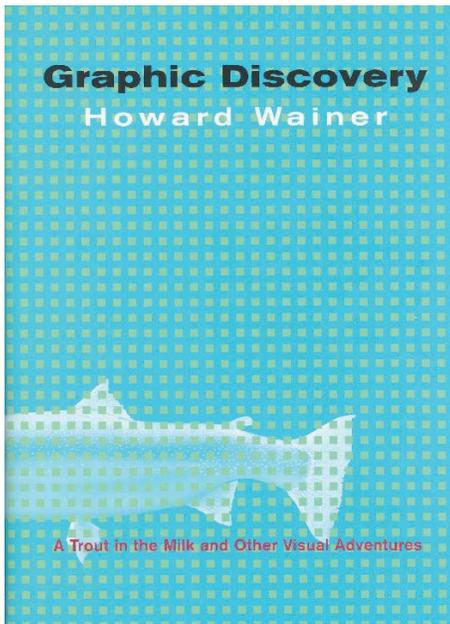Graphic Discovery: A Trout in the Milk and Other Visual Adventures. Howard Wainer. Princeton: Princeton University Press; 2005. 192 pages. Hardcover. $29.95. ISBN: 0-691-10301-1.

People have been trying to display information graphically ever since our ancestors depicted hunts on the cave walls. From those early efforts through the graphs and tables in modern scientific publications, the attempts have met with various degrees of success, as Howard Wainer describes in *Graphic Discovery: A Trout in the Milk and Other Visual Adventures*.

This book is no dry, academic tome about data. The conversational tone, well-chosen illustrations, and enriching asides combine to create a delightful presentation of the highlights and lowlights of graphic display. And good data displays will continue to be important in our current, data-inundated society.

Like any good story, this one has its hero. Although writers have used pictures to present information for centuries—astronomical movements were depicted in circular diagrams in the 9th century, and one early example of printed graph paper dates to about 1680—it wasn't until the late 18th century that a Scot named William Playfair greatly expanded the reach of graphical display, Wainer writes. Playfair invented or perfected three workhorses of data display: the pie chart, the bar chart, and the statistical line graph. And it was Playfair's *Commercial and Political Atlas of England and Wales*, first published in 1786, that showed that graphs were applicable to fields outside the realm of pure science. The *Atlas*, which did not include a single map, graphically described various aspects of England's economy. Charts of taxes, trade, and debt demonstrated the applicability of graphic display to a wide array of economic data, and they showed that such display could be visually appealing. The *Atlas*, in fact, was the first major publication to contain this kind of statistical display, Wainer writes. Playfair was by no means the first to graph data—the aptly named Robert Plot, for example, charted barometric pressures at Oxford a century before Playfair's *Atlas* first appeared—but it was Playfair, using shading and other design elements, who showed that "the presentation of evidence could be beautiful", Wainer writes. And Playfair was no

dull statistician or economist: he dabbled in fields as varied as engineering, journalism, and blackmail, the reader discovers.

There is essentially no limit to the types of data display that can be influenced by good design, as Wainer makes clear by the variety of examples he presents. The college acceptance letter Wainer's son received is cited as a successful display. The word "YES," which is really the only information the reader cares about in such a letter, is printed in large type in the middle of the page, with two short, smaller-type lines of congratulatory text at the bottom. As Wainer points out, that tells readers what they want to know without making them hunt for it. (He leaves unaddressed what that school's rejection letters looked like that year. Would a giant "NO" be as well received?)

The acceptance letter, with its useful presentation, contrasts sharply with the all-too-common "Alabama first" pattern. The tendency to alphabetize data displays is a disservice because it may hide the aspect of the data that is truly interesting, Wainer writes. Alabama is the first state, alphabetically speaking, but instances in which it should head a data display are rare. Wainer presents a graph depicting Supreme Court justices' votes on six cases by way of illustration. When both the justices' names and the nature of the cases are alphabetized on their own axes, a largely indecipherable blob emerges, although one can discern that Sandra Day O'Connor always voted in the majority and Clarence Thomas rarely did. Reordering the two axes in a manner that Wainer describes as "obvious, but data-related" is far more informative. This time, John Paul Stevens is on the far left and Antonin Scalia on the far right of the horizontal axis, and the cases are reordered to group similar votes together. The Supreme Court's expected voting blocs become much clearer.

The Court display is one of many that show how wide-ranging data displays can be. The prices of convertible vehicles, the number of private elementary schools, and men's and women's performances in the Boston Marathon are additional examples of dif-

ferent ways to present data and to highlight the message one is trying to impart. Wainer also discusses what we might see in future graphic displays, paying special attention to tools derived from modern computing.

Wainer devotes ample space to the potential pitfalls of data displays. Graphs can be manipulated in an attempt to mislead, he writes. The size of the vertical scale on bar and line graphs is a tempting target. Too narrow a scale exaggerates minor changes and risks presenting a surfeit of data; too large a scale makes all but the largest variations disappear. If one has too choose, too small a scale that "fills the plot with data" is preferable, Wainer writes. Later reviewers could always replot the data by using a larger scale without having to resort to the original data. That is not the case when the scale is too large to be meaningful.

As befits a work about graphic displays, this book is beautifully designed. The two-column pages are easy to read, and much thought clearly went into the selection and presentation of the graphic examples. Helpful and entertaining asides to the main text are presented as footnotes, whereas text references are in endnotes.

The conversational tone of the writing makes it accessible to those without an extensive background in statistics. Readers whose graphics experiences are limited to pondering the graphics in *USA Today* will find something of value in this work. Wainer's text is enlivened by allusions to fields far beyond statistics, such as history and current events. Indeed, the book's subtitle is derived from Henry David Thoreau's 1850 journal entry regarding suspicions that milk was being watered down during a dairymen's strike: "Sometimes, circumstantial evidence can be quite convincing, like when you find a trout in the milk." The frequent allusions to history and social science make this book both entertaining and useful for writers and editors who strive to improve data displays in their work.

Edith Paal

EDITH PAAL *works in human-subjects research oversight at the University of Arkansas for Medical Sciences.*