

nounced on a 30-foot screen before an audience of hundreds. . . . Even in solitary encounters with nature . . . our pleasure . . . has been anticipated by a thousand L.L. Bean catalogues, Ansel Adams calendars, and advertisements.”

Despite a few weak spots—he too hastily dismisses sincere conservative forms of civic

activism, and his treatment of religion is superficial—*For Common Things* is the work of an unusually perceptive social observer. If one wishes to see the world through the eyes of a very intelligent 24-year-old, this is an excellent place to begin.

—Patrick Glynn

Science & Technology

THE UNIVERSAL HISTORY OF NUMBERS: From Prehistory to the Invention of the Computer.

By Georges Ifrah. Translated by David Bellos, E. F. Harding, Sophie Wood, and Ian Monk. Wiley. 633 pp. \$39.95

In 1937, archeologists in Czechoslovakia unearthed a 30,000-year-old wolf bone with 55 notches carved into it. A caveman had used the bone to count something (nobody knows what), but he would have been at a loss to say how many notches he had made. Other than perhaps 1 and 2, numbers hadn't been invented. There was no word for 55; like the numbers 6, 78, and 203, it was too large to have an individual name. It was “many.”

Humans got by with “1, 2, many” for millennia. Even in the 20th century, the Siriona Indians of Bolivia used the word *pruka* to describe any number greater than 3. Luckily, though, humans have a built-in calculator, which gave rise to number systems based on 5, 10, and 20. In the Ali language of Africa, the word for 5 means “hand” and the one for 10 means “two hands.” When each value was associated with an individual word, numbers were born.

In *The Universal History of Numbers*, Ifrah, a former math teacher, traces the tortured past of our Arabic system, which denotes each number by a combination of 10 symbols. It started in Babylon, was carried to India by Alexander, was captured by the conquering Arabs a millennium later, and reached Europe during the 13th century, where it was promptly banned. Westerners were so suspicious of Arabic numerals that Pope Sylvester II, an early advocate of the system, was accused of selling his soul in order to borrow Muslim magic. In 1648, papal authorities cracked open Sylvester's tomb to

ensure that Satan wasn't in residence.

Ifrah also describes the evolution of number systems that failed. Early in the first millennium A.D., the Mayans developed a system that was much more advanced than medieval Europe's—it had a zero, which was unknown in the West until after the Spanish conquest in the 16th century. But Mayan civilization mysteriously collapsed in the 10th century, leaving others to discover zero for themselves.

The Universal History of Numbers is less narrative history than reference work. In the middle, Ifrah interrupts the text with a 70-page alphabetical list of Hindu number concepts. The book also bears little anecdotal filigree. For instance, the author explains that the British Court of Exchequer kept records on wooden tally sticks, but he doesn't tell what happened when the government ended the practice and tried to get rid of the sticks in 1834: the tally stick bonfire got out of control and burned down Parliament.

Despite its lack of flourish, this is a highly satisfying volume, none the worse for having been translated from the French. It will give the same pleasure to math and history buffs that a fine dictionary gives to philologists.

—Charles Seife

MEANING IN TECHNOLOGY.

By Arnold Pacey. MIT Press. 264 pp. \$27.50

Pacey, who teaches at Britain's Open University, has long been one of the most learned and humane scholars of technology. He made his reputation with a series of wide-ranging works, including *The Maze of Ingenuity* (1976), *The Culture of Technology* (1983), and *Technology in World Civilization* (1991). In popular usage, the word *technology* has become synonymous with computerized devices and software; for Pacey, technology