

and its related sciences are human endeavors spanning centuries and continents.

In the remarkable *Meaning in Technology*, he argues that technology expresses the aesthetic drives of its creators and users. Machines, for example, have characteristic tempos and sounds, and many automobiles and motorcycles are tuned acoustically for a pleasing effect. And, just as musicians develop tactile relationships with their instruments, scientists, engineers, and artisans often can understand and diagnose conditions by touch. Some aircraft radio repair technicians during World War II developed a kind of empathy toward the electronics equipment they worked on that enabled them to find problems without full testing. Technology, Pacey argues, unites ears, eyes, and hands.

Machines and structures also unite people. *Things* bear meanings for society. The design of bicycles and aircraft incorporates ideas about who is going to operate them, and how. Will the devices be unforgiving but powerful, rewarding strength and precision but treating weakness and misjudgment harshly? Will they require authoritarian, top-down control for safe operation, or will they promote cooperation among smaller communities? Do they draw on our innate playfulness? Are they available equally to girls and boys, women and men?

If music is Pacey's central metaphor for scientific and technological creation, the garden exemplifies human works in the natural world. The human transformation of the landscape, he shows, goes beyond anything required by the body's simple need for nourishment and shelter. This change is not always harmful to nature, either. Preserves and other artificial microhabitats (he could also have mentioned England's remaining hedgerows) support higher densities of species, including some rare ones, than their "natural" surroundings. To many engineers, bridges and roads can enhance the beauty of landscapes.

The strength of this book, its catholic approach to technology, is also a limitation. Too little space is devoted to the central scientific and engineering trend of the new century, the rise of electronic networks—and to the fortunes being made from them. Many great inventors of a hundred years ago, notably Thomas Edison, lived for innovation rather than for profits. Even the engineers and scientists of the old military-industrial complex,

which Pacey sees as a source of Faustian temptation, were generally interested less in wealth or military power than in opportunities to pursue elegant work with ample resources. Salaries, in those days before stock options, were merely comfortable.

Do today's technological entrepreneurs pursue new meaning in the products they create? Or does the prospect of rapid wealth make values—not to mention basic business ethics—a luxury? More broadly, does the present Internet embody the "people-centered" technology that Pacey advocates and many of its pioneers had in mind, or does the driving competition of electronic commerce substitute staring eyeballs and clicking fingers for engaged minds? Pacey does not ask these questions directly, but he gives us the right tools for answering them.

—Edward Tenner

***THE UNDISCOVERED MIND:
How the Human Brain Defies
Replication, Medication, and
Explanation.***

By John Horgan. Free Press. 336 pp.
\$25

Horgan's last book whipped up a small storm. *The End of Science* (1996) argued that various sciences, their big problems either solved or insoluble, have hit the wall. Scientists protested, conferences convened, pundits pondered, and the storm passed. Nevertheless, one protest registered on the author, who was then a writer at *Scientific American*. Neuroscientists denied that their science was stymied by the brain's "sheer complexity." The mind sciences were not ending, they insisted, but just beginning. Chastened, Horgan set out to write *The Undiscovered Mind*.

Along with neuroscience, the book focuses on the fuzzier sciences that study the mind by trying to control its problems, recount its evolution, or reproduce it in a machine. The mind sciences, Horgan says, haven't ended. They just don't get anywhere, and in one chapter after another, he knocks them down. The genetics of behavior can't explain the mind's motivations. Psychoanalytic, psychological, and pharmacological therapies can't cure the mind's malfunctions. Neuroscience can't put systems of neurons together and explain the mind's capabilities. Evolutionary psychology can't account for the mind's predilections.

Artificial intelligence can't reproduce the mind's complexity. And the loose confederation of mystics who study consciousness barely make sense.

Horgan's writing is vivid, intelligent without being jargony, and personal without being condescending. The amount of research he has done on the mind sciences—which barely communicate with one another—is impressive. And the reader can't help but share his impatience with studies on ill-defined subjects, theories that are not only unverified but unverifiable, endless debates over the relative importance of heredity and environment, and highly educated people who want to test psychoanalytic theory with artificial intelligence or explain consciousness using quantum theory. "When it comes to the human brain," he writes, "there may be no unifying insight that transforms chaos into order." The reader can't help but share that suspicion.

Another thing the reader can't do—at least this one can't—is fully trust Horgan's assessment. He says his goal is to redress his earlier message that the mind's complexity overwhelms neuroscience. Yet this book's message, extended to the rest of the mind sciences, is exactly that. Another goal, he says, is to look at the mind sciences with the proper mix of hope and skepticism, and thereby "protect us from [our] own lust for answers while keeping us open-minded enough to recognize genuine truth." But the book details plenty of grounds for skepticism and none for hope.

Let's assume that the stated goals are window-dressing, that Horgan set out to look for the limitations of the mind sciences, and that he found what he looked for. We distrust scientists who reach conclusions this way. We should distrust science writers who do too.

—Ann Finkbeiner

Contemporary Affairs

THE BIG TEST: The Secret History of the American Meritocracy.

By Nicholas Lemann. Farrar, Straus & Giroux. 406 pp. \$27

In *The Promised Land* (1991), Lemann analyzed poverty and race by looking at the "great migration" of American blacks after World War II. Now he analyzes class and race by looking at college admissions tests and affirmative action. Like his earlier book, *The Big Test* is full of valuable insights.

A staff writer at the *New Yorker*, Lemann goes back to the roots of the dreaded SAT (originally the Scholastic Aptitude Test, then the Scholastic Assessment Test). The test originated in Harvard University president James Bryant Conant's desire to transform the university's undergraduate body from an aristocracy of birth to an aristocracy of intellect. The author chronicles the 1948 creation of the Educational Testing Service (ETS), the parent of the SAT, which has tried to perform the mutually inconsistent functions of monitoring the test and marketing it. He also recounts the inevitable appearance of an industry that helps students—those who can afford it—boost their test scores, despite early protestations that this

was impossible; the research on the correlation between test scores and socioeconomic status, aborted because it would necessarily entail delicate social judgments; and the short, unhappy life of the Measure of Academic Talent, which adjusted SAT scores based on the student's family background, but only for internal consumption in the ETS research department.

In Lemann's account of the SAT, this tool designed to eliminate the class system has simply spawned a different but equally rigid hierarchy. He argues that the test (and its graduate school siblings), by directing some young people to the top universities, determines admission to elite status much too early, and does so based on childhood education rather than adult performance. And elite status, once conferred, tends to adhere. He would substitute a more protean system in which "the essential functions and the richest rewards of money and status would devolve to people only temporarily, and strictly on the basis of their performances; there would be as little lifelong tenure on the basis of youthful promise as possible. . . . The purpose of schools should be to expand opportunity, not to determine results."

Conant discovered a letter in which Thomas Jefferson sounded a meritocratic note,