

Looks Matter

Visual Strategies: A Practical Guide to Graphics for Scientists and Engineers

Authors: Felice C. Frankel and Angela H. DePace
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We've all done it—spent hours getting a figure just right for a paper, presentation, or grant application. We use tried and true compositions, standard depictions, and intuitive colors and then think to ourselves, this is how you do it. Or is it?

A new guide by Felice C. Frankel and Angela H. DePace, *Visual Strategies*, eases the process of data presentation and enhances its effectiveness. If you seek inspiration and practical advice on how to craft more useful scientific graphics, this guide might be what you are looking for.

With the increasing variety and complexity of information that we need to convey, there are great demands on scientists to rethink the ways in which we communicate visually. Past approaches to graphics may not scale to meet the new visualization challenges. *Visual Strategies* provides a simple approach drawn from a broad range of scientific examples, using basic design principles as its underlying analytical framework.

The book is a reference manual of examples organized into essentially two main sections with tabbed subsections, which makes the information easily accessible. The first half of the guide focuses on three major types of graphics: (1) those that illustrate form and structure, (2) those that illustrate events that take place over time, and (3) those that ask readers to compare and contrast. The second half of the book is a compilation of examples from a dozen or so scientists, illustrators, and animators. The book urges readers to develop a visual strategy and to invest the time to produce good graphics. Successful graphics, the authors write, “have the power to shape new thinking and approaches in your field.”

The first half of the book takes a practical approach to designing scientific graphics that we find particularly useful.

The authors highlight examples from chemistry, astrophysics, medicine, and biology. Each image is presented as a two-page spread with the “before” on the left and the “after” on the right. Asking straightforward questions such as “who is the audience” and “what is the goal of my graphic,” the authors quickly identify elements in need of improvement and define the level of refinement required to ensure a successful figure. Some basic instructions from graphic design (such



as “Compose, Abstract, Color, Layer, and Refine”) are then applied systematically to the candidate image to derive the result. This process of questioning and using the answers to justify design choices is enumerated for the entire set of example images. In this portion of the guide, the accompanying explanatory text is concise so that it is easy to grasp the main ideas. The approach outlined should help researchers to improve the clarity of their graphics, with the caveat that the process can be very challenging and time consuming.

The second half of the book includes contributions from a number of people

and highlights case studies of either static or interactive graphics. Here, Frankel and DePace aim to show the process of creating graphics, stating that, “creating a visual representation should be just as much about process as it is about the science.” Frankel and DePace also note that, “seeing how others think is a valuable approach for rethinking your own work,” and the contributed examples demonstrate a variety of ways that experts solve visualization challenges.

This section of the guide builds on the design instruction provided in the first half, asking readers to draw out the visual strategies employed in the examples, which are conveyed in the details of the science and personal accounts that sometimes include excerpts from conversations and e-mail exchanges. As with any crowd-sourced material, the lessons are not consistent with one another but do show a diversity of approaches. For those readers looking for a more obvious continuity with the first half of the book, a synopsis added at the end of each graphical example describing the universal design concepts would have been useful to help readers better make relevant connections between the examples and their own work.

The guide has a companion website at <http://visual-strategies.org> with additional contents. The authors want to provide an “opportunity to discuss a number of issues that lie beyond the scope of a printed book with colleagues, expert graphic designers, and journal editors.” We hope that this web forum will garner strong community involvement, as getting people to think about the issues raised in the guide will certainly help to advance scientific visualization. Insights generated through such a public venue will hopefully lead to a compendium of best practices governing scientific graphics.

This guide is a beautiful illustration of how design thinking benefits scientific graphics. Most significantly, the guide makes us aware of the need to have a visual strategy and to work in cross-disciplinary environments. The graphics described in the guide are mostly done through collaborative processes between scientists, computer scientists, designers, and artists. This working relationship underpins the reality that data

design today is and should be a highly collaborative process; more than 25 experts contributed in some form or another to the making of this guide.

Data designers and scientists have looked for inspiration in Edward Tufte's celebrated work on data visualization as well as in other publications. *Visual Strategies* takes a systematic approach to graphics but is narrower in scope

when compared to the seminal work of the French cartographer Jacques Bertin, who in 1967 provided a wide theoretical framework for information visualization. Bertin explored in depth each visual property of graphical elements such as shape, orientation, color, texture, volume, and size for displaying quantitative variation. Whereas Tufte focuses on statistical data, Bertin concentrated on census

information (primarily in France). To our knowledge, this guide is the first book to be exclusively dedicated to providing direct advice on how to improve scientific graphics through actual examples. In this way *Visual Strategies* is among a handful of resources and comprises a valuable, important, and useful guide for scientists, illustrators, and data designers alike.

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