

The Popular and the Phony

Proofiness: The Dark Arts of Mathematical Deception. By Charles Seife, Viking, New York, 2010, 304 pages, \$25.95.

Charles Seife, who majored in math in college and is now a science writer and professor of journalism at New York University, has come up with a new word: “proofiness.”

Seife defines “proofiness” as

“The art of using bogus mathematical arguments to prove something that you know in your heart is true—even when it’s not.”

This art, or technique, is an old story. In a Biblical version, King Solomon suggested that a baby be split in half. As it worked out, his suggestion imposed peace between two women, each of whom claimed the baby as her own.

BOOK REVIEW

By Philip J. Davis

We all know that “There are lies, damn lies, and statistics”—a saying often attributed to Benjamin Disraeli, twice prime minister of England. The number of books that deal with the misuse and misinterpretations of statistics is large. With this new book, Seife has extended the recognition of untruths engendered by mathematics far beyond the field of statistics. *Proofiness* is an easy read, delightful even, if one likes to know about deceptions, obfuscations, frauds, swindles, humbugs, Ponzi schemes, all of which abound in the book. Many were created deliberately, but just as often the culprits were following old patterns without conscious thought. Seife’s book invites both laughter and incredulosity at our own gullibility.

Face it: The public both loves and hates mathematics; it is ambivalent toward numbers. Watch a baseball game on TV and notice how many numbers are mentioned or displayed; then turn to the financial pages of the daily paper and do the same. In almost the same breath, the public ascribes to numbers an objectivity that trumps the subjectivity of personal perceptions. Yet it does not want to deal with numbers themselves. “You do the math” is a common attitude, one that can imply that I’ll accept whatever you hand me.

Seife has come up with and recorded in this book dozens of instances of contemporary proofiness. His examples involve pollsters, risk takers, politicians, Supreme Court justices, psychiatrists, election officials, journalists, population experts, economists. No one, it would seem, is immune from committing proofiness. Was I guilty of proofiness when, arriving at Fred and Laura’s house for a visit, I told them, “We were four hours on the road”? Actually it was six and a half hours, but “who’s counting?”

Seife deals with real-world instances, but let me begin in pure mathematics. If we write $1 \times 0 = 2 \times 0$ and then say “Cancel the 0s,” we get $1 = 2$, which most of us would reject. If we deal with the alternating infinite series $1 - 1 + 1 - 1 + \dots$ and parenthesize it in two different ways, we can get $0 = 1$. Mathematical logic informs us that one contradiction implies that all statements are true, which fact would be good news for some politicians. So we become whistle blowers, formulate prohibitions; we say: Never divide by zero, and be particularly careful when manipulating non-absolutely convergent series.

But what is a contradiction in mathematics? Girolamo Cardano reacted as if to mental torture when he came up against $\sqrt{-1}$ in the solution of a cubic equation—this symbol, this number, whatever, contradicted the law of signs. And was Dirac committing proofiness when he came up with a function that is zero everywhere except at one point and yet has an integral that is positive?

Mathematics exults in eliminating the onus of contradictions. In his book *What Is Mathematics, Really?*, Reuben Hersh observes that in mathematics, “Consistency is a secondary issue. We can usually patch things up to be consistent.” Hence: Generalized functions were dreamed up to explain the Dirac function. In Cantorian arithmetic, $\aleph + \aleph = \aleph$. Hence: Completed infinities have emerged. Contemporary mathematicians, as well as Poincaré, considered the existence of these infinities just plain goofiness. Or shall we now call it proofiness?

But back to Seife’s examples from the social world. Here are a few: (a) “On October 13, 1999, UN Secretary General Kofi Annan welcomed a young Bosnian boy into the world as the six billionth person on earth.” (b) In Al Gore’s movie *An Inconvenient Truth*, the world’s coastlines are shown to be disappearing as a result of global warming. Gore assumes a rise in sea level of twenty feet, ignoring more moderate estimates. (c) In the 1980s, regression analysis was performed by a Yale economist, who then “came up with an equation . . . that predicted who would win a presidential election. All you had to do was plug in a few economic indicators—inflation, growth rate, and a few other factors—and voilà, out pops the next president.” The equation worked in 1984, and again in 1988, to great applause. Confidence soared. Alas, the formula flopped in 1992. In 1996, despite having been tweaked by the economist, the equation flopped again.

This last story is only a small part of Seife’s long and informative discourse on recent elections. He provides many reasons for which winners of elections can’t be declared with absolute and irrefutable certainty, even when votes have been cast electronically and tallied by computer. Human counting of large numbers in the precise mathematical sense is, as I have always asserted, an impossibility.

The future may be hard to predict, but because we all want to know what fate has in store for us, predictions of all sorts are made every day. A variety of methods are available. You can predict with tarot cards, with horoscopes, with Newton’s equations of motion, or with the laws of quantum physics. You can wet your index finger and hold it up to the wind. Every physical equation that includes t for time holds an implied invitation for us to predict.

What works for social questions? Well, polls are a frequent device and have developed into a major industry. Many politicians have personal pollsters. Newspapers love polls. As Seife points out,

“Polls are perhaps the leading source of proofiness in modern society. They are an indispensable tool for journalists; it’s hard to pick up a paper, listen to a newscast or browse the Web for news without stubbing your toe on a poll.”

“Polls allow a news organization to manufacture its own news. It’s incredibly liberating.”

In a chapter called “Propaganda by the Numbers,” Seife introduces us to the notion of “Potemkin numbers.” This name is derived from the Russian story in which Catherine the Great’s minister Grigory Potemkin erected a village of two-dimensional houses to impress the empress. Fast forwarding to the present, Seife cites as Potemkin numbers body counts in wars, numbers of captured enemy soldiers, claims of energy efficiency for new automobiles based on test runs. These figures have been produced to impress an assorted clientele. “No matter how dependent [a claim] might be on proofiness,” he laments, “the press dutifully broadcasts and amplifies it, giving manufactured ‘facts’ a life of their own.”

Rhetorical devices for substantiating an argument are many: pounding on the lectern, employing ad hominem logic, citing facts and figures culled from who knows where. To these we can now add proofiness and thank Seife for recognizing it as a popular if shady and questionable branch of applied mathematics, a field that has supplied us with much of value.

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