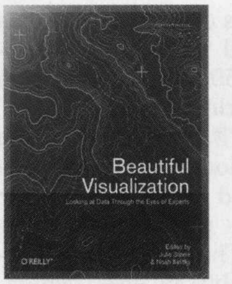
as Nathalie Miebach's imaginative constructs, can be understood as parodies of failed experiments in data visualization.



Beautiful Visualization: Looking at Data Through the Eyes of Experts. *Edited by Julie Steele and Noah Iliinsky. O'Reilly, 2010. 416 pages. $59.99*

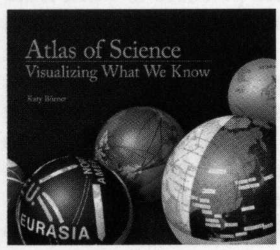
Beautiful Visualization is an entertaining collection of first-person accounts by data visualization developers. Whereas *Dataflow 2* offers the experience of wandering a museum gallery, *Beautiful Visualization* offers a behind-the-scenes tour of 20 studios, where readers meet the individuals responsible for the visualizations and learn how they designed and developed them. Most of the contributors are engineers, programmers and computer scientists, but they also include editors, writers, artists and composers.

Co-editor Noah Iliinsky proffers that a beautiful visualization of data must have four qualities: It must be not only aesthetically pleasing but also novel, informative and efficient. Andrew Odewahn, creator of visualizations that display the partisanship of the U.S. Senate, adds that "like a good story, a beautiful visualization should draw you in, provoke questions and offer a sense of exploration and discovery."

Two well-known exemplars that possess these qualities are the periodic table devised by the Russian chemist Dmitri Mendeleev and the influential London Underground ("Tube") map designed by Harry Beck, an engineering draftsman whose design was inspired by electrical circuit diagrams.

A recurrent theme in *Beautiful Visualization* is the importance of discovering and displaying patterns within datasets. Patterns are the source of novelty, information, efficiency and pleasure. The most powerful patterns are actually predictive, as with the periodic table, where "holes" helped to anticipate the discovery of additional elements. Lance Putnam and his cocontributors explain, "We are looking for interesting patterns that reveal essential aspects of the system … patterns [that] maintain identity long enough to be recognized, but also change sufficiently to capture attention."

The need to reveal pattern presents what Martin Wattenberg and Fernanda Viégas, creators of visualizations of *Wikipedia* entries, describe as "a classic decision in a visualization project: as we travelled through the data, how close to the ground should we fly?" The key to visualization success is finding a vantage point from which meaningful patterns become evident.



Atlas of Science: Visualizing What We Know. *Katy Börner. MIT Press, 2010. 288 pages. $29.95*

This beautiful, fascinating large-format book is like no traditional atlas, nor are most of its "maps" what you would normally conceive by the term. Science maps are complex information graphics that "focus on the creation or transfer of knowledge among people" and "visually encode the structure and evolution of scholarly knowledge."

In practice, the study of science depends strongly on bibliometrics, the measurement of texts, such as scientific books, papers and patents. What has accelerated the study of science is the development of comprehensive digitized indices of scholarly activity, such as the *Science Citation Index*, the *Social Sciences Citation Index*, the *Arts and Humanities Citation Index*, and *Scopus*.

Because science indices are very large, science maps depend as well on advances in network analysis and visualization techniques. Visually, science maps often take the form of networks. Nodes in these networks are typically publications. Links among publications can be established through the calculation of "direct citation, cocitation (number of times they are jointly cited by another paper), or bibliographic coupling (the number of references they share)."

The core of the atlas consists of 100 pages of science maps and their precursors, mostly developed since 2005. These include Kevin W. Boyack and Richard Klavans' map of the structure of science, a Milky Way-like view featuring 671 clusters of journals and 96,500 clusters of papers. A hand drawn-map by Daniel Zeller depicts a hypothetical model of the evolution and structure of science that looks like a cutaway view of a coral fringed with growing polyps.

Because network visualization techniques remain experimental and unconstrained by representational conventions such as those enjoyed by traditional cartography, each science map is *sui generis* and requires some patience to learn how to read. But without exception those collected here are worth the effort. ■

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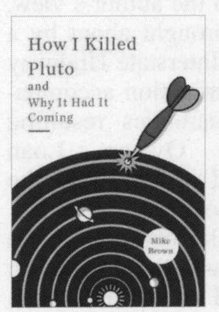
By Jay Pasachoff



How I Killed Pluto and Why It Had It Coming. *Mike Brown. Spiegel & Grau, 2010. 288 pages. $25.00*

The world noticed when, in 2006, the International Astronomical Union demoted (some of us astronomers try to spin it as promoted) Pluto from being a "planet" to being a "dwarf planet." Aspects of science, culture and humanity come together in this eminently readable book by Caltech professor Mike Brown, the discoverer of several objects in the outer solar sys-