



THE NEUROSCIENCE OF MEDITATION

AN INTRODUCTION TO THE SCIENTIFIC
STUDY OF HOW MEDITATION
IMPACTS THE BRAIN

BY ERIC THOMPSON

The Neuroscience of Meditation

*An Introduction to the Scientific Study of How Meditation
Impacts the Brain*

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INTRODUCTION

Popular science once believed that we were more or less stuck with the conditioned neural wiring with which we were born. In that paradigm, you and I were considered to be hopeless victims of our own neurophysiology, with no practical means of influencing brain function and development. Further progressions in neuroscience, however, confronted scientists with a startling question: could it be possible for human beings to consciously shift their neural functioning, to make small but consistent changes that, over time, catalyzed major transformations in personality, behavior and well being? The answer is an exciting yes!

This book not only explores the general ways in which conscious attention has been empirically observed to transform the brain, but how meditation in particular is now widely accepted within the scientific community to offer a tried and true approach to impacting the human nervous system for greater levels of happiness, resourcefulness and personal effectiveness. You are about to embark on an intense crash course in *contemplative neuroscience*—the scientific study of how spiritual practices like meditation affect the human brain and nervous system.

You will discover exactly what brainwaves are, what science has to say about them, and how they relate to meditation and traditional teachings within the ancient texts of Buddhism and Hinduism. You will see for yourself the scientific evidence which strongly suggests that mental training—that is, *the mind*—can instigate long-term positive changes in neurological functioning. You will understand why and how meditation and higher awareness activate and develop the parts our brain that make us most human. You will realize how meditation can help you develop more empathy and care for your fellow human beings as well as yourself. Finally, we will dig deep into exactly what happens inside the brain during meditation, as well as how certain brain scans reveal the brains of experienced meditators to be significantly different from those of non-meditators.

The information we are about to explore is revolutionary not only because of the short-term effects experienced in deep meditation, but because of the long-term metamorphosis that occurs within the brain when meditation is practiced daily over several years. One such example is offered by meditation researcher Fred Travis, who has shared a PowerPoint presentation in which the EEG (i.e., electroencephalograph) reading of a beginning Transcendental Meditation (TM) practitioner during meditation is compared with that of an experienced TM practitioner.

The two EEG readings look very similar, which Fred believes denotes how quickly TM can facilitate deep meditation. Even more interesting, however, is the comparison of the beginner TM practitioner's EEG during a normal waking state with that of the experienced practitioner: the new meditator's waking EEG looks very much like the waking EEG of a non-meditator, while the long-term meditator's waking EEG very

closely resembles the EEG taken during meditation. In other words, long-term meditation, in this case, seems to have facilitated a *deep-seated integration* of the peaceful and highly efficient brain functioning of meditation into the daily operations of waking consciousness.

Some of the additional cutting-edge studies you will encounter in this book reveal that:

- The temporal states of profound meditation, when evoked consistently on a daily basis over time, can become *permanent traits*.
- Loving kindness and compassion can be cultivated and literally *hardwired* into the brain.
- The emotional set point with which we deeply identify—that is, the ingrained emotional disposition of our personality—*can be shifted over time* toward healthier levels of integration and well being.
- Meditation activates the CEO of the brain.
- Both the quality and habitual focus of our attention directly shape the brain.
- By becoming more profoundly aware of our awareness (i.e., through the development of meta-awareness), we can activate the parts of our brain that contribute to *the highest levels of human achievement and social contribution*.

It is my great pleasure to be your guide on this journey, and I sincerely thank you for being willing to take it. When I first became aware of these discoveries, I felt as though I was rooting downward into a deep reservoir of inspiration and hope that would eventually result in the unfolding of my deepest potential. This experience was especially invigorating because I had suffered two to six months of severe bipolar depression every year for more than twenty years.

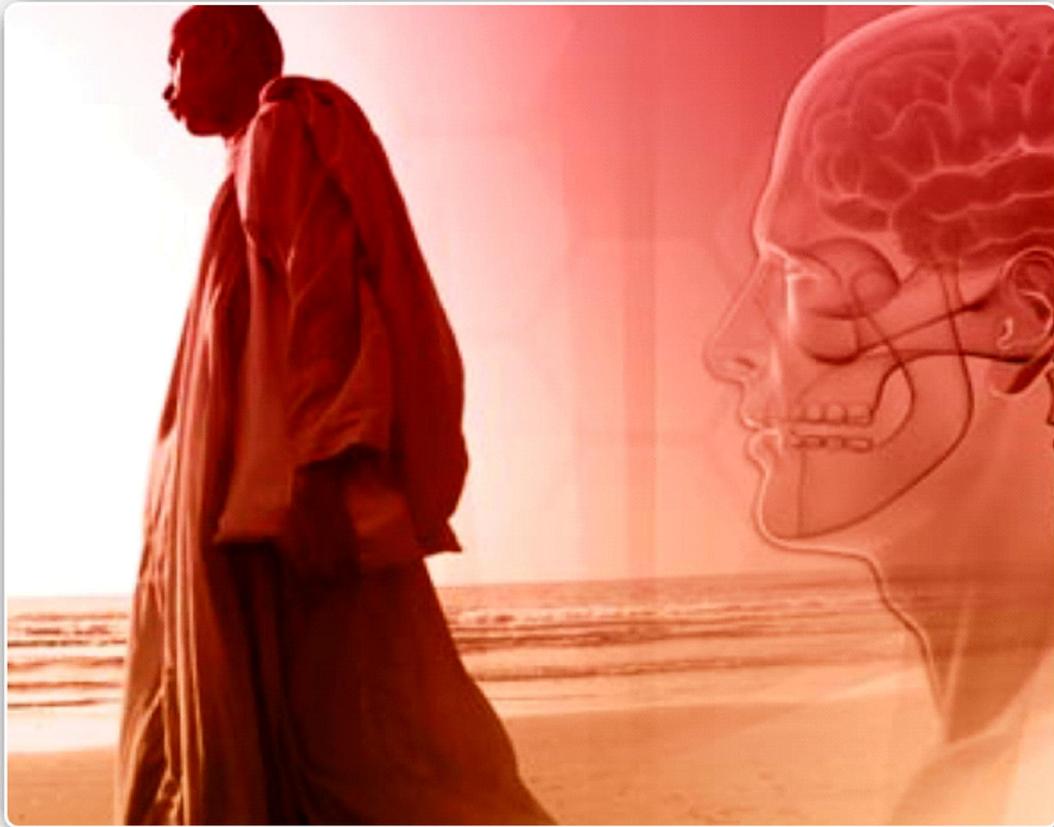
The more I came to the lucid realization that my own consciousness was capable of transforming my brain and nervous system (and therefore my mind and body), the more excited I became about actually developing and maintaining a consistent meditation practice. And to this day, this research still inspires me; and, yes, I very gratefully have a daily meditation practice that continues to soothe and awaken not only my brain's highest potential, but that of my inmost heart as well. It is this same inspiration, hope and renewed engagement with the wonder of life and awakened consciousness that I hope to share with you.

Blessings to you,

Eric Thompson

CHAPTER 1

Contemplative Neuroscience, Neuroplasticity and the Transformative Power of Consciousness



What, exactly, is contemplative neuroscience and what relevance, if any, does it have to the study of brain and behavior? Contemplative neuroscience is primarily the study of how introspective spiritual practices, such as meditation and prayer, affect the brain and nervous system. This emerging science, however, can sometimes take on a second but equally valid definition: The contemplative *philosophical view* of the relationship between the brain and the mind.

Questioning the Conventional Interpretations of Contemplative Neuroscience

So, before we explore the “hard science” of meditation and the brain any further, I’d like to first offer a short introduction to a conceptual foundation for interpreting the data generated by this emerging science in a way that differs significantly from conventional

explanations offered by the behavioral neuroscientific community. In essence, this conceptual framework agrees with a great majority of the world's wisdom traditions, which envision a world of form (which includes the brain) that can be transformed and renewed through the awakening of consciousness; a world in which consciousness plays a primary role in the expression of all life rather than being a mere by-product of the material world.

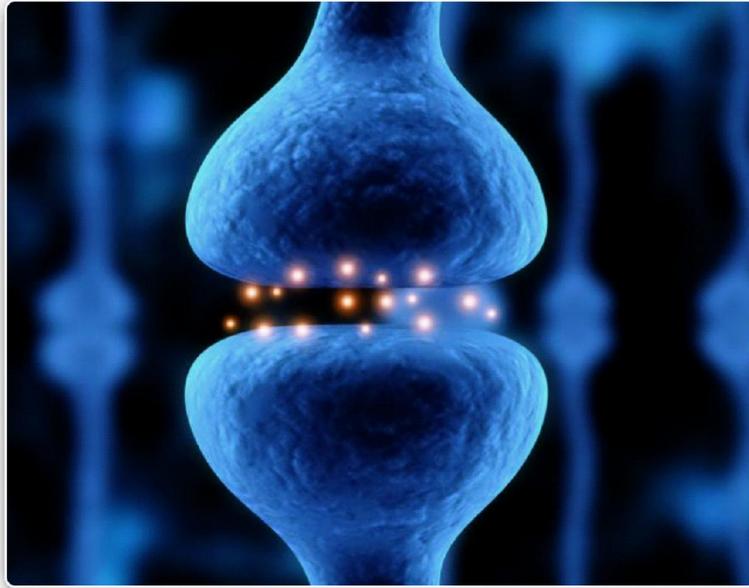
In my experience, by viscerally and experientially apprehending this spiritual view of the neuroscientific data concerning meditation and the brain, a very practical aptitude for leading and evolving our brains can emerge. In the popular view of behavioral neuroscience, however, we often do not have a choice of what brain state and corresponding emotional state we wish to inhabit. In the view of much of the behavioral neuroscientific community, we lack the capacity to lead our brains, and are instead led *by* our brains. However, with the awakening of higher awareness and conscious intention, in my experience, we can open up to a transformational process wherein we become the awakened and compassionate directors of our own brains, and in a manner that fosters more of our innate capacity for human empathy, care, intuition, morality, happiness, peace, wisdom, insight and loving cooperation.

Material Reductionism and the Theft of Transformative Power

Ever since the emergence of behaviorism, the trend to interpret the material world as being primary and the world of conscious awareness as being secondary (and therefore without the capacity for causation) has increased steadily and rapidly. The wisdom traditions, on the other hand, have usually maintained that the intangible world of spirit is primary. The struggle to understand how the mental and material worlds are related has been visited again and again by some of the world's greatest intellectuals and spiritual luminaries, and is commonly referred to in philosophy as the mind-body problem.

As science has progressed over the ages and repeatedly demonstrated the inaccuracy of many of the belief systems long held by the world's wisdom traditions, it has only been natural to assume that the notion of a world consisting of something as intangible as pure consciousness must also be wrong. As such, the behavioral neuroscientific community more often than not reduces not only all mental phenomena but *conscious awareness itself* to neurological functioning, giving virtually all authority to the brain and denying the power of influence to the consciousness that *inhabits* the brain. By adhering so adamantly to such an interpretation, it has been my experience that our inherent capacity to evolve our brains remains malnourished, leaving countless people feeling hopeless and frustrated. This is particularly the case when such individuals either do not have access to proper psychiatric care or do not respond well to the medication typically administered for their conditions.

Neuroplasticity: Your Brain's Capacity to Be Shaped and Molded by Conscious Experience



Over the last 20 years, science has discovered how deeply the human brain is impacted by both human experience and the environment, and not only early in life but throughout the lifespan as well. This new understanding of the brain's capacity to change and develop, often referred to as *neuroplasticity*, offers new inroads to personal development that once seemed impossible. According to Sharon Begley (2007), by making the best possible use of brain plasticity through the intentional training of conscious awareness, "the goal is not merely the absence of mental illness, which seems to be all that psychiatric and psychological therapies strive for these days, but *the enduring presence of robust mental and emotional health*" (p. 221, emphasis mine).

The research on neuroplasticity clearly shows that specific kinds of mental training can influence how our brains operate, strongly implying that our emotional and mental well-being can indeed be cultivated through mental discipline; that is, through the development of awareness and the evolution of consciousness. The evidence seems clear: *Our individual emotional set-points can be shifted toward higher levels of well-being*. Conventional psychiatry, on the other hand, typically approaches treatment by treating the *symptoms* of mental and emotional discomfort through psychopharmacology, without necessarily addressing the deeper, *causal* issues behind such discomfort.

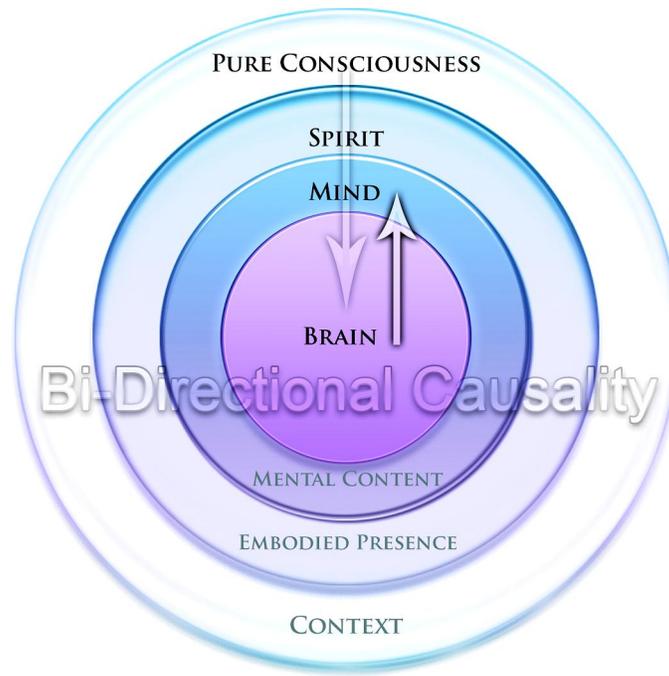
The conventional emphasis, as such, seems to be on the manipulation of neurotransmitters to alleviate symptoms, relegating the people who are suffering from such discomfort to the role of victims of brain chemistry and physiology, sentenced as it

were to rely for the rest of their lives solely upon psychopharmacology for any hope of future relief. Furthermore, such medication often requires *additional* medication to counteract its own distressing side effects.

Before I go any further, please allow me to be very clear: *I'm not against psychopharmacology, psychiatry, or the use of medication.* The development and use of such medication has greatly contributed to the world in which we live, and has positively contributed to my own well being more than once. While the use of psychopharmacology is often necessary in the short-term treatment of symptoms (and in some cases may actually be necessary for long-term treatment), it is by itself quite limited at offering long-term treatment with the potential of *teaching the brain new and healthy neurological habits.* The cultivation of conscious awareness through meditation and mindfulness, on the other hand, *are* capable of such long-term treatment.

How a Spiritual View of Contemplative Neuroscience Can Facilitate the Liberation of Our Highest Potential

The spiritual interpretation of contemplative neuroscience, which I will be sharing throughout this book, agrees with the basic view that biology plays a role in causation. Many of the thoughts and feelings experienced in our daily lives are indeed the result of habitual neural processes. However, the spiritual view of contemplative neuroscience sees causation between the brain and mind as not merely uni-directional but *bi-directional.* As such, this view acknowledges the capacity of conscious awareness to influence and change the brain, particularly when it is *systematically and consistently trained over long periods of time.*



By granting the world of consciousness its own reality, the spiritual view of contemplative neuroscience offers a scientific worldview capable of radically changing what we believe is possible for our lives and the lives of future generations.

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