

THOU ART THAT
AND
OTHER ESSAYS

Reflections of an Algorithmic Scientist
on an Era Between Gods

John Lawrence Nazareth

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For Abbey

Preface

This book lies at the intersection of religion, science, and philosophy. Here I have sought to build a bridge between the “perennial philosophy” of the past, which has inspired and provides the foundation for the world’s major religions, and the “natural philosophy of organism” of four great philosopher-scientists of the 19th and early 20th centuries---Gustav Theodor Fechner, William James, Henri Bergson, and Alfred North Whitehead---who were widely-celebrated during their lifetimes, but today have fallen into relative obscurity. Their profound philosophical insights could greatly facilitate our scientific understanding of the natural world, and, in particular, the scientific effort currently under way to unravel the mystery of consciousness. They can also help to address the deep spiritual malaise of our present day, which the novelist John Updike has aptly characterized as an “Era Between Gods.”

Readers may not join me in my far-reaching conclusions. However, at the very least, they will find this book to be a survey of a fascinating and wide-ranging literature, covering philosophical, spiritual and scientific works, and ranging from ancient to modern. In particular, I provide a unified, harmonized, and intentionally-poetic introduction to the writings of the aforementioned four great natural philosopher-scientists.

My book’s title, “Thou Art That,” derives from the central insight of the ancient treatises of Hinduism known as the *Upanishads*, as expressed originally in Sanskrit: “Tat Tvam Asi.” These three words echo and re-echo throughout this book and they encapsulate the aforementioned “perennial philosophy,” as will be explained, in detail, at the outset of Chapter 1. We shall see that the spiritual enlightenment of the founders of the world’s major religions is premised on this commonly-shared philosophy, each founder’s inspiration then being transformed by his disciples into a distinct *symbolic* structure, a human creation built from words and bricks, leading over time to the codified texts and the houses of worship---churches, temples, or mosques---of an organized religion.

Symbolism is indeed the very hallmark of the human species, the source of both its strengths and its weaknesses. The Cartesian dictum, "I think therefore I am," which has provided the inspirational basis for the entire scientific enterprise, can be interpreted with greater specificity as "I think, *symbolically*, therefore I am, *experientially*." And, furthermore, during the era of the digital computer, this has been expanded to "I compute, *algorithmically*, therefore I think, symbolically, therefore I am, experientially." This dictum is clarified and explored, in detail, in Chapter 1 and provides a framework for the discussion in this opening essay.

Symbols acquire *semantic* meaning only in the presence of human *consciousness* and this most mysterious of phenomena thus becomes the natural subject of Chapter 2. Research into human (and animal) consciousness has become scientifically respectable in recent years and this second essay presents a survey and evaluation of some of the major works in this field, with emphasis being placed on writings that are accessible to the non-specialist. Neurobiological-based theories of consciousness proposed by some of the most prominent scientists and philosophers of our day will be the primary focus of attention, but other approaches, for example, physics-based and cognitive-science-based, are also considered very briefly.

Although significant progress has been made in understanding the so-called "easier problem" of *psychological* aspects of consciousness, the lack of a real breakthrough in what has been termed the "hard problem" of *phenomenological* consciousness then leads to our concluding essay, which comprises Chapter 3. Here we reach back to philosopher-scientists of an earlier period----Fechner, James, Bergson, and Whitehead---who were more cognizant of the aforementioned perennial philosophy, and whose works could lead to a more effective unraveling of the mystery of human consciousness. Their writings are voluminous and their complexity of thought, presented here under the "natural philosophy of organism" rubric, cannot be fully captured within the space of a few dozen pages. Instead, in Chapter 3, I will provide their essential flavor though carefully-selected

quotations, interspersed with commentary. In previous chapters, too, I have not hesitated to quote directly and extensively from source material, rather than summarizing such content in my own words, a style of writing inspired, for example, by William James---one of my heroes---in his classic, *The Varieties of Religious Experience*. (Another is provided by Aldous Huxley's well-known anthology, *The Perennial Philosophy*.) And quotation, throughout, is always in the service of a larger theme, or set of ideas, that one is seeking to convey. The renowned Russian poet, Osip Mandelstam, has justified the use of quotations to this end as follows:

"A quotation is not an excerpt. *A quotation is a cicada*. It is part of its nature never to quiet down. Once having got hold of the air, it does not release it."

In Chapter 3, the quoted writings are often poetic in nature, and, many a time, I will present them in the form of short prose-poems, thereby adding to their "cicadian" rhythm. It is my belief that the aforementioned four philosopher-scientists have opened a new chapter in the search for a spiritual meaning in life, one that is *not* at odds with the findings of modern science. Indeed, we may be at the threshold of a new Copernicus-like scientific revolution that reverses the Cartesian dictum of Chapter 1, and this prospective undergirds our concluding essay.

Further detail on the three chapters comprising this book---its beginning, its middle, and its end, so to speak---can be found in the Table of Contents, which immediately follows this preface. Instead of numbering individual sections of each chapter, I have followed a paradigm commonly employed in the essay-and-lecture collections of Henri Bergson, William James, and others by simply listing the main sections of a chapter in sequence, thereby highlighting their logical flow. Quotations are normally presented in a smaller typeface, and some phrases and sentences within a quotation may be highlighted using *italics* and/or clarified through commentary added within [square brackets].

The bibliography is organized alphabetically by author. If a citation contains two dates, then the first date [in square brackets] is the original date of

publication, possibly in a language other than English, and the second is the date of the cited publication. Otherwise, the citation specifies the date of publication of the cited reference [in square brackets]. Examples are as follows:

Bergson, H. [1922], *Duration and Simultaneity*, The Library of Liberal Arts, The Bobbs-Merrill Company, Indianapolis, Indiana, 1965.

Searle, J.R. [1997], *The Mystery of Consciousness*, The New York Review of Books, New York, NY.

Whenever I make reference to a particular work, for example, Bergson [1922], I have also included its title within the text itself, thereby minimizing the need to consult the bibliography when reading the book.

Author's Background Information and Acknowledgments

Background detail on the book's author can be found at the website www.math.wsu.edu/faculty/nazareth and in Nazareth [2017] and its online companion memoir, Nazareth [2018]. An earlier attempt at addressing the issues considered in this book, in the alternative genre of a play written for the stage, can be found in Nazareth [2016]. And for two additional milestones on the long, personal journey that led to the present book, see also Nazareth [1996], [1986].

First and foremost, my thanks to my wife, Abigail Reeder Nazareth, for her encouragement of this effort and for her careful reading of my manuscript. I'm also very grateful to Beresford Parlett and Stuart Dreyfus for their interest in this writing and their feedback, in particular, on the first chapter. My thanks to Arthur Ginsberg for bringing *The Swerve* to my attention and thus, indirectly, the great poem of Lucretius, and I'm grateful also to David Krakauer for introducing me to the philosophy of Charles Pierce on symbolism. My thanks to Christopher Coughlin for giving this work a respectful hearing, which led to an improvement of the manuscript and useful avenues to explore for its publication, and to Kristin von Kreisler for

her unwavering belief in me and for her always helpful advice. And, without mentioning other names explicitly and thereby avoiding sins of omission, I thank my relatives, friends, and colleagues---near and afar---for their companionship, support, and feedback during a lifelong journey of discovery and adventure, which led me to this concluding publication. Last, but not least, I thank the readers of this little book and I hope that they derive as much pleasure from perusing it as did I from its writing.

JLN

Bainbridge Island,

Washington, USA

August, 2020

johnlawrencenazareth@gmail.com or

larrynaz@uw.edu

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About the Author

1. The Limitations of Symbolism

The Perennial Philosophy

In his introduction to the sacred texts of Hinduism known as the *Upanishads*, Juan Mascaro [1965], the renowned translator of these writings from their original Sanskrit into English, says the following:

"... when the sage of the *Upanishads* is pressed for a definition of God, he remains silent, meaning that God is silence. When asked again to express God in words, he says '*Neti, neti*', 'Not this, not this'; but, when pressed for a positive explanation, he utters the sublimely simple [Sanskrit] words: 'TAT TVAM ASI', '*Thou Art That*'."

In other words, the sage initially says nothing, his silence intimating that God is no-*thing*! Pressed further, he simply repeats this assertion, saying in effect: not this *thing*, not that *thing*! Neither through imagination nor by intellectual means---visual imagery of any-*thing*, the poetry of human language, the precision of mathematical equations---can one grasp the true nature of God. Only a mystic, a guru, an enlightened being, is capable of doing so, and then only by becoming one with God.

Gottfried Wilhelm Leibnitz, the great 17th century German philosopher, coined the Latin phrase "*Philosophia Perennis*" for this mystical assertion of an *absolute identity* between the immanent conscious Self of a human being (the "*Thou*") and the transcendent Reality of the Universe (the "*That*"). And a well-known anthology under the same title, *The Perennial Philosophy*, which was compiled by the British author Aldous Huxley [1944], has provided a wealth of evidence that the teachings of the *Upanishads* have much in common with the mystical traditions of all the world's major religions. Indeed, even within a more secular literature, one finds echoes and re-echoes of the perennial philosophy, for example, in *The Rubaiyat* of Omar Khayyam, the *Four Quartets* of T.S. Eliot, or Rabindranath Tagore's *Gitanjali*.

However, the world's religions do not stop there. Instead, they seek to translate the mystical insight of their founders---the unsayable, the unseeable, the unimaginable---into an elaborate *symbolism*: images, icons, gospels, rituals, written laws. *Because symbols are the fundamental currency, indeed the very hallmark, of the human species!* Thus, within the Hindu religion, we have the Trimurti---Brahma the Creator, Vishnu the Preserver, and Shiva the Destroyer---a conception of the Godhead made even more subtle by the postulate that each of these three aspects contains, within itself, the essence of the other two. Within the Roman Catholic religion, we have an alternative, more personalized conception of the Trinity---God the Father, God the Son, and God the Holy Ghost. Within Mahayana Buddhism, we have the wonderfully peaceful images of the meditating Buddha, marking an evolution of Buddhism from its earlier, austere Hinayana form that adhered more closely to the original spirit of its founder, Gautama Buddha. And, of course, we have the pantheon of earlier Gods that have served the human religious impulse in the more distant past---Jehovah of the Old Testament, Zeus and the various other Gods of Greece and Rome, Thor and Wodin of Northern Europe, and so on. We see that in marked contrast to their common rooting in the perennial philosophy, the major religions of the world differ greatly from one another in their *codified* systems of beliefs, rituals, and rules of conduct. Buddhism emphasizes non-attachment; Christianity emphasizes devotion and love; and while Islam would seem an exception to the symbolizing rule due to its strict injunctions against the use of images and icons to depict its God and his prophet, Mohamed, the religion simultaneously prescribes a draconian form of observance known as the Sharia law.

Towards the end of his life, the great French philosopher, Henri Bergson [1935], published a masterful work, *The Two Sources of Morality and Religion*, in which he introduced the term "*dynamic*" to characterize the initial, formative phase of a religion, when its wellspring is the mystical insight of its founder, marking a renewal of the perennial philosophy. And Bergson contrasted this phase with the subsequent, *symbolizing* phase of

that religion, along lines discussed in the previous paragraph, which he termed “*static*.” In our present era, which is dominated by the breakneck pace of science and engineering, the *religions of old*—Hinduism, Buddhism, Christianity, Islam—continue to have billions of adherents. But their “static” explanations of the natural world are now unconvincing, and, although they still offer their followers something tangible to hold onto, they are no longer able to satisfy the deeper, more “dynamic” spiritual needs of modern humanity. And neither does modern science and engineering, despite all the advances they have made in our state of material comfort! In the words of the novelist John Updike, truly we live today in an “*Era between Gods*.” A spiritual desert!

De Rerum Natura: The Nature of Things

Two millennia ago, during the late Romano-Greek period, there was an era that paralleled our own. The dominant religions and mythologies no longer provided satisfactory answers, and the new religions of Christianity and Islam, which later would spread across Europe and the Middle East, were only beginning to take root. That too was an era between gods. Bearing a resemblance to our present era, the Roman period was marked by feats of engineering on an enormous scale, excessive militarism, oft-unrestrained hedonism, and a law-driven but corrupted, oligarchic form of governance that masqueraded as democracy.

It was during this time that the Roman sage, philosopher, and poet, Titus Lucretius Carus, composed his masterpiece, *The Nature of Things*, an epic poem that exhibits a surprising consonance with 21st century scientific thought. Below is a key extract, which captures Lucretius’ point of view and stands in marked contrast to that of the aforementioned sage of the *Upanishads* (italics and boldface mine):

“.....For anything that *is* must be,
By definition, *something*. If it can affect the touch,
However faintly, then it adds its mass – however much

Or little --- to the Sum of Things, if it exists at all.
And yet if, on the other hand, it is intangible,
And offers no resistance, so that anything that moves
Can pass through any part of it, without a doubt that proves
That it is void. Besides, whatever exists, will either do
Something, or it is itself, by other things, done *to*,
Or it will be where things exist and where events take place.
But unless something is empty and vacant, it cannot offer space;
Neither can anything, sans body, be acted on or act.
Therefore, other than ***void*** and ***substance***, there cannot be, in fact,
Any third nature existing in its own right – neither one
That falls at any time within the range of our perception,
Nor one that we can figure out by means of the mind's reason."

Lucretius describes everything else in the natural world, including 'Time' itself, as a 'quality' or a 'consequence' of these two fundamentals, namely, substance and void, as follows (italics mine):

"For you will find that everything for which we have a name
Is either a *quality* of the two, or *consequence* of the same.
A quality is what, without obliterating shock,
Can never be separated and removed: as weight to rock,
As flame to heat, wet to water, and ability to touch
To every substance, intangibility to void. But such
As slavery, penury and riches, freedom, war and peace,
Whatever comes and goes while natures stay unchanging, these
We rightly tend to term as 'consequences' or 'events'.
Nor does Time exist in its own right. But there's a sense
Derived from things themselves as to what's happened in the past,
And what is here and now, and what will come about at last.
No one perceives Time in and of itself, you must attest,
As something apart from things in motion and from things at rest."

Lucretius was inspired by the philosophy of Greece, in particular, that of Epicurus, dating back to the 5th century B.C. But his great poem of roughly 7,400 lines was written in Latin. Each line of the original poem followed a classical form known cryptically as "dactylic hexameter," which means, very

simply, that each line was composed from a word-pattern comprising a long syllable, followed by a short syllable, followed by a second short syllable, this pattern being repeated six times. This form must come naturally to Latin, because translations into English often make no attempt to conform and instead render the poem into English prose, thereby preserving the content, but throwing away the poetic magic of the original. The great English poet, Dryden (1632-1700), set out to translate Lucretius into a different, classical English poetic form---rhyming couplets, or pairs of lines, where each line consists of *ten* syllables---but he managed to translate only about ten percent of the poem. A truly noble effort is the translation of A.E. Stallings [2007], which renders the poem in the form of "rhyming fourteenths," i.e. couplets where each line consists of *fourteen* syllables and the last words of each line of the couplet *rhyme* with each other. (The foregoing quotations from Stallings' version of Lucretius' poem illustrate this form.) Although much of the content of the poem would today be considered out-of-date, Stallings' rendition nevertheless makes for wonderfully enjoyable reading.

After the collapse of the Roman Empire, the great philosophical poem of Lucretius was lost for well over a millennium. It only came to light again, recovered from the dark recesses of a library of a medieval monastery, during the 15th century A.D., a period coincident with the early Renaissance and the revolution in thinking initiated by Copernicus (1473-1543) and Galileo (1564-1642). The inspiring tale of the rediscovery of Lucretius' treasure-trove of knowledge and wisdom is nicely told in *The Swerve* by Harvard professor, Stephen Greenblatt [2011], who summarizes its key ideas as follows:

- Everything is made of invisible particles.
- The elementary particles are infinite in number but limited in shape and size.
- The particles are in motion in an infinite void.
- The universe has no creator or designer.
- Everything comes into being as a result of a swerve (a fanciful mechanism for introducing "indeterminacy").
- The swerve is the source of free will.

- Nature ceaselessly experiments.
- The universe was not created for or about humans.
- Humans are not unique.
- Human society began not in a Golden Age of tranquility and plenty, but in a primitive battle for survival.
- The soul dies.
- There is no afterlife.
- Death is nothing to us.
- All organized religions are superstitious delusions.
- Religions are invariably cruel.
- There are no angels, demons, or ghosts.
- The highest goal of human life is the enhancement of pleasure and the reduction of pain.
- The greatest obstacle to pleasure is not pain; it is delusion.
- Understanding the nature of things generates deep wonder.

It is small wonder then that Lucretius' great philosophical work is said to have had an influence on scientific geniuses ranging from Galileo and Darwin to Freud and Einstein. Still, what self-respecting philosopher or scientist of today would choose to write his or her treatise in dactylic hexameter!

Cogito Ergo Sum: I Think Therefore I Am

Lucretius' central thesis was that nature is composed of fundamental particles, and quoting him again:

"We term them in philosophy, according to our needs,
Matter, atoms, generative bodies, elements and seeds,
And first-beginnings since it is from these that all proceeds."

In *The Swerve*, Stephen Greenblatt relates that "the Spanish-born Harvard philosopher George Santayana called this idea---the ceaseless mutation of forms composed of indestructible substances---'the greatest thought that mankind has ever hit upon.'" Lucretius set out to refute other prevailing theories, for example, that matter was composed of four basic elements---fire, air, water, and earth---but he put aside questions of how larger

assemblages of matter and their qualities (*qualia*) would themselves arise from the fundamental particles. To again quote Greenblatt: "He did not claim to know the *hidden code* of matter. But, he argued, it is important to grasp that there is a code and that, in principle, it could be investigated and understood by human science." This type of philosophical thinking is at the very root of the scientific revolution that was to follow, not long after Lucretius' rehabilitation in the middle of the second millennium, A.D.

The task of laying the philosophical foundation for a detailed exploration of the "hidden code" of nature fell to Rene Descartes (1596-1650) and is encapsulated by his famous dictum that has echoed down the centuries: *Cogito Ergo Sum!* I think therefore I am! In *A History of Western Philosophy*, the renowned philosopher, Bertrand Russell [1945], tells us that Descartes' decision to regard *thoughts* rather than external objects as prime empirical certainties was of great importance, and that it had a profound effect on all subsequent philosophizing. In place of nature being composed of particles of a single fundamental type, Descartes now postulated two fundamental, and fundamentally different, constituents of the world: *res cogitans*, the thinking substance, or more accurately, the cognitive *no-thing*, and *res extensa*, corporeal things that had extended substance. *Res cogitans* and *res extensa* mysteriously made contact within the human brain, specifically, within the pineal gland. Furthermore, as Russell notes, "[Descartes] regarded [animals] as automata, governed entirely by the laws of physics, and devoid of feeling or consciousness." While today this sounds bizarre, it was nevertheless a useful philosophical sleight-of-hand. *Res cogitans*, which endowed humanity with intelligence and free will, thereby served as the means for unlocking the door to natural philosophy---the precursor of the natural sciences---and the hidden codes of *res extensa*, i.e., it unlocked the door to the scientific exploration of nature. Later, says Russell, "it was not difficult to extend the theory that animals were automata: why not say the same of man, and simplify the system by making it a *consistent materialism*? This step was actually taken in the eighteenth century."

What precisely did Descartes mean by “I think” in his famous dictum? To once again quote Bertrand Russell: “‘Thinking’ is used by Descartes in a very wide sense. A thing that thinks, he says, is one that doubts, understands, conceives, affirms, denies, wills, imagines, and feels---for feeling, as it occurs in dreams, is a form of thinking. Since thought is the essence of mind, the mind must always think, even during deep sleep.” And this observation is given greater clarity by Stanislas Dehaene [2014], a leading cognitive neuroscientist, in his *Consciousness and the Brain* (italics ours):

“Rene Descartes was certainly right in one thing: only *Homo Sapiens* ‘use[s] words or other signs by composing them, as we do to declare our thoughts to others.’ This capacity to *compose* our thoughts may be the crucial ingredient that boosts our inner thoughts. Human uniqueness resides in the peculiar way we explicitly formulate our ideas using *nested or recursive structures of symbols*.”

Knowing also that Descartes was a mathematician of note---for example, he invented what today are called Cartesian coordinates---and that mathematics is a subject whose essence lies in the formal manipulation of symbols, we can conclude with a certain measure of certainty that Descartes’ dictum means: “I think, *symbolically*, therefore I am”, or more compactly: “*I symbolize therefore I am*.” The all-encompassing use of *symbolism* within spoken, written, and even hand-signed language does indeed appear to uniquely separate humans from all other animals, a thesis that has been brilliantly argued by Terrence Deacon [1997] in his masterpiece, *The Symbolic Species: the Co-evolution of Language and the Brain*.

Other ways to distinguish humans from animals have all fallen by the wayside. Post-Darwin, few believe that animals are devoid of intelligence, feeling, or consciousness, as was a common belief in Descartes’ time. And humans, once upon a time, were even erroneously characterized as the *only* tool-making animal, overlooking the fact that many animal species utilize found objects as simple tools, and sometimes even re-fashion them to meet particular needs: a chimpanzee will strip a twig of its leaves and

use it to forage for food by poking this constructed “tool” into an anthill and drawing out and eating the ants that cling to it; a seagull will pick up and drop a clam repeatedly onto seashore rocks in order to “hammer” open its shell; an elephant will dig a waterhole with its tusks, then tear bark from a tree and chew it into a ball used to plug the waterhole and prevent evaporation, thereby enabling it to return to drink again; a sea otter will use a stone to repeatedly strike an abalone attached to a rock until it releases its grip. (Admittedly these tools used by animals are very simple, but it is worth recalling that during the Paleolithic and much of the Neolithic eras---the Old and New Stone Ages---the stone tools of humans were equally unsophisticated.) And, all this time, right in front of our very noses, is the spider web, certainly a tool ingeniously constructed to gather food and attract mates, and perhaps even to establish status.

Icon, Index, and Symbol

It is the ability to operate with *spoken and written* symbols that sets us apart, and this distinguishing characteristic of the human species, in contrast to the foregoing examples, has stood the test of time. Most people have an intuitive notion of the meaning of the word “symbolic”, namely, the use of “something” to represent, signify, and stand for “something else.” For example, a weather forecaster on the nightly TV news might employ a little box containing a yellow circle that represents the sun to predict a sunny tomorrow. Alternatively, the circle may be colored yellow with varying intensities in order to indicate the level of predicted sunshine, ranging from bright yellow, when the next day will be hot, to a paler shade, when it is predicted to be merely warm. And the box containing a yellow circle might be used in yet a third way, to depict the *logo* of the Society of Meteorologists to which our certified TV weather forecaster belongs. We see that the colored box is being employed in *three* very different senses, which specialists in linguistics distinguish by the names *iconic*, *indexical*, and *symbolic*, a terminology that was introduced by the philosopher Charles S. Peirce in the 19th Century (see Justus Buchler [1955]) . He used the term *sign* to embrace all three usages and reserved

the name “symbolic” for the third, which lies at the very foundation of modern human language.

Informally stated, a sign is a stimulus pattern, or signal, that has a meaning, and the way that the meaning is attached to the sign tells us whether it serves as an icon, an index, or a symbol. Thus, an icon is a sign that bears a physical *resemblance to* the “something else” it is chosen to represent, as in our first example, where the yellow circle within the box resembles the sun. An index is a sign that *correlates* with the “something else” in our environment that it signifies, as in our second example, where the shade of yellow within the box correlates with the level of sunshine. Finally, a sign, now quite possibly just an arbitrary pattern, is said to be a symbol when it “gets its meaning primarily from its mental association with other symbols and only secondarily from its resemblance or correlation with environmentally relevant properties” (quoted from the excellent lecture notes of Robert Port [2000]). We have seen this in our third example, where the yellow box, with a circle within, serves to symbolize the organization of people who qualify as meteorologists.

The “box” in the foregoing example is a *visual* sign. But signs in general can run the gamut from visual to audible to tactile, even to symbols that arise in our dreams. Indeed, any signal, or pattern, that is accessible to our senses can serve as a sign in one or more of its three manifestations. The subject is fraught with subtlety. For example, Bow-wow can be an index. So can Brrr..rr, uttered with varying intensities when we feel cold. The road sign STOP is an icon for a dog, but for us it is a symbol within the context of all the other road conventions, like YIELD. In place of the aforementioned box with a yellow circle within it, one could equally well have used the abbreviation ‘MS’ or the words ‘Meteorological Society’. Most words are symbols in this sense. Moreover, there are word-like symbols and non-word symbols (as in “sign” language for humans deprived of speech). The claim made by Terrence Deacon and others is that only the human species is capable of full-blown symbolism, in particular, through the various forms of spoken and written human language and its ultimately

refined expression that is modern mathematics. This symbolizing ability developed in parallel with human brain development over an extended period of at least a million and a half years. In contrast, Deacon speculates that other species of animals are capable of using only iconic and indexical signs and do most of their thinking on the basis of associated visual, audible, and olfactory images (and perhaps other types too that are not available to humans).

We humans live in a symbolic world and the ability to symbolize is both the source of our greatest strength and simultaneously a source of weakness. We capture the world through a "net" spun from symbolic words---spoken, written, signed, or even just silently comprehended---that provide us with our primary means for locating and obtaining food, attracting mates, and establishing status, the three activities that occupy much of a human being's waking hours. Think for a moment of the Oxford dictionary! Its organization in alphabetical word-order is apparently simple and linear. But observe that each letter of the (Roman) alphabet has meaning only in relation to the others twenty-five. And every alphabetized word in the dictionary is explained in terms of other words. Suppose we took all the dictionary entries, i.e., the words that are explained in the Oxford dictionary, and listed them instead in twenty-six columns on a very large sheet of paper: the words that start with the letter `a' in the first column, the letter `b' in the second, and so on. Let us now go, in turn, through each entry and its corresponding explanation---for example, "*dictionary*: a reference book listing alphabetically terms or names important to a particular subject or activity along with discussion of their meanings and applications"---and on our sheet of paper let us draw straight lines, which can be thought of as pieces of nylon thread, that connect the word currently being explained to each of the different words in its explanation. (In our example, the word `dictionary', in the fourth column, would have twenty-one threads that connect it to the twenty-one different words in its explanation.) Repeat this procedure for all the words on the sheet of paper. The resulting, unbelievably-dense network of nylon threads, knotted

together at each dictionary word, can be imagined as the “symbolic net” by means of which we English-speakers “fish” out the meaning of our daily world! And the same holds true for the multitude of other human languages.

Continuators of Descartes

As we have already noted, mathematics is the most precise symbolization of them all. Beginning with the concept of number and its representation by decimal numerals, i.e., sequences composed from the symbols 0, 1, 2, ..., 9, it has evolved over many centuries into the magnificent edifice which today serves as the “language” of modern science---see Dantzig [1930]. And here we have the remarkable assumption that underlies physical science, namely, that the natural world can be captured in its *essence* by simple relations between mathematical symbols, for example, Einstein’s great breakthrough, $E = mc^2$, or the equations underlying his special theory of relativity in space-time. (The great philosopher Henri Bergson called this most fundamental of assumptions a “continuator of Descartes”.) The Brandeis University philosopher, Palle Yourgrau [2005], in his very readable *A World Without Time: The Forgotten Legacy of Godel and Einstein*, describes the close friendship between Kurt Godel, the greatest logician of the twentieth century, and Albert Einstein, that century’s greatest physicist, during the last decades of their lives spent at Princeton’s Institute for Advanced Study, and how Godel, with Einstein’s blessing, carried the latter’s theories one step further in demonstrating by mathematical arguments that “time does not exist in our world.” And this reliance on mathematical symbolism is taken to its logical conclusion, for example, by the prominent MIT physicist, Max Tegmark [2014], in *Our Mathematical Universe: My Quest for the Ultimate Nature of Reality*. His central hypothesis is that physical reality is a mathematical structure or, his own words (italics his), “a crazy-sounding belief of mine that our physical world not only is *described* by mathematics, but that it *is* mathematics, making us self-aware parts of a giant mathematical object.” Along similar lines, another famous physicist is once said to have written the basic

equations of the universe, as conceived by modern physics, on a blackboard and then proudly declared: "All I need do now is clap my hands and a universe will spring into being." You can see how we are becoming prisoners of our own nature! As a thought experiment, consider an intelligent species of arachnid that spins wonderful, silken webs with which to gather food, attract mates, and establish status---its three primary means of survival, and, in this regard, not unlike humans. Perhaps such a species might surmise that the world at large, the sun and the moon and the stars, are themselves hung from the heavens by fine, silken filaments of web, invisible to the naked eye!

The next step beyond the highly-precise symbolism of mathematics and its associated skillful manipulation of mathematical symbols is *machine computation*, i.e., the *formal manipulation of symbols by automata*, which has its roots in the so-called "difference" and "analytic" engines, pioneered by Charles Babbage in the first half of the 19th Century and later publicized by Lady Lovelace, the mathematically-trained daughter of the famed poet Lord Byron. It undergirds our 21st Century world of digital *computers* that are connected globally through the internet; computer *programs*, or "computer software," that run on digital computers and render them usable; and *algorithms*, or formal procedures, that are the very heart of computer programs.

Digital computers today are most commonly constructed from integrated circuits; computer programs are written in a variety of computer languages ranging from early Fortran to modern Java; and algorithms are usually formulated at first in a human language, and then translated, or programmed, in an appropriate computer language, i.e., they are the "brain-ware," so to speak, of computer programs. Today, nothing functions without them! And at their foundation are a wide variety of conceptual, i.e., abstract or theoretical, models of computation that capture the essence of machine computation: finite-state automata, Turing machines, cellular automata, associative machines, and the ubiquitous neural-

networks, whose structure most closely resembles, albeit in a highly-simplified form, that of the human-animal brain and nervous system.

In a development that paralleled the claims of the physicist Max Tegmark that were mentioned above, the famed theoretical physicist turned computer scientist, Stephen Wolfram [2002], makes the following astonishing assertion in his monumental work, *A New Kind of Science* (bracketed phrase and italics in the quotations are mine):

"Three centuries ago science was transformed by the dramatic new idea that rules based on mathematical equations could be used to describe the natural world. My purpose in this book is to initiate another transformation, and to introduce a new kind of science that is based on much more general types of rules that can be embodied in *simple computer programs*."

And again:

"Simple programs [for instance, the rules that define a cellular automaton] can capture the essential mechanisms for all sorts of complex behavior in nature."

Indeed, paraphrasing Max Tegmark and now putting words into Stephen Wolfram's mouth, which, we hasten to add, were *not* actually uttered by him: "a crazy-sounding belief of mine is that our physical world not only is *described* by computation, but that it *is* computation, making us self-aware parts of a giant computational object---a universal cellular automaton based on simple rules!" Descartes' *res cogitans* now fully automated---the previously-quoted "consistent materialism" of Bertrand Russell!

Wolfram's position is, of course, extreme. But the extension of Descartes' dictum, which followed naturally on the heels of the digital computer revolution---*I compute, therefore I think, therefore I am*---has provided the basis, in one form or another, for an enormous volume of work by philosophers, computer scientists, cognitive scientists, and neuroscientists, during the second half of the 20th Century and beyond; for example, Newell & Simon [1972] in *Human Problem-Solving*, Bernard Baars [1988] in *A Cognitive Theory of Consciousness*, Daniel Dennett [1991] in *Consciousness Explained*, Churchland & Sejnowski [1992] in *The*

Computational Brain, and the Turing-Award Laureate, Manuel Blum [2018] in *Towards a Conscious in AI*, to cite only a few representatives works on the *computational model of the mind*. Here “compute” is used in a broad sense to include rule-based algorithmic, neural-based associative, and even quantum-based approaches to computation. As described by the renowned philosopher John Searle [1997] in *The Mystery of Consciousness* (italics mine):

“There are different versions of the computational theory of the mind. The strongest is: *the mind is just a computer program*. There is nothing else there. This view I call Strong Artificial Intelligence (Strong AI for short) to distinguish it from the view that *the computer is a useful tool in doing simulations of the mind*, as it is useful in doing simulations of just about anything we can describe precisely, such as weather patterns or the flow of money in an economy. This more cautious view I call Weak AI.”

Note that Searle [1997] then emphatically refutes Strong AI, but he subscribes to Weak AI, as do Hubert Dreyfus [1972] in *What Computers Can't Do* and brothers Hubert & Stuart Dreyfus [1986] in *Mind over Machine*; others, for example, the mathematical physicist Roger Penrose [1989], [1994] in *The Emperor's New Mind* and *Shadows of the Mind*, reject *both* Strong and Weak AI. But regardless of which AI hypothesis one rejects or accepts, it is beyond any reasonable doubt that programmed computers and associative neural nets (employing “deep-learning” and large data sets) are able to achieve remarkable feats of intelligence within restricted problem-solving arenas; for example, self-driving automobiles or playing the game of Go. For a revealing discussion, see *Neural Age* by Drakopoulos [2018] and, in particular, its extensive, web-accessible bibliography, and also *AI Super-Powers* by Kai-Fu Lee [2018].

In the words of Henri Bergson, all such philosophers and scientists, who knowingly or unknowingly subscribe to the foregoing dictums and models of the mind, are “continuators of Descartes.” Yourgrau [2005] has summarized this state of affairs very aptly in his aforementioned work as follows:

"The two fundamental axes along which the course of philosophy is plotted are ontology [the philosophy of being] and epistemology [the philosophy of knowledge]."

He observes that it is possible to assess any position in philosophy by the relationship it proposes between being and knowing, and that "the modern period inaugurated by Descartes, *put the emphasis on epistemology.*" In consequence, one may add, we have today almost completely lost sight of the *philosophia perennis*---the perennial philosophy with which we began this essay.

Has our modern scientific era---an Era between Gods---reached a philosophical dead end? Is its central premise as erroneous as the pre-Copernican belief that the sun revolved around the earth? And can the perennial philosophy be rediscovered within a modern setting? These issues began to be addressed frontally towards the end of the 20th Century, when the study of human (and animal) consciousness and the mind, and not just computer-centric, "symbolical" thinking, became the subject of serious and respectable scientific investigation. An intellectual revolution was initiated afresh, spearheaded by some of the most prominent scientists and philosophers of the day---Nobel Laureates Gerald Edelman and Francis Crick, Antonio Damasio, John Searle, and several others---who began to question the validity of the computational model of the mind. They asserted that consciousness itself and all that it entails---thinking, feeling, awareness, intuition---should be viewed instead as *natural biological phenomena* that emanate from the brain and central nervous system, inseparable from their *embodiment*, and that they should be investigated scientifically as such, an approach that placed its emphasis on ontology rather than epistemology. The latter therefore being premised on the former, not the other way around! Within the span of a few decades, there came into print another enormous volume of scientific research into human and, more broadly, animal consciousness. The absence of a breakthrough in this approach has led other prominent scientists and philosophers, in particular, Christof Koch, Giulio Tononi, and David Chalmers, to turn to *information theory*, an offshoot of the computer

revolution, as a vehicle for explaining consciousness. And, indirectly, the foregoing advances, in their totality, have played a role in resurrecting long-neglected works of equally prominent natural philosophers of the 19th and early 20th Centuries---Gustav Theodor Fechner, William James, Henri Bergson, and Alfred North Whitehead---who collectively had *not* lost sight of the *Philosophia Perennis* of Gottfried Wilhelm Leibnitz. I will turn to these developments in the essays comprising the next two chapters.

In the spirit of the present discourse on the limitations of symbolism, let me close by reaching back to the masterpiece of the renowned, early 20th century scientist, Sir Arthur Eddington [1928], *The Nature of the Physical World*. In his chapter `Science and Mysticism' one finds the following altogether illuminating paragraphs that are worth quoting in full (italics again mine):

"We have two kinds of knowledge, which I call *symbolic knowledge* and *intimate knowledge* [and as we shall see later, after our discussion of Bergson's philosophy, one could substitute `intuitive knowledge']. I do not know whether it would be correct to say that reasoning is only applicable to symbolic knowledge, but the more customary forms of reasoning have been developed for symbolic knowledge only. The intimate knowledge will not submit to *codification* and *analysis*, or rather, when we attempt to analyse it the intimacy [intuition] is lost and it is *replaced by symbolism*.

For an illustration let us consider *Humour* [English spelling, and note that he does not say *Laughter*, or comedy, which requires analysis of a different sort as discussed in Bergson [1900]]. I suppose that Humour can be analysed to some extent and the essential ingredients of the different kinds of wit classified. Suppose that we are offered an alleged joke. We subject it to scientific analysis as we would a chemical salt of doubtful nature, and perhaps after careful consideration of all its aspects we are able to confirm that it really and truly is a joke. Logically, I suppose, our next procedure would be to laugh. But it may certainly be predicted that as a result of this scrutiny we shall have lost all inclination we may ever have had to laugh at it. It simply does not do to expose the inner workings of a joke. The classification concerns a symbolic knowledge of humour which preserves all the characteristics of a joke except its laughableness. The real appreciation must come spontaneously, not introspectively [and earlier Eddington says `by introspection we drag out the truth for external survey']. I think this is not an unfair analogy for our mystical feeling for Nature, and I would venture even to apply it to our mystical experience of God. There are some to whom the sense of a

divine presence irradiating the soul is one of the most obvious things of experience. *In their view a man without this sense is to be regarded as we regard a man without a sense of humour. The absence is a kind of mental deficiency.* We may try to analyse the experience as we analyse humour, and construct a theology, or it may be an atheistic philosophy, which shall put into scientific form what is to be inferred about it. But let us not forget that the theology is symbolic knowledge [recall our discussion along these lines near the start of this essay] whereas the experience is intimate [i.e., intuitive] knowledge. And as laughter cannot be compelled by the scientific exposition of the structure of a joke, so a philosophic discussion of the attributes of God (or an impersonal substitute) is likely to miss the intimate response of the spirit which is the central point of the religious experience."

And, in conclusion, let us not forget that Sir Arthur Eddington's "intimate response of the spirit" has found full expression in the perennial philosophy of old, and, in particular, in the three timeless, Sanskrit-derived words of utmost simplicity that have echoed and re-echoed down through the centuries: *Thou Art That!*

2. The Mystery of Consciousness

Defining Consciousness

Everything that we know and feel during the course of our lives, from dawn through dusk and all through the night, becomes known to us and felt by us through the medium of our waking and dreaming consciousness. And yet consciousness itself, the ultimate arbiter of our inner and outer reality, remains the most mysterious of phenomena.

What precisely is meant by the term "consciousness"? In *The Mystery of Consciousness*, the renowned philosopher and scholar, John R. Searle [1997], addresses this problem head-on as follows:

"There is a problem that is supposed to be difficult but does not seem very serious to me, and that is the problem of *defining* "consciousness." It is supposed to be frightfully difficult to define the term. But if we distinguish between analytic definitions, which aim to analyze the underlying essence of a phenomenon, and common-sense definitions, which just *identify* what we are talking about, it does not seem to me at all difficult to give a common-sense definition of the term: "consciousness" refers to those states of sentience and awareness that typically begin when we awake from a dreamless sleep and continue until we go to sleep again, or fall into a coma or die or otherwise become unconscious. Dreams are a form of consciousness, though of course quite different from full waking states. Consciousness so defined is an inner, first-person, qualitative phenomenon. In my view, we have to ... start with the assumption that consciousness is an ordinary biological phenomenon comparable to growth, digestion, or the secretion of bile."

In a similar vein, Nobel Laureate Francis Crick [1994] begins his discussion of human consciousness in *The Astonishing Hypothesis: The Scientific Search for the Soul* as follows (italics mine):

"....."You," your joys and your sorrows, your memories and your ambitions, your sense of personal identity and free will, are in fact no more than the behavior of a vast assembly of neural cells and their associated molecules. As Lewis Carroll's Alice might have phrased it: "*You're nothing but a pack of neurons.*" "

And yet others, for example, V.S. Ramachandran [2004] in *A Brief Tour of Human Consciousness: From Impostor Poodles to Purple Numbers*, assert that the need for a definition of “consciousness” will simply fade away as our probing and knowledge of the detailed mechanisms of the brain increases, in much the same way that the need for a formal definition of “life” has receded following the discovery of its underlying genetic code.

Perhaps the most useful of the many attempts to define and categorize consciousness has been provided by the physicist-turned-philosopher, David Chalmers [1996] in a highly-acclaimed work, *The Conscious Mind*. He distinguishes the “hard problem,” which he terms “phenomenological consciousness” (experience, qualia), from the “easier problem” of seeking to explain “psychological consciousness” (learning, memory, awareness). Note that he does not call it the “easy problem.” Throughout, I will utilize Chalmers’ categorization, and, later in this essay, I’ll give a more detailed account of his perspective on the subject, along with that of the great psychologist and philosopher, William James [1912], whose mysteriously-titled essay, “Does Consciousness Exist?,” has become a philosophical touchstone for modern scientific investigators of the mystery of consciousness.

Scientific Investigations

The research literature on the subject of consciousness is vast. One simply has to pick and choose! But, nevertheless, it soon becomes evident that almost all the *recent* scientific research addresses Chalmers’ “easier problem,” on which considerable progress in understanding has been achieved.

Much of this work is highly technical in nature, but it is fortunate that leading researchers in this field have also written books that make their work accessible to members of the general public. And John Searle has done a great service to this readership-at-large by publishing reviews of these works in the pages of the *New York Review of Books*. Many of his

reviews have also been collected into his aforementioned compact volume, *The Mystery of Consciousness*.

My purpose in this essay is to provide an overview of this body of scientific and philosophical work, and, in assessing whether these investigations are successful in their explanation of consciousness, I will rely heavily on the judgments of John Searle and David Chalmers. These two philosophers are in broad agreement in their evaluation of this scientific research, but, as we shall see subsequently, they then vigorously part company when it comes to their own perspectives on the mysterious nature of *phenomenological* consciousness.

David Chalmers [1996] groups the different approaches taken by researchers into consciousness into three broad categories as follows:

1. *Physics-Based Theories*, which are exemplified by the works of the renowned mathematical-physicist, Roger Penrose [1989], [1994], namely, *The Emperor's New Mind: Concerning Computers, Minds, and the Laws of Physics*, and, some years later, *Shadows of the Mind: A Search for the Missing Science of Consciousness*. In joint work with a colleague, Stuart Hammeroff, he has speculated that the collapse of the quantum wave function, specifically within sub-structures of neurons called microtubules, may hold the key to conscious experience. John Searle [1997] tells us that these works present a truly masterful overview of the foundations of mathematics and theoretical physics, in particular, Godel's incompleteness theorem and quantum mechanics, but that they provide very little insight into the phenomenon of consciousness itself. To paraphrase an old biblical saying, Searle cautions Penrose, in essence, to render unto mathematical physics what belongs to mathematical physics and to consciousness what belongs to consciousness! Physics-based approaches to the study of consciousness will not be considered further in this essay.

2. *Cognitive-Modeling Theories* are exemplified by philosopher Daniel Dennett [1991] in *Consciousness Explained*, where he presents a version of Strong AI known as the "Multiple Drafts" model. According to Searle [1997]:

"On Dennett's view there is no consciousness in addition to the computational features, because that is all that consciousness amounts to for him: mere effects of a von Neumann(esque) virtual machine implemented in a parallel architecture."

In other words, and once more resorting to Chalmers' terminology, Dennett *denies* the very existence of phenomenological consciousness and narrows the problem to a computational explanation of psychological consciousness. Again quoting Searle:

"I regard Dennett's denial of the existence of consciousness [i.e., *subjective* inner mental states] not as a new discovery or even a serious possibility but rather as a form of intellectual pathology."

Naturally this strong dismissal elicited an equally-strongly worded response from Dennett, which Searle published as an appendix to his review under the heading "An Exchange with Daniel Dennett." For these, and also for reasons that we have presented in the previous chapter, we will not consider cognitive-modeling theories further in this essay.

3. *Neurobiological Theories* form the third category and are exemplified by the research of three world-renowned scientists, Gerald Edelman, Francis Crick, and Antonio Damasio, along with their co-workers and disciples, in particular, Christof Koch and Giulio Tononi. This will be the focus of our discussion in the remainder of this essay. While I have studied many of their books aimed at the general readership and cited herein, I remain insufficiently qualified to pass judgment on whether these researchers have attained their objectives and achieved a satisfactory explanation of consciousness. Thus I will view

these neurobiological theories primarily through the lens of John Searle's aforementioned reviews, which appear in the pages of the *NY Review of Books*, and David Chalmers' assessment in *The Conscious Mind*. And, in so doing, I will often resort to the device of employing direct quotations from these two philosophers' works rather than recasting their views in my own words (recall also the quote from Osip Mandelstam in the Preface of this book).

The present essay is intended as a bridge between the previous essay and the next, where I will then turn to a very different school of thought on the mystery of consciousness and express more of my own views on this subject.

Neurobiological-Based Approaches

Gerald Edelman's Remembered Present

In a remarkable series of books, Nobel-Laureate Gerald Edelman has put forward a brain-based mechanism termed "*Neural Darwinism*" whereby conscious states are attained, which he succinctly characterizes as "*The Remembered Present*." The foregoing two terms provide the titles of his initial books on the subject, Edelman [1987], [1989] and his subsequent writings then furnish concise summaries of this neurobiological theory of consciousness, in particular, *Bright Air, Brilliant Fire* (Edelman [1992]), and the even more accessible overview, *Wider than the Sky* (Edelman [2004]), which is the last in the series. An overall philosophical context is provided in Edelman's [2006] most recent work, *Second Nature: Brain Science and Human Knowledge*.

John Searle [1997] gives a concise description of the three central ideas in Edelman's approach as follows:

1. The notion of maps, namely, sheets of neurons in the brain which are systematically related to corresponding sheets of receptor cells, e.g., on the skin or the retina.

2. The theory of “neuronal group selection” whereby groups of neurons are strengthened or weakened by a Darwinian process, i.e., the brain employs the mechanism of evolutionary selection rather than programmed instruction.
3. Most importantly, the idea of “reentry” whereby parallel signals go back and forth between maps.

He then outlines Edelman’s theory of how “the brain *causes* consciousness” (italics mine):

“So, to summarize, on Edelman’s view, in order to have consciousness the following conditions are both *necessary and sufficient*: the brain must have systems for categorization, and it must also have the kinds of memory Edelman describes [elsewhere Searle summarizes this as “not just a passive system of storing but an active process of re-categorizing on the basis of previous categorizations”], as well as a system of learning, where learning necessarily involves values. The brain must be able to make the distinction between the self and the rest of the world, and there must be brain structures that can order events in time. And, most important of all, the brain needs global reentry pathways connecting these anatomical structures.”

Chalmers [1996] gives a more succinct summary of Edelman’s approach as follows:

“The central element of his theory involves re-entrant neural circuits to which perceptual signals can be conceptually categorized before they contribute to memory. Perceptual information and internal state interact in a subtle way ... to give rise to “primary consciousness.” His model of “higher-order consciousness” brings in a new memory element through “semantic bootstrapping,” which yields concepts of the self, past, and, future. All this is linked to language production through Broca’s and Wernicke’s areas.”

In summing up his aforementioned review of Edelman’s theory, Searle declares:

“It is the most thorough and profound attempt that I have seen in the neurobiological literature to deal with the problem of consciousness.” [But, he continues] ... any explanation of consciousness must account for subjective states of awareness, i.e., conscious states [and again] ...the problem of what accounts for the inner qualitative

states of awareness or sentience called 'qualia' is not an aspect of consciousness that we can set on one side; it *is* the problem of consciousness."

This, he argues, Edelman's theory has failed to encompass!

Chalmers [1996] arrives at an identical conclusion, namely, that Gerald Edelman has satisfactorily tackled the "easier" problem of psychological consciousness, but not the "hard" problem of phenomenological consciousness.

Francis Crick's Astonishing Hypothesis

Francis Crick collaborated very closely with a younger researcher, James Watson, in their discovery of the structure of the DNA molecule, for which they later shared a Nobel Prize. In much the same vein, Crick has conducted much of his investigation into human consciousness in very close cooperation with another younger researcher, Christof Koch. Ten years after the appearance of the aforementioned work, *The Astonishing Hypothesis* by Francis Crick [1994], his colleague Christof Koch [2004] published his own follow-up treatise, *The Quest for Consciousness*, each dedicating his book to the other. Their close collaboration and high regard for one another is further highlighted by phrases like "Christof and I" and "Francis and I" that one finds throughout these two works. The two scientists also share a contempt for philosophers in general, but they make exceptions for the two mentioned above, John Searle and David Chalmers.

Crick's focus is on consciousness within the visual system of the brain and he hypothesizes that "consciousness depends critically on *thalamic connections with the cortex*. It exists only if certain cortical areas have reverberatory circuits that project strongly enough to produce significant reverberations," and, with regard to the latter, "*often with rhythms in the 40-Hertz range*" (italics mine).

However, Francis Crick cautions that

"he hopes nobody will call it the Crick (or the Crick-Koch) Theory of Consciousness. While writing it down, my mind was constantly assailed by reservations and qualifications"

In his review of this book, Searle [1997] lauds Crick for his willingness to speculate, but he says that even if it "turns out to be 100 percent correct [that] synchronized firing in the range of 40 Hertz in the networks connecting the thalamus to the cortex might be *the key to solving the problem of consciousness*," we nevertheless "still need to know the mechanisms whereby the *neural correlates cause* the conscious feelings, and we are a long way from even knowing the form such explanation might take" (italics mine).

David Chalmers [1996] arrives at a similar assessment. He points out that Crick has demonstrated that these 40 Hertz oscillations appear to play an important role in *binding* various kinds of information into a unified whole. Thereby, all sorts of disparate information might be integrated into the contents of consciousness and working memory, and thus the control of behavior. But this still fails to answer the key question of phenomenological consciousness, which Chalmers highlights as follows (italics mine):

"Why should these oscillations be accompanied by conscious experience? The theory provides a partial answer: because the oscillations are responsible for binding. But the question of why binding itself should be accompanied by *experience* is not addressed. The theory gains its purchase by assuming a link between binding and consciousness, *and therefore does nothing to explain it.*"

As was the case with Edelman, the work of Francis Crick (and Christof Koch) has not succeeded in solving the "hard" problem of phenomenological consciousness.

Antonio Damasio's Self Comes to Mind

A third line of development is pursued by the renowned neuroscientist, Antonio Damasio [1994], [1999], [2003] in another remarkable sequence of books. The first, and arguably the best in this series, is *Descartes' Error: Emotion, Reason, and the Human Brain*, and it was followed by *The Feeling*

of What Happens: Body and Emotion in the Making of Consciousness and later by *Looking for Spinoza: Joy, Sorrow, and the Feeling Brain*. All three are well worth reading for their elegance of presentation, their wealth of interesting information, and their overarching framework for tackling the mystery of consciousness. The three works provide the foundational premise for a fourth, culminating book in this series: Damasio [2010], *Self Comes to Mind: Constructing the Conscious Brain*.

Again it is our good fortune that John Searle continued his review of books on consciousness that appeared subsequent to the publication of Searle [1997]. In Searle [2011], "The Mystery of Consciousness Continues," he encapsulates Damasio [2010], *Self Comes to Mind*, as follows within the pages of *The New York Review of Books*:

"To summarize Damasio's argument is not an easy task because the book is densely argued and to me at least often unclear. Here is the basic framework: the brain creates an (unconscious) mind. The brain also creates the self. When the self encounters the mind, consciousness results."

It is equally challenging to summarize John Searle's [2011] own detailed summary of Damasio's argument, but here are two extracts:

"The brain creates the mind by creating images, which are *unconscious* momentary patterns on sheets of neurons called maps. The images may either be of *parts of the body* or of *things outside the body*."

And then:

"Body mapping is the key to the problem of consciousness, because by mapping the body the brain manages to create the critical component of the self. Having made a mind by making maps, the brain makes the mind conscious by creating a self, and when the self encounters the mind, consciousness results. This is the source of Damasio's title *Self Comes to Mind*."

Searle then goes on to examine each of these three key aspects in detail, namely, "self," "mind," and "consciousness" and he comes to the stunning conclusion that there is *circularity* in Damasio's argument. Because "it

seems there is no way to understand the sort of self that he describes without supposing that it is already conscious," and again that Damasio "does not see how much consciousness is essential in our understanding of the mind." Searle ends his review as follows:

"I have great admiration for the book and its author. I think it is an adventurous, courageous, and intelligent effort. I do not think he has made a convincing case that this is the right way to solve the problem of consciousness."

In Conclusion

In challenging Descartes' edict, "I think therefore I am," each of these three great scientific researchers says, in essence, "I am embrained and embodied, therefore I am conscious, therefore I think and feel!" For Gerald Edelman this is achieved via neural Darwinism; for Francis Crick via 40k Hertz oscillations in the brain; and for Antonio Damasio via the process of self coming to mind. In each case, and again resorting to Chalmers' categorization, each researcher primarily addresses psychological consciousness and has failed to explain the mystery of phenomenological consciousness.

On one particular point all three scientific researchers are agreed, namely, that consciousness is a *dynamic accomplishment* within the brain and nervous system. Each takes philosophical guidance from William James [1890], referencing, in particular, and paying tribute to this great work in two volumes, *The Principles of Psychology*. Gerald Edelman [2004] is especially emphatic as follows (italics mine):

"What is the most important statement one can make about consciousness from this point of view? *It is that consciousness is a process, not a thing.* James makes this point trenchantly in his essay, "Does Consciousness Exist?" [which appears in James [1912]]. To this day, many *category errors* have been made as a result of ignoring this point. For example, there are accounts that attribute consciousness specifically to nerve cells (or "consciousness neurons") or to particular layers of the cortical mantle of the brain. The evidence, as we shall see, reveals that the process of consciousness is a *dynamic accomplishment* of the distributed activities of populations of neurons in many different areas of the brain."

While all three researchers make reference to James [1890], it is interesting to note that only Gerald Edelman references the aforementioned essay "Does Consciousness Exist?" itself, which appears in James [1912], at least as far as is evidenced by specific references to William James listed in their books' indexes. And perhaps the reason for this is that William James, in this mysteriously-titled article, goes much further in his assertions as follows (*italics mine*):

"My thesis is that if we start with the supposition that there is only one primal stuff or material in the world, a stuff of which everything is composed, and if we call that stuff *pure 'experience,'* then knowing can easily be explained as a particular sort of *relation* to one another [in other words, a process] into which portions of pure experience can enter. The relation itself is a part of pure experience, one of the 'terms' becomes the subject or bearer of the knowledge, the other becomes the object known. This will need much explanation before it can be understood."

William James then goes into a detailed discussion of this extraordinary statement and continues in an immediate, follow-up essay with an equally mysterious title, "A World of Pure Experience." We'll have more to say on his point of view later in this essay and again, and in much in more detail, in the next chapter.

A Turn to Information Theory

The failure to explain phenomenological consciousness by the neurobiological theories of Crick and Edelman has led their co-workers and disciples to consider an information-theoretic approach to which we now turn. We will discuss the theories of David Chalmers, a physicist turned philosopher; Giulio Tononi who was a co-author with Gerald Edelman and later branched off; and Christof Koch, who worked closely with Francis Crick as noted above.

David Chalmers' Conscious Mind

Chalmers' [1996] book, in his own words, is "a serious work in philosophy," but simultaneously he has striven to make it accessible to non-

philosophers. In the quotation below taken from Chalmers' introduction to his book, I've replaced chapter and section *numbers* by the chapter and section *titles* themselves (within quotation marks), thereby making them more indicative of content, and this edited paragraph then serves as a useful road-map through Chalmers' highly-technical work (italics mine):

"For a short tour that avoids technicalities, read "Two Concepts of Mind," skim the early parts of "Supervenience and Explanation" as background material, then read all of "Can Consciousness Be Reductively Explained?" (skimming "Is consciousness logically supervenient on the physical?" where necessary) for the central argument against reductive explanation, and then "An argument against materialism" and "Reflections on naturalistic dualism" for the central considerations about dualism. "The Coherence between Consciousness and Cognition" is worth reading for the basic shape of the positive approach. Of the positive material, "Absent Qualia, Fading Qualia, Dancing Qualia" is perhaps the most self-contained as well as the most fun, with easy-to-understand thought experiments involving silicon brains; and those who like *wooly and wild speculation* might enjoy "Consciousness and Information: Some Speculation"."

Reading this restricted material helps to "de-blur" Chalmers' complex train of philosophical argument, thereby enabling one to obtain a relatively clear picture of his conclusions, although not the means by which he arrives at them. Furthermore, this "short tour" provides a vocabulary for judging other scientific and philosophical works in this area. Let us therefore consider it in some detail.

As already noted, Chalmers' draws a distinction between "psychological" and "phenomenological" consciousness, the "easier" and "hard" problems, respectively. Next, he introduces the very helpful notion of "supervenience," which captures the relationship between high-level facts about the world that we inhabit (formally called B-properties), for example, biological properties of living creatures, and low-level facts of the underlying physical world (formally called A-properties), for example, mass, electric-charge, fields, and so on. Using this formal nomenclature, he tells us that "B-properties *supervene* on A-properties if *no* two possible situations are identical with respect to their A-properties while differing in their B-properties." (Thus, for example, biological properties supervene on

physical properties.) Depending upon whether we “take the situations in question to be individuals or entire worlds, we arrive at notions of *local* and *global* supervenience, respectively.”

More important, however, is the distinction between *logical* (conceptual, not-inconceivable) supervenience and *natural* (empirical, as observed within nature) supervenience. This is central to his argument, which he makes as follows:

“The distinction between logical and natural supervenience is vital for our purposes. We can intuitively understand the distinction as follows. If B-properties supervene logically on A-properties, then once God (hypothetically) creates a world with certain A-facts, the B-facts come along for free as an automatic consequence. If B-properties merely supervene naturally on A-properties, however, then after making sure of the A-facts, God has to do more work in order to make sure of the B-facts: he has to make sure there is a law relating the A-facts and the B-facts. Once the law is in place, the relevant A-facts will automatically bring along the B-facts, but one could, in principle, have had a situation where they did not.”

Chalmers then argues that consciousness cannot be reductively explained, by which he means that he is able to demonstrate that consciousness is *not globally, logically supervenient* on the physical. In his own words (italics his):

“Physical explanation is well suited to the explanation of *structure* and *function*. Structural properties and functional properties can be straightforwardly entailed by a low-level physical story, and so are clearly apt for reductive explanation. And almost all the high-level phenomena that we need to explain ultimately come down to structure and function: think of the explanation of waterfalls, planets, digestion, reproduction, language. But the explanation of consciousness is not just a matter of explaining structure and function. Once we have explained all the physical structure in the vicinity of the brain, and we have explained how all the various brain functions are performed, there is still a further sort of explanandum: [phenomenological] consciousness itself. Why should all this structure and function give rise to experience? The story about the physical processes does not say.”

Thus there is an *explanatory* gap between the physical level and conscious experience, the latter being a *further fact*, not explainable simply by telling the story about the physical facts. Again quoting directly:

"...we can formulate precisely the widely held doctrine of *materialism* (or *physicalism*), which is generally taken to hold that everything in the world is physical, or that there is nothing over and above the physical, or that the physical facts in a certain sense exhaust all the facts about the world. In our language, materialism is true if all the positive facts about the world are globally logically supervenient on the physical facts. This captures the intuitive notion that if materialism is true, then once God fixed the physical facts about the world, all the facts are fixed. (Or at least all the positive facts were fixed.)"

His earlier demonstration that phenomenological consciousness cannot be reductively explained implies immediately that materialism is false. He tells us that after a long period of resistance, he came to believe in dualism, not *substance* dualism as did Descartes, but in a kind of *property* dualism, one that involves fundamentally new nonphysical features of the world. He assures us that "there is nothing antiscientific or supernatural about this view" and that "there is good reason to believe that there is a lawful relationship between physical processes and experience." These laws will be "psychophysical" or "supervenience" laws. He calls his view "naturalistic dualism" and elaborates further as follows:

"Like the fundamental laws of physics, psychophysical laws are eternal, having existed since the beginning of time. It may be that in the early stages of the universe there was nothing that satisfied the physical antecedents of the laws, and so no consciousness, although this depends on the nature of the laws. In any case, as the universe developed, it came about that certain physical systems evolved that satisfied the relevant conditions. When these systems came into existence, conscious experience automatically accompanied them by virtue of the laws in question. Given that psychophysical laws exist and are timeless, as naturalistic dualism holds, the evolution of consciousness poses no special problem."

Chalmers turns to the positive side as described in his foregoing "road map." He seeks to build a relationship between a *non-reductive* theory capturing the coherence between phenomenological consciousness

(experience) and psychological consciousness (awareness) and to draw them together into “a unified picture of the mind,” a quest whose objectives he states as follows:

“Ultimately, we will wish for a set of *fundamental laws*. Physicists seek a set of basic laws simple enough that one might write them on the front of a T-shirt; in a theory of consciousness, we should expect the same thing. In both cases, we are questing for the basic structure of the universe, and we have good reason to believe that the basic structure has a remarkable simplicity. The discovery of fundamental laws may be a distant goal, however.When we finally have fundamental theories of physics and of consciousness in hand, we may have what truly counts as a theory of everything. The fundamental physical laws will explain the character of physical processes; the psychophysical laws will explain the conscious experiences that are associated, and everything else will be a consequence.”

He argues for a new principle that he calls *organizational invariance* saying the following:

“I claim that conscious experience arises from fine-grained functional organization. More specifically, I argue for a *principle of organizational invariance*, holding that given any system that has conscious experiences, then any system that has the same fine-grained functional organization will have quantitatively identical experiences. According to this principle, consciousness is an organizational invariant: a property that remains constant over all functional isomorphs of a given system. Whether the organization is realized in silicon chips, in the population of China, or in beer cans and ping-pong balls does not matter. As long as the functional organization is right, conscious experience will be determined.”

And then:

“Just as one can believe that consciousness arises from a physical system but is not a physical state, one can believe that consciousness arises from a functional organization but is not a functional state. The view that I advocate has this form---we might call it *nonreductive functionalism*. It might be seen as a way of combining functionalism and property dualism.”

And, in order to give the reader some sense of the complexity of the underlying philosophical alternatives that must be circumvented in justifying his conclusions, he adds the following:

"Some other views found in the philosophical literature do not fall explicitly into the framework I have outlined. With this framework in place, however, it is not hard to locate them and to analyze their problems. I briefly discuss nine such positions in the endnotes [of his book]: biological materialism, physicalist-functionalism, psychofunctionalism, anomalous monism, representationalism, consciousness as higher-order thought, reductive teleofunctionalism, emergent causation, and mysterianism."

From the foregoing it is evident that Chalmers accepts the strong artificial intelligence hypothesis and he devotes an entire chapter to this subject in the closing part of his book. In order to span the gap between psychological and phenomenological consciousness, through yet-to-be-discovered psychophysical laws, *he looks to what has more recently become known as Integrated Information Theory (IIT)*, which will be discussed in the next section of this essay. Chalmers believes that phenomenological consciousness is everywhere---a version of panpsychism---and, in admittedly wild speculation, he asserts that even a device as innocuous as a thermostat might be capable of having conscious experiences. The animal brain, in particular, is *sufficient* for consciousness, *but not necessary*.

Where does Searle [1997] stand on all of this? We can begin by quoting a comment of Chalmers [1996]:

"Like me, Searle holds that consciousness is merely naturally supervenient on the physical. But he denies that this is a variety of dualism, even property dualism."

And, indeed, John Searle [1997] goes much further, coming out with guns blazing and expressing his own views as follows:

"I believe there is not much to be said in favor of either functionalism or property dualism [earlier in his review he had discussed both in considerable detail] but Chalmers' book shows the extra absurd consequences of trying to combine the two. To his credit he follows out the logical consequences of his views, even when doing so leads to conclusions that are quite breathtakingly implausible."

For Searle, both intelligence and consciousness are inextricably intertwined. They are *caused* by the brain and its encompassing nervous system, which are both necessary and sufficient for conscious experience. He tells us that

"we must keep reminding ourselves that the brain is a biological organ, like any other, and consciousness is as much a biological process as digestion or photosynthesis."

As noted in the previous chapter, Searle accepts only the weak AI hypothesis and rejects strong AI. Nor does he recognize Chalmers' distinction between psychological and phenomenological consciousness. For Searle, information (IIT) cannot stand on its own and only has meaning *relative* to an embodied observer. Chalmers, on the other hand, tells us in a rebuttal published in the same volume that Searle makes "elementary mistakes" in rejecting his detailed arguments that consciousness is a nonphysical (including non-biological) feature of the world. Searle's rejoinder:

"It is to his [Chalmers'] credit that he sees the consequences of his views; it is not to his credit that he fails to see that they are absurd."

This is a gladiatorial battle between two eminent philosophers that we can only watch from the sidelines!

Giulio Tononi's Phi

Meanwhile another young researcher, Giulio Tononi, entered the field through co-authorship with Gerald Edelman of *A Universe of Consciousness: How Matter becomes Imagination* (Edelman and Tononi [2000]). Later, he branched out independently, and, surprisingly, seemed to distance himself from this earlier work, converging instead on yet another approach to understanding human consciousness that is premised on information theory. Thus, in a most unusual sequel to the foregoing work, titled *Phi: A Voyage from the Brain to the Soul*, Giulio Tononi [2012] uses the vehicle of "imaginary dialogues" between characters patterned on four great thinkers of the past---Galileo, Francis Crick, Alan Turing, and Charles Darwin---to introduce integrated information theory (IIT) and a resulting theory of consciousness as follows:

"Integrated information measures how much can be distinguished by the whole above and beyond its parts, and Phi is its symbol. A complex is where Phi reaches its

maximum and therein lives one consciousness---a single entity of experience" (see his Chapter 16).

Consciousness has become a "thing" that can be quantified numerically. However, in his own after-notes to this discussion, Tononi cautions as follows:

"If integrated information is indeed the weighty concept at the heart of consciousness that it is claimed to be, this chapter introduces it in a rather light-hearted manner. Perhaps the author was trying to avoid equations at all costs, but the result is far from satisfactory. Versions of Phi dressed in equations, but in the end just as unsatisfactory, can be found in ...[several references follow]."

Guilio Tononi appears to have committed the "category error" described earlier by Gerald Edelman, and moreover, in equally honest but revealing remarks:

"William James thought that integration was a key to consciousness and fought hard to understand it, as revealed by some excerpts from his *Principles of Psychology* Unfortunately, he never succeeded and eventually gave up amid doubts and denial, writing an essay with the revealing title "Does Consciousness Exist?"

This misses the essence of William James' view of consciousness, as we shall see in the next chapter.

Christof Koch's Confessions of a Romantic Reductionist

The work of Christof Koch [2004], *The Quest for Consciousness: A Neurobiological Approach*, with a foreword by his close collaborator, Francis Crick, is likewise reviewed in depth by John Searle [2005] within the pages of *The New York Review of Books* under the title "Consciousness: What We Still Don't Know." Searle's assessment of the work is akin to his earlier assessment of Crick's and he concludes his review as follows (italics mine):

"This is the most exciting period for the study of consciousness in my intellectual lifetime. We have now, at least, cleared away three of the worst mistakes in dealing with the subject, beginning with the view that consciousness does not exist at all, that it is just an illusion, and there really are no subjective, qualitative states of sentience and

awareness. A similar mistake is to claim that consciousness may exist but that it is really just publicly observable, third-person behavior. The third mistake is to argue that if consciousness does exist and is manifested in behavior it must be nothing more than a computer program running in the brain. All of these mistakes leave out the real existence and the subjective character of qualitative conscious states. We are now in the position to investigate those states through the collaborative efforts of philosophers, psychologists, cognitive scientists, and neurobiologists. *Koch's excellent book is necessary reading for anybody interested in the neurobiological foundations of this project.*"

Christof Koch himself has reinforced this encapsulation of his work. In Chalmers [1996], we find an extract from a published interview of Koch in which the latter is quite clear about the limitations of his (and Crick's) approach, speaking to his interviewer as follows:

"Well, let's forget about the really difficult aspects, like subjective feelings, for they may not have a scientific solution. The subjective state of play, of pain, of pleasure, of seeing blue, of smelling a rose---there seems to be a huge jump between the materialistic level, of explaining molecules and neurons, and the subjective level. Let's focus on things that are easier to study---like visual awareness."

Later, Christof Koch [2012] continues his change of course in a courageously-revealing memoir, *Consciousness: Confessions of a Romantic Reductionist*. He tells us the following:

"I used to be a proponent of the idea of consciousness emerging out of complex nervous networks. Just read my earlier *Quest*. But over the years my thinking has changed. Subjectivity is too radically different from anything physical for it to be an emergent phenomenon. The phenomenal hails from a different kingdom from the physical and is subject to different laws."

And again (italics mine):

"I believe that consciousness is a fundamental, an elementary property of living matter. It can't be derived from anything else: it is a *simple substance* in Leibnitz's words."

But here again we see the potential for the "category error" described earlier by Gerald Edelman as Christof Koch begins to collaborate with Giulio Tononi in the latter's integrated information theory of consciousness, which

seeks a law-like, psycho-physical linkage between phenomenological and psychological consciousness. The following year, Koch [2012] was reviewed in depth by John Searle [2013] under the title "Can Information Theory Explain Consciousness?", again within the pages of *The New York Review of Books*. Searle is circumspect, but nevertheless damning, in his evaluation of Koch's and Tononi's (and also Chalmers') turn to information theory as a model for explaining consciousness. He says (*italics mine*):

"I have great admiration for Tononi and Koch [...but] once you recognize all the examples given by Koch and Tononi are forms of information *relative to an observer*, then it seems to me that *their approach is incoherent*, [...because] information is only information relative to some consciousness that assigns the informational status."

Naturally this led to a spirited defense of IIT by Koch and Tononi, which was reported shortly afterwards within the pages of *The New York Review of Books*, culminating in Christof Koch's [2019] most recent work, *The Feeling of Life Itself: Why Consciousness is Widespread but Can't be Computed*. Here he argues that the usage of "information" within IIT is "very different from its customary meaning in science and engineering introduced by Claude Shannon [the father of information theory]," which is "observational and intrinsic," and he concludes as follows (*italics his*):

"Information in the sense of integrated information theory reflects a much older Aristotelian usage, derived from the Latin *in-formare*, "to give form or shape to." [Other Latin-English translations: "to form an idea of a thing, imagine, conceive" and "to form a conception, notion of a thing."] Integrated information gives rise to the cause-effect structure, a form. Integrated information is causal, intrinsic, and qualitative: it is assessed from the inner perspective of a system, based on how its mechanisms and its present state shape its own past and future. How the system constrains its past and future states determines whether the experience feels like azure blue or the smell of wet dog."

Christof Koch defines his subject of investigation straightforwardly as follows: "consciousness is experience" and "consciousness is *lived* reality," hence the chosen title for his book. Thus, in a nutshell, we could characterize integrated information theory (IIT) as a *symbolical conceptualization of lived experience*. This theory itself remains rough-

hewn, as acknowledged by its creator, Giulio Tononi, in the previous subsection. But, nevertheless, IIT provides a useful vehicle for Koch to argue a key thesis of his monograph, namely, that *consciousness is a widespread phenomenon* and that it cannot be achieved algorithmically (see also Chapter 1).

Koch [2019] is an admirable book. It is well organized, imaginative, and written throughout with great clarity and honesty---the two chapters over-viewing the structure of the human brain are especially masterful---and while it purports to remain within the Cartesian tradition, which heralded the modern scientific era, it does so through an interpretation of Descartes' dictum that runs counter to that of Chapter 1. In our view, Koch [2019] has elements in common, albeit only implicitly, with the approach to consciousness of the philosopher-scientists discussed in the next chapter.

In Conclusion

It is interesting to note also that this "information-theoretic" school of thought has recently begun to reach back for philosophical guidance to another analytic philosopher, Bertrand Russell, whom we have previously encountered in Chapter 1. In *The Analysis of Mind*, Russell [1921] seeks to harmonize psychological "mind" and physical "matter," taking his cue from William James (as did the neurobiologists described at the conclusion of the previous main section of this essay). He tells us that:

"The view that seems to me to reconcile the materialistic tendency of psychology with the anti-materialistic tendency of physics is the view of William James and the American new realists, according to which the "stuff" of the world is neither mental nor material, but a "neutral stuff," out of which both are constructed. [Note a substitution of the term "neutral stuff" for William James' "pure experience," which Russell dismisses as a leftover from "a lingering influence of idealism."] I have endeavoured in this work to develop this view in some detail as regards the phenomena with which psychology is concerned."

And Russell, somewhat paradoxically, concludes the stage-setting for his work as follows (*italics mine*):

"It is therefore natural to suppose that, whatever may be the correct definition of "consciousness," "consciousness" is not the essence of life or mind. In the following lectures, this term will disappear until we have dealt with words, when it will re-emerge as mainly *a trivial and unimportant outcome of linguistic habits.*"

In his follow-up work, *The Analysis of Matter*, Russell [1927] describes a "neutral monism" that harmonizes mind and matter and, in the process, he appears to have abandoned William James entirely, at least judging from the lack of indexical reference to the latter's work. Let us, in turn, abandon Russell's "neutral monism" in favor of a direct return, in the next chapter, to the more acceptable views of William James himself. Because, in almost all the scientific and philosophical explorations of consciousness discussed in the present essay and ranging in time from the mid-20th century down to the present day, one cannot entirely escape a visual image that comes to mind, namely, that of a Cartesian dog in a perpetual, circular chase of its symbolical tail.

The researchers considered in this main section---Chalmers, Koch, and Tononi---all remain unabashedly Cartesian. (They are "continutors of Descartes" in the terminology of Chapter 1.) They have tackled the most difficult of problems and they speak with great honesty. One cannot help but join John Searle in his expressed admiration of their endeavors, and indeed one emerges from the dense philosophical and scientific thicket of their writings with an armful of new insights, connections, unanswered questions, and potential directions for exploration. Can an individual cell have experiences? Is a plant or a tree conscious? Does the earth or the moon have a consciousness? Is an atom or an electron conscious? Does every quantum have an associated quale? Can quality be numerically quantified? Is there an "atomic theory" of consciousness governed by psychophysical laws that can be written on a T-shirt? In daring to raise questions such as the foregoing, and in failing to put forward a satisfactory answer, Chalmers, Koch, and Tononi, and their predecessors, Edelman, Crick, and Damasio, have opened the door to a reconsideration of a very different school of thought, one that was once prominent, but today has fallen into relative obscurity, and to which I will turn in the next essay.

A Return to the Perennial Philosophy

We began this essay with several definitions of consciousness, and I will conclude with my own poetic definition, which draws on what we have learned from the researchers discussed in this essay. Let us keep front-and-center the active, dynamic perspective of Gerald Edelman, namely, that consciousness is not a “thing” but a “process”; not merely a static interaction, but rather a dynamic, *inter-active-binding*. Let us replace static “representation” by a dynamic “*re-presentation*.” Likewise, let us replace the static “information” of IIT by a dynamic, hyphenated “*in-formation*” that mediates between reality, on the one hand, and re-presentation, on the other. And thus, in conclusion, let us define the mysterious phenomenon of consciousness, simply and poetically, as follows:

*Consciousness is Nature's
Inter-Active-Binding between
Reality and Re-Presentation whereby
Each is In-Formation of the Other.*

We have returned to the *perennial philosophy* where we began our journey. Because the foregoing definition can be recast, even more simply and succinctly, into the sublimely beautiful words of the Upanishads: *Thou Art That!*

3. A New Copernican Revolution?

Introduction: The Philosophy of Organism

In the two previous essays, we have seen that much of the current research into the mystery of consciousness has proven to be unsatisfactory. Where do we now turn?

It is within the writings of four preeminent natural philosopher-scientists of the 19th and early 20th centuries---William James, Gustav Theodor Fechner, Henri Bergson, and Alfred North Whitehead---that I have found safe harbor and can bring to a satisfactory conclusion this journey of exploration into the mystery of consciousness, under the rubric of a "philosophy of organism." It is my belief that these philosopher-scientists can open a new chapter in our search for a spiritual meaning in life---one that is not at odds with the findings of modern science---and that they can help to lead us out of our present spiritual wilderness, our so-called "Era between Gods." Their writings are voluminous and their complexity of thought cannot be captured within the space of a few dozen pages. Instead, by way of guidance, I will provide their essential flavor through selected quotations, interspersed with commentary, and thereafter, the original works themselves should be consulted.

The renowned Russian poet, Osip Mandelstam [1933], has justified the use of quotations to this end in his *Journey to Armenia and Conversation about Dante* as follows (italics mine):

"A quotation is not an excerpt. *A quotation is a cicada.* It is part of its nature never to quiet down. Once having got hold of the air, it does not release it."

Observe that this touchstone for selection applies to the foregoing Mandelstam quotation as well. (It is *recursive* in the jargon of algorithmic science!) A second touchstone will be that quotations should be poetic in nature and, often, I will explicitly translate them into short prose-poems, thereby adding to the "cicadian" rhythm of this concluding essay.

William James' Does Consciousness Exist?

William James was one of America's most seminal thinkers, his reputation having been cemented by his monumental treatise in two volumes, *The Principles of Psychology* (James [1890]), which was followed a decade later by his classic, *The Varieties of Religious Experience* (James [1902]). The latter and the anthology of Huxley [1944], which we have encountered in our first essay, are both required reading for anyone interested in matters of religion.

Current-day philosophers and scientific researchers frequently make reference to William James' mysteriously-titled and far-reaching essay "Does 'Consciousness' Exist?", which is most easily accessed within the collection *Essays in Radical Empiricism* (James [1912]), but was first published several years earlier in James [1904]. By and large, however, these researchers choose to interpret it as an assertion that *consciousness is not a thing*, or substance, but rather a *process*, a dynamic relation between things. None are willing to entertain the notion that James [1912] may have been going much further (*italics mine*):

"To deny that 'consciousness' exists seems so absurd on the face of it---for undeniably 'thoughts' do exist---that I fear readers will follow me no farther. Let me then immediately explain that I mean only to deny that the word stands for an entity, but to insist most emphatically that it does stand for a function. There is, I mean, no aboriginal stuff or quality of being, contrasted with that of which material objects are made, out of which our thoughts of them are made, but there is a function in experience which thoughts perform, and for the performance of which this quality of being is invoked. This function is *knowing*. 'Consciousness' is supposed necessary to explain the fact that things not only are, but get reported, are known. Whoever blots out the notion of consciousness from his list of first principles must still provide some way for that function's being [for that function to be] carried out.

My thesis is that if we start with the supposition that *there is only one primal stuff or material in the world, a stuff of which everything is composed, and if we call that stuff pure 'experience,'* then knowing can easily be explained as a particular sort of relation to one another into which portions of pure experience may enter. The relation itself is a part of pure experience, one of its 'terms' becomes the subject or bearer of the

knowledge, the knower, the other being the object known. This will need much explanation before it is understood."

James then goes on to explain this thesis in detail and answer possible objections. But it is only much later, in the third essay of his foregoing collection, "The Thing and Its Relations," that he makes himself crystal clear (capitals his, italics mine):

"EXPERIENCE in its immediacy seems perfectly fluent. The active sense of living, which we all enjoy before reflection shatters our instinctive world for us, is self-luminous and suggests no paradoxes. Its difficulties are disappointments and uncertainties. They are not intellectual contradictions.

When the reflective intellect gets to work, however, it discovers incomprehensibilities *in the flowing process*. Distinguishing its elements and parts, it gives them separate names, and what it thus disjoins it can not easily put together."

And he continues (italics his):

'Pure experience' is the name which I give to the immediate flux of life which furnishes the material to our later reflection, with its conceptual categories. Only new-born babies, or men in semicoma from sleep, drugs, illness, or blows, [or religious mystics, I might add] may be assumed to have an experience pure in the literal sense of a *that* which is not yet any definite *what*, though ready to be all sorts of whats; full both of oneness and of manyness, but in respects that don't appear; changing throughout, yet so confusedly that its phases interpenetrate and no points, either of distinction or of identity, can be caught. Pure experience in this state is but another name for feeling or sensation. But the flux of it no sooner comes than it tends to fill itself with emphases, and these salient parts become identified and fixed and abstracted; so that experience now flows as if shot through with adjectives and nouns and prepositions and conjunctions. Its purity is only a relative term, meaning the proportional amount of un verbalized sensation which it embodies."

In other words, William James [1912] might very well be saying to us: "*I experience, therefore I symbolize.*"

In-between the aforementioned two essays is a third essay, "A World of Pure Experience," where James justifies the characterization of his philosophy as "empiricism." He tells us that empiricism is the very *opposite* of rationalism. The latter "tends to emphasize universals and make wholes

prior to parts in the order of logic as well as in that of beings," i.e., it places epistemology ahead of ontology. Empiricism, on the other hand, "lays the explanatory stress upon the part," and it "treats the whole as a collection and the universal as an abstraction." Furthermore, he prefixes the word "*radical*" to empiricism because "the relations that connect experiences must themselves be experienced relations, and any kind of relation experienced must be accounted as 'real' as anything else in the system." The problem of qualia is thereby finessed, because William James *begins with experience in the immediate flux of life*, he begins with qualia. If I were to replace the word 'experience' by 'qualia' and appropriate a well-known phrase from the Bible---"all is clear, only I am clouded"---I might well be tempted to put fresh words into William James' mouth: "All is qualia, only I am clouded." *Clouded by symbolism!*

It is in *A Pluralistic Universe: Hibbert Lectures at Manchester College on the Present Situation in Philosophy* that William James [1909] brings his life's work to a conclusion and *truly bares his soul*. This masterful collection of lectures, which he delivered at Oxford University in 1908 and published subsequently just a year before his death in 1910, is where any serious reading of William James should begin. His stated program in these lectures is "not to consider materialism in any shape, but to place ourselves straightway upon a more spiritualistic platform." And he then proceeds to distinguish three kinds of spiritual philosophy:

1. The older *dualistic theism*;
2. The *monistic form of pantheism* where the "world is experienced all at once in its absolute totality," which he terms the "all-form;"
3. And the *pluralistic form of pantheism* termed *radical empiricism* where "the absolute sum-total of things may never be actually experienced or realized in that shape at all, and that disseminated, distributed, and incompletely unified appearance is the only form that reality may yet have achieved." He calls this the "each-form."

He favors the third of these three, and he summarizes his “programme” of lectures as follows:

“Think of the universe as existing solely in the each-form, and you will have on the whole a more reasonable and satisfactory idea of it than if you insist on the all-form being necessary. The rest of my lectures will do little more than make this thesis more concrete, and I hope more persuasive.”

By way of contrast with his own each-form philosophy, William James begins with a discussion of the philosophical method of “that strange and powerful genius Hegel” and his monistic, or idealistic, all-form pantheism, the second of the three philosophies itemized above. Thereafter, he introduces his listeners to the natural philosophies of Gustav Theodor Fechner (1801-1887) and Henri Bergson (1859-1941), which constitute the backbone of his lectures, and to which we now turn.

Gustav Theodor Fechner’s Daylight View

Here is William James’ glowing tribute to Gustav Theodor Fechner (italics mine)¹:

“Fechner’s name lives in physics as that of one of the earliest and best determiners of electrical constants, also as that of the best systematic defender of the atomic theory. In psychology it is a commonplace to glorify him as the first user of experimental methods, and the first aimer at exactitude in facts. In cosmology he is known as the author of a system of evolution which, while taking account of physical details and mechanical conceptions, *made consciousness correlative to and coeval with the whole physical world* [Fechner termed this the “*daylight*” view of the world]. In literature he has made his mark by *certain half-humoristic, half-philosophical essays* published under the name of Dr. Mises. ... In aesthetics he may lay claim to be the earliest systematically empirical student. In metaphysics he is not only the author of an independently reasoned ethical system, but of a theological theory worked out in great

¹ This extract is actually quoted from a preface that James wrote for an edition of Fechner’s little booklet, *Life After Death*, which Fechner [1836] first published under his pseudonym, Dr. Mises. But it was subsequently repeated, almost verbatim, in James [1909].

detail. *His mind, in short, was one of those multitudinously organized cross-roads of truth, which are occupied only at rare intervals by children of men, and from which nothing is either too far or too near to be seen in due perspective. Patient observation and daring imagination dwelt hand in hand in Fechner; and perception, reasoning, and feeling all flourished on the largest scale, without interfering either with the other's function.*"

It is unfortunate that most of Fechner's works remain unavailable in English translation from the original German. An exception is *Religion of a Scientist: Selections from Gustav Theodor Fechner*, which contains selected translations by Walter Lowrie [1946], along with this translator's detailed interpolations.² The following, in Fechner's own words, is a summary of his entire oeuvre, which is extracted from his preface to *Concerning Souls* (to which I have added, in square brackets, the original date of publication of each book that he references):

"When I was a student I had a room-mate who didn't find it easy to get out of bed. Once when I had to get him up I accomplished it in the following way. At five minute intervals I shouted, always the same words: "Get up!" the first time it had no effect at all; the second time he said, "Leave me alone"; the third time, "It's no use"; the fourth time he kept silent, but he was approaching the boiling point; the fifth time he began to storm and curse; the sixth time he cried, "It's unendurable"; the seventh time he actually could no longer endure it and sprang out of bed with the intention of cudgeling me; but his anger at once subsided, since he was glad now to find himself out of bed, and he did not lie down again.

So it is that in *The Little Book of Life After Death* [1836] I said it for the first time to a public which did not like to get out of the bed of old ideas: "Get up!" I said it a second time with *Nanna* [1848]: "Get up!" I said it a third time with *Zend-Avesta* [1851]: "Get up!" I said it a fourth time, with the book *About the Moon* [1856]: "Get up!" I say it now for the fifth time: "Get up!" [within the currently quoted book *Concerning Souls* [1861], which it is worth noting appeared two years after the publication in 1859 of

² Another book akin to Lowrie [1946] is *The Living Word* by Elwood Worcester [1908]. This is much less appealing than Lowrie's, because Worcester's approach in his words "... is to reproduce some of Fechner's thoughts in the form which in the course of years they had assumed in my own mind, employing his language or my own as it occurred to me, and adding what I chose. The result is a book that belongs neither to Fechner nor to me, but which I hope will be useful."

Darwin's theory of evolution]. And if I live I shall say it a sixth and a seventh time: "Get up!" [Fechner did in fact live long enough to summon the public seven times to awake. *The Three Motives and Grounds* [1863] was the sixth call, and *The Daylight View* [1873] was the seventh]. And it will always be the same: "Get up!".

I have no notion that I, were I to shout ever so often, could compel the people to get up, if the time for rising had not really come; but soon they must get up even if I do not call. By my call I can at the most do something to hasten the time, and in this respect I do what I can. For the call that *is* to awaken a sleeping world requires a greater breadth: I am only one aspiration in this mighty breath."

William James [1909] tells us that (italics mine): "The hidden motive of all he [Fechner] did was to bring what he called the daylight view of the world into ever greater evidence, that daylight view being this, that *the whole universe in its different spans and wave-lengths, exclusions and envelopments, is everywhere alive and conscious.*" And he notes that "Fechner's great instrument for vivifying the daylight view is analogy; not a rationalistic argument is to be found in all of his many pages---only reasoning like those which men continually use in practical life."

Genius is the power of seeing analogies, says William James. But analogy, being neither inductive nor deductive, must be used with the greatest of care, because genius is also the capacity for taking infinite pains in bringing to fruition any argument by analogy. Again to quote James [1909]: "Throughout his writings, Fechner makes difference and analogy walk abreast, and by his extraordinary power of noticing both, he converts what would ordinarily pass for objections to his conclusions into factors of their support." When set down abstractly, Fechner's key conclusion is that *the world is identical throughout* and William James summarizes Fechner's natural philosophy as follows:

"The vaster orders of mind go with the vaster orders of body. The entire earth on which we live must have, according to Fechner, its own collective consciousness. So must each sun, moon, and planet; so must the whole solar system have its own wider consciousness, to which the consciousness of our earth plays one part. So has the entire starry system as such its consciousness; and if that starry system be not the sum of all that *is*, materially considered, then the whole system, along with whatever else

may be, is the body of that totalized consciousness of the universe to which men give the name of God.”

In a final glowing tribute to Fechner’s genius, William James [1909] then declares (italics his):

“Inevitably one does him miserable injustice by summarizing and abridging him. For altho [abbreviation his] the type of reasoning he employs is almost childlike for simplicity, and his bare conclusions can be written on a single page, the *power* of the man is due altogether to the profuseness of his concrete imagination, to the multitude of the points which he considers successively, to the cumulative effect of his learning, of his thoroughness, and of the ingenuity of his detail, to his admirably homely style, to the sincerity with which his pages glow, and finally to the impression he gives of a man who doesn’t live at second-hand, but who *sees*, who in fact speaks as one who has authority, and not as if he were one of the common herd of professorial philosophic scribes.”

In one of Fechner’s earliest works on consciousness, which he titled *Nanna*---after a Germanic goddess and roughly the equivalent of the Roman goddess *Flora*---he envisioned a conscious, inner life for plants. But in so doing, it is essential to make the analogy in the correct way. By way of contrast, let us consider recent forest ecology research reported by Peter Wohlleben [2015] in a stimulating book, *The Hidden Life of Trees: What They Feel, How they Communicate*. In his chapter titled “The Language of Trees,” one learns that when a giraffe feeds on an acacia tree, the latter begins to pump toxins into its leaves in order to discourage the herbivore. Moreover, the acacia produces a chemical compound, specifically ethylene gas, emitted from its leaves and dispersed into the air, which is detected by other trees of the same species in its immediate neighborhood and enables them to take similar action. Wohlleben tells us that this is akin to the human sense of smell. Trees have the ability to produce different compounds that enable them to ward off attack by insects. The saliva of each species of insect is different and there are species of trees that are able to distinguish the saliva of a particular species of insect and release pheromones that summon specific predators for that insect, thereby protecting the tree from damage. But then

Wohlleben adds (*italics mine*): "The fact trees can recognize saliva is, incidentally, yet another skill they must have. *For if they can identify saliva, they must also have a sense of taste.*" We learn that trees are able to communicate with one another via electrical impulses at 220 hertz that are sent "via a form of nerve cell at the tips of the roots." When roots are exposed to a crackling at 220 hertz then they orient their tips in that direction and therefore "it makes sense to say they 'heard' it." Moreover, trees of a single species, or even trees of different species, are able to exchange information underground *with the assistance of fungal connections between their roots*, which operate like "internet cables." The term "wood-wide web" has been used by forest ecology researchers to describe this vast underground network of communication. Trees obviously do not have a nervous system, but, if we continue to speak in the foregoing vein, we may begin erroneously to *analogize* the tangled root structure of a tree, which often has twice the spread as its crown, as a sort of "brain" that is kept safe within the "skull" of the soil; we may imagine the narrow trunk of a tree as being a sort of "spinal cord"; and the flowers as "sex organs" on open display within a tree's crown or hidden away within its clothing of foliage. And, going even further along these lines, we may even begin to imagine trees as being *huge inverted creatures* that live *consciously* within the social "wood-wide web" network of a forest. But this is precisely the wrong way to make the plant-consciousness analogy!

In contrast, this is how William James states Fechner's view of the consciousness of trees and other plants in general (*italics mine*):

"His earliest book was a vision of what the inner life of plants may be like. He called it 'Nanna.' In the development of animals the nervous system is the central fact. Plants develop centrifugally, *spread their organs abroad*. For that reason people suppose that they have no consciousness, for they lack the unity which the central nervous system provides. But the plant's consciousness may be of another type, being connected with other structures. Violins and pianos give out sounds because they have strings. Does it follow that nothing but strings can give out sound? How then about flutes and organ-pipes? Of course their sounds are of a different quality, and so may the consciousness of plants be of a quality correlated exclusively with the kind of organization that they

possess. *Nutrition, respiration, propagation take place in them without nerves. In us these functions are conscious only in unusual states, normally their consciousness is eclipsed by that which goes with the brain. No such eclipse occurs in plants, and their lower consciousness may therefore be all the more lively.* With nothing to do but to drink the light and air with their leaves, to let their cells proliferate, to feel their rootlets draw the sap, is it conceivable that they should not consciously suffer if water, light, and air are suddenly withdrawn? or that when the flowering and fertilization which are the culmination of life take place, they should not feel their existence more intensely and enjoy something like what we call pleasure in ourselves?"

And he then continues in my prose-poetic transliteration:

"Does the water-lily,
Rocking in her triple bath of water, air, and light,
Relish in no wise her own beauty?

When the plant in our room turns to the light,
Closes her blossoms in the dark,
Responds to watering or pruning
By increase of size or change of shape or bloom,
Who has the right to say she does not feel,
Or that she plays a purely passive part?

Truly plants can foresee nothing,
Neither scythe nor mower,
Nor the hand extended to pluck their flowers.
They can neither run away nor cry out.
But this proves only how very different are their modes of feeling
From animals that live by eyes and ears and locomotive organs.
It does not prove they have no mode of feeling life at all.

How scant and scattered would sensation be,
If feeling-life of plants were blotted from existence on our globe?
Solitary would consciousness move throughout the woods
In shape of deer or other quadruped,
Or fly about the flowers in shape of bird or insect!
But can we really `pose that Nature,
Through which God's breath blows,
Is such a barren wilderness as this?"

And now, let us turn from William James to Gustav Theodor Fechner himself for a broader discussion of his "daylight view," wherein he exhibits all the qualities that James has claimed for him. I will simply quote two passages at length, each from Fechner's book *Concerning Souls* in its translation by Lowrie [1946] (italics his):

"`Man is a measure of the world.' Just as man is the starting point and the point of reference for belief in the animate character of all other creatures, so is the animated earth the starting point and the point of reference for belief in the animate character of all other stars which inhabit with it the same heaven. So it is upon the fact of our own souls [consciousness] that the whole argument hangs.

The *common* view is reluctant to think such a dry object as the earth, in which no trace of free choice is apparent, might be animated by soul [consciousness]. *Natural science*, delving deeper, sees the earth as a purely astronomical, geological, meteorological, physical object, finding in it no more hint of a soul [consciousness] than a place for its exercise. *Materialism*, standing upon the shoulders of natural science and raging against heaven, finds in anatomical and physiological facts the strictest proof against a soul [consciousness] of the earth; for in its view the soul is merely the product of the nervous system. *Idealism*, flying like an eagle towards the sun and beholding the earth with its tail, raises ideal difficulties from the point of view of the ideas of independence, autonomy, freedom, individuality, personality, etc. *Theology*, claiming to be officially guaranteed in the possession of heaven itself, does not find the animation of the stars among the dogmas that affirm its title to possession; it will not suffer pagan gods to enter this heaven, and would erect no wall of partition between us and God.

The whole difficulty of the common opinion and of natural science stems in the last resort from the fact that, instead of regarding the earth as what it is, namely, a coherent material system out of which the totality of its organisms was developed and in which they all are now united, men conceive it rather as something external to its organisms, something contrasted with them, *as indeed it is not*--neither *astronomically*, for it revolves around the sun as an indivisible whole, with all its animals and plants; nor *geologically*, for the organic kingdoms have developed in connection with the geological epochs, and their remains lie buried in it; nor *meteorologically*, for the air of the earth is at the same time the breath of man, its pressure holds the blood in his veins and the head of the femur in its socket; nor *physically*, for the law of the conservation of living energy in the earth is valid only when man is taken into account; nor *teleologically*, for everything here which has been educed separately, along with all

which has not, is as aptly designed and adapted to the whole as is everything in our little body, which in turn fits teleologically into the greater whole.

Have then animals and plants fallen *upon* the earth, that they may be regarded as something contrasted with it externally? Or have men, animals and plants fallen *away* from the earth, that they may be regarded as something separate or separable? Or is their existence in separation even so much as thinkable? *Nothing of the sort.* They belong to the inward development of the earth, they are components of an organization of members which was accomplished in the earth by its own forces, and even now it is only as such they are capable of enduring."

And, after much further discussion and elaboration, Fechner concludes as follows (*italics his*):

"There are two possibilities open to us, and substantially *only* two---two paths of thought, one of which leads to hades [hell], the other to the light. We should make clear to ourselves that there are only two ways, and instead of vacillating between them, or following each by half, we should resolutely choose between them, after taking a clear view of each, and follow the chosen path to the end.

The one thought is, that beside the impressions of things we have in our own consciousness, beside our sensation, feeling, thinking, willing, and poetic imagination, there is an obscure, unknowable, "thing-in-itself," or multitude of such things [atoms, quarks, quanta, strings, etc.], which engenders in consciousness the impression it has of things, or by reciprocal action engenders consciousness itself, and yet is something entirely different from the notions we have of it.

The other thought is, that beside our consciousness there is still more consciousness, that over and above all individual consciousness there is a broader and higher consciousness with broader and higher content, a consciousness which on the side upon which it excels and surpasses our consciousness represents the outward world by which our consciousness is determined, and ties together all individual consciousness by common situations and effective relationships, the highest unity of which is found in the last knot.

The first thought leads away from all experience and from everything which is conceivable in terms of experience, or can be proved by experience, hence it leads us into the dark, because the notion of "the-thing-in-itself" behind consciousness, and of its effect upon consciousness, or its possible effect in engendering consciousness, has in fact no basis in experience, finds in experience no help for understanding it, and holds out no prospect that experience might reach it. The second thought leads out of

the light of common experience only into a higher light, inasmuch as our own consciousness, luminous in itself, with its immanent determinations, relations and laws, furnishes us with a clue to the more universal, higher and more luminous consciousness, and supplies us with the means for inferring it.”

Let me close with a celebrated passage from Fechner’s writing which was transliterated by Walter Lowrie into a prose-poem as follows³ and where the only alteration is that I have capitalized the beginning of each line:

“Thou hast only two eyes to close,
And when they are closed,
All vision is excluded,
Till thou hast opened them again;
Thus it is thou dost contrive
To gain visual impressions.

He has the eyes of all men to close
And still keeps thousands open
When thousands have been closed;
And instead of opening again
Those that have been closed in death,
He opens a thousand new eyes in other places.

Thus it is He contrives,
And thereby gains,
In a far higher sense than thou,
While at the same time he elaborates
The memories of preceding generations
In the spiritual intercourse of the hereafter.

³ Lowrie prefixes it with the following justification: “...a poetic feeling [in Fechner’s writing] is indicated by the measure and cadence of the phrases. But only at this point, where the poetic character is more continuous, do I venture, by way of experiment, to print the lines as the ear might hear them. In this passage, as in all music, the tact, the cadence, is measured by the beats of the author’s heart. Here evidently his heart throbbed high with faith and hope. But I would not have it thought that Fechner, who when he wrote poetry followed strictly the rules of that art, would tolerate the implication that he might be inclined to *vers libre* [free verse].” This has, in fact, inspired the conversion to prose-poems of other selected quotations in subsequent sections of this chapter, as did the poetry of Lucretius in Chapter 1.

Every pair of human eyes
Is for Him a new pair of pails,
Wherewith He draws something especial in a special way,
Drawing old things also in a new way.

Thou art thyself merely a bearer
Of such a pair of pails in His service
When thou hast drawn from Him enough,
Thou art bidden to bear it home
And the cover is put upon the pails
In order that nothing may be spilt,
And they are removed to the interior of the house.

Now it is the task to elaborate what has been drawn.
But He does not dismiss thee His servant.
Thou who hast brought this home
Hast the management of it in the home;
For He hath no more need of thee outside;
Yet within thou art of use to Him,
To elaborate further what thou hast drawn.

Thousands of other laborers are standing there,
Who like thee have brought home to Him their share,
And work with one another
In the house of the same Spirit,
Now or the first time knowing clearly what this means.

How much closer now do they come to one another,
As now from all quarters they come carrying the full pails;
How much closer than when they went out in all directions to draw,
And only occasionally encountered one another on the way,
And asked themselves whence and whither,
And strayed about the still closed door of the house,
Which opens only at death.

What now is thy reward?
How gracious is the Lord!
All thou has brought home,

And what thou has wrought therewith
In the service of the higher Spirit,
Is thy reward;
He keeps nothing for Himself alone,
He so shares it with thee
That he hath it wholly.
And thou hast it wholly,
Since thou thyself art wholly His.

Hence take care that thou bring home to Him good things;
Thou dost bring them home to thyself."

William James [1909] tells us: "Where there is no vision the people perish. Few professional philosophers have any vision. Fechner has vision, and that is why one can read him over and over again, and each time bring away a fresh sense of reality." One can only hope that, over the course of time, many more of Fechner's aforementioned writings will be translated and published in English.

Henri Bergson's Duration and Simultaneity

Gustav Theodor Fechner was not a professional philosopher and was able nimbly to sidestep philosophical issues of a highly technical nature associated with his "daylight view" and his belief that the more inclusive forms of consciousness are, in part, *constituted* by the more limited forms. These complex issues, in the words of William James [1909], are as follows (italics his):

"This *assumption that conscious experiences freely compound and separate themselves*, the same assumption by which absolutism explains the relation of our minds to the eternal mind, and the same by which empiricism explains the composition of the human mind out of subordinate mental elements, is not one which we ought to let pass without scrutiny."

William James does not shrink from the task and he explores this seemingly innocent philosophical problem in considerable detail. This is not

the place to enter into philosophical technicalities and I must leave the reader to consult James' lectures directly for his arguments on the topic. But I can quote here the *truly astonishing conclusions* to which he arrives (italics his):

"Sincerely, and as patiently as I could, I struggled with the problem for years, covering hundreds of sheets of paper with notes and memoranda and discussions with myself over the difficulty. How can many consciousnesses be at the same time one consciousness? How can one and the same identical fact experience itself so diversely? The struggle was vain, I found myself in an *impasse*. I saw that I must either forswear that 'psychology without a soul' to which my whole psychological and Kantian education had committed me,---I must, in short, bring back distinct spiritual agents to know the mental states, now singly and now in combination, in a word bring back scholasticism and common sense---or else I must squarely confess the solution of the problem impossible, and then either give up intellectualistic logic, the logic of identity, and adopt some higher (or lower) form of rationality, or, finally, face the fact that life is logically irrational."

He tells us that few philosophers have had the frankness fairly to admit the necessity of facing the horns of the dilemma that he outlines above. But, with great courage, William James makes his choice (italics his):

"Well, what must we do in this tragic predicament? For my own part, I have finally found myself compelled to *give up the logic*, fairly, squarely, and irrevocably. It has an imperishable use in human life, but that use is not to make us theoretically acquainted with the essential nature of reality---just what it is I can perhaps suggest to you a little later. Reality, life, experience, concreteness, immediacy, use what word you will, exceeds our logic, overflows and surrounds it. If you like to employ words eulogistically, as most men do, and so encourage confusion, you may say that reality obeys a higher logic, or enjoys a higher rationality. But I think that even eulogistic words should be used rather to distinguish than to commingle meanings, so I prefer bluntly to call reality if not irrational then at least non-rational in its constitution,---and by reality here I mean reality where things *happen*, all temporal reality without exception. I myself find no good warrant for even suspecting the existence of any reality of a higher denomination than that distributed and strung-along and flowing sort of reality which we finite beings swim in. That is the sort of reality given us, and that is the sort with which logic is incommensurable. If there be any higher sort of reality---the 'absolute,' for example---that sort, by the confession of those who believe in it, is still less amenable to ordinary

logic; it transcends logic and is there still less rational in the intellectualist sense, so it cannot help us to save our logic as an adequate definer and confiner of existence."

It was the reading of Henri Bergson's works, William James tells us, that "made him bold" and he declares himself openly as follows and in a manner strangely reminiscent of Sir Arthur Eddington's observations at the conclusion of Chapter 1 (*italics mine*):

"The essential contribution of Bergson to philosophy is his *criticism of intellectualism*. In my opinion he has *killed intellectualism definitively and without hope of recovery*. I don't see how it can ever revive again in its ancient platonizing role of claiming to be the most authentic, intimate, and exhaustive definer of reality."

Small wonder then that Henri Bergson raised the hackles of Albert Einstein and Bertrand Russell, and others that followed in their wake. Of course, it is incumbent on William James [1909] to say precisely what he means by "intellectualism," and again he does not shrink from the task (*italics mine, except where noted*):

"In recent controversies some participants have shown resentment at being classed as intellectualists. *I mean to use the word disparagingly*, but shall be sorry if it works offence. *Intellectualism has its source in the faculty which gives us our chief superiority to the brutes*, our power, namely of translating the crude flux of our merely feeling experience into a conceptual order. An immediate experience, as yet unnamed or classed, is a mere *that* [*italics his*] that we undergo, a thing that asks, ` *What* [*italics his*] am I?' When we name and class it, we say for the first time what it is, and all these whats are abstract names or concepts. Each concept means a particular *kind* [*italics his*] of thing, and as things seem once for all to have been created in kinds, a far more efficient handling of a given bit of experience begins as soon as we have classed the various parts of it. Once classed, a thing can be treated by the law of its class, and the advantages are endless. *Both theoretically and practically this power of framing abstract concepts is one of the sublimest of our human prerogatives*. We come back into the concrete from our journey into these abstractions, with an increase both of vision and of power. It is no wonder that earlier thinkers, forgetting that *concepts are only man-made extracts from the temporal flux*, should have ended by treating them as a *superior type of being*, bright, changeless, true, divine, and utterly opposed to the turbid, restless lower world. The latter then appears as but their corruption and falsification."

This is none other than the key issue that has been discussed in considerable detail in Chapter 1 of this book, save that William James has addressed it both more compactly and more forcefully. In wonderful fashion, he explains why it is Henri Bergson alone among philosophers of his time “who denies that mere conceptual logic can tell us what is impossible or possible in the world of being or fact; and he [Bergson] does so for reasons which at the same time that they *rule logic out from lordship over the whole of life, establish a vast and definite sphere of influence where its sovereignty is indisputable*” (italics mine). William James then gives a detailed introduction to Bergson’s philosophy in a lecture titled “Bergson and his Critique of Intellectualism,” which he encapsulates in concluding remarks as follows (prose-poetic transliteration and italics mine):

“Everything is all at once,
Whatever different things
It is at once at all.
It is active and passive,
Physical and mental.
A whole of parts
And part of a higher whole.
All simultaneously, without interference
Or need of doubling-up its being.

Keep to the immediate point of view.
Follow sensational life’s continuity
To which all living language conforms.
Only when we try to “mediate” the immediate,
Substituting concepts for sensational life,
Does intellectualism celebrate its triumph
And the immediate self-contradictoriness
Of all our smooth-running finite experience
Gets proved.”

The aforementioned lecture of William James provides a useful overview of Bergsonism and can be recommended in its entirety. But now, without

further delay, let us turn directly to the writings of Henri Bergson himself, and, in particular, to his three main treatises: Bergson [1889], *Time and Free Will: An Essay on the Immediate Data of Consciousness*; Bergson [1896], *Matter and Memory*; and Bergson [1907], *Creative Evolution*, each with its highly-revealing title.

A good embarkation point for this journey is the two introductory essays in Bergson [1934], *The Creative Mind: An Introduction to Metaphysics*, which were written late in life expressly for this publication. Here Henri Bergson truly lays bare his soul, just as earlier did William James. (The remainder of the book is based on lectures and essays that date between 1903 and 1923 and they are a continuation of Bergson [1919], *Mind-Energy: Lectures and Essays*. Taken together, they provide an excellent primer on Bergson's three main treatises.) The two introductory essays in Bergson [1934], however, stand apart and they should be studied with the greatest of care, because it is here that the renowned philosopher describes the heart of his method and opens a window on the continuous creativity that is on display through his entire oeuvre. He summarizes the latter as follows in a manner reminiscent of Fechner's summary of his own treatises and "daylight view." (In the quotation below, italics are Bergson's except where explicitly noted and the writings he references have been identified in the preceding paragraph.)

"Tension, concentration, these are the words by which I characterized a method which required of the mind, for each new problem, an entirely new effort. I should never have been able to extract from my book *Matter and Memory*, which preceded *Creative Evolution*, a true doctrine of evolution (it would have been one in only appearance); nor could I have extracted from my *Essay on the Immediate Data of Consciousness* [Editor's note: English title --- *Time and Free Will*] a theory of the relations of the soul [consciousness] and the body like the one I set forth in *Matter and Memory* (I should have had only a hypothetical construction); nor from the *pseudo-philosophy* [italics mine] to which I was devoted before the *Immediate Data*---that is to say from the general notions stored up in language---could I have extracted the conclusions on duration and the inner life which I presented in this first work. My initiation into the *true philosophical method began the moment I threw overboard verbal solutions, having*

found in the inner life [italics mine] an important field of experiment. After that, all progress was an enlarging of this field."

Bergson tells us how this "true philosophical method" led him to his great idea of *duration* and then, in turn, to his revolutionary ideas on free will, on memory at the intersection of mind and matter, and on the inherent creativity within evolution. Without mentioning him explicitly by name, he addresses the objections to his work of Bertrand Russell and others who remained squarely within the "intellectualist tradition" (as defined and delimited above by William James).

Each of Bergson's major works is an act of creation and not merely an intellectual derivative of his prior writings. They are a continuous flowing into newness. Even if you disagree with his ideas and cannot adopt his method and his mindset, Bergson's entire oeuvre can be read and enjoyed purely as great works of literature (for which he was awarded the Nobel Prize). No other philosopher-scientist of nature writes as beautifully and as imaginatively as does Henri Bergson. His writings have a spiritual dimension that is truly unique within philosophy and places them, perhaps, even within the written tradition of the great religions of the world. Bergson's prose simply flows as though from a hidden spring of pure, crystalline water, it does not appear to be something axiomatically constructed by the intellect alone. It has a true non-Cartesian quality!

Let us begin at the beginning. Bergson [1989], *Time and Free Will: An Essay on the Immediate Data of Consciousness*, stems from his doctoral dissertation and constitutes the first of his three major treatises. It is a gem of a book and contains the very germ of his thinking in all his subsequent writings. Almost every page of this dissertation has a striking sentence or paragraph. The English translator of the dissertation, F.L. Pogson, tells us that Bergson's dissertation was worked out and written during the period 1883 to 1887 and was originally published in 1889, and, at the time of publication of his English translation in 1910, it had already gone through seven editions in France. Pogson adds that he had the benefit of Bergson's "close co-operation at every stage" and, in his

translator's preface, he gives us the very essence of Bergson's thinking as follows (*italics his*):

"The idea of a homogenous and measurable time is shown to be an artificial concept, formed by the intrusion of the idea of space into the realm of pure duration. Indeed, the whole of Professor Bergson's philosophy centers round his conception of *real concrete duration* and the specific *feeling* of duration which our consciousness has when it does away with convention and habit and gets back to its natural attitude. At the root of most errors in philosophy he finds a confusion between this *concrete duration* and the *abstract time* which mathematics, physics, and even language and common sense, substitute for it. Applying these results to the problem of free will, he shows that the difficulties arise from taking up one's stance *after* the act has been performed, and applying the conceptual method to it. From the point of view of the living, developing self these difficulties are shown to be illusory, and freedom, though not definable in abstract or conceptual terms, is declared to be one of the clearest facts established by observation."

And Henri Bergson himself sums up his extended argument on lived time and free will as follows (re-expressed in prose-poetic form):

"Every explanation of freedom
Begs the question:
Can time be represented by space?

Yes, if you speak of time flown!
No, if you speak of time flowing!

The free act
Takes place in time which is flowing,
Not in time which has flown.
Freedom is a fact.
Among observed facts none is clearer.

All difficulties of the problem,
Indeed the problem itself
Comes from seeking to endow duration
With the attributes of extensity.
From interpreting succession by a simultaneity
From expressing the idea of freedom

In language that is untranslatable.”

Much later in life, Henri Bergson [1922] published, *Duration and Simultaneity*---he was then sixty-three years of age---where he sought to reconcile his views on time (and space) with Einstein’s Theory of Relativity, which had appeared in 1905 and initiated a revolution in 20th century physics. Here Bergson highlights his distinction between basic, lived time and the mathematical, or spatialized, time of Einstein’s physical theories and it is here that one finds Bergson’s clearest statement on “duration” at the heart of his philosophy (the quote is transliterated again into prose-poetic form and italics are also mine):

“Time is the continuity of our inner life,
A self-sufficient flow or passage,
The flow not implying a thing that flows,
The passing not presupposing states
Through which we pass.

The *thing* and the *state*
Are but artificial snapshots
Of the transition naturally experienced
That is duration itself.

It is memory,
But not personal memory,
External to what it retains,
Distinct from a past
Whose preservation it assures.
It is a memory
Within change itself!
A memory that prolongs
The before into the after,
Keeping them from being mere snapshots,
Appearing and disappearing in a present
Ceaselessly reborn.
A melody to which we listen with eyes closed,
Heeding it alone, comes closest

To coinciding with this Time,
The very fluidity of our inner life.

Still it has qualities too many,
Definition too much.
First, we must efface
The difference among the sounds,
Then banish the distinctive features
Of sound itself,
Retaining only the continuation
Of what precedes into what follows.

Uninterrupted transition,
Multiplicity without divisibility,
Succession without separation!
Thus, finally, do we re-discover
Basic, Lived Time."

*Such is immediately perceived duration.
Without it, we would have no idea of time!"*

Moving now to the second of his trilogy, the great philosopher investigates two other facets of the natural world in Bergson [1896], *Matter and Memory*. This is the most difficult of his three major works, because it is densely argued, and, in contrast to his other writings, it contains little that lends itself to transliteration into prose-poetic form. But, fortunately, Bergson has himself provided a fresh and helpful introduction to this work, which he wrote to accompany its publication in English translation in 1910, and which appeared, coincidentally, in the same year as F.L. Pogson's English translation of the first in the trilogy. Bergson begins this introduction as follows (italics mine):

"This book affirms the reality of spirit [consciousness] and the reality of matter, and tries to determine the relation of the one to the other by the study of a definite example, that of memory. *It is, then, frankly dualistic.* But, on the other hand, it deals with body and mind in such a way as, we hope, to lessen greatly, if not to overcome, the theoretical difficulties which have always beset dualism, and which cause it, though

suggested by the immediate verdict of consciousness and adopted by common sense, to be held in small honor among philosophers.”

Bergson tells us that traditional philosophy, to date, had focused on two contradictory doctrines: realism and idealism. Realism, or materialism, has its roots in the philosophy of Descartes and its subsequent refinements; see, in particular, our discussion in Chapter 1. Descartes (and his followers) had made of matter “a *thing* able to produce in us perceptions, but of itself of another nature than they.” He had made it “one [in the sense of identity] with geometrical extensity” and had “set up the mathematical relations between phenomena as their very essence.” Idealism, on the other hand, which traces its origins to the philosophy of Bishop Berkeley, reduces matter to the perception that we have of it. Bergson credits Bishop Berkeley with making a great step forward by demonstrating that “the secondary qualities of matter [for example, the color ascribed to it by the eye] have at least as much reality as the primary qualities,” but then Berkeley made the fundamental mistake of placing matter solely within the mind and making of it a “pure idea.” Henri Bergson highlights his own position as being midway between the two in a sentence that I have rearranged slightly and to which I have added bracketed content in order to achieve greater clarity (*italics mine*):

“If philosophy had been content to leave matter half way between the place to which Descartes had driven it and that to which Berkeley drew it back---to leave it, in fact, where it is seen by common sense---then the criticism of Kant [that sought to restore a mathematical order within nature and give back to physics a solid foundation, but only by limiting the range and value of our senses and our understanding] would not have been necessary; the human mind would not have been led to limit its own range; *metaphysics would not have been sacrificed to physics.*”

This is the essence of Bergson’s approach, namely, to consider matter before the dissociation which realism and idealism had brought about between its existence and its appearance. In his exploration of the relation between matter and consciousness---in more traditional terms, between body and soul---Bergson rejects two major trends, or hypotheses, of philosophy, namely, “epiphenomenalism” and “parallelism.” The former

regards all mental phenomena as merely different states of the brain and therefore consciousness as no more than an epiphenomenon of the brain. And the latter regards mental states and brain states as "two different versions, in two different languages, of the same original." He does not dispute the fact that there is a close connection between a state of consciousness and a state of the brain. But he compares it, humorously one might add, to the close connection between "a coat and a nail on which it hangs, for, if the nail is pulled out, the coat falls to the ground." He tells us that

"anyone who approaches, without preconceived ideas and on the firm ground of facts, the classical problem of the relations of soul [consciousness] and body [matter], will soon see the problem as centering upon the subject of memory, and, even more particularly, upon the memory of words: it is from this quarter, undoubtedly, that will come the light which will illumine the obscurer parts of the problem."

Bergson asserts that "memory is just the intersection of mind and matter," and "the brain state indicates only a very small part of the mental state, the part that is able to translate itself into movements of locomotion," thereby fulfilling its primary purpose of "attention to life." The latter, he tells us, is a *ruling idea* of his book, whose conclusions he summarizes as follows (italics mine):

"The idea that we have disengaged [extracted] from the facts and confirmed by reasoning is that our body [in particular, our brain] is an *instrument of action, and of action only*. In no degree, in no sense, under no aspect, does it serve to prepare, far less to explain, a *representation*. Consider external *perception*: there is only a difference of degree, not of kind, between the so-called perceptive faculties of the brain and the reflex functions of the spinal cord. While the spinal cord transforms the excitations received into movements which are more or less necessarily executed, the brain puts them into relation with motor mechanisms which are more or less freely chosen; but that which the brain explains in our perception is action begun, prepared or suggested, *it is not perception itself*. Consider *memory*. The body retains motor habits capable of acting the past over again; it can resume attitudes in which *the past will insert itself*; or, again, by the repetition of certain cerebral phenomena, which have prolonged former perceptions, it can furnish to remembrance a point of attachment with the actual, a means of recovering its lost influence upon present reality: *but in no case can the brain*

store up recollections or images. Thus, neither in perception, nor in memory, nor a fortiori in the higher attainments of the mind, does the body contribute directly to representation. By developing this hypothesis under its manifold aspects and thus pushing *dualism* to an extreme, we appear to divide body and soul by an impassable abyss. In truth, we are indicating the only possible means for bringing them together."

The argument he presents in support of these conclusions is not easy to absorb, but it is our good fortune that Bergson has given a beautiful and poetic summary of *Matter and Memory* in a subsequent lecture titled "The Soul and the Body." This was delivered in Paris in 1912, a mere two years after the English translation of his treatise appeared in print, and, in the published version of this lecture which can be found in Bergson [1919], *Mind-Energy: Lectures and Essays*, he once again outlines his unique philosophical method for exploring the relation between body and soul---or in his *equally-valent words*, between brain and mind---as follows (italics mine):

"What is this relation? Ah! We may indeed challenge philosophy here! To philosophy falls the task of studying the life of the soul in all its manifestations. *Practised in introspection, the philosopher ought to descend within himself, and then, remounting to the surface, follow the gradual movement by which consciousness detends, extends, and prepares to evolve in space.* Watching this progressive materialization, marking the steps by which consciousness externalizes itself, at least he would obtain a vague intuition of what the insertion of mind in matter, the relation of body to soul, may be. No doubt it would be only a first glimmer, nothing more. But, had we only this glimmer, it would enable us to pick our way amongst the innumerable facts with which psychology and pathology deal. These facts, in their turn, correcting and completing what is incomplete or defective in the internal experience, would rectify the method of internal observation. Thus, by an indefinite series of comings and goings between two centers of observation, one situated within, the other without, we should obtain a solution more and more adequate to the problem, never perfect, as the solutions of metaphysicians too often claim to be, but always perfectible, *like those of science.* The first impulse would, it is true, have come from within; *it is in the internal vision that we should have sought the chief enlightenment;* and that is why the problem would remain what it must be, a problem of philosophy."

And then Bergson asserts, most poetically (italics mine):

"Consciousness retains the past,
Enrolls what time unrolls,
Prepares a future
It will itself help to create."

He tells us that "this thing, which overflows the body on all sides and which creates acts by new-creating itself, is the "I", the "soul," the "mind". And again: "The relation of the brain to thought is then complex and subtle. Were you to ask me to express it in a simple formula, necessarily crude, I would say that the brain is an organ of pantomime, and of pantomime only." And for greater specificity: "Let us say, if you will, that the brain is the organ of attention to life."

If recollection has *not* been stored in the brain, as he forcefully asserts, where then has it been preserved? His answer is as follows (italics mine except where noted):

"I will however accept, if you insist, but in a *purely metaphorical sense*, the idea of a container in which recollections are lodged, and I say then quite frankly they are in the mind. I make no hypothesis, I do not call in aid a mysterious entity, I confine myself to observation, for there is nothing more immediately given, nothing more evidently real, than consciousness, and mind *is* [italics his] consciousness. Now, consciousness signifies, before everything, memory. At this moment that I am conversing with you, I pronounce the word "conversation." Clearly my consciousness presents the word all at once, otherwise it would not be a whole word, and would not convey a single meaning. Yet, when I pronounce the last syllable of the word, the three first have already been pronounced: they are past with regard to the last one, which must then be called the present. But I did not pronounce this last syllable "tion" instantaneously. The time, however short, during which I uttered it is decomposable into parts, and all these parts are past in relation to the last among them. This last would be the definitive present, were it not, in its turn, decomposable. So that, however you try, you cannot draw a line between the past and the present, *nor consequently between memory and consciousness*. To make the brain a depository of the past, to imagine in the brain a certain region in which the past, once past, dwells, is to commit a psychological error, to attribute a scientific value to a distinction entirely practical, for there is no exact moment when the present becomes the past, *nor consequently when perception becomes recollection*."

He pushes this argument to the limit by considering the extraction of meaning, not just from a single multi-syllabic word, but then also from an entire sentence composed of sequentially-uttered words. The flow of life is akin to a greatly-extended sentence such as this, whose meaning is grasped all at once. He states his resulting analogy and conclusions as follows (in prose-poetic transliteration and italics also mine):

"Our whole psychic existence
Is like a single sentence
Continued since the first awakening
Of consciousness,
Interspersed with commas,
Never broken by full stops.
I believe our whole past still exists.
It exists subconsciously.

To have revelation of it
Consciousness has no need
To go outside itself,
To seek for foreign aid.
It has but to remove an impediment
To withdraw a veil
For all that actually is
To be revealed.

Fortunate are we to have this obstacle
Infinitely precious is this veil!
For such is our brain's part
In the work of memory.
It preserves not the past
But instead masks it,
Allowing only what is practically useful
To emerge through the mask.

The mind overflows the brain on all sides,
Cerebral activity responds to mental activity
Only in very small part.

Body is simply made use of by mind
And there is no reason to suppose
That body and mind are united inseparably.
Thus even survival for a time
Is probable.

Finally we come to the third in his great trilogy, Bergson [1907], *Creative Evolution*. Again a very useful overview and summary of this treatise is his Huxley Lecture (named for the renowned British biologist), which Bergson delivered at the University of Birmingham in England in 1911 under the title "Life and Consciousness," and which was subsequently published in Bergson [1919], *Mind-Energy: Lectures and Essays*. Here he declares that whenever he speaks of mind, he means, above everything else, consciousness, and furthermore, he characterizes consciousness by its most obvious feature: "it means, before everything else, memory." For Bergson:

"Consciousness is the hyphen
That joins what has been
To what will be.
The bridge that spans
The past and the future."

And thus, if consciousness means memory and anticipation---past and future---it is because consciousness is "synonymous with choice." For him, consciousness is co-extensive with life and a radically different form of existence from matter. "Consciousness is freedom, matter is necessity [inertia, geometry]," and he then waxes poetic as follows (italics mine, except for his quoted book's title):

"On the one hand, there is matter, subject to necessity, devoid of memory, or at least with no more than suffices to form the bridge between two of its moments, each of which can be deduced from its antecedents, each of which adds nothing to what the world already contains. On the other hand, there is consciousness, memory with freedom, continuity of creation in a duration in which there is real growth;---a duration which is drawn out, wherein the past is preserved indivisible; a duration which grows like a plant, but like the plant of a fairy tale transforms its leaves and flowers from

moment to moment. We may surmise that these two realities, matter and consciousness, are derived from a common source. If, as I have tried to show in a previous work (*Creative Evolution*), matter is the inverse of consciousness, if consciousness is action unceasingly creating and enriching itself, whilst matter is action continually unmaking itself or using itself up, *then neither matter nor consciousness can be explained apart from one another*. I will not return to this theme now, I will merely say that I see in the whole evolution of life on our planet a crossing of matter by a creative consciousness, and effort to set free, by forces of ingenuity and invention, something which in the animal still remains imprisoned and is finally released when we reach man."

A great current of creativity---he calls it the "Elan Vital" but we may give it any other name we choose, for example, "Eros"---is the wellspring for the splendiferous flowering of conscious life forms that we see all around us. For Bergson, things have happened just as though an immense current of consciousness, interpenetrated with potentialities of every kind, had traversed matter to draw it towards organization and make it an instrument of freedom. He tells us that "regarded from without, *nature appears an immense inflorescence of unforeseeable novelty*. The force which animates it seems to create lovingly, for the mere pleasure of it, the endless variety of vegetable and animal species. On each it confers the absolute value of a great work of art." However, he then appears to make a serious misstep in his prediction for the future as follows (italics mine):

"That the united efforts of physics and chemistry to manufacture matter resembling living matter may one day be successful is by no means improbable, for life proceeds by insinuating, and the force which drew matter away from pure mechanism could not have taken hold of matter had it not first adopted that mechanism. ... In other words, life must have installed itself in matter which had already acquired some of the characters of life without the work of life. *But matter left to itself would have stopped there; and the work of our laboratories will probably go no further*. We shall reproduce, that is to say, some characters of living matter; we shall not obtain the push in virtue of which it reproduces itself and, in the meaning of transformism, evolves. Now, reproduction and evolution are life itself. Both are the manifestation of an inward impulse, of the twofold need of increasing in number and wealth by multiplication in space and complication in time, of two instincts which make their appearance with life and later become the two great motives of human activity, love and ambition.The

evolution of life, from its early origins up to man, presents to us *the image of a current of consciousness flowing against matter*, determined to force for itself a subterranean passage, making tentative attempts to the right and to the left, pushing more or less ahead, for the most part encountering rock and breaking itself against, it, and yet, in one direction at least, succeeding in piercing its way through and emerging into the light. That direction is the line of evolution which ends in man."

What of DNA, the discovery of the double helix, the human genome, not to speak of modern genetic engineering? It appears that all is lost! But then, just when we are ready to join the scientific mainstream and dismiss Bergson as being no more than a starry-eyed vitalist, he is rescued by none other than the philosopher David Chalmers [1996] as follows (italics mine, except where noted):

"One reason a vitalist might think something is left out of a functional [materialistic] explanation of life is precisely that nothing in a physical account explains *why there is something it is like to be alive*. Perhaps some element of belief in a "vital spirit" was tied to the *phenomena of one's inner life*. Many have perceived a link between the concepts of life and experience, and even today it seems reasonable to say that one of the things that needs to be explained about life is the fact that many living creatures are conscious. But the existence of *this* [italics his] sort of vitalist doubt is of no comfort to the proponent of reductive explanation of consciousness, as *it is a doubt that has never been overturned*."

Bergson's ideas on duration, on time and free will, and on matter and memory, all found resonance again in his third creation, a masterpiece for which, many years later, he received the Nobel Prize for literature. Let us conclude with a prose-poetic transliteration taken from this great work (italics again mine):

"Real duration
Gnaws on Things
Leaves on them
The mark of its tooth.

If everything is in time,
Then everything changes inwardly.

The same concrete reality never recurs.
Repetition is possible
Only in the abstract.

What is repeated
Is some aspect that our senses,
And especially our intellect,
Have singled out from reality.
Because action,
Upon which all effort of intellect is directed,
Moves only among repetitions.

Concentrated on that which repeats,
Solely preoccupied in welding
The same to the same,
Intellect turns from the vision of time.
It dislikes what is fluid,
Solidifies everything it touches.

We do not *think* in time.
We *live* in time.
Because life transcends intellect!
The feeling we have of our evolution
And the evolution of all things in duration is there,
Forming around the intellectual concept
An indistinct fringe that fades into darkness.

Mechanism and finalism take only into account
The bright nucleus shining in the center
Forgetting that this nucleus
Is formed from the rest by condensation.
Forgetting that the whole must be used,
The fluid as well as and more than the condensed
In order to grasp the inner movement of life."

Toward the end of his life Bergson [1935] wrote *The Two Sources of Morality and Religion*, which we have already encountered in Chapter 1 and

to which we will return at the end of the present chapter. It complements the writings of James [1902] and Huxley [1944], and reveals Henri Bergson himself as an inspired guide whose works live on within the tradition and the teachings of the great religious mystics of the world.

Read Bergson as you would the great poem of Lucretius, *The Nature of Things*, which we have encountered in Chapter 1. But now Bergson is heralding the birth of a very different era. (On a lighter note, one could even go so far as to describe his guiding idea of duration as "*The Nature of No-Thing*," which hopefully will not be lost to the world for centuries, as was the poem of Lucretius.) To repeat the earlier-quoted words of William James [1909], but with one key alteration: "Where there is no vision the people perish. Few professional philosophers have any vision. Henri Bergson [substituted here for Fechner] has vision, and that is why one can read him over and over again, and each time bring away a fresh sense of reality."

Alfred North Whitehead's Process and Reality

It is a tragedy that William James did not live long enough to continue his vigorous defense of Henri Bergson against the onslaught of Bertrand Russell (and others) that threw Bergson's philosophy into deep shadow during the course of the 20th Century. This task fell to Alfred North Whitehead, a quintessential mathematical philosopher and one of the most influential scholars of his age.

Following an early and close collaboration with Bertrand Russell, who had been his student at the University of Cambridge, Alfred North Whitehead moved across the ocean to Harvard University and struck out on a very different path. Although the two philosophers parted ways, they remained friends, and, once, when Whitehead was introducing Bertrand ('Bertie') Russell to a Harvard lecture audience, he is said to have characterized their

now greatly divergent philosophies as follows: "Bertie thinks I'm muddle headed and I think he's simple minded."

In *The Concept of Nature – The Tarner Lectures Delivered in Trinity College, November 1919*, Whitehead [1920] bares his soul (and his increased divergence from his former student, Bertrand Russell, whose philosophy we have touched on in Chapter 2) in a series of brilliant lectures presented at Cambridge University, and in a manner akin to the Hibbert Lectures of William James [1909] at Oxford, which we have encountered in detail in previous sections of this essay. In the conclusion of the lecture titled "Time," Whitehead [1920] tells us that (*italics mine*):

"The materialistic theory has all the completeness of the thought of the middle ages, which had a complete answer to everything, be it in heaven or in hell or in nature. There is a trimness about it, with its instantaneous present, its vanished past, its non-existent future, and its inert matter. This trimness is very medieval and ill accords with the brute fact.

The theory which I am urging admits a greater ultimate mystery and a deeper ignorance. The past and the future meet and mingle in the ill-defined present. The *passage of nature* which is only another name for the *creative force of existence* has no narrow ledge of definite instantaneous present within which to operate. Its operative presence which is now urging nature forward must be sought for throughout the whole, in the remotest past as well as in the narrowest breadth of any present duration. Perhaps also in the unrealized future. Perhaps also in the future that might be as well as the actual future which will be. It is impossible to meditate on time and the mystery of the creative passage of nature without an overwhelming emotion at the limitations of the human intelligence."

These remarks concerning the limitations of the (symbolic) human intellect are curiously reminiscent of the observations of the great physicist, Sir Arthur Eddington, which were quoted at the end of Chapter 1. And, earlier in the same lecture, Whitehead clarifies his foregoing terminology and his consonance with the philosophy of Henri Bergson as follows (*italics mine*):

"The process of nature can also be termed the passage of nature. I definitely refrain at this stage from using the word 'time,' since the *measurable* time of science and of civilized life generally merely exhibits some aspects of the more fundamental fact of the

passage of nature. I believe that in this doctrine I am in full accord with Bergson, though he uses `time' for the fundamental fact which I call the `passage of nature.' "

Nine years later, Alfred North Whitehead [1929] published *Process and Reality*, which is widely acknowledged to be the masterpiece amongst his voluminous writings. In its preface, he states his sources of influence as follows (italics mine):

"I am also greatly indebted to Bergson, William James, and John Dewey. *One of my preoccupations has been to rescue their type of thought from the charge of anti-intellectualism*, which rightly or wrongly has been associated with it."

This is a highly-challenging book in which Whitehead invents a whole new philosophical vocabulary, and it will not be discussed in any detail here. But the following are two quotations that capture its flavor. They are taken from Whitehead's concluding chapter, "God and the World," and within them one can hear distinct, albeit distant, echoes of Bergson and even of Fechner. The first is quoted in prose-poetic transliteration as follows:

"It is as true to say that God is permanent and the World is fluent,
As that the World is permanent and God is fluent.

It is as true to say that God is one and the World is many,
As that the World is one and God is many.

It is as true to say that, in comparison with the World, God is actual eminently,
As that, in comparison to God, the World is actual eminently.

It is as true to say that the World is immanent in God,
As that God is immanent in the World.

It is as true to say that God transcends the World,
As that the World transcends God.

It is as true to say that God creates the World,
As that the World creates God.

God and the World are the contrasted opposites
In terms of which Creativity achieves its supreme task
Of transforming disjointed multiplicities, with its diversities in opposition,
Into concrescent unity, with its diversities in contrast.

In each actuality there are two concrescent poles of realization:
'Enjoyment' and 'appetition,'
The 'physical' and the 'conceptual.'

For God the conceptual is prior to the physical,
For the World the physical poles are prior to the conceptual poles."

And here is Alfred North Whitehead's magnificent, concluding paragraph of his entire oeuvre, his final summing-up (in my prose-poetic transliteration and with italics also mine):

"God is the great companion---
The fellow-sufferer who understands.
Here we find the final application
Of the doctrine of objective immortality.

Through the perishing occasions
In the life of each temporal Creature,
The inward source of distaste or of refreshment,
The judge arising out of the very nature of things,
Redeemer or goddess of mischief,
Is the transformation of itself,
Everlasting in the Being of God.

In this way, the insistent craving is justified---
The insistent craving that zest for existence
Be refreshed by the ever-present, unfading importance
Of our immediate actions,
Which perish and live for Evermore."

Support for the Natural Philosophy of Organism

Whilst the mainstream of philosophical and scientific research during the 20th century has remained firmly within the Cartesian tradition, one can nevertheless find glimmerings of support for the countervailing approach described in previous sections of this chapter, to which the name “natural philosophy of organism” has become attached. Let us list some of these here, accompanied by my own brief and, indeed, speculative commentary.

Within Physics

The renowned physicist, Lee Smolin [2013] in *Time Reborn: From the Crisis in Physics to the Future of the Universe* theorizes that it is time itself that may be fundamental in nature, space being a derivative and symbolic construct. (Here one hears echoes of Bergson, although the philosopher receives no mention in the book.) And Lee Smolin simultaneously highlights the limitations of mathematical symbolism as follows (italics mine):

“John Archibald Wheeler [a renowned physicist] used to write physics equations on the blackboard, stand back, and say, “Now I’ll clap my hands and a universe will spring into existence.” *Of course, it didn’t.* Stephen Hawking [another physicist of great renown] asked [in *A Brief History of Time*], “What is it that breathes fire into the equations and makes a universe for them to describe?” *Such utterances reveal the absurdity of the view that mathematics is prior to nature.*”

This issue has also been reopened in *The Physicist and the Philosopher: Einstein, Bergson, and the Debate that Changed our Understanding of Time*, by Jimena Canales [2015], where one learns that other leading mathematical physicists, for example, Henri Poincare and Hendrik Lorentz, have also expressed sympathy for Bergson’s ideas on time.

The overarching conundrum in mathematical physics today is the need to reconcile Albert Einstein’s theories of relativistic space-time and gravitation, on the one hand, and Neil Bohr’s quantum theory, on the other, i.e., to unify physics on the largest scale and physics on the smallest. Perhaps it will only be through an understanding of consciousness itself, following in

the footsteps of Bergson and William James, that physicists will be able to reconcile the two theories, if indeed a single symbolical (mathematical) reconciliation is ever within reach.

Within Biology

The distinguished but controversial biologist, Rupert Sheldrake [1988] in *The Presence of the Past: Morphic Resonance and the Habits of Nature* proposes a much more expansive view of memory, one that stands in marked contrast to current brain-based theories. He postulates that nature itself “remembers” and shapes biological morphology through a novel, physics-inspired concept of “morphic fields.”

As a thought experiment, let us cast ourselves back to the time of the ancient Greeks at the height of their civilization and imagine a Greek philosopher-scientist—let us call him Icarus!---setting out to explain the flight of birds and the mystery of aviation. (The word itself happens to be derived from the Latin “avis,” meaning “bird.”) He may not recognize that air is the key element in any explanation of flight. Who would ever think that a heavy object could be supported by air? It must be some complex property of the feathered wing! Thus Icarus---following John Searle as quoted in Chapter 2---might instead provide a common-sense definition of aviation as what a bird does when it takes off from one high branch and then alights on another. Or Icarus---now following Francis Crick again in Chapter 2---might say of a bird’s ability to fly: “You are nothing but a pair of wings and a pack of feathers.” Thus a detailed study of this phenomenon by Icarus might involve the clipping of particular wing or tail feathers, say of an eagle, and noting that the bird can no longer fly. Furthermore, Icarus has observed that birds must flap their wings to get off the ground, and thus the flapping must create a “flying energy” retained in the wing, which would then explain the phenomenon of birds being able to remain aloft also by gliding.

Who could have imagined two thousand years ago that it is the simple shape of an aerofoil that links the flight of a bird to the workings of a

propeller, an airplane, a helicopter, and even a boomerang? (Perhaps only an Australian aborigine!) We are nowhere close to an understanding of this type in the study of consciousness, Rupert Sheldrake's efforts notwithstanding. What we have instead is a detailed study of the brain's neuronal structure, of its "feathers," so to speak. All we know at present from neurological science is that there are many different types of memory: short-term, long-term, procedural, symbolical, phenomenological. But the workings of memory itself remain a mystery.

Something fundamental is missing! Is the brain a "memory pump" in the way that the heart is a blood pump? If so, where does the memory reside, if indeed it does "reside" somewhere! Bergson tells us that to understand consciousness we must first and foremost understand memory, and to understand memory we must comprehend the flow of time. Resorting to a metaphor, the "wing" of consciousness is held aloft by the "wind" of time! And recalling also that Newton proposed the concept of "gravity" in order to understand how matter is held together within the confines of space, perhaps some corresponding notion of "memory" must be created, as Rupert Sheldrake has attempted, in order to explain how consciousness enables matter to cohere within the flow of time.

Within Psychology

Let us never lose sight of the wonderful writings of C.G. Jung on human consciousness and the unconscious psyche, and, in particular, his two books written as a summing up, namely, the autobiographical *Memories, Dreams, Reflections* (Jung [1961]) and the highly-popular compendium, *Man and His Symbols* (Jung [1964]), which was co-authored with others during the last year of his life. Jung's approach too can be viewed as adopting a broader conception of mind, in particular, his "collective unconscious" could be viewed, in alternative terms, as a form of "collective memory."

Within the Management and Social Sciences

The recent resurgence of interest in the philosophy of Henri Bergson has arguably been strongest within these two fields. For example, see *Managerial and Philosophical Intuition in the Thinking of Bergson and Minzberg* by Ghislain Deslandes & Kenneth Casler [2010] and *The Perception of the Environment* by the social anthropologist, Tim Ingold [2000].

Within the Information and Computer Sciences

We have already discussed in Chapter 2 how some leading researchers have turned to Integrated Information Theory (IIT) in search of an explanation of consciousness. A merit of the approach is its recognition that consciousness may be a widespread phenomenon and not simply restricted to creatures with a brain or, at the very least, a nervous system. Indeed, one of its leading exponents, David Chalmers [1996], has gone so far as to speculate that the simple electrical thermostat, affixed to the walls of many a house, may exhibit a form of consciousness.

In another thought, or gedanken, experiment, let us consider an intermediate approach. Imagine a very simple organism that consists of a pair of neurons (taken, say, from a nematode, and henceforth identified by the symbols 0 and 1). Assume they are kept alive in some suitably-warm nutrient bath, and suppose their dendrites are connected to a metal strip that is sensitive to temperature and constitutes the organism's "skin." The "connectors" between the skin and the dendrites convert heat into electrical impulses, and let us assume that the connectors are constructed so that the dendrites of neuron 0 are activated when the temperature of the skin falls below some acceptable temperature level, say t , and the dendrites of neuron 1 are activated when the temperature of the skin rises above some level, say T . The axons of the two neurons are in turn connected, respectively, to on-and-off switches of an electric heater that warms the surrounding air. When axon 0 is activated it turns the heater on, and when axon 1 is activated it turns the heater off.

Thus, whenever the air temperature falls below level t as sensed by the "skin," the dendrites of neuron 0 are activated and this results in an electric impulse being then sent along the axon of this neuron, which turns on the heater. Later, when the room temperature rises above level T , a similar process results in neuron 1 turning off the heater. Thus our gedanken-organism remains comfortably within the temperature range $[t, T]$, which is essential for it to remain alive. (In order to make the organism a little more interesting, one could add a totally unnecessary detail that the telodendria of axon 0 are connected to other dendrites of neuron 1, and vice-versa, thus putting the two neurons in contact with one another to create a primitive "brain.") These twin neural cells engage with the outer world in order to maintain an ambient temperature. Of course, they are also miniature chemical factories, engaged in all the operations of absorbing nutrients and expelling waste, also needed to maintain life.

Does this gedanken-organism have experiences? Does it experience the qualia of hotness and coldness? Does it have phenomenological consciousness? If you subscribe to the philosophy of organism, or to the neurobiological explanation of consciousness, or even to the integrated information theory (IIT) of Tononi, Koch, and Chalmers, you are very likely to answer in the affirmative. But its consciousness would be very different from our own.

As with any other biological organism, our gedanken-organism will eventually age and die and presumably lose all consciousness. Let us now replace the two neurons and their dendrites and axons by two electricity-conducting wires, again identified by 0 and 1, and design a conventional thermostat, in an obvious way, so that an electrical current along wire 0 turns on the heater and a current along wire 1 turns it off. The IIT school of thought tells us that a consciousness of sorts will be restored to this thermostat, i.e., according to David Chalmers, this electrical device also has a primitive phenomenological consciousness. It is this that John Searle declares to be "incoherent," as discussed in Chapter 2. We leave it to the reader to take sides in this argument between philosophers.

A much more radical departure from current computer- and neural-based scientific studies of consciousness, which we have considered in Chapters 1 and 2, is proposed by the famed microprocessor and touch-screen pioneer, Federico Faggin. It is based on the premise that “consciousness is an *irreducible and fundamental* property of nature,” and its underlying philosophy has much in common with the approach advocated in this book. Details can be found in several articles posted at Faggin [2011].

Within Philosophy

The school of philosophical thought known as phenomenology has been defined by one of its leading exponents, Maurice Merleau-Ponty [1945] in his classic *Phenomenology of Perception*, as “the study of essences; and according to it, all problems amount to finding definitions of essences: the essence of perception, or the essence of consciousness.” The founder of this school, Edmund Husserl [1905], *The Phenomenology of Internal-Time Consciousness*, is reported once to have declared: “We are all Bergsonians now!” Husserl’s student, Martin Heidegger [1927], *Being and Time*, followed in his footsteps, as did the successor to Henri Bergson in his University Chair in France, Maurice Merleau-Ponty. Also within this tradition are the authors George Lakoff and Mark Johnson [1999] of the very readable work, *Philosophy in the Flesh: The Embodied Mind and its Challenge to Western Thought*.

Thus it seems paradoxical that phenomenology served to sideline Bergson’s “type of thought” (in the words of Alfred North Whitehead quoted in the previous section). But very recently, its proponents have begun to view the works of Henri Bergson in a fresh light. See, in particular, Kelley [2010], *Bergson and Phenomenology*. And for a brilliant critique of the entire modern epistemological tradition from Descartes onwards, see also Hubert Dreyfus and Charles Taylor [2015], *Retrieving Realism*.

I Experience Therefore I Symbolize Therefore I Compute

At the turn of the 15th Century, Copernicus (1473-1543) initiated a revolution in our understanding of the universe when he proposed the heliocentric model of the solar system, namely, that it was the planet earth that revolved around the sun and not the other way round. Prior to that time the Ptolemaic model, which dated to the ancient Greeks and Romans and was favored by the Catholic Church, had reigned supreme. Galileo (1564-1642), the father of modern physics, was heavily censured by the religious authorities for his support of Copernicus, and it took almost a century before the heliocentric model gained widespread acceptance. The Copernican revolution marked the beginning of our modern scientific age, which has come to flower over the course of the subsequent five centuries under the banner proclaimed by Descartes (1596-1650), which we have discussed in detail in Chapter 1: *"I think therefore I am."*

Today's science tells us that approximately 15 billion years ago, all matter in the universe, and indeed space itself, existed in a highly compressed state, which then expanded rapidly in a so-called "big-bang," scattering debris over an unimaginably vast space. Over time this debris aggregated into a universe composed of galaxies numbered in the billions, containing stars numbered in the trillions, separated from one another by distances measured in the millions of light-years. (A light-year is the distance travelled at the speed of light over the course of one year.) Approximately 4.5 billion years ago, in an undistinguished corner of this vast universe and within a galaxy known as the Milky Way, the scattered debris orbiting a nondescript star, which we call our Sun, aggregated into a collection of planets. And, on one of these planets, which we call our Earth and which happened to be favored within this solar system, primitive life made its appearance, perhaps a billion years after the birth of the planet, perhaps even much earlier. The earth cooled, geological history advanced, and life continued to evolve, taking advantage of each geological and ecological

niche as it became available, creating the multitude of bacterial, plant and animal species of today, amongst which the human species became dominant. According to modern science as premised on the Descartes-inspired dictum, "I compute therefore I symbolize therefore I experience," the earth and the human beings who inhabit it are simply *a speck in a vast universe of countless galaxies and stars*.

But there is another perspective spearheaded by the four natural philosopher-scientists discussed in this concluding essay that *reverses* the Cartesian dictum. This alternative edict, "*I experience therefore I symbolize therefore I compute*," has slowly taken root over the course of the past century, heralding a revolution that may be as significant as that of Copernicus. So let us leave the concluding words of our book to Bergson [1934] himself, which I quote from his final book, *The Two Sources of Morality and Religion*:

"People are never tired of saying that a man is but a minute speck on the face of the earth, the earth is a speck in the universe. Yet, even physically, man is far from occupying the tiny space allotted to him, and with which Pascal himself was content when he condemned the "thinking reed" to be, materially, only a reed. [Blaise Pascal (1623-1662) was a French polymath.] For if our body is the matter to which our consciousness applies itself [then] it is coextensive with our consciousness, it comprises all we perceive, it reaches to the stars. But this vast body is continually changing, sometimes radically, at the slightest shifting of one part of itself which is at its center and occupies a small fraction of space. This inner and central body, relatively invariable, is ever present. It is not merely present, it is operative: it is through this body, and through it alone, that we can move other parts of the large body. And since action is what matters, since it is an understood thing that we are present where we act, the habit has grown of limiting consciousness to the small body and ignoring the vast one. The habit appears, moreover, to be justified by science, which holds outward perception to be an epiphenomenon of corresponding intracerebral processes: so that all we perceive of the larger body is regarded as being a mere phantom externalized by the smaller one. We have previously exposed the illusion contained in this metaphysical theory [*Matiere et Memoire* (Paris, 1896). See the whole of Chap. I.] If the surface of our organized small body (organized precisely with a view to immediate action) is the seat of all our actual movements, our huge inorganic body is the seat of our potential or theoretically possible actions: the perceptive centers of our brain being the pioneers

that prepare the way for subsequent actions and plan them from within, everything happens as *though* our external perceptions were built up by our brain and launched by it into space. But the truth is quite different, and we are really present in everything we perceive, although through ever varying parts of ourselves which are the abode of no more than potential actions. *Let us take matters from this angle and we will cease to say, even of our body, that it is lost in the immensity of our universe."*

Thou Art That!

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About the Author

John Lawrence (Larry) Nazareth was educated at the University of Cambridge (Trinity College) and the University of California at Berkeley. He is a mathematical and algorithmic scientist, industry consultant, and university professor by vocation and an avocational travel and memoir writer, poet, essayist, and playwright. He makes his home on Bainbridge Island near Seattle, Washington. For further biographical information, please visit www.math.wsu.edu/faculty/nazareth .