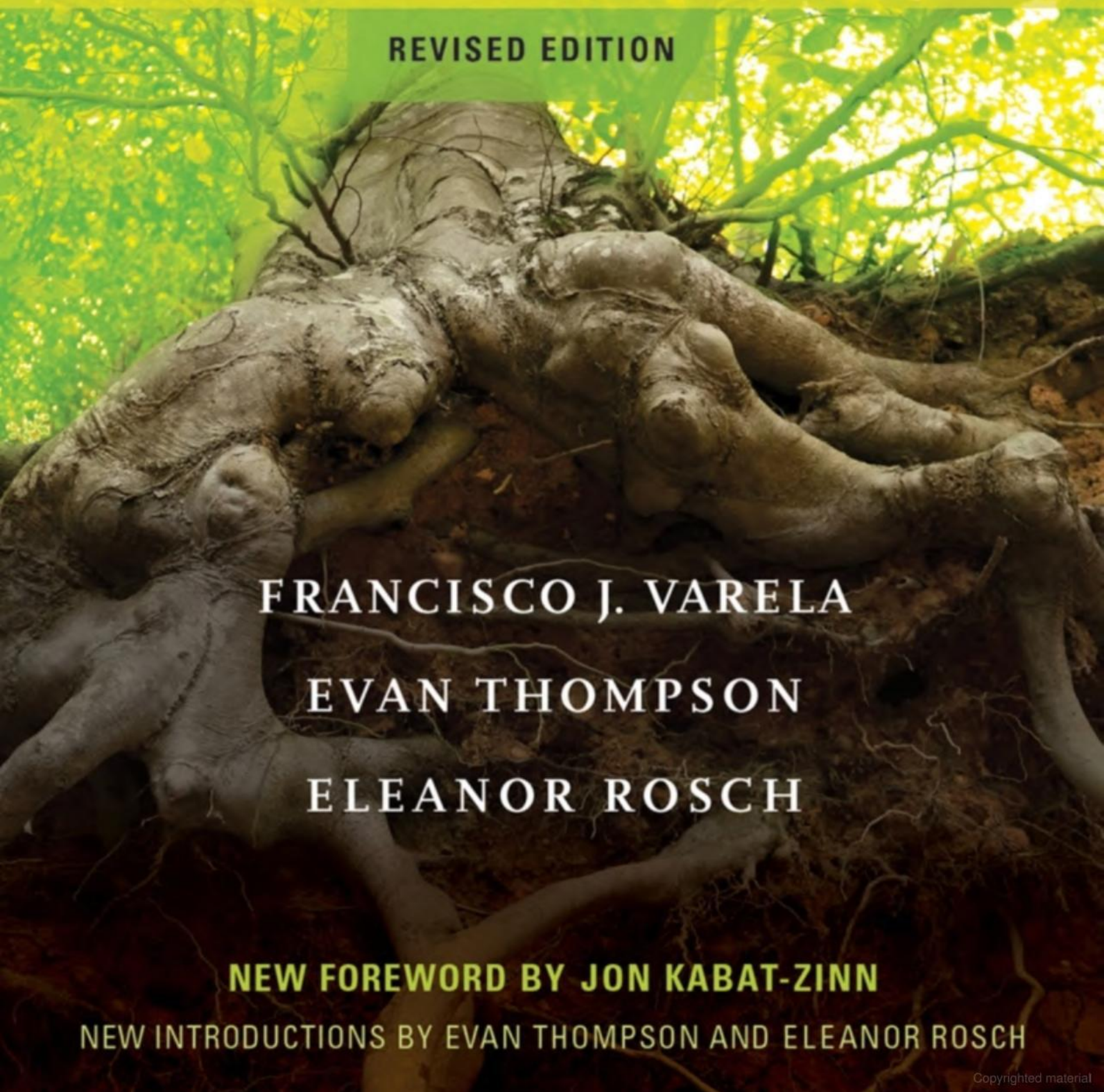
THE EMBODIED MIND

Cognitive Science and Human Experience

REVISED EDITION



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NEW INTRODUCTIONS BY EVAN THOMPSON AND ELEANOR ROSCH

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revised edition

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new foreword by Jon Kabat-Zinn
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Foreword to the Revised Edition

Jon Kabat-Zinn

In the annals recording the remarkable and improbable confluence of dharma, philosophy, and science in this era, if such are ever written, *The Embodied Mind* will be found to have played a seminal and historic role.

I was elated and, in many ways, awed when I first discovered it shortly after it was published by the MIT Press in 1991. Not that I understood it all, or even most of it, since I am neither a cognitive scientist nor a philosopher by training. But I nonetheless was able to recognize its breadth and depth, the rigor, edginess, and bravery of its scholarly lines of argument, well beyond the thought lines of academic cognitive science, and sensed that its publication by the MIT Press was a landmark and momentous signature of something new and profound emerging at the interface of science and dharma.

What I did understand of the book at the time (which over the years I wound up reading, consulting, and highlighting on multiple occasions), I found very much in alignment with my own thinking from early on in my scientific career as a molecular biologist pondering questions such as what makes life *life* and how consciousness arises from cells. It was also germane to my work, beginning in 1979, offering relatively intensive training in mindfulness meditation and mindful hatha yoga to medical patients with a wide range of diagnoses and chronic conditions and documenting what ensued in their lives and health from such an engagement. In those early days, I found myself at times somewhat tongue-in-cheek referring to this approach—that we later came to call MBSR, for "mindfulness-based stress reduction"—as "Buddhist meditation without the Buddhism," since mindfulness had been explicitly and authoritatively characterized as "the heart of Buddhist meditation."[1] MBSR was meant from the start to be a clinical

program orthogonal to conventional narratives of health and well-being, a laboratory for a more experiential and participatory medicine, a vehicle for self-education, healing, and transformation rather than a new "therapy." It was conceived as a public health intervention and as a "skillful means" for demonstrating the liberative potential of mindfulness practice in regard to conventional views of self and the world and their attendant, often imprisoning narratives, which we all experience to one degree or another. Without that underlying, if mostly implicit element, MBSR would not have been either "mindfulness-based" nor a vehicle for dharma and, therefore, to my mind, of little value from the perspective of healing, transformation, or liberation.[2]

I remember feeling confirmed and uplifted by the centrality the authors accorded to "mindfulness" and "mindful awareness" in their wholly radical yet compelling, rigorous, and challenging attempts to bring together the fields of cognitive science, phenomenology, and dharma to examine the larger connections between mind, body, and experience. This feeling was amplified by the fact that the analysis and arguments were coming from not one but three authors, who seemed to be speaking with one voice from an unusually deep collaboration, and who were obviously also speaking from their own direct, "first-person"[3] experience of mindfulness meditation practice, in addition to being serious scientist-researchers, philosophers, and scholars with grounding in the worlds of cognitive science and phenomenology, as well as in the contemplative and philosophical traditions within Buddhism. So it felt that they were themselves embodying in their collaboration what they were putting forth, a new way of, in their words, "laying down a path in walking." This impression is only strengthened now by the "correctives" the authors have added in their introductions to this edition to clarify a deeper understanding of mindfulness grounded in lived experience and, in particular, in relationality itself and in what they term "enaction." These correctives are really evolving refinements indicative of ongoing learning and growing, and are based on continuing investigation, reflection, inquiry, dialogue among colleagues, and actual embodied and enacted cultivation/practice of mindfulness. They are themselves "vital signs" of health, if you will, indicators of the vitality of the evolutionary arc of thinking and praxis at the cutting edge where cognitive science and the meditative disciplines converge and radically challenge each other's models and understanding. Stasis at this

on other consciousness disciplines. The complexities abound. This is both extremely healthy and, at the same time, a conundrum for scientific investigation, demanding new levels of precision both in the descriptions of what is being taught and in first person accounts of what is being attempted and experienced, moment by moment.[7] Francisco Varela would have had a field day with the vast opportunities presented to us in this unique era of the confluence of cognitive science, phenomenology, and dharma that he contributed hugely to bringing about. But his vision, his insights, and his voice are enduring and timeless, intimately permeating this volume and residing in the hearts and perspectives of his coauthors, as well as in his friends and former students and colleagues around the world.

May this new edition touch the minds and hearts and imagination of many, far and wide, in many different disciplines, and contribute to the "profound transformation of human awareness" (X) that was its original aspiration and remains so, appropriately amplified, to this day. That profound transformation and the accompanying learning to inhabit the spaciousness and boundlessness of awareness itself as the core of our embodied being, and then taking wise action for the benefit of others and ourselves from that vantage point when called for, is more sorely needed now on this planet than ever before.

Woods Hole, Massachusetts
October, 2015

Notes

1. Thera Nyanaponika, *The Heart of Buddhist Meditation* (New York: Samuel Wiser, 1962).

2. J. Kabat-Zinn, Some reflections on the origins of MBSR, skillful means, and the trouble with maps, in *Mindfulness: Diverse Perspectives on Its Meaning, Origins, and Applications*, ed. J. Mark G. Williams and Jon Kabat-Zinn (London and New York: Routledge, 2013), 281–306.

3. See Francisco J. Varela and Jonathan Shear, eds., *The View from Within: First-Person Approaches to the Study of Consciousness* (Exeter, UK: Imprint Academic, 1999).

4. See, for example, David Abrams, *The Spell of the Sensuous* (New York: Vintage, 1996).

5. See S. Kay Tombs, *The Meaning of Illness: A Phenomenological Account of the Different Perspectives of Physician and Patient* (Dordrecht, Netherlands: Kluwer, 1992).

6. Evan Thompson, *Mind in Life: Biology, Phenomenology, and the Sciences of Mind* (Cambridge, MA and London, UK: Harvard University Press, 2007).

7. K. A. Garrison, D. Scheinost, P. D. Worhunsky, et al., Real-time fMRI links subjective experience with brain activity during focused attention, *NeuroImage* 81 (2013): 110–118.

Introduction to the Revised Edition

Evan Thompson

Almost thirty years ago, in the summer of 1986 in Paris, Francisco Varela and I began writing what would eventually become this book. I was a first-year Ph.D. student in philosophy at the University of Toronto and Varela had just moved to the Ecole Polytechnique and the Institut des Neurosciences. We had met about ten years earlier in the summer of 1977 when he came to a conference at the Lindisfarne Association, an educational institute and contemplative community founded by my father, William Irwin Thompson. My father and Gregory Bateson, who was Lindisfarne's scholar in residence that summer, led the conference, called "Mind and Nature."[1] Varela in turn was a Lindisfarne scholar in residence in 1978. Living together at Lindisfarne in Southampton, New York, and Manhattan, he became a member of our family—a combination of uncle and older brother to me, as well as my intellectual mentor. That relationship was the context in which we worked together on *The Embodied Mind* in Paris from 1986 to 1989.

Varela had moved to Paris from Chile by way of the Max Planck Institute in Frankfurt (where he had collaborated with neuroscientist Wolf Singer for a year)[2] in order to set up his laboratory investigating the neurophysiology of vision. I had graduated from Amherst College, where I majored in Asian Studies and studied Buddhist philosophy. I planned to write my philosophy dissertation in cognitive science and the philosophy of mind. My first published paper—a revision of my undergraduate thesis on Martin Heidegger and the Japanese philosopher Nishitani Keiji—had just been published in the journal *Philosophy East and West*.[3] Varela had read the paper (I still have the typewritten letter he sent me from the Max Planck Institute with his comments on an early draft) and he encouraged me to apply to a

German philosophy foundation for research support. A grant from the foundation—the Stiftung Zur Förderung der Philosophie—supported my stay in Paris in the summer of 1986. That summer Varela also suggested that I write my dissertation on theories of perception, using color vision, and specifically the investigation of color vision in different animal species, as my focus. Comparative color vision was the main focus of Varela's experimental work at the time, so I learned color vision science and wrote my dissertation in his lab while we worked together on this book.[4]

Eleanor Rosch joined us in 1989. I had moved to Berkeley, where I was a visiting postdoctoral scholar in philosophy, and where Rosch was a professor of psychology. Varela and Rosch had also been friends for many years. The three of us finished the book in 1989–1990.

By the end of our first summer working together in 1989, Varela and I had a first draft of the core chapters and a working title—*Worlds Without Ground*, which became the title of part V—suggested by my father. (We changed the title to *The Embodied Mind* in 1990.) The title came from one of our guiding ideas, the philosophical idea of *groundlessness*. In Buddhist philosophy, groundlessness means that phenomena lack any inherent and independent being; they are said to be "empty" of "own being." In Western philosophy, groundlessness means that knowledge and meaning lack any absolute foundation. Biology and cognitive science were arriving at the same idea—that human cognition is not the grasping of an independent, outside world by a separate mind or self, but instead the bringing forth or enacting of a dependent world of relevance in and through embodied action. Cognition as the enaction of a world means that cognition has no ground or foundation beyond its own history, which amounts to a kind of "groundless ground." At the same time, the discovery of groundlessness places us in an existential quandary because we habitually experience things as if they did have an absolute ground, either in what we take to be the outside world or in what we take to be our self. Is this discrepancy between scientific knowledge and lived experience inevitable and insurmountable? Or are cognitive science and human experience somehow reconcilable? Is it possible for cognitive science and human experience to reshape each other in a transformative way beyond our scientific and habitual, experiential reifications of a separate self and an independent world? These questions were the ones that motivated and inspired us when we set out to write this book.

Many things have changed in the intervening years, in ways that make this book more immediately accessible than when it was first published. The embodied cognition approach is now central to cognitive science.[5] Whereas the dominant model of the brain in early cognitive science was that of a stimulus-driven, sequential processing computer, it is now widely recognized that brain activity is largely self-organizing, nonlinear, rhythmic, parallel, and distributed.[6] The idea that there is a deep continuity in the principles of self-organization from the simplest living things to more complex cognitive beings—an idea central to Varela's earlier work with neurobiologist Humberto Maturana[7]—is now a mainstay of theoretical biology and is receiving increasing attention in neuroscience.[8] Subjective experience and consciousness, once taboo subjects for cognitive science, are now important research topics, especially in cognitive neuroscience.[9] Phenomenology now plays an active role in the philosophy of mind and experimental cognitive science.[10] Meditation and mindfulness practices are increasingly used in clinical contexts and are a growing subject of investigation in behavioral psychology and cognitive neuroscience.[11] And Buddhist philosophy is increasingly recognized as an important interlocutor in contemporary philosophy.[12]

Nevertheless, the motivating questions of this book have only become more pointed. Consider the frequent pronouncements made in the name of neuroscience that the self is nothing but an illusion created by the brain's workings, that the world we experience is really a neural simulation, or that consciousness is nothing but a brain process. Our personal experience, however, presents things differently. We feel as if there is a real self that is the subject of our consciousness and that is in direct contact with an independent, real world. Although we may dispute the philosophical assumptions on which such neuroscientific pronouncements rest, such disputation by itself does nothing to change our lived experience. Hence the quandary: either accept what science seems to be telling us and deny our experience—thereby forgetting that lived experience is the source of science, and that science can never ultimately step outside it—or hold fast to our experience and deny science—thereby forgetting that experience itself constantly seeks to enlarge its own horizons through scientific investigation. Our present culture is still caught up in the constant oscillation between these two tendencies.

real," to borrow the opening words of Eleanor Rosch's introduction, while also making the book "not fit easily into any of the usual academic disciplines" (X). It is also responsible, I believe, for the book's lasting influence in the study of embodied cognition—not just in cognitive science, but also in the arts and the humanities, as well as in somatics and the bodywork disciplines.

At the same time, when I reread the book now I cannot help but see it as limited by several shortcomings, ones that have become increasingly apparent to me over the years and that we need to leave behind in order to advance the vision and project of this book. Specifically, I no longer accept three of the rhetorical and argumentative strategies on which we relied.

The first strategy is our portrayal of Western phenomenology, in the tradition of Husserl, Heidegger, and Merleau-Ponty, as a failed or broken down philosophical project (see chapter 2). On the contrary, Western phenomenology remains a vital and important movement of continuing relevance to philosophy and cognitive science, as well as to practical disciplines of human transformation. My book *Mind in Life: Biology, Phenomenology, and the Sciences of Mind* argues this point at length and includes an appendix specifically devoted to correcting and explaining the reasons for our mischaracterization of Husserl in *The Embodied Mind*.[15] Other philosophers, notably Shaun Gallagher and Dan Zahavi, have shown the importance of phenomenology for cognitive science.[16] Many important phenomenological works have appeared in the last two decades, making phenomenology a rich and active area of contemporary thought.[17] These works include not just phenomenological philosophy, but also phenomenology as a way of doing qualitative research in tandem with cognitive science.[18] Varela, in the last years of his life before he died in 2001, contributed to this revitalization of phenomenology, specifically in his contributions to the "naturalizing phenomenology" movement, his helping to found the new journal *Phenomenology and the Cognitive Sciences*, and especially in his scientific research program of "neurophenomenology," which uses Western phenomenology as well as mindfulness practices in the investigation of the large-scale brain dynamics related to conscious experience.[19] Neurophenomenology provides the framework for my most recent book, *Waking, Dreaming, Being: Self and Consciousness in Neuroscience, Meditation, and Philosophy*, which revisits many of the ideas and topics of *The Embodied Mind*.[20]

The second strategy is our depiction of Buddhist philosophy, specifically the Indian Buddhist Abhidharma school and the writings of the Madhyamaka (middle way) philosopher Nāgārjuna, as based on meditation or as deriving from meditative experience. I now see this idea as being simplistic and inaccurate. As Buddhist scholars have discussed, the formation and evolution of Indo-Tibetan Buddhist philosophy were shaped by many factors, such as doctrinal constraints, scholasticism, and the pressing need to respond to non-Buddhist philosophers.[21] For these reasons (among others), we cannot suppose that Indo-Tibetan philosophical ideas were derived directly from meditation. Indeed, it is equally possible that theoretical ideas, such as the momentariness of mental processes (see chapters 4–6), shaped certain kinds of meditative experience. The extent to which Buddhist philosophical ideas either shaped or were shaped by meditative experience remains an open and interesting question in the field of Buddhist studies.

In any case, classical Indian Buddhist philosophy was certainly not based on the kind of "Buddhist modernist" style of meditation that we call "mindfulness/awareness." "Buddhist modernism" is a contemporary, transnational form of Buddhism that cuts across Asian and Western cultural and geographical contexts.[22] One of its central elements is a style of mindfulness meditation practice that derives largely from the modern Theravada Buddhist meditation revival that occurred in Burma, Thailand, and Sri Lanka during the nineteenth and twentieth centuries.[23] The mindfulness meditation methods promoted by this movement influenced modern Asian Buddhist reformers and teachers, especially in the West, as well as Western teachers who studied in Asia and returned to teach in the West. Virtually all of the contemporary meditation instruction texts we list in appendix C and on which we relied in describing mindfulness meditation can be described as Buddhist modernist works. My point in calling attention to this fact is not at all to suggest that Buddhist modernism is somehow a less "authentic" form of Buddhism; on the contrary, such appeals to "authenticity" are unsustainable, for Buddhism is and always has been a constantly evolving tradition. Rather, it is to alert the reader to the fact that our assumption that Buddhist philosophy derives from meditation is a typically Buddhist modernist claim and one that does not do justice to the complex historical and interpretative issues that arise in trying to relate mindfulness meditation practices (especially in their Buddhist modernist form) to the Abhidharma and Madhyamaka philosophies.

As a philosopher, I also feel duty bound to declare that Buddhist philosophy is every bit as abstract, theoretical, and technical as Western philosophy, so the idea that Buddhist philosophy is somehow closer to direct experience and thereby more immediately phenomenological—as we state at certain points in the text—is misguided. Moreover, being able to be abstract, theoretical, and technical is a strength of Indian and Tibetan Buddhist philosophy, and also of the Indian and Tibetan philosophical traditions overall, not a weakness.[24]

The third strategy is our tendency sometimes to depict "mindful awareness" or "mindfulness" as a special kind of inner observation of a mental stream whose phenomenal character is supposed to be somehow independent of such observation. This tendency is evident when we argue that mindful awareness reveals consciousness to really be discontinuous and gappy (rather than just appearing to be so in certain contexts and under certain conditions) (see chapter 4). Hubert Dreyfus, in his review of *The Embodied Mind,* rightly objected to this conception of phenomenology as inward observation.[25] As he pointed out, such an effort of inward observation alters experience, so no valid claim can be made on the basis of such observation about how experience is apart from such observation. Moreover, reading the results of such inward observation back into world-immersed, embodied experience would inevitably distort such experience. Besides wishing to acknowledge Dreyfus's criticism,[26] I mention it here because the Buddhism–cognitive science encounter continues to be influenced by the idea of Buddhist mindfulness practice as offering a special kind of introspection that can serve the purposes of the cognitive neuroscience of consciousness. In my view, however, although mindfulness practices can facilitate a unique kind of acute awareness of what phenomenologists such as Merleau-Ponty call the "phenomenal field" of lived experience,[27] this kind of awareness is not inward observation in any introspectionist sense of "inward"—for example, it is not the inward perception of basic mental elements, whether these be sensations, after the fashion of Western introspectionist psychology, or momentary and elementary mental events, after the fashion of Abhidharma.

The Embodied Mind also contains another, better conception of mindfulness meditation. According to this conception, mindfulness practices should be understood as skillful ways of enacting certain kinds of embodied states and behaviors in the world, not as inner observation of an

observer-independent mental stream. This conception connects to the central, original idea of the book, namely, the view of cognition that we call *enaction* or the *enactive approach* (mentioned at the outset of this introduction).

In formulating the enactive approach, we drew on multiple sources: the theory of living organisms as self-producing or "autopoietic" systems that bring forth their own cognitive domains; newly emerging work on embodied cognition (how sensorimotor interactions with the world shape cognition); Merleau-Ponty's phenomenology of the lived body; and the Buddhist philosophical idea of dependent origination, and specifically that cognition and the experienced world co-arise in mutual dependence. The basic idea of the enactive approach is that the living body is a self-producing and self-maintaining system that enacts or brings forth relevance, and that cognitive processes belong to the relational domain of the living body coupled to its environment.[28] One implication of this idea is that cognition requires the exercising of capacities for skillful action and that even abstract cognitive processes are grounded on the body's sensorimotor systems, including the brain systems that, as we would say today, emulate sensorimotor processes in an "offline" way. Today, this idea of cognition as based on modal sensorimotor processes is central to the approach called "grounded cognition," where "grounded" means based on body states, situated action, and modal perception-action systems.[29]

From the enactive perspective, mindfulness practices should be viewed as forms of skillful know-how for enacting certain situated mind–body states and behaviors, not as a form of inner observation of a private mental realm. Notice that this contrast—between understanding mindfulness meditation as a kind of enactive cognition versus as a kind of inner mental observation—is a conceptual and phenomenological one. Notice also that each conception has implications for cognitive science. On the one hand, thinking of mindfulness meditation as inner observation of a private mental realm feeds the internalist tendency in cognitive neuroscience to model mindfulness as a kind of mental activity instantiated in neural networks inside the head and visible through brain imaging tools such as electroencephalogram (EEG) and functional magnetic resonance imaging (fMRI). This approach runs the risk of confusing the biological conditions for mindfulness with mindfulness itself, which, as classically described, consists of the integrated exercise of a whole host of cognitive and bodily skills

in situated and ethically directed action.[30] On the other hand, thinking of meditation as the enactment of situated mind–body states and behaviors requires us to distinguish clearly between the causally enabling conditions for mindfulness, which include neural systems but are not limited to them, and the cognitive processes that constitute mindfulness as a meaningful form of human experience and that cannot be fully understood unless described phenomenologically. This is one way in which thinking through the enactive approach returns us to the phenomenology of lived experience as a necessary complement to scientific investigation.

Since the publication of this book, the enactive approach has usually been understood as a particular version of the embodied cognition paradigm in cognitive science.[31] According to this paradigm, the body plays a constitutive role in cognition, that is, cognition depends directly on the body as a functional whole and not just the brain. The enactive approach adds a number of specific ideas about the body and cognition; many researchers have extensively developed these ideas in the past two decades.[32] First, what is meant by "body," for the enactive approach, is not the body as a functional system defined in terms of inputs and outputs—as it is for functionalist cognitive science—but rather the body as an adaptively autonomous and sense-making system. An adaptively autonomous system is one that generates and maintains itself through constant structural and functional change (like a living cell), and in so doing brings forth or enacts relevance. In being a self-individuating system, it is also a sense-making one, and in being a sense-making system, it is also a self-individuating one. Cognition and world are interdependently originated via the living body. Second, the nervous system is accordingly understood as an adaptively autonomous dynamical system: it actively generates and maintains its own coherent and meaningful patterns of activity, according to its operation as a self-organizing network of interacting neurons. The nervous system does not process preexistent information in the traditional computationalist sense; it creates information in concert with the rest of the body and the environment. Third, cognition as sense-making is the exercise of skillful know-how in situated and embodied action. Cognitive structures and processes emerge from and constitutively depend on recurrent sensorimotor patterns of perception and action. At the same time, the sensorimotor coupling between the organism and its environment does not determine the ongoing, self-organizing brain activity; it modulates it while that brain

reality" of meditation, let alone a determination of the value of meditative practice as a way of life. Moreover, without Madhyamaka philosophy and the reflexive application of the enactive approach to science itself, we will miss the radical transformative possibilities of the science–Buddhism circulation, and specifically the prospect of a different way of being in the world and doing science beyond our habitual cognitive reifications. In other words, we will miss the guiding vision of this book.

This vision—to undo or at least reduce our self-centered ways of being, especially as they shape and are shaped by science and technology—is decidedly normative and so makes this book different from many other scientific and philosophical works on embodied cognition. Many readers may take this vision to be a specifically Buddhist one. When I reread the book today, I cannot deny that much of its content and tone justifies such a reading. Nevertheless, promoting a "Buddhist cognitive science" or writing a work of Buddhist modernism has never been my intention. Indeed, the parts of the book that I like the least are the ones where we veer into that mode of discourse. Rather, my intention has always been to foster a new kind of wisdom, one rooted in a mature cognitive science that is deeply informed by experiential practices of ethical human transformation. Buddhism is an important source for this effort, but my aim is not to advocate for this tradition per se but rather to draw from its rich philosophy and practice in order to create a contemplative and cross-cultural cognitive science that does justice to our full developmental capacities for awakening. My hope is that this vision can inspire a new generation of readers who take up this book.

Notes

1. Bateson, *Mind and Nature*.

2. Varela and Singer, Neuronal dynamics in the visual corticothalamic pathway revealed through binocular rivalry.

3. Thompson, Planetary thinking/planetary building.

4. My dissertation on color vision was eventually published as the book *Colour Vision: A Study in Cognitive Science and the Philosophy of Perception*.

5. See Shapiro, *Embodied Cognition*.

6. See Buszaki, *Rhythms of the Brain*.

7. Maturana and Varela, *Autopoiesis and Cognition*, and *Tree of Knowledge*.

8. Friston, Free-energy principle.

9. See, for example, Dehaene, *Consciousness and the Brain*.

10. See Gallagher, and Zahavi, *Phenomenological Mind*.

11. For clinical perspectives on mindfulness, see Brown, Creswell, and Ryan, eds., *Handbook of Mindfulness*. For cognitive science perspectives, see Lutz et al., Investigating the phenomenological matrix of mindfulness-related practices from a neurocognitive perspective.

12. See Garfield, *Engaging Buddhism*.

13. Nishitani, *Religion and Nothingness*.

14. The idea of the "fusion of horizons" in interpretation comes from Gadamer, *Truth and Method*.

15. Thompson, *Mind in Life*.

16. See Gallagher, and Zahavi, *Phenomenological Mind*.

17. See especially Zahavi, *Subjectivity and Selfhood* and *Self and Other*.

18. See Hasenkamp and Thompson, eds., Examining Subjective Experience.

19. For naturalizing phenomenology, see Petitot et al., eds., *Naturalizing Phenomenology*. For neurophenomenology, see Varela, Neurophenomenology, and Specious present; and Lutz et al., Guiding the study of brain dynamics by using first-person data. For a more recent presentation, see Fazelpour and Thompson Kantian brain.

20. Thompson, *Waking, Dreaming, Being*.

21. For recent introductions to Indian Buddhist philosophy, see Carpenter, *Indian Buddhist Philosophy*, and Siderits, *Buddhism as Philosophy*.

22. See McMahan, *Making of Buddhist Modernism*, and Sharf, Buddhist modernism and the rhetoric of meditative experience.

23. See Sharf, Buddhism modernism and the rhetoric of meditative experience, and Braun, *The Birth of Insight*.

24. For a recent and important work of cross-cultural philosophy in which the technical precision of the Indian philosophical tradition is on display, see Ganeri, *Self*. For the Buddhist tradition specifically, see Garfield, *Enaging Buddhism*.

25. Dreyfus, Review of *Embodied Mind*.

26. I also discussed Dreyfus's criticisms in Thompson, Mindful body.

27. See Merleau-Ponty, *Phenomenology of Perception*, 52–65.

28. For more recent statements of this idea, see Thompson, *Mind in Life*, and Di Paolo and Thompson, Enactive approach. See also Stewart, Gapenne, and Di Paolo, *Enaction*.

29. Barsalou, Grounded cognition.

30. See Garfield, Mindfulness and ethics.

31. See Wilson and Foglia, Embodied cognition, and Shapiro, *Embodied Cognition*.

32. For further discussion, see Thompson, *Mind in Life*, and Di Paolo and Thompson, Enactive approach.

33. Husserl, *Crisis of European Sciences and Transcendental Phenomenology*.

34. See Bitbol, Is consciousness primary?

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called *enaction* that we argued would provide the ground for a science both embodied and experientially relevant.

Now, twenty-five years later, much has changed in the cultural and intellectual environment in which ordinary people live and in which research on body and mind is performed, changes that make *The Embodied Mind* even more relevant and probably more accessible than when first published:

1) This is the era of body, particularly of the brain. New techniques such as functional magnetic resonance imaging (fMRI) and an enhanced electroencephalogram (EEG) have made it possible to observe changes in blood flow and electrical activity in the brain in real time, thus providing a window into the relation between thoughts, emotions, and brain activity. Increasingly the prevailing assumption in psychology, cognitive science, and many other fields is that the mind (and hence experience) is just the brain and that the gold standard for studying anything human is to observe changes in the brain. Note our new vocabulary: not only is there neuroscience but also neuro-economics, neuro-ethics … even neuro-theology. But *body* is not necessarily the same as *embodied*; what is that body that is under scrutiny?
2) This is also the era of personal technology. Hence it is not surprising that the brain (and thus the mind with its experiences) is increasingly assumed to work like a computer, that is, for all its subtlety to be a machine that should be studied accordingly. A personal side of this technological change may be the overriding of much self-awareness. Where once there were spaces in the day between events to digest information, reflect on occurrences, notice one's reactions, and be with one's thoughts and emotions, now there is only time to whip out the cell phone.

These first two trends have to do with the objectification of science and the externalization of our lives; they provide the background from which the quest of this book and our concept of enaction stand out as contrast. The next three, more local in scope but potentially of great generative importance, are efforts toward reclaiming the mind.

3) Interest in phenomenology is growing, particularly in Europe and Latin America. In strict usage, phenomenology refers to work stemming from the school of philosophy originated by Edmund Husserl,

Martin Heidegger, and Maurice Merleau-Ponty, but it is now also applied to research that looks into experience through a variety of other methods. While phenomenology is the province of my coauthor Evan Thompson, I wish to make just one point about it here. We began *The Embodied Mind* with a single phenomenological insight that can turn objectivist science (and one's world view) on its head if one allows it to. Everything perceived, believed, theorized, researched, and known is done so by an observer. The brain is seen, dissected, experimented on, believed to be the cause of mental events ... by the minds of scientists—and likewise for the other sciences. (This is what those circular diagrams in the first chapter are trying to convey.) From that point of view, the brain is inside the mind rather than vice versa. And it is from that point of view that phenomenology throws down the gauntlet and challenges cognitive science, thus initiating, though by no means closing, our conversation.

4) "Mindfulness" training derived from Buddhist practices has been shown to have both physically and mentally therapeutic effects, and use of it is spreading exponentially. There is a corresponding outpouring of research on mindfulness not only to confirm its clinical effectiveness but, as we might expect, to relate it to the brain and to develop methods to define it, measure it, and to understand it within the framework of our already existing mechanistic science. Such work has been anointed with names like *contemplative clinical science* and *contemplative neuroscience*, and one can only hope that this will be a case of "If you build it [here "if you name it"] they will come." One positive result is that Buddhism and the large family of concepts being called "mindfulness" are no longer treated as visits from an extraterrestrial as they were twenty-five years ago; both are now—however poorly understood—on the cultural and scientific radar. On the other hand, much that Buddhism and contemplative practices in other traditions could contribute to science, not to mention human life (some might say the heart of what they have to contribute), is being overlooked or downright banished in the name of science.

5) The theory of enaction has itself developed. It has been refined and more clearly described (Evan Thompson has been the leader in this),[1] and there have been advances in knowledge of the phenomenological background of the theory. Of most interest to cognitive

scientists, enaction is gaining traction as a philosophical paradigm and has staked claims to be a scientific program under which research can be performed.[2]

In the rest of this essay I will: 1) summarize the clarified version of enaction—twenty years of emails from confused readers of chapter 8 have shown how needed this is; 2) show how understanding enaction in full requires input from Buddhism, including its later forms; 3) appraise the new concept of Buddhist modernism being used in academia to delegitimize serious study of living Buddhism; 4) critique the research on mindfulness that is in vogue and suggest alternatives; 5) discuss the enaction–science interface; and 6) open questions about future contemplative neuroscience and the future of enaction.

Enaction Clarified

Phase 1 Enaction

Enaction can be understood in two stages. The core idea of enaction is that the living body is a self-organizing system. This is in contrast to viewing it as a machine that happens to be made of meat rather than silicon. Mechanisms act and change their state only because of input and programming from sources outside of themselves, whereas the living body continuously reorganizes itself to survive and maintain its own homeostasis. (Notice how this alone is a radical departure from the dominant view of the body in present research.) Survival means that the organism must preserve the integrity of its boundaries while having constant interchange with the environment. Even the simplest one-celled organism exchanges materials through the semipermeable membrane of its cell walls and performs overt actions relevant to its self-maintenance, such as swimming toward a detectable food source or away from insupportable temperatures. Actions of the organism are thus purposive and have been said by enactivists to be the embryonic forms of cognition, of mind, and even of values.

The *environment* of a given living body of whatever degree of complexity can only be what is knowable and known to its sense organs and cognitions, and that environment is in turn constantly changed by the organism's actions on it—in the terms we use in the book, neither side is pregiven. The lived body, lived mind, and lived environment are all thus part of the same process, the process by which one enacts one's world (in

phenomenology speak, "brings forth a world"). Humans, of course, can enact self, boundaries, survival, environment, exchange, desire, and aversion into symbolic castles of great subtlety, but that does not change the basic processes.

This is a phase 1 account of enaction. It seems self-contained as it is; what need is there for Buddhism? In fact a description of sentient beings almost identical to the above portrayal of enaction is provided in the teaching of the five *skandhas* (heaps) of early Buddhism. We present the skandhas in chapter 4 as an example of the Buddhist deconstruction of the self, but they can also be seen as a logical and temporal account of how the false sense of self is constructed. It begins with a living body with its dualistic senses; develops through that living being's perception of the world through the filter of what is felt to be good, bad, or indifferent for the subject pole of the dualism; develops yet further into habits based on actions to get the good, shun the bad, and ignore the indifferent; and ends with birth into a moment of consciousness already situated in a complete inner and outer "world" stemming from whichever of the basic impulses (desire, aversion, or indifference) of the subject toward its objects predominates.[3] But there is one major difference between the phase 1 enactive and the Buddhist accounts: in Buddhism, this is the beginning of the story, not the end.

Phase 2 Enaction

From the Buddhist point of view, both phase 1 enaction and the skandhas are portraits of the confused and ignorant body, mind, and world that is called *samsara*, that is, the wheel of life through which sentient beings cycle in ignorance and suffering (see chapters 4 and 6). The good news is that there is an alternative. There is another mode of knowing not based on an observer and observed. This ushers in phase 2 of enaction, what in the book we call *groundlessness* (chapter 10).

At this point we have gone beyond phenomenology. Yes, this is a controversial claim given Heidegger's account of Being-in-the-World (*in-der-Welt-sein*) where there is no split between subject, object, consciousness, and world,[4] followed by Merleau-Ponty's psychology that extends this foundational idea.[5] Added to these are the new interpretations of Husserl based partly on material of his not available when our book was originally written.[6] But there is a difference between such ideas as philosophy or sci-

entific theory and what results from the actuality of a mind in the nondual awareness that can be brought about (*uncovered* is probably a better term) by Buddhist meditations, contemplations, transmissions, and other practices.

Here is the difference. In foundational European phenomenology (for convenience I will use Heidegger's terminology), the central image of a mind that does not make distinctions between subject and object, that is, of a mind in the pre-reflective natural state, is of a person actively engaged in the world, a person with interests, cares, concerns, and goals who is vigorously pursuing those goals using whatever comes before him as a tool. It is when there is some breakdown in that state (something doesn't work) that the person will draw back, assume the abstract attitude, reflect on experience, and give birth to those distinctions. From the Buddhist point of view, this is a romanticization of samsara. What that actively engaged person is engaged in is vigorously trying to grasp and cling to what he wants, flee from or attack what he does not want, and ignore what he feels is irrelevant to himself—all while using objects, other people, and the environment only as instruments to foster his desires. The opposition between self and other is not a matter of abstract reflection but is built into the engagements of a consciousness birthed via the skandhas or, in our terminology, *enacted* without awareness of its nature. When the unaware person is actively, even skillfully or harmoniously, engaged in his life, he is generally in a state of absorption, his mind cushioned by a cloud of fragmented perceptions, attentions, intentions, fantasies, thoughts, efforts, feelings, and memories that give him the sense of who he is and what he is about, but do not make him fully present (in Buddhist terms he is in "the ghostly confusion of phenomenal existence"). And when that person attempts to stop and look at his experience, the shadow of an ever present but slippery separate observer already present in the cloud comes to the fore, another kind of fragmented duality that makes it difficult to look. There is no first person here and only a ghostly sense of any second or third person.

What Buddhist practices have to contribute to this conundrum is that there is a different mode of knowing altogether in which the mind is neither absorbed nor separated but simply present and available. There is no longer that observer claimed in the first chapter here; experience is simple and self-known. This is the mind that can actually know firsthand the

and Sarvodaya Shramadana). Evan Thompson describes this kind of cycling back and forth in enactive language in his introduction; in Buddhism it is known as path.

The second main objection to our use of Buddhism as a window into personal experience is a variant of the general argument that experience cannot be used as a basis for research either in science or religious studies (in psychology, for example, this is the view that gave rise to behaviorism). The particular form of this view leveled at us is the phenomenological objection that by looking at experience closely or in any other particular way, one is thereby changing the experience[10] (an argument that would apply equally, of course, to phenomenological investigation). For Buddhism this critique is a confusion of path with results and a misunderstanding of the nature and purpose of path meditation.

From the nondual perspective there is no you looking inwardly at a separate experience, but from the beginner's dualistic viewpoint there appears to be; thus meditation instructions make use of the marvelous human capacity to move one's attention in order to direct that attention in ways that will reveal aspects of experience hitherto unnoticed or unacknowledged. For example, a practitioner may be told to attend to her breath as it goes in and out. Shortly she sees that this is difficult; her mind leaps around and she cannot control or even find the looker. Here you find the seeds of later recognition of impermanence (the movement) and egolessness (no separated looker to look). Such discoveries are not about particular contents of experience but of parameters of its nature, and they are the necessary forerunners for even a glimpse of the nonduality of the Madhyamaka as direct experience rather than only as philosophical theory.

Science and Buddhism

Because Buddhist practices involve working with experience, one would expect the science–Buddhism interchange to be a poster child for what we have asked for in a dialogue between experience and science. Instead it may presently be a cautionary tale.

Mindfulness

In the years since we wrote our book, the word *mindfulness* has achieved rock star status and attracted an exponentially expanding amount of

research. Various trends have fed into this. In 1979 Jon Kabat-Zinn at the University of Massachusetts Medical Center put together a pioneering program consisting of two Theravada mindfulness meditations, hatha yoga, and a number of exercises allied to Western clinical techniques. He called the program Mindfulness Based Stress Reduction (MBSR)[11] and it proved remarkably successful at helping chronic pain patients who had hitherto been finding no relief from standard medical techniques. Since then the use of mindfulness in therapies, many modeled on MBSR, has burgeoned, with corresponding research showing its benefits for a large variety of physical and psychological ills as well as benefits for people without clinical diagnoses.[12] A further encouragement for research has come through support from His Holiness the Dalai Lama who holds conferences in which he dialogues with Western scientists and supports research in other ways through his Mind and Life Institute.

There are endemic problems with research on mindfulness. My coauthor has provided a critique of this work through the perspective of enaction; here I want to indicate briefly some of its weaknesses as ordinary science. It is basic scientific logic that if you want to study the effect of something (the independent variable) on a resultant mental or physical state (the dependent variable), you have to know what the independent variable is and have evidence that it is actually present in your subjects. You must also be able to define and measure the appropriate outcome variables(s). However, defining and measuring mindfulness, as either kind of variable, is problematic. Even in early Buddhism there were debates over just what kinds of attention constituted mindfulness (Pali: *sati*, Sanskrit: *smrti*) and about what other virtues were or were not to be included in it.[13] The situation today is even more intricate since some teachers in all the forms of Buddhism have begun to use the word *mindfulness* to refer to everything from the most beginning practice to their version of presence with a fully enlightened mind. Therapists contribute their own mindfulness descriptions, as do popular authors in a variety of genres. Researchers usually settle on a single verbal definition, perhaps from another researcher, without considering what it might imply or questioning whether their subjects are in fact doing that.

Here are some of the problems with the resultant research:[14] 1) The major mindfulness measurement scales basically measure Western mental health variables with little reference to any of its prior meanings. Not only does

this elide what might be new and interesting about mindfulness, but methodologically the operational definition of mindfulness becomes the same thing as the desired outcome of being mindful—a circular process. 2) A widely used de facto definition of mindfulness is that subjects have taken MBSR, but the genius of that multifaceted program is that people can benefit from it in many different ways,[15] and so benefits may well not correspond to the researcher's definition of mindfulness. 3) If a would-be mindfulness instruction is given, and subjects show a brain response, it is assumed that this is the brain signature of mindfulness—but as every meditator knows, instruction is not equivalent to performance, and as every neuroscientist is coming to know, anything that one does affects the brain. 4) Mindfulness is often treated as a mechanism, a pill that should work in the same way regardless of context, but, as we have seen (and as is basic in enaction), context is important in how people interpret and proceed with what they are doing—even for pills.

Perhaps the final indignity is that when researchers come to explain mindfulness, they inevitably assimilate it to an already established and well-domesticated theory in clinical or, increasingly, brain science. This assumes that our scientific knowledge is already complete with nothing new to learn. Is it?

Beyond Mindfulness: Basic Knowledge Questions

Are the mind and its experiences only the brain? Is the mind limited to the body? Mainstream neuroscience assumes the affirmative to both questions, but the only evidence for that position is that changes in the brain can affect experience and behavior, and vice versa. To take such two-way interactions as a brain monism depends on a scientific materialist metaphysics, not on science itself. It also depends on the assumption that we now know everything basic that there is to know about matter and living bodies. And finally it assumes that there is no faculty of knowing beyond the dualistic mind of samsara and phase 1 enaction.

Evidence contrary to these assumptions has been slowly accumulating for the past century. Best known by Westerners are the alternative physiologies offered by the yogic (and Asian medical) views of the body in which the body is regarded as a pattern of energy. The energy channels described in these systems do not correspond to the nervous system of Western physiology but can nonetheless be manipulated by techniques such as

acupuncture to produce both experiences and health benefits. In Tibetan Buddhism, inner subtle-body visualizations and guidance are a part of advanced practices, at least one of which, the inner heat practice of *tummo*, has readily observable physical effects; for example, practitioners can raise their body temperature enough to sit in freezing temperatures and to dry wet sheets wrapped around them.[16] Less dramatic, but perhaps more to the point, is that movements of energy in the subtle body are understood in Hindu, Buddhist, and Daoist yogas to be the origin of mental effects, such as wildness versus stability of mind. In fact both later Buddhism and Daoism offer inner-energy paths that can transform both the actual embodiment of the practitioner and, if comprehended, could potentially transform the understanding of embodiment of the scientific community as a whole. Interestingly, hatha yoga and/or qi gong exercises form an integral, though in research generally ignored, part of MBSR and thus may play a correspondingly important role in its health benefits. In short, what we have here is an organized and detailed alternative map of a body-mind, consonant with enaction, that cries out for serious scientific investigation.[17]

Even more scientifically challenging is evidence that there could be aspects of mind that are separable from the brain and perhaps even the body. Tibetan lamas give mind-to-mind transmission of various kinds of wisdom states. Unlike the design of multitudes of failed extra sensory perception experiments in the West, such transmissions are not of mental contents but of what are considered deeper aspects of mind. Although the transmissions are not conveyed by ordinary sensory or intellectual means, they can be experienced—as is attested by many Western students of Tibetan teachers. Less exotic phenomena such as experimenter bias or placebo effects may or may not be in the same category as this.

Evidence for separation of the deep mind from the brain occurs in even more paradigm-challenging circumstances. At death Tibetan high lamas enter into what is called the *death samadhi*. The lama is medically dead: no brain activity, no organ activity, but his heart center remains warm, and transmissions of enlightened mind states can emanate from him even more strongly and clearly than in life. This may continue for days, even weeks or longer. The Vajrayana yogic explanation is that the subtlest energies of the nondual mind have withdrawn from the outer body into the central channel, have then united in the heart center, and are now radiating to the world.[18] Typically when the lama's mind, in its most subtle yogic sense, is

judged to have merged with the *dharmakaya* (the fundamental ground of being), and his body is cremated, rainbows appear. I have witnessed all of this twice; it definitely shakes one's scientific preconceptions.

Science and Enaction

The idea of the mind as embodied—now generally called *embodied cognition*—has become an active field of research, often hailed by its adherents as the new paradigm for cognitive science. Such research occurs under a loosely knit consortium of headings that include: embodied cognition, enaction, embedded cognition, extended mind, grounded cognition, situated cognition, nonrepresentational cognition, emergent cognition, and anti-Cartesian cognition. The differences in name, to some extent, map differences in theoretical orientation and research methods. Thus you can see that enaction, in its particulars, has now become one part of a more general scientific movement. Interestingly, *The Embodied Mind* is commonly cited as one origin of this entire movement.

All of this makes sense if one thinks in terms of the sociology of science. New theories should not only be able to generate multiple experimental or observational results that older theories could not, but they are even more likely to gain prominence if they are in direct opposition to those previous theories. In cognitive science and psychology it helps if some of the new results are provocatively, perhaps charmingly, counterintuitive. Embodied cognition meets all of these criteria. It sets itself in clear opposition to what it sees as the prevailing stance in cognitive science and psychology, that is, cognitivism and computational methods that abstract mental performance from the full functioning of the body in its environment (see chapter 3). It is likewise in adamant disagreement with the mind seen as a product of the brain alone. From this quite general basis (perhaps "battle cry" in Wittgenstein's sense), it is relatively easy to generate a torrent of experiments and studies by showing that a particular movement of the body or interaction with the physical or social environment makes a measurable difference in cognition or vice versa, all of which count as confirmation of the basic proposition of embodiment. A final spur to interest in embodiment as a new paradigm is its ability to generate surprise. One example: holding a cup of warm versus cold liquid in one hand changes how experimental subjects evaluate other unrelated stimuli.

Meanwhile observations that do not fit the mind-is-only-brain (or even mind-is-only-body) paradigm are building. In recent years, two books have thoughtfully addressed this issue. Edward Kelly and Emily Kelly[23] provide a compendium of well-documented case studies and experiments indicating that the mind is something in its own right apart from the brain. Some examples are: extreme psychosomatic effects, out-of-body experiences during clinical death while undergoing surgery, feats of Hindu yogis who remained alive and cognizant for long periods with heartbeat and respiration suspended, physiological changes induced by hypnosis, and many others. The death samadhi of Tibetan lamas is the most extreme example. Charles Tart[24] offers a similarly motivated collection. He also ranks categories of such paradigm-challenging phenomena as to how well documented they are.

What would put these presently marginal studies center stage, of course, would be if physics were to discover something measurable about the mind, apart from the brain, that fit within the ever-expanding domain of what is considered material. We now have particles without mass, dark energy, bosons of various types, and, at least theoretically, vibrating strings of energy that constitute the universe—how about massless *mentons* that operate within a mental energy field? Not impossible; we don't know everything.

The Future of Enaction

Enaction occupies a liminal and potentially fertile place in cognitive science. It is a philosophy that is shape shifting into science. As such it may be unique, but it runs some risks. One of the signatures of enactive language, inherited from phenomenology, is its ability to evoke a sense of humanity and deep respect for life. But as it reaches the level of specificity where it is reframed into the impersonal world of dynamic systems analysis, brain mechanisms, and so on, it can easily lose the mind/experience aspect of the lived body and drift toward a body-based reductionist materialism much like brain reductionism. Retaining input from Buddhism or one of the other contemplative traditions could be helpful for anchoring it in its original roots.

Enaction would also do well to continue to expand its analysis of the processes that psychology calls "higher-level cognition." In complex

organisms like humans, how does the principle of self-organization (survival, boundaries, exchange with environments, purposiveness) relate to the multiple and possibly hierarchical systems that make up the body and mind? How does enaction account for and work in relation to symbol systems, language, and all of the vast symbolic extensions of the human definition of self and its boundaries? And what is it that breaks down in pathologies of self-organization and self-maintenance such as autoimmune disease, cancers, and emotive thought patterns so self-destructive that they may even lead to suicide?[25] What might enaction have to say about social systems and their pathologies or about other challenging societal endeavors such as warfare and peace negotiations?

Is there a place in all this, either in the philosophy or science of enaction, for its type 2 counterpart? At present, this would seem to rest on the intelligence and awareness of individual people. For example, there are forms of therapeutic bodywork based on the principle of self-organization and possible reorganization,[26] but beyond the theory, what is so striking about them is that from numerous case studies and patient narratives, one can see the therapist, operating perhaps from a vantage point past the ordinary restricted consciousness of phase 1 enaction, reaching out to connect with the inner intelligence of the client and probing for what will initiate the needed reorganization. The same can probably be said for founders and skilled practitioners of other kinds of therapies. For example, the Bill Moyers documentary on MBSR[27] reveals Kabat-Zinn as an inspired and inspiring teacher who is tangibly conveying more to his patients than any simple automated technique. Perhaps the extreme of this kind of intelligence is the presence felt from some religious teachers whose wisdom seems to go well beyond their doctrine—a specialty of Tibetan lamas whose ability to function and palpably transmit beyond concepts is almost part of their job description. And, of course, in our not-yet-very-enlightened society, it is at the level of the individual that some people will be able to break out of the constraints of dynamically escalating destructive interactive systems (such as domestic quarrels, obedience-to-authority psychology experiments, and group aggression). Something of this type of vision may also be needed for scientists; that is, researchers need to be able to look at their subject matter from a position of understanding beyond where their field already is in order to make creative contributions.

Ending Note

For a real dialogue (or trialogue) to occur, all sides need to speak and be heard equally. That has not happened yet for the topics we explore in *The Embodied Mind*. Where science, as it is done now with its mechanistic and materialist assumptions, meets experience, Buddhism, or anything else, the science simply takes over like a colonial ruler. This is body imperialism, not dialogue. It need not always be that way. There is also a quantity of good-will being generated, and that could become fertile ground for a more responsive future.

We have offered enaction as a form of science that may help bridge the communication gap between experience and science. It will not do this automatically. Ideas such as the lived body and enaction can easily become merely a romanticization of the old paradigm of a corporeal form limited to self-survival and self-aggrandizement; on the other hand, such ideas could be a transition to a new paradigm for what body and mind are altogether. The key to progress is to keep an open mind—and while we are at it, it would not hurt to also have an open heart. Actually that is good advice for doing anything, including reading this book. So bon voyage, and enjoy!

Notes

1. Thompson, *Mind in Life*.
2. Stewart, Grapenne and Di Paolo, *Enaction*.
3. Rosch, Grinch who stole wisdom, and Trungpa, *Myth of Freedom*.
4. Heidegger, *Being and Time*.
5. Merleau-Ponty, *Phenomenology of Perception*, and *Structure of Behavior*.
6. Thompson, *Mind in Life*.
7. Nishida, *Place and Dialectic*; Nishitani, *Religion and Nothingness*.
8. McMahan, *Making of Buddhist Modernism*.
9. Sharf, Buddhist modernism and the rhetoric of meditative experience.
10. Dreyfus, Review of *Embodied Mind*.
11. Kabat-Zinn, *Full Catastrophe Living*.
12. Baer, *Mindfulness Based Treatment Approaches;* Brown, Ryan, and Creswell, Mindfulness; Didonna, *General Handbook of Mindfulness*; Grossman et al.,

Mindfulness-based stress reduction and health benefits; and Ostafin, Robinson, and Meier, *Handbook of Mindfulness and Self-Regulation*.

13. For accounts of the first texts on mindfulness and subsequent debates, see Grossman and Van Dam, Mindfulness by any other name, and the whole issue of *Contemporary Buddhism* 12 (1).

14. Everything in the following paragraphs is treated in detail in Rosch, Emperor's clothes.

15. From interviews in Rosch, Emperor's clothes.

16. Benson, *Beyond the Relaxation Response*, and Cromie, Meditation changes temperatures.

17. There is one related study; it describes and brings neuroscience to bear on movement-based Eastern practices. See Schmalzl, Crane-Godreau, and Payne, Movement-based embodied contemplative practices.

18. Sogyal, *Tibetan Book of Living and Dying;* Rosch, Tibetan Buddhist dream yoga and the limits of Western psychology. At an even deeper level, the mind is understood to be nonmaterial and not measurable—in life as well as death.

19. This should help explain phenomenological terms such as "intentional tissue," "life space," and "phenomenal field."

20. A prime example of this is the multitude of materials available on the website of Ezequiel Di Paolo, https://ezequieldipaolo.wordpress.com, accessed October 5, 2015 through October 26, 2015.

21. Di Paolo and De Jaegher, Interactive brain hypothesis.

22. Davidson and Begley, *Emotional Life of Your Brain*, 196.

23. Kelly and Kelly, *Irreducible Mind*.

24. Tart, *End of Materialism*.

25. One example is Hanne de Jaegher's detailed and movingly sympathetic account of the multiple factors that can compose the experienced world of a person with autism. See De Jaegher, Embodiment and sense-making in autism.

26. Alexander, *Eutony;* Baniel, *Kids Beyond Limits;* Feldenkrais, *Awareness Through Movement*.

27. Moyers, *Healing the Mind Vol. 3*.

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Over the next few years Francisco Varela continued to work privately on developing the dialogue between cognitive science and the Buddhist tradition, only occasionally presenting ideas in public. One particularly helpful discussion took place as a series of talks given in 1985 at Karma Choeling in Vermont.

The overall shape of this book first came into being when Evan Thompson, supported by a research grant from the Stiftung Zur Förderung der Philosophie (Germany), joined Francisco Varela at the Ecole Polytechnique in Paris in the summer of 1986. During this time a tentative first draft of the book was completed. We are grateful to the Stiftung and to Uri Kuchinsky for support during this period.

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