Visualizing Data with Edward Tufte

By Stephen Turbek

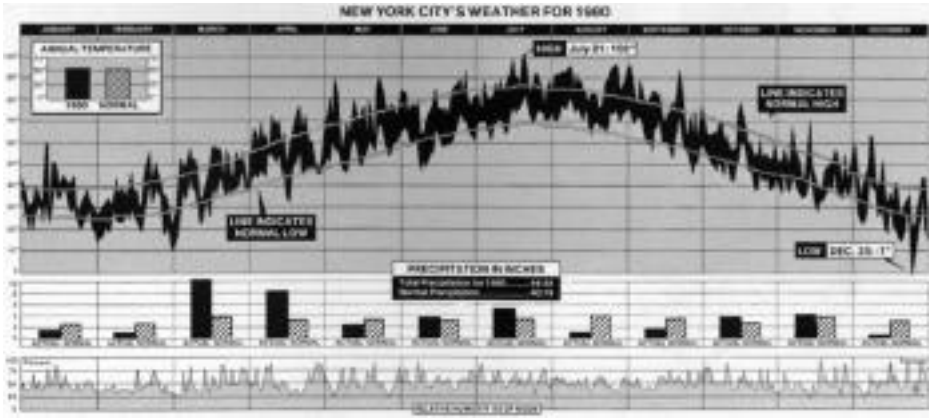
RAZORFISH REPORTS

a publication of the razorfish science department | 05.31.00 | report 021

This short paper intends to introduce the work of this great living thinker to pass on his ideas and encourage further exploration of his work. In his three books on design, Edward Tufte develops several ideas into a number of principles for design. They are presented here with with Tufte terms in quotes.

"What is to be sought is the clear portrayal of complexity. Not the complication of the simple; visual access to the subtle and the difficult, the revelation of the complex."
-Edward Tufte

Edward Tufte is a professor at Yale University, where he teaches courses in statistical evidence and information design. His books include Visual Explanations, Envisioning Information, The Visual Display of Quantitative Information, Political Control of the Economy, Data Analysis for Politics and Policy, and Size and Democracy (with Robert A. Dahl). He operates a publishing company, Graphics Press, to print his books of design, and lectures across the world. His primary focus has been on making better displays of information, charts and graphs to make life simpler and more understandable for the reader.

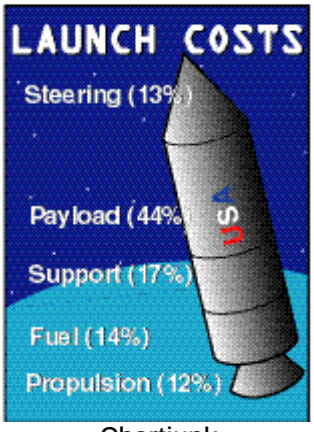


High Data Density, but Readable

"Graphics Reveal data"

Graphics can take a large group of numbers and illustrate trends and unusual events. With large groups of numbers, graphs are often the only way to convey trends or show patterns in a way that is accessible to those unfamiliar. They are only as good as the idea behind the graph. Graphics should serve a reasonably clear purpose: description, comparison or decoration.

"Quantitative Information": Information that can be measured and expressed in numbers, for example sales figures or poll results; as opposed to qualitative information, such as the worst event in history.



Chartjunk

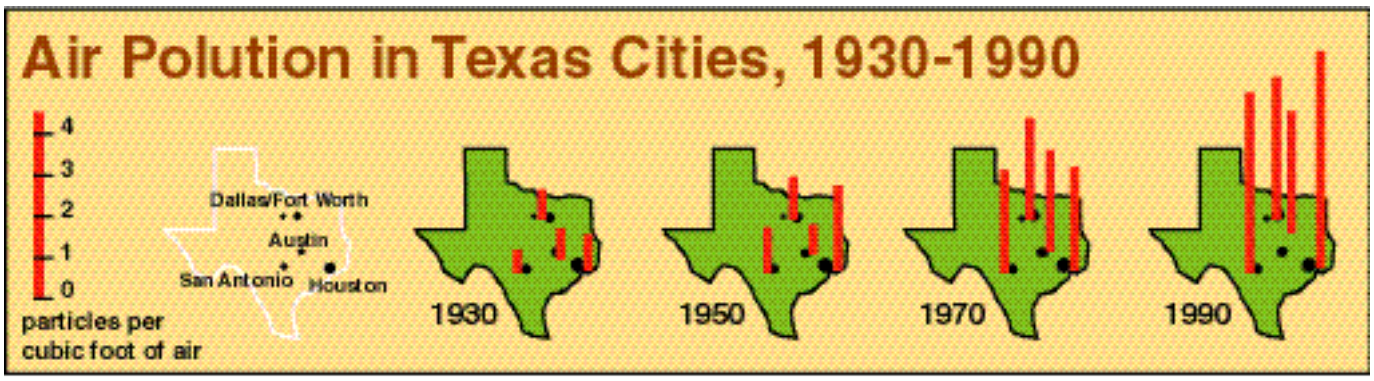
"Chartjunk": Decoration added to charts and graphs added to "liven up" the information, but distract or mislead the viewer from the data. USAToday's graphs are a prime example of this tendency.

"Small multiples": Showing several views of the same data, from different times or places to show a trend or pattern of results. An example would be a series of maps showing the change in population over a number of years.

Small multiples are effective as they implicitly compare the data, show more than one dimension of measurement, are shrunken, high density graphics, usually based on a large data set, are drawn almost entirely with data, are easy to understand and interpret and are often narrative in context, showing shifts in the data.

"Micro and Macro": Showing the data in multiple scales (for example, showing a graph of yearly stock prices with the graph of daily prices)to give an accurate context to the data. Displaying the data at several levels of detail, from a broad overview to fine details prevents the reader from misinterpreting a minor trend as a major change.

"Graphical Excellence": The well-designed presentation of complex ideas communicated with clarity, precision and efficiency. "It gives the greatest number of ideas in the shortest time with the least ink in the smallest space."



Small Multiples

"Graphic Integrity": A writer or editor considers the effect of what they are writing and seeks to eliminate any false impressions their writing may inspire. "Designers must be held to the same standard, not distorting the information by the way it is displayed, nor losing it in the aesthetics of the piece."

Guidelines for Visualizing Data

-Clearly identify that the purpose of the graphic is and what it is illustrating.-Keep the basic logic of a graph consistent. A chart of yearly sales totals should not contain a bar that shows 6 months of sales, whether or not it is noted, the visual impression is incorrect. A solution would be to add 6 months of projected sales.

-Illustrate one set of measurements at a time. Showing two separate measurements in one graph is a prime source of confusion.

-"Clear, detailed and thorough labeling should be used to defeat graphical distortion and ambiguity. Write out explanations of the data on the graphic itself. Label important events in the data."

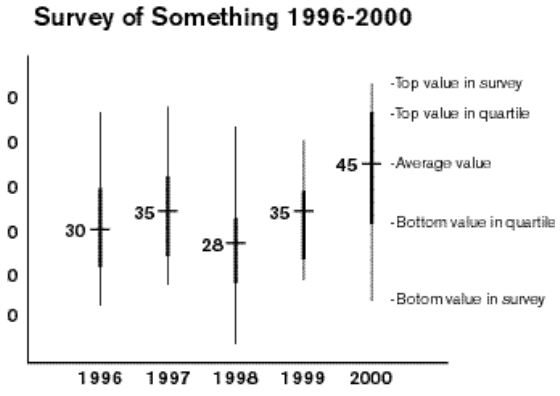
-"Show data variation, not design variation.

-For comparisons of similar things, use the same graphic language. Changing colors or patterns in graphs distracts the viewer.

"Design is Choice. The principles of Visual Display of Quantitative Information generate design options."
-Edward Tufte

-Encourage the viewer's eye to compare different pieces of data in the graph, not on the framework of the graph itself.

-Maximize the data to ink ratio. Compare the number of items in a graph not showing information to find the percentage of unnecessary items. Revise and edit the graph, taking out everything but the data points, then add back the text necessary to fully explain it.



simple, clean, readable

Aesthetics

Attractive displays of statistical information:

-Have a properly chosen format and design and reflect a sense of relevant scale

-Integrate words, numbers and images

-Display an accessible complexity of detail

-Have a story to tell about the data

Edward Tufte's guidelines for designing information graphics have defined the field and offer much to the casual writer who needs an illustration, as well as the professional designer.

Stephen Turbek (stephen@razorfish.com) is in the razorfish science department.

for more information:

The Visual Display of Quantitative Information, Edward Tufte, Graphics Press, 1983

Envisioning Information Edward Tufte, Graphics Press, 1990

Visual Explanations Edward Tufte, Graphics Press, 1997

razorfish reports are published regularly by the razorfish science department for our colleagues and the interested public.