Connectome: How the Brain's Wiring Makes Us Who We Are

Sebastian Seung
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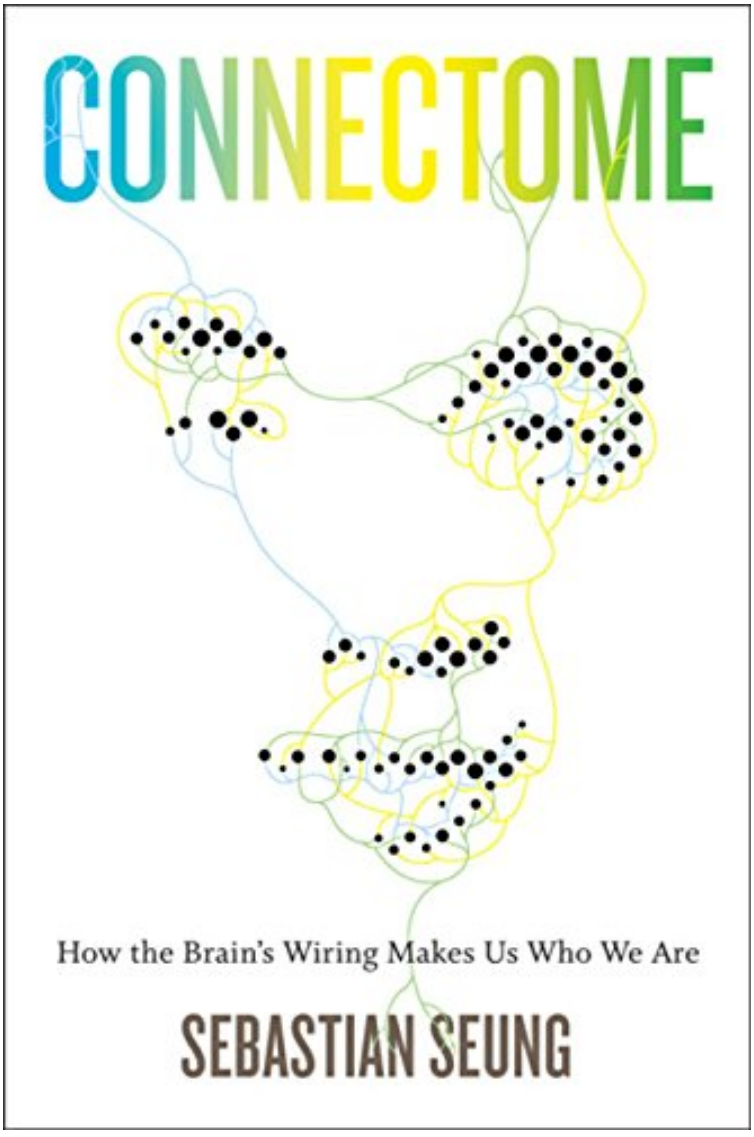

#626044 in Books 2012-02-07 2012-02-07Original language:EnglishPDF # 1 9.25 x 6.25 x 1.00l, 1.25 #File Name: 0547508182384 pages | File size: 55.Mb

Sebastian Seung : Connectome: How the Brain's Wiring Makes Us Who We Are before purchasing it in order to gage whether or not it would be worth my time, and all praised Connectome: How the Brain's Wiring Makes Us Who We Are:

2 of 2 people found the following review helpful. The Fascinating Wires of Our BrainsBy XimuthConnectome: How the brain's Wiring Makes Us Who We Are, is a comprehensive overview of a new field of science called connectomics, its importance, and the possibilities that it holds, by Sebastian Seung (2013), a renowned professor of computational neuroscience at the Massachusetts Institute of Technology; he gave a TED talk in 2010, and has been

featured several times in the popular press. Seung starts by talking about how scientists in the past tried to find quantitative ways of measuring intelligence, the compartmentalization of the brain, and the basic the anatomy of neurons, how they work, and their physiology. He then takes you on a journey through the fascinating jungles of neuroscience, and talks about how our current technological limitations prevent us from studying the connections of the human brain in more detail, and the great potential such studies hold. Connectomics is the study of connectomes, and a connectome is a map of the entirety of the neural connections that make up a brain. He argues that we are the manifestation of our connectomes and not just our genomes, our personalities, memories and Intelligence, are encoded in our connectomes, and that's why we are who we are. Throughout the book, the author maintains an enthusiastic, funny, and sometimes sarcastic style of writing, and he manages to explain complex ideas very clearly.Before Seung starts talking about connectomes, he introduces the readers to basic neuroscience principles to allow them to appreciate the more complex topics covered later in the book. In the book, Seung begins by giving the reader some historical knowledge of neuroscience, and then a general overview of the brain and the basic structure of the nervous system, the neuron, by talking about its anatomy and how electrical signals are transmitted between two connected neurons. He explains synapses, neurotransmitters, and receptors, excitation and inhibition of neurons, to give the reader the necessary background before moving on to more complicated topics, such as, neural networks, the process by which new synapses are formed between neurons, the hierarchical organization of neurons and how such an organization allows us to perceive the world and store memories. In later chapters, the author talks about how our brains are the product of both nature and nurture. However, he emphasizes that our connectomes are greatly influenced by our nurture, and that genes alone cannot explain how our brains became way they are, because genes don't encode our memories, or the skills we learn throughout our lifetimes. He then moves on to talk about the technology needed to efficiently study connectomics, and argues that the study of connectomics will open many new doors for scientists to understand how the brain works, and give us an insight into why people are who they are, and why they are different from each other. He finishes by speculating about what the future might hold, and the plausibility of ideas such as the ability to preserve our brains for future study, or the possibility of living indefinitely as computer simulations.The book tries to promote a very ambitious project, the human connectome project, in which researchers all over the world will collaborate to try and map the entirety of the neurons and their connections in the human brain. This will be done in hopes of getting a better understanding of how our brains work, and if successful it'll open a lot of new doors for future research. Even though this sounds like a great idea, it might be a bit early for it, as we currently don't have the necessary technology to simulate the brain on a computer, nor to efficiently map the whole human brain. Though, this might change in the near future. The book is speculative at times, and makes some interesting and reasonable claims.Even though the book discussed many complicated topics, it was written for a lay audience. So, anyone who's interested in the topic, even someone with little to no knowledge about neuroscience, would be able to read, understand, enjoy, and appreciate all the interesting information presented in this book, while at the same time learning a lot in the process.1 of 1 people found the following review helpful. If Interested in how the mind works, a good book to be read :"Connectome", by Sebastian SeungBy JackAs it happens, I know nothing in this domain , so I wanted to try to understand what is all about.The book is written in such a way as to transmit to people like me, the basic knowledge they are interested in.I'd like to make two special remarks :First ,the subject itself is simply fascinating , and the author manage to write it in such a way, as it remainsfascinating . With the complex system which is the brain, his is,I would say, a notable performance !Also ,I'd like to remark the sincerity of the author , a reputed neuroscientist :Along the book, the (not so many) known facts are clearly separated from the hypotheses and modelsdifficult to confirm experimentally .It becomes clear along the lecture , that the future of the brain understanding resides is supervening on the development of devices giving the scientist intimate access to neurons and , especially ,to the synapses , even to the entire structure of the connectome.A good part of the book is thus dedicated to a review of the methods and technologies used in this field ,from therudimentary beginnings until the extremely sophisticated ,high-tech facilities of today .By themselves, these technologies , fairly well described in the book together with their results,are an astonishing products of the human brain !With all the above in mind, I would recommend this book to anybody interested, at different levels, in "what works in our brain" !Jack Cohen,PhDTel Aviv,Israel2 of 2 people found the following review helpful. Original, Thought-Provoking Perspectives in Beautiful ProseBy Lane YoderConnectome is beautifully written, in an entertaining style unlike anything you'll find in a standard neuroscience tome. I began reading by browsing randomly, and virtually every page turned up something interesting and thought-provoking. Even though I was already familiar with most of the material, the many original and surprising analogies make the points from a new and enlightening perspective. To get an idea of Seung's unique ideas and style, take a moment to see him compare and contrast the neuron, only his second-favorite cell, with sperm, his favorite. (Click on "Look Inside" and click on chapter three, "No Neuron Is an Island," in the Table of Contents.)Shunning the customary attempt at an impartial exposition, Seung passionately promotes the importance of his own niche in neuroscience. How much more appealing and revealing science writing could be if more scientists had the courage to adopt this approach! While writing from a personal perspective, Seung still manages to give a "big picture" overview of the current state of neuroscience, including the human side of it with recent controversies and heated battles among scientists. Another

valuable feature that is also somewhat rare in science writing is Connectome's fairly thorough treatment of what is still unknown and what is conjectured."Page-turner" is not a term commonly applied to science books, but Connectome qualifies. It should be the first choice for anyone who has some curiosity about neuroscience, and even those who think they have no interest could be converted. A third or fourth year neuroscience major would also find much of interest.

We know that each of us is unique, but science has struggled to pinpoint where, precisely, our uniqueness resides. Is it in our genes? The structure of our brains? Our genome may determine our eye color and even aspects of our personality. But our friendships, failures, and passions also shape who we are. The question is: how? Sebastian Seung, a dynamic professor at MIT, is on a quest to discover the biological basis of identity. He believes it lies in the pattern of connections between the brain s neurons, which change slowly over time as we learn and grow. The connectome, as it s called, is where our genetic inheritance intersects with our life experience. It s where nature meets nurture. Seung introduces us to the dedicated researchers who are mapping the brain s connections, neuron by neuron, synapse by synapse. It is a monumental undertaking the scientific equivalent of climbing Mount Everest but if they succeed, it could reveal the basis of personality, intelligence, memory, and perhaps even mental disorders. Many scientists speculate that people with anorexia, autism, and schizophrenia are "wired differently," but nobody knows for sure. The brain s wiring has never been clearly seen. In sparklingly clear prose, Seung reveals the amazing technological advances that will soon help us map connectomes. He also examines the evidence that these maps will someday allow humans to "upload" their minds into computers, achieving a kind of immortality. Connectome is a mind-bending adventure story, told with great passion and authority. It presents a daring scientific and technological vision for at last understanding what makes us who we are. Welcome to the future of neuroscience.

Wall Street Journal's 10 Best Nonfiction Books of 2012 's Top 100 Editor's Picks for 2012 Publishers Weekly Top Ten in Science for Spring 2012The best lay book on brain science Ive ever read. Wall Street Journal by Daniel Levitin, Professor, McGill University; author of This Is Your Brain on Music and The World in Six Songs. This is complicated stuff, and it is a testament to Dr. Seungs remarkable clarity of exposition that the reader is swept along with his enthusiasm, as he moves from the basics of neuroscience out to the farthest regions of the hypothetical, sketching out a spectacularly illustrated giant map of the universe of man. New York Times [A] bracing, mind-expanding report from neurosciences razor edge. Accessible, witty, [e]minently logical and at times poetic, Connectome establishes Seung as an important new researcher, philosopher and popularizer of brain science. It puts him on par with cosmologys Brian Greene and the late Carl Sagan. Cleveland Plain Dealer Seung argues intelligently and powerfully that the self lies in the totality of the brains wiring. Nature by Christof Koch, Professor, California Institute of Technology; Chief Scientific Officer, Allen Institute for Brain Science; author of Quest for Consciousness and Consciousness: Confessions of a Romantic Reductionist With the first-person flavour of James Watsons Double Helixan account of how DNAs structure was discoveredConnectome gives a sense of the excitement on the cutting edge of neuroscience. NewScientist by Terry Sejnowski, Professor and Director, Computational Neurobiology Lab, Salk Institute; Investigator, Howard Hughes Medical Institute; Member, National Academy of Sciences and National Academy of Engineering USA. An elegant primer on whats known about how the brain is organized and how it grows, wires its neurons, perceives its environment, modifies or repairs itself, and stores information. Seung is a clear, lively writer who chooses vivid examples. Washington Post Sebastian Seung scales the heights of neuroscience and casts his brilliant eye around, describing the landscape of its past and boldly envisioning a future when we may understand our own brains and thus ourselves.Kenneth Blum, Executive Director, Center for Brain Science, Harvard University Sebastian Seung can do it all. Hes widely recognized as a superb physicist, a whiz with computers, and a path-breaking neuroscientist. Connectome shows that he's also a terrific writer, as inspiring as he is clear and good humored.Steven Strogatz, Cornell University, author of Sync: the Emerging Science of Spontaneous Order In Connectome, Sebastian Seung reminds us that the human brain has contemplated itself for centuries. This is an important book, full of refreshingly new science and engaging history, about the essential quest to understand ourselves.Phillip A. Sharp, MIT, 1993 Nobel Prize in Physiology or Medicine A landmark work, gorgeously written. No other researcher has traveled as deeply into the brain forest and emerged to share its secrets.David Eagleman, author of Incognito and Sum Connectomics is emerging as a crucial and exhilarating field of study. Sebastian Seung takes you by the hand and shows you why. Connectome is a page turnera book that should be read by anyone who lays claim to be thinking about the nature of life.Michael Gazzaniga, University of California at Santa Barbara and author of Human and The Ethical Brain