tism. Furthermore, even in terms of argumentation, vivid, seductive analogies and similes are ostentatiously offered as convincing explanations. The potency of the analogies seeks to neutralize any possible rebuttal by contrary historical evidence. Consequently, we are to suppose that the counterclaims made by the author are themselves self-evident: a very conventional historian of science colleague referred to this form of presentation as premised on the 'use of the affirmative assertion'. In fact, we have here a key disagreement between what traditional historians of ideas consider an adequate account, that is at variance with some of those adopting a sociological approach to history. Experts will continue to passionately disagree with this form of argumentation, and not without reason.

However, for those predisposed to the critique of modernity, SV's argument would present itself as apodeictic. The malediction is less fervent in the later articles, where SV attempts to grapple with how an ecological science could be assembled as distinct from the science of ecology, of the different senses of the diversity of nature and the destruction of this diversity. The purport is to restore alternate theorizations about nature and bring them into the realm of the engagement of scientists. This requires reckoning with the 'nitty gritty' of science. And that requires a critical and disciplinary engagement of a different order, which is what makes the essay on Vavilov particularly interesting.

As pointed out earlier, contemporary political events and scientific controversies of the last three decades are reflected in each of the essays: it would not be extending a point too far in suggesting that some of these events promoted these very essays. The stamp of the last two decades is evident. New directions in the social studies of science in India were generated by grass roots movements during the 1970s and 1980s. Those who either participated or led these movements were 'India's dissenting academics of the eighties and nineties', who had figured out that the politics of knowledge were linked with democratic politics. SV traces his genealogy to those dissenting academics who felt that 'India was a theater for a critique of the West'. This critique counterposes the West's expert knowledge to Indian folk wisdom, but not the West's (however the West maybe constructed) folk wisdom to the Indian high church traditions.

The reader is left to navigate between two myths: the one produced by scientists believing in value transcendent and neutral science that exculpates scientists of any responsibility of the knowledge produced. The other is of scientific autonomy, wherein there is 'allegedly' an autonomous logic of science that is working towards the ineluctable goal of removing man from his sacred place in nature. In problematizing science within the critique of development SV conceives science as transcendent and thus philosophically, and hence it appears more demonic than it actually is; but when he comes down to specifying alternative schemes or ethics for science, his reading becomes more social determinist: social forces and interests embodied in other conceptual frameworks come to the fore.

This ambivalence makes it difficult to label this work as one in anti-science. For SV appears to suggest that science is not an independent, unique, truth-making strategy. In that sense, this is possibly a work in reformist critique, and as Julia Loughlin and Sal Restivo write, reformist critique seeks to amend the social grounds which produce error and lacunae in knowledge, but do not challenge the grounds for 'truth making' itself. The book is not written for a popular audience, although the style is quite literary, but for professional social scientists, though there is much in it for the student of the history of sciences. The readership of this journal would possibly find this book exasperating, its value nevertheless resides in the issues and questions posed. This would require engaging with the nested concerns of civilizations, knowledge(s) and ethics. The encounter between different knowledge systems founded on different ethical and epistemic precepts might actually produce a carnival for science, a carnival that this self-professed science basher would, I suspect, secretly welcome.

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Flying Buttresses, Entropy and O-Rings, The World of an Engineer. James L. Adams. Universities Press, 3-5-819 Hyderguda, Hyderabad 500 029, India. 1997. 264 pp. Price: Rs 190.

There is a certain paradoxical nature to how engineering and engineers are perceived in society. On the one hand most people are interested in and impressed by the glamorous end products of successful engineering: the Space Shuttle, the Voyager spacecraft, the Web, the latest Ferrari, etc. They are even interested in and horrified by glaring engineering failures like the *Challenger* and Chernobyl. But when it comes to engineers and engineering as a profession... well, doesn't one get the impression that most people consider them somewhat uninteresting? James L. Adams, the author of the book under review mentions that his wife responded to his first draft with 'The writing is OK, but I don't want to know about engineering'. As an engineer, I can think of a number of reasons for this situation. Most engineering work does involve, as does most scientific work, a lot of routine, uninteresting and hard but necessary work. Secondly, the nature of the enterprise is such that usually it involves team work and incremental improvements rather than spectacular invention. And thirdly, perhaps because caution and meticulousness are so essential to the profession, engineers are generally not very articulate about their work and are conservative in their behaviour. So there is an image problem. The book by James Adams, subtitled *The World of an Engineer*, attempts, rather successfully, in my opinion, to explain to a lay audience what makes engineers tick and what makes engineering such an exciting, important and diverse endeavour.

One of the merits of the book is its wide scope. The fact is that many factors come to bear on engineering as a discipline. A layman would imagine innovative engineering design to be the main concern and he would be partially right. But what the book shows is that development, testing, research, manufacture and assembly, and economics and management, all play important roles. More recently, Adams shows, with examples, that environmental safety and regulatory issues have begun to increasingly bear on the engineering enterprise. Take, for example, manufacture and assembly, one of the less glamorous areas. In 1798, the US Government gave a great boost to the cause of standardization and manufacture employing interchangeable parts, by giving a contract to Eli Whitney for the manufacture of 10,000 muskets. But after World War II, especially towards the seventies, the US found itself struggling to compete with the resurgent nations of Europe and Japan with their modern plants and high motivation. This was mainly because of overconfidence and complacency with regard to manufacturing and assembly. The book is very strong in clearly bringing out the complex and interdisciplinary nature of the field.

There are many examples, stories and anecdotes, some from the author's own career and practice, used to illustrate the multifacetedness of engineering practice. The title stories deal with the evolution of the graceful supports used in medieval cathedrals, the development of the steam engine and the well known problem that caused the catastrophic failure of the Space Shuttle *Challenger*. Here let me just mention a few that I found very interesting. Take the development of CT scanners, a case of classic applied science. Although the Radon transform had already been developed, the physicist Allan Cormack essentially rediscovered it and, more importantly, showed, around 1957, how it could be used with a practical machine to get images orders of magnitude better than those that could be obtained with conventional X-rays. Although he published his work there was little interest in it, even among the medical profession. This work was rediscovered and further developed around 1967 by G. Hounsfield, who had the advantage of the backing of a large corporation, EMI Limited. Primarily because the social and economic environment were now conducive, EMI was able to translate the invention into a marketable product and actually make money on the device. And as usually happens in such circumstances where large sums of money are to be made, competition arose very soon, and EMI ultimately lost the business to General Electric, mainly because GE had a huge marketing force and much bigger resources. An instructive story; as an aside, Cormack and Hounsfield won the 1979 Nobel Prize for Medicine.

Or take the problem of how to teach design to *non-engineering and non-science* students, something I would have thought not possible. Normally, the design course even for engineers is one of the most problematic ones since design involves very much more than analysis and is in that sense 'soft'. Amazingly, Adams is able to sufficiently instruct and motivate his students that as their project he is able to set them the task of designing and *actually building* a small electrical vehicle. And the students are successful, since there is a photograph of their working vehicle! Or take the case of Adams' uncle, a machinist by profession with little technical education, who rose to be a foreman and then a general manager. Being an extremely good machinist with a taste for fine machinery, on retirement he spent his time designing and building sophisticated specialty equipment in his garage. An automatic high speed machine to make small lemon pies and a working steam engine with a piston approximately the size of a grain of rice are examples of his *ouvre*. These are the stories that remind us how great a country the US is, not its ability and taste for bullying other countries. If we are to be more productive as a nation, we need to create environments in our schools, universities and work places where the talents of individuals, irrespective of their nominal qualifications, will be recognized and allowed to blossom.

The book is not without weaknesses. I did not enjoy Adams' discussion of the history of technology. The book is written for an American audience and so it is, naturally, Eurocentric; there is little mention of technology prior to AD 1600 and Asian contributions are hardly mentioned. And the author's style certainly doesn't compare with that of, say, D. D. Kosambi. But these are small matters. The writing is clear and simple and so the book is eminently readable. A great merit is that it can be enjoyably read by anyone with little or no technical background. No doubt the book should be in the libraries of all colleges of science and engineering and should be read by those who administer such colleges and those who teach engineering and engineering design. But I'd go further; engineering is a part of our twentieth century culture and so it should be read by all cultured people.

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Science Matters: The Principles of Science Simply Explained. Robert M. Hazen and James Trefil. Universities Press, 3-5-820, Hyderguda, Hyderabad 500 029, India. 1996. xix + 294. pp. Price. Rs 135.

Imagine trying to convince a young person, brought up on a diet of MTV and ESPN that science matters. The most successful people of the turn of this century (among them, notably, Madonna, the many Michaels – Jackson (MTV), Jordan (ESPN) and Johnson (ESPN)) did not need science in a personally enabling way to get there. Yet it is science, and technology, that delivers them to the living room, in a global village, amplifying and distorting them in proportions grotesque to their relative abilities to improve the physical quality of life. The Whittles and von Ohains are so easily forgotten.

This book is a sincere attempt to convey the principles of science to the MTV generations – from teenagers to baby-boomers alike – in a simple and sometimes simplistic way, always avoiding subtlety. Madonna fans should have no difficulty in following the thread of presentation here.

From absolute zero (p. 28) to the Z particle (p. 126, 128), lucid and compressed, almost telegraphic, explanations are offered, with the underlying scientific principles shown to be simple, but of crucial importance, both for unifying the understanding of the universe and for the making of the modern world, through technology.

The book is divided into 18 chapters, with the introductory chapter outlining the epistemological confidence that the universe might be complex, but is regular and based on simple principles which are knowable thereby making it