Daniel Goleman and Richard J. Davidson: Altered Traits: Science Reveals How Meditation Changes Your Mind, Brain, and Body. Avery, New York, NY, 2017, 336 pp [Book review]

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BOOK REVIEW

Daniel Goleman and Richard J. Davidson: *Altered Traits: Science Reveals How Meditation Changes Your Mind, Brain, and Body*. Avery, New York, NY, 2017, 336 pp

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Can meditation bring about enduring changes to our mind, brain, and body? This is the question Daniel Goleman and Richard J. Davidson started asking in the early 1970s, while still graduate students at Harvard University. Since then, Goleman and Davison have been actively engaged in contemplative science, a research field both of them have played prominent roles in defining, establishing, and advancing. Almost 50 years later, their book *Altered Traits* has been published as a compendium of all they have lived and learned throughout the journey. *Altered Traits* is an immersive dive into the science of meditation, covering both its origins and history as well as its most consolidated findings to date. The authors make a dedicated effort to address limitations in the existing literature and to dismiss claims from less rigorous research, thus drawing their conclusions only from the best available studies. As a result, the book offers an entertaining and trustworthy introduction to anyone with an interest in contemplative science, and in what meditation can (and cannot) do for us.

Altered Traits can be divided into four main sections. The first section (Chapters 1 to 4) acts as the historical and conceptual preface to the book. Chapters 1 and 2 narrate the starting point of the friendship between Goleman and Davidson, as well as their initial trips to India to learn and practice meditation. The authors also describe how they started envisioning the "altered traits" hypothesis——their original intuition that meditation could potentially generate long-lasting, trait-like changes in our brain and behavior——when virtually no research had yet been done on the topic. Chapter 3 introduces the concept of neuroplasticity (i.e., the ability of neural networks to grow and reorganize through experience) as a critical mechanism underlying the benefits of meditation practice. Finally, Chapter 4 offers a discussion about the quality of research in contemplative science and informs the reader about the various methodological biases to bear in mind when interpreting findings in this field of study.

In the second section of the book (Chapters 5 to 10), Goleman and Davidson synthesize the scientific evidence available for the salutary effects of meditation practice in a number of key domains. At this point, they focus on research conducted in beginner (up to 100 h of practice) and expert (having 9000 h of practice on average) meditation practitioners. In Chapter 5, the authors address the effectiveness of meditation to bring about "a mind undisturbed"——a mind less vulnerable to stress. They also discuss the neural processes underlying this soothing effect, highlighting prefrontal control of amygdala reactivity as the main mechanism at play. Chapter 6 reviews the literature concerning the practices of loving-kindness and compassion meditation, showing their positive impact in a variety of outcomes including empathic concern and implicit intergroup bias. In Chapter 7, the authors discuss the effectiveness of meditation in enhancing attention. Even though they show that various kinds of meditation have proven highly effective in enhancing a range of attentional functions, the reader is cautioned that continuous practice might be needed in order to maintain many of these gains.

Chapter 8 addresses the self. Particularly, it discusses the extent and means by which both mindfulness and loving-kindness meditation disrupt the process of mind-wandering (which by nature involves self-referential processing of mostly negatively valenced content) and diminish the activity of the main neural system involved, namely, the default mode network. In Chapter 9, Goleman and Davidson assess the literature that links meditation practice to basic biological functioning. Among other examples, they describe research showing that even short doses of mindfulness

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meditation practice can downregulate the production of pro-inflammatory cytokines (which have been linked to a variety of diseases), while both mindfulness and loving-kindness meditation can increase the activity of the enzyme telomerase (known for slowing down cellular aging). On the other hand, the authors warn that current evidence linking meditation practice to structural brain changes remains inconclusive, highlighting the need for more research in this particular vein. Finally, Chapter 10 addresses the value of meditation as a tool in psychotherapy. As the chapter unfolds, evidence is presented for meditation having a positive psychotherapeutic effect on a range of disorders, the strongest being in the treatment of depression and anxiety.

In the third section of the book (Chapters 11 and 12), Goleman and Davidson switch their focus from research conducted in beginners and experts to the study of what they call the "Olympic-level" meditation group. These are Tibetan meditation masters with an average of 27,000 h of practice. Chapter 11 narrates the case study of Mingyur Rinpoche——likely the most seasoned meditation practitioner who has ever entered the lab——describing how his brain activity immediately and dramatically increased up to an impressive 800% when asked to enter a meditative state. Equally fascinating, this research revealed the extent to which the monk's brain appears to resist the effects of aging: at the age of forty-one, it resembled what is typically expected for a 33-year-old. Chapter 12 presents research conducted in other Olympic-level practitioners. Among other findings, the authors describe how the monks' neural activity is characterized by a unique whole-brain pattern of high-amplitude gamma waves (frequency linked to attention and awareness), up to 25 times greater than that found in the control group. Despite this pattern being stronger during meditation, it was also present at rest and even during deep sleep, a feature interpreted as a genuine trait-like change.

In the last section (Chapters 13 and 14), Goleman and Davison summarize the research unpacked throughout the book while reflecting on the future of contemplative science and its potential for societal change. Chapter 13 revisits the main findings for beginner, expert, and Olympic-level practitioners, showing how the consequences of meditation unfold in a dose–response fashion and, eventually, crystalize into trait-like changes. In Chapter 14, the authors look back at their years in graduate school and reflect on all that has been discovered since then, concluding that they were not mistaken in their initial intuition: meditation has the potential to bring about significant, long-lasting effects. They also discuss the future, value, and limitations of the use of new technologies to deliver meditation training to widespread sectors of society. In closing, Goleman and Davidson provide an encouraging reflection on how the systematic training of attention and compassion through contemplative practice can drive not only individual flourishing, but also positive change in our communities and the world at large.

Altered Traits is a brilliant combination of storytelling and popular science writing. The reader will become familiar with the unfolding of the personal and professional pathways of the authors, as well as with the field of contemplative science itself. From convoluted low-budget trips to India, to insightful encounters with itinerant *sadhus*, to scientific expeditions through the Himalayas, the book is packed with entertaining anecdotes and stories. Yet, at the same time, it offers a thorough overview of research in the field, covering findings relevant to all its core scientific areas. Moreover, it is careful to caution the reader about the hype meditation research is often surrounded by, thus stimulating a critical and balanced perspective on the matter. In sum, *Altered Traits* is an engaging, comprehensive, and reliable take on the science of meditation that will be of interest to researchers, practitioners, and the general public alike.