

## Usage and abusage

John Allen Paulos

**200% of Nothing: An Eye-Opening Tour Through the Twists and Turns of Math Abuse and Innumeracy.** By A. K. Dewdney. Wiley: 1993. Pp. 192. \$19.95, £12.95.

A. K. DEWDNEY'S new book is a pleasant listing of instances of innumeracy taken from the media, advertising, government, gambling and personal finance. It begins and ends with discussion of a few basic arithmetic and probabilistic ideas, percentages, ratios, expected values and the like, but its heart is in its examples. The former "Mathematical Recreations" columnist for *Scientific American* states that he was apprised of these abuses by "math detectives" from across North America.

Consider the first of these, which suggests the book's title: a light-bulb advertised to save 200 per cent of one's energy bill. Dewdney considers possible derivations of this figure, including those involving bizarre physical principles, and decides that it may have come about from dividing the energy saved by the energy "unsaved". If the energy saved is two-thirds, the 200 per cent figure results. He goes on in the first chapter to remark on the difficulty of quickly estimating deaths from natural disasters, the perils of informal risk assessment and the tendency we all have to filter our enquiries, making only those observations that confirm our beliefs. Broken into two-page snippets, the book moves quickly from one misuse to another.

Discussing misleading diagrams and graphs, what he calls "chart abuse", Dewdney gives contemporary illustrations of all the standard failings — different units, flawed perspectives, unlabelled axes, and the confusion of areas and volumes with linear measures. There is a nice section on sampling variability, especially among mutual fund managers whose differential successes can be quite adequately accounted for by chance. Dewdney also deconstructs claims such as "Life jackets are six times as safe", supports a magazine columnist's analysis of the best strategy to follow on a popular game show, suggests that prices with 9s in them should be rounded up, and considers the problem of false positives in medical and drug testing. Brief treatments of compound growth, scientific notation and the importance of informal estimation occasionally give way to more general remarks and exhortations.

The mathematical infelicities noted are sometimes unintended, sometimes deliberately misleading. The former is cer-

tainly the case with the computer company whose advertisements boasted that it had the highest price-performance ratio in the industry. Conscious deception, on the other hand, was probably the motive of the pocket-dictionary publisher who claimed that the dictionary contained 90,000 words, but neglected to mention that they were used to provide the 8,000 definitions.

The issue of baseless precision is broached in the context of a camera advertisement featuring a rare bird whose scientific characteristics are listed, in particular its average weight of 226.8 grams. The correspondent who brought this example to Dewdney's attention wondered at the remarkable exactness of this number until he realized that it was merely a literal translation from another system of measurement: 226.8 grams is simply half a pound. Dewdney, who gives idiosyncratic names to these various solecisms, terms the unwarranted digits "dramadigits".

Innumeracy is a perennial problem and any attempt to alleviate it is to be applauded. My primary complaint about this otherwise fine, right-thinking compendium is that it is not clear for whom it is written. Knowledgeable sorts, such as readers of *Nature*, will be amused by some of the examples but are unlikely to find much that is new. And neither they nor the people to whom the abuses cited are novel will be seduced by the book's writing or organization which, though serviceable, are not particularly engaging. Despite the cute terms scattered about ("dimensional dementia", "num", "percentage pumping"), the book's tone tends to be a bit bland. On a 0–10 scale, I'd give it a 7.231548. As the numerate reader knows, however, a book review is merely a sample of size one. □

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## Principles of modern volcanology

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**Volcanoes: A Planetary Perspective.** By Peter Francis. Oxford University Press: 1993. Pp. 443. £50, \$98 (hbk); £25, \$49.95 (pbk).

THE phrase 'planetary exploration' probably conjures thoughts of the many spacecraft that have examined the surfaces and atmospheres of most of the bodies in our Solar System during the past two decades. But the same period has seen great advances in understanding the broad aspects of the evolution of our own planet.

Not least of these has been the new view of the Earth produced by the use of sonar-related techniques to map and obtain images of the floors of the oceans. These new data have fundamentally changed our perception of geological processes. In particular, we now realize that volcanism has been the primary process for the generation of almost all the rocks, and a great proportion of the topographic features, of planetary surfaces. Volcanology is also an excellent example of an area of Earth science in which important theoretical advances can readily be seen to



In the renowned *Campi Phlegraei*, with its hand-coloured engravings, Sir William Hamilton gave admirable descriptions of the eruptions of Vesuvius from 1766 to 1794. These examples appear in *Volcanoes: Fire from the Earth* by Maurice Krafft, who died with his wife Katia in the eruption of Mount Unzen, Japan, in 1991. The book is the latest in Thames and Hudson's New Horizons series of compact paperbacks, which impressively combine hundreds of illustrations with concise and informative texts.