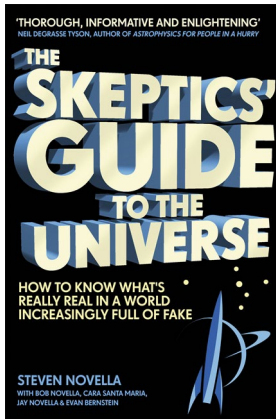


Fighting quackery



The Skeptics' Guide to the Universe

by Steven Novella

HODDER & STOUGHTON:
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What a blissful state most physicists live in: all we need to get terribly worked up is a newspaper article explaining that quantum computers will be fast because they'll try all possible solutions at once. Of course, hype and distortion in the media are real problems when they lead to exorbitant expectations of the opportunities a new technology may afford. But irrational beliefs and false media reports on vaccines causing autism and the non-existence of climate change makes the odd journalist getting entanglement wrong seem like a proper first-world problem.

The growing prevalence and real-world consequences of anti-science beliefs, with measles outbreaks becoming more common in western Europe and climate science funding under threat in the United States, are truly terrifying. So what should a scientist or scientifically interested member of the public tired of standing on the sidelines do to fight the good fight for science?

The book *The Skeptics' Guide to the Universe* by Steven Novella, Bob Novella, Cara Santa Maria, Jay Novella and Evan Bernstein is a handy guide of how to mobilize forces against irrational beliefs, resorting to scientific scepticism and sceptic activism to rebut pseudoscience and quackery. Novella and colleagues have a track record of such activities, having run the New England Skeptic Society since 1996. A weekly podcast, which the book is named after, has been aired since 2005.

The New England Skeptic Society understands scientific scepticism as a mindset in which any claims about the workings of the world are rigorously assessed through methods of science and

reason. A scientific sceptic will only form an opinion after thorough review of all the available evidence. Knowing how the human mind works and which cognitive pitfalls can lead even the most rational people astray forms an important part of a sceptic's assessment tools. Hence, a considerable portion of the book is devoted to topics of metacognition, which the authors discuss in an entertaining, if colloquial, tone. From confirmation bias to motivated reasoning, many a scientist would surely benefit from increased awareness of 'I want to believe' traps and how to guard themselves against them.

To illustrate where science went wrong, Novella and colleagues recount historical examples of where science morphed into pseudoscience, some through blatant fraud but others through non-deliberate irrationalities. For example, the French physicist Prosper-René Blondlot announced in 1903 the discovery of N-rays. Soon after Blondlot's announcement other scientists confirmed that they, too, could see N-rays — faint glows that were only noticeable by people with exceptional vision. Alas, they all fell victim to self-deception: N-rays were not real, as the US physicist Robert W. Wood eventually demonstrated by blinding the analysis.

Today, the New England Skeptic Society endeavours to take on Wood's role and has taken action against the anti-GMO movement, various forms of 'alternative' medicine, con men selling perpetual motion machines and ghost hunters, to name just a few. The book's descriptions of these personal 'adventures' are amusing and invoke a great deal of admiration for the tenacity with which this group tirelessly fights battle after battle to make the world a more rational place.

Whether these actions convince the many people around the globe who hold irrational and potentially dangerous beliefs is questionable: naturally, sceptics struggle not to sound smug. Thankfully, the book provides valuable guidance for the fledgling sceptic activist on convincing friends and family to rethink their positions without ruining relationships: play the long game, don't be confrontational but instead find common ground and nurture their scepticism, think about your tone, and listen.

Crucial in nurturing someone's scepticism is changing the way they

consume media. After all, social media echo chambers play a huge role in spreading conspiracy theories and pseudoscience. The book's attempt at giving guidance on how to navigate the swamp of information without drowning in false claims is, however, very concise and rather superficial. The authors give the usual advice of relying on trustworthy outlets, tracking the information down to the source and paying attention to who is talking.

Most regrettably, a deeper discussion about what to do with the sources of media reports — which in many cases are scientific papers — is missing. As scientists we know that a single published paper isn't always the last word on a subject — particularly in fickle fields like nutrition and health with many variables that are near impossible to control. Not only scientists are human and can make honest and non-trivial mistakes that remain undetected in peer review, but science is a process and we require repeated measurements of the same phenomenon to have confidence in an effect and its size. Educating the public on how to read papers beyond the headline claims, how to conduct a thorough literature research and how to read a meta-analysis would allow more people to 'see for themselves' what the science says. The first step towards such an educational project would be to hide fewer research articles behind a paywall. Somewhat disappointingly, however, the open access movement doesn't get a mention in the book (please note that my current employer is the Public Library of Science (PLOS), an open access publisher).

Until meta-analysis reading clubs become more widespread, however, the Skeptics' approach of high-profile debunking and fiery campaigning is proving to be rather effective at mobilizing individuals to canvass for science. Maybe the book will convince more physicists to leave behind their anger at inaccurate descriptions of quantum computing, and join the real fight against quackery. □

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