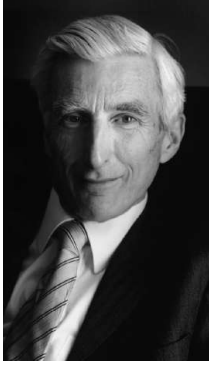

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Denial of Catastrophic Risks

IN A MEDIA LANDSCAPE SATURATED WITH SENSATIONAL SCIENCE STORIES AND "END OF THE WORLD" Hollywood productions, it may be hard to persuade the wide public that real catastrophes could arise as unexpectedly as the 2008 financial crisis, and have a far greater impact. Society could be dealt shattering blows by the misapplication of technologies that exist already or could emerge within the coming decades. Some of the scenarios that have been envisaged may indeed be science fiction, but others may be disquietingly real. I believe these "existential risks" deserve more serious study. Those fortunate enough to live in the developed world fret too much about minor hazards of everyday life: improbable air crashes, possible carcinogens in food, low radiation doses, and so forth. But we should be more concerned about events that have not yet happened but which, if they occurred even once, could cause worldwide devastation.

The main threats to sustained human existence now come from people, not from nature. Ecological shocks that irreversibly degrade the biosphere could be triggered by the unsustainable demands of a growing world population. Fast-spreading pandemics would cause havoc in the megacities of the developing world. And political tensions will probably stem from scarcity of resources, aggravated by climate change. Equally worrying are the imponderable downsides of powerful new cyber-, bio-, and nanotechnologies. Indeed, we're entering an era when a few individuals could, via error or terror, trigger societal breakdown.

Some threats are well known. In the 20th century, the downsides of nuclear science loomed large. At any time in the Cold War era, the superpowers could have stumbled toward Armageddon through muddle and miscalculation. The threat of global annihilation involving tens of thousands of hydrogen bombs is thankfully in abeyance, but now there is a growing concern that smaller nuclear arsenals might be used in a regional context, or even by terrorists. We can't rule out a geopolitical realignment that creates a standoff between new superpowers. So a new generation may face its own "Cuba," and one that could be handled less well or less luckily than was the 1962 crisis.

What are some new concerns stemming from fast-developing 21st-century technologies? Our interconnected world depends on elaborate networks: electric power grids, air traffic control, international finance, just-in-time delivery, and so forth. Unless these are highly resilient, their manifest benefits could be outweighed by catastrophic (albeit rare) breakdowns cascading through the system. Social media could spread psychic contagion from a localized crisis, literally at the speed of light. Concern about cyberattack, by criminals or hostile nations, is rising sharply. Synthetic biology likewise offers huge potential for medicine and agriculture, but in the sci-fi scenario where new organisms can be routinely created, the ecology (and even our species) might not long survive unscathed. And should we worry about another sci-fi scenario, in which a network of computers could develop a mind of its own and threaten us all?

Online

sciencemag.org

Podcast interview with author Martin Rees (http://scim.ag/ed_6124).

Some would dismiss such concerns as an exaggerated jeremiad: After all, societies have survived for millennia, despite storms, earthquakes, and pestilence. But these human-induced threats are different—they are newly emergent, so we have a limited time base for exposure to them and can't be so sanguine that we would survive them for long, or that governments could cope if disaster strikes. That is why a group of natural and social scientists in Cambridge, UK, plans to inaugurate a research program to identify the most genuine of these emergent risks and assess how to enhance resilience against them. True, it is hard to quantify the potential "existential" threats from (for instance) bio- or cybertechnology, from artificial intelligence, or from runaway climatic catastrophes. But we should at least start figuring out what can be left in the sci-fi bin (for now) and what has moved beyond the imaginary. **– Martin Rees**

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