Entertainment for the technically mature

GLENN ZORPETTE

Among the silly electronic messages I received recently was an amusing disaster-movie spoof. Midway through it, a character exclaims: "Trish, the pantograph is giving us a vector plasma reading in the cosine range!" Asked what that means, the spoof heroine replies, "Nothing. It's movie science gibberish.

A few days later, browsing on a Sunday through The New York Times, I came across a fawning profile of the actor Jeff Goldblum, in which the screenwriter of the moment said admiringly of him, "He is one of the few people who can really pull off that technobabble."

So this is what it has come to. As technology and science dominate popular culture in a way they haven't since the 1950s, we have Hollywood hotshots speaking in awe of an actor's ability to talk nonsense (and in the cultural pages of the "newspaper of record," no less).

The average consumer of popular culture seems not even to notice the silly talk, much less take offense at it. But what of those who are bothered by blather? Are there any works of fiction that a technical professional can read without gagging?

It turns out that there are. These two books, recently published by small presses, are fine examples. Although they have different agendas—The Uncertainty Principle aims mainly to entertain, whereas The Deadline seeks to inform—both are full of the kind of insights that accrue when an author actually knows something about his or her subject matter.

In The Uncertainty Principle, Steven J. Frank does for the Massachusetts Institute of Technology what the novel and film The Paper Chase did for Harvard Law School. The story follows one Paul C. Bustamente as he passes an eventful sophomore and junior year in the school's electrical engineering and computer science curriculum. Bustamente becomes obsessed with his undergraduate research project, a software system that would conquer nonlinearity, or at least assault it mightily, in forecasting weather. Meanwhile, he matures into pre-adulthood, after the unique style of the technically precocious. The setting being MIT, the rite of passage includes not only revelations about love and sex, but some about the probability of meeting an attractive member of the opposite sex and the quantum mechanical process of tunneling.

Characters are sharply drawn. There is Jeffrey S. Watt, Bustamente's zen-spout-ing, downwardly mobile research advisor; Rita Dorfman, his brilliant, confrontational girlfriend, and Dexter D. Drain III, his competitive, patrician roommate. The plot advances through skillful use of dialogue, which often crackles.

The author, a Boston patent attorney whose clients include several at MIT's Media Lab, is particularly brilliant in a passage lampooning the esotericism of his own profession:

Mo Herman held up the huge Palm, now stained blue with ink from the injured pen. "Not enough," he announced. "The forecast is still just reportage. It's what the Patent Office calls insignificant post-solution activity. The cases cited in 1:06 O.G. 5, September 5, 1989 explain all this."

"Is that correct?" Sue asked us. "Or so you do something more with the output?"

Jeff said: "I always remember Kiangsu in March—the cry of the partridge, the mass of fragrant flowers."

The lawyers looked at each other. I wanted to die.

MIT grads may recognize more than their younger siblings or friends in the novel. The infinite corridor, the Lindgren Library, the Walker Memorial, and Building 54 all put in appearances. Before the novel winds its way to an ambiguous and yet oddly satisfying conclusion, not only patent attorneys but also venture capitalists, television newscasters, and even philanthropic dentists have been skewered. The Uncertainty Principle is compelling entertainment for technically mature audiences.

The Deadline begins improbably with the abduction, by a gorgeous industrial spy, of a laid-off, middle-aged middle manager. It is far from the only time the reader will have to suspend disbelief. The manager, Webster Tompkins, is taken to the Eastern European country of Morovia, which has just been purchased by a software tycoon. There he is given his orders: manage not one but six software projects, each aimed at producing a knock-off of a popular application software package.

Character development and complexity are beside the point. Consider Belok, the psychopathic boss from hell. "I want every man who works for me to be reminded on a daily basis of his inadequacy," he thunders at Tompkins in one passage. "That is the essence of running a tight ship. Rub their noses in it. I want to see a specific nose-rubbing plan from you, in writing, by the close of business today."

Logically enough, the author Tom DeMarco, a software consultant, lecturer, and author, set The Deadline in the world he knows best. Still, probably three-quarters of the book's management wisdom is applicable to any enterprise. In fact, if everyone who manages more than 10 people were to read this book, the business world would be a far, far better place.

Unfortunately for underlings everywhere, it is not clear just who might buy the novel. Those people who are ambitious enough to actually read books that might help them become better managers are probably the type who would simply mine dreary or superficial nonfiction tomes for whatever useful nuggets they might contain. That's a shame, because this book would give them much the same good advice and insights, but in a breezier, more entertaining format.

If you plan on buying the book, good for you. Stop reading right here, because I am about to reveal and grieve about the book's trite ending. The hero gets not only the girl, but a massive windfall from an IPO. It's a bit nauseating, in the way...
that too much angel-food cake is. But perhaps the book’s intended audience won’t find it so.

And if forced to choose, I suppose I’d rather be nauseated by saccharine than patronized by technobabble.

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The science behind global change

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Simple diagrams of how water, oxygen, carbon, nitrogen, and sulfur cycle through natural systems and the human economy are a regular feature at nature centers and in elementary school text books. Their relationship to current understanding in biogeochemistry is about the same as that of newspaper diagrams that “explain” the Internet to the engineering design of network communications. If you would like to move beyond the ecological PR to a concise, carefully balanced, semi-technical treatment of the science that underlies such issues as climate change, acid rain, photochemical smog, and the ecological effects of fertilizer runoff, Vaclav Smil’s Cycles of Life is a good place to start.

The first two chapters set the stage. Carbon, nitrogen and sulfur are the focus because these “doubly mobile” elements both are soluble in water and exist as atmospheric gases. Their cycling “is critically dependent on the ubiquitous and intricate participation of living organisms,” including terrestrial plants, soil bacteria, and oceanic phytoplankton. While their cycles are “indispensable for life,” they are also “the creations of life—and they are particularly vulnerable to human interference.”

Chapter 2 is historical, tracing the origins of biogeochemistry. It is interesting, well-written background but easily skipped by anyone eager to get to the heart of the current science. Indeed, Chapter 3, which lays the foundations for the review of the state of the science today, overlaps with and repeats some of the first two chapters’ ideas.

At the core of the book are detailed accounts of the carbon, sulfur, and nitrogen cycles. While readers who have followed general press accounts of climate change and acid rain will be familiar with some aspects of the carbon and sulfur cycles, it is unlikely that many will have seen all the pieces put together, or seen their interrelationships laid out with such clarity and critical insight. There is an excellent discussion of “forest decline,” which in many locales turns out to be more subtle, and less severe, than once thought.

Much of the discussion of the nitrogen cycle will be new to most Spectrum readers. Diatomic nitrogen is the dominant constituent of the atmosphere, but is not accessible to most organisms. Indeed, “nitrogen is the nutrient limiting the productivity of terrestrial ecosystems.” A number of bacteria, plus lightning, to a lesser degree, convert nitrogen into various reactive forms that plants can use.

Oxides of nitrogen, produced during combustion in power plants and automobiles, are a key ingredient in photochemical smog. These nitrates, together with sulfates, fall onto the land. Intentional applications of nitrogen in fertilizer have grown exponentially since the 1960s, when less expensive electricity-saving means of producing ammonia were devised. While applications are stabilizing or declining in the highly industrialized world as a result of more efficient practices, use continues to grow in densely populated and land-scarce regions of the developing world. Overall, about a third of the protein consumed worldwide can be said to depend on artificial fertilizers, and in countries like China, Egypt, Indonesia, Bangladesh, Pakistan, and the Philippines, the ability to feed fast-growing populations still is based on extensive and growing use of nitrogen.

Current U.S. applications are about 50 kg of nitrogen per hectare. China is averaging above 200, “and in the country’s most intensively cultivated provinces (occupied by some 300 million people) it surpasses 300 kg N/ha.” In ecosystems, an excess of reactive nitrogen can overly enrich water with nutrients, and can dramatically shift and narrow the mix of species.

The study of biospheric cycles is an inherently interdisciplinary subject, requiring, as Smil notes, careful attention to such diverse topics as “cyanobacteria and large turbogenerators... atmospheric chemistry and national dietary patterns.” Few can legitimately claim as wide and deep a command of the relevant material as Smil, and even fewer can write about it with his clarity and balance.

Chapter 7, “Balancing the Accounts,” examines such questions as: what is the net productivity of the biosphere? how much carbon goes to forests and how much to the oceans? to what extent does all the added carbon and nitrogen fertilize the biosphere?

Smil does a good job of explaining how we know what we know, where the important gaps are in our knowledge, and which of the uncertainties are the most significant.

The final chapter enters the realms of forecasting and public policy. In less than a dozen pages, likely future patterns of global population and energy use are sketched. A compelling case is made for energy efficiency. The adaptability of people and societies is stressed, as is the idea that technology, not just human behavior, counts heavily in solving key problems. Smil correctly argues that policy conclusions entail major value choices but has relatively little to say about these difficult issues.

Better and more generally diffused understanding is a prime prerequisite for developing informed public policy on issues of global change. By a sizeable margin Cycles of Change is the best semi-technical treatment of biogeochemistry available. It deserves a wide readership.

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