

• DELAUER ON DEFENSE • CUTTING REGULATORY RED TAPE •

• TAX REFORM: BONUS FOR HIGH TECH •

TechnologyReview

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JULY 1986

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RELOCATING THE NAVAJO

WHEN
TECHNOLOGY AND
TRADITION
CLASH





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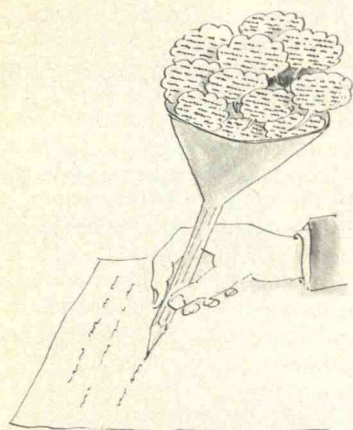
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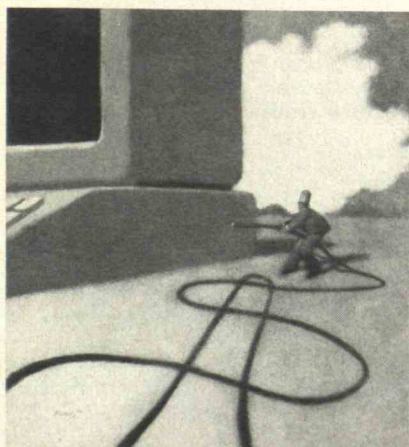
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Lessons from Japan

"By focusing on the broader economic, political, and social issues that center around technology, *Technology Review* is sending warning signals to America about future problems," writes Japanese journalist Takashi Kakuma in *Beruf*, the Tokyo magazine that carries translated articles from the *Review* for Japanese readers. "Just about everything that happens in the United States eventually occurs in Japan," Kakuma warns.

This comment on *Technology Review* and its relevance to Japan as well as the United States was published on the occasion of *Beruf*'s fourth anniversary. Kakuma's remarks came in a dialogue with Yoshiro Hoshino of Teikyo University. Together they speculated on Hoshino's observation that American technology has changed: "It used to be that when a product had 'Made in America' stamped on it, quality was guaranteed."

What has changed? asked Kakuma.

Hoshino's answer: "When American engineers were knowledgeable about production and maintenance problems, they designed products that wouldn't easily break down.

"Now a different America is emerging," he says. For example, General Motors introduced articulated robots on their assembly lines without changing the basic manufacturing processes, without studying the consequences thoroughly beforehand. "This would not have happened in an earlier America."

In other ways, too, says Hoshino, U.S. technology is showing its age. It's focusing, he thinks, too sharply on space, electronics, and biotechnology, and by

emphasizing Star Wars the United States is "taking a chance on falling behind in the industrial technology infrastructure here on earth."

What are the real problems for tomorrow's technology? asked Kakuma.

Hoshino's answer: it may be possible to guide a rocket to its target in space, but "I'll eat my hat if you can operate an automated car from Shinbashi to the middle of Ginza in downtown Tokyo. Issues related to nature and unpredictability . . . are a challenge that can't be solved by conventional technology."—*John Mattill*

TWO STAFF ADDITIONS

Our masthead displays two new names this month—Laura van Dam and Beth Horning, associate editors. Van Dam will edit Forum contributions and major articles, working on our contributors' words, while Horning as copy editor will concentrate on improving the editors' efforts.

After graduating in science communication from Boston University, van Dam worked as a reporter for the *St. Petersburg (Fla.) Times* and *New England Business*. Earlier she did editorial work for the New England Wild Flower Society and (as an intern) for the *Christian Science Monitor*. Horning studied and taught English at Indiana University and since 1980 has been working as an editor for various publishers in the Boston area. She writes poetry, essays, and fiction for several newspapers and magazines.

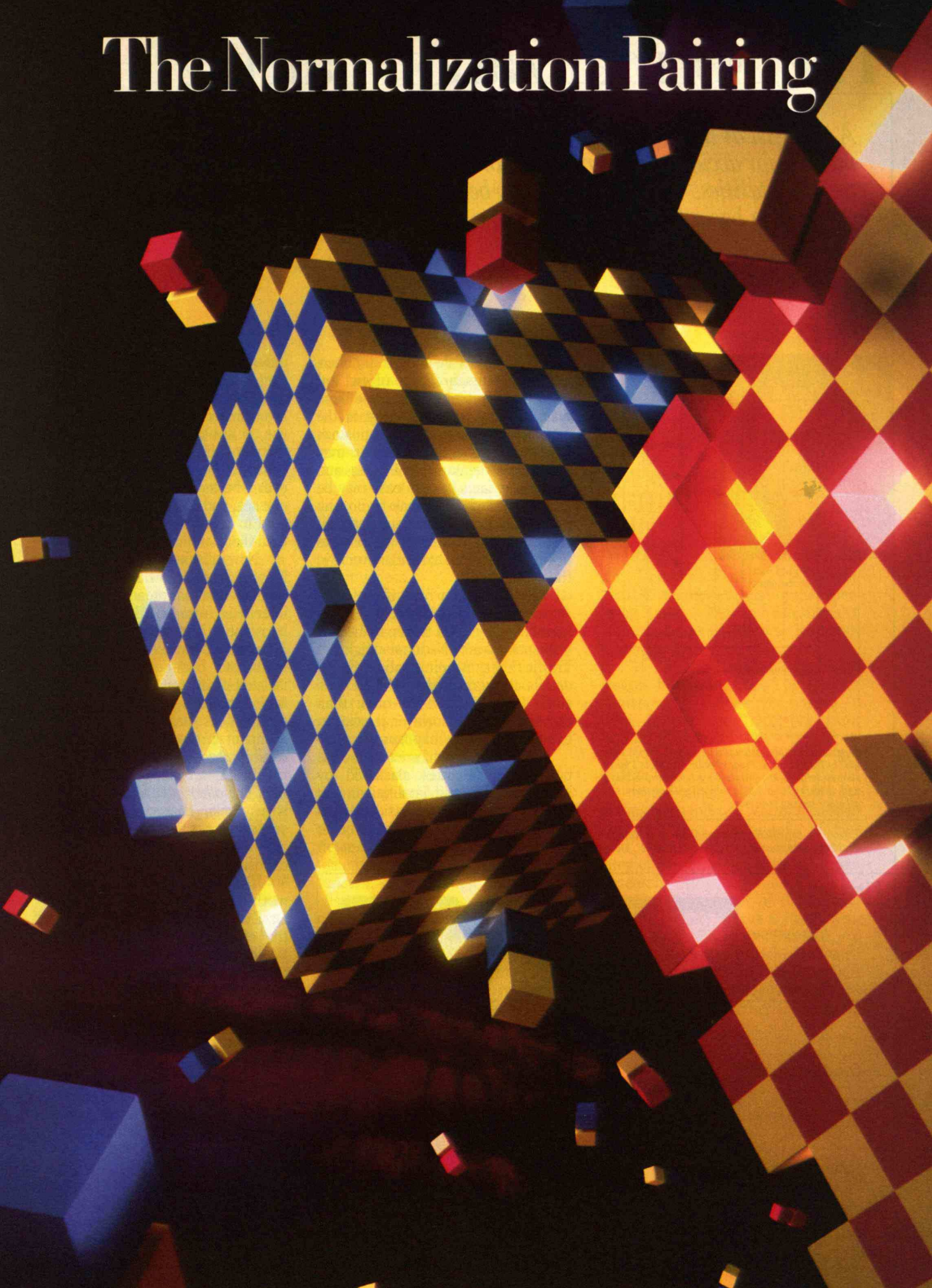
Because of other pressing commitments, Robert Cowen was unable to write his column for publication in this issue.

***Beruf* magazine, which brings the content of *Technology Review* into Japan, celebrates its fourth anniversary.**



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The Normalization Pairing



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Chemists and the Media

SCIENCE AND SENSATIONALISM

In "Time for Chemists to Pull Their Heads from the Sand" (*February/March*, page 6), Robert Cowen wrongly disparages the National Research Council (NRC) report *Opportunities in Chemistry*. The report's intent was to show how chemistry aids each of us every day—and to counter media sensationalism, which is typified by Mr. Cowen's suggestion that "many people . . . wonder what new chemical horrors are being released daily into the environment." Such sensationalism tends to induce anxiety rather than encourage prudent consideration of the risks and benefits of scientific developments.

As the report states, the public must make choices on its own behalf. Neither scientists nor any other special interest group should be allowed to influence those choices. The electronics engineer who facilitates better television communication is not thereby qualified to decide whether Big Brother, Jerry Falwell, or Robert Cowen should appear on sets in every home.

Scientists do have ethical responsibilities, though. Whenever the public has to make informed decisions, scientists are crucial—not as advocates but as experts. To quote the report, they must supply objective information "in language free of technical jargon." The media must do their part by providing balanced coverage.

Scientists and the media must cooperate. Currently, however, some parts of the media represent the chemistry community as uncaring and irresponsible, and some parts of the chemistry community strongly resent the media's persistently pejorative treatment of news involving chemicals.

A constructive step would be for the media and the chemistry community to engage in an open dialogue on how to communicate with the public about technological benefits and attendant problems. Such a dialogue would be most useful if it were based on the good-faith premise that both the media and the chemistry community sincerely wish to help people. I'm happy to report that such a dialogue will be initiated, with Mr. Cowen as a participant, at the national meeting of the American Chemical Society this September. And I invite interested readers to attend.

GEORGE C. PIMENTEL
Berkeley, Calif.

George C. Pimentel is president of the American Chemical Society and chairman

of the Committee to Survey the Chemical Sciences, which commissioned the NRC report.

PARTICIPATORY MANAGEMENT

In "Pruning Our White-Collar Ranks: A Key to Productivity" (*November/December*, page 14), Lester Thurow suggests that corporations would profit from participatory management, which, in his view, could increase productivity and eliminate superfluous middle management. My own experience with a small specialty-chemicals plant does not bear him out.

When I came to the plant in 1933, it had participatory management: the plant manager spent fully half the working day with the employees. Yet even though participatory management remained in effect, the plant closed forever in June 1985. One reason had to do with the untimely deaths of two key managers. But three other knockout blows came from American industry in general and show why participatory management, valuable as it may be, is usually infeasible in today's business world.

First, since the plant needed substantial funds for technical improvements, traditional financial-management policies began to displace participatory management. The plant began to look for personnel attuned to fiscal management rather than enlightened technical management.

Second, the plant felt the effects of World War II, which marked a critical transition in the nation's economic history. The war spawned a need to train millions of both military and civilian personnel in a short time, and this led to government involvement in civilian affairs. This involvement steadily increased, introducing bureaucracy into the private sector on a very large scale. As a result, plant managers found themselves further and further removed from workers.

Third, the plant's parent corporation, like so many others, moved toward quantitative growth and away from qualitative growth based on technical excellence and participatory management. Much of this action was necessary because of inflation and the instability of interest rates, which put a high premium on immediate profit and discounted the responsibility of both government and industry to provide for the nation's economic and technical future. The upshot has been ever-larger conglomerates and multinational corporations.

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who started me thinking," Lozano says, "because he said it is very rare for a Hispanic to ever get this type of cancer. He asked me right away whether I spent a lot of time in the sun. I said there's no way I could have because I was normally going into the plant at a quarter of six in the morning and not leaving until my 12-hour shift was up."

Rohr began the legal battle with little local support, and she has faced opposition even from the local chapter of the International Brotherhood of Electrical Workers, which represents the Lenkurt employees. The union overlooked health and safety issues, choosing to fight against layoffs instead. But despite these efforts, GTE has gradually moved most departments from the Lenkurt plant across the border to Juarez, Mexico. Only about 150 workers remain at the Lenkurt plant.

Lozano and Rohr have received assistance from the National Network for a New High-Tech Agenda. Made up of high-tech workers, health and safety specialists, and environmentalists, the group is known informally as the Integrated Circuit. One of its main priorities is the health of high-tech workers.

Integrated Circuit member Nancy Lessin, director of the Massachusetts Coalition for Occupational Safety and Health, has followed the Albuquerque case closely. She notes that doctors, toxicologists, and epidemiologists are showing a growing interest in environmentally induced damage to the immune system. These researchers think they see a pattern in the symptoms of workers exposed to a broad spectrum of chemicals, especially in large doses. "It is an unusual constellation of symptoms," Lessin says, "but

one we are coming to recognize."

The immune system, an extremely intricate biological system, protects the body against disease by identifying potentially harmful alien materials and releasing antibodies to fight them. Albert Levin, a physician at the University of California at San Francisco, emphasizes the ability of large amounts or large numbers of chemicals to break down the immune system. He has coined the term CAIDS—Chemically Acquired Immune Deficiency Syndrome—to describe the variety of symptoms that can result. However, he cautions strongly against comparing CAIDS to AIDS, in which the immune breakdown is rapid and far more extensive.

David Ozonoff, an epidemiologist at Boston Univer-

sity, agrees that researchers are seeing "definite effects on the immune system from chemical exposure." He feels that those effects are just beginning to be understood, but he can see why defendants such as GTE fear evidence that working conditions could cause them: immune deficiency might explain "a whole range of diseases."

The focus on the immune system marks a significant change in research on toxic effects. Until recently, researchers have tried to link specific symptoms to individual chemicals. Many of the symptoms like the ones exhibited in Albuquerque "were previously seen by the medical community to be psychosomatic, or what we call ideopathic [of no known cause]," says Levin. He notes the "growing recognition that

a lot of the cancer we are seeing is related to immune-system breakdown."

So far, it is unclear whether courts and state worker compensation systems will accept any of the theories that connect different diseases with employee exposure to chemicals. After almost two years, the cases brought by Lozano and her co-workers have yet to come to trial.

Levin believes that the public will benefit from the suits regardless of the outcome. "My goal is to make the public recognize the dangers of the indiscriminate use of toxic chemicals. I think the toxic torts arena works faster and more effectively than virtually any other in this respect, certainly faster and more effectively than publishing findings in a scientific journal."—*Seth Shulman*

Lancashire Laundry Day

 n the site of an abandoned gasworks in Blackburn, Lancashire, in the British Midlands, biotechnology is being used for the first time to decontaminate spoiled land. The two-year project began this past December. It could be the largest such cleanup operation ever undertaken in Europe or the United States, says a representative of BioTechnica Ltd, the company hired by the Blackburn Borough Council to do the job.

The Greenbank Gasworks closed in the 1970s, when natural gas from offshore fields in the North Sea replaced "town gas" manufactured from coal. The site was left contaminated, primarily with phenols, coal tars, and cyanide.

The idea that microbes could munch through heaps of waste like an army of Pacmen appeals to those who must deal with the excreta of industry. The usual practice of shifting the material from one site to another simply buys time. At Greenbank, BioTechnica employs natural microorganisms from the site itself to completely eliminate the problem.

The technique being used at Blackburn does not rely on genetic engineering to create new organisms. Rather, it focuses on stimulating existing microbes—with improved climates and nutrients—to vigorously attack waste material and contaminants. The first step is isolating microorganisms that have, on a limited scale, already begun the degradation process. According

to John Rees, BioTechnica's environmental program director, such microbes have to exist. "It would be a very strange site that did not have natural microbes."

However, says Rees, they exist in insufficient quantities and conditions for them are usually "unsatisfactory." Therefore, once the active microbes are isolated, they are bred in 150-liter fermenters. Then layers of the microbes go into specially designed mounds built by a team from Miller Buckley Projects, a civil-engineering firm that is undertaking the decontamination with BioTechnica. To provide a better climate for the microbes, tents enclosing the mounds raise the temperature a few degrees. A watered-down mixture of the microbes and soil will be sprayed on the rest of the site.

The bacteria digest the contaminants in the mound, excreting water and carbon