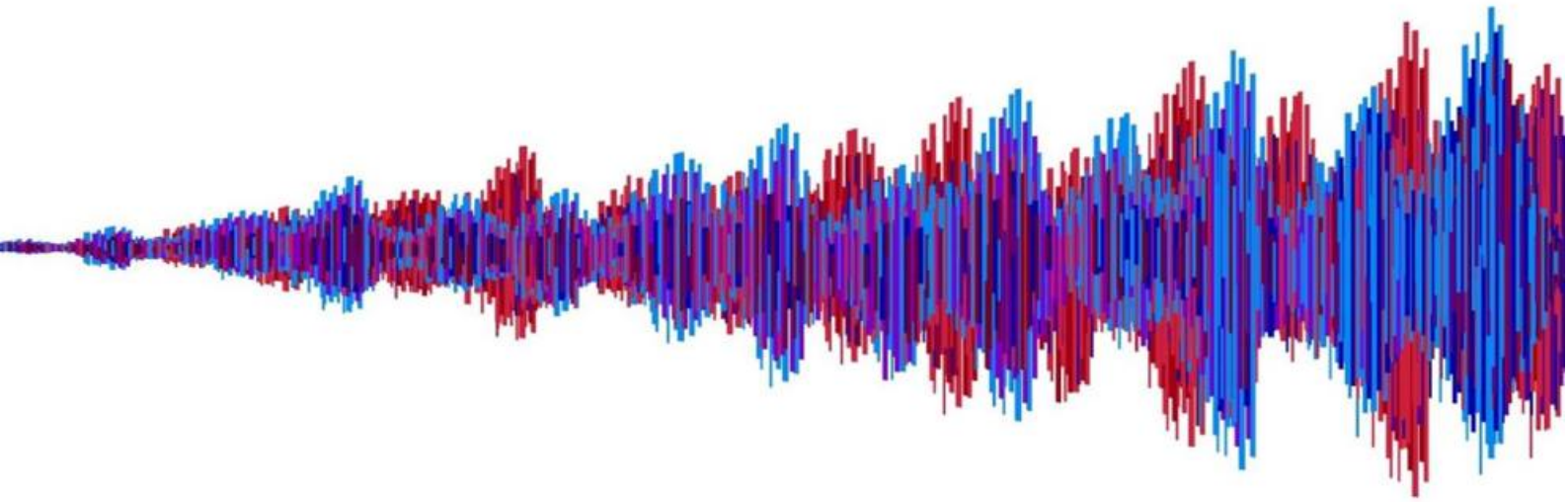
Altered Traits



Science Reveals How Meditation Changes Your Mind, Brain, and Body

NEW YORK TIMES BESTSELLING AUTHORS

Daniel Goleman & Richard J. Davidson

ALTERED TRAITS

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One bright fall morning, Steve Z, a lieutenant colonel working in the Pentagon, heard a "crazy, loud noise," and instantly
was covered in debris as the ceiling caved in, knocking him to the floor, unconscious. It was September 11, 2001, and a passenger jet had smashed into the huge building, very near to Steve's office.

The debris that buried Steve saved his life as the plane's fuselage exploded, a fireball of flames scouring the open office. Despite a concussion, Steve returned to work four days later, laboring through feverish nights, 6:00 p.m. to 6:00 a.m., because those were daytime hours in Afghanistan. Soon after, he volunteered for a year in Iraq.

"I mainly went to Iraq because I couldn't walk around the Mall without being hypervigilant, wary of how people looked at me, totally on guard," Steve recalls. "I couldn't get on an elevator, I felt trapped in my car in traffic."

His symptoms were classic post-traumatic stress disorder. Then came the day he realized he couldn't handle this on his own. Steve ended up with a psychotherapist he still sees. She led him, very gently, to try mindfulness.

Mindfulness, he recalls, "gave me something I could do to help feel more calm, less stressed, not be so reactive." As he practiced more, added loving-kindness to the mix, and went on retreats, his PTSD symptoms gradually became less frequent, less intense. Although his irritability and restlessness still came, he could see them coming.

Tales like Steve's offer encouraging news about meditation. We have been meditators all our adult lives, and, like Steve, know for ourselves that the practice has countless benefits.

But our scientific backgrounds give us pause, too. Not everything chalked up to meditation's magic actually stands up to rigorous tests. And so we have set out to make clear what works and what does not.

Some of what *you know about meditation may be wrong. But what is true about meditation you may not know.*

Take Steve's story. The tale has been repeated in endless variations by countless others who claim to have found relief in meditation methods like mindfulness—not just from PTSD but from virtually the entire range of emotional disorders.

Yet mindfulness, part of an ancient meditation tradition, was not intended to be such a cure; this method was only recently adapted as a balm for our modern forms of angst. The original aim, embraced in some circles to this day, focuses on a deep exploration of the mind toward a profound alteration of our very being.

On the other hand, the pragmatic applications of meditation—like the mindfulness that helped Steve recover from trauma—appeal widely but do not go so deep. Because this wide approach has easy access, multitudes have found a way to include at least a bit of meditation in their day.

There are, then, two paths: the deep and the wide. Those two paths are often confused with each other, though they differ greatly.

We see the deep path embodied at two levels: in a pure form, for example, in the ancient lineages of Theravada Buddhism as practiced in Southeast Asia, or among Tibetan yogis (for whom we'll see some remarkable data in chapter eleven, "A Yogi's Brain"). We'll call this most intensive type of practice Level 1.

At Level 2, these traditions have been removed from being part of a total lifestyle—monk or yogi, for example—and adapted into forms more palatable for the West. At Level 2, meditation comes in forms that leave behind parts of the original Asian source that might not make the cross-cultural journey so easily.

Then there are the wide approaches. At Level 3, a further remove takes these same meditation practices out of their spiritual context and distributes them ever more widely—as is the case with mindfulness-based stress reduction (better known as MBSR), founded by our good friend Jon Kabat-Zinn and taught now in thousands of clinics and medical centers, and far beyond. Or Transcendental Meditation (TM), which offers classic Sanskrit mantras to the modern world in a user-friendly format.

The even more widely accessible forms of meditation at Level 4 are, of necessity, the most watered-down, all the better to render them handy for the largest number of people. The current vogues of mindfulness-at-your-desk, or via minutes-long meditation apps, exemplify this level.

We foresee also a Level 5, one that exists now only in bits and pieces, but which may well increase in number and reach with time. At Level 5, the lessons scientists have learned in studying all the other levels will lead to innovations and adaptations that can be of widest benefit—a potential we explore in the final chapter, "A Healthy Mind."

The deep transformations of Level 1 fascinated us when we originally encountered meditation. Dan studied ancient texts and practiced the methods they describe, particularly during the two years he lived in India and Sri Lanka in his grad school days and just afterward. Richie (as everyone calls him) followed Dan to Asia for a lengthy visit, likewise practicing on retreat there, meeting with meditation scholars—and more recently has scanned the brains of Olympic-level meditators in his lab at the University of Wisconsin.

Our own meditation practice has been mainly at Level 2. But from the start, the wide path, Levels 3 and 4, has also been important to us. Our Asian teachers said if any aspect of meditation could help alleviate suffering, it should be offered to all, not just those on a spiritual search. Our doctoral dissertations applied that advice by studying ways meditation could have cognitive and emotional payoffs.

The story we tell here mirrors our own personal and professional journey. We have been close friends and collaborators on the science of meditation since the 1970s, when we met at Harvard during graduate school, and we have both been practitioners of this inner art over all these years (although we are nowhere near mastery).

While we were both trained as psychologists, we bring complementary skills to telling this story. Dan is a seasoned science journalist who wrote for the *New York Times* for more than a decade. Richie, a neuroscientist, founded and heads the University of Wisconsin's Center for Healthy Minds, in addition to directing the brain imaging laboratory at the Waisman Center there, replete with

its own fMRI, PET scanner, and a battery of cutting-edge data analysis programs, along with hundreds of servers for the heavyduty computing required for this work. His research group numbers more than a hundred experts, who range from physicists, statisticians, and computer scientists to neuroscientists and psychologists, as well as scholars of meditative traditions.

Coauthoring a book can be awkward. We've had some of that, to be sure—but whatever drawbacks coauthorship brought us has been vastly overshadowed by the sheer delight we find in working together. We've been best friends for decades but labored separately over most of our careers. This book has brought us together again, always a joy.

You are holding the book we had always wanted to write but could not. The science and the data we needed to support our ideas have only recently matured. Now that both have reached a critical mass, we are delighted to share this.

Our joy also comes from our sense of a shared, meaningful mission: we aim to shift the conversation with a radical reinterpretation of what the actual benefits of meditation are—and are not—and what the true aim of practice has always been.

THE DEEP PATH

After his return from India in the fall of 1974, Richie was in a seminar on psychopathology back at Harvard. Richie, with long hair and attire in keeping with the zeitgeist of Cambridge in those times — including a colorful woven sash that he wore as a belt—was startled when his professor said, "One clue to schizophrenia is the bizarre way a person dresses," giving Richie a meaningful glance.

And when Richie told one of his Harvard professors that he wanted to focus his dissertation on meditation, the blunt response came immediately: that would be a career-ending move.

Dan set out to research the impacts of meditation that uses a mantra. On hearing this, one of his clinical psychology professors asked with suspicion, "How is a mantra any different from my

obsessive patients who can't stop saying 'shit-shit-shit'?"[1] The explanation that the expletives are involuntary in the psychopathology, while the silent mantra repetition is a voluntary and intentional focusing device, did little to placate him.

These reactions were typical of the opposition we faced from our department heads, who were still responding with knee-jerk negativity toward anything to do with consciousness—perhaps a mild form of PTSD after the notorious debacle involving Timothy Leary and Richard Alpert. Leary and Alpert had been very publicly ousted from our department in a brouhaha over letting Harvard undergrads experiment with psychedelics. This was some five years before we arrived, but the echoes lingered.

Despite our academic mentors' seeing our meditation research as a blind alley, our hearts told us this was of compelling import. We had a big idea: beyond the pleasant states meditation can produce, the real payoffs are the lasting *traits* that can result.

An altered trait—a new characteristic that arises from a meditation practice—endures apart from meditation itself. Altered traits shape how we behave in our daily lives, not just during or immediately after we meditate.

The concept of altered traits has been a lifelong pursuit, each of us playing synergistic roles in the unfolding of this story. There were Dan's years in India as an early participant-observer in the Asian roots of these mind-altering methods. And on Dan's return to America he was a not-so-successful transmitter to contemporary psychology of beneficial changes from meditation and the ancient working models for achieving them.

Richie's own experiences with meditation led to decades pursuing the science that supports our theory of altered traits. His research group has now generated the data that lend credence to what could otherwise seem mere fanciful tales. And by leading the creation of a fledgling research field, contemplative neuroscience, he has been grooming a coming generation of scientists whose work builds on and adds to this evidence.

In the wake of the tsunami of excitement over the wide path, the alternate route so often gets missed: that is, the deep path, which has always been the true goal of meditation. As we see it, the most

compelling impacts of meditation are not better health or sharper business performance but, rather, a further reach toward our better nature.

A stream of findings from the deep path markedly boosts science's models of the upper limits of our positive potential. The further reaches of the deep path cultivate enduring qualities like selflessness, equanimity, a loving presence, and impartial compassion—highly positive altered traits.

When we began, this seemed big news for modern psychology—if it would listen. Admittedly, at first the concept of altered traits had scant backing save for the gut feelings we had from meeting highly seasoned practitioners in Asia, the claims of ancient meditation texts, and our own fledgling tries at this inner art. Now, after decades of silence and disregard, the last few years have seen ample findings that bear out our early hunch. Only of late have the scientific data reached critical mass, confirming what our intuition and the texts told us: these deep changes are external signs of strikingly different brain function.

Much of that data comes from Richie's lab, the only scientific center that has gathered findings on dozens of contemplative masters, mainly Tibetan yogis—the largest pool of deep practitioners studied anywhere.

These unlikely research partners have been crucial in building a scientific case for the existence of a way of being that has eluded modern thought, though it was hiding in plain sight as a goal of the world's major spiritual traditions. Now we can share scientific confirmation of these profound alterations of being—a transformation that dramatically ups the limits on psychological science's ideas of human possibility.

The very idea of "awakening"—the goal of the deep path—seems a quaint fairy tale to a modern sensibility. Yet data from Richie's lab, some just being published in journals as this book goes to press, confirm that remarkable, positive alterations in brain and behavior along the lines of those long described for the deep path are not a myth but a reality.

THE WIDE PATH

We have both been longtime board members of the Mind and Life Institute, formed initially to create intensive dialogues between the Dalai Lama and scientists on wide-ranging topics.[2] In 2000 we organized one on "destructive emotions," with several top experts on emotions, including Richie.[3] Midway through that dialogue the Dalai Lama, turning to Richie, made a provocative challenge.

His own tradition, the Dalai Lama observed, had a wide array of time-tested practices for taming destructive emotions. So, he urged, take these methods into the laboratory in forms freed from religious trappings, test them rigorously, and if they can help people lessen their destructive emotions, then spread them widely to all who might benefit.

That fired us up. Over dinner that night—and several nights following—we began to plot the general course of the research we report in this book.

The Dalai Lama's challenge led Richie to refocus the formidable power of his lab to assess both the deep and the wide paths. And, as founding director of the Center for Healthy Minds, Richie has spurred work on useful, evidence-based applications suitable for schools, clinics, businesses, even for cops—for anyone, anywhere, ranging from a kindness program for preschoolers to treatments for veterans with PTSD.

The Dalai Lama's urging catalyzed studies that support the wide path in scientific terms, a vernacular welcomed around the globe. Meanwhile the wide way has gone viral, becoming the stuff of blogs, tweets, and snappy apps. For instance, as we write this, a wave of enthusiasm surrounds mindfulness, and hundreds of thousands—maybe millions—now practice the method.

But viewing mindfulness (or any variety of meditation) through a scientific lens starts with questions like: When does it work, and when does it not? Will this method help everyone? Are its benefits any different from, say, exercise? These are among the questions that brought us to write this book.

Meditation is a catch-all word for myriad varieties of contemplative practice, just as *sports* refers to a wide range of

athletic activities. For both sports and meditation, the end results vary depending on what you actually do.

Some practical advice: for those about to start a meditation practice, or who have been grazing among several, keep in mind that as with gaining skill in a given sport, finding a meditation practice that appeals to you and sticking with it will have the greatest benefits. Just find one to try, decide on the amount of time each day you can realistically practice daily—even as short as a few minutes—try it for a month, and see how you feel after those thirty days.

Just as regular workouts give you better physical fitness, most any type of meditation will enhance mental fitness to some degree. As we'll see, the specific benefits from one or another type get stronger the more total hours of practice you put in.

A CAUTIONARY TALE

Swami X, as we'll call him, was at the tip of the wave of meditation teachers from Asia who swarmed to America in the mid-1970s, during our Harvard days. The swami reached out to us saying he was eager to have his yogic prowess studied by scientists at Harvard who could confirm his remarkable abilities.

It was the height of excitement about a then new technology, biofeedback, which fed people instant information about their physiology—blood pressure, for instance—which otherwise was beyond their conscious control. With that new incoming signal, people were able to nudge their body's operations in healthier directions. Swami X claimed he had such control without the need for feedback.

Happy to stumble on a seemingly accomplished subject for research, we were able to finagle the use of a physiology lab at Harvard Medical School's Massachusetts Mental Health Center.[4]

But come the day of testing the swami's prowess, when we asked him to lower his blood pressure, he raised it. When asked to raise it, he lowered it. And when we told him this, the swami berated us for serving him "toxic tea" that supposedly sabotaged his gifts.

Our physiological tracings revealed he could do none of the mental feats he had boasted about. He did, however, manage to put his heart into atrial fibrillation—a high-risk biotalent—with a method he called "dog samadhi," a name that mystifies us to this day.

From time to time the swami disappeared into the men's room to smoke a *bidi* (these cheap cigarettes, a few flakes of tobacco wrapped in a plant leaf, are popular throughout India). A telegram from friends in India soon after revealed that the "swami" was actually the former manager of a shoe factory who had abandoned his wife and two children and come to America to make his fortune.

No doubt Swami X was seeking a marketing edge to attract disciples. In his subsequent appearances he made sure to mention that "scientists at Harvard" had studied his meditative prowess. This was an early harbinger of what has become a bountiful harvest of data refried into sales hype.

With such cautionary incidents in mind, we bring open but skeptical minds—the scientist's mind-set—to the current wave of meditation research. For the most part we view with satisfaction the rise of the mindfulness movement and its rapidly growing reach in schools, business, and our private lives—the wide approach. But we bemoan how the data all too often is distorted or exaggerated when science gets used as a sales hook.

The mix of meditation and monetizing has a sorry track record as a recipe for hucksterism, disappointment, even scandal. All too often, gross misrepresentations, questionable claims, or distortions of scientific studies are used to sell meditation. A business website, for instance, features a blog post called "How Mindfulness Fixes Your Brain, Reduces Stress, and Boosts Performance." Are these claims justified by solid scientific findings? Yes and no—though the "no" too easily gets overlooked.

Among the iffy findings gone viral with enthusiastic claims: that meditation thickens the brain's executive center, the prefrontal cortex, while shrinking the amygdala, the trigger for our freezefight-or-flight response; that meditation shifts our brain's set point for emotions into a more positive range; that meditation slows aging; and that meditation can be used to treat diseases ranging from diabetes to attention deficit hyperactivity disorder.

On closer look, each of the studies on which these claims are based has problems with the methods used; they need more testing and corroboration to make firm claims. Such findings may well stand up to further scrutiny—or maybe not.

The research reporting amygdala shrinkage, for instance, used a method to estimate amygdala volume that may not be very accurate. And one widely cited study describing slower aging used a very complex treatment that included some meditation but was mixed with a special diet and intensive exercise as well; the impact of meditation per se was impossible to decipher.

Still, social media are rife with such claims—and hyperbolic ad copy can be enticing. So we offer a clear-eyed view based on hard science, sifting out results that are not nearly as compelling as the claims made for them.

Even well-meaning proponents have little guidance in distinguishing between what's sound and what's questionable—or just sheer nonsense. Given the rising tide of enthusiasm, our more sober-minded take comes not a moment too soon.

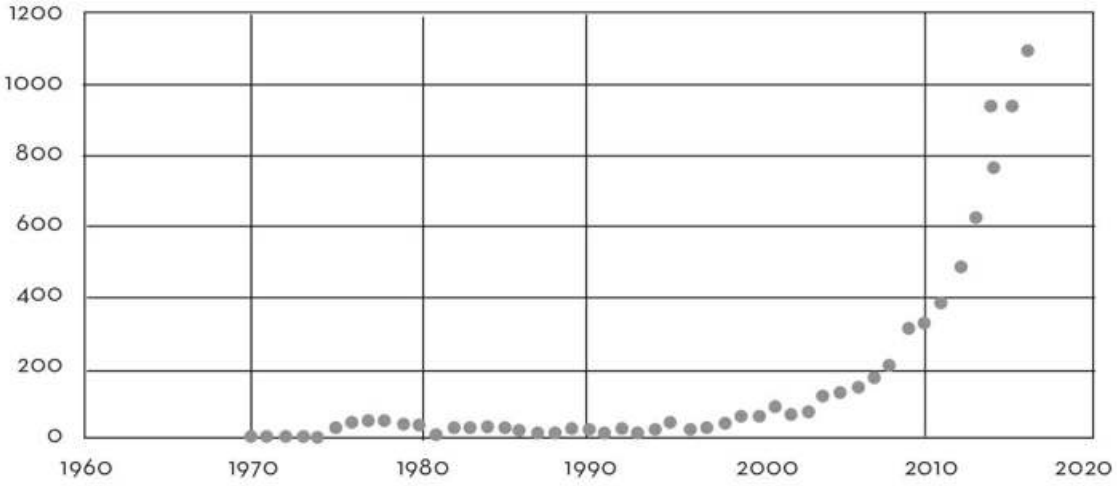
A note to readers. The first three chapters cover our initial forays into meditation, and the scientific hunch that motivated our quest. Chapters four through twelve narrate the scientific journey, with each chapter devoted to a particular topic like attention or compassion; each of these has an "In a Nutshell" summary at the end for those who are more interested in what we found than how we got there. In chapters eleven and twelve we arrive at our longsought destination, sharing the remarkable findings on the most advanced meditators ever studied. In chapter thirteen, "Altering Traits," we lay out the benefits of meditation at three levels: beginner, long-term, and "Olympic." In our final chapter we speculate on what the future might bring, and how these findings might be of greater benefit not just to each of us individually but to society.

THE ACCELERATION

As early as the 1830s, Thoreau and Emerson, along with their fellow American Transcendentalists, flirted with these Eastern inner arts. They were spurred by the first English-language translations of ancient spiritual texts from Asia—but had no instruction in the practices that supported those texts. Almost a century later, Sigmund Freud advised psychoanalysts to adopt an "even-hovering attention" while listening to their clients—but again, offered no method.

The West's more serious engagement took hold mere decades ago, as teachers from the East arrived, and as a generation of Westerners traveled to study meditation in Asia, some returning as teachers. These forays paved the way for the current acceleration of the wide path, along with fresh possibilities for those few who choose to pursue the deep way.

Publication Count for Scientific Studies on Meditation or Mindfulness, 1970–2016



In the 1970s, when we began publishing our research on meditation, there were just a handful of scientific articles on the topic. At last count there numbered 6,838 such articles, with a notable acceleration of late. For 2014 the annual number was 925, in 2015 the total was 1,098, and in 2016 there were 1,113 such publications in the English language scientific literature.[5]

PRIMING THE FIELD

It was April 2001, on the top floor of the Fluno Center on the campus of the University of Wisconsin–Madison, and we were convening with the Dalai Lama for an afternoon of scientific dialogue on meditation research findings. Missing from the room was Francisco Varela, a Chilean-born neuroscientist and head of a cognitive neuroscience laboratory at the French National Center for Scientific Research in Paris. His remarkable career included cofounding the Mind and Life Institute, which had organized this very gathering.

As a serious meditation practitioner, Francisco could see the promise for a full collaboration between seasoned meditators and the scientists studying them. That model became standard practice in Richie's lab, as well as others.

Francisco had been scheduled to participate, but he was fighting liver cancer and a severe downturn meant he could not travel. He was in his bed at home in Paris, close to dying.

This was in the days before Skype and videoconferencing, but Richie's group managed a two-way video hookup between our meeting room and Francisco's bedroom in his Paris apartment. The Dalai Lama addressed him very directly, looking closely into the camera. They both knew that this would be the very last time they would see each other in this lifetime.

The Dalai Lama thanked Francisco for all he had done for science and for the greater good, told him to be strong, and said that they would remain connected forever. Richie and many others in the room had tears streaming down, appreciating the momentous import of the moment. Just days after the meeting, Francisco passed away.

Three years later, in 2004, an event occurred that made real a dream Francisco had often talked about. At the Garrison Institute, an hour up the Hudson River from New York City, one hundred scientists, graduate students, and postdocs had gathered for the first in what has become a yearly series of events, the Summer Research Institute (SRI), a gathering devoted to furthering the rigorous study of meditation.

The meetings are organized by the Mind and Life Institute, itself formed in 1987 by the Dalai Lama, Francisco, and Adam Engle, a

lawyer turned businessman. We were founding board members. The mission of Mind and Life is "to alleviate suffering and promote flourishing by integrating science with contemplative practice."

Mind and Life's summer institute, we felt, could offer a more welcoming reality for those who, like us in our grad school days, wanted to do research on meditation. While we had been isolated pioneers, we wanted to knit together a community of like-minded scholars and scientists who shared this quest. They could be supportive of each other's work at a distance, even if they were alone in their interests at their own institution.

Details of the SRI were hatched over the kitchen table in Richie's home in Madison, in a conversation with Adam Engle. Richie and a handful of scientists and scholars then organized the first summer program and served as faculty for the week, featuring topics like the cognitive neuroscience of attention and mental imagery. As of this writing, thirteen more meetings have followed (with two so far in Europe, and possibly future meetings in Asia and South America).

Beginning with the very first SRI, the Mind and Life Institute began a program of small grants named in honor of Francisco. These few dozen, very modest Varela research awards (up to $25,000, though most research of this kind takes far more in funding) have leveraged more than $60 million in follow-on funding from foundations and US federal granting agencies. And the initiative has borne plentiful fruit: fifty or so graduates of the SRI have published several hundred papers on meditation.

As these young scientists entered academic posts, they swelled the numbers of researchers doing such studies. They have driven in no small part the ever-growing numbers of scientific studies on meditation.

At the same time, more established scientists have shifted their focus toward this area as results showed valuable yield. The findings rolling out of Richie's brain lab at the University of Wisconsin—and labs of other scientists, from the medical schools of Stanford and Emory, Yale and Harvard, and far beyond—routinely make headlines.

Given meditation's booming popularity, we feel a need for a hard-nosed look. The neural and biological benefits best documented by