illuminate a mystery that has puzzled students of the Han dynasty for centuries. At the beginning of the Han, before Confucianism became the official ideology of the empire, the court was dominated by a form of Taoism known as Huang-Lao (a term that combines the names of Huang Di, the Yellow Emperor, and of Laozi, the legendary founder of Taoism). The content of Huang-Lao was unknown until 1973, because there were no received texts clearly identified with it. Most scholars agree that the four texts appended to Mawangdui *Laozi* B will help to clarify Huang-Lao, but the consensus ends there.

Yates's is the first complete English translation of the four *Laozi* B texts (and one other text from the same cache). Some of his interpretations are controversial, especially his theory that a distinct school of philosophy, Yin-Yang, existed prior to Huang-Lao and contributed significantly to it. Of course, no translator could avoid controversy in the midst of such fertile debate. These are exciting times for anyone interested in the fundamentals of Chinese thought, and this translation provides a welcome introduction.

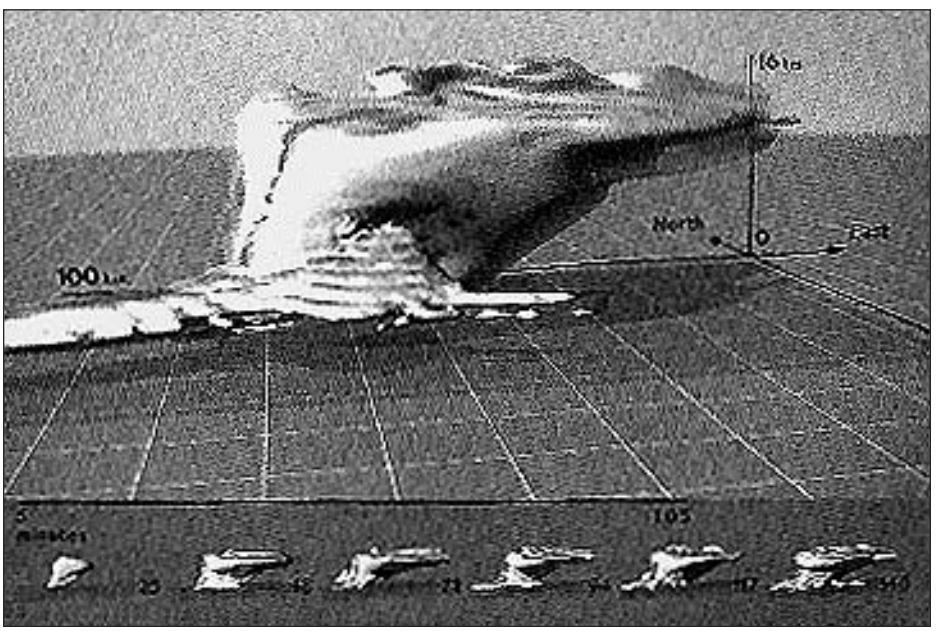
—Andrew Meyer

Science & Technology

*VISUAL EXPLANATIONS: **Images and Quantities, Evidence and Narrative.***
By Edward R. Tufte.
Graphics Press. 156 pp. $45

Edward Tufte's first book, *The Visual Display of Quantitative Information* (1983), revealed a curious fact about the incipient era of personal computing: unprecedented amounts of data can now be manipulated with unheard-of speed, yet users often rely on visual presentations that are ungainly and distracting. In his book, described by one reviewer as "a visual Strunk and White," Tufte did not try to create a new aesthetic for the Information Age (as publications such as *Wired* have since claimed to do). Rather, the Yale University political scientist and statistician searched the past for graphic works exemplifying clarity, integrity, and ingenuity—such as a combined map and chart, drawn in 1861 by the French engineer Charles Joseph Minard, that traces both the advance and the retreat of Napoleon's army in Russia during his invasion of 1812. Using a thick line that changes color and grows thinner as the troops move westward, Minard vividly captured the drastic attrition that Napoleon's army suffered. It is, in Tufte's opinion, "the best graphic ever made."

Despite the comparison to Strunk and White, Tufte's works are not mainly rule books or guides. Rather, they are splendidly



personal anthologies of good and bad instances of visual presentation. His second book, *Envisioning Information* (1990), includes such arresting images as an exploded diagram of an IBM copier-duplicator, in which 300 parts are kept in their relative positions but separated and labeled.

Motion in time, both physical and abstract, is the focus of the present volume. Process, change, causation—the challenge here is the compression of four-dimensional data into two-dimensional images. Hence the striking cover image of a developing thunderstorm. On a clear but subdued time-space grid, the viewer sees both the enormous cloud depicted at a particular moment and six smaller depictions of its past and future states.

"Certain methods for displaying and analyzing data are better than others," writes Tufte. "The difference between an excellent analysis and a faulty one can sometimes have momentous consequences." Thus he compares the ways in which crucial information was presented in "two life-and-death decisions": the attempt to curb a cholera epidemic in London in 1854, and the decision to launch the space shuttle *Challenger* in January 1986. In 1854, the Victorian physician John Snow drew lucid data maps that linked the epidemic with a single contaminated water pump. In 1986, the *Challenger* engineers used number charts that were incomplete and confusing, and seven astronauts died. The same *Challenger* data—the recorded effects of hot and cold temperatures on the rubber O-rings holding the rocket together—show up much more clearly in the two formats devised by Tufte: a number chart that includes all the relevant information, and an old-fashioned scatter plot.

In Tufte's book, as in life, simpler is not always better. Most of his other examples demand unusual analytic and aesthetic skill—and often time. These are not always available. A second limit of Tufte's method is his penchant for purely visual analysis, abstracted from the history of representation. For instance, he describes the title page of Thomas Hobbes's *Leviathan* (1651) as having been organized as a "confection" along the same lines as an illustration from Jean de Brunnhoff's *Babar's Dream* (1933). Such ahistoricism can delight but it can also mystify. Tufte also deplores Isotype glyphs (e.g., one stylized coffin equals so many deaths) without explaining why they were once so popular. Nor does he say what is so very bad about Isotype. It may not be elegant, but is it misleading? Occasionally, aesthetics can even dehumanize. Tufte's own composite illustration of a psychotic patient's agonizing medical history is a masterpiece, but is there any evidence that it helped that particular patient or any other? Ultimately, what *Visual Explanations* illustrates best is the reason why good graphic designs are so uncommon: they are uncommonly hard to do.

—Edward Tenner

THE MATHEMATICAL UNIVERSE: An Alphabetical Journey through the Great Proofs, Problems, and Personalities.

By William Dunham. John Wiley & Sons. 320 pp. $24.95

The mathematician Felix Klein once responded to the hackneyed comparison of mathematics to music by saying, "But I don't understand; mathematics is beautiful!" Every mathematician knows what Klein meant. So will readers of this fine popularization. As he did in his previous book, a guided tour of the 12 great theorems called *Journey through Genius* (1990), Dunham describes the human and the historical dimensions of mathematical discovery. But while most popularizers settle for gee-whiz accounts of incomprehensible discoveries that merely reinforce our prejudice that math is baffling, Dunham, a professor of mathematics at Muhlenberg College, does the opposite. He walks us through the actual proofs, and we learn that with math, unlike sausage or legislation, we do want to see how it's made. His book is organized into 26 alphabetical entries, from A (Arithmetic) to Z (the symbol for the complex-number system). An awkward arrangement, perhaps, but in Dunham's hands it still permits some historical depth. The entry "Hypoteneuse," for example, presents three proofs of the Pythagorean theorem: an ancient Chinese diagram, an elegant 17th-century calculation, and a clever proof devised by President James Garfield when he was in Congress. About the latter, Garfield remarked drily that it was "something on which the members of both houses can