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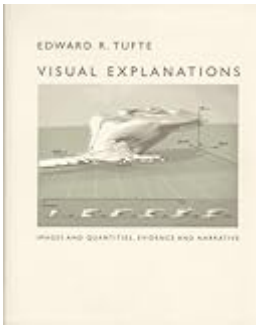

Edward R. Tufte. *Visual Explanations: Images and Quantities, Evidence and Narrative.* Cheshire, Conn.: Graphics Press, 1997. 156 pp. $45.00 (cloth), ISBN 978-0-9613921-2-3.

Reviewed by Ann S. Jennings (University of Houston-Downtown)

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Specialists in esoteric fields can become cult figures in their own time. Carl Sagan in astronomy and Stephen Hawking in physics have achieved that status.

A third cult figure has emerged: Edward R. Tufte in the field of information design. The author of works on subjects as varied as graphic design, statistics, and political economy, Tufte is building his own legend. Through his books and public lectures, he serves as historian and theoretician of graphic and information design, advocate of the pairing of illustrations and words, and teacher of audiences as diverse as technical writers, illustrators, and statisticians.

In the early 1980's Tufte founded a publishing company to produce his books on information design, thereby gaining control of their appearance and distribution. One result of his founding the company is that the books do not go out of print. Another is that he controls their distribution and physical appearance. His books look as their author wishes them to look–full of gorgeous color illustrations and what I call adult learning toys: three-dimensional pop-ups and lift-up flaps that conceal intriguing or astonishing information. The books assemble illustrations and text from many centuries and cultures and from authorities in numerous fields: statistics, music, medicine, painting, engraving, cartography, graphics, computer display design, and business correspondence.

Tufte's *Visual Explanations* (1997) forms a triptych with *The Visual Display of Quantitative Information* (1983) and the multiple-award winning *Envisioning Information* (1990). The design principles he explores in these books are applicable to images delivered in print as well as electronically. The books should be required reading for those interested in ways that data can be used to both inform us and lie to us. Tufte's work has already been embraced by statisticians, technical writers, graphics designers, designers of computer displays of all kinds, including Web pages, architects, scientists, engineers, and aficionados of art history.

The text of *Visual Explanations* touches on graphics history, iconography, and design theory. The purpose of the text is to explain the persuasive and story-telling power of the creative elements available to information designers: images, words, dimension, duration, and motion.

The illustrations in *Visual Explanations* support the text's purpose, and do it in an engaging way. Illustrations consume approximately half of the generously sized pages. That is Tufte's preference and his chief message throughout the three books: well-designed graphics can convey in a single image what may take numerous pages

to report in words. The graphics also demonstrate Tufte's lesson that an illustration can convey instantly information difficult for the mind to grasp if presented as prose.

In *Visual Explanations* Tufte reinforces a principle he announced in his first book, *The Visual Display of Quantitative Information* (168): if you have a lot of data to report, use graphics, perhaps with verbal labels. If you have little data to report, use words.

He also reiterates in new contexts several ideas and terms he presented in the earlier books: the concept of the "flatland" of the page and the computer screen (*Visual Explanations* p. 141 , *Envisioning Information* pp. 12-35), the notion of "chart junk" (*Visual Explanations* p. 48, The Visual Display of Quantitative Information *pp. 107-121,* Envisioning Information *p. 34) that clutters many illustrations and detracts from the clarity of their messages, the idea of using color as a quantifier as well as a decorative element (*Visual Explanations *pp. 76-77,* Envisioning Information *p. 91), and the value of repeated elements he calls "small multiples" (*Visual Explanations *pp. 104-109,* The Visual Display of Quantitative Information *pp. 170-175,* Envisioning Information_ pp. 67-79).

In one striking chapter of *Visual Explanations*, Tufte proves the persuasiveness of a historical graphic display: a street map of London used in 1854 by Dr. John Snow to pinpoint the cause of that summer's cholera epidemic. Dr. Snow's map and related research (27-38) pass Tufte's tests for determining whether a particular visual display is properly designed: it places data "in an appropriate context for assessing cause and effect" (29), it makes "quantitative comparisons" (30), it considers "alternative explanations and contrary cases" (32), and it provides an "assessment of possible errors in the numbers reported in the graphics" (34).

In the same chapter, Tufte presents a powerful verbal and visual argument that accurate graphic display of data might have prevented the tragic explosion of the space shuttle Challenger. Properly constructed charts–such as those supplied by Tufte in *Visual Explanations* (44-45)–would have clarified the relationship between low temperature and O-ring failure and might have convinced NASA officials not to launch the shuttle.

Ineptness at conveying information, as demonstrated by the charts and memos associated with the shuttle disaster, is one cause of the misuse of data. Deliberate creation of inaccuracies is another cause. Tufte demonstrates the subtleties of visual disinformation design in a lighthearted chapter on magic. He balances that chapter with one on "visual confections," which he describes as "an assembly of many visual elements…brought together and juxtaposed on the still flatland of paper" (121) and not intended to be realistic. To demonstrate the ability of confections to convey both emotion and fact, Tufte reproduces illustrations as dissimilar as an engraving (127) from 1514, Albrecht Durer's "Melancholia I," and a 1980's warning-and-information diagram (144) of the treacherous Potomac River by illustrator Johnstone Quinan.

The remaining half of *Visual Explanations* is devoted to chapters that investigate visual parallelism, the power of multiples in time and space, and the use of "the smallest effective difference" to distinguish graphical elements from one another.

Tufte correlates parallelism of visual images with parallelism of written language (79). Using charts, photographs, and reproductions of paintings and computer screens, he demonstrates the value of accurate parallel structure and the disinformation power of faulty parallel structure.

He writes of the power of multiple, adjacent images to "reveal repetition and change, pattern and surprise–the defining elements in the idea of information" (105). He reproduces multiple images from the worlds of politics, music, and medicine to support his contention.

Finally, Tufte revisits his three-book preoccupation with visual clutter. His chapter on the "smallest effective difference" explains the importance of suppressing the visual strength of elements that support major images. These supporting elements include grids, frames, and bevels that surround data, as well as various types of lines that tie images to explanatory text (74).

Despite Tufte's sometimes stern, sometimes irreverent admonishments, the page layout of *Visual Explanations* occasionally lapses from his prescriptions for effective information design. Several illustrations are unidentified (83, 143), others (83) are separated from their identifying cutlines, and one (44) does not include the important color distinctions promised in a page of accompanying text. The book lacks a conclusion to balance the useful introduction.

Visual Explanations and its two predecessors repay scrutiny. I read all three books cover to cover, in sequence, within a five-day period, taking notes as I read. When I finished my Tufte read-a-thon, my first impulse was to create a chart of the design principles contained in the books. I think Tufte would be gratified that his work

stimulated not only a powerful reaction, but one that will result in the creation of a graphic whose purpose is to organize data currently spread out over the 460 pages of his three books. The chart will demonstrate that yet another reader has heeded Tufte's message: a single image can convey what takes numerous pages to report in words.

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