BOOK REVIEW

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Take various combinations of the words "consciousness," "brain," "explained," "mystery," "quest," "accidental," "astonishing," "neurobiology," "evolution," "mind," and so forth, and you will have the titles of quite a few books describing current speculations about what is often called the mind-body problem: How is it that mental experiences - including thoughts, feelings, perceptions, and conscious awareness of it all - are related to the physiological activities within the body and, most specifically, the brain? Add to this list the word "irreducible," and readers can extract the title of the subject of this essay, Irreducible Mind, as yet another book on the mind-body problem. However, this book is different, very different, from all the rest.

The Mind-Body Problem and the Standard Model

Because a full appreciation of Irreducible Mind requires context, I begin with background information. I will use the term "mind" to denote the entire range of mental states and processes - thoughts, feelings, perceptions - both in and out of awareness. "Consciousness" is often also used to describe these mental phenomena collectively, although this usage can be confusing, because the same word is used

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to denote waking awareness, as in "conscious" versus "unconscious." Sometimes the terms "mind" and "consciousness" are used to denote some sort of numinous aspect of existence that may transcend the body or be beyond physical analysis. At the outset of this discussion, I will use the operational definition of mind given above. This being said, certainly one of the central issues of cognitive science, the scientific investigation of mental phenomena, is the nature of the mind-body or mind-brain connection.

Some scholars call this area of inquiry the mind-body problem. What is meant here by "problem"? Is it a problem for which there may be no solution? That is, will it ever be possible to produce a plausible explanation in terms of brain physiology for why and how it is we have internal, subjective experience and conscious awareness? Scientists have no reason to conclude that this problem is not soluble. Most students of cognitive science would probably say that this is a problem with a solution and that, at the present time, scholars just do not know exactly what form the solution will ultimately take. It may be a hard problem to solve, and that is, at least in part, because the brain is very, very complex. Indeed, the more researchers learn about the brain, the more complex they find it to be. But, it is presumed, if investigators spend enough time doing more and more work in experimental neuroscience, they will eventually discover enough about the brain that a compelling description linking brain and body physiology with mental phenomena will emerge. The solution to the mind-body problem will eventually be understood in terms of patterns of cellular activity.

For many years, scholars in the fields of elementary particle physics and cosmology have used the phrase Standard Model. I will import this phrase into our discussion and use it to denote the hypothesis that mind or mental experience or consciousness is completely understandable or explainable in terms of patterns of cellular activity in the brain and body. At present, researchers and theorists do not understand the nature of the connection, the higher-order interpretation of physiological activities that produces mental experience. A more complete understanding is currently not available, perhaps due to the enormous complexity of the brain. But it will come, eventually. The Standard Model is supported by a vast amount of data: from two centuries of observations in clinical neurology relating brain damage to changes in mental function, to the latest results from functional brain imaging demonstrating patterns of neural activity correlated
with various kinds of mental states. Nonetheless, a key question is: Will the Standard Model do?

The history of science is a story punctuated by major revolutions (Kuhn, 1970). This pattern is most vividly represented in physics, where a prevailing understanding of the world changed enormously after the work of Nicolaus Copernicus, Galileo Galilei, and Isaac Newton ... and again after the work of Albert Einstein ... and again after the advent of quantum theory. In biology, Charles Darwin formulated a way of looking at living organisms that was revolutionary. The Darwinian perspective has gained in explanatory power as the discoveries of modern biology revealed cellular and molecular mechanisms for macroscopic organismal behaviors, leading to an appreciation of how these molecular mechanisms could have resulted from evolutionary processes of variation and selection operating at microscopic levels. Inspired by the awesome successes of the present scientific trajectory, scientists have developed a dominant worldview in which they hold a kind of atomic reductionism as sufficient to provide a deep explanation for just about everything. This scientific worldview prevails despite the conceptual implications of quantum mechanics indicating a kind of fuzziness and uncertainty in the most basic properties of what Westerners call "physical reality."

In neuroscience, the molecular biology of the synapse, as scientists understand it thus far, is another evolving triumph of physical reductionism. The synapse is the contact point where cells of the nervous system exchange signals. It is a molecular universe of vast complexity, involving the interactions of nerve cells, glial cells, neurotransmitter molecules passing in both forward and backward directions, and receptor proteins having rapid effects on the electrical properties of the cell membrane and thus altering the cell's immediate excitability, or having prolonged effects on the turning on and turning off of genes, thereby changing the long-term functioning of the cell and the strengths of its connections with other cells. All this action takes place over distances of a few billionths of a meter and in time periods as short as a few microseconds. Each new discovery relating to the molecular biology of the synapse adds another piece of extraordinarily beautiful intricacy to a seemingly ever-more-complex jigsaw puzzle of events.

In the human brain, perhaps a trillion neurons and glial cells interconnect in networks containing hundreds of trillions of synapses. The Standard Model holds that from this vast complexity will
eventually emerge a perspective as to exactly how all this cellular and molecular activity is related to mental experience. It is acknowledged that despite all existing knowledge about brain physiology, humans may still be at a relatively primitive level of understanding. Comparison has been made to an understanding of chemistry, say, 200 years ago. At that time, although investigators had identified many chemical elements and molecules and theorists were giving serious attention to the atomic theory of matter, they knew little about how to describe or explain the higher-order properties of matter in terms of underlying atomic and molecular structure. Take water, for example. A molecule of water appeared to be made of atoms of hydrogen and oxygen, but how this combination of atoms gave rise to a substance that flowed, froze, vaporized, and dissolved when mixed with some substances, but did not dissolve when mixed with other substances, was a mystery. It would be many years before increasing data collection and theorizing in the field of chemistry produced a framework that explained the higher-order chemical properties of water in terms of the underlying atomic structure and distribution of electrons in the \( \text{H}_2\text{O} \) molecule. The Standard Model holds that some similar sort of emergence of understanding will eventually take place for the brain-mind connection.

In nearly all areas of scientific endeavor, the reductionistic framework of physicalism has been awesomely successful. Working with general relativistic astrophysics and relativistic quantum electrodynamics, scholars can now account for most cosmological observations. Working with quantum mechanics and atomic theory, they can account for all known observations in chemistry. Working with the principles of evolutionary biology, the laws of chemistry, and the discoveries of modern molecular biology, they are continuing to develop deepening explanations of the inner workings of living organisms and how life negotiates survival and reproduction in complex and challenging environments. Thus, many researchers and theoreticians share a great confidence that this broad paradigm can be extended to describing, explaining, and understanding the mind.

Irreducible Mind and the Standard Model

In *Irreducible Mind*, the authors argued for a perspective beyond the Standard Model. I found it to be an extraordinary book, written
with impeccable scholarship and clarity. The authors summarized a vast amount of evidence suggesting that the Standard Model, powerful though it may be, will simply not do. They drew inspiration from the work of Frederic Myers, who lived more than a century ago and whom they regard as a neglected genius of scientific psychology; from William James, contemporary of Myers and pioneer experimental psychologist, neuroscientist, and deeply insightful philosopher of mind; and, more recently, from Ian Stevenson, the University of Virginia psychiatrist who spent 50 years rigorously studying and impeccably documenting a large number of cases of phenomena that may perhaps be most easily understood in terms of the reincarnation of some aspect of an individual's personality.

The book opens with an outstanding overview of the current conceptualization of the mind-body connection within the framework of the Standard Model, followed by a superb summary of the work of Myers from more than a century ago. Throughout the book the authors described a number of phenomena, collectively called "rogue phenomena," that they suggested do not fit in any straightforward way into the Standard Model. Such phenomena include many examples of profound influences of mental state on body physiology, telepathic interactions, veridical apparitions, some of the more profound aspects of memory, some hypnotic phenomena, various genius-type abilities, and mystical experiences, to name but a few. Some of these phenomena, it might be argued, can conceivably be accounted for within the Standard Model, whereas some most definitely cannot. By considering these phenomena collectively, the authors made a compelling case that some sort of expansion of the current doctrine is necessary if more powerful approaches to addressing the mind-body problem are to be developed. If these rogue phenomena are taken seriously, some clever new experimental and theoretical directions of work may follow.

Most notable perhaps for readers of this Journal is the topic of unusual experiences that are reported by individuals who have come close to death and are revived. Such experiences may also occur in persons who fear they are close to death, as for example in falls or collisions, even if their bodies are not physically damaged. Under conditions of greatly impaired neuronal activity in the brain, people often report complex mental experiences and even out-of-body experiences. The authors of Irreducible Mind stated at the conclusion of their chapter describing these phenomena that
the conflict between current neuroscientific orthodoxy and the occurrence of [near-death experiences] under conditions of general anesthesia and/or cardiac arrest is head-on, profound, and inescapable. In our opinion, no future scientific or philosophic discussion of the mind-brain problem can be fully responsible, intellectually, without taking these challenging data into account. (p. 421)

As an alternative to the Standard Model, the authors of *Irreducible Mind* argued for a filter or transmission theory of the brain-mind connection, ideas that James, Myers, and others first proposed more than a century ago. In such theories of the brain-mind relationship, neuronal processes remain of central importance and the Standard Model becomes a subset of a larger framework that includes processes that in some way transcend the physical body. As James (1898), quoting Schiller (1891), wrote, "matter is not that which produces Consciousness, but that which limits it, and confines its intensity within certain limits."

In the understanding of the physical force of gravity, the mathematical description Newton put forth in the 1700s was one of great predictive power. If Einstein had not lived, astronomers might not now have the general theory of relativity and might still be using Newtonian gravitational physics to understand celestial phenomena. Indeed, much of what planetary scientists and cosmologists observe could be fit into a Newtonian model. However, the general theory of relativity allows for the precise computation of observed values for things like orbital precession and gravitational red shifts. It also enables scientists to account for acceleration of the observed rate of expansion of the universe, a finding currently associated with the mysterious concept of dark energy, a notion that is at least consistent with Einstein's gravitational theory. Thus, in the absence of the explanatory framework of the theory of general relativity, it is possible that scientists would be giving little attention to some seemingly important observational data.

I like to think of the Standard Model as a kind of Newtonian theory of the mind-brain connection. It is very powerful and very beautiful. Its adherents will not relinquish center stage easily. And through its limitations, many scientists perpetuate the practice of ignoring a wide range of data that do not fit into it. I find it fascinating that scientists who would not consider the possibility of veridical out-of-body experiences – that mental awareness and perception might under some circumstances be demonstrably disembodied – find it easy to believe that the entire immense cosmological universe consisting, at
this point of knowledge, of 10 billion trillion stars, all emerged from an exploding point of nothingness. Scientists are often simply not ready to accept data that do not fit into a compelling edifice of theory. And if the explanatory framework is there, then any amount of weirdness may be acceptable. Big Bang cosmology nicely exemplifies this.

Neuroscientists interested in the mind-body problem who open their written or spoken discourse with statements like “mind is what the brain does” are immediately accepted into the fold of adherents to the prevailing worldview. The Standard Model so dominates intellectual discourse and guides the design, implementation, and interpretation of experiments that scholars who question the completeness of that Model and speculate outside of it can find they are not even heard, let alone taken seriously. The Standard Model has achieved a kind of orthodoxy akin to religious dogma. No doubt, it is a powerful model. However, rigid commitment to it, including an unwillingness even to consider data that do not readily fit into its explanatory framework, is and will continue to be a limitation in expanding the framework of cognitive science. For any scientist considering open-mindedly grappling with phenomena that do not fit easily within the Standard Model, nowhere will they find a more comprehensive source than Irreducible Mind.

It may be the case that cognitive science is poised for revolutionary events in the arena of the mind-body problem. Place your bets, ladies and gentlemen. Will the Standard Model do? My money is betting that it will not suffice. In the future history of the science of mind, Irreducible Mind may well prove a book of landmark significance, one that helped spark a revolution in the scientific investigation of the nature of consciousness.

References