

BOOK REVIEW: Our final century: Will the Human Race Survive the Twenty-first Century?

by Martin Rees

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This is as macro as it gets, folks. Multiverses, big bangs, solar systems, and yes, our planet are systemically linked and existentially evaluated by Sir Martin Rees in this superb work. The universal and the particular, objective and subjective, probable and unknowable, are among the tensions and dynamics running throughout this examination of various risks that humans are helping to concoct for the future. The book examines highlights and trends of human history from anthropological, environmental, and sci-tech perspectives.

Rees discusses the 20th century arms race and the dilemma of mutually assured destruction via nuclear weapons. Indeed, he thinks we are lucky to have survived the past 50 years. He surveys the environmental degradation and resource depletion that have accelerated since the industrial age began, and appreciates the 'green' or full-cost accounting that some economists have suggested which counts more than monetary costs and profit.

Rees questions the value of the views of the future by many known 'experts': "Scientists are often blind to the ramifications of their own discoveries." (p. 13). He gives examples including the opinion of both computer designer Von Neumann and IBM founder T.J. Watson that only a few computers would be needed in the US. Rees generally agrees with Ray Kurzweil (*The Age of Spiritual Machines*), Gordon Moore (Moore's Law), Hans Moravec (robotics), and John Sulston (Human Genome Project) that the speed of technological change will continue increasing. But he perceives far more risk from the likely progressions than do the others. And he integrates physical limits, which most do not, noting "some limits are set by energy and resources." (p.20). Rather than viewing science as a requisite sum of certainties, Rees agrees with Isaac Asimov, whom he quotes: "No matter how much we learn, whatever is left, however small it may seem, is just as infinitely complex as the whole was to start with." (p. 142).

When future probabilities are considered, best judgments usually depend upon a consensus of best current evidence. Religious-like fervor in adherence to particular theories is irrational behaviour; yet that seems to be a dominant human trait.

Sociobiologists like E.O. Wilson have examined this for decades. Rees engages this issue indirectly. Evolution selects traits that best fit the circumstances for the life form. Imprudent risk-taking and feelings of invincibility are characteristics of the explorer in us—like those who sailed the flat earth risking the unknown cliff. That irrational trait may now have become our Achilles heel, as the ramifications of our technologically enhanced behaviour create horrific possible outcomes. The quadrupling of our numbers in one century stresses our everyday lives and earth's biosphere, increasing our self-destructive potential. Rees covers all of this and more.

Rees is among the few scientists who easily think in a whole-system fashion while largely avoiding jargon and convoluted explanations. His examination of the history and trajectory of earth and its' life forms is systemically connected to the cosmos via feedback loops at many levels. The inter-linkages demonstrate interdependence; and humans are pushing the envelope on many fronts. Rees accepts infinite reality as the most reasonable assumption rather than positing a boundary for which there is no evidence. We do not know if 'intelligent life' (as we define it) exists elsewhere. So he feels we have a responsibility to carry on successfully if possible.

Rees gives major consideration to 'bioerror' and 'bioterror'. He has offered US\$1000 as his half of a charitable bet that at least one million humans will die from a single event involving one or the other of these within 10 years. The offer may be accepted at <http://www.longbets.org>. The Long Now Foundation operates this website, with participants such as Kurzweil,

Paul Hawken, and myself. I urge everyone to have a look at this site, as it encourages long-term thinking about a wide variety of issues affecting our future.

The risk with the potential for the greatest destruction would threaten not only earth but conceivably the entire universe. A knowledge of astrophysics may be required to properly grasp this, but the gist of it makes sense. Future, vastly more rapid high-speed particle collision experiments are known to have the unlikely potential to create a 'new' particle called a "strangelet", which could cause earth to compress into a 100 m diameter sphere. A black hole could also be a result, engulfing earth. There is a third risk: the creation of a 'vacuum bubble'. This "could trigger a 'phase transition' that would rip the fabric of space itself." (p. 121). Since this would occur at the speed of light, the event would be unknown until it happened.

Rees makes the point that the greater the risk, the less the high odds against the occurrence matters. The stakes are just too high. Yet he claims that many risks have been

taken without a proper societal evaluation of the merits of doing so. Many people worldwide now plead for the use of 'The Precautionary Principle' when discussing what they perceive to be reckless, inadequately tested scientific experimentation and technological applications. Rees agrees that the current system is flawed, going as far as discussing the 'Paymasters of Science' (p. 79).

According to some futurists, progress in nanotechnology risks the future takeover of life forms by machines. Rees is concerned about the perpetuity of what he calls intelligent life. Humans could live virtually indefinitely with smart parts. But the earth might not be hospitable. Perhaps we will attempt to colonize other worlds, following the irrational urge of the flat-earth explorers. Rees thinks it is possible that there is other intelligent life some place-time.

This leads to my only critical comment about the book. In effect, Rees follows the 'Anthropic Principle' in opting for a continuation of our type of being as of utmost import. This implies teleology, a positive direction of evolution or development in which complexity of mind and senses somehow matters. And it implies a plan or purpose, to some a first cause. Of course this is existentially normal: to create value subjectively from one's point of view. But Rees also holds that infinite multi-verses are as likely as a single universe.

"...what we have traditionally called our universe may be just one 'island' in an infinite archipelago." (p. 147)

The notion of infinite possibilities can lead one to the conclusion that whatever 'is', must exist some place-time. Infinite combinations of elements of reality MUST-some place-time arrange as they do here-now. The usual argument made is that given the numbers of things that had to fit properly for humans to develop on earth, there must have been a plan. In my view, this is *The Spirit in the Gene* at work [1]; humans feel special and create the meaning of life to suit that need. Obviously, given infinite time-space and constant change, a planet ripe for human life is a necessary eventuality. We have difficulty with the concept of infinity; and we do not like thinking of ourselves as an accident!

It seems to me that most humans have difficulty thinking and behaving with long term horizons in mind. We may focus on, for example, our next bonus, paycheck, job, meal, sexual encounter, or crime. The tougher our personal circumstance is, the shorter term is our required focus. Survival is number one. Recall the native American notion of

Seven Generations. A sustainable human future requires that sort of thinking in my opinion, and I think Rees fully agrees.

All in all, Rees has done a magnificent job of framing the risks of the 21st century. The book is quite accessible, and I would like to see it required reading for all capable of high school level material. The fewer of us flying blind into the future the better.

References

[1] R. Morrison, *The Spirit in the Gene: Humanity's Proud Illusion and the Laws of Nature*, Cornell University Press (1999).