



an easily digested introduction to many of the key concepts of the philosophy of science. It demonstrates vividly that there is no single way of doing science; philosophers of science are hard pressed to describe what is going on, let alone prescribe what we ought to be doing.

There is another layer too. Harré is obviously troubled by the ethical dilemmas associated with the use of live organisms in science. He argues, quite rightly, that it makes no sense to hold strong views on animal experimentation without having a sound understanding of how science works, of how and why animals have been used, and the unpredictable gains that can result. The book does a terrific job of generating that understanding. Even the inclusion of examples that, at first glance, have little to do with animal experimentation — plants, worms on mounds of methane ice, and virtual animals such as the titular cat and Richard Dawkins' biomorphs — bring into sharp focus issues that are central to the political debate. Harré discusses the merits of inanimate and non-sentient alternatives, and the unpredictable value of generalizing from model organisms.

This book should be compulsory reading for activists who man the barricades, throw the bombs or step up to the microphone. As Harré says, "Only when we have a clear idea of what has been done by whom and for what purpose can we take up the pressing moral questions that must arise."

But then comes frustration. Having provided that "clear idea", Harré doesn't take up the pressing moral questions. He concludes that there are three dimensions to argue about: the extent to which gaining scientific knowledge is an absolute good, the extent to which other living things have inalienable rights, and the extent to which we ascribe mental lives to other things. But then he dodges the bullet, saying "I leave the working out of moral arguments to others more qualified than I am to reach just

and ethically sound conclusions". How much more qualified than Harré can you get?

It is easy to feel that Harré has interesting views that he has not shared. He mentions early on that he has "serious reservations about many projects in which animals have been involved". He hints in two places that experimenting with plants has implications for the animal-experimentation debate. He even says there may be moral issues about working with

virtual organisms. But on none of these does he expand.

Could it be that with animal experimentation, things are so muddy, so difficult, that even a professional philosopher, immersed in the topic and its context, is unable to come to a logically justifiable position? Are the moral issues raised by the scientific use of animals different from those raised by, say, slavery, abortion, euthanasia or the death penalty? They could well be. For the most part, we cannot tell in

advance which areas of scientific knowledge are worth knowing. Nor, for the interesting cases, can we tell whether our instrumentation — animate or inanimate — is up to the game. I think the debate on animal experiments is with us for eternity. ■

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## A billionaire's vision for India

### Imagining India: The Idea of a Renewed Nation

by Nandan Nilekani

Penguin: 2009. 528 pp. \$29.95

Nandan Nilekani's book is a product of the new India. The author, a first-generation, wealthy software entrepreneur, belongs to the iconic trinity of that nation — along with the film star and the cricketer, his words command attention.

On graduating in electrical engineering from the Indian Institute of Technology in Bombay in 1978, Nilekani, unlike many of his classmates, did not emigrate to the United States. In 1981, he and six others pooled US\$250 to start Infosys Technologies, an information-technology (IT) consulting

and service company; its revenue eventually surpassed \$4 billion. Today this company, listed on the US stock exchange and with more than 103,000 employees, has a global footprint.

As Infosys soared, so did the stature of Nilekani. He emerged as one of a new breed of businessmen, blessed by both Lakshmi and Saraswati, the rival Hindu goddesses of wealth and wisdom. He is a role model for young, ambitious Indians. Such is his profile in India that simply emblazoning his face on the cover of the book guaranteed a best-seller.

The various Indian Institutes of Technology, the seedbeds for the technical prowess of Nilekani and his peers, were founded as part of Jawaharlal Nehru's vision. Nehru, India's first prime minister, believed that these state-run institutes, offering quality technical



### Flower Hunters

by Mary Gribbin and John Gribbin (Oxford Univ. Press, \$19.95)

This engaging collection tells the stories of 11 remarkable 'flower hunters' who travelled the globe to discover new plants. It describes the impacts they had on both gardening and science, highlighting the difficulties they experienced on their travels and when trying to propagate the plants they brought back with them.



### Starved for Science: How Biotechnology Is Being Kept Out of Africa

by Robert Paarlberg (Harvard Univ. Press, \$16.95)

In this controversial book, Robert Paarlberg argues that opposition to agricultural science in prosperous countries is reaching Africa, denying poor farmers access to technologies that might improve their yields — especially transgenic crops with insect- or drought-resistance.

education almost for free, would produce the leaders of tomorrow. As Nilekani points out, “India set off on a path of knowledge-intensive growth that was both unique and unusual for a developing economy”.

The policies of planned development and state-financed education gave less-privileged children access, first to intellectual capital and later to bank loans. Thus, a strong foundation was laid before some of Nehru’s economic policies were reversed in the 1990s.

The author’s training in engineering is reflected in the modular structure of *Imagining India*. Nilekani interviews more people than a journalist would and cites as many sources as an academic. The former may see him as a rival in recycling the views of others, and the latter may find him lacking in rigour. But as an IT expert, the author knows a thing or two about ‘crowd sourcing’ — of information and knowledge.

This book is not the story of Infosys. Nilekani has chosen a broader canvas. He takes in the whole range of the nation’s maladies — a frozen mindset, inequity, the halting economic reforms, bumbling bureaucrats, caste-biased sectarian politicians, unethical businessmen, inadequate infrastructure and a crippled higher-education system. His strongest comments are reserved for the failures in the education sector, which lacks competition and quality control and is marked by a proliferation of degree-giving institutions, a shortfall of teachers and a lacklustre administration.

Nilekani laments the sharp polarization of discourse in all of India’s spheres — political, economic and social. The mindless ‘for or against’ clashes that occur trivialize important issues and leave little scope for reasoned debate and policy-making. Such conflicts raise barriers against change and stunt the growth of new ideas. In my view,

such polarization and the weakening social cohesion constitute a far greater danger than a temporary dip in the economic growth rate. However, no fault line shakes the author’s optimism.

Nilekani is critical of the early quasi-socialist policies of planned development, state-run enterprises and industrial licensing that stifled initiative and kept entrepreneurs and the economic growth rate shackled. But he is

state-run space, atomic energy and other research programmes also nurtured hundreds of ancillary enterprises.

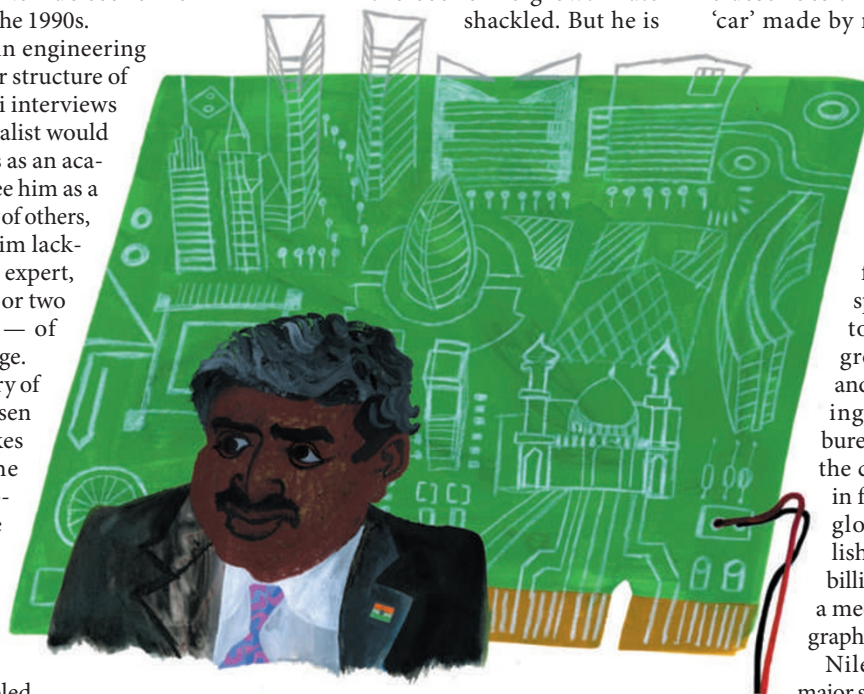
Nilekani pleads for innovation in business and governance. He refers to projects that enable slum children and illiterate farmers to gain access to computers and the Internet, and discusses grass-roots innovations based on the Indian tendency to improvise. He describes the *jugaad*, a multipurpose ‘car’ made by rural mechanics who put together whatever parts they can lay their hands on. Regrettably, he does not devote much space to India’s strengths in advanced technology development.

Nilekani sees a great future for India, provided it speeds up economic reforms towards more market-led growth in the global arena, and adopts new ways of thinking to counter statism and bureaucracy. He is heartened by the change in people’s attitude in favour of entrepreneurship, globalization and the English language. He hails India’s billion-strong population, with a median age of 23, as its demographic dividend.

Nilekani notes that “all our major strengths have come together and matured at the same time”. By using the rare opportunity provided by a constellation of domestic and international factors, he believes that India can reach farther and higher. Yet, he warns, such windows of opportunity do not remain open for long.

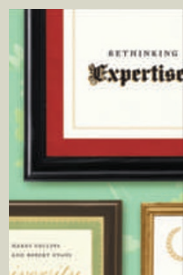
Hope has been an enduring characteristic of the Indian civilization. At a time when possibility has just encountered feasibility, *Imagining India* carries a strong message of hope. ■

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not handcuffed to dogma. Nor does he spare private enterprise from criticism. He agrees that it was the legacy of those socialist policies that brought the country certain advantages when it decided to take the path of economic liberalization in the 1990s. His own business has drawn on the pool of talent directly nurtured by the state.

Part of the Nehruvian legacy is the country’s competence in science and technology, most of it built up in the public sector. This competence came in handy when the private sector became mature enough to use it in industries such as biotechnology, IT and electronics. The



### Rethinking Expertise

by Harry Collins and Robert Evans  
(Univ. Chicago Press, £15.50)

By classifying different types of expertise, Harry Collins and Robert Evans make the case for a radical rethink of what constitutes expertise and how to exploit it. “Collins and Evans put their points vividly, with elegant language and diagrams,” wrote Robert P. Crease (*Nature* **450**, 350–351; 2007).



### A Cultural History of Modern Science in China

by Benjamin A. Elman  
(Harvard Univ. Press, \$17.95)

In this concise, accessible, but comprehensive book, Benjamin Elman describes the effects on science of the Jesuit mission in imperial China in 1600–1800, and the later influence of Protestants in the nineteenth century. By doing so, he places the emergence of modern science in China in historical context.