened*
*And I have looked*
*With open eyes.*
*I have poured my soul*
*Into the world*
*Seeking the unknown*
*Within the known.*
*And I sing out loud*
*In amazement.*

Obviously, many more people than the aforementioned contributed to the book: Jean Burns, Paul Ray, David Clark, John David Garcia, Suprokash Mukherjee, the late Fred Attneave, Jacobo Grinberg, Ram Dass, Ian Stuart, Henry Stapp, Kim McCarthy, Robert Tompkins, Eddie Oshins, Shawn Boles, Fred Wolf, and Mark Mitchell—just to mention a few. The encouragement and emotional support of friends were important, notably from Susanne Parker Barnett, Kate Wilhelm, Damon Knight, Andrea Pucci, Dean Kisling, Fleetwood Bernstein, Sherry Anderson, Manoj and Dipti Pal, Geraldine Moreno-Black and Ed Black, my late colleague Mike Moravcsik, and especially our late and beloved friend Frederica Leigh.

Special thanks go to Richard Reed, who convinced me to submit the manuscript for publishing and who took it to Jeremy Tarcher. In addition, Richard has given important support, critique, and help with the editing. Of

course, my wife, Maggie, has contributed so much both to the development of ideas and to the language that expresses the ideas that this book literally would have been impossible without her. The editors provided by J. P. Tarcher, Inc.—Aidan Kelly, Daniel Malvin, and especially Bob Shepherd—have earned my heartfelt thanks, as has Jeremy Tarcher himself for believing in this project. I thank you all.

# FOREWORD

It wasn't that long ago when we physicists believed that we had finally come to the end of all our searching: We had reached the end of the road and found the mechanical universe perfect in all of its splendor. Things behave the way they behave because they were the way they were in the past. They will be the way they will be because they are the way they are, and so on. Everything fit in a nice tiny package of Newtonian-Maxwellian thought. There were mathematical equations that actually fit the behavior of nature. There was a one-to-one correspondence between a symbol on the page of the scientific paper and the movement of the tiniest to the grossest object in space and through time.

It was the end of a century, the nineteenth, to be exact, and the renowned A. A. Michelson, speaking about the future of physics, said that it would consist of "adding a few decimal places to results already obtained." To be fair, Michelson believed he was quoting the famous Lord Kelvin in making this remark. Actually it was Kelvin who said that indeed everything was perfect in the landscape of physics except for two dark clouds obscuring the horizon.

These two dark clouds, it turned out, not only blotted out the sun of the Turneresque, Newtonian landscape, they changed it into a bewildering abstract Jackson Pollock vision of points, smears, and waves. These clouds were the forerunners of the now-famous quantum theory of everything.

Thus here we are again at the end of the century, the twentieth, to be exact, and once more clouds are gathering to obscure the landscape of even the quantum world of physics. Just as before, the Newtonian landscape certainly had and still has its admirers. It still works in explaining a vast range of mechanical phenomena, from spaceships to automobiles, from satellites to can openers; and yet, just as the quantum abstract painting ultimately has shown that this Newtonian landscape is made up of seemingly random dots (quanta), there are still many of us who believe that ultimately there is some kind of objective mechanical order underlying everything, even the quantum dots.

Science, you see, proceeds by a very fundamental assumption of the way things are or must be. That assumption is the very thing that Amit Goswami, with the assistance of Richard E. Reed and Maggie Goswami, brings into question in the book you are about to read. For this assumption, like its cloudy

predecessors of the century before, seems to be signaling not only the end of a century but the end of science as we know it. That assumption is that there exists, "out there," a real, objective reality.

This objective reality is something solid; it is made up of things that have attributes, such as mass, electrical charge, momentum, angular momentum, spin, position in space, and continuous existence through time expressed as inertia, energy, and going even deeper into the microworld, such attributes as strangeness, charm, and color. And yet the clouds still gather. For in spite of all that we know about the objective world, even with its twists and turns of space into time into matter, and the black clouds called black holes, with all of our rational minds working at full steam ahead, we are still left with a flock of mysteries, paradoxes, and puzzle pieces that simply do not fit.

But we physicists are a stubborn lot, and we fear the proverbial toss of the baby out with the bathwater. We still lather and shave our faces watching carefully as we use Occam's razor to make sure that we cut away all superfluous "hairy assumptions." What are these clouds that obscure the end of the twentieth century's abstract art form? They boil down to one sentence: The universe does not seem to exist without a perceiver of that universe.

Well, at some level this certainly makes sense. Even the word "universe" is a human construct. So it would make some kind of sense that what we call the universe depends on our word-making capacity as human beings. But is this observation any deeper than a simple question of semantics? For example, before there were human beings, was there a universe? It would seem that there was. Before we discovered the atomic nature of matter, were there atoms around? Again, logic dictates that the laws of nature, forces and causes, etc., even though we didn't know about such things as atoms and subatomic particles, certainly had to exist.

But it is just these assumptions about objective reality that have been called into question by our present understanding of physics. Take, for example, a simple particle, the electron. Is it a little speck of matter? It turns out that to assume that it is such, consistently behaving itself as such, is clearly wrong. For at times it appears to be a cloud made up of an infinite number of possible electrons that "appear" as a single particle when and only when we observe one. Furthermore, when it is not a single particle it appears to be an undulating wavelike cloud that is capable of moving at speeds in excess of light speed, totally contradicting the Einstein concern that nothing material can move faster than light. But Einstein's worry is assuaged, for when it moves this way, it is not actually a piece of matter.

Take as another example the interaction between two electrons. According to quantum physics, even though the two electrons may be vast distances apart, the results of observations carried out upon them indicate that there must be some connection between them that allows communication to move faster than light. Yet before those observations, before a conscious observer made up his or her mind, even the form of the connection was totally indeterminate. And as a third example, a quantum system such as an electron in a bound physical state appears to be in an indeterminate state, and yet the indeterminacy can be analyzed into component certainties that somehow add to the original uncertainty. Then along comes an observer who, like some gigantic Alexander chopping the Gordian knot, resolves the uncertainty into a single, definite but unpredictable state simply by observing the electron.

Not only that, the blow of the sword could come in the future determining what state the electron is in now. For we have now even the possibility that observations in the present legitimately determine what we can say was the past.

Thus we have come to the end of a road once again. There is too much quantum weirdness around, too many experiments showing that the objective world—one that is running forward in time like a clock, one that says action at a distance, particularly instantaneous action at a distance, is not possible, one that says a thing cannot be in two or more places at the same time—is an illusion of our thinking.

So what can we do? This book may have the answer. The author posits a hypothesis that is so strange to our Western minds as to be automatically dismissed as the ravings of an Eastern mystic. It says that all of the above paradoxes are explainable, are understandable, if we are to give up that precious assumption that there is an objective reality “out there” independent of consciousness. It says even more, that the universe is “self-aware” and that it is consciousness itself that creates the physical world.

As Goswami uses the word “consciousness,” he is implying something perhaps more profound than you or I would imply. In his terms consciousness is something transcendental—outside of space-time, nonlocal, and all-pervading. It is the only reality, yet we are able to glimpse it only through the action that gives rise to the material and mental aspects of our observational processes.

Now, why is this so hard for us to accept? Perhaps I am presuming too much to say that it is hard to accept for you the reader. Perhaps you find this hypothesis self-evident. Well, at times I am comfortable with this, but then I

bump into a chair and bruise my leg. That old reality sinks in, and I "see" myself distinct from the chair as I curse its position in space so arrogantly separate from mine. Goswami addresses this issue admirably and provides several often amusing examples to illustrate his thesis that I and the chair arise out of consciousness.

Goswami's book is an attempt to bridge the age-old gap between science and spirituality, which he believes his hypothesis accomplishes. He has much to say about monistic idealism and how it alone resolves the paradoxes of quantum physics. Next he looks into the age-old question of mind and body or mind and brain and shows how his overarching hypothesis that consciousness is everything heals the Cartesian split—and in particular, in case you were wondering, even how one consciousness appears to be so many separate consciousnesses. Finally, in the last part of the book he offers a glimmer of hope as we grope through the clouds to the twenty-first century as he explains how this hypothesis will actually accomplish the re-enchantment of the person with his environment, something we assuredly need. He explains how he experienced his own theory when he realized the mystical truth, the "nothing-but-consciousness must be experienced in order to be truly *understood."*

Reading this book, I also began to feel this. Given that the hypothesis is truth, then it would follow that you too will have this experience.

Fred Alan Wolf, Ph.D.
author of *The Dreaming Universe,*
*Taking the Quantum Leap,* and other books
La Conner, Washington

# PART 1

## THE INTEGRATION OF SCIENCE AND SPIRITUALITY

*A critical level of confusion permeates the world today. Our faith in the spiritual components of life—in the vital reality of consciousness, of values, and of God—is eroding under the relentless attack of scientific materialism. On the one hand, we welcome the benefits derived from a science that assumes the materialist worldview. On the other hand, this prevailing worldview fails to satisfy our intuitions about the meaningfulness of life.*

*During the past four hundred years, we have gradually adopted the belief that science can be built only on the notion that everything is made of matter—of so-called atoms in the void. We have come to accept materialism dogmatically, despite its failure to account for the most familiar experiences of our daily lives. In short, we have an inconsistent worldview. Our predicament has fueled the demand for a new paradigm—a unifying world view that will integrate mind and spirit into science. No new paradigm, however, has surfaced.*

*This book proposes such a paradigm and shows how we can develop a science that embraces the religions of the world, working in concert with them to understand the whole human condition. The centerpiece of this new paradigm is the recognition that modern science validates an ancient idea—the idea that consciousness, not matter, is the ground of all being.*

*The first part of this book introduces the new physics and a modern version of the philosophy of monistic idealism. On these two pillars, I shall attempt to construct the promised new paradigm, a bridge over the chasm between science and religion. Let there be commerce between the two.*

# *Chapter I*

## THE CHASM AND THE BRIDGE

I SEE A STRANGE, torn-up caricature of a man beckoning to me. What is he doing here? How can he exist in so fragmented a state? What do I call him?

As if reading my mind, the tortured figure speaks: "In my condition, what difference does a name make? Call me Guernica. I am looking for my consciousness. Am I not entitled to consciousness?"

I recognize the name. *Guernica* is the masterpiece Pablo Picasso painted in protest against the Fascist bombing of a little Spanish town of that name.

"Well," I reply, trying to soothe him, "if you will tell me precisely what you need, perhaps I can help."

"You think so?" His eyes light up. "Maybe you will plead my case?" He looks at me yearningly.

"With whom? Where?" I ask, intrigued.

"Inside. They are having a party while I am abandoned out here unconscious. Maybe if I find my consciousness, I'll be whole again."

"Who are they?" I ask.

"The scientists, the ones who decide what's real."

"Oh? The situation can't be so bad then. I am a scientist. Scientists are an open bunch. I'll go talk to them."

The people at the party are divided into three separate groups like the islands of the Bermuda triangle. I hesitate for a moment, then stride firmly toward one of these groups—when in Rome and all that. The conversation is intense. They are talking about quantum physics. They must be physicists.

"Quantum physics gives predictions for the events that we observe experimentally, nothing more," a distinguished-looking gentleman with just a touch of gray in his hair says. "Why make unsupported assumptions about reality when talking about quantum objects?"

"Aren't you a little tired of that line? A whole generation of physicists seems to have been brainwashed into thinking that an adequate philosophy of quantum physics was developed sixty years ago.[1] That is just not the case. Nobody understands quantum mechanics," says another, whose sad

demeanor is obvious.

Those words scarcely register in the discussion when another gentleman, displaying an unruly beard, says with arrogant authority: "Look, let's set the context right. Quantum physics says that objects are represented by waves. Objects are waves. And waves, as we all know, can be at two (or more) places at the same time. But when we observe a quantum object, we find it all at one place, here, not over there, and certainly not both here and over there at the same time."

The bearded fellow is waving his hands excitedly. "So what does this mean in simple terms? You," he says, looking at me, "what do you say, sir?"

I am taken aback for a moment by this challenge but speedily recover. "Well, it seems that our observations, and thus we, have a profound effect on quantum objects."

"No. No. No," my interrogator thunders. "When we observe, there is no paradox. When we don't, the paradox of the object being in two places at the same time returns. Obviously, the way to avoid the paradox is to vow never to talk about an object's whereabouts in between observations."

"But what if we, our consciousness, really have a profound effect on quantum objects?" I persist. Somehow, it seems to me, Guernica's consciousness has something to do with this speculation.

"But that means mind over matter," all the people in the group cry in unison, looking at me as if I have uttered heresy.

"But, but," I stammer, refusing to be daunted, "suppose there is a way of reconciling mind over matter."

I tell them about Guernica's predicament. "Look, fellows, you have a social responsibility here. You have known for sixty years that the conventional, objective way of doing physics does not work with quantum objects. We get paradoxes. Yet you pretend objectivity, and the rest of the society misses a chance of recognizing that we—our consciousness—are intimately connected with reality. Can you imagine the impact on the ordinary person's worldview if physicists plainly admit that we are not separate but, instead, are the world and must take responsibility for it? Maybe then only, Guernica, nay, all of us can return to wholeness."

The distinguished gentleman intervenes. "I will admit when it's deep in the night and nobody's around, I have doubts. Maybe we are missing a chance. But my mother taught me, when in doubt, it's much better to pretend ignorance. We don't know a thing about consciousness. Consciousness belongs to psychology, to those guys over there," he gestures toward a corner.

"But," I persist doggedly, "suppose we define consciousness as the agency that affects quantum objects to make their behavior sensible. I am sure

psychologists would consider that possibility if you guys join me. Let's take a crack at changing our separatist worldview right now." I have become certain that Guernica's chance to gain consciousness depends on the success of my rallying these people.

"It is opening Pandora's box to say that consciousness causally affects atoms. That would turn objective physics upside down; physics would not be self-contained, and we would lose our credibility." There is a tone of finality in the voice that speaks. Somebody else with a voice that I had heard before, says: "Nobody understands quantum mechanics."

"But I promised Guernica that I would plead for his consciousness! Please, hear me out," I protest, but nobody pays any attention. I have become a nonentity in this group—a nonconsciousness, like Guernica.

I decide to try the psychologists. I recognize them by the cluster of rat cages and computers in their corner.

A competent-looking woman is explaining something to a young man. "By assuming that the brain-mind is a computer, we hope to go beyond the behaviorist rat race. The brain is the computer's hardware. There is nothing, really, but the brain; that's what's real. However, the states of the brain's hardware, over time, carry out independent functions, like computer software. It's these states of the hardware that we call the mind."

"Then what is consciousness?" probes the young man.

Hey, what perfect timing. That's just what I came over here to find out—how psychologists think of consciousness! They must be the ones who have control over Guernica's consciousness.

"Consciousness is like the central processing unit, the command center of the computer," answers the woman patiently.

Her questioner, not satisfied with this reply, presses on: "If we can explain, even in principle, all our input-output performances in terms of the activity of computer circuits, then consciousness seems to be absolutely unncessary."[2]

I cannot restrain myself. "Please don't give up on consciousness yet. My friend Guernica needs it." I tell them about Guernica's problem.

Sounding like an echo of my erstwhile physicist friend, a nattily dressed gentleman casually interjects: "But cognitive psychology is not ready for consciousness yet.[3] We don't even know how to define it."

"I can give you a physicist's definition of consciousness. It has to do with the quantum."

That last word gets their attention. First, I explain about quantum objects being waves that spread in existence at more than one place and how consciousness may be the agency that focuses the waves so we can observe

them at one place. “And this is the solution to your problem,” I offer. “You can take the definition of consciousness from physics! And then maybe you can help Guernica.” ,

“But aren’t you mixing things up? Don’t physicists say that everything is made of atoms—quantum objects. If consciousness is also made of quantum objects, how can it causally act on them? Think, man, think.”

I am panicking a little bit. If these psychologists know what they are talking about, even my consciousness is an illusion, let alone Guernica’s. But the psychologists are right only if all things, including consciousness, really are made of atoms. Suddenly, another possibility flashes to my mind! And I blurt out: “You are doing it all wrong! You can’t be sure if all things are made of atoms—it’s an assumption. Suppose all things, including atoms, are made of consciousness, instead!”

My listeners seem stunned. “Look, there are some psychologists who think that way. I admit, yours is an interesting possibility. But it is not scientific. If we want to elevate psychology to the status of science, we must keep away from consciousness—especially the notion that consciousness might be the primary reality. Sorry, fella.” The woman who has spoken actually sounds quite sympathetic.

But I still haven’t made any headway for Guernica’s consciousness. In desperation, I turn to the last group—the third apex of the triangle. They turn out to be neurophysiologists (brain scientists). Perhaps they are the judges who really count.

The brain scientists are also having an argument about consciousness, and my expectations rise. “Consciousness is a causal entity that brings meaning to existence, I give you that,” says one of them, addressing an older man who is quite thin. “But it must be an emergent phenomenon of the brain, not separate from it. After all, everything is made of matter; that’s all there is.”[4]

The thin fellow, speaking with a British accent, objects. “How can something made of something else act causally on what it’s made of? That would be like a television commercial repeating itself by acting on the electronic circuitry of the television set. God forbid! No, consciousness has to be a separate entity from the brain in order to have a causal effect on it. It belongs to a separate world outside the material world.”[5]

“But then how do the two worlds interact? A ghost cannot act on a machine.”

Rudely interrupting, a third man, wearing his hair in a ponytail, laughs and says: “Both of you are talking humbug. All your problems arise from trying to find meaning in an inherently meaningless material world. Look, the physicists are right when they say there is no meaning, there is no free will, and

everything is the random play of atoms."

The British supporter of a separate world for consciousness, now sarcastic, retorts: "And you think what you say makes sense! You, yourself, are the play of the random, meaningless motion of atoms, yet you make theories and think that your theories mean something."

I wedge myself into the debate. "I know a way to have meaning even in the play of atoms. Suppose that instead of everything being made of atoms, everything is made of consciousness. What then?"

"Where did you get that idea?" they challenge.

"Quantum physics," I tell them.

"But there is no quantum physics at the macro level of the brain," they all exclaim with authority, unified in their objection. "The quantum is for the micro, for the atoms. Atoms make up molecules, molecules make up cells, and cells make up the brain. We work with the brain every day; there is no need to invoke the quantum mechanics of atoms to explain the gross-level behavior of the brain."

"But you don't claim complete understanding of the brain, do you? The brain is not that simple! Didn't somebody say that if the brain were so simple that we could understand it, then we would be so simple that we couldn't?"

"Be that as it may," they concede, "how does the idea of the quantum help with consciousness?"

I tell them about consciousness affecting the quantum wave. "Look, this is a paradox if consciousness is made of atoms. But if we flip our view of what the world is made of, this paradox is very satisfactorily resolved. I assure you, the world is made of consciousness." I can't conceal my excitement and even pride—it is such a powerful idea. I plead with them to join me.

"The sad thing," I continue, "is that if ordinary people really knew that consciousness and not matter is the link that connects us with each other and the world, then their views about war and peace, environmental pollution, social justice, religious values, and all other human endeavors would change radically."

"That sounds interesting, and I sympathize, believe me. But your idea also sounds like something out of a Good Book. How can we adopt religious ideas as science and still be credible?" The questioner sounds like he is talking to himself.

"I am asking you to give consciousness its due," I reply. "My friend Guernica needs consciousness to become whole again. And from what I've heard at this party, he's not the only one. How can you still debate whether consciousness even exists? Enough is enough. Surely the existence of consciousness is not debatable, and you know it."

"I see," says the fellow with the ponytail, shaking his head. "My friend, there's been a misunderstanding. We have all chosen to be Guernica; you have to if you want to do science. We have to assume that we are all made of atoms. Our consciousness has to be a secondary phenomenon—an epiphenomenon—of the dance of atoms. The essential objectivity of science demands it."

I go back to Guernica and sadly tell him my experience. "As Abraham Maslow once said, 'If the only tool you have is a hammer, then you start treating everything as if it were a nail.' These people are used to seeing the world as made of atoms and separate from themselves. They see consciousness as an illusory epiphenomenon. They can't grant you consciousness."

"But how about you?" Guernica gazes at me intensely. "Are you also going to hide behind scientific objectivity, or are you going to do something to help me regain wholeness?" He is shaking me now.

His intensity wakes me from the dream. Slowly, a resolve is born to write this book.

Today in physics, we face a great dilemma. In quantum physics—the new physics—we have found a theoretical framework that works; it explains myriad laboratory experiments and more. Quantum physics has led to such tremendously useful technologies as transistors, lasers, and superconductors. Yet we cannot make sense of the mathematics of quantum physics without suggesting an interpretation of experimental results that many people can only look upon as paradoxical, even impossible. Behold the following quantum properties:

- A quantum object (for example, an electron) can be at more than one place at the same time *(the wave property).*
- A quantum object cannot be said to manifest in ordinary space-time reality until we observe it as a particle *(collapse of the wave).*
- A quantum object ceases to exist here and simultaneously appears in existence over there; we cannot say it went through the intervening space *(the quantum jump).*
- A manifestation of one quantum object, caused by our observation, simultaneously influences its correlated twin object—no matter how far apart they are *(quantum action-at-a-distance).*

We cannot connect quantum physics with experimental data without using some schema of interpretation, and interpretation depends on the philosophy we bring to bear on the data. The philosophy that has dominated science for centuries (physical, or material, realism) assumes that only matter—consisting of atoms or, ultimately, elementary particles—is real; all else are secondary phenomena of matter, just a dance of the constituent atoms. This worldview is called realism because objects are assumed to be real and independent of subjects, us, or of how we observe them.

The notion, however, that all things are made of atoms is an unproven assumption; it is not based on any direct evidence for all things. When the new physics confronts us with a situation that seems paradoxical from the perspective of material realism, we tend to overlook the possibility that the paradoxes may be arising because of the falsity of our unproven assumption. (We tend to forget that a long-held assumption does not thereby become a fact, and we often even resent being reminded.)

Many physicists today suspect that something is wrong with material realism but are afraid to rock the boat that has served them so well for so long. They do not realize that their boat is drifting and needs new navigation under a new worldview.

Is there an alternative to the philosophy of material realism? Material realism strains unsuccessfully, notwithstanding its computer models, to explain the existence of our minds, especially the phenomenon of a causally potent self-consciousness, "What's consciousness?" The material realist tries to shrug away the question by answering cavalierly that it doesn't matter. If, however, we take all the theories that the conscious mind constructs (including the ones that negate it) with any seriousness, consciousness does matter.

Since René Descartes divided reality into two separate realms—mind and matter—many people have tried to rationalize the causal potency of conscious minds within Cartesian dualism. Science, nevertheless, presents compelling reasons to doubt that a dualistic philosophy is tenable: In order for the worlds of mind and matter to interact, they must exchange energy, yet we know that the energy of the material world remains constant. Surely, then, there is only one reality. Here is the catch 22: If the one reality is material reality, consciousness cannot exist except as an anomalous epiphenomenon.

So the question is, Is there a monistic alternative to material realism, where mind and matter are integrally part of one reality, but a reality that is not based on matter? I am convinced there is. The alternative that I propose in this book is monistic idealism. This philosophy is monistic as opposed to dualistic, and it is idealism because ideas (not to be confused with ideals) and the

consciousness of them are considered to be the basic elements of reality; matter is considered to be secondary. In other words, instead of positing that everything (including consciousness) is made of matter, this philosophy posits that everything (including matter) exists in and is manipulated from consciousness. Note that the philosophy does not say that matter is unreal but that the reality of matter is secondary to that of consciousness, which itself is the ground of all being—including matter. In other words, in answer to What's matter? a monistic idealist would never say, Never mind.

This book shows that the philosophy of monistic idealism provides a paradox-free interpretation of quantum physics that is logical, coherent, and satisfying. Moreover, mental phenomena—such as self-consciousness, free will, creativity, even extrasensory perception—find simple, satisfying explanations when the mind-body problem is reformulated in an overall context of monistic idealism and quantum theory. This reformulated picture of the brain-mind enables us to understand our whole self entirely in harmony with what the great spiritual traditions have maintained for millennia.

The negative influence of material realism on the quality of modern human life has been staggering. Material realism poses a universe without any spiritual meaning: mechanical, empty, and lonely. For us—the inhabitants of the cosmos—this is perhaps the more unsettling because, to a frightening degree, conventional wisdom holds that material realism has prevailed over theologies that propose a spiritual component of reality in addition to the material one.

The facts prove otherwise; science proves the potency of a monistic philosophy over dualism—over spirit separated from matter. This book presents a strong case, supported by existing data, that the monistic philosophy needed now in the world is not materialism but idealism.

In the idealist philosophy, consciousness is fundamental; thus our spiritual experiences are acknowledged and validated as meaningful. This philosophy accommodates many of the interpretations of human spiritual experience that have sparked the various world religions. From this vantage point we see that some of the concepts of various religious traditions become as logical, elegant, and satisfying as the interpretation of experiments of quantum physics.

Know thyself. This has been the advice through the ages of philosophers who were quite aware that our self is what organizes the world and gives it meaning; to know the self along with nature was their comprehensive objective. Modern science's embracing of material realism changed all that; instead of being united with nature, consciousness became separate from nature, leading to a psychology separate from physics. As Morris Berman notes, this material realist worldview exiled us from the enchanted world in

which we lived in yesteryear and condemned us to an alien world.[6] Now we live like exiles in this alien land; who but an exile would risk destroying this beautiful earth with nuclear war and environmental pollution? Feeling like exiles undermines our incentive to change our perspective. We are conditioned to believe that we are machines—that all our actions are determined by the stimuli we receive and by our prior conditioning. As exiles, we have no responsibility, no choice; our free will is a mirage.

This is why it has become so important for each of us to examine closely our worldview. Why am I being threatened by nuclear annihilation? Why does warfare continue as the barbaric way to settle the world's disputes? Why is there recurrent famine in Africa when we in the United States alone can grow enough food to feed the world? How did I acquire a worldview (more importantly, am I stuck with it?) that dictates so much separateness between me and my fellow humans, all of us sharing similar genetic, mental, and spiritual endowments? If I disown the outdated worldview that is based on material realism and investigate the new/old one that quantum physics seems to demand, might the world and I be once more integrated?

We need to know about us; we need to know if we can change our perspectives—if our mental makeup permits it. Can the new physics and the idealist philosophy of consciousness give us new contexts for change?

# *Chapter 2*

## THE OLD PHYSICS AND ITS PHILOSOPHICAL LEGACY

SEVERAL DECADES AGO, the American psychologist Abraham Maslow formulated the idea of a hierarchy of needs. After human beings satisfy their basic survival needs, it becomes possible for them to strive toward the fulfillment of higher-level needs. To Maslow the highest of these needs is the spiritual: the desire for self-actualization, for knowledge of oneself at the deepest possible level.[1] Since many Americans, in fact many Westerners, have already passed through the lower rungs of Maslow's ladder of needs, we should expect to see Westerners enthusiastically mounting the upper rungs toward self-actualization or spiritual fulfillment. We do not. What is wrong with Maslow's argument? As Mother Teresa observed when she visited the United States in the eighties, Americans are materially blessed but impoverished in spirit. Why should this be so?

Maslow neglected to take into account the consequences of unquestioned materialism, which is dominant in today's Western culture. Most Westerners accept as scientific fact the idea that we live in a materialist world—a world in which everything is made of matter and where matter is the fundamental reality. In such a world, material needs proliferate, resulting in desire not for spiritual progress but for more, bigger, and better things: bigger cars, better housing, the newest fashions, amazing forms of entertainment, and a dazzling extravaganza of present and future technological goodies. In such a world, our spiritual needs are often unrecognized, denied, or sublimated when they surface. If only matter is real, as materialism has taught us to believe, then material possessions are the only reasonable foundation for happiness and the good life.

Of course, our religions, our spiritual teachers, and our artistic and literary traditions teach that such is not the case. On the contrary, they teach that materialism leads, at best, to a sickening surfeit and, at worst, to crime, disease, and other ills.

Most Westerners hold both of these conflicting beliefs and live with ambivalence, partaking of a ravenously materialistic consumer culture yet secretly despising themselves for it. Those of us who still consider ourselves religious are not altogether able to ignore that, although our words and

thoughts adhere to religion, all too often our deeds violate our intentions; we fail to embody with conviction even the most basic teachings of religions, such as kindness to our fellow humans. Others of us resolve our cognitive dissonance by embracing religious fundamentalism or equally fundamentalist scientism.

In sum, we live in a crisis—not so much a crisis of faith as a crisis of confusion. How did we reach this sorry state? By accepting materialism as the so-called scientific view of the world. Convinced that we must be scientific, we are like the keeper of an old curio shop in the following tale: A customer, finding an unfamiliar instrument, brought it to the shopkeeper and asked what it was for.

"Oh, that's a barometer," answered the shopkeeper. "It tells you if it's going to rain."

"How does it work?" the man wondered aloud.

The shopkeeper actually did not know how a barometer works but to admit that would be to risk losing a sale. So the shopkeeper said, "You hold it out the window and then bring it back in. If the barometer is wet, you know it is raining."

"But I could do that with my bare hand, so why use a barometer?" the man protested.

"That would not be scientific, my friend," responded the shopkeeper.

I submit that in our acceptance of materialism, we are like the shopkeeper. We want to be scientific; we think we are being scientific, but we are not. To be truly scientific, we must remember that science has always changed as it has made new discoveries. Is materialism the correct scientific worldview? I believe that the answer is demonstrably no, although scientists themselves are confused on this issue.

The scientist's confusion is due to a hangover caused by an overly enthusiastic indulgence in a four-hundred-year-old revel called classical physics that was kicked off by Isaac Newton sometime around 1665. Newton's theories launched us on the course that led to the materialism that dominates Western culture. The philosophy of materialism, which dates back to the Greek philosopher Democritus (ca. 460—ca. 370 B.C.), matches the worldview of classical physics which is variously termed material, physical, or scientific realism. Although a new scientific discipline called quantum physics has formally replaced classical physics in this century, the old philosophy of classical physics—that of material realism—is still widely accepted.

## CLASSICAL PHYSICS AND MATERIAL REALISM

When he visited the palace at Versailles, the seventeenth-century French mathematician and philosopher René Descartes was enchanted by the huge assembly of automata in the palace garden. Driven by unseen mechanisms, water flowed, music played, sea nymphs frolicked, and mighty Neptune rose from under a pool. As he watched the display, Descartes conceived the idea that the world might be such an automaton—a world machine.

Descartes later propounded a significantly modified version of his picture of the world as a machine. His famous philosophy of dualism divided the world into an objective sphere of matter (the domain of science) and a subjective sphere of mind (the domain of religion). Thus did Descartes free scientific investigation from the orthodoxy of the powerful church. Descartes borrowed the idea of objectivity from Aristotle. The basic notion is that objects are independent of and separate from the mind (or consciousness). We will refer to this as the principle of *strong objectivity.*

Descartes also made contributions to the laws of physics that would scientifically enshrine his idea of the world as a machine. It was, however, Newton and his heirs going into the eighteenth century who solidly established materialism and its corollary: the principle of *causal determinism,* which is the idea that all motion can be predicted exactly given the laws of motion and the initial conditions on the objects (where they are and with what velocity they are moving).

To understand the Cartesian-Newtonian view of the world, think of the universe as a big bunch of billiard balls—large and small—in a three-dimensional billiard table that we call space. If we know all the forces acting on each of these billiard balls at all times, then just knowing their initial conditions —their positions and velocities at some initial time—enables us to calculate where each of these bodies will be at all future times (or, for that matter, where they were at any previous time).

The philosophical import of determinism was best summarized by the eighteenth-century mathematician Pierre-Simon de Laplace: “An intelligence that, at a given instant, was acquainted with all the forces by which nature is animated and with the state of the bodies of which it is composed, would—if it were vast enough to submit the data to analysis—embrace in the same formula the movements of the largest bodies of the universe and those of the lightest atoms: nothing would be uncertain to such an intelligence, and the future, like the past, would be present to its eyes.”[2]

Laplace also wrote a successful book on celestial mechanics that made him famous, so famous that the emperor Napoleon summoned him to the palace.

“Monsieur Laplace,” said Napoleon, “you have not mentioned God in your book even once. Why is that?” (In those days, custom demanded that God be

This philosophy is also called scientific realism, which implies that material realism is essential to science. Most scientists, at least unconsciously, still believe that this is so, even in the face of firmly established data that contradict the five principles.

It is important to realize at the outset that the principles of material realism are metaphysical postulates. They are assumptions about the nature of being, not conclusions arrived at by experiment. If experimental data are discovered that contradict any of these postulates, then that postulate must be sacrificed. Similarly, if rational argumentation reveals the weakness of a particular postulate, the validity of that postulate must be questioned.

A major weakness of material realism is that the philosophy seems to exclude subjective phenomena altogether. If we hold on to the postulate of strong objectivity, many powerful experiments done in the cognitive laboratory will not be admissible as data. Material realists are quite aware of this shortcoming; thus in recent years much attention has been given to the question of whether mental phenomena (including self-consciousness) can be understood on the basis of material models—notably, computer models. We shall examine the basic idea behind such models: the idea of the mind machine.

## CAN WE BUILD A COMPUTER THAT Is CONSCIOUS?

The challenge for science after Newton was, of course, to attempt to approximate as closely as possible Laplace's all-knowing intelligence. The insight of Newtonian classical physics proved to be quite powerful, and significant strides were made toward such an approximation. Scientists gradually unraveled, at least in part, some of the so-called eternal mysteries—how our planet came into being, how stars find their energy to burn, how the universe was created, and how life reproduces itself.

Eventually, the successors of Laplace took on the challenge of explaining the human mind, self-consciousness and all. With their deterministic insight, they had no doubt that the human mind also was a Newtonian classical machine, like the world machine of which it was a part.

One of the believers in mind-as-machine, Ivan Pavlov, was very gratified with his dogs' confirmation of his belief. When Pavlov rang a bell, his dogs salivated, even though no food was offered. The dogs had been conditioned to expect food whenever the bell rang, explained Pavlov. It was quite simple,

limits for any human being, and I am concerned that thinking they are may be a self-fulfilling prophecy.

"We are the mirrors of the world in which we dwell," said the science historian Charles Singer. The question is, How big a mirror can we be? Reflections of the sky are found in little ponds and in the mighty ocean. Which is the bigger reflection?

But we have come a long way toward developing an intelligent Turing machine, protest the mind-machine proponents. Our machines already can pass the Turing test with an occasional unsuspecting human. Surely, with further nurturing and development they will have minds like those of humans. They will understand, learn, and behave like us.

If we can make Turing machines that behave like humans in every known way, the mind-machinist continues in a determined voice, isn't that proof that our own minds are nothing but a bunch of classical computer programs, utterly determined? Since determined is not the same as predictable, the unpredictability of humans presents no obstacle to the view. This argument is persuasive as far as it goes. If our computers can simulate human behavior, good; this will make communication easier between us and our machines. If by studying the workings of the computer programs that simulate some of our behavior, we learn something about ourselves, that is even better. Simulating our behavior on computers, however, is a long way from proving that we are made of those programs that do the simulations.

Of course, even one example of a program we possess that a classical computer can never duplicate will destroy the myth of the mind-as-machine. The mathematician Roger Penrose argues that computerlike, algorithmic reasoning is insufficient for the discovery of mathematical theorems and laws. (An algorithm is a systematic procedure for solving a problem: a strictly logical, rule-based approach.) So, asks Penrose, where does mathematics come from if we operate like a computer? "Mathematical truth is *not* something that we ascertain merely by use of an algorithm. I believe, also, that our *consciousness* is a crucial ingredient in our comprehension of mathematical truth. We must 'see' the truth of a mathematical argument to be convinced of its validity. This 'seeing' is the very essence of consciousness. It must be present *whenever* we directly perceive mathematical truth."[5] In other words, our consciousness must exist prior to our algorithmic computer capacity.

An even stronger argument against the position of mind-as-machine is pointed out by the Nobel laureate physicist Richard Feynman.[6] A classical computer, notes Feynman, can never simulate nonlocality (a technical word meaning information or influence transfer without local signals; such influences are action-at-a-distance and instantaneous). Thus, if nonlocal information

I feel that the question of computer consciousness is not a question of complexity. Admittedly, a high level of complexity can guarantee that the responses of a computer under a given stimulus will be no more easily predictable than are a human's, but it means no more than that. If we can trace the computer's input-output performance to the activities of its internal circuits without any ambiguity, without losing the trail (and this, at least in principle, should always be possible for a classical computer), then what is the necessity for consciousness? It would seem to have no function. I think it is an evasion of the issue for artificial intelligence protagonists to say that consciousness is only an epiphenomenon, or an illusion. The Nobel laureate neurophysiologist John Eccles seems to agree with me. Asks Eccles: "Why do we have to be conscious at all? We can, in principle, explain all our input-output performances in terms of the activity of the neuronal circuits; and consequently consciousness seems to be absolutely unnecessary."[10]

Not everything that is unnecessary is forbidden in nature, but it is not likely to occur. Consciousness seems unnecessary for a classical Turing machine, and this is reason enough to doubt that these machines, however sophisticated, will ever be conscious. The fact that we do have consciousness suggests only that our input-output performances are not wholly determined by the algorithmic programs of classical computer machinery.

The mind-machinists sometimes pose another argument: We freely assign consciousness to other human beings because they report mental experiences —thoughts, feelings—that are similar to our own. If an android were programmed to report thoughts and feelings similar to yours, could you discern its consciousness from that of your friend? After all, you cannot experience what is inside your human friend's head any more than you can experience what is inside the android's. Thus you can never really know, anyway!

This reminds me of an episode of the television show "Star Trek." A con man is given an unusual punishment that on the face of it seems to be no punishment at all. He is banished to a colony where he will be the only human, surrounded by androids at his service—many of them in the form of beautiful maidens.

You can guess as well as I can why this is a punishment. The reason that I do not live in a solipsistic (only I am real) universe is not that others like me logically convince me of their humanness but that I have an inner connection with them. I could never have this connection with an android.

I submit that the sense we have of an inner connection with other humans is due to a real connection of the spirit. I believe that classical computers can never be conscious like us because they lack this spiritual connection.

Etymologically, the word *consciousness* derives from the words *scire* (to

know) and *cum* (with). Consciousness is “to know with.” To me, this term implies nonlocal knowing; we cannot know with somebody without sharing a nonlocal connection with that person.

It should cause no dismay if we cannot build a model of ourselves based on classical physics and using a silicon computer’s algorithmic approach. We have known from the beginning of this century that classical physics is incomplete physics. No wonder it gives us an incomplete worldview. Let us examine the new physics, born at the dawn of the twentieth century, and explore, from our vantage point as the century draws to a close, what freedom its worldview brings.

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