Types of Visuals: Choosing an effective visual

MIS561 Data Visualization

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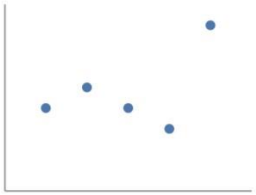
Outline

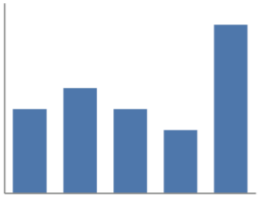
- Types of visuals
  - Simple text
  - Tables
  - Graphs
    - Points, lines, bars, areas
- Visual types /elements to avoid

The visuals we use most

Simple text



Scatterplot



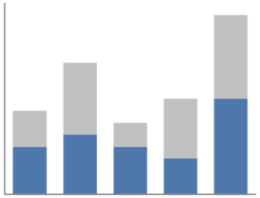
Vertical bar

Horizontal bar

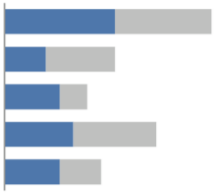
	A	B	C
Category 1	15%	22%	42%
Category 2	40%	36%	20%
Category 3	35%	17%	34%
Category 4	30%	29%	26%
Category 5	55%	30%	58%
Category 6	11%	25%	49%

Table

Line



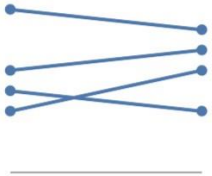
Stacked vertical bar



Stacked horizontal bar

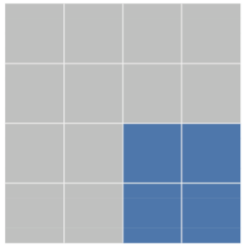
	A	B	C
Category 1	15%	22%	42%
Category 2	40%	36%	20%
Category 3	35%	17%	34%
Category 4	30%	29%	26%
Category 5	55%	30%	58%
Category 6	11%	25%	49%

Heatmap



Slopegraph

Waterfall



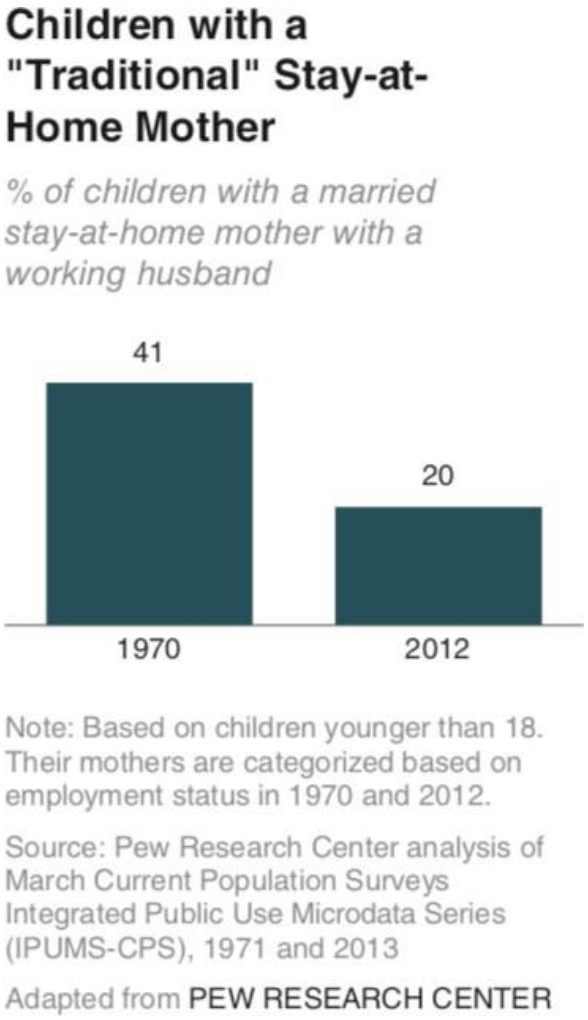
Square area

Simple text

When you have just a number or two to share, simple text can be a great way to communicate.

Think about solely using the number—making it as prominent as possible—and a few supporting words to clearly make your point.

The graph doesn't do much to aid in the interpretation of the numbers



Stay-at-home moms original graph

Simple text

Stay-at-home moms simple text makeover

Tables

Tables are great for just that—communicating to a mixed audience whose members will each look for their particular row of interest.

If you need to communicate multiple different units of measure, this is typically easier with a table than a graph.

Group	Metric A	Metric B	Metric C
Group 1	$X.X	Y%	Z,ZZZ
Group 2	$X.X	Y%	Z,ZZZ
Group 3	$X.X	Y%	Z,ZZZ
Group 4	$X.X	Y%	Z,ZZZ
Group 5	$X.X	Y%	Z,ZZZ

Tables

The data stands out more than the structural components of the table in the second and third iterations (light borders, minimal borders).

Heavy borders

Group	Metric A	Metric B	Metric C
Group 1	$X.X	Y%	Z,ZZZ
Group 2	$X.X	Y%	Z,ZZZ
Group 3	$X.X	Y%	Z,ZZZ
Group 4	$X.X	Y%	Z,ZZZ
Group 5	$X.X	Y%	Z,ZZZ

Light borders

Group	Metric A	Metric B	Metric C
Group 1	$X.X	Y%	Z,ZZZ
Group 2	$X.X	Y%	Z,ZZZ
Group 3	$X.X	Y%	Z,ZZZ
Group 4	$X.X	Y%	Z,ZZZ
Group 5	$X.X	Y%	Z,ZZZ

Minimal borders

Group	Metric A	Metric B	Metric C
Group 1	$X.X	Y%	Z,ZZZ
Group 2	$X.X	Y%	Z,ZZZ
Group 3	$X.X	Y%	Z,ZZZ
Group 4	$X.X	Y%	Z,ZZZ
Group 5	$X.X	Y%	Z,ZZZ

Table borders

Heatmap

- Tables

A heatmap is a way to visualize data in tabular format, where in place of (or in addition to) the numbers, you leverage colored cells that convey the relative magnitude of the numbers.

Table

	A	B	C
Category 1	15%	22%	42%
Category 2	40%	36%	20%
Category 3	35%	17%	34%
Category 4	30%	29%	26%
Category 5	55%	30%	58%
Category 6	11%	25%	49%

Heatmap

LOW-HIGH

	A	B	C
Category 1	15%	22%	42%
Category 2	40%	36%	20%
Category 3	35%	17%	34%
Category 4	30%	29%	26%
Category 5	55%	30%	58%
Category 6	11%	25%	49%

Two views of the same data

Graphs

Tables – verbal system

Graphs – visual system

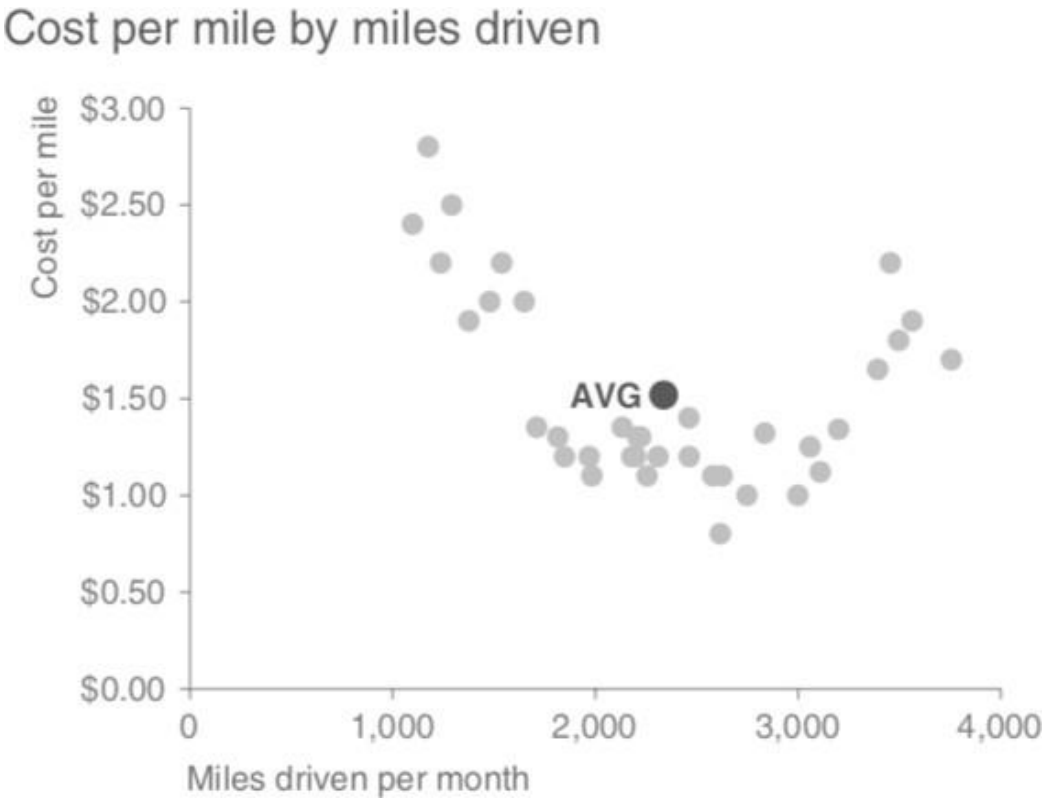
Well-designed graph > well-designed table

Types of graphs:

- points
- lines
- bars
- area

Scatterplot – points

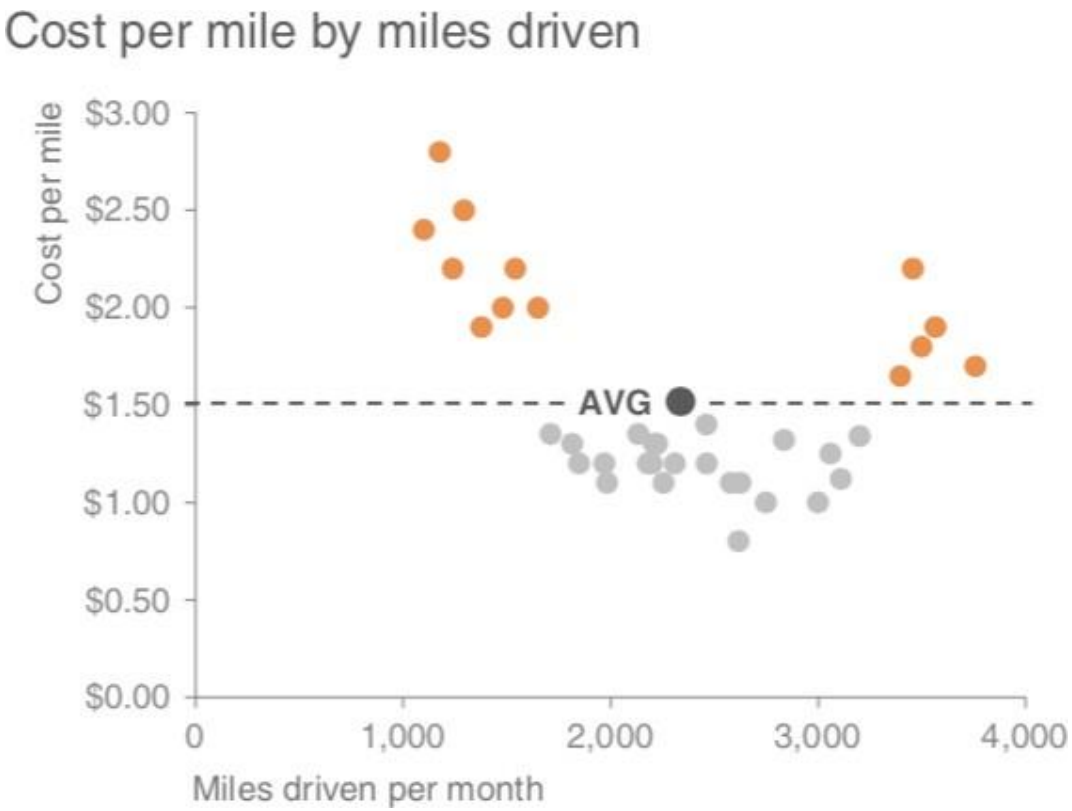
Scatterplot can be useful in showing the relationship between two things.



scatterplot

Scatterplot – points

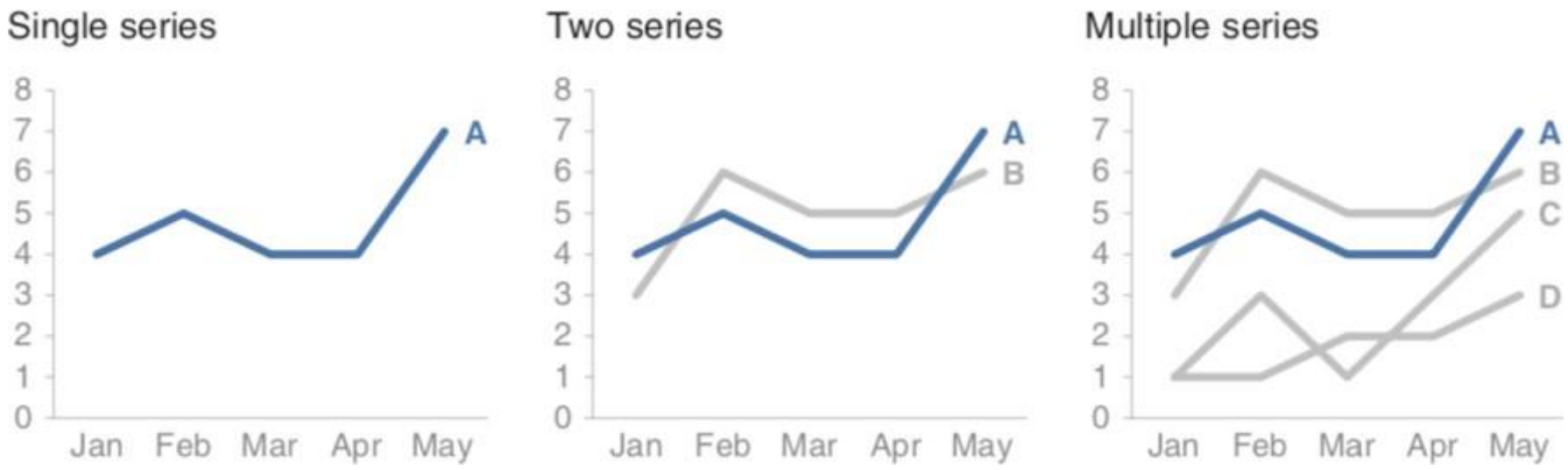
The cases where cost per mile is above average



Modified scatterplot

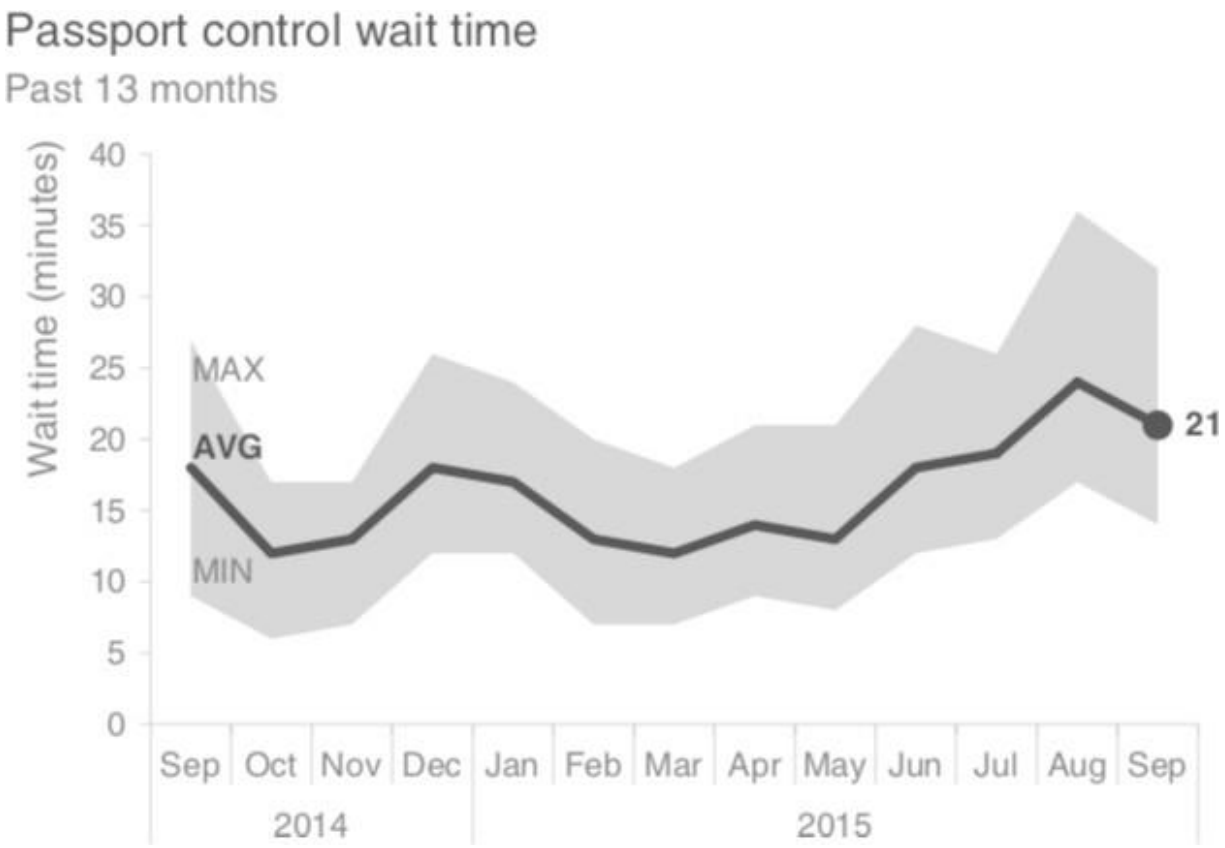
Line gragh – lines

Line graphs are most commonly used to plot continuous data.



Line graphs

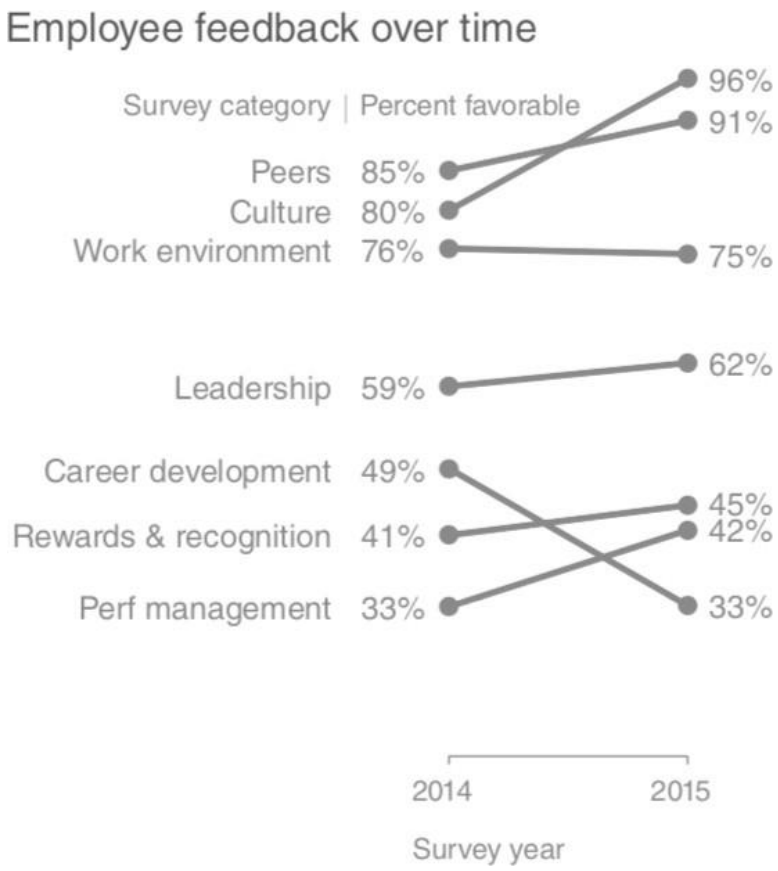
Line gragh – lines



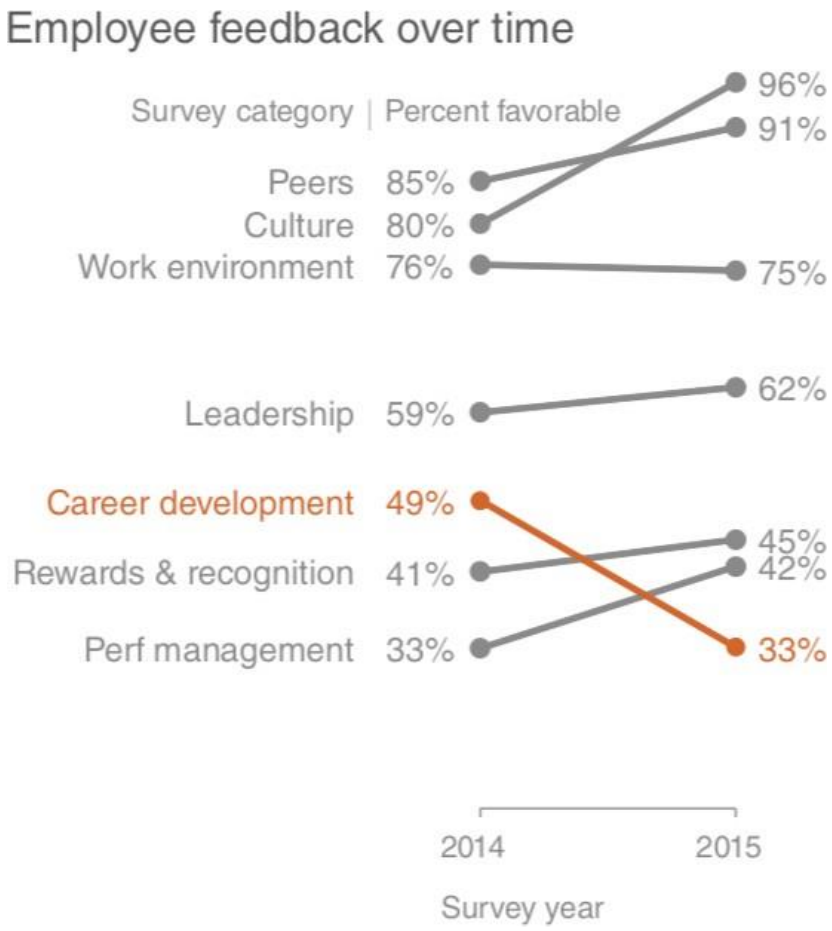
Showing average within a range in a line graph

Slopegraph – lines

Slopegraphs can be useful when we have two time periods and points of comparison



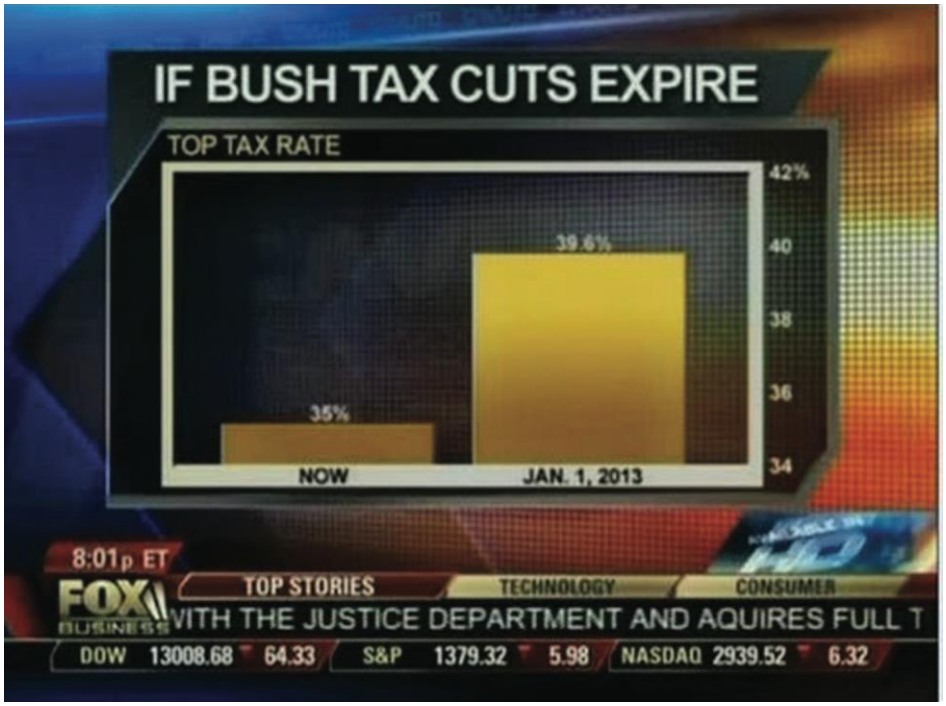
Slopegraph – lines



Modified slopegraph

Bars

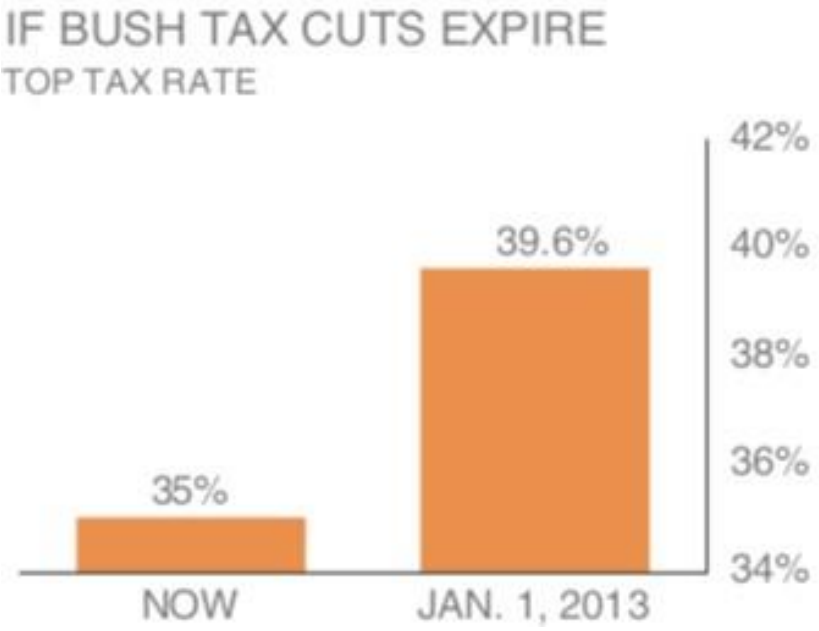
Bar charts are easy for our eyes to read. Our eyes compare the end points of the bars, so it is easy to see quickly which category is the biggest, which is the smallest, and also the incremental difference between categories.



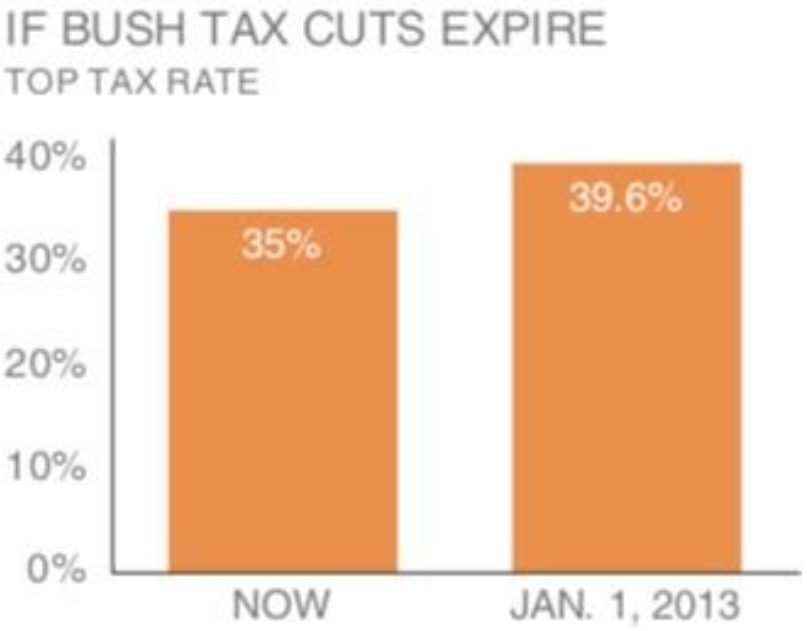
Fox News bar chart

Bars

Non-zero baseline: as originally graphed



Zero baseline: as it should be graphed



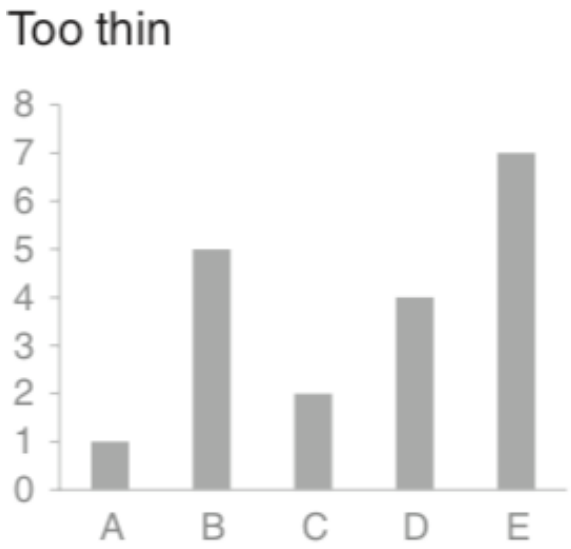
Bar charts must have a zero baseline

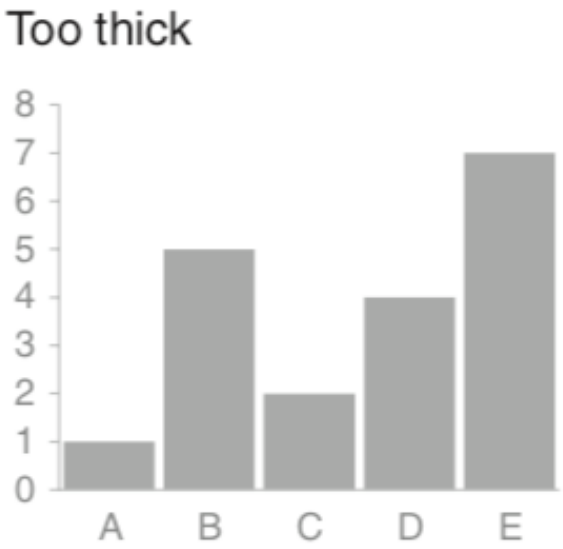
Bars

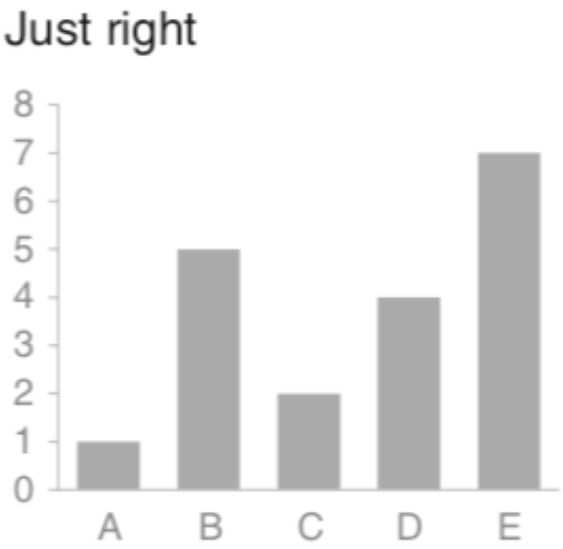
Ethics and data visualization

But what if changing the scale on a bar chart or otherwise manipulating the data better reinforces the point you want to make? Misleading in this manner by inaccurately visualizing data is not OK. Beyond ethical concerns, it is risky territory. All it takes is one discerning audience member to notice the issue (for example, the *y*-axis of a bar chart beginning at something other than zero) and your entire argument will be thrown out the window, along with your credibility.

Bars



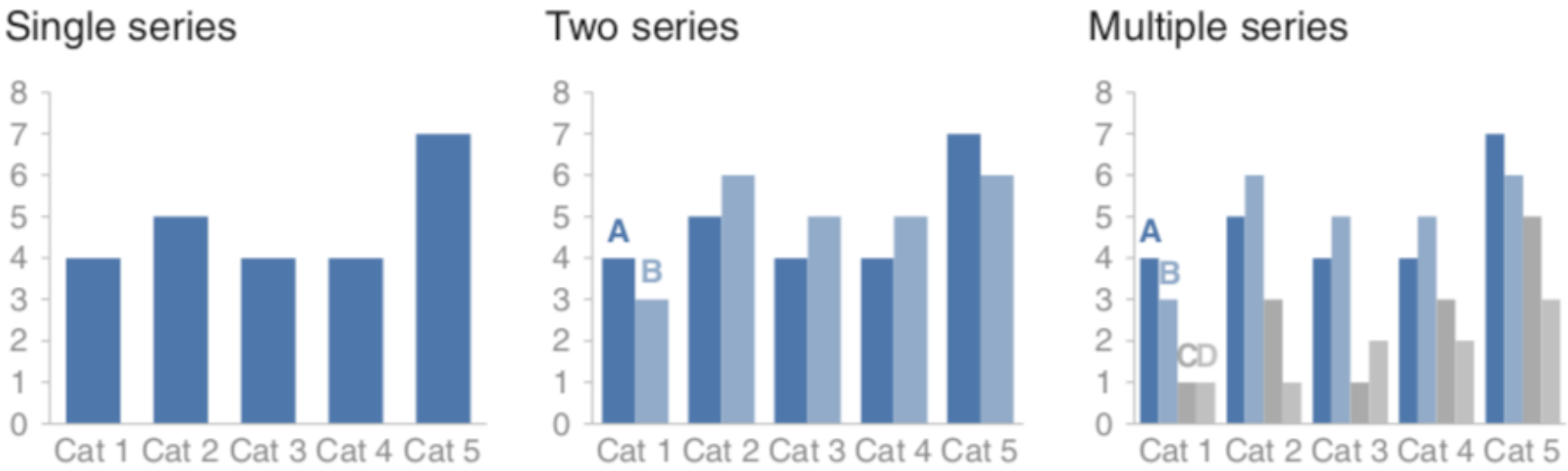




Bar width

Generally, the bars should be wider than the white space between the bars.

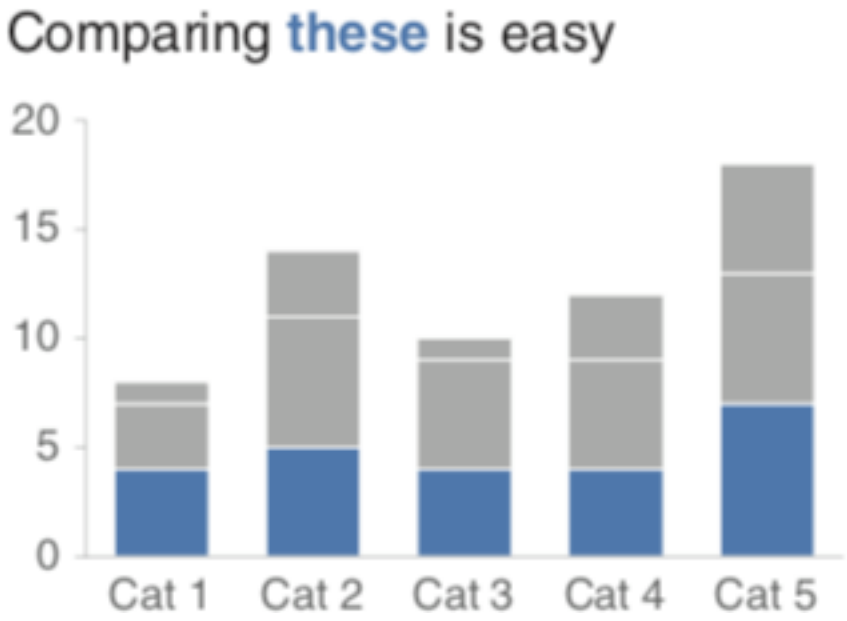
Vertical bar chart – Bars

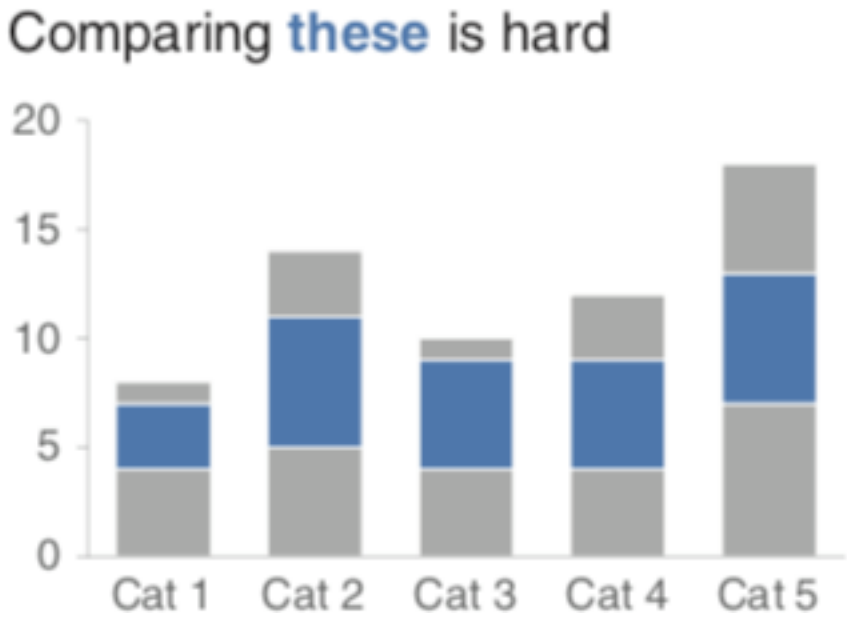


Note that as you add more series of data, it becomes more difficult to focus on one at a time and pull out insight, so use multiple series bar charts with caution.

Stacked vertical bar chart – Bars

Stacked vertical bar charts are meant to allow you to compare totals across categories and also see the subcomponent pieces within a given category.

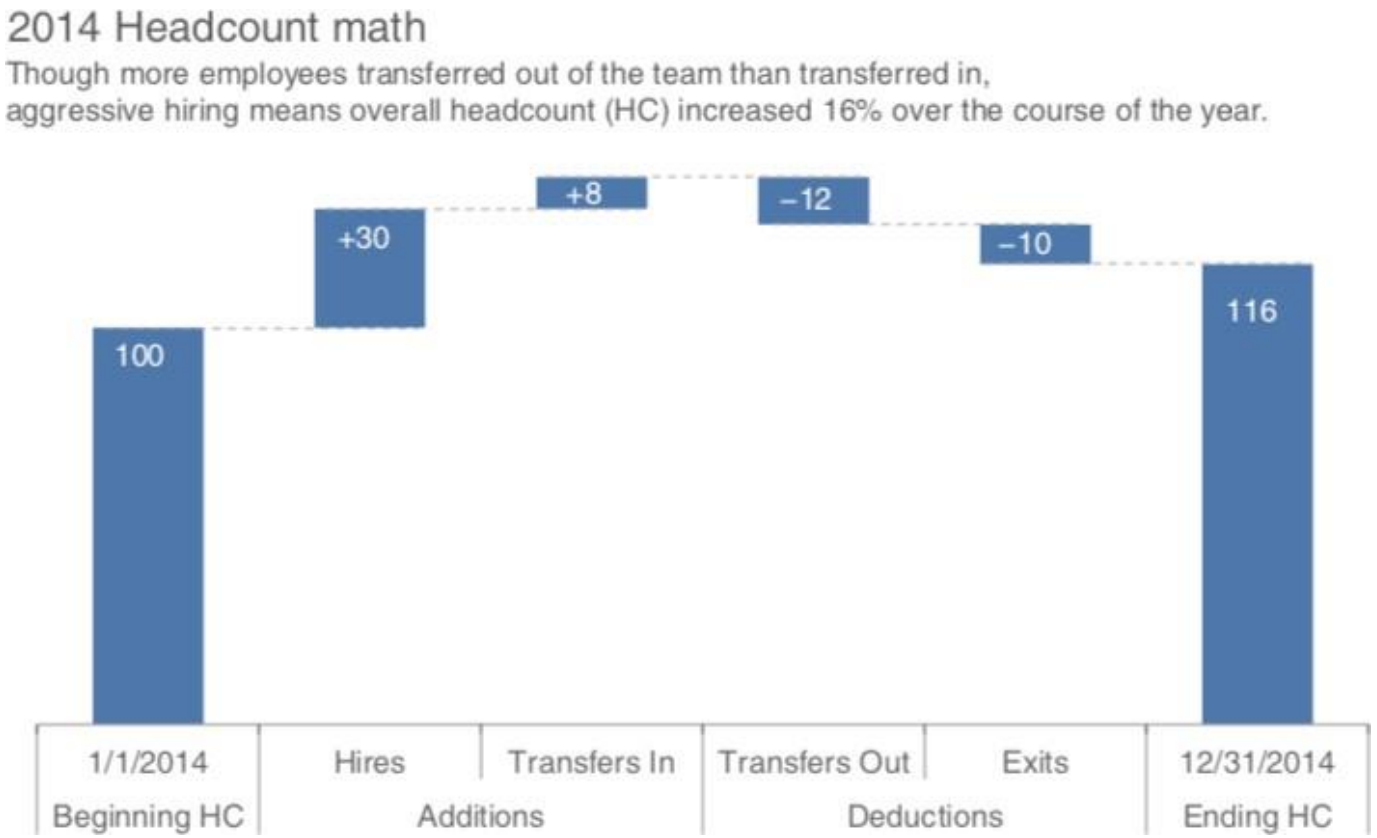




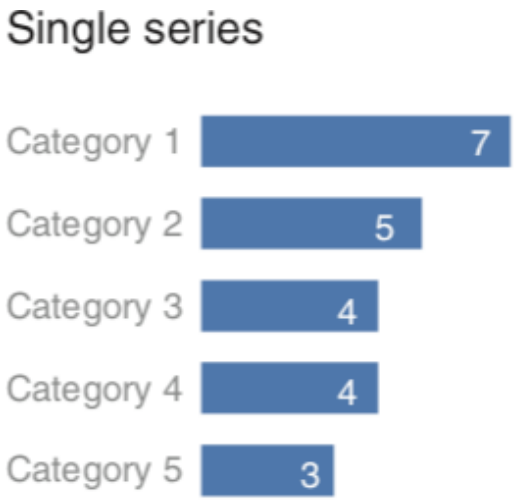
Comparing series with stacked bar charts

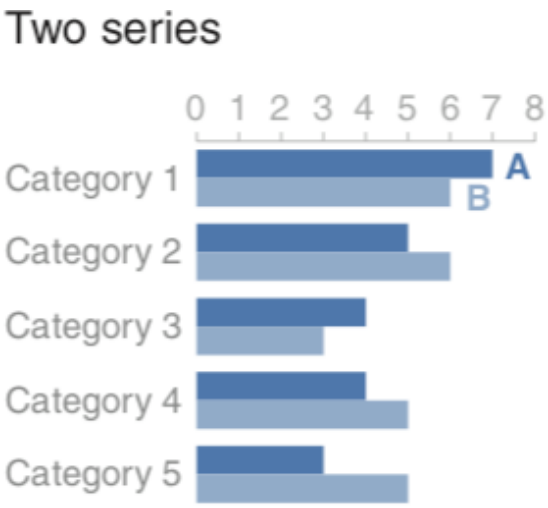
Waterfall chart – Bars

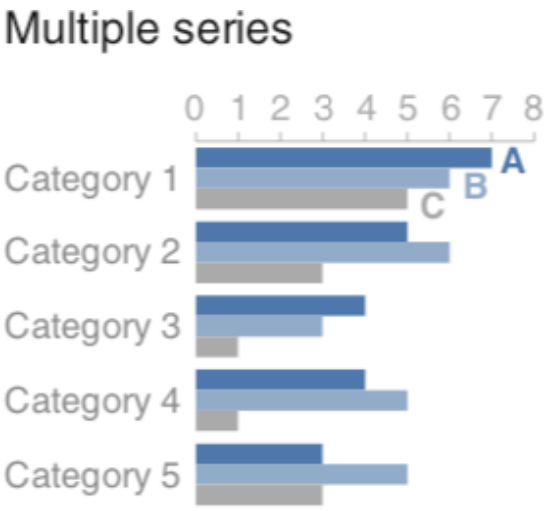
Waterfall chart shows a starting point, increases and decreases, and the resulting ending point.



Horizonal bar chart – Bars



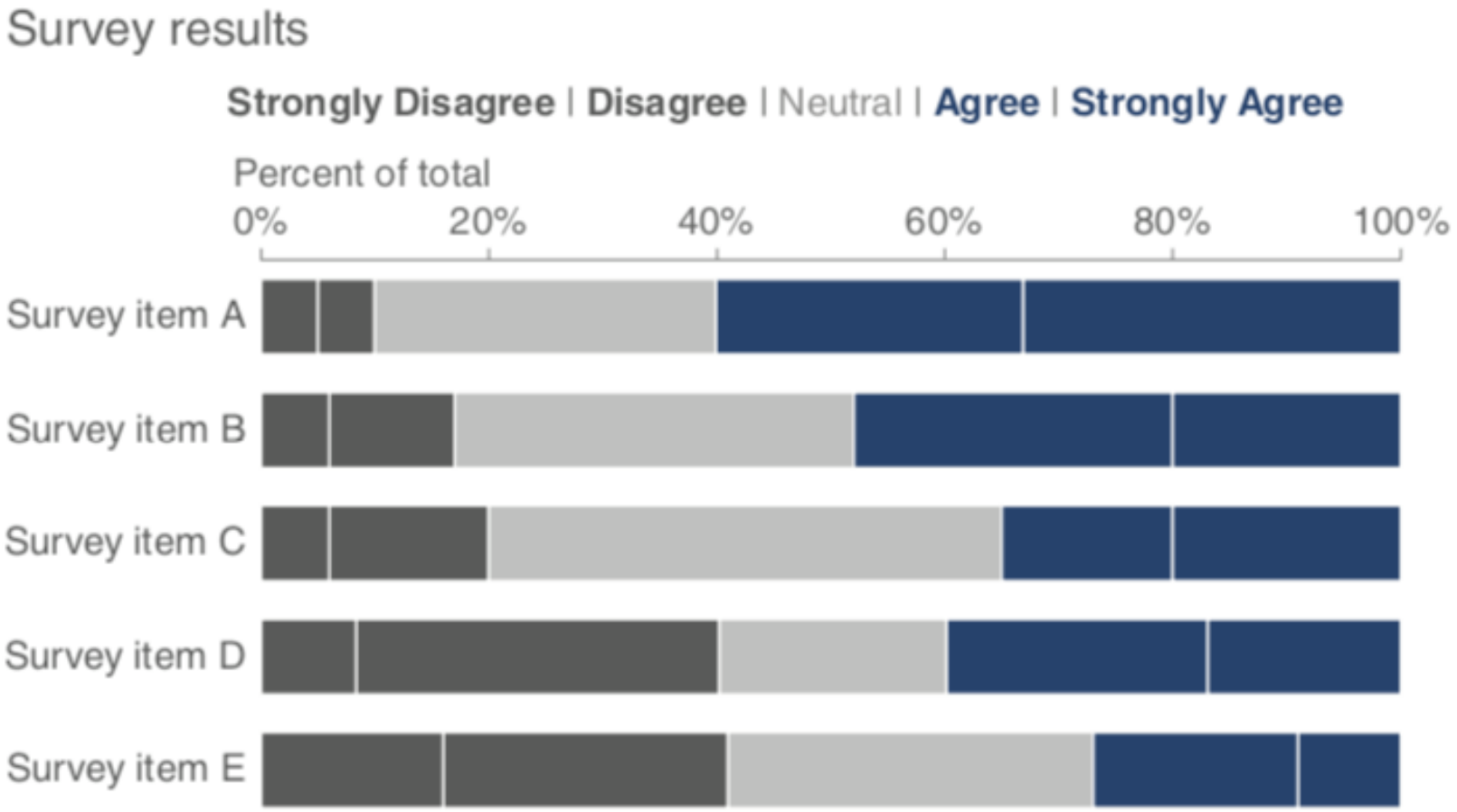




Horizonal bar chart is *extremely easy to read.*

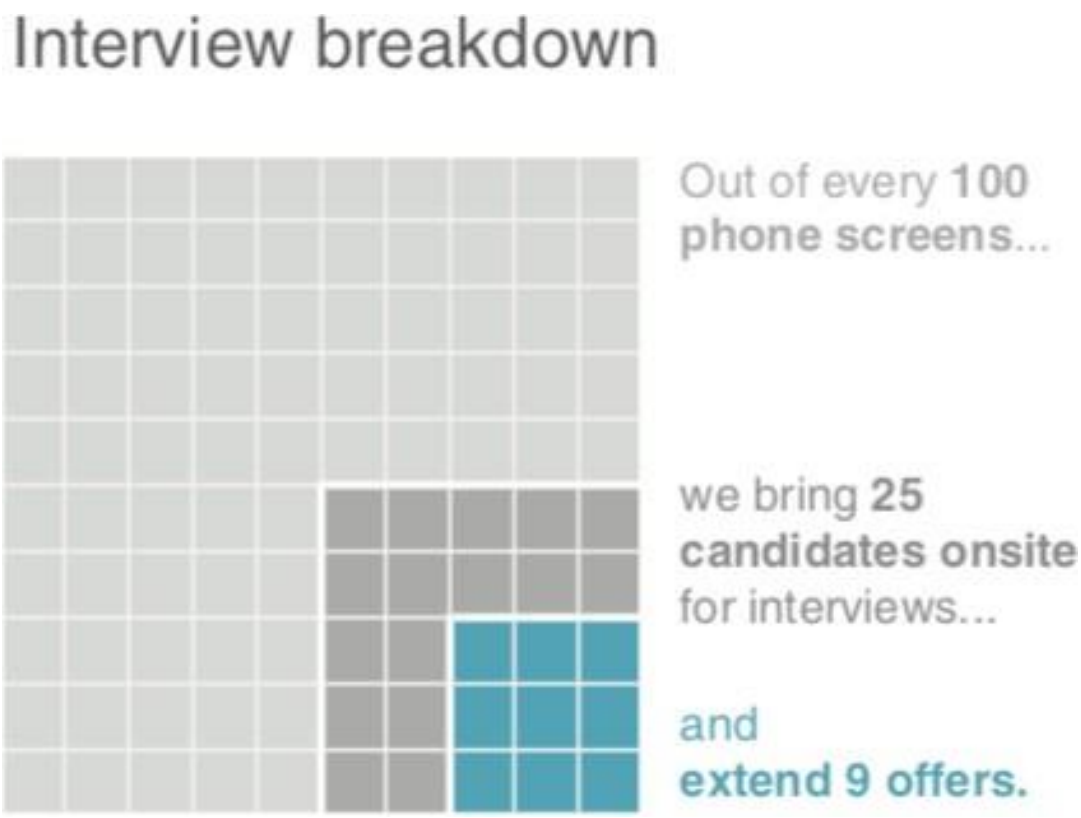
Because of the way we typically process information—starting at top left and making z's with our eyes across the screen or page—the structure of the horizontal bar chart is such that our eyes hit the category names before the actual data.

Stacked horizontal bar chart – Bars



100% stacked horizontal bar chart

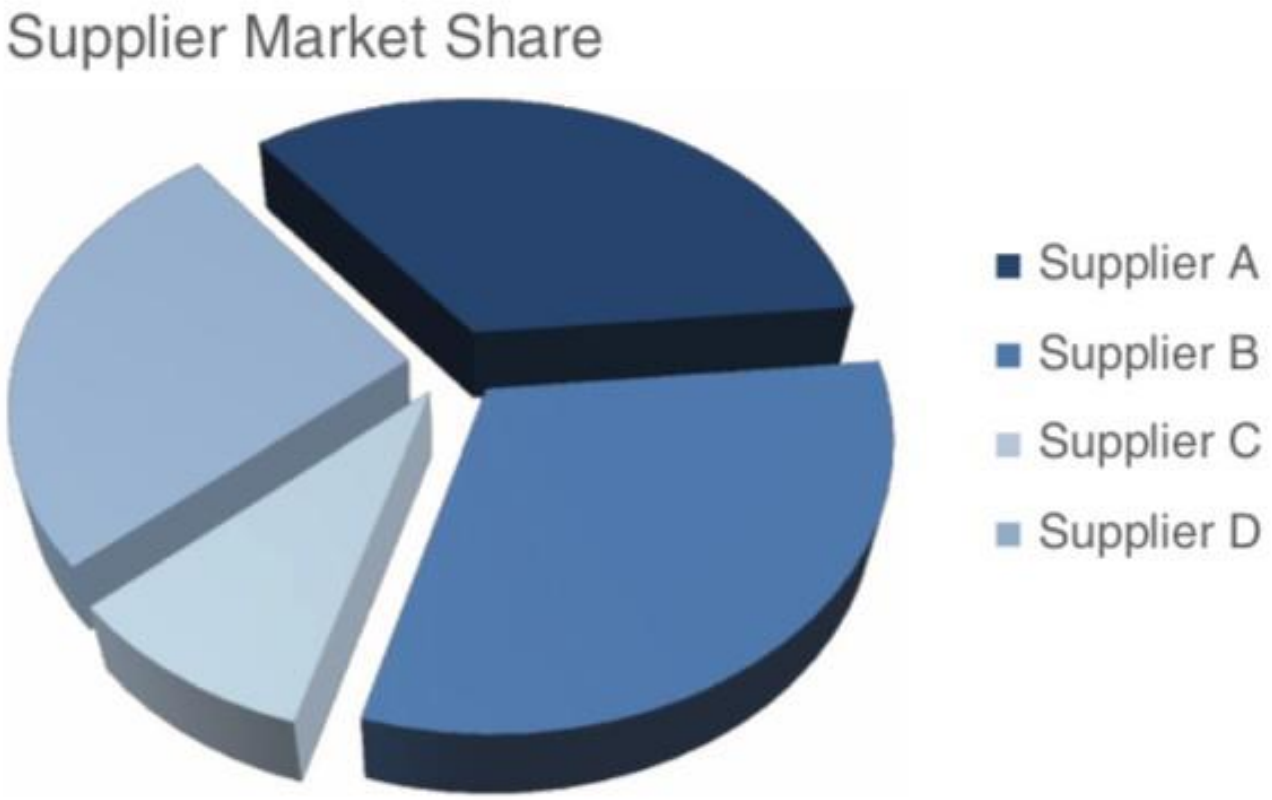
Area



Square area graph

Pie charts

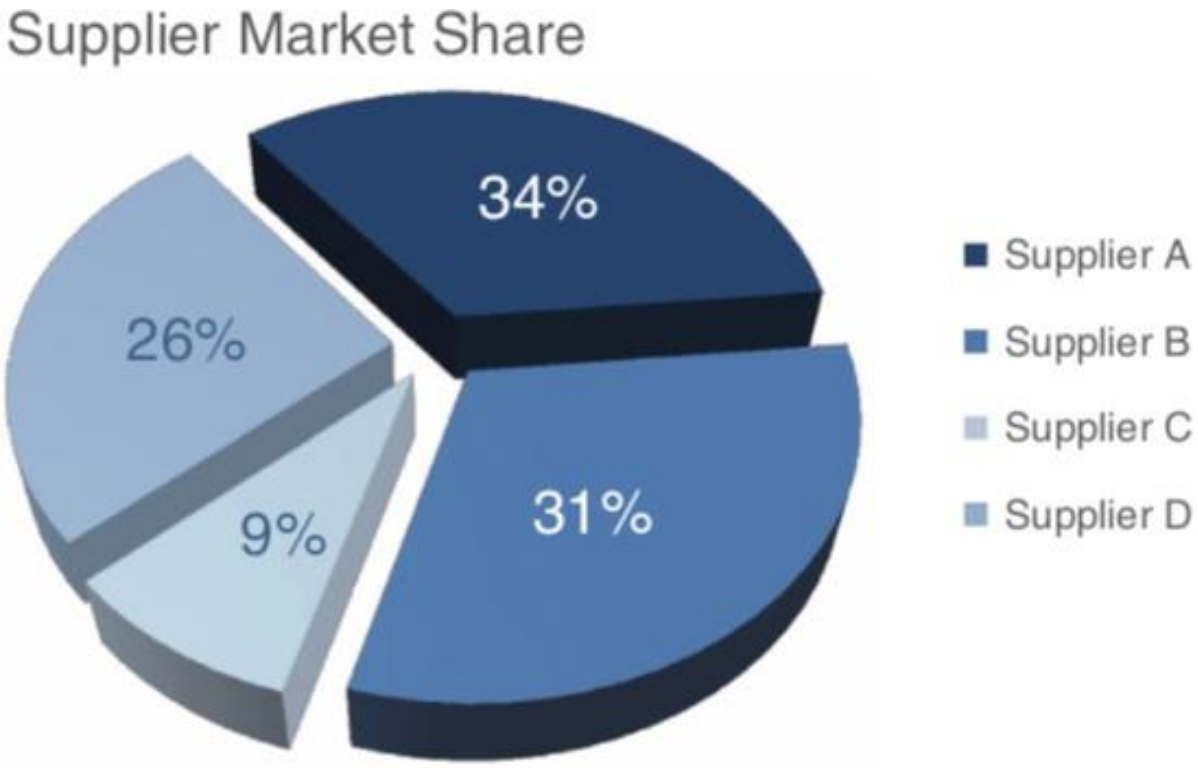
- To be avoided



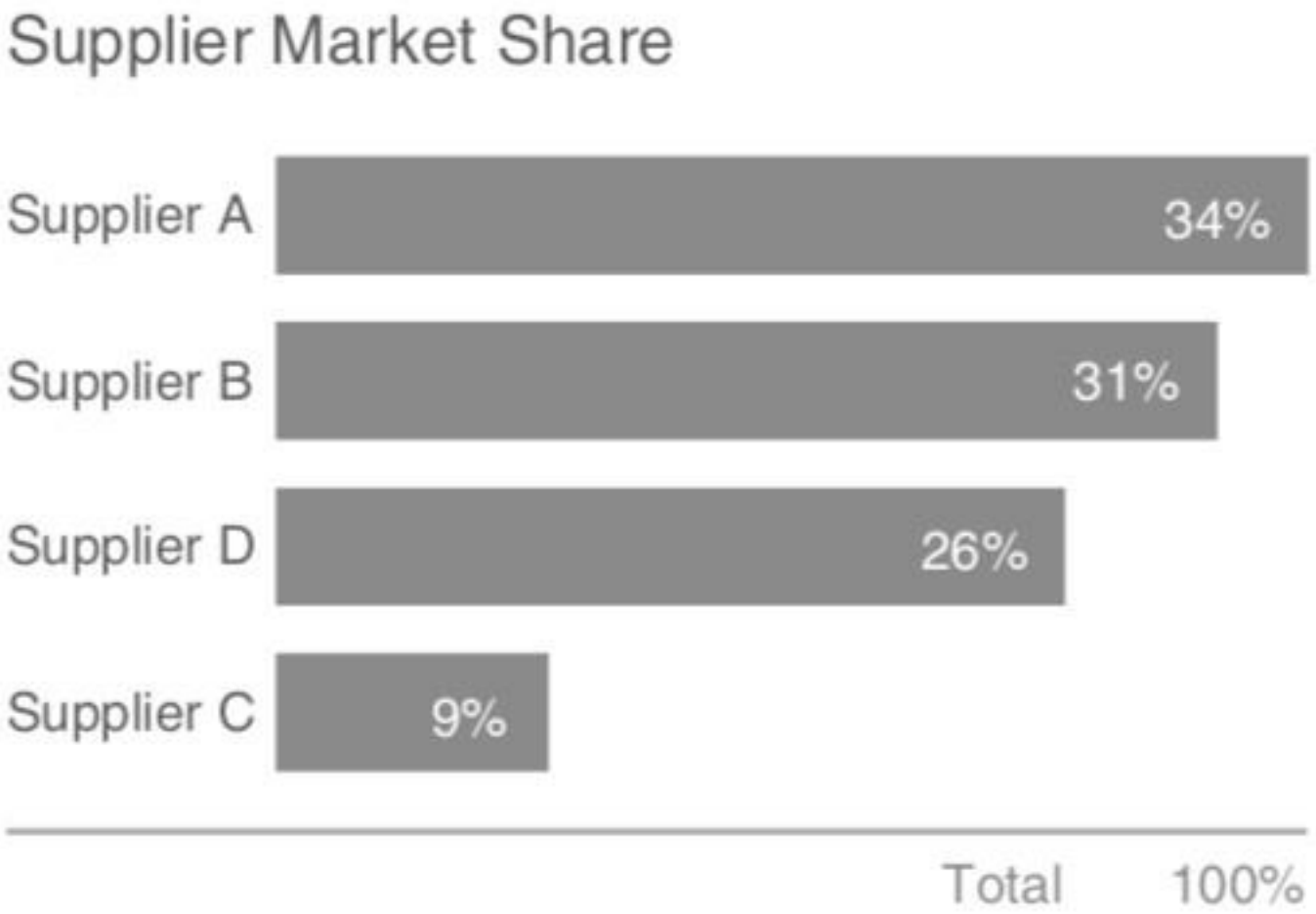
Pie chart

Pie charts

- To be avoided



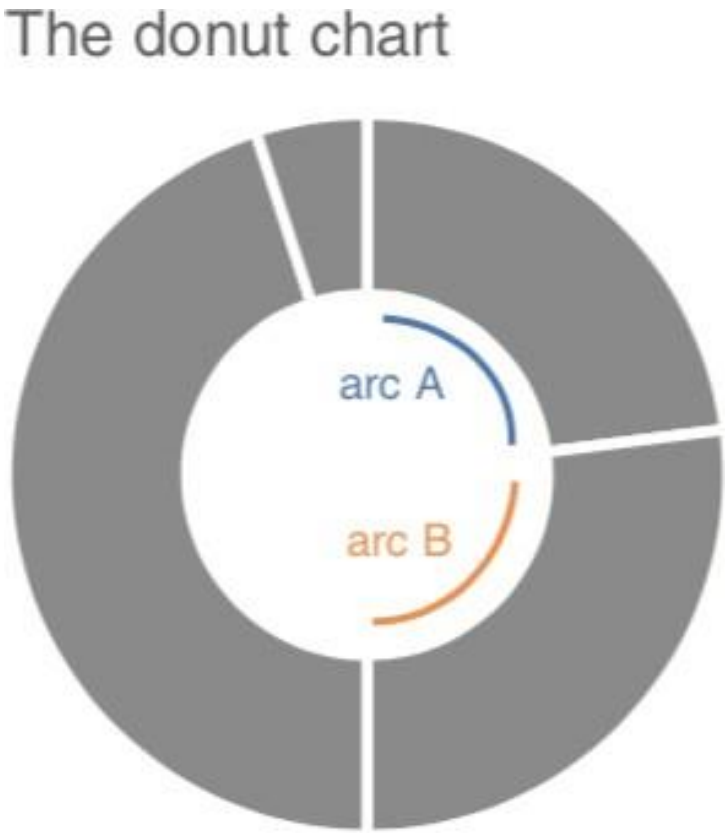
Pie chart with labeled segments



An alternative to the pie chart

Donut charts

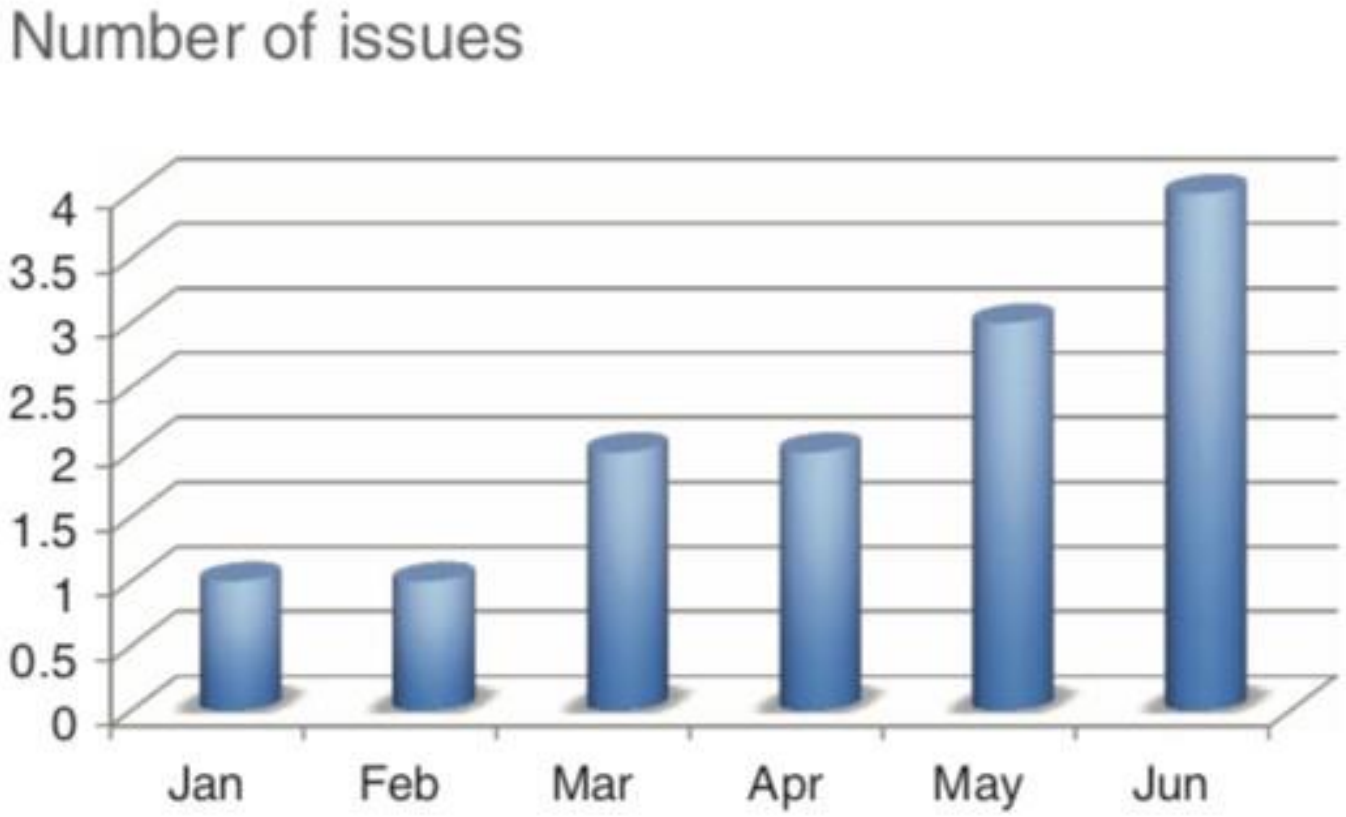
- To be avoided



Donut chart

Never use 3D

- To be avoided



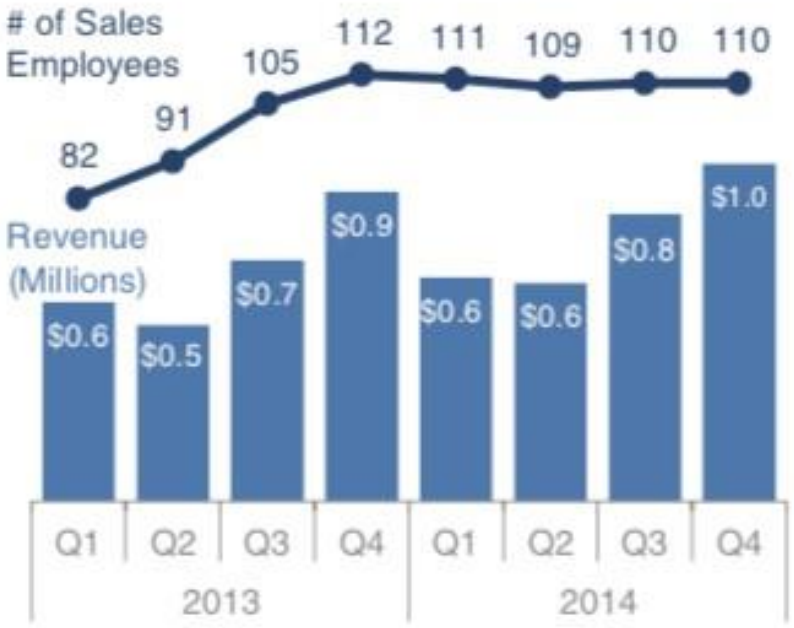
3D column chart

Secondary y-axis – generally not a good idea

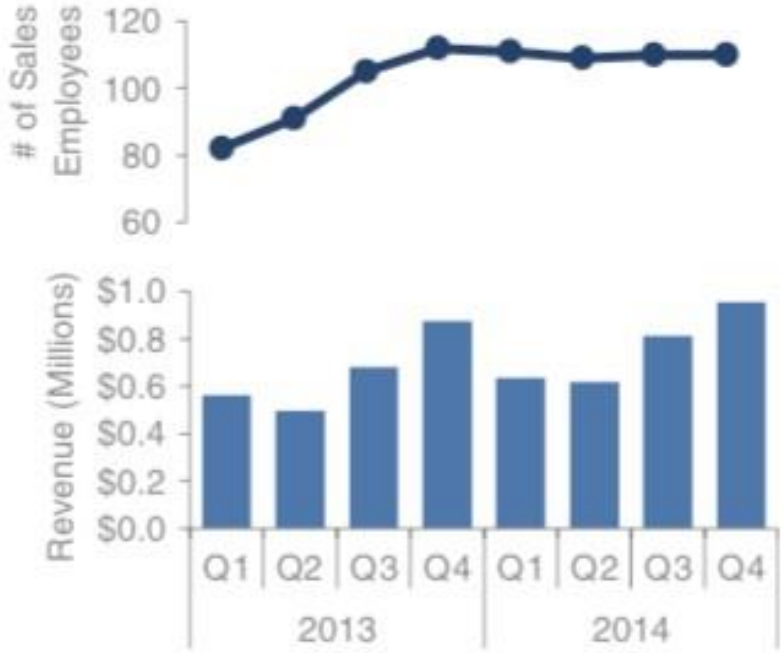
Secondary y-axis

Secondary y-axis – generally not a good idea

Alternative 1: **label directly**



Alternative 2: **pull apart vertically**



Strategies for avoiding secondary y-axis

Summary

What we have learnt today?

- Types of visual displays we use most
  - Simple text
  - Tables
  - Graphs
    - Points, lines, bars, areas

- Visual types /elements to avoid
  - Pie charts
  - Donut charts
  - 3D
  - Secondary y-axis