The Visual Scientist Presents

Graph Design

content • layout • science!

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Topics Covered

This is a how-to-guide for effectively presenting *information* in *graphs and charts*. The suggestions are simple to follow and broadly applicable to multiple fields of study.

Make Your Point

Breathing Room

Sparklines

Free Your Lines

Legend & Labels

Sans Serif Text

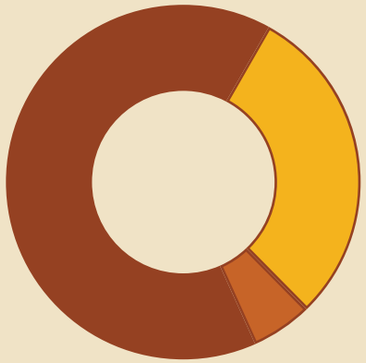
Black and Gray

Graph Design 1

Make Your Point

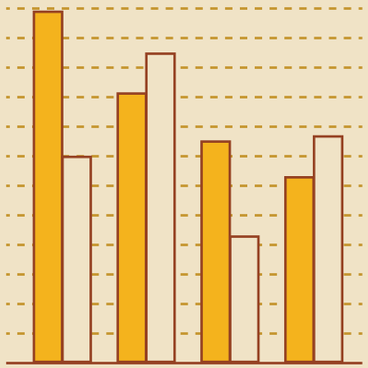
Line Graph

Continuous or Temporal Data



Pie Graph

Percentages of a Whole



Bar Graph

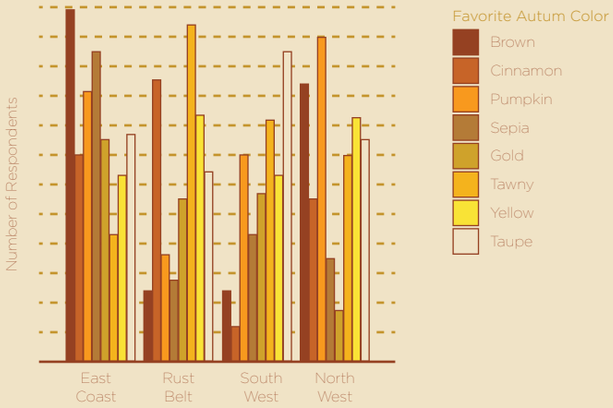
Categorical Performance

graphs should tell one story

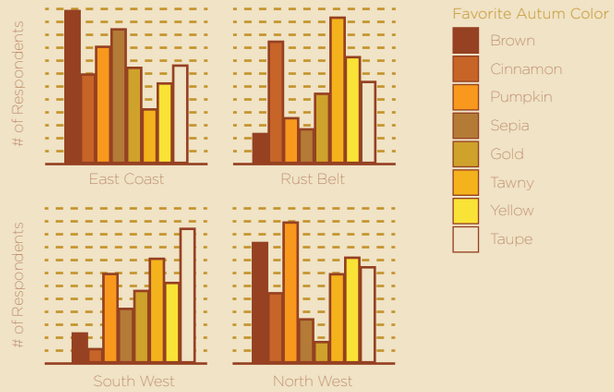
A graph is used to visually represent data or information containing a pattern or a trend that you wish to draw attention to. The purpose of a graph is to quickly reveal the key takeaway to the reader.

It is very important to begin by choosing the right graph type for making your point. Some examples include showing an increase or decrease in some metric over time (line graph), comparing multiple values (pie chart), or demonstrating the effectiveness of multiple approaches (bar graph).

A graph communicates knowledge visually. The better your graph looks, the clearer your point will be.



Cluttered



Separated

Graph Design 2
Breathing Room

don't clutter the graph

Too much data can lead to a cluttered graph that is difficult to interpret. If you find your graph visually confusing, a good technique is to separate it into multiple graphs.

In the example at left, a bar graph has four categories but many measurements at each. When separated into four smaller graphs, the readability is immediately improved, even though the same amount of space on the page is used.

It is important to keep the separated information consistent. In the example, keeping the y axis constant allows for easy and accurate visual comparison across the small graphs.

Graph Design 3
Sparklines

	Mean (mg)	Std Dev	Median (mg)	Histogram
Americano	115	27	120	
Decaf	5	2	5	
Espresso	100	44	97	
Capuccino	110	37	124	
Latte	80	16	76	
Caramel Latte	65	31	62	
Mocha	90	24	93	
Irish Coffee	110	48	101	

Caffeine Content Across Coffee Shops

Fake Data Sampled from 250 Imaginary Coffee Shops

show succinct trends

A very small graph showing a single trend rather than precise data can be embedded within body text or a table. Such graphs, usually lacking axes or coordinates, are called sparklines.

Some examples of sparklines include:

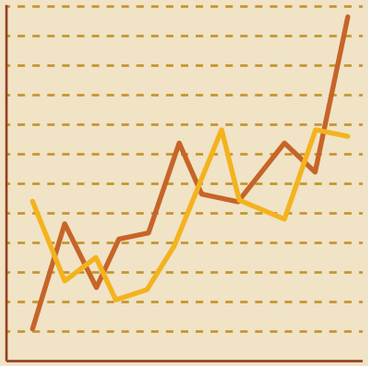
- Line graph  illustrating the trend of a variable over time.

- Bar graph  showing a histogram and highlighting the mean with a different color.

- Pie graph  showing the values of 2 or 3 variables

Graph Design 4

Free Your Lines



Dotted Grid

use for making detailed comparisions, and the graph is sufficiently large

Thin Line Grid

use when trends are relatively easy to see or graph is a bit smaller

No Grid

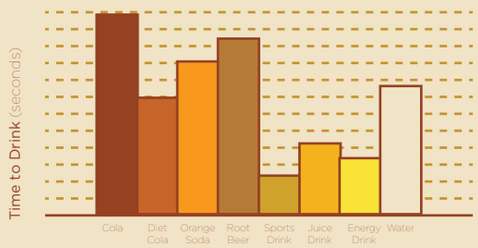
use when trends are obvious, or the graph is about broad themes

keep your graphs clean

Borders, visual effects, excessive tick marks, and unneccesary gridlines can all distract from the main message of the graph. Use the minimum amount necessary to convey the context for your data.

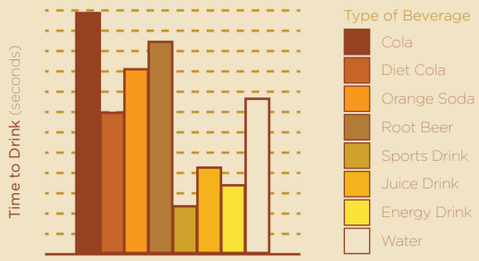
Graph Design 5

Legend & Labels



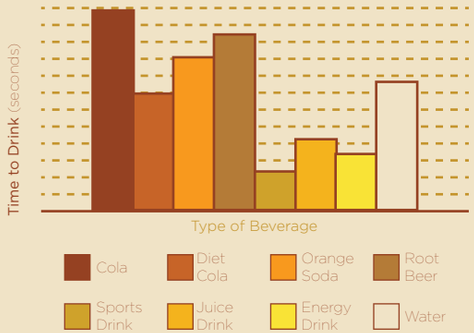
No Legend

PRO: easy to find labels
CON: hard to read label text (small text)
USE: lots of space -or- very few bars



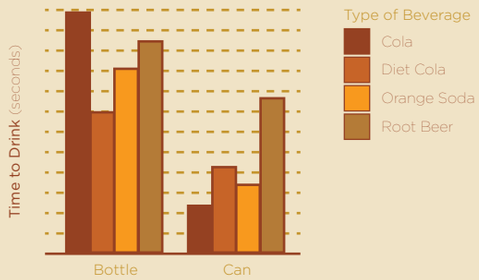
Side Legend

PRO: easy to read labels (larger text)
CON: very hard to find labels
USE: limited height -or- lots of bars



Bottom Legend

PRO: easy to read labels (larger text)
CON: hard to find labels (easier than side legend)
USE: limited width -or- lots of bars



Categorical + Legend

MUST: put legend on right so not to confuse legend with category (x-axis) labels
USE: categories and more than one bar

readability and spacing are key

Give axes and labels sufficient padding to ensure legibility. Slant axis labels if it is necessary for spacing. Do not stack text; even a 90° rotation is still more readable than stacked text.

Place the legend to the right of, or under the chart, instead of on top of the chart.

Blackletter
Goudy Text

Oldstyle
Adobe Jenson

Script
Mistral

Transitional
Baskerville

Modern
Didot

Square Serif
Rockwell

Sans Serif
News Gothic

Decorative
Curlz

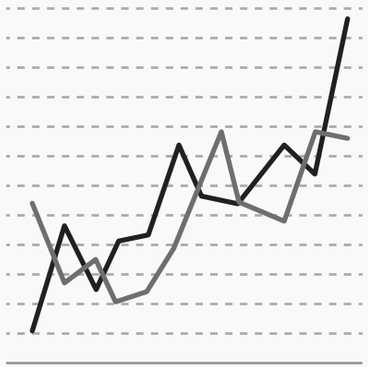
Graph Design 6
Sans Serif Text

sans serif is bset for graphs

Choose a sans serif font for your graph text. Even if you must follow a template for graph captions, you still have control over the graph legend, axis labels, and other text components within the graph. Try to avoid ALL CAPS, though for axis titles of labels you may choose to use Small Caps.

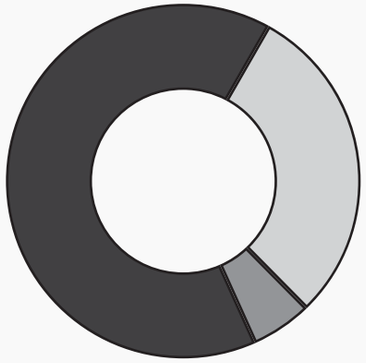
Some great sans serif fonts to choose from are: Avenir, Gill Sans, Gotham, Helvetica, Myriad Pro, Optima, and Univers. Avoid fancy, decorative or script fonts! The body text of this book is typeset using Avenir, with section titles and graph titles, legends, and captions in Gotham.

Graph Design 7
Black & Gray



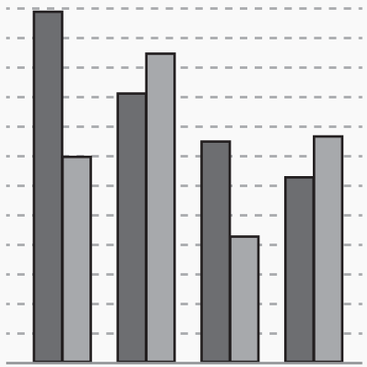
Line Graph

Continuous or Temporal Data



Pie Graph

Percentages of a Whole



Bar Graph

Categorical Performance

posters, slides & papers!

People can differentiate grays at minimum brightness intervals of roughly 20% (use larger intervals, if possible.) Reserve the full 100% saturated color for borders and axes, and start with 90% (or 80%) saturation for the first data series.

Always check how the black & white version of your graph looks!

Want More?

For more information about presenting scientific information, including templates and other guides, visit our website:

www.the**V**isual**S**cientist.com

Text is set in Avenir and titles in Gotham.
Layout was done in Adobe Illustrator CS6.
Avenir was designed by Adrian Frutiger in 1988 for Linotype Library.
Gotham was designed by Hoefler & Frere-Jones in 2000

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