

Good graphics

Simplicity of design and complexity of data

Quality presentations of data —

- Take advantage of how people process information
- Reduce the number of thought processes required to understand the data
- Tear down some fundamental obstacles to understanding

Statistical graphics —

- show the big picture
- are paragraphs of data
- are best constructed to convey one finding or concept

When do you use tables?

- 10 or fewer data points
- Exact numerical data
- Localized comparisons

Types of graphics —

Continuous variables

- line graphs
- area charts
- scatter plots
- maps

Categorical variables

- bar graphs
- maps
- diagrams

Not recommended

- pie charts
- stacked bar graphs
- stacked line graphs

Hierarchy of graphical perception

- Position along a common scale
- Position along identical
- nonaligned scales
- Length
- Angle - slope
- Area
- Volume
- Color - hue

Source: William S. Cleveland, *The elements of graphing data*, (Monterey, California: Wadsworth Advanced Books and Software, 1985)

Tips for statistical graphics

Make all verbal tasks easy to understand

- Do not use abbreviations
- Avoid acronyms
- Write labels left to right
- Use proper grammar
- Do not use legends except on maps

Avoid optical illusions and graphical puzzles

- Use solids for line styles and fills
- Avoid data point markers on lines
- Use the appropriate aspect ratio
- Start the scale at zero
- Use only one unit of measurement per graphic
- Use 2 dimensional designs for 2 dimensional data

Summary

Highlight the data

Present logical visual patterns

Let the data lead you to the best method of presentation

Avoid nondata ink and chartjunk

Strive for clarity in all elements of your presentation

Use those graphical elements that are highest on Cleveland's perception scale

Do the work for your audience so that they can easily understand your point

Sources

Cleveland, William S., *The elements of graphing data*, (Monterey, CA: Wadsworth Advanced Books and Software, 1985)

Ehrenberg, A.S.C., "Rudiments of numeracy," *Journal of the Royal Statistical Society*, 1977, Ser. A, 140, 277-297.

Kosslyn, Stephen M., *Elements of graph design*, (New York: W. H. Freeman and Company, 1994)

Paulos, John Allen, *Innumeracy; Mathematical illiteracy and its consequences*, (New York, NY: Hill and Wang, 1988)

Tufte, Edward R., *The visual display of quantitative information*, 1983; *Envisioning information*, 1990; and *Visual Explanations*, 1997 (Cheshire, CN: Graphics Press)

Wallgren, Anders; Wallgren, Britt; Persson, Rolf; Jorner, Ulf; and Haaland, Jan-Aage, *Graphing Statistics & Data: Creating Better Charts*, (Thousand Oaks: SAGE Publications, 1996)

See also:

Maltz, M. and Zawitz, M., *Displaying Violent Crime Trends Using Estimates from the National Crime Victimization Survey*, Bureau of Justice Statistics, NCJ 167881, June 1998, www.ojp.usdoj.gov/bjs/abstract/dvctue.htm