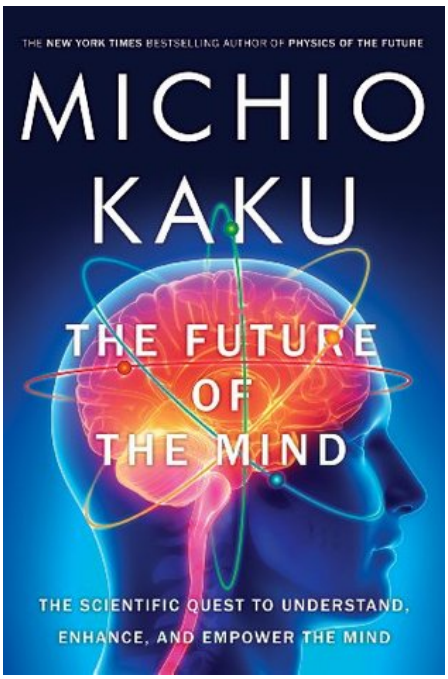

The Future of the Mind: The Scientific Quest to Understand, Enhance, and Empower the Mind

Michio Kaku

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The New York Times best-selling author of *Physics of the Impossible*, *Physics of the Future* and *Hyperspace* tackles the most fascinating and complex object in the known universe: *the human brain*.

For the first time in history, the secrets of the living brain are being revealed by a battery of high tech brain scans devised by physicists. Now what was once solely the province of science fiction has become a startling reality. Recording memories, telepathy, videotaping our dreams, mind control, avatars, and telekinesis are not only possible; they already exist.

The Future of the Mind gives us an authoritative and compelling look at the astonishing research being done in top laboratories around the world—all based on the latest advancements in neuroscience and physics. One day we might have a "smart pill" that can enhance our cognition; be able to upload our brain to a computer, neuron for neuron; send thoughts and emotions around the world on a "brain-net"; control computers and robots with our mind; push the very limits of immortality; and perhaps even send our consciousness across the universe.

Dr. Kaku takes us on a grand tour of what the future might hold, giving us not only a solid sense of how the brain functions but also how these technologies will change our daily lives. He even presents a radically new way to think about "consciousness" and applies it to provide fresh insight into mental illness, artificial intelligence and alien consciousness.

With Dr. Kaku's deep understanding of modern science and keen eye for future developments, *The Future of the Mind* is a scientific tour de force--an extraordinary, mind-boggling exploration of the frontiers of neuroscience.

The Future of the Mind: The Scientific Quest to Understand, Enhance, and Empower the Mind Details

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From Reader Review The Future of the Mind: The Scientific Quest to Understand, Enhance, and Empower the Mind for online ebook

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Grumpus says

Each Michio Kaku book challenges the limits of my understanding by slowly taking me to the edge of what I know and then pushing me over the precipice. His books always seem to start out slowly by getting me comfortable with what I already know. Next, he pulls the rug out and I’m happily trying to figure out which way is up.

The types of things that scientists are working on today make me sad that I probably won’t be around to benefit from them. Some of these “mind” things as well as robotics are going to give humans abilities we only dream of today. However, they will come with a price. Eventually, completely new fields of expertise in bioethics will have to be developed in conjunction with the legal community to handle the gray areas we will soon have the capability to move into.

So much to contemplate, so much wonder, so much awe, so many possibilities. I don’t know whether to be excited for humanity or scared.

Randy says

I haven't finished it yet, but I don't need to finish this one to write the review.

It's a nice summary of the state of knowledge about the human brain... how it works, how technology is being used to learn more about it and how technology is being used to fix it/control it.

The level of technical skill needed to read this book is on a par with any of the popular science shows on the Discovery Channel. That's not a complaint; I like the 30,000 foot view it provides.

But the constant surface treatment is a bit monotonic. I thoroughly enjoy hearing Professor Kaku on any program I find him... but the constant stream of summary level info doesn't satiate me. There is a large percentage of commentary about developments which may follow, or ethical conundrums which may present... and no real in-depth discussion of ethical conundrums which already exist.

It's a broad category, and I really am enjoying the trip. I do wish there were more _Nature_ and less _Scientific American_.

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Update, after completing the book.

I don't withdraw the earlier criticism. It continued to pall, hearing "this may happen" over and over.

There were also a couple of places where his logic baffled me a bit. Perhaps it's the reader's stupidity in this case... The passage on encoding consciousness on a laser beam referred to transmission stations on the moon and planets, and the physics of it just didn't make sense to me.

Anyhow, it was a diverting read. I'm not sorry I picked it up, and would recommend it to any layman interested in the brain. Just don't be swayed by the celebrity of its author into expecting something deep.

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James Williams says

I can't abide futurism. The best science fiction postulates an imaginary future society with imaginary future technologies and explores the present through a fantastical lens. Futurism, on the other hand, postulates that imaginary future because "why not?".

Futurism is little more than making extravagant predictions while hand-waving away the very real technical issues that stand between the present and that predicted future. In my field of computer programming, we often tell stories of "the sufficiently advanced compiler": a theoretically-possible program that be able to understand what we *mean* when we write computer programs and not just what we *say* and will use that understanding to rewrite programs to be faster and more correct than we could ever manage on our own.

It should be needless to say that this sufficiently advanced compiler does not really exist, even though the only thing standing in its way is sufficiently clever engineering. It turns out that sufficiently clever engineering is *really hard*.

Similarly, futurism pretends that all of their fantastical technical advances are just a matter of that same kind of sufficiently clever engineering. "This is theoretically possible, therefore we're guaranteed to figure it out, and I don't need to worry about the how because it's just engineering." is the song of the futurist -- and once they've established that one or two fantastic technologies are inevitable they can pile advancement on top of advancement on it until you end up with future predictions that are barely distinguished from fairy tales.

It is, or (at least) should be, obvious that this book is a work of futurism. It has the word "future" in the title and everything. But, I'd hoped that Dr. Kaku's experiences with actual physics would drive him to ground the work in the reasonable if not the possible.

Unfortunately, Dr. Kaku is extremely excitable. Excitability certainly has its place in science. I like my popular scientists to exude a sense of and wonder, but I'm also pleased when they can barely keep themselves from jumping up and down because science is just so *cool*. Unfortunately, Kaku quickly moves from excitement to breathlessness as moves without pause from wonder to wonder that neuroscience is making possible.

Well, might make possible.

Well, might show is theoretically possible.

One day.

It's an engineering problem. Let's assume it's real and see what happens next.

And so on and so forth.

At one level, it's exhausting. He never slows down to let you marvel at the mysteries of the brain or the Herculean efforts that researchers are making in order to unlock them. At another level, it's extremely frustrating as he completely sacrifices the near-term in favor of looking centuries ahead. By focusing solely on the far-future potential (beaming consciousness around the solar system? Really?), he's giving short-shrift to the work-a-day scientists who are relentlessly plugging away at the enigmas that are in front of them today.

But then again, I suppose: what should I expect from a theoretical physicist?

Dr. Kaku's prowess as a theoretical physicist may also lead into the second most problematic part of this book (aside from my distaste for futurism in general): "I'm not an expert in this, but...".

The most glaring example of this is when Kaku admits that he does't know what he's talking about but decides to try to define "consciousness" anyway. That's the entire second chapter of the book, "Consciousness - A Physicist's Viewpoint". Instead of being embarrassed about trying to define something that the actual experts in the field have struggled with, he instead builds large portions of the book on top of this scaffolding.

Indeed, he seems quite proud of his definition. He gives it a name, "the space-time theory of consciousness" and refers to it by name again and again. I have my doubts about his theory of consciousness.

I don't think it's entirely wrong, but I also don't think it's entirely useful. I was also put off by the way he pokes fun at the homunculus argument (which more-or-less posits that there's a "little person" in the brain driving our bodies) and then almost immediately names an imaginary "CEO" as the consciousness in his definition. I've read the entire book and I can't really tell you the difference between Kaku's CEO and the discredited homunculus.

If all you're going to do is reduce the idea down to an ineffable "CEO", what's the point? And how can you build so much of your book on this topic?

Finally, Dr. Kaku's insistence that so many wonderful things ("reverse-engineering the brain", making full brain copies, beaming our consciousness to the stars on beams of light, controlling robots with our brain as if they were our bodies, etc.) are only a century out (two centuries out at most) seems perfectly analogous to the claims that useful fusion reactors are only fifty years away -- claims that have been made continuously for over fifty years.

A scientist's skepticism should require him to justify these claims with far more than he even attempts.

Ultimately, I found this book extremely unsatisfying. The interesting work being done today would make a

fascinating book, but Kaku races past them to instead dive into limp science fiction which offers neither the technical rigor of the best "hard" sci-fi nor the reflection of our own society offered by "soft" sci-fi.

I can only recommend it as a reminder to not read non-fiction books with the word "future" in the title. They rarely go well.

Ivy says

Interesting intro to neuroscience for the casual reader. If you're looking for depth and analysis, this is not the book for you. I belong to the latter category, and for me, the shallowness makes it an incredibly frustrating read.

Don't get me wrong. I like Michio Kaku. He's a very charismatic speaker. But I just don't like to waste my time on magazine-level introductory knowledge.

Maria says

For so many many centuries, the universe and consciousness have been two of the greatest mysteries for many philosophers and scientists. Interestingly, physicists like Francis Crick and Christof Koch among many others have engaged to this fascinating area of research. In "Future of the Mind" Michio Kaku, a theoretical physicist, also approaches this subject. What is consciousness? Is it possible to be explained by the laws of Physics? and, with such an advance in technology, what can we expect of this topic on the future?

The book is divided in three major parts: Book I (The Mind and the Consciousness), Book II (Mind Over Matter) and Book III (Altered Consciousness) and I will mention a few thoughts on some topics of each book.

Book I
As in many books that approach this complex and fascinating subject of neuroscience, "The future of the mind" introduces the reader with basic generalizations of neuroanatomy and neurophysiology. Also, some background history beginning with the famous Phineas Gage case that led to the understanding of the important role that the frontal lobe plays on behavior, also the study of Wernicke and Broca's patients to understand language, Joseph Gall's pseudoscience of phrenology and Dr. Penfield's homunculus which is a generalized map of the motor cortex we still find useful today in medical texts. These cases are important because they mark the beginning of the era of Neuroscience. Honestly, I would have loved a bigger chapter that included more neuroscientists such as the Nobel laureate Ramon Ramon y Cajal's work on neurons or the first psychiatrist Dr Meynert, who was Freuds professor at School of Medicine in Vienna leading to one of the most important theories of the mind we've had and which the author does not discuss.

Kaku also introduces the reader to the evolutionary history of the brain (reptilian--> mammalian--> human), being the neocortex our highest evolutionary structure involved in higher cognitive functioning. The introductory information given is very accurate but very generalized and you can easily find it in many books related to neuroscience.

So, where are we standing today in neuroscience? How are we able to understand how our brain works and

what are we still missing? The many useful high technology devices that have been created to understand our brain are thanks to the four forces that govern our universe, some of this machines are: MRI, fMRI, DBS and optogenetics, all of these based on the electromagnetic force except PET scans which is governed by the weak force. It is worth noting that as new technological devices are invented so the analogies regarding our brain functioning, such as the hydraulic model, the telephone model and now the computational theory of the mind.The author does not leave behind and also creates an analogy of subconscious as the CEO obviously representing the prefrontal cortex... Our rational thought, the area that plans and helps you take decisions.

Although Kaku doesnt talk about Freuds Theory of Mind, what i did find interesting was his "space-time theory of consciousness" defined as:

"Consciousness is the process of creating a model of the world using multiple feedback loops in various parameters (e.g., in temperature, space, time, and in relation to others), in order to accomplish a goal (e.g., find mates, food, shelter)."
According to this idea animals create their goal based more on environment and space and humans base more this model on relation with time.
He gives this theory three levels of consciousness, which mostly applies to the evolutionary structures of our brain. Level I will be that of the reptiles and level II which includes the limbic system essential for relations will be that of mammalian brain. Finally, level III that of the human brain defined as the following:

"Human consciousness is a specific form of consciousness that creates a model of the world and the simulates in time, by evaluating the past to simulate the future. This requires mediating and evaluating many feedback loops in order to make a depiction to achieve a goal."

Based on this definition, we use our model or view of the world by analyzing previous experiences and memories of people or events and use all this to predict the future and therefore make the decisions we would consider appropriate for a favorable outcome. If this space-time theory is accurate, Kaku says that it can give us a definition of self awareness:

"Self awareness is creating a model of the world and simulating the future in which you appear"

Book II. In Mind over Matter, Kaku approaches Telepathy, Telekinesis, Memory and Intelligence.
On memory: What do you think of the idea of downloading a memory or perhaps learning a new complex skills (Matrix style) and molding our intelligence with new software? The possibility to create or experience new memories, or sharing it just as we upload our pictures through the web, live a new trip or love experiences, or the memories of loved ones already passed away, will that lead us to lose the difference from our innate self and fake memories??? Would this ever be possible? I do think of the amazing possibilities it could bring for patients suffering from amnesia or also it's exciting to know the use of optogenetics to activate or shut down memories such as in PTSD patients. What has the function of memory provided in our evolutionary process and why are they so important to us? That is of the ability to predict the future and act and take decisions according to these experiences,This is the essential reason of why humans are intelligent. I also applaud Kaku approaching the prion like proteins topic involved in Alzheimer's (tau amyloid proteins) and the CREB genes role in memory formation... quite accurate but I insist, this is another topic which I would have loved he expanded more with detailed information. Sometimes, it did seemed like reading a special-edition science magazine.

Book III. Altered Consciousness: Dreams, mind-control, artificial intelligence, altered states of consciousness, reverse engineering in the brain and the alien brain.
On the chapter Altered state of consciousness, which I really enjoyed, Kaku approaches OCD, Schizophrenia

and Hallucinations with the sufficient neuroscience behind each disorder and talks about where are we placed right now regarding management and the possibilities of how science will approach them in the future. Once again, he gives us a definition of most forms of mental illness based on his space-time theory of consciousness:

"Mental illness is largely caused by the disruption of the delicate checks and balances between competing feedback loops that simulate the future (usually because one region of the brain is o reactive or under-active)"

Some hospital today make use of DBS (Deep Brain Stimulation), a small probe inserted into a brain and applying electro shocks like a pacemaker, many disorders like depression, Parkinson's and epilepsy or even comma patients are being treated. So far DBS and pharmacotherapy, have been the best way to manage these cases but not the optimal state, sometimes only to ameliorate symptoms. Molecular reductionist approach has also helped understand the neurobiochemistry of many disorders and the main target that can guide new and more specific treatments. Now, the BRAIN initiative is expected to complete a detailed map of the brain at neural level with the possibility to understand the exact pathophisiology behind disorders like Alzheimer, Parkinson's, dementia or bipolar disorders and hopefully, the upcoming technology can give us a better approach to help many of these patients in a successful way. Could you imagine the possibility of a paralyzed patient to move thanks to the use of a microchip inserted to his brain?

In summary, the information given by Michio Kaku is accurate and I could probably stop at every topic and discuss many thoughts i have in mind related to neuroscience, from evolution to artificial intelligence, but i should leave you with something to read by yourself. His space-time theory of consciousness is good and useful and he tries to demonstrate its application throughout the book. Also, Kaku uses many analogies and examples with books and movies including Star Trek, Star Wars or Planet of the apes, A space odyssey 2001 and many other fictional characters to place the reader on the topic and it was quite funny to see his geek side, especially if you like them. So, what can we expect in the near future regarding treatments and technology? Is there really alien intelligence out there? Is it possible that Artificial Intelligence could ever develop consciousness and take decisions for us like Hal 9000? Would we continue evolving and give a big step towards the next Homo evolutis or Star Child or have we reached our limitations?

Read the book and allow your mind imagine all the possibilities that science could give our human race in the future!

A fantastic Voyage!

Slim Khezri says

Knowledge and education is everything in life!!!! This is one fantastic book. "The Future of the Mind" by Michio Kaku introduces inquisitive readers to the exciting science of the human mind. Dr. Kaku is perhaps the preeminent popular scientist of our time with numerous books, television productions and media appearances to his credit. This fascinating book will interest everyone who wants to get up to speed on the rapidly evolving field of brain sciences including what the future might hold for humanity.

The book is divided into three sections. `Book I: The Mind and Consciousness' is a brief survey of brain research up to the present day including an overview of how the brain works. `Book II: Mind Over Matter' discusses how science is shedding new light on telepathy, telekinesis, memories and the possibility of enhancing the brain's powers. `Book III: Altered Consciousness' speculates about how humanity's mastery of brain sciences might radically change our destiny on earth and beyond, including allowing us to reach across the universe with our minds.

Of course, Dr. Kaku carefully weighs the myriad ethical issues that inevitably come up when scientists talk about tinkering with the human brain. For example, when discussing the possibility of improving human intelligence, Dr. Kaku points to the benefits of enabling workers to rapidly learn new job skills but also warns about the social disparity that might ensue if such powerful technology is distributed only to the few. More than anything else, Dr. Kaku shares his vision and enthusiasm for where science can lead us. Through his demonstrated command of the subject matter, we become excited not only about the shorter-term promise of discovering more effective treatments for mental illnesses; but also about the longer-term possibility of exploring distant stars using our minds. The end result is a highly engaging book that rewards us with its keen intelligence, compassion and sense of wonder.

I highly recommend this outstanding book to everyone. I LOVED it!!!!!!

Claudia Badiu says

Pe dr. Michio Kaku îl ?tiu din diferite documentare de la BBC sau Discovery ?i eu un tip super carismatic pe care ?i-e mai mare dragul s?-l ascul?i. Dup? ce am citit "Universuri paralele", m-am bucurat s? g?sesc ?i cartea asta, b?nuind c? va fi cel pu?in la fel de interesant?. A fost!
Cartea e scris? ca un articol al unei reviste tehnice cu informa?ii pe în?elesul publicului larg, astfel încât s? fascineze cititorul ?i s? îl fac? s?-?i pun? o mul?ime de întreb?ri în timp ce cite?te despre ultimele cercet?ri în domeniul neurologiei.
În paginile c?r?ii se g?sesc foarte multe informa?ii fascinante. Creierul - o ma?in?rie extraordinar de complex? c?reia omenirea înc? nu a reu?it s?-i descifreze în?elesurile, constituie obiectul cercet?rii a numeroase ?i costisitoare studii. Citim despre minte ?i con?tiin??, despre telepatie, telekinezie, amintiri, inteligen??, controlul viselor, con?tiin?a de siliciu, retroingineria creierului, mintea desprins? de materie, mintea ca energie pur?, despre con?tiin?a cuantic?... Fascinant? carte! :)

David says

What a wonderfully "feel-good" book about science! Michio Kaku is a theoretical physicist, and a well-known author of popular books about physics, especially the future of physics. In this book, he strays a bit from physics, and enters the realms of biology, neuroscience, evolution, and the brain. Kaku admits that he is not an expert in these fields. However, he writes so engagingly, his fast-paced, light-hearted writing style, and fearless exploration of a wide range of topics makes this a very fun book to read.

This book explores a wide range of topics, including consciousness, telepathy, telekinesis, memories, enhancing intelligence, dreams, mind-control, artificial intelligence, the mind transcending the framework of the body, and possibilities of an alien mind. Wherever possible, Kaku uses his intimate knowledge of physics

to lend credence to his speculations about the future of the mind.

Kaku does not try to be overtly humorous, but his prose always seems to be just "on the verge" of subtle humor. Since this book is about "the future", Kaku peppers his chapters with references to science fiction books and movies. This book should really appeal to science fiction fans, and to anyone interested in understanding what the near and distant future holds for evolution of the mind.

Ross says

Very disappointing. This book is billed as scientific but is simply science fiction nonsense. The book starts out well enough with a review of the current types of brain scans and some commentary of potential future enhancements to these technologies. Then the author launches into wild speculation about telepathy and telekinesis and how these may be possible in the "very near future." Since my only interest in the brain is of a purely scientific and practical bent, these speculations were of zero interest to me and I gave up.

Ahmed M. Gamil says

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Kristy K says

Interesting, but I have to say I enjoyed Kaku's The Future of Humanity a lot more. This wasn't quite as engaging.

Rama says

The future of human mind and artificial intelligence

In this book, City University of New York Professor Michio Kaku, a well-respected theoretical physicist has discussed our current understanding of human mind and consciousness, and where it is heading in the next few decades. He has followed his life-long interest in biology of mind in this exhaustive literature work after

his discussion with leading neurobiologists. Despite the fact that his field of expertise lies in theoretical physics, this book is written with scientific accuracy and solid understanding of the subject.

Using MRI scans, biologists can now read thoughts of our brains; a totally paralyzed patient with a microchip inserted into the patient's brain can literally do anything a normal person could do via a computer. In the first part of the book, the author defines consciousness and the various types of consciousness that exists in this world. The second part of the book looks at computers that record electrical signals emanating from brain and decode them into familiar digital language. Thus brain and computer can be directly interfaced (brain-machine interface) to control any object around it. The author discusses with examples to illustrate how new technology has helped scientists to record memories, mind reading, videotaping our dreams and telekinetically control objects around us (mind controlling matter), and perhaps enhance our intelligence. In the third part, the author introduces us into alternate forms of consciousness, observed in dreams; drug-induced state; mental illness; and non-human consciousness of robots and aliens. There is an interesting section (appendix) that summarizes quantum consciousness and describes how consciousness and the laws of physics overlap to make physical reality a coherent whole. This is one of the best sections of the book I have read where the author shares his expertize as a theoretical physicist. This part is lucidly written and I enjoyed reading it.

According to the author, consciousness is a process of creating a model of the world using multiple feedback loops in various parameters (spacetime, temperature, pressure and in relation to others) to find friends, food, shelter, and other survival necessities. Level 0 consciousness that exist among plants which doesn't have nervous structure but responds to heat, light and pressure. Level-1 consciousness exists at the lower side of evolution where the central nervous system is primitive (brain structure: brain stem) and reacts only in space but not time (no sense of past or future). Level-2 consciousness that exists among mammalian systems where the nervous system is evolved (brain structure: limbic system) which has a well-defined social structure. Level-3 consciousness exists only in humans where the brain structures consists of prefrontal cortex, and operate in space and time, especially future: Feedback loops evaluate the past and simulate the future. It follows from this that self-awareness is creating a model of the world and simulating the future in which you appear.

Another sticky question that is addressed while discussing reality is the concept of free will, does it really exist. The author concludes that it may exist but not the way we think; that we are the masters of our fate. The brain influenced by unconscious factors that predisposes us to make certain choices ahead of time even if we think we made the decision ourselves. The end of the fate is not written yet because the effects of quantum reality and chaos theory preclude strict determinism.

I have rated this book five stars since it reads flawlessly. Highly recommended to anyone interested in the future of mind and how artificial intelligence will control our destiny.

Lis Carey says

Michio Kaku, a theoretical physicist with a love of science fiction and of explaining science to non-scientists as well as of physics, once again takes a big, broad subject area that people are fascinated by, and explores what we know and can do now, what we can expect in the near future, and what the next century or two might bring us.

This is a readable, fascinating introduction to what we know about the workings of the human brain, and how the mind emerges from it, as well as the current state and realistic prospects for artificial intelligence.

In recent decades we have learned, with new tools many of which emerge from physics, startling details about the deep structure of the brain, what parts correspond to which abilities and behaviors, and how memory is constructed and stored. As we understand more about how our brains and minds really work, the problems of artificial intelligence become clearer. Past periods of optimism about AI were founded largely in a lack of understanding of the complexities involved. Now we have a much greater understanding of what intelligence and consciousness are, and a more realistic prospect of creating the computing power we need to replicate it--in the future. That capacity doesn't exist yet, and we are in the early stages of creating robots with minimal "intelligence" and learning ability. The breakthroughs we've made are exciting, though, and the prospects even more so.

As our ability to create intelligent machines increases, what will the implications be? Will our machines be our children, or will they be a threat to us? Will we use mechanical surrogates controlled by our own minds to explore distant worlds? Will we achieve immortality through replacement robotic bodies? Will we live our lives wholly inside a computer-generated environment?

Kaku also considers the question of intelligent alien life. Why haven't we heard from them? What will happen when we do find intelligent aliens? Aliens advanced enough to make traveling from their worlds to ours would not be just a few centuries ahead of us, technologically; they would be thousands of years ahead of us. Would they even notice us, or would the biggest danger we face from them be the danger the deer face from the developer--having our environment developed into uninhabitability, not out of malice but because we're not important enough to notice.

This is an entertaining, educational, and stimulating book. Recommended.

I received a free electronic galley from the publisher via NetGalley.
