

countries, the costs continue to grow without commensurate improvements in outcomes. In poorer regions, the lack of health-care workers becomes unsustainable as the population and its needs expand. And the setting for this play is appealing: a sea of data from online behaviour, sensors, smartphones, genome scans, imaging, lab tests and clinical records. If data are the new oil, health data — which Topol describes as between six and ten times as valuable as financial data — are the refined petroleum that AI can inject into diagnostic and treatment decisions.

But big data is not the same as good data. For most health-care questions, we might not have the information to find a solution. For instance, we recognize the role of social determinants in health but rarely collect data on them. And even if the data were optimal, the algorithms accurate and the diagnostic process improved, would doctors choose to be present? Would they be educated to be empathetic and compassionate? *Deep Medicine* wrestles with these questions, recognizing that technology is about tools, whereas medicine is about a person-to-person bond.

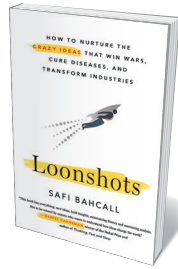
This is Topol's third popular-science book. The first, *The Creative Destruction of Medicine* (2011), focused on sensors and sequencing as a pathway for digitizing medicine. The second, *The Patient Will See You Now* (2014), described how practice could be transformed by empowering people with their own health data. Like these, *Deep Medicine* is about technology and health care, but it evolves surprisingly towards the values of the past while imagining the tools of the future. When Topol describes how medicine has changed since his training four decades ago, one feels his regret that technology has not improved things. He addresses that by bringing together the deep phenotyping of digitized medicine, the engagement of the empowered patient and the analytical power of AI to improve the doctor-patient relationship.

I appreciate Topol's willingness to recognize that these are early days. He invites us to dream about what the AI future could look like, while reminding us that we need to be drivers, not just passengers, if AI is to serve patients and clinicians rather than payers and tech monopolies. Much of what he has written will soon be outdated in this fast-moving field, but his argument for using technology to bring care back to health care is timeless. ■

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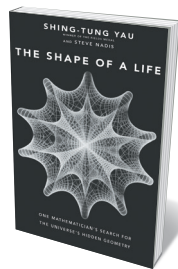
Books in brief



Loonshots

Safi Bahcall ST MARTIN'S (2019)

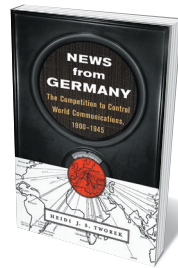
History is riddled with seemingly crackpot ideas that led to massive breakthroughs. How can we ensure that such “loonshots” are nurtured? In this witty, invigorating exploration of human behaviour and discovery, physicist and biotechnology entrepreneur Safi Bahcall argues that it's all about “phase transitions”: group dynamics that govern how a team snaps from dismissing to embracing a new concept. Drawing on examples from traffic jams to the James Bond film franchise, Bahcall shows how structure, size and communication govern groups' capacity to “engineer serendipity”.



The Shape of a Life

Shing-Tung Yau and Steve Nadis YALE UNIVERSITY PRESS (2019)

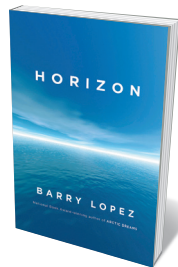
For decades, mathematician Shing-Tung Yau — a winner of the 1982 Fields Medal — has been central to the cross-fertilization between modern mathematics and physics. His work in geometry, for instance, underlies much of string theory. This volume, co-authored with science writer Steve Nadis, is an intimate account of Yau's life, and includes frank responses to his critics. It ends with a twist: Yau does not believe that the Poincaré conjecture — the most important question in topology in the twenty-first century — has truly been settled.



News from Germany

Heidi J. S. Tworek HARVARD UNIVERSITY PRESS (2019)

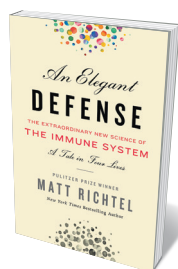
This riveting technological chronicle dispels two myths: that the digital era spawned information warfare, and that twentieth-century global communications was largely Anglo-American. From 1900 to 1945, reveals historian Heidi Tworek, Germany strove mightily to achieve world power through news agencies, spoken radio and wireless, urged on by figures from Weimar Republic foreign minister Gustav Stresemann to Nazi propagandist Joseph Goebbels. A chillingly timely cautionary tale, demonstrating that once elites destroy democratic institutions, a free press cannot prevent further disintegration.



Horizon

Barry Lopez KNOPF (2019)

Subtle, monumental, rich, spare: this opus by acclaimed writer Barry Lopez contains and transcends contradictions. A reflection on journeys with researchers, into history and across continents, it uses six sites as loci for scientific and philosophical musings, as Lopez sorts sea-floor organisms in Antarctica, sifts soils with archaeologists in the High Arctic, hunts hominin remains in Kenya with palaeontologist Kamoya Kimeu and contemplates the “cultural detonation” of Aboriginal peoples in Western Australia. Above all, he asks what, amid existential crises, we seek beyond the horizon's line.



An Elegant Defense

Matt Richtel WILLIAM MORROW (2019)

The immune system is less war machine than peacekeeping force, seeing off viral and bacterial disruption to keep the body safe. But what if that balance shifts? Award-winning reporter Matt Richtel examines the scientific and human realities of immune anomaly through four case studies. Jason Greenstein, for instance, struggled with terminal Hodgkin's lymphoma, his immune system ‘duped’ by cancer. Through these harrowing accounts, Richtel interweaves the research history — a relay race involving immunologists Élie Metchnikoff, Peter Medawar and Anthony Fauci, among others. [Barbara Kiser](#)