gists, and so forth) agreed that the very diagnostic criterion of a classification is that it is based on similarity. All but the cladists have maintained this view. Hence it has been quite correctly said that "cladistic classification" is an oxymoron.

All in all, I have much praise for *Sex and Death*, but it must be read critically.

BOOKS: DECISION-MAKING

Calculating the Chances

John S. Evans

Richard Wilson, a pioneer of risk assessment, notes that its essence "is the application of ... knowledge of past mistakes in an attempt to prevent new mistakes in new situations" (*1*). Put this way, risk assessment sounds as natural as breathing.

William Ruckleshaus, a former administrator of the U.S. Environmental Protection Agency and strong proponent of risk analysis, characterized it as "the attempt to quantify the degree of hazard that might result from human activities; a kind of pretense to avoid the paralysis that would result from waiting for definitive data; somewhat of an intellectual orphan" (*2*). He also noted that many scientists are uncomfortable with risk analysis because it uses scientific data "in a way that is outside of the normal constraints of science." Put this way, risk assessment appears necessary but perhaps a bit less informative and somewhat more controversial than one might have hoped.

More recently, the Environmental Research Foundation published an article on the Internet entitled "The Waning Days of Risk Assessment" in which Peter Montague asserted that "[r]isk assessment, it is now clear, promises what it cannot deliver, and so is misleading at best and fraudulent at worst ... Risk assessment is inherently an undemocratic process because most people cannot understand the data, the calculations, or the basis for the risk assessor's judgment" (*3*). Put this way, risk assessment seems treacherous.

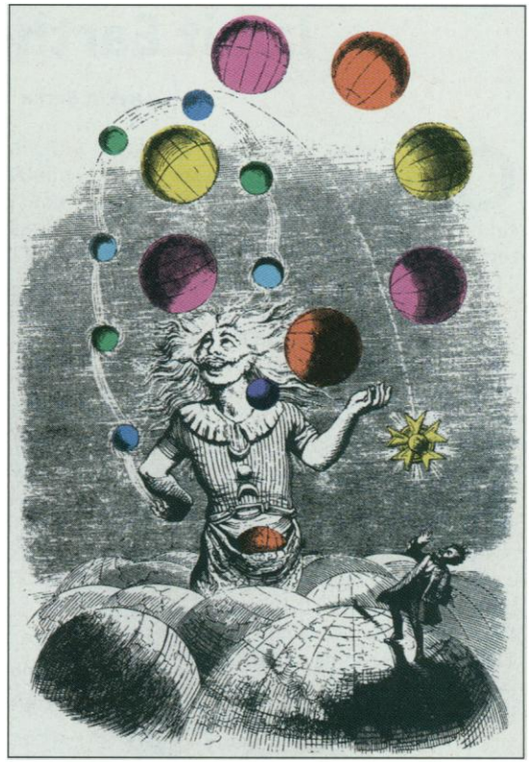
What, then, is risk analysis? And where can one turn to learn what all the fuss is about?

Should We Risk It?
Exploring Environmental, Health, and Technological Problem Solving
by Daniel M. Kammen and David M. Hassenzahl
Princeton University Press, Princeton, NJ, 1999. 424 pp. $39.50, £23.95. ISBN 0-691-00426-9.

Should We Risk It?, an exciting new text by Daniel Kammen and David Hassenzahl, explores the nature and methods of risk analysis through a set of carefully selected, critically analyzed and clearly explained problems. An introductory chapter provides an overview of the history and philosophy of the field. Nine substantive chapters cover the scientific and analytic foundations of risk assessment: modeling, statistics, uncertainty, toxicology, epidemiology, exposure assessment, technological risk, decision analysis, and communication. Each chapter includes an extensive set of solved problems, which provide a grounding in the scientific concepts and analytic methodologies underlying the field. These examples introduce the reader to many of the substantive environmental health problems where risk assessment has been instrumental in the analysis of public policy.

The basic principles of epidemiology are taught through examinations of data on lung cancer in smokers and non-smokers, cholera in London during 1853–54, leukemia in workers exposed to benzene at Pliofilm rubber manufacturing facilities, and the spread of the AIDS epidemic in the United States from 1982 to 1996. Rather than starting with a lengthy set of definitions, terminology, and formulae, Kammen and Hassenzahl dive straight into the data and use a series of thoughtfully crafted questions to guide the reader on a fascinating tour of the field.

The authors consider toxicology from an analytic perspective, using data from rats exposed to a hypothetical pesticide (Kill-EZ) and data from mice exposed to benzene via oral gavage (delivered through a tube into the stomach). The reader is asked to use the Kill-EZ data to determine whether the pesticide is a rat carcinogen or a human carcinogen and, if it is a carcinogen, to determine its potency. The data from the experiments with benzene are used to explore maximum likelihood estimation of three different dose-response models and to examine the issue of interspecies scaling. The authors' approach is informative, although it may disappoint those looking for complex diagrams of the mechanisms of particle deposition in the alveoli, detailed descriptions of the biochemistry governing receptor-ligand interactions in endocrine modulation, nuanced discussions of the role of peroxisome proliferation in cancer induction, or similar aspects of the biology underlying the risks.



Grandville's *Infinity Juggler*.

The primary strengths of Kammen and Hassenzahl's book are its careful, but intuitive, development of the nature of models; its extensive use of worked problems; and the sophistication and balance of its approach to the relationship between science and policy. For all its strengths, the book does have a few weaknesses: somewhat too strong an emphasis on methods for assessing cancer risks; a tendency to unduly limit citations and reference lists; and a relatively weak chapter on exposure assessment. In addition, the authors have been a bit too assiduous in their effort to minimize the use of unnecessary technical terminology.

Should We Risk It? would serve well as the textbook for an introductory undergraduate course in risk assessment or, with supplementary readings from the current literature, as the basic text for a graduate course. Perhaps more importantly, the book is written in a way that it should be accessible to nearly any scientist with an interest in the field.

The author is at the Program in Environmental Science and Risk Management, Harvard School of Public Health, 718 Huntington Avenue, Room 211, Boston, MA 02115. E-mail: jevans@hsph.harvard.edu

References
1. R. Wilson and E. A. Crouch, *Science*, **236**, 267 (1987).
2. W. D. Ruckleshaus, *Issues Sci. Technol.*, **1**, 19 (1985).
3. www.rachel.org/bulletin/bulletin.cfm?Issue_ID=1479 (27 May 1999).