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# Visual Cues: Practical Data Visualization FREE

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# BOOK REVIEWS:
# VISUAL CUES: PRACTICAL DATA VISUALIZATION
# WORLD WIDE WEB

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## Visual Cues: Practical Data Visualization

Peter R. Keller and Mary M. Keller

IEEE Computer Society Press, Los Alamitos, CA, 1993. ISBN 0-8186-3102-3, 229 pp., hardcover, $79.95.

### Reviewed by Scott Markel

*Visual Cues* is a welcome addition to the literature on data visualization. The authors take to heart Richard W. Hamming's quote: "The purpose of computing is insight, not numbers." They recommend thinking broadly about available techniques and back this up with numerous examples.

The book has a wonderfully easy-to-use format. *Visual Cues* contains two main sections: "Effective Visualization" and "Illustrated Techniques." In addition, the authors provide six separate indexes that can be used to find appropriate examples and techniques.

The "Effective Visualization" section introduces the various facets of data visualization. Each of the four subsections touches on an important aspect of data presentation. Examples from the "Illustrated Techniques" section are used abundantly. Jackson Mayes is a principal contributor to the design and color subsections.

The subsection entitled "Visualizing Data: Focusing on an Approach" covers the authors' methodology for selecting visualization techniques. Its main points are to identify the visualization goal, remove mental roadblocks, and decide between data or phenomena. I particularly enjoyed the discussion of mental roadblocks. The authors urge the reader "to think of data only as numbers—numbers that computers know about. If data are only numbers, you can then consider any image-construction technique." This "eliminates artificial constraints" and allows the consideration of "any technique that will reveal the meaning in your data."

"Output Media: Communicating the Visualization" contains a useful discussion of decisions that many of us put off to the day before an important conference presentation. The authors discuss the media types in general use: CRT, paper, transparencies, movie film, 35-mm slides, and video. They cover issues involving color, resolution, proportion and image area, and timing for film or video. As for those last-minute decisions, the reader is encouraged to consider the following aspects of media choice: purpose, level of detail, quantity of text versus quantity of graphics, production time, availability of projection equipment, availability of support staff and talent, convenience, impression on viewer, color constraints, cost, and size of audience.

"Design: Selecting and Arranging Image Components" addresses what comes after having selected a visualization technique. Four categories of image components are discussed: color, grayscale, and black and white; lines; type; and background. The discussion of design warns against dismissing design principles "as aesthetic rules that contribute little insight or meaning." Complexity and orientation are the two design subtopics.

"Color: Managing a Complex Component" is packed with helpful hints. It also comes with a warning: "Without some knowledge of this complex element, you are as likely to contribute confusion by using color as to contribute enlightenment." Thankfully, the authors provide plenty of guidance for those of us who are artistically challenged! They cover selecting color, properties of color, color schemes, color-output media, creating color, projecting color, and lighting adjustments.

The "Illustrated Techniques" section is well organized and covers a broad range of techniques. The examples are grouped in thirteen categories: comparisons and relationships, multivariate, time, process, animation, motion, 2-D, surface and slice, volume, models, multiform visualization, artistic cues, and black and white. Each example is accompanied by a few labels for use with the indexes found in the appendices, a short caption describing the technique, a brief description of the application area, the computing power needed to use the technique efficiently, hints for using the technique or similar techniques, and references supplied by the contributor.

The indexes in the appendices help the reader to find appropriate examples and techniques. The indexes are "Choosing Visualization Techniques," "Taxonomy of Visualization Goals," "Major Visualization Goal of Image,"

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"Number of Variables," "Discipline and Application," "Hardware and Software," and "Contributors." I found Appendix B, "Taxonomy of Visualization Goals," to be the most useful.

The only addition I would suggest is the inclusion of a bibliography. Several times I found myself paging through the "Effective Visualization" section, searching for a particular reference I recalled seeing.

In conclusion, I recommend this book for anyone engaged in trying to make sense of data. The many examples alone make this a book worth having. ♦

## World Wide Web

T. Berners-Lee *et al.*

New edition published daily. Available free of charge to Internet users.

Reviewed by Dimitri Dimitroyannis

Hypermedia is not simply 1990s hype; all researchers use hypertext, perhaps without knowing they are doing so. When our writings refer to the efforts of others by explicitly citing their work, we automatically turn our manuscripts into hypertext—text that is not linearly constrained and that contains information links to other documents. To profit from the hypertextual nature of scientific literature, however, one needs readily accessible copies of the links contained in the hyper-document. These readily accessible copies are analogous to the existence of a good local research library. A well-supported library is never enough, though; one has physically to do the linking. This involves legwork to the stacks, the copier, etc., possibly only to discover upon returning to one's study that a reference in the original paper contains an important link to some earlier work and that more visits to the library are needed, guaranteeing frustration and productivity loss.

Similarly, if a library card catalog can be searched from a remote computer screen, why not use existing technology to implement a realistic hypermedia scheme? Modern visions of hypermedia exist in the works of Vannevar Bush (notably his "Memex," a mechanical memory extension device) and, later, in Theodore Nelson's "Literary Machines."

The World Wide Web was started in 1989 by Tim Berners-Lee at the research facility CERN in Geneva, Switzerland, as an initiative to encourage physicists to share information over wide-area networks. The Web has since become the de facto standard for hypermedia implementation over the Internet. The experimental particle physics community was the ideal place for such an initiative: there are few laboratory sites, the large collaborations formed are geographically dispersed, and the infrastructure in computers and computer networks already exists.

The Web is built around the client-server paradigm. The user of the Web sits in front of a networked "client" (usually a graphics terminal) running a Web "browser." The browser instructs a "server" (usually another remotely located computer) to provide a specific hyper-document. The document is de-

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