

any external laws or initial conditions.

It is a tall order, and if Smolin's theory is to work, then all the great experimental discoveries in physics — from elliptical planetary orbits to the Higgs boson — need to be incorporated. Hallowed theories such as quantum physics and relativity must be dismantled and some radically new way of explaining how the Universe evolves must come into play. Smolin shies away from actually telling us what that new way is, because he doesn't seem to know himself. All he can do is to explain how different his theory must be from everything we have done before.

To explain why anything can be predicted at all in such a lawless Universe, Smolin invokes reproducibility: if a physical process has happened in a certain way before, it will happen in the same way again. We can predict what will happen if we have some familiarity. But, Smolin notes, there will be situations that we have never seen before, in which it will be impossible to predict the outcome.

Writing a book is a well-worn way of presenting a provocative theory that is still in its infancy. Smolin, a respected physicist with a track record of best-sellers, has a privileged platform for promoting his ideas, similar to Arthur Eddington, Erwin Schrödinger or Fred Hoyle before him. Books can, however, feel reckless without the filter of the (albeit flawed) peer-review process.

Yet I enjoyed *Time Reborn*. Smolin is an excellent writer, a creative thinker and is ecumenical in the way he covers so many different branches of thought. Even as I mentally argued with this book, I kept on ploughing through to see how Smolin dealt with the objections. I would love to sit down with him over a drink and debate the ins and outs of his theory. And that is how this book should be read: as an account that makes you ask questions. ■

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NEUROSCIENCE

Drugs to build a better brain

Anjan Chatterjee probes a cognitive-enhancement primer.

Decisions can be as trivial as which coffee to order or which wine to buy, or as consequential as who to marry or which job to accept. Yet even the most profound choices are rarely made on strictly logical grounds. We don't weigh up pros and cons and dispassionately pick the best course of action. Our emotions and attitude to risk, how a situation is framed and the time available all influence our final choices.

In *Bad Moves*, Barbara J. Sahakian and Jamie Nicole Labuzetta lay out the neuroscience of how people make decisions and the ethical quandaries that accompany the use of drugs to enhance cognition. Their slim book is admirable in reviewing these important topics, but it does little to explore the wider view of how emotions can be regulated by drugs.

Sahakian, well known for her research on the neuropsychology of affective and cognitive systems, and neurologist Labuzetta use people with dementia, depression, mania and phobias, who tend to make poor

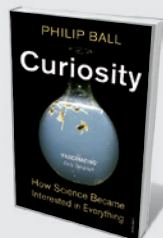


Bad Moves: How Decision Making goes Wrong, and the Ethics of Smart Drugs
BARBARA J. SAHAKIAN AND JAMIE NICOLE LABUZETTA
Oxford University Press: 2013. 192 pp. £14.99

decisions, as exaggerated examples of how we can all err. Abnormal functioning of the frontal lobes and deep limbic structures in the brains of people with these disorders disrupts their emotional control and thus decision-making ability.

After discussing decision-making processes in the brain, Sahakian and Labuzetta explore cognitive enhancers. They focus on cholinesterase inhibitors and stimulant medications that can improve memory, sharpen attention and boost concentration. Such 'smart drugs' raise an ethical question: if drugs developed to treat people with

ILLUSTRATION BY ALEX ROBBINS



Curiosity: How Science Became Interested in Everything

Philip Ball (Vintage, 2013; £9.99)
Humanity's burning urge for knowledge drives science. Philip Ball's scintillating history of curiosity brims with treats — such as seventeenth-century philosopher Francis Bacon's use of a Pan myth as an allegory for the quest to learn from nature.



Genentech: The Beginnings of Biotech
Sally Smith Hughes (Univ. Chicago Press, 2013; \$16)

The history of Genentech, the company that kick-started the biotech industry, is compellingly told by Sally Smith Hughes. Studded with in-depth portraits of its pioneers. (See Linnaea Ostroff's review: *Nature* **478**, 456; 2011.)

► cognitive disorders can also make people with healthy brains smarter, should we use them?

There is no simple answer. Smart drugs can make us more efficient and productive, which may be a good thing for society. But there are many reasons to be cautious. The long-term safety of ingesting these drugs is not fully known, although stimulants can be addictive. Easy rewards from these medications undermine the value of hard work and threaten our ideas of authenticity. And the availability of such drugs could compromise our liberties.

We could feel compelled to use drugs of this kind if all those around us are taking them and appear more productive. We might even insist that some people, such as commercial pilots and medical residents, take cognitive enhancers. And variations in access to smart drugs could raise concerns of fairness and justice, particularly if the advantages they confer are available disproportionately to the rich.

Although the book's themes are timely, the link between them is not transparent. After the authors make the convincing case that emotional dysregulation can cause us to choose badly, I expected a discussion about our ability to regulate emotions chemically. Surprisingly, the authors make no mention of antidepressants, anxiolytics and mood stabilizers, and the ethics of their use in healthy people. As a result, Sahakian and Labuzetta's diagnosis of the emotional source of bad decisions is disconnected from potential interventions.

Nonetheless, *Bad Moves* offers a good introduction to issues that affect us all. As the authors astutely point out, academics are not the final arbiters of the ethics of cognitive enhancement — these are societal concerns. With this accessible primer, full of medical anecdotes and clear explanations, Sahakian and Labuzetta prepare the public for an informed discussion about the role of drugs in our society. ■

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CULTURE

Of Genesis and genetics

Tim Radford revels in a masterly take on science invoked by the Bible.

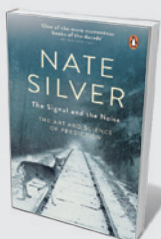
The *Serpent's Promise* is a believer's book. It expresses belief in the power of language, imagination, scholarship, high art, enduring myth, tribal tradition, unforgettable poetry, irrational vision and inspired insight. If you wanted to find all of these things between just one set of covers, you might pick up the Authorized Version of the Bible; but this is not a book by somebody who believes in God. It is a book by the distinguished geneticist, broadcaster, lecturer, writer and Welshman Steve Jones, who has a sharp awareness of moral imperative

and a warm feeling for those Joneses before him who invoked the bread of heaven and yearned to be safe on Canaan's side. It is the ambivalence at the heart of this book which makes it so hugely enjoyable and, perhaps, so important.

Jones' story is not of the science of the Bible, but of the science invoked by the Bible. The Good Book (his words, his capitals), he says, was always more of a guide

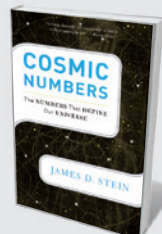
➔ **NATURE.COM**
For Mark Pagel on Steve Jones's *Almost Like a Whale* see: go.nature.com/ca6kzj

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The Signal and the Noise: The Art and Science of Prediction

Nate Silver (Penguin, 2013; £8.99)
Statistician Nate Silver reveals how 'noise', a random component of data, often clogs up the complex process of forecasting. Silver makes a convincing case for a Bayesian approach (See Paul Ormerod's review: *Nature* **489**, 501; 2012.)



Cosmic Numbers: The Numbers that Define Our Universe

James D. Stein (Basic Books, 2013, \$15.99)
Key numbers in physics, chemistry and astronomy star in this mathematical history. James D. Stein captures ideas from luminaries such as Isaac Newton and Johannes Kepler to characterize these 'universal' measurements.