Pie Charts and Other Chart Types

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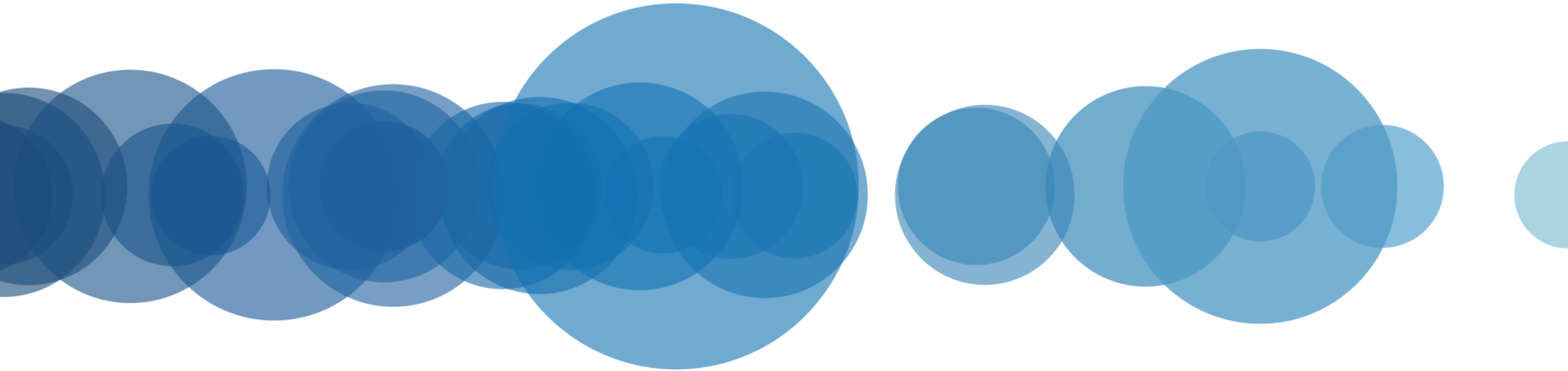
Goals

By completing the course modules, students will:

- Learn basic chart types
- Learn how chart types encode data and how they can be used
- Discuss problems with various chart types
- See examples of various chart types through compare and contrast

Chart Types

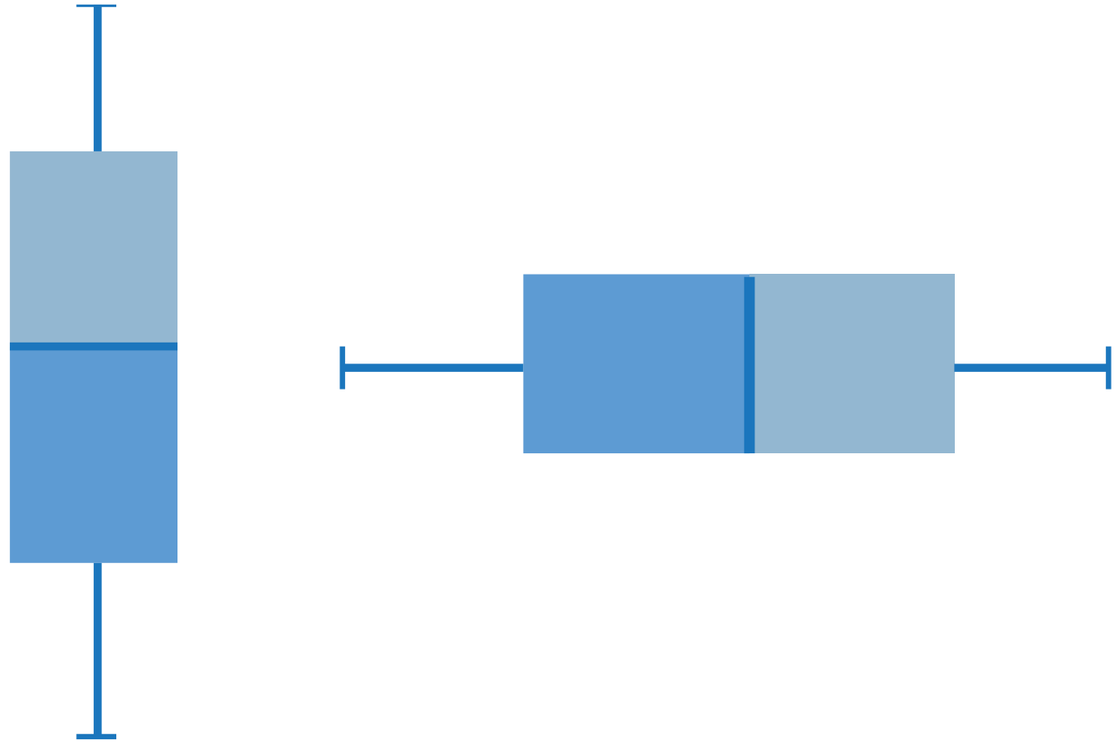


Bar Chart

encodes data using height/length of bar and shows categorical comparisons.

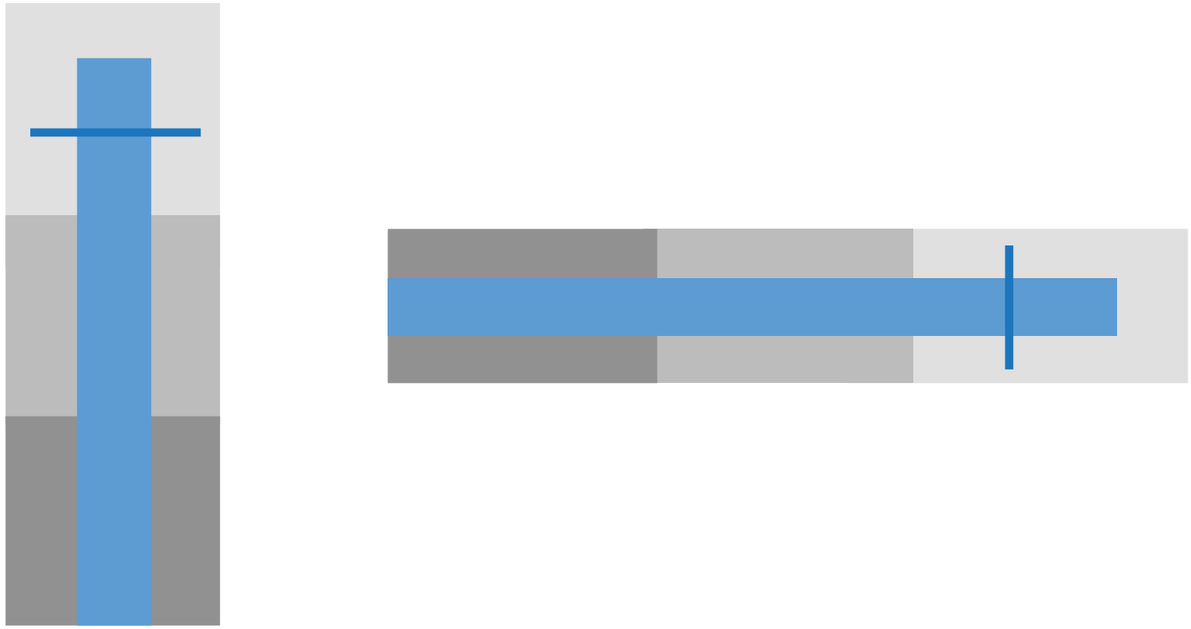
Box Plot

encodes data using position and height/length to show the distribution of the data.



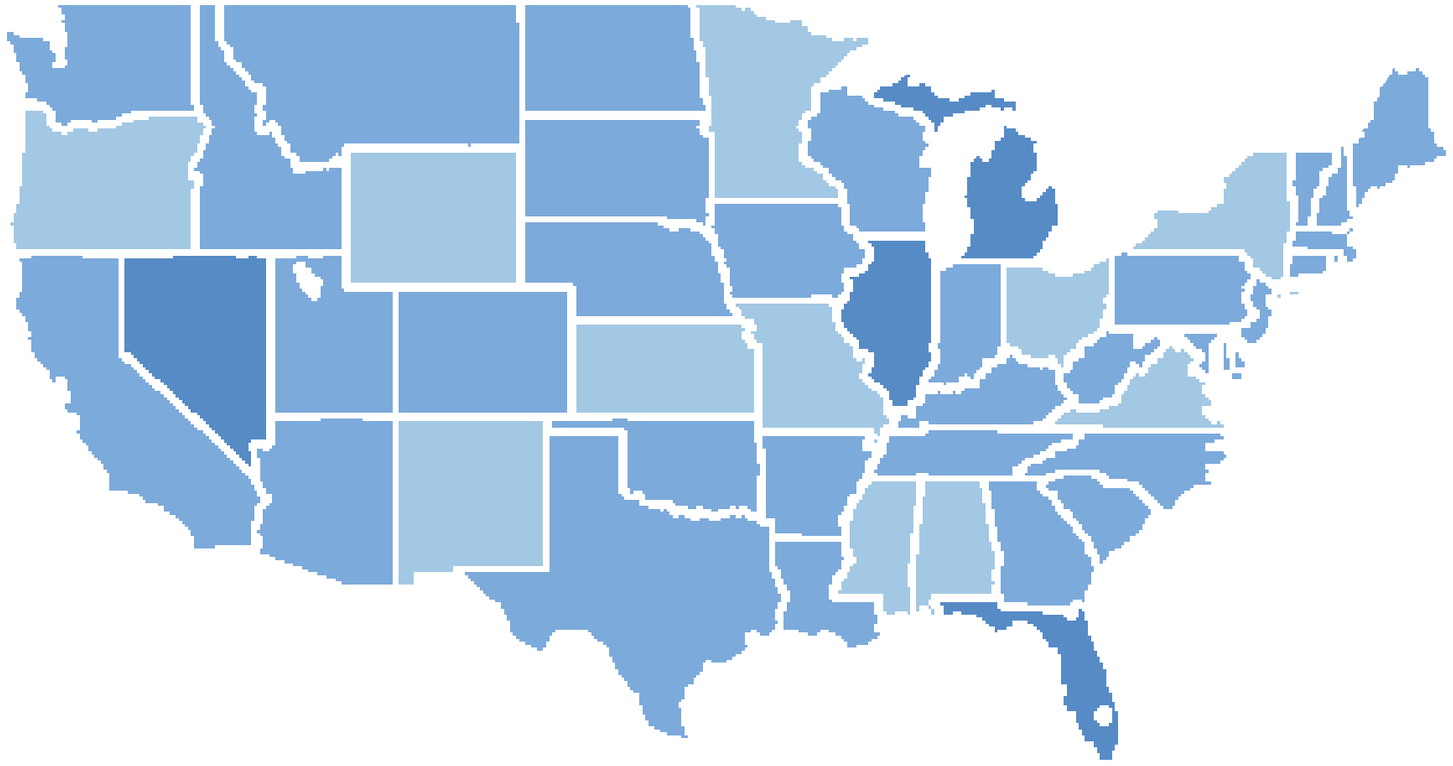
Bullet Graph

encodes data using length/height, position and color to show actual compared to target and performance bands.



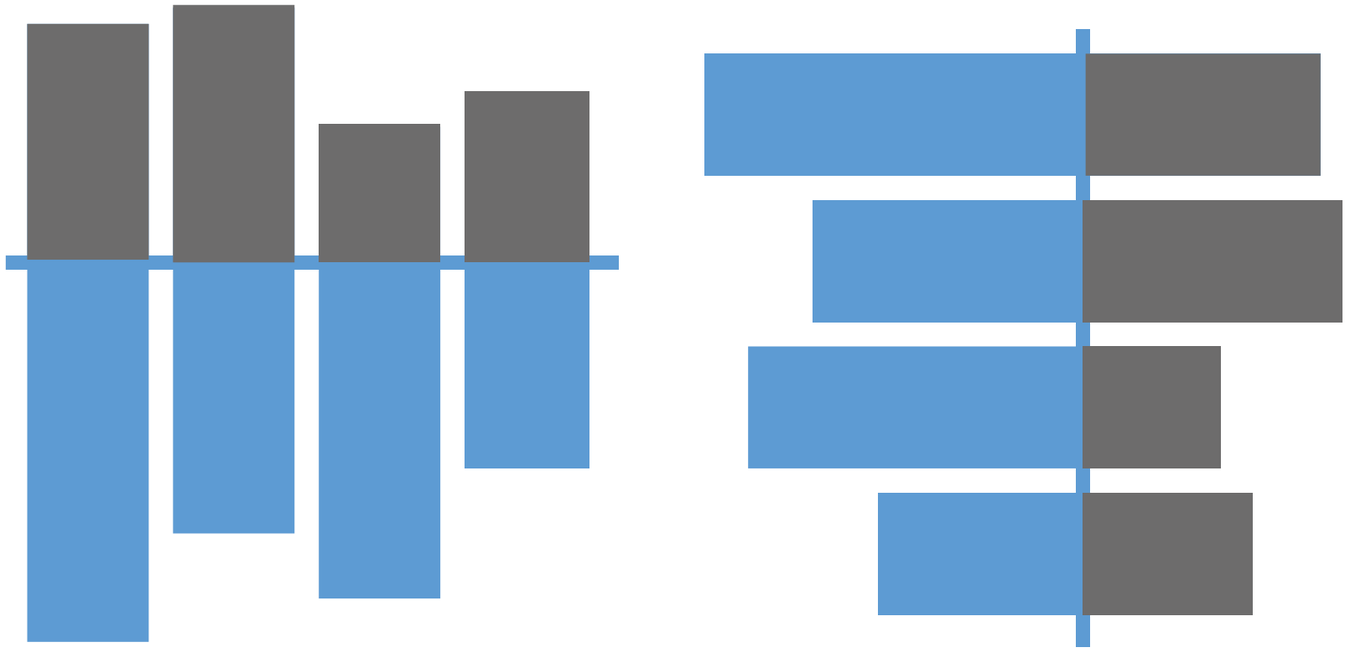
Choropleth Map (Shaded Map)

encodes data using color and position to show data geographically.



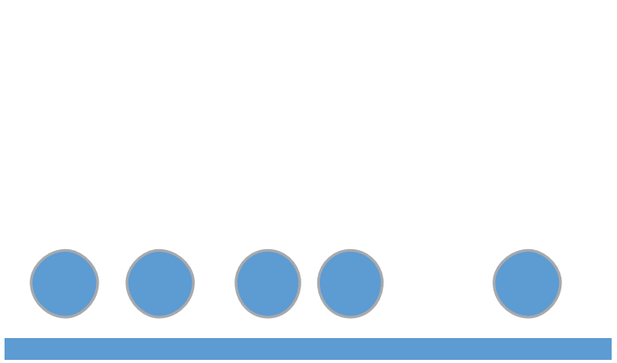
Diverging Bar Chart

encodes data using height/length of bar diverging from a midpoint to show categorical comparisons.



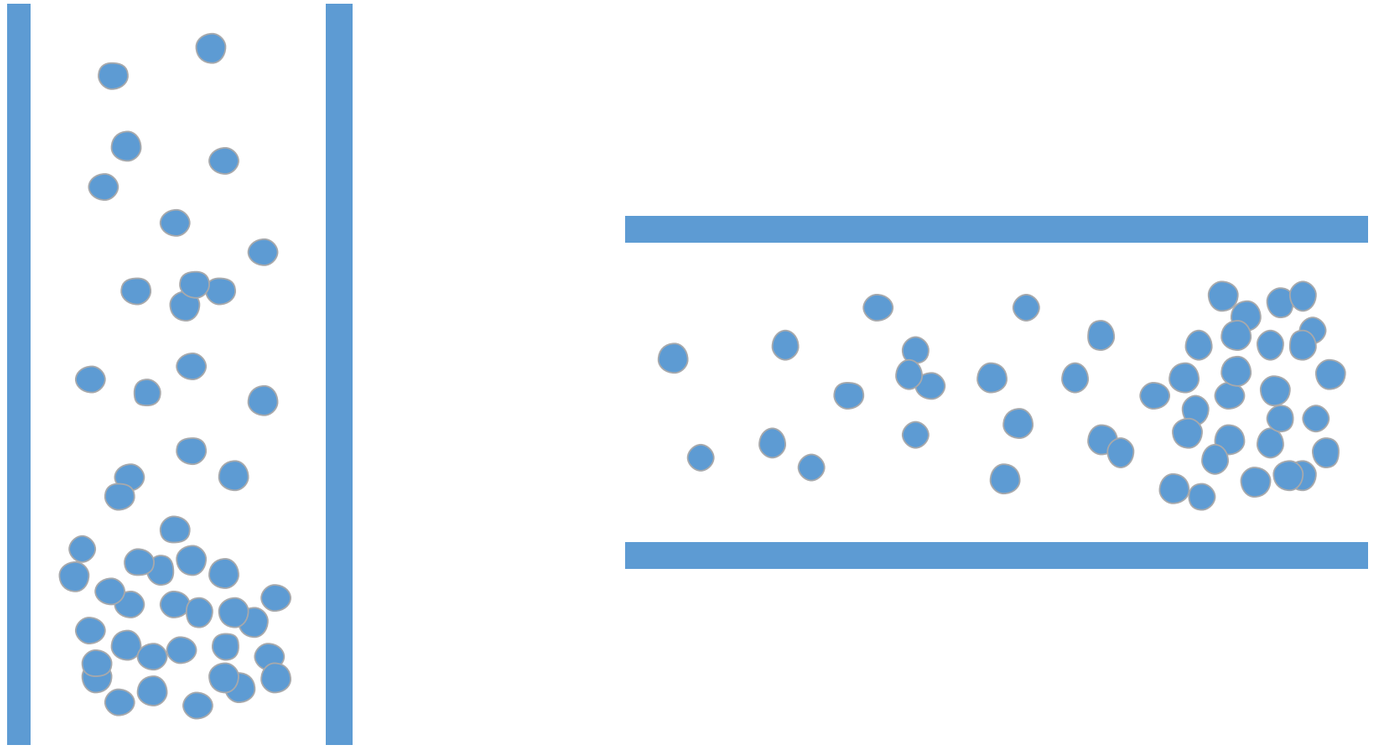
Dot Plot

encodes data using position to show the comparisons.



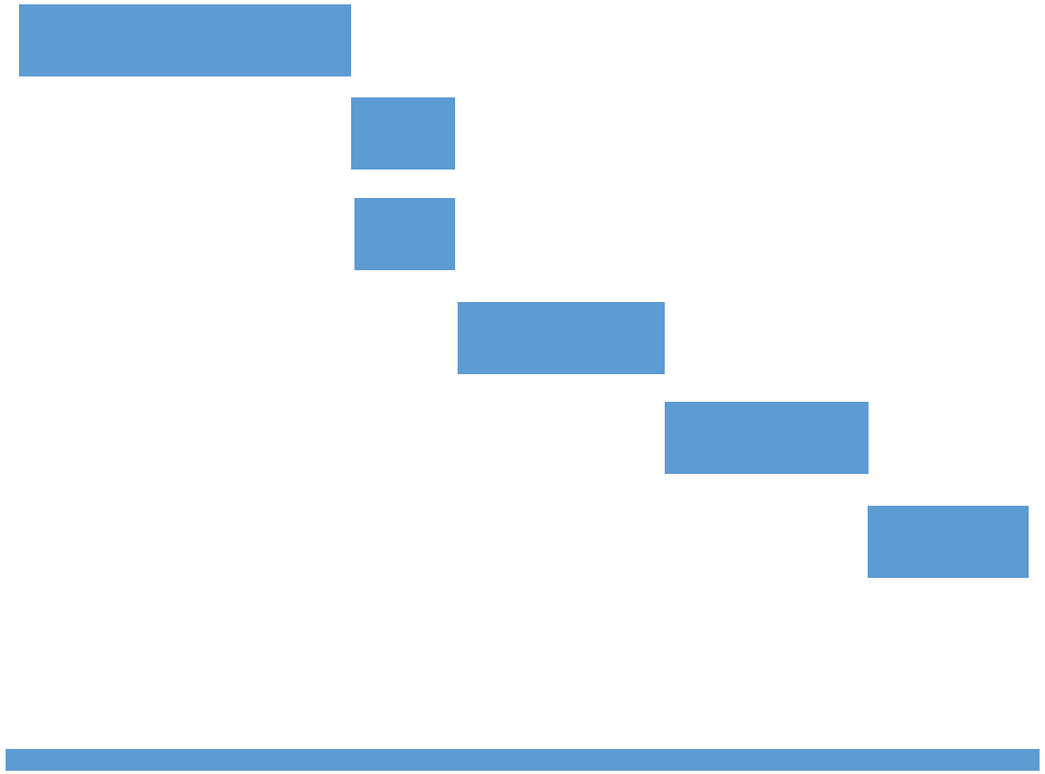
Dot Plot with Jitter

encodes data using position to show comparisons but offsets points randomly to reduce overlap of dots.



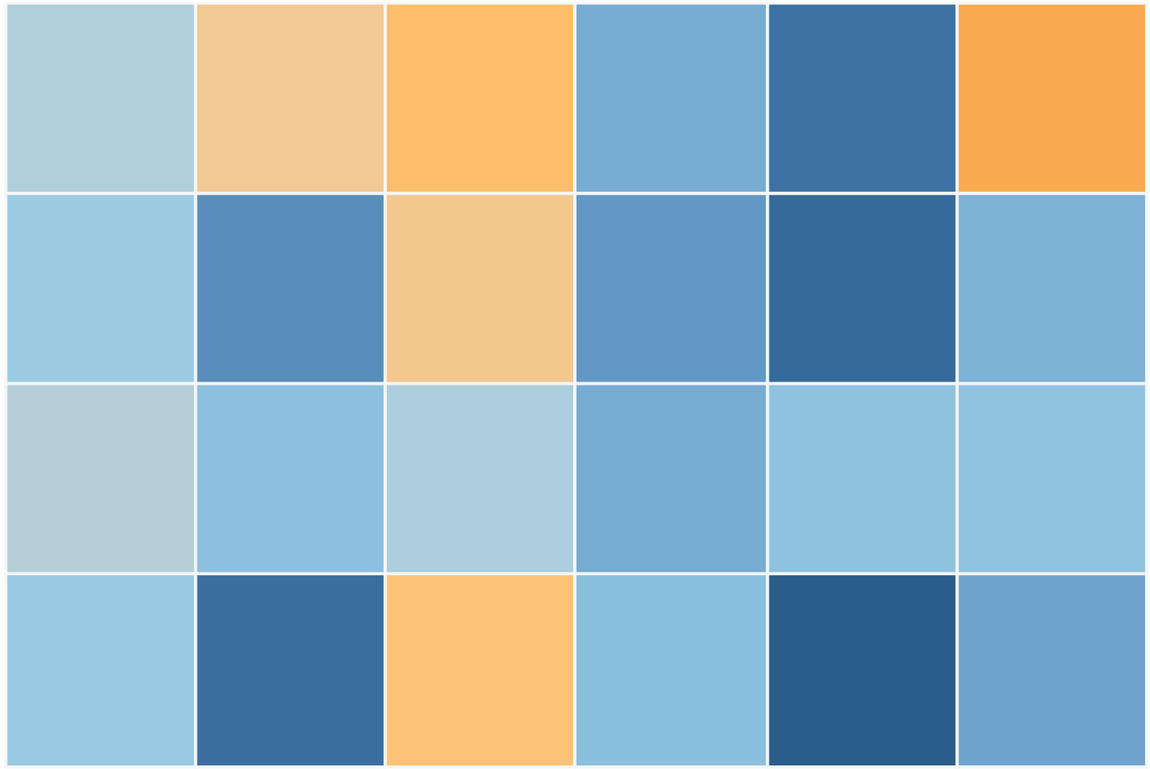
Gantt Chart

encodes data using length and position to show amount of work completed in segments of time.



Heat Map

encodes a data table using color to highlight the differences in the table without numbers.



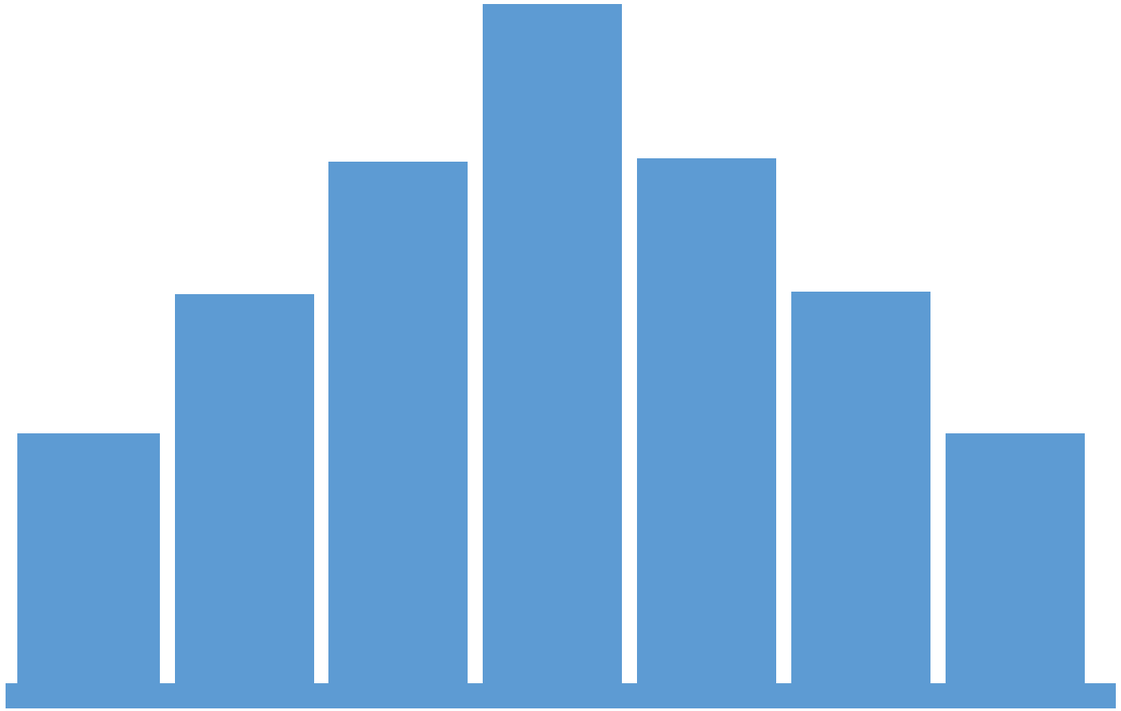
Highlight Table

encodes a data table using color to highlight the differences in the table numbers.

$29,071	$17,307	$30,073
$2,603	$2,353	$5,079
$66,106	$53,891	$42,444
$20,173	$14,151	$26,664
$100,615	$58,304	$98,684
$71,613	$35,768	$70,533
$10,760	$8,319	$18,127
$39,140	$43,916	$84,755

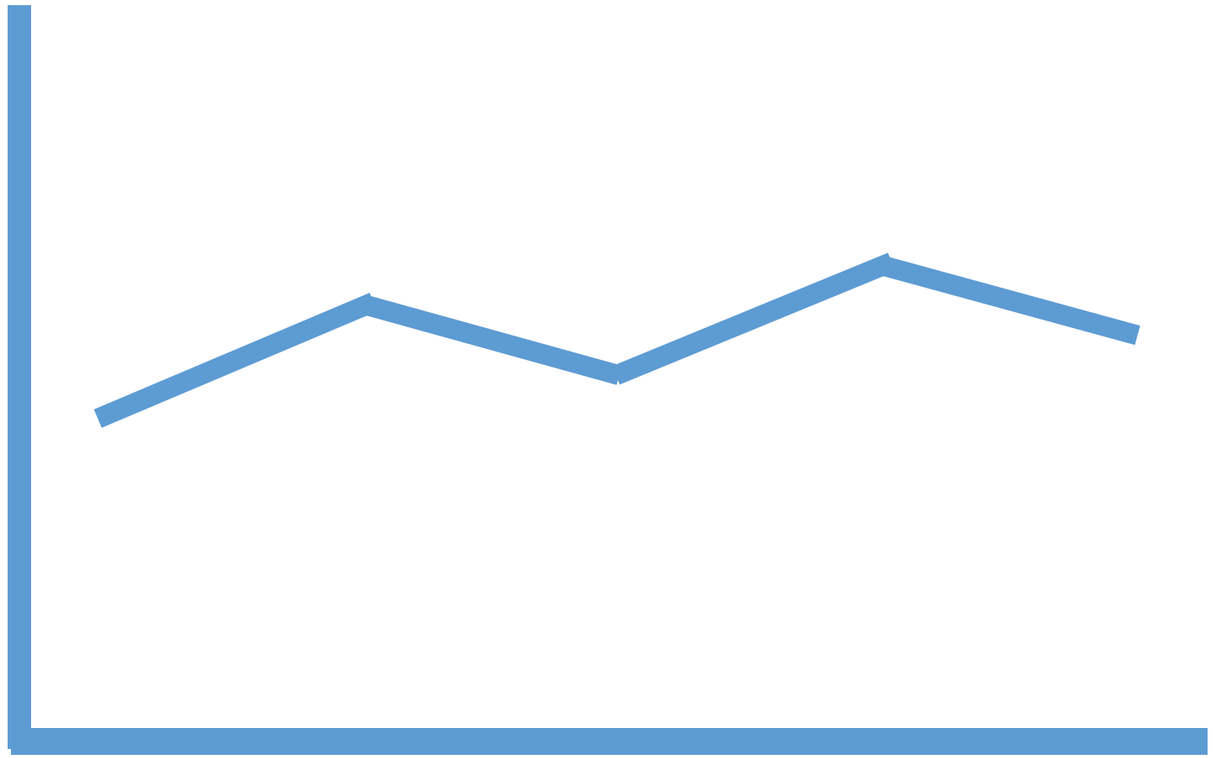
Histogram

encodes data using height and shows a distribution.



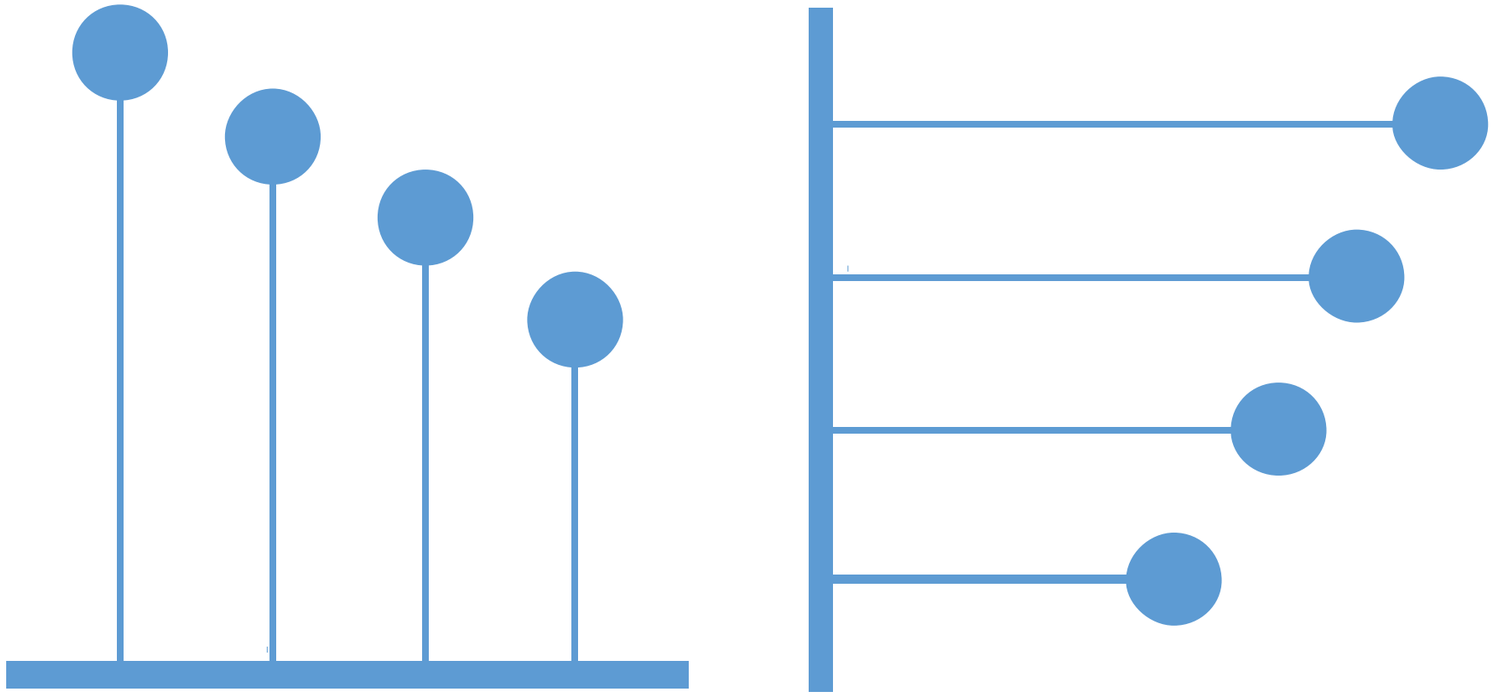
Line Chart

encodes data using position and often shows trend over time.



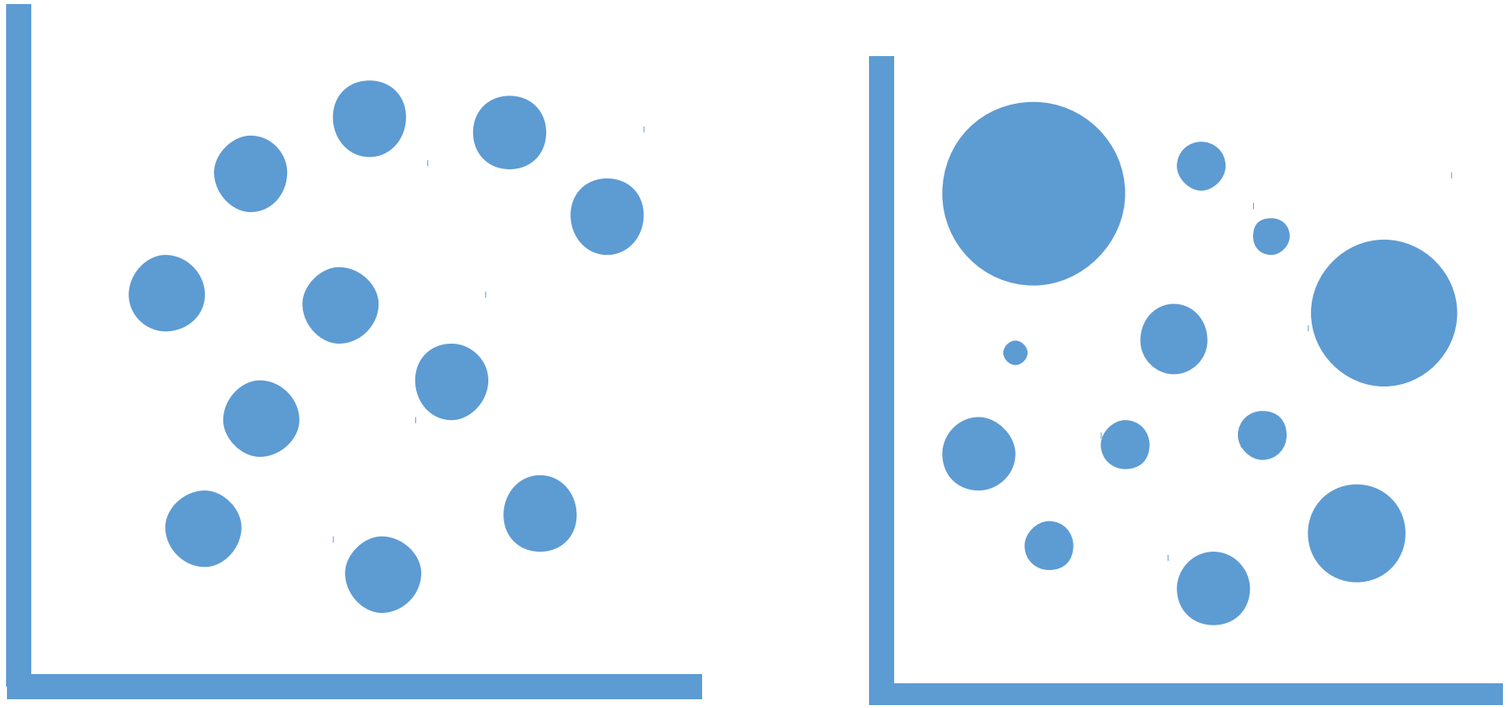
Lollipop Chart

encodes data using height or length of bar and shows categorical comparisons.



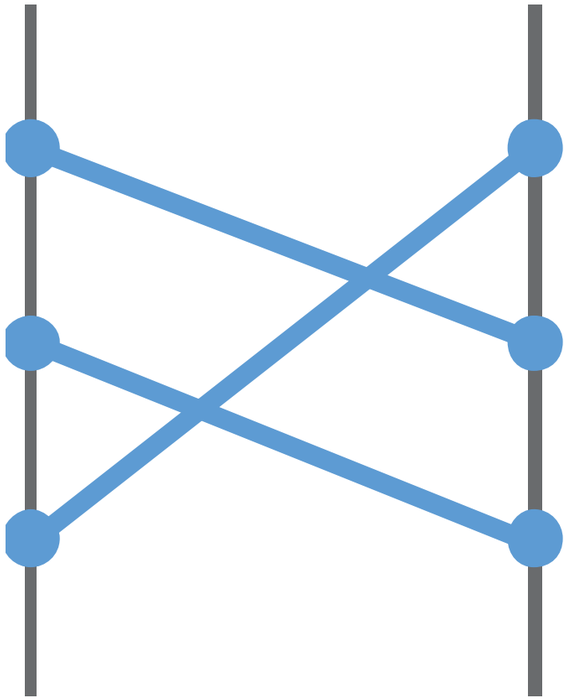
Scatter Plot

encodes data using position to show the relationship between two variables. Size can also be used to show a secondary comparison.



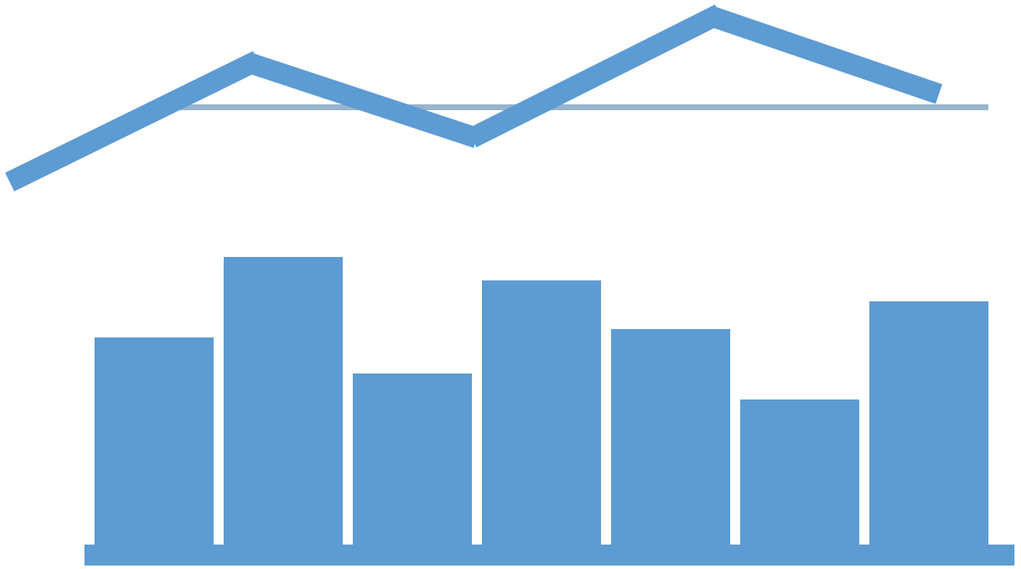
Slopegraph

encodes data using position to show quantitative comparison or rank, typically between two time periods.



Sparkline/Sparkbar

encodes data using position (line) or height/length (bar) in a small, word-sized graphic.



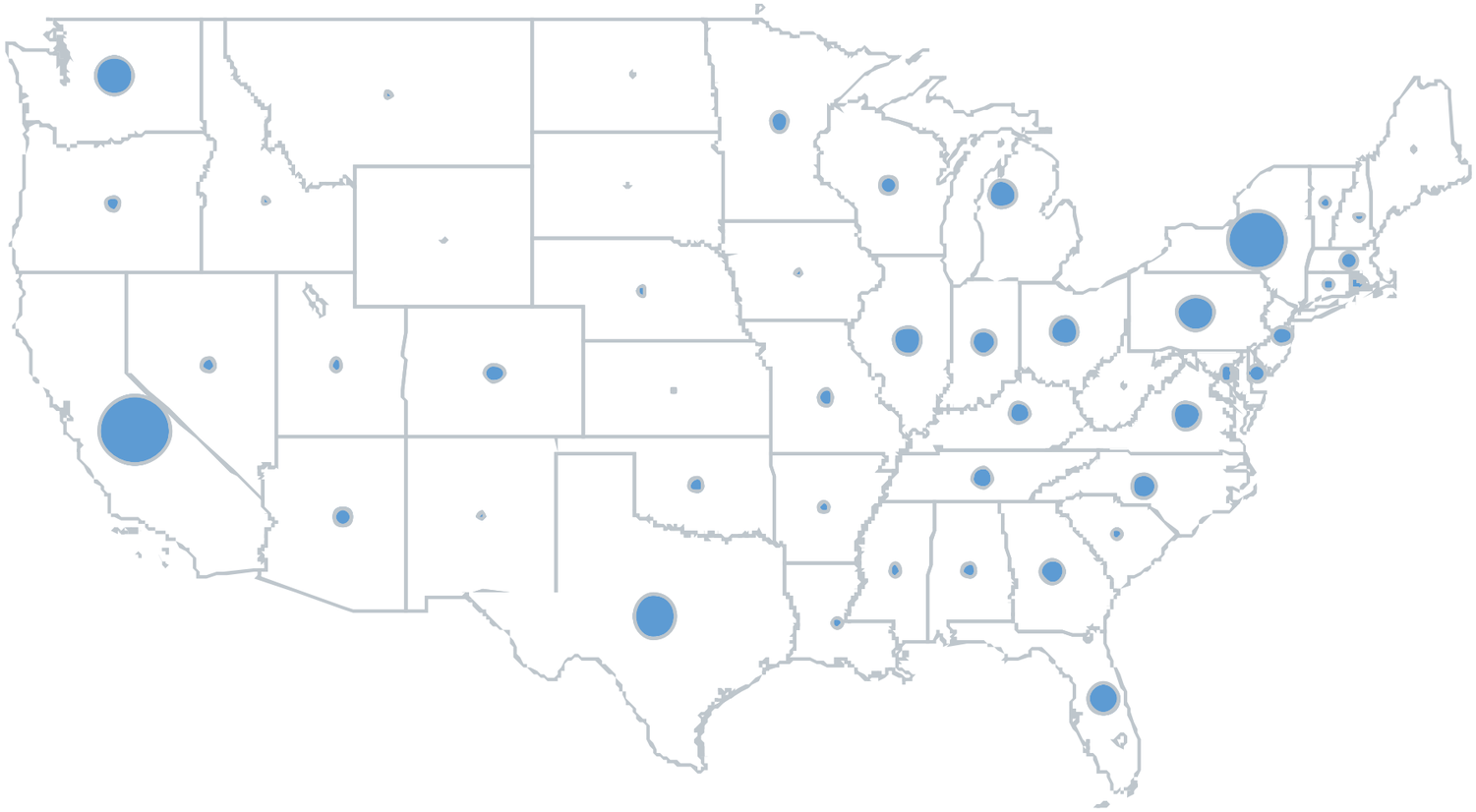
Stacked Bar Chart

encodes data using height or length of bar and color by segment and shows categorical and part-to-whole comparisons.

* Caution be careful not to slice stacked charts into too many segments.

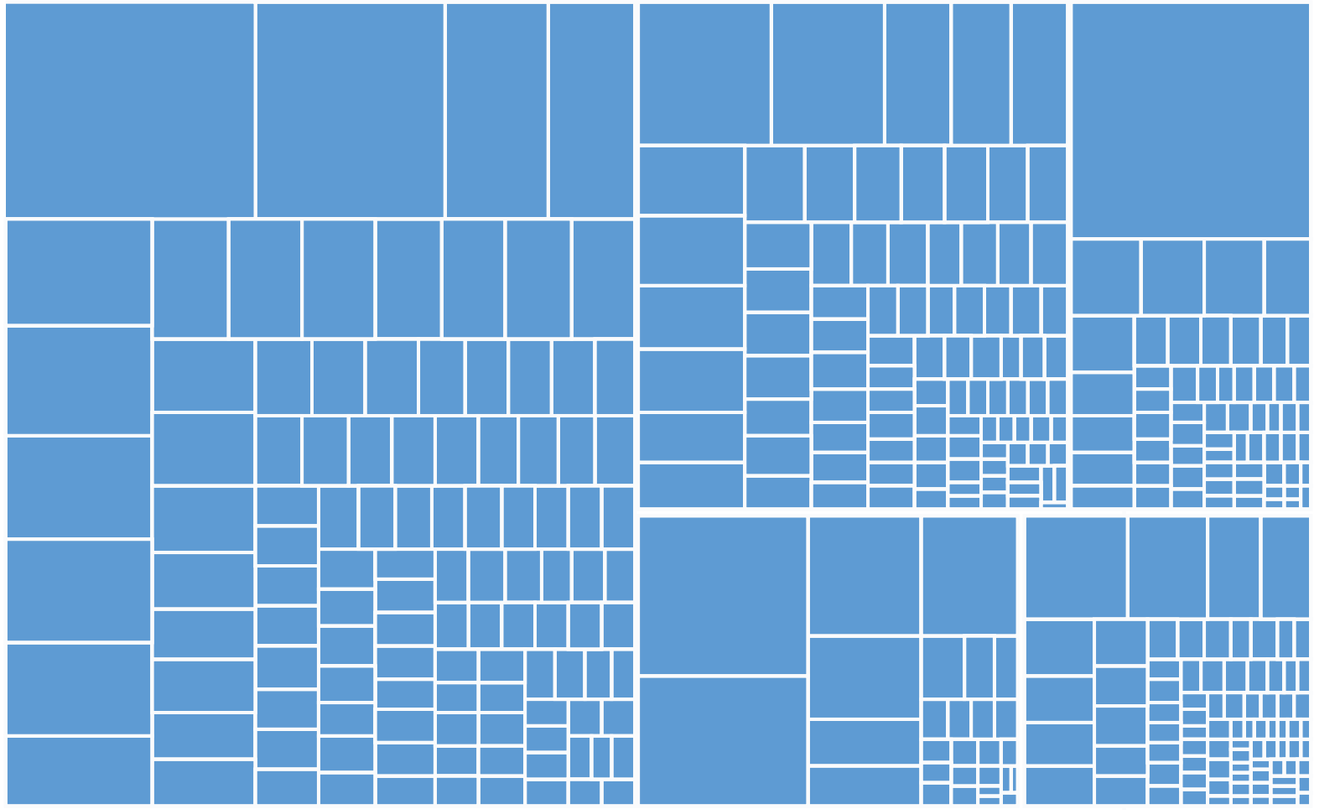
Symbol Map (Dot Map)

encodes data using position to show data geographically and can also use size to show quantitative data.



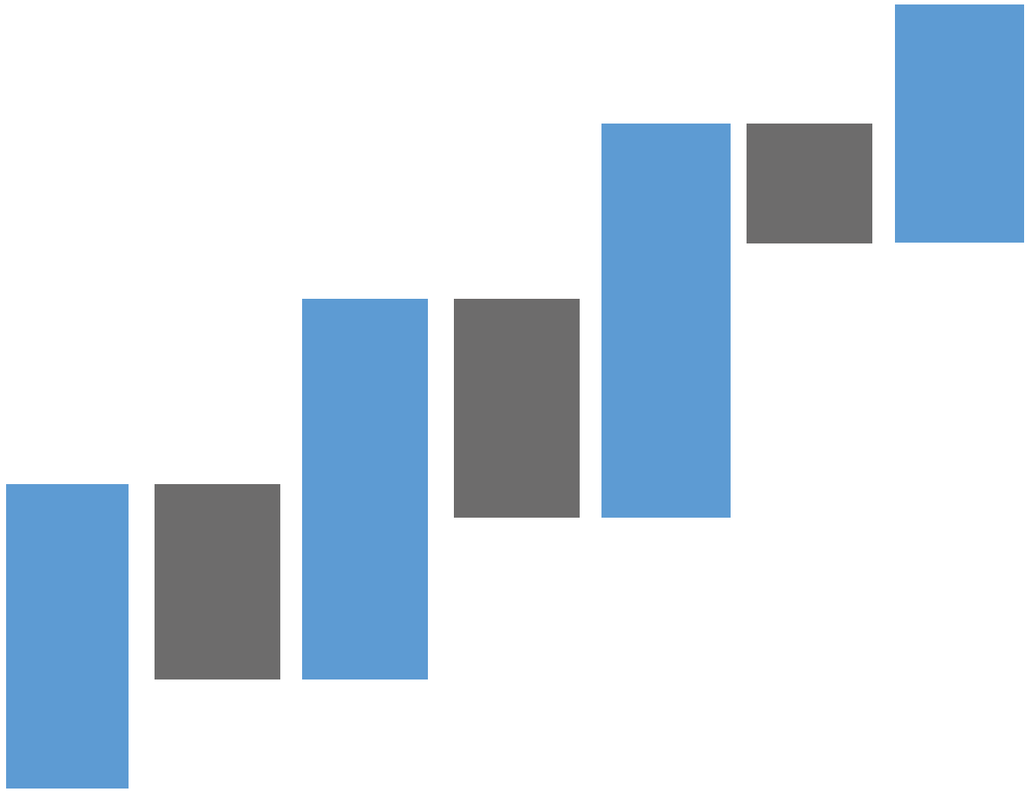
Treemap

encodes data using size and color and is useful for hierarchical data or when there are a very large number of categories to compare.



Waterfall Chart

encodes data using height and often color to show increase and decrease between time periods or categories.



Bubble Chart

encodes data using size of circle to show comparisons which is difficult for making precise quantitative comparisons.

* Caution this chart type is not recommended.

Concentric Circles

encodes data using arc and area to show comparisons but problematic for many reasons.

* Caution this chart type is not recommended.

Donut Chart

encodes data using arc and area to show a part-to-whole comparison
but problematic for many reasons.

* Caution this chart type is not recommended.

Pie Chart

encodes data using angle, area and arc to show a part-to-whole comparison but problematic for many reasons.

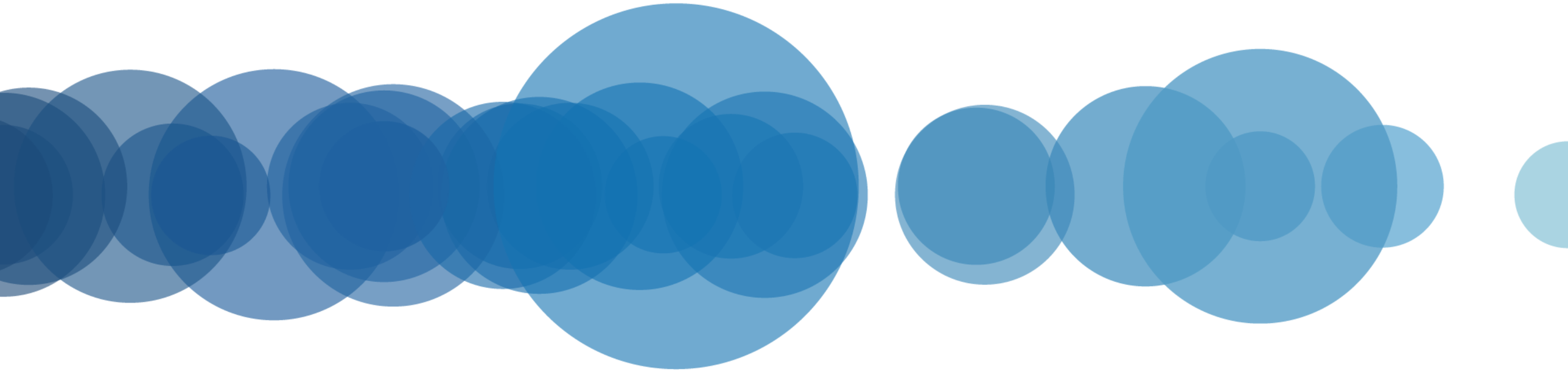
* Caution this chart type is not recommended.

Word Cloud

encodes data using size of word to show comparisons which is difficult for making precise quantitative comparisons.

* Caution this chart type is not recommended.

Pie Charts



"Save the Pies for Dessert"- Stephen Few

5 2 8 3 6 1 9 3 6 2 5 3 7 4 3 8 3

8 5 8 9 6 2 1 4 4 3 9 3 6 5 2 4 9

1 0 2 7 5 2 8 3 6 1 6 2 9 3 8 3 8

5 8 4 7 2 0 3 7 3 5 4 7 1 8 2 0 1

2 5 3 6 4 3 9 1 0 8 9 5 7 3 4 5 3

2 7 5 2 8 3 6 1 6 2 9 3 8 3 8 5 8

4 7 2 0 3 7 3 5 4 7 1 8 2 0 1 9 6

2 1 4 4 3 9 3 6 5 2 4 9 1 0 2 7 5

2 8 3 6 1 6 2 9 3 8 3 8 5 8 4 7 2

0 3 7 3 5 4 7 1 8 2 0 1 2 5 3 6 4

3 9 1 0 8 9 5 7 3 4 5 3 2 7 5 2 8

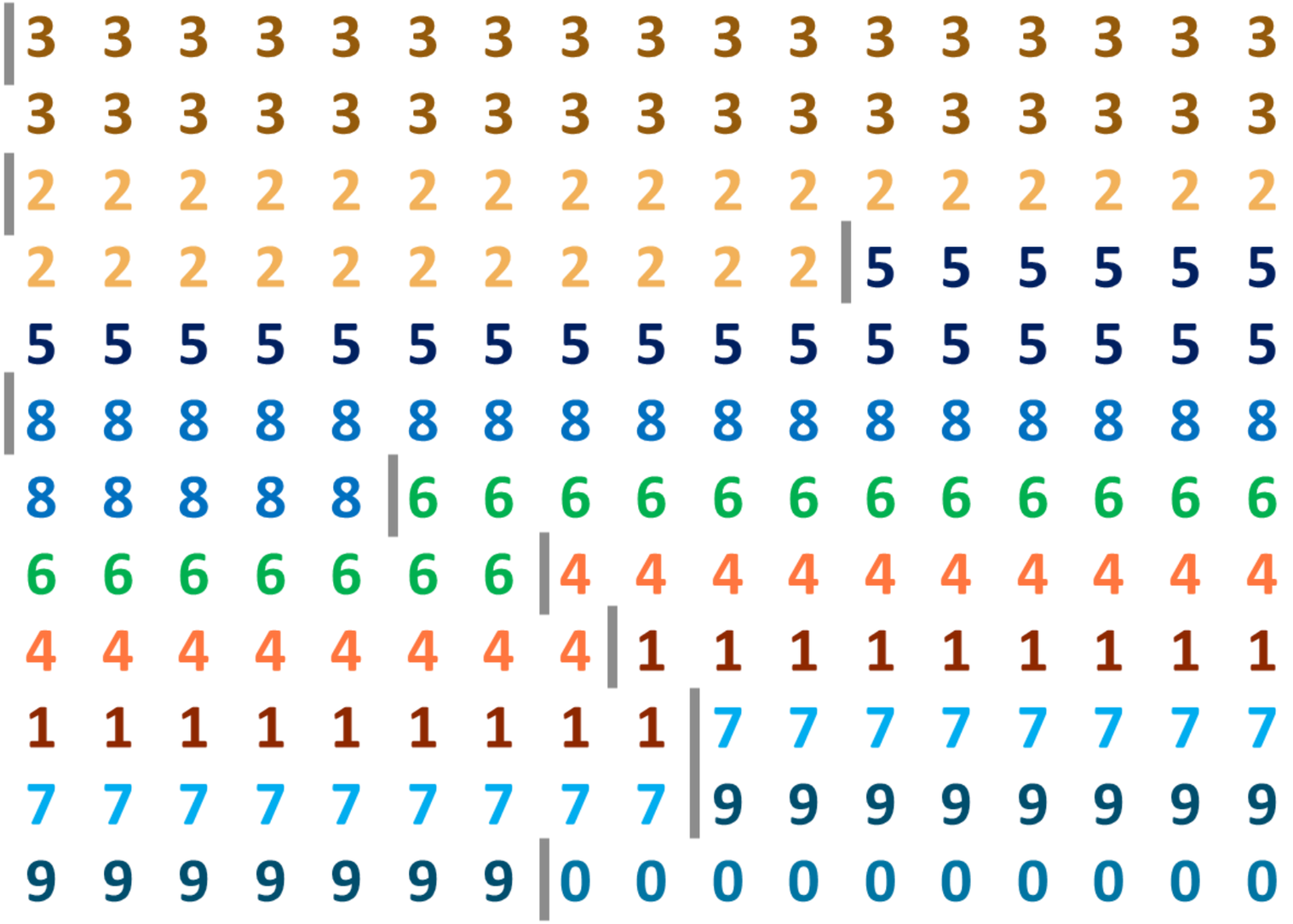
3 6 1 6 2 4 6 2 7 5 9 1 5 2 6 3 6

This is how a Pie Chart Represents the Data

3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3
3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3
2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2
2 2 2 2 2 2 2 2 2 2 2 5 5 5 5 5 5
5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5
8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8
8 8 8 8 8 6 6 6 6 6 6 6 6 6 6 6 6
6 6 6 6 6 6 6 4 4 4 4 4 4 4 4 4 4
4 4 4 4 4 4 4 4 1 1 1 1 1 1 1 1 1
1 1 1 1 1 1 1 1 1 7 7 7 7 7 7 7 7
7 7 7 7 7 7 7 7 7 9 9 9 9 9 9 9 9
9 9 9 9 9 9 9 0 0 0 0 0 0 0 0 0 0

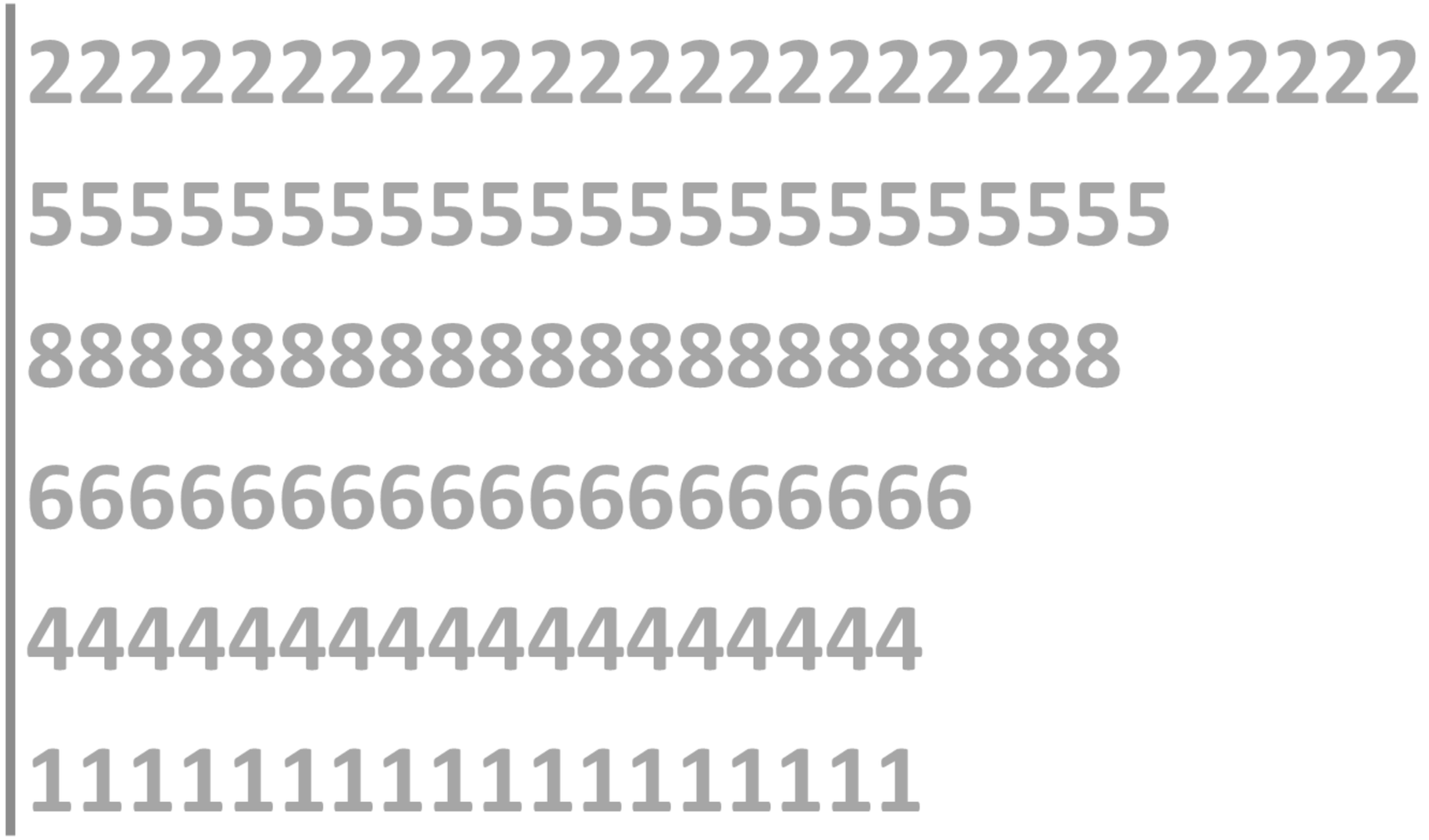
Try to quickly compare the totals of any digits.

This is how a Pie Chart Represents the Data



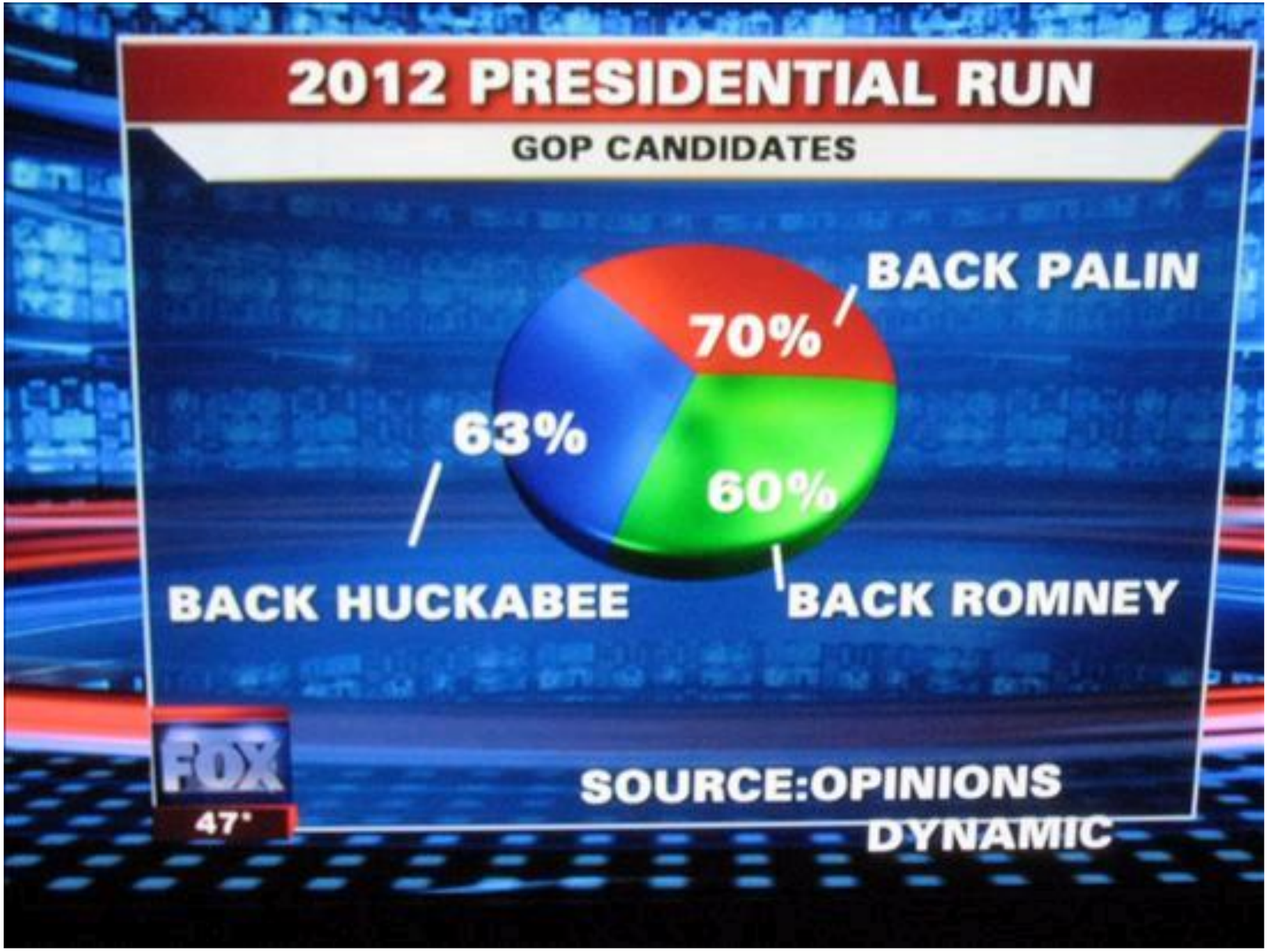
Baseline moves based on previous # of Digits

This is how a Bar Chart Represents that Data



Easier comparison even without color encoding!

Remove
to improve
the **pie chart** edition


2012 PRESIDENTIAL RUN
GOP CANDIDATES
BACK PALIN
70%
63%
60%
BACK HUCKABEE
BACK ROMNEY
FOX
47
SOURCE:OPINIONS
DYNAMIC

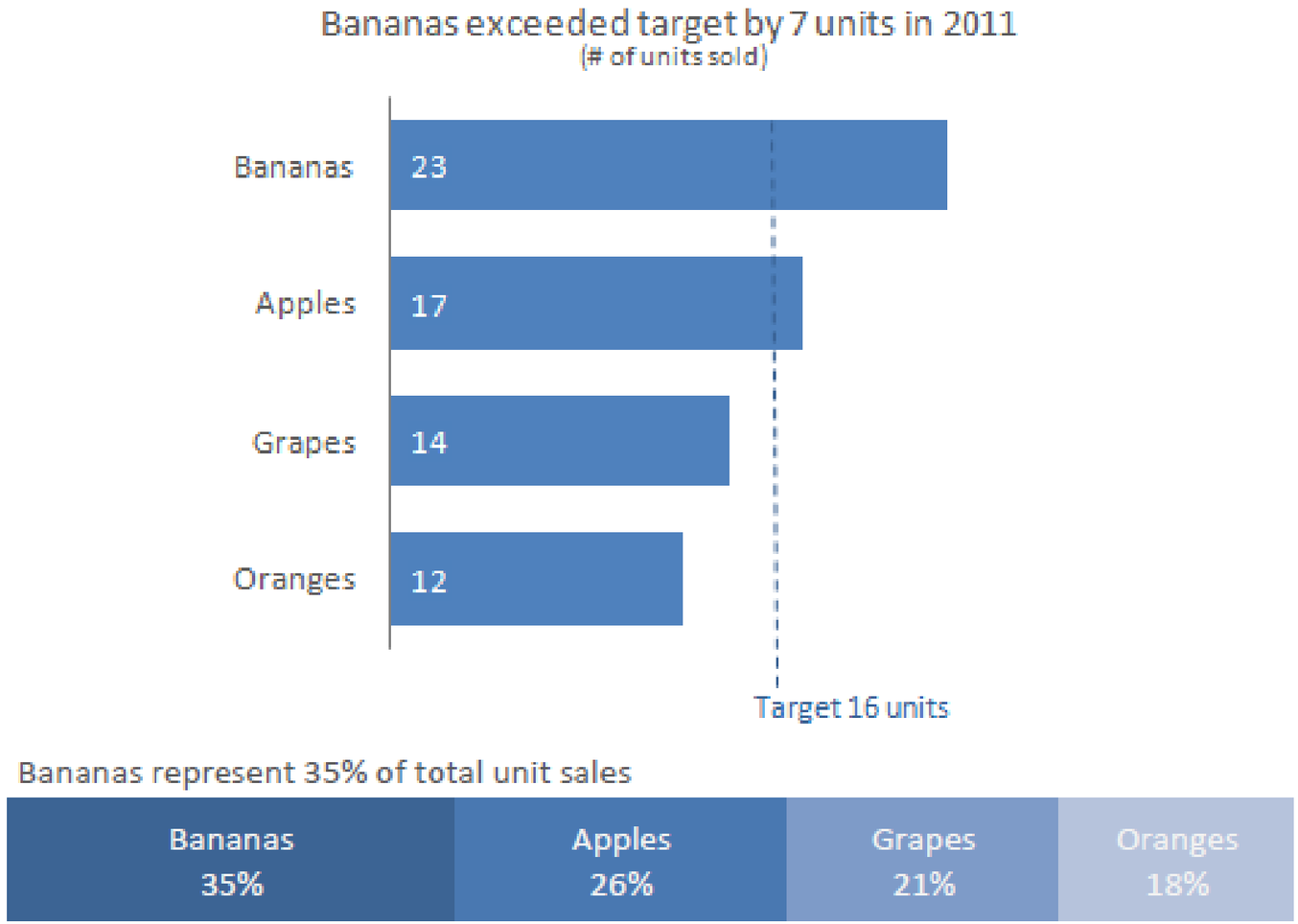
General Rules for Pie Charts

1. Don’t Use Pie Charts

If you must break Rule #1 then:

2. Make sure it adds up 100%
3. Only a few categories
4. Start at noon and move clockwise
5. Largest to Smallest Values
6. Add Labels for %
7. Avoid 3D
8. Keep it Simple

Show part-to-whole relationship (in lieu of Pie Charts)



100% Stacked Bar Chart

Girl Scout Cookie Sales

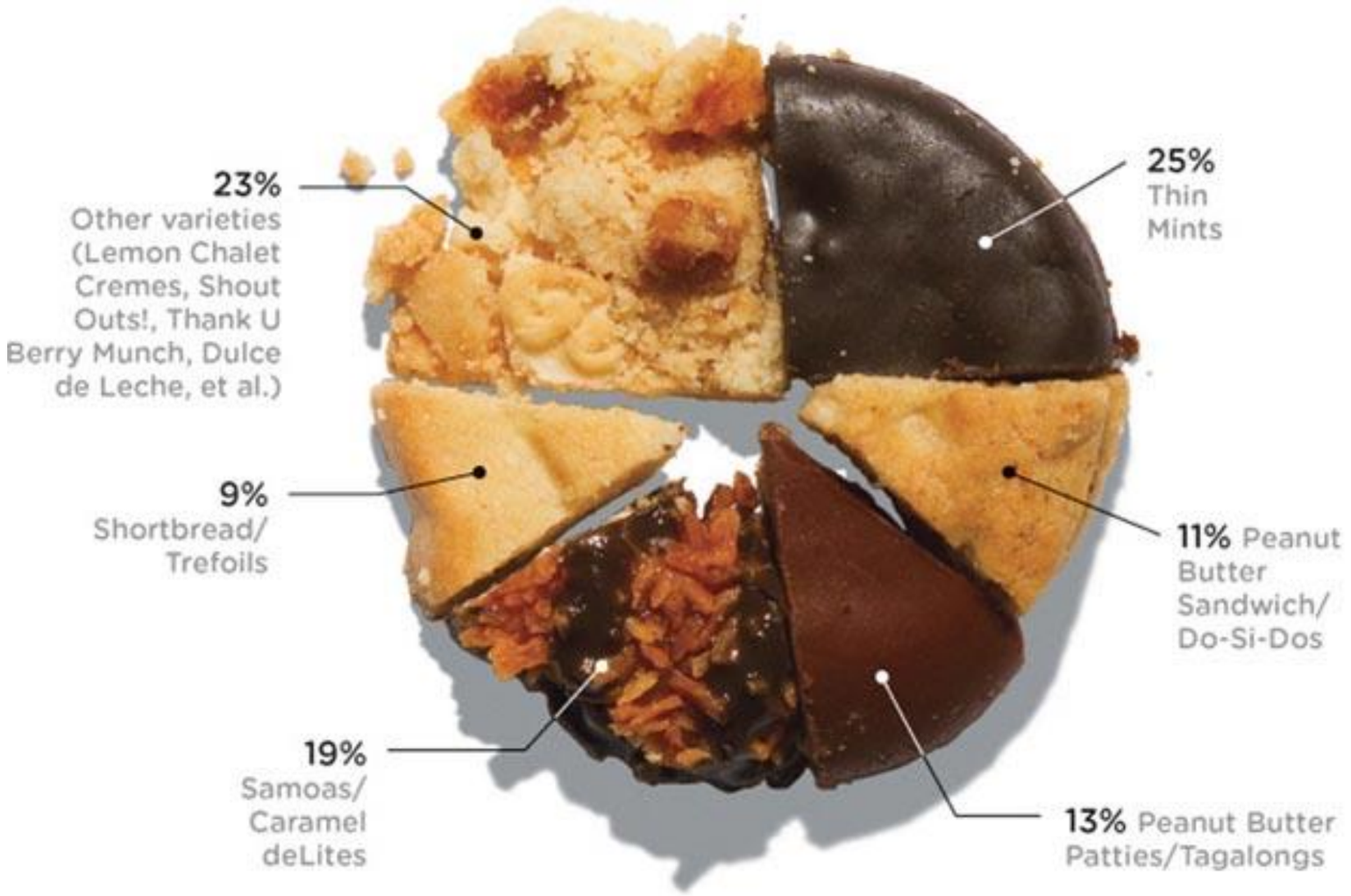
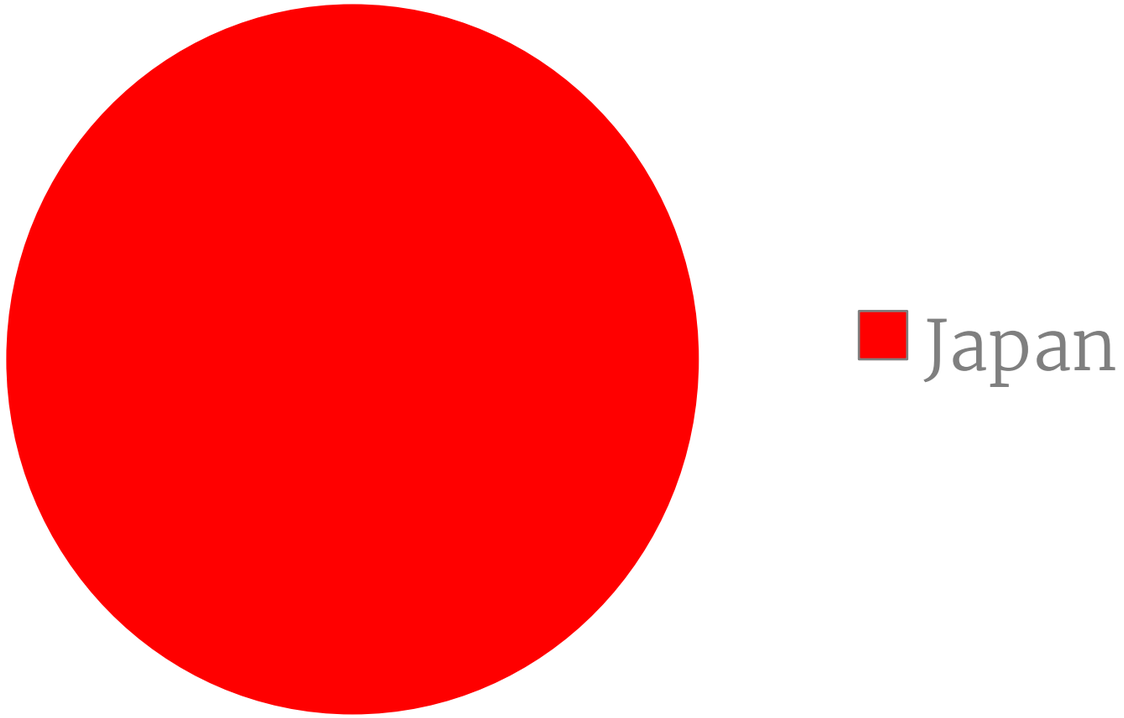


Photo: Celine Grouard
Source: www.wired.com/magazine/2011/08/st_datagirlscoutcookies

Pie Chart of Japan



Common Chart Types

Bar Chart - category comparison (with target line)

Line Chart - time series data

Flow Chart – process flow (also Swimlane diagram)

Bullet Graph – actual to target

Dot Plot or Strip Plot

Sparklines

Histogram

Map

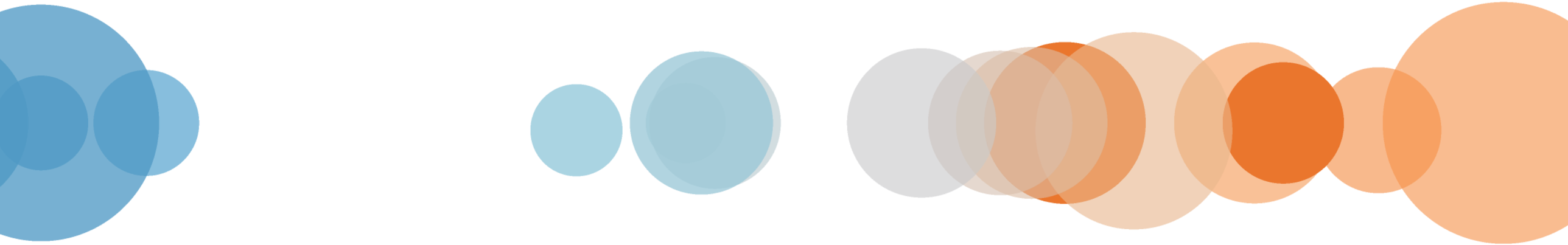
100% Stacked Bar Chart (with caution)

Scatter Plot – relationship/correlation

Box Plot – grouping with summaries

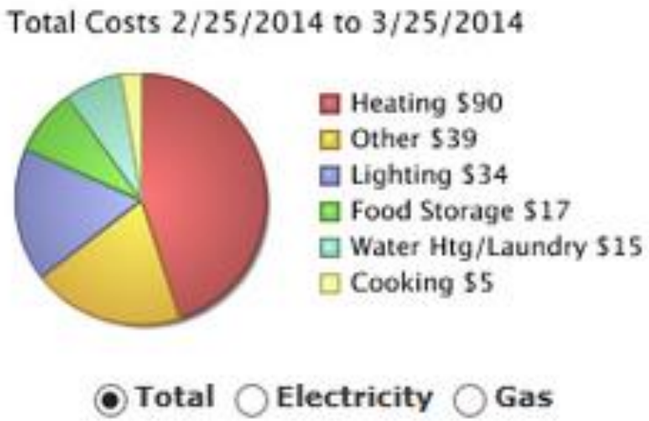
Area Chart (with caution)

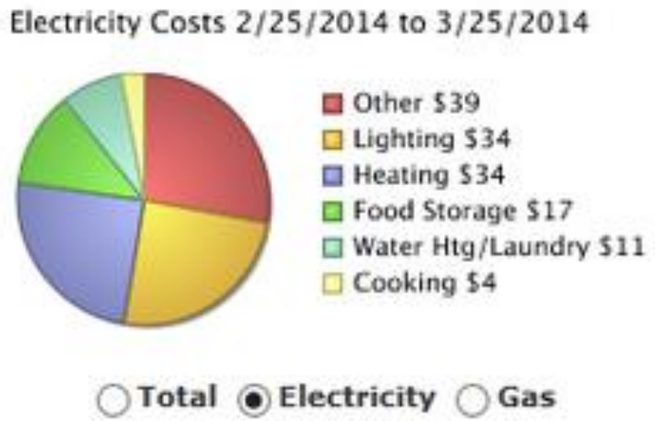
Compare and Contrast

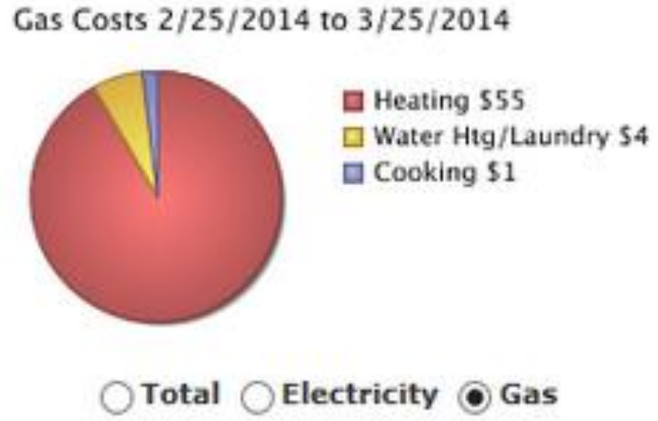


A Pie Chart Redesign

Original Version by Duke Energy



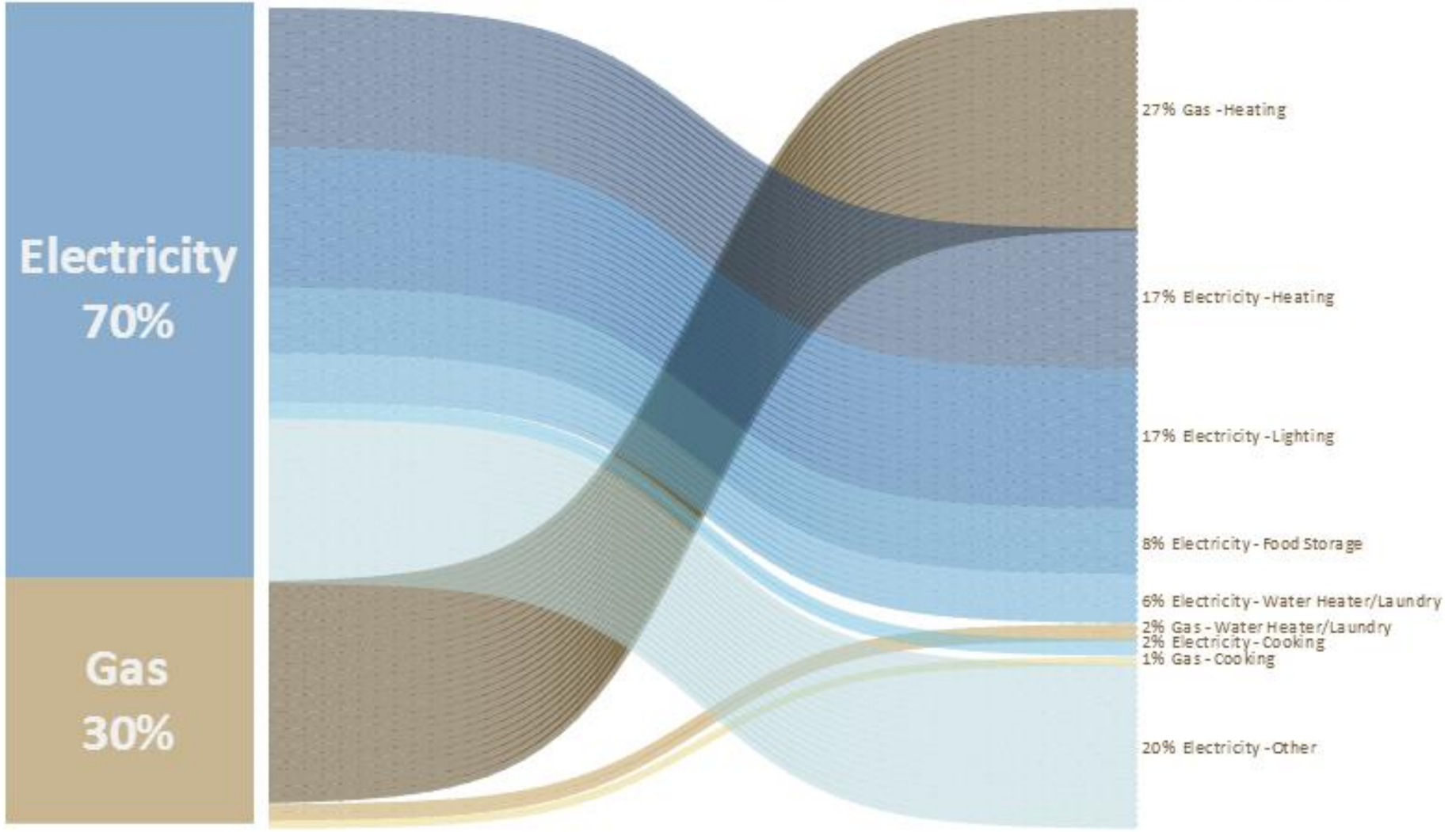




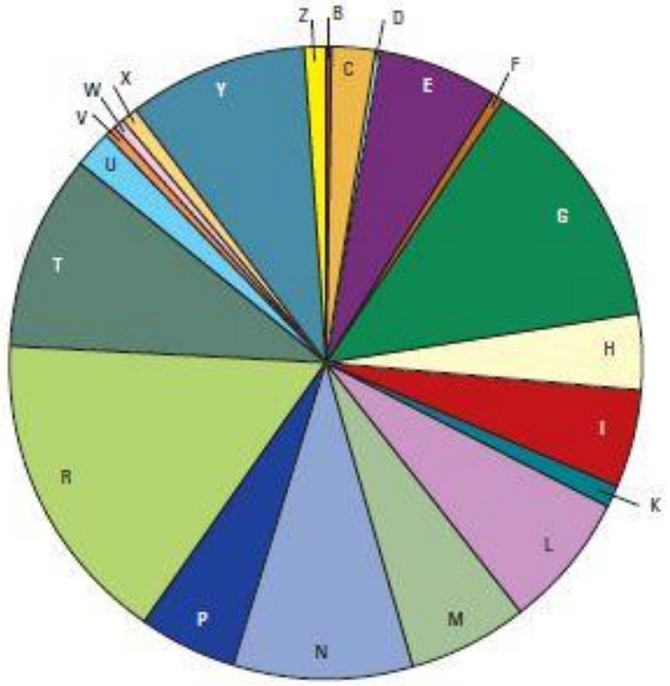
Redesigned Using a Sankey Diagram

My Monthly Energy Bill Redesigned

data + science
= transforming data to insight



If you indicated your debt collection agency used collection software, which type?

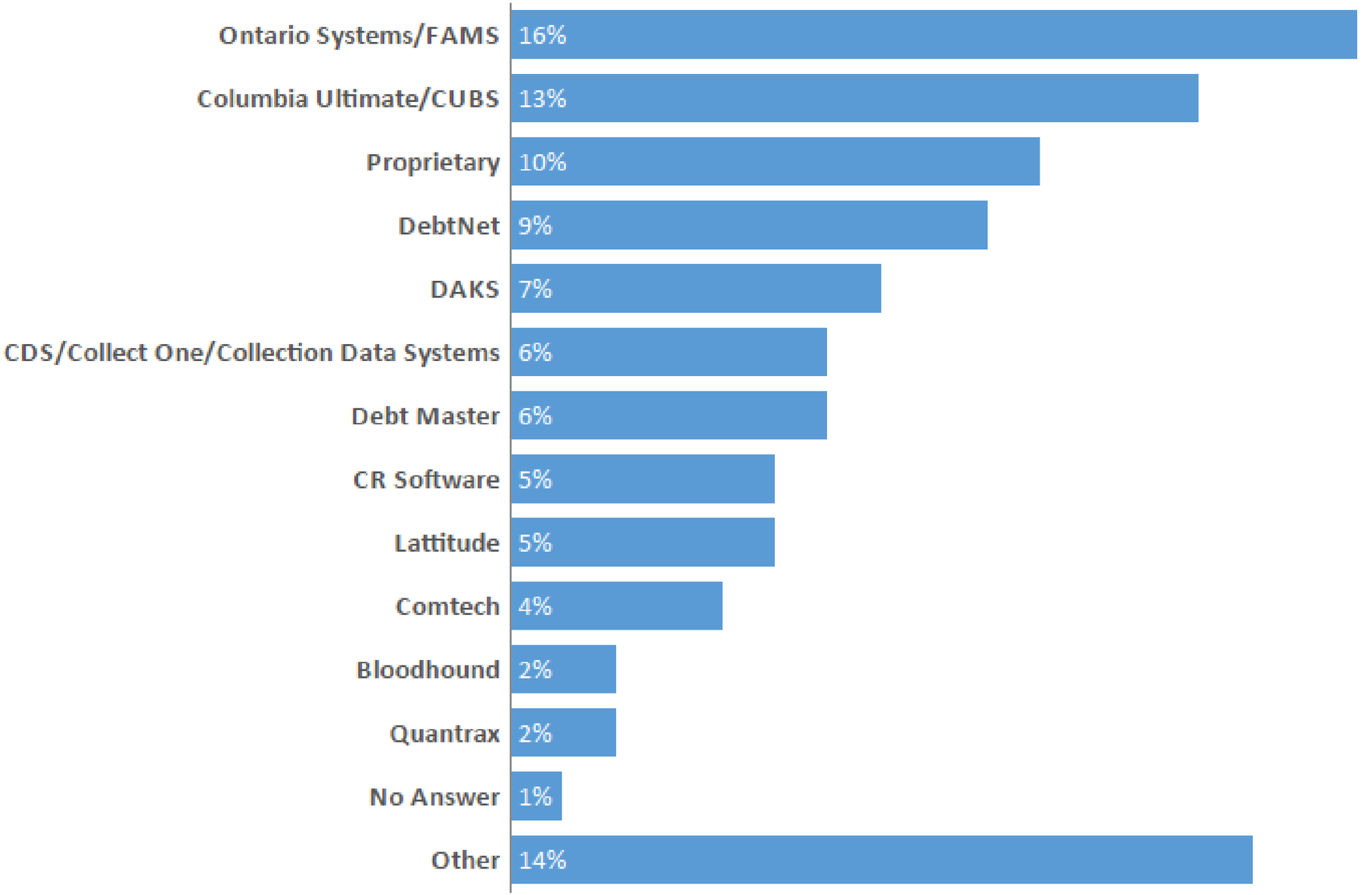


Base: 214 respondents

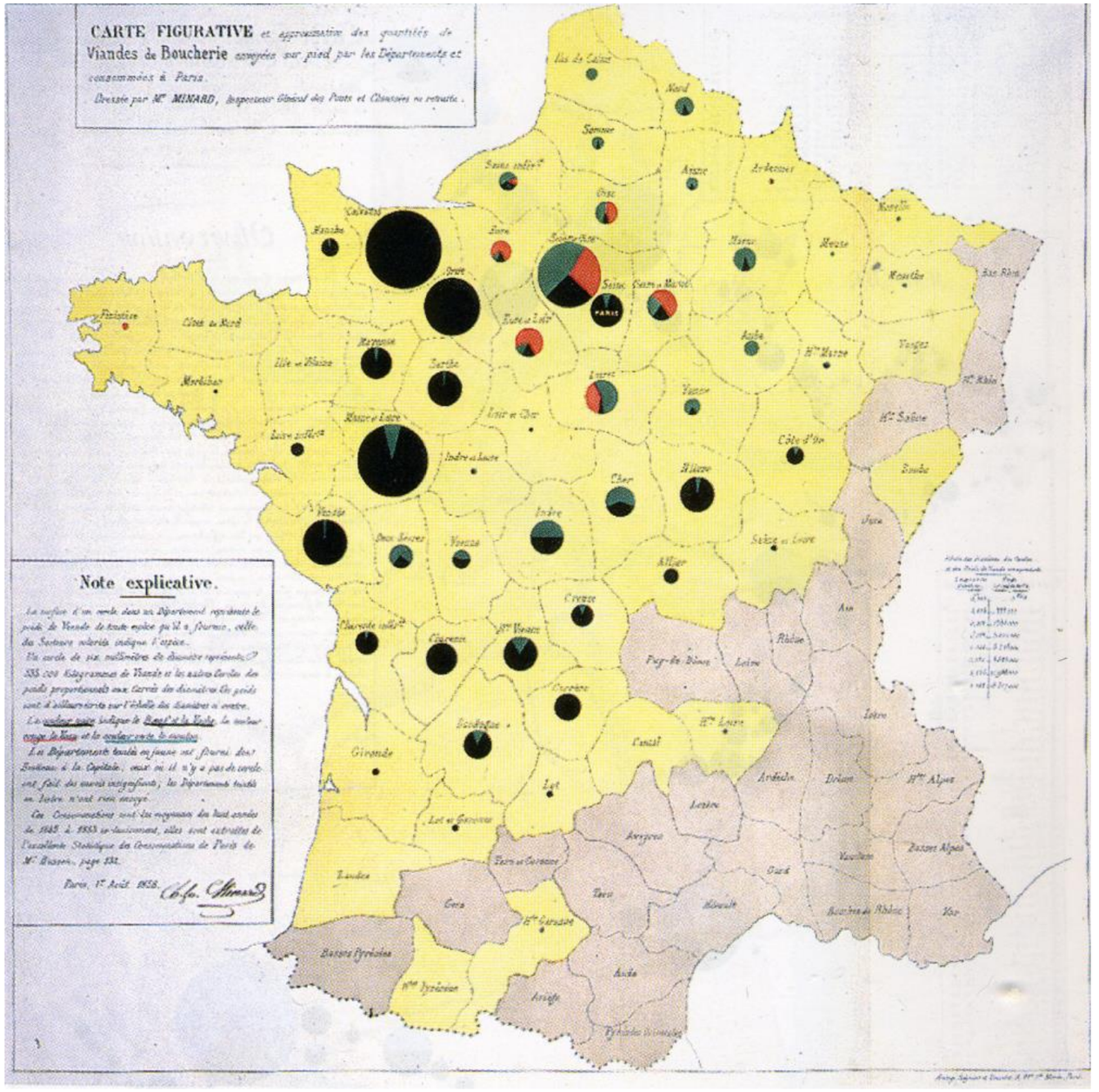
A	ADS	0 %
B	Advantage	<1 %
C	Bloodhound	2 %
D	C.A.M.S.	<1 %
E	CDS/CollectOne/ Collection Data Systems	6 %
F	Collection Master	<1 %
G	Columbia Ultimate/CUBS	13 %
H	Comtech	4 %
I	CR Software	5 %
J	Credit Soft	0 %
K	Cyclone	1 %
L	DAKCS	7 %
M	DebtMaster	6 %
N	DebtNet	9 %
O	DTC	0 %
P	Latitude	5 %
Q	Northridge Loan System	0 %
R	Ontario Systems/FAMS	16 %
S	PaPlus	0 %
T	Proprietary	10 %
U	Quantrax	2 %
V	RZ Designs	<1 %
W	Unisource	<1 %
X	WinDebt	1 %
Y	Other	9 %
Z	No Answer	1 %

Source: American Collectors Association

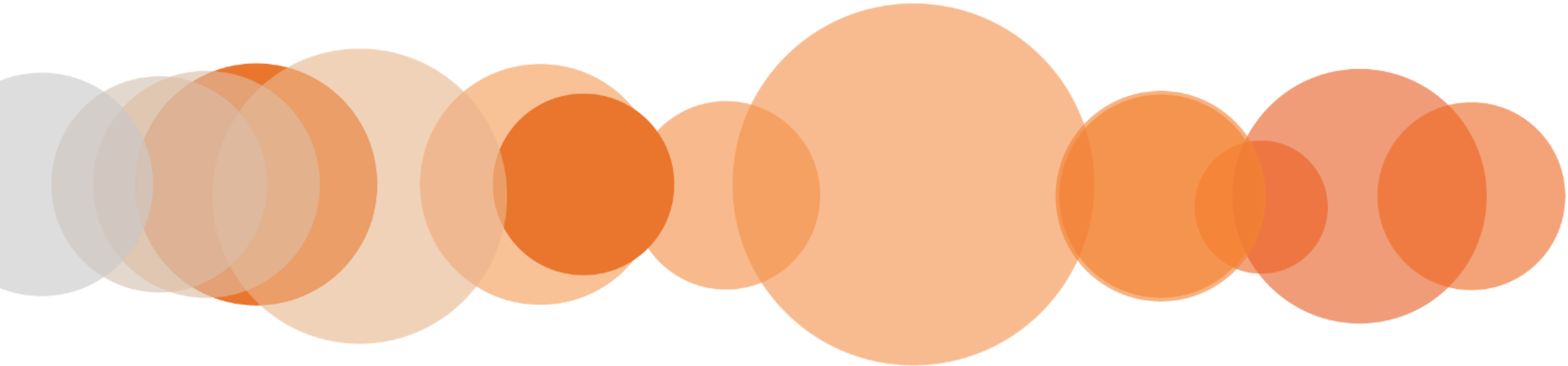
If you indicated your debt collection agency used collection software, which type?



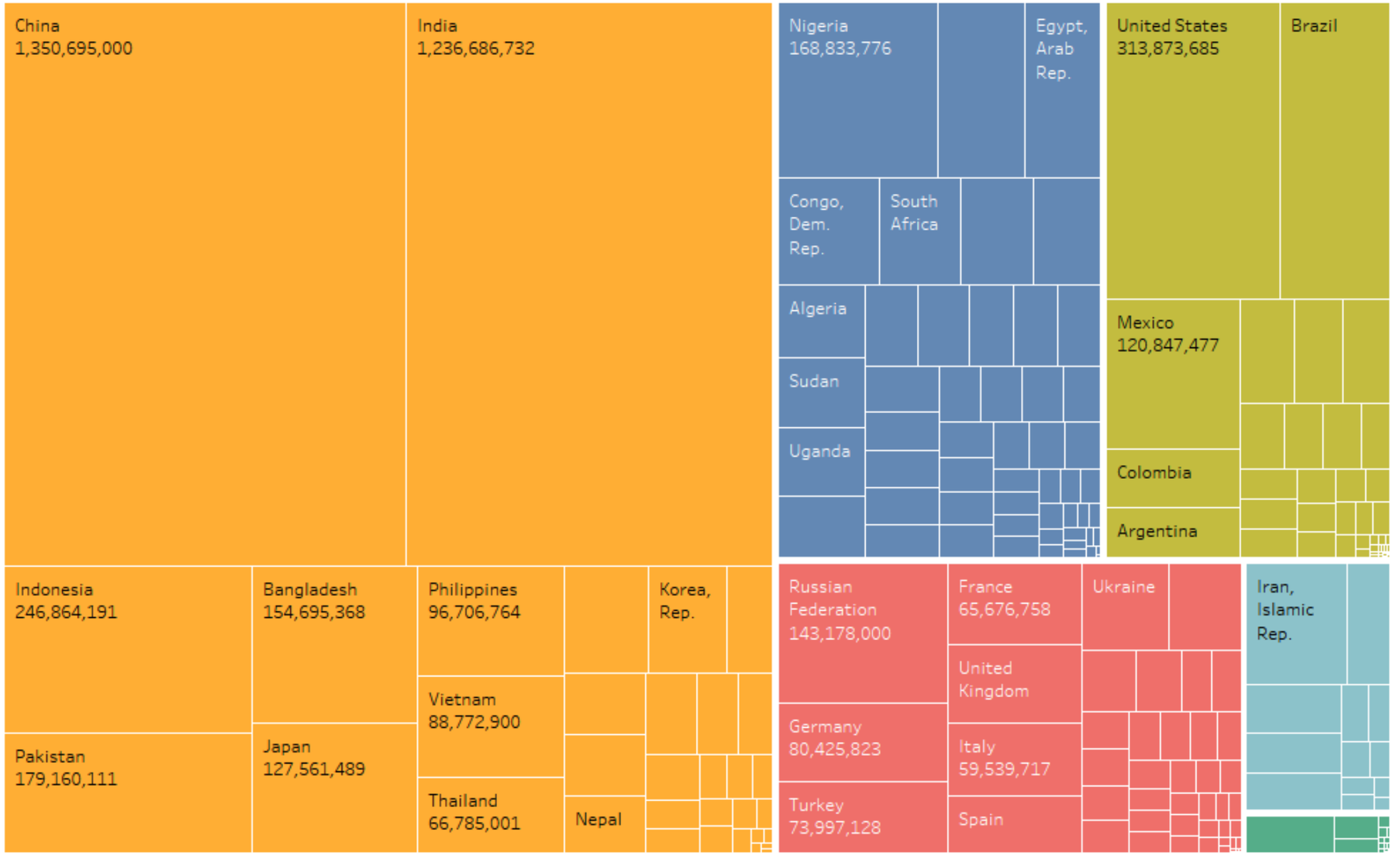
Pie Charts on a Map



Other Chart Types



World Poplation in 2012

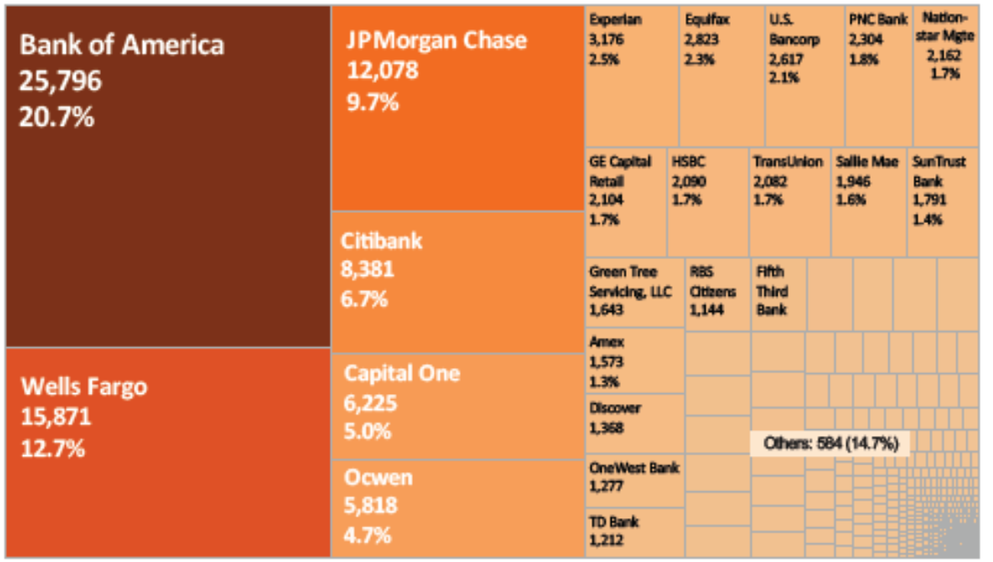


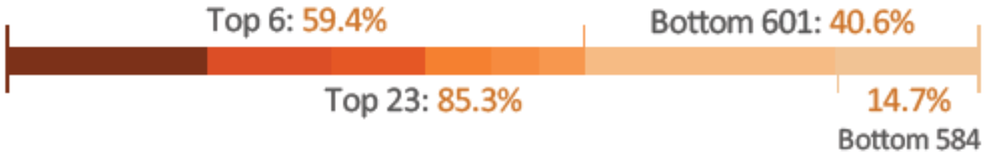
Source: https://www.dataplusscience.com/BuildingTreemaps.html

CFPB Compaint Database

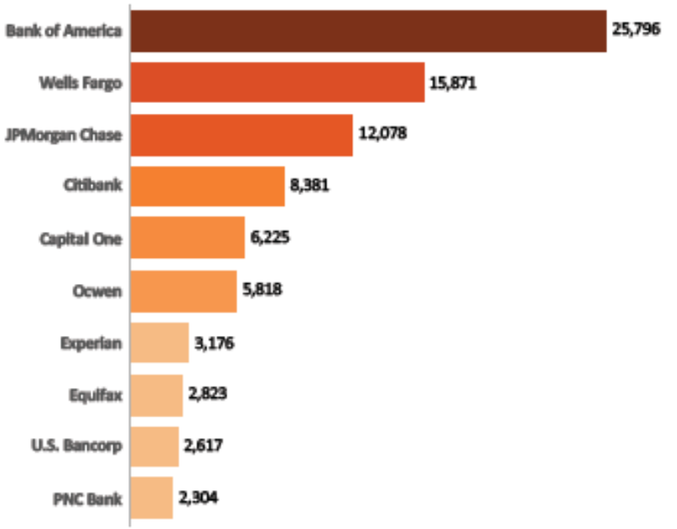
(11/30/2011 through 7/10/2011)

Total Complaints: 124,798 Total Companies: 607

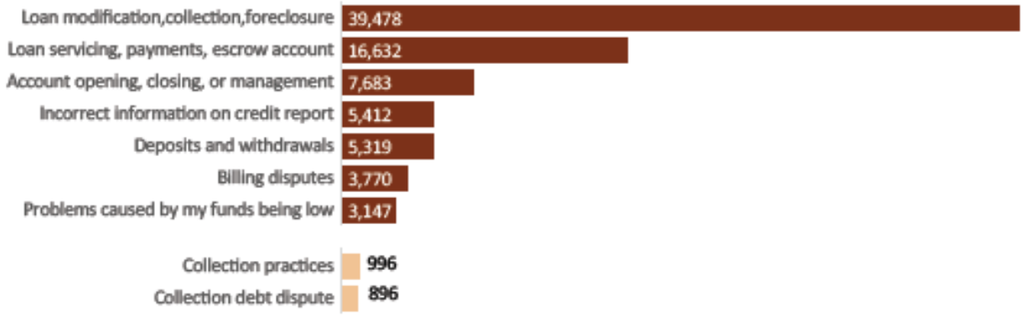




of Complaints for Top 10 Companies

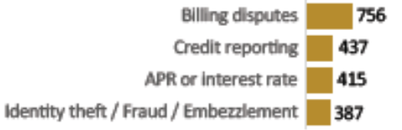


Top CFPB Complaints Compared to Collection Practices and Disputes

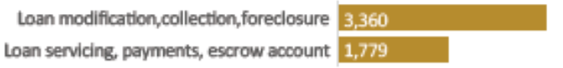


Top CFPB Complaints for Bank of America

Top CFPB Complaints for Capital One



Top CFPB Complaints for Ocwen



Source: https://www.dataplusscience.com/BankSentiment.html

Goooooooooaaaaaaaaal!

How long should the word "goal" be when you Tweet after your team scores?

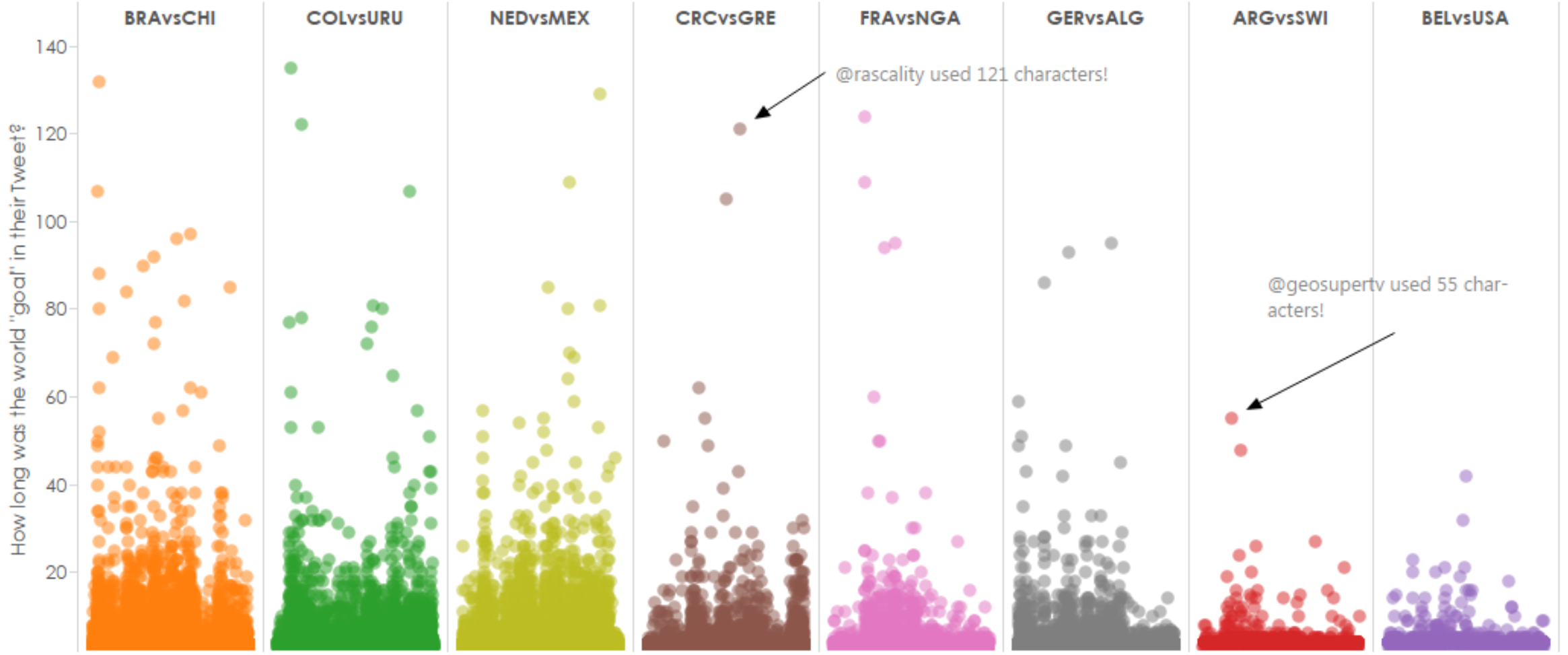
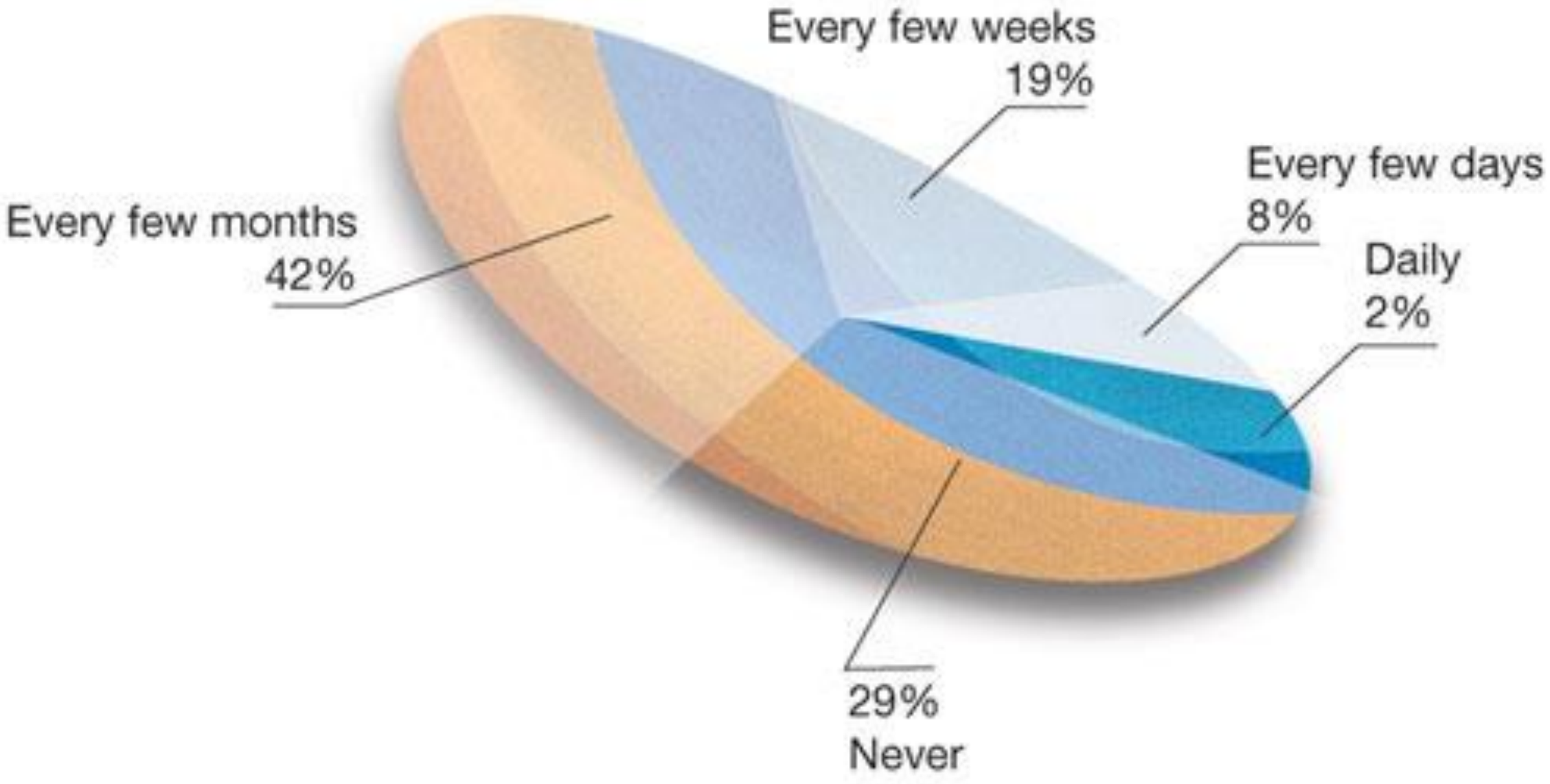


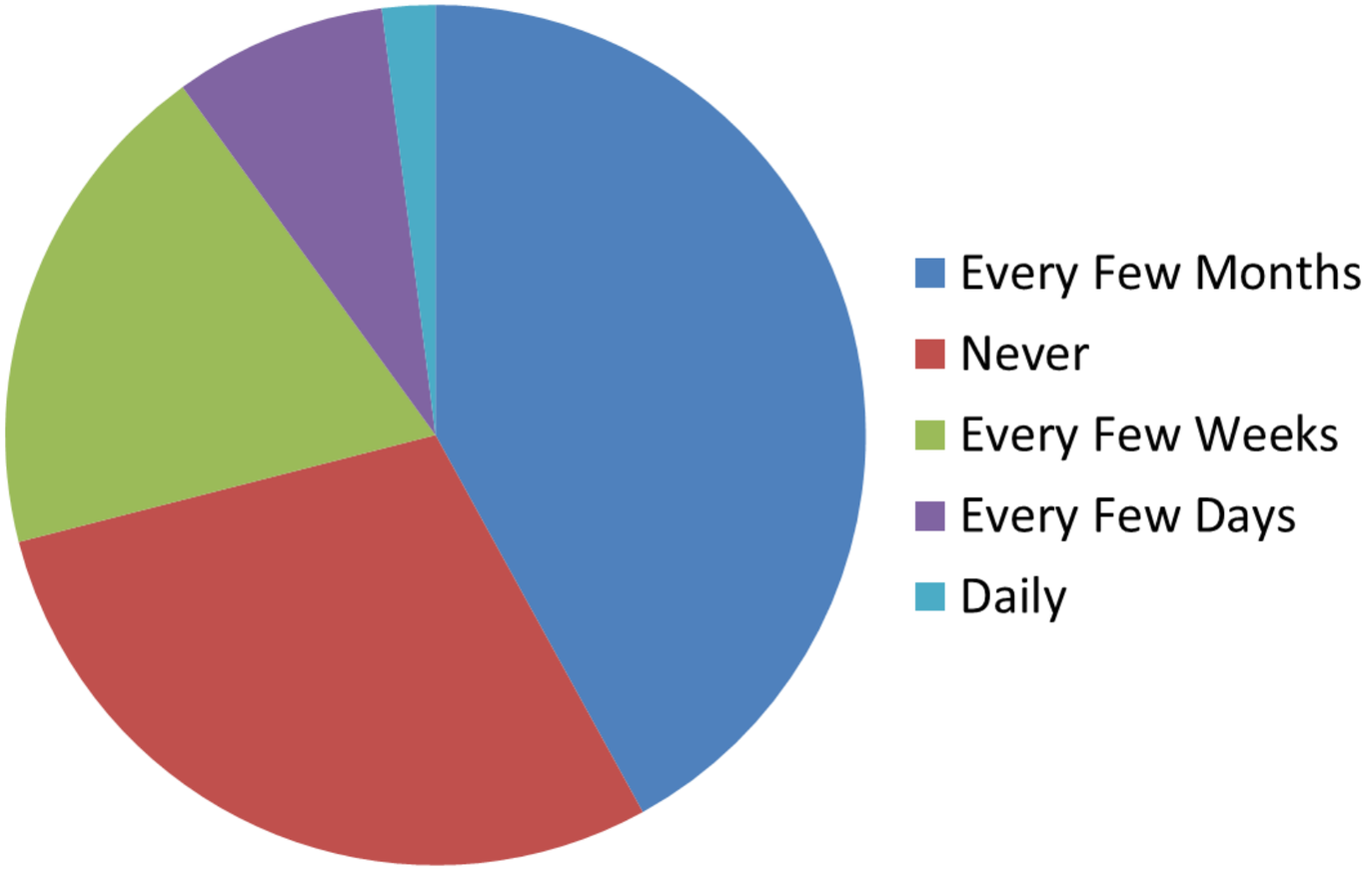
Chart shows the number of letters people use in the word "gol" or "goal" during the second round matches of the World Cup.

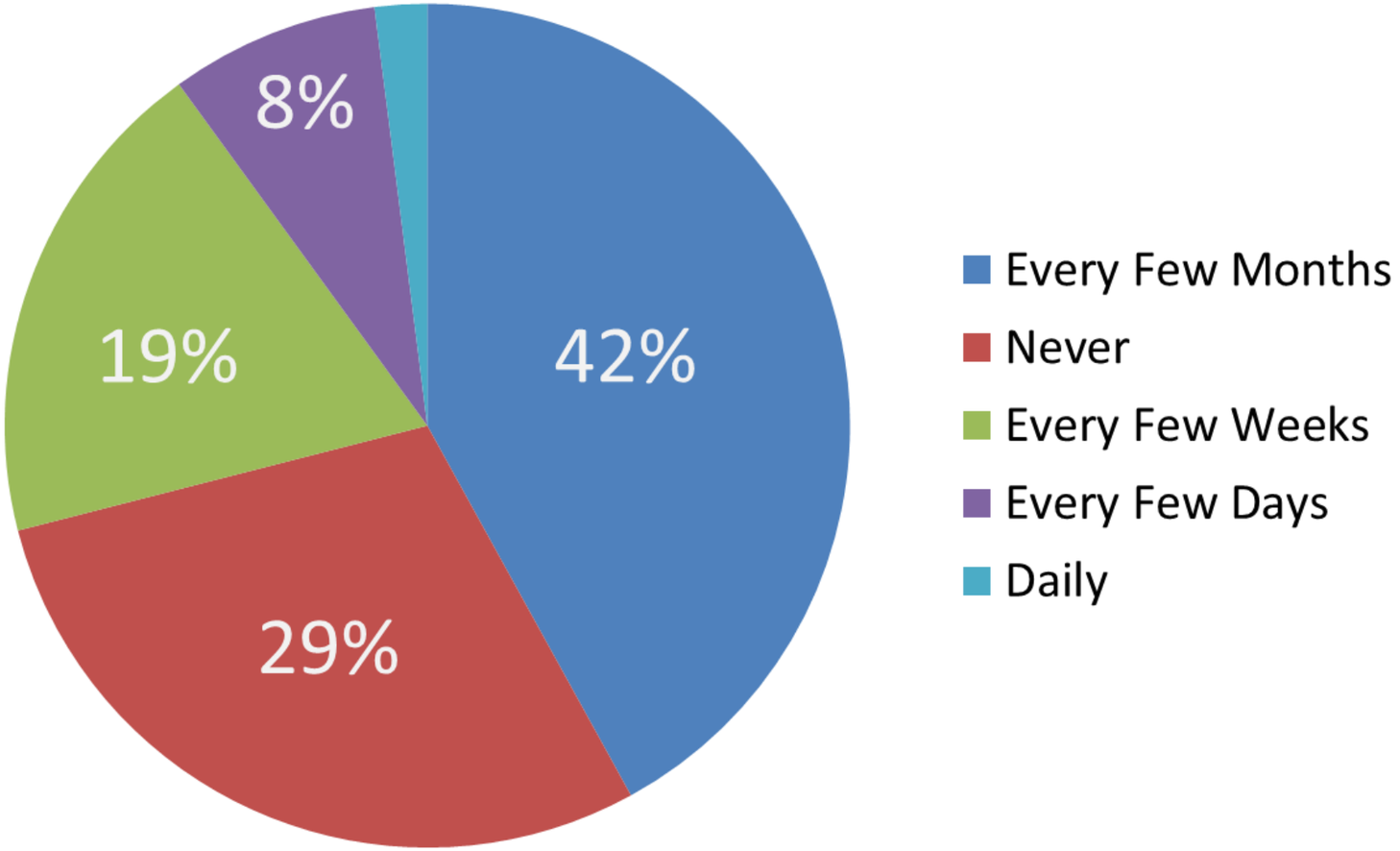
Source: http://tabsoft.co/2u4WUyU



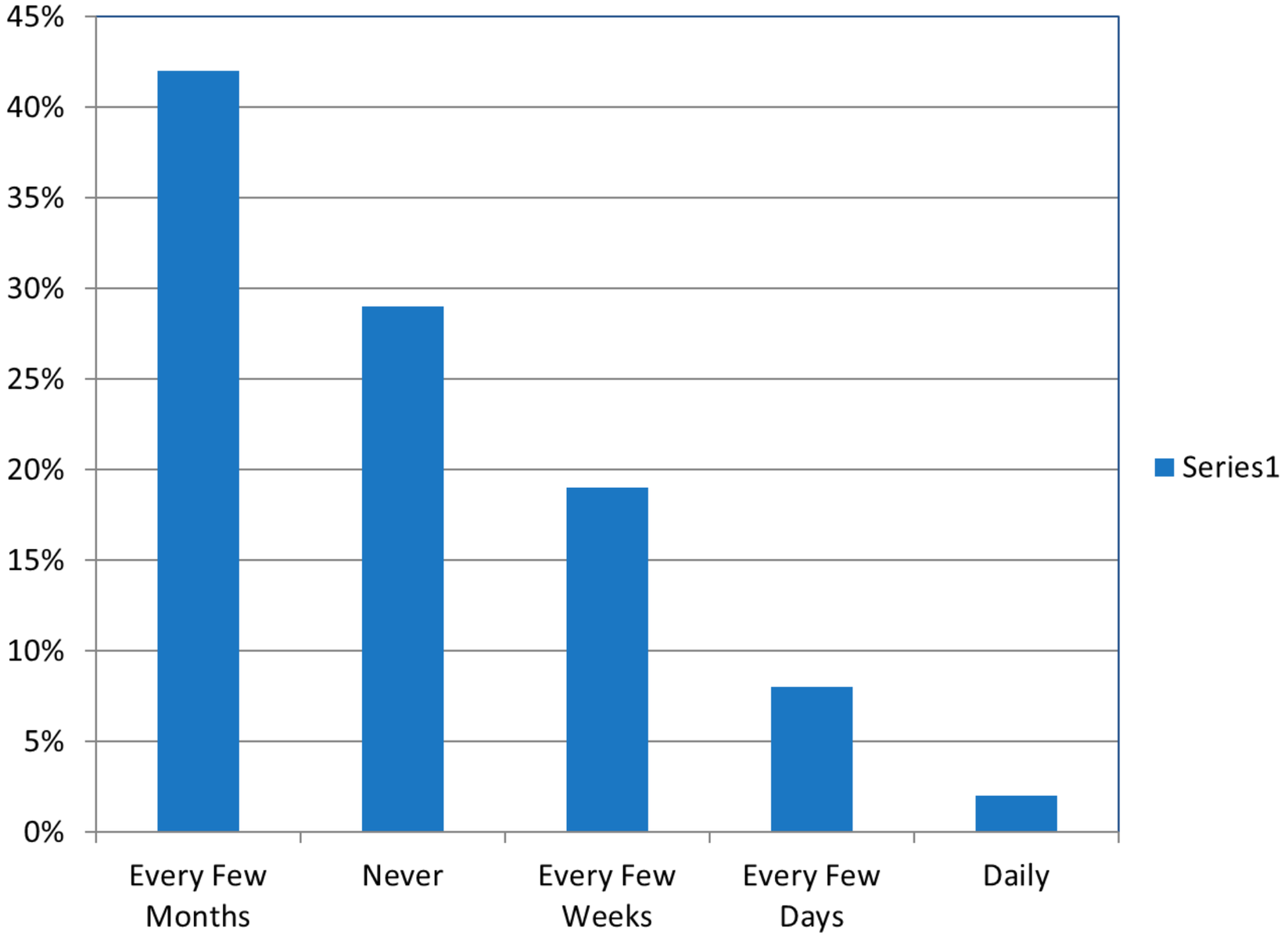
Source: https://eagereyes.org/criticism/march-chart-madness

Default in Excel

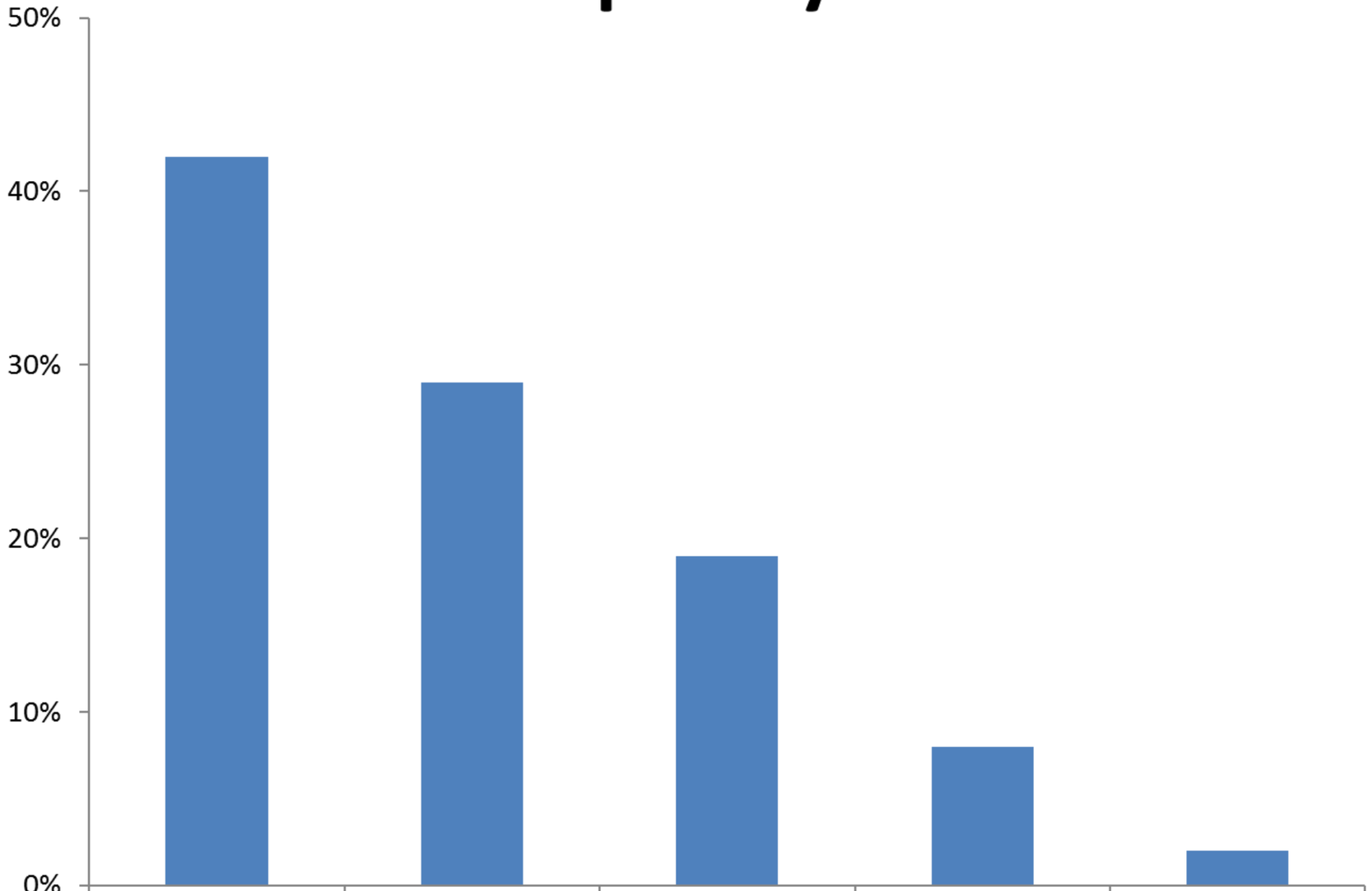



8%
19%
42%
29%
Every Few Months
Never
Every Few Weeks
Every Few Days
Daily

Default in Excel

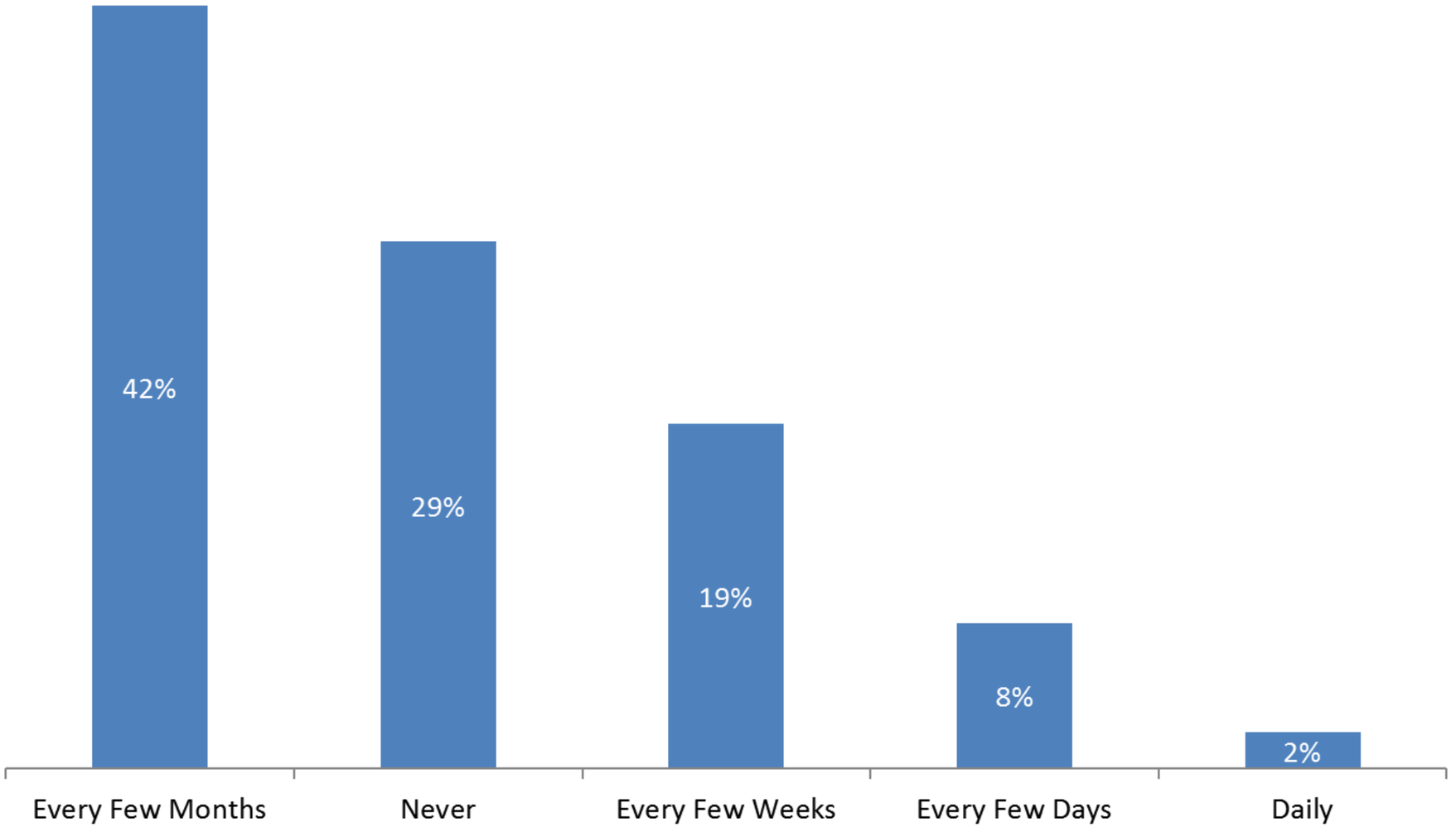


Frequency

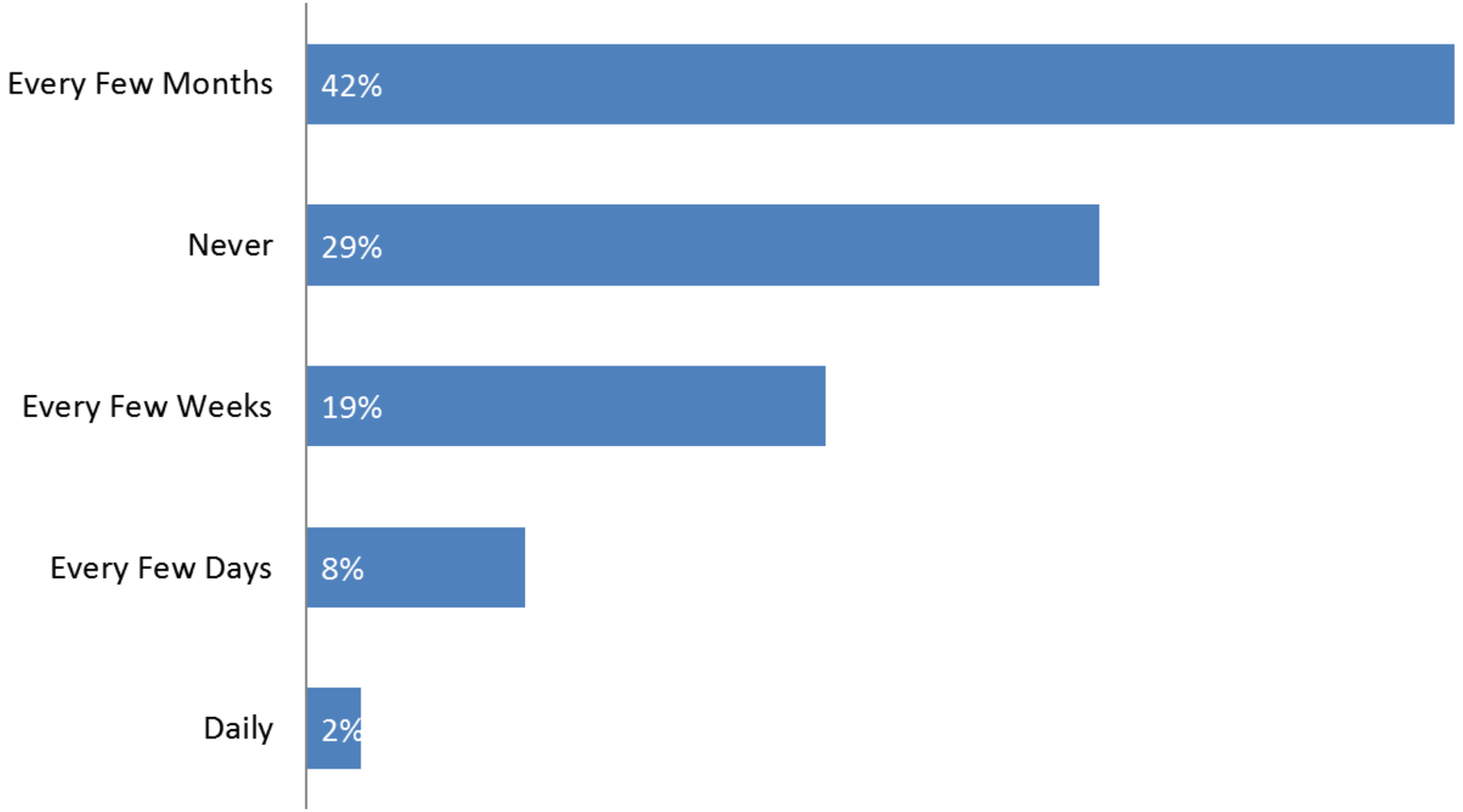


	Every Few Months	Never	Every Few Weeks	Every Few Days	Daily
Frequency	42%	29%	19%	8%	2%

Frequency

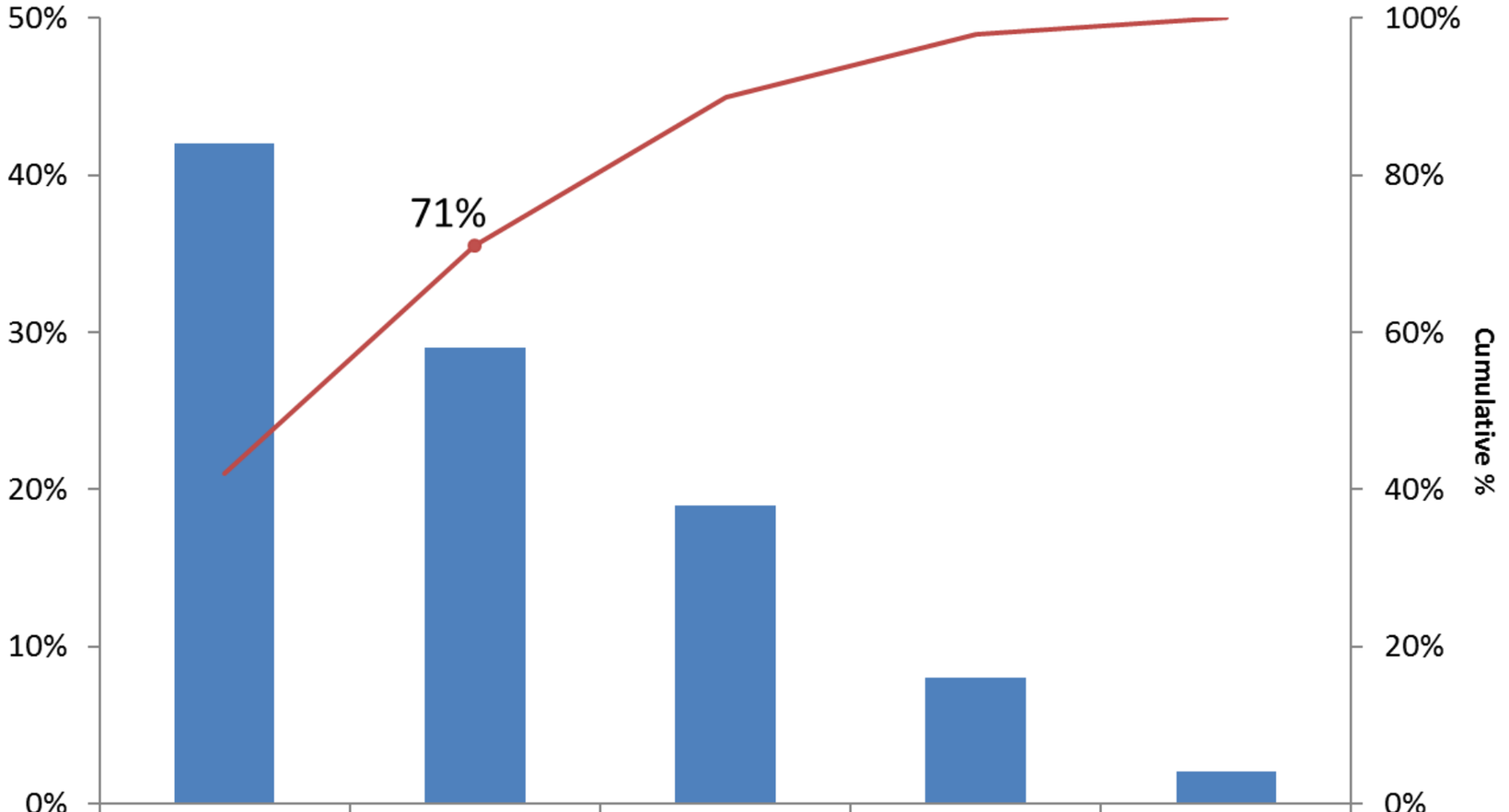

42%
29%
19%
8%
2%
Every Few Months
Never
Every Few Weeks
Every Few Days
Daily

Frequency


Every Few Months
42%
Never
29%
Every Few Weeks
19%
Every Few Days
8%
Daily
2%

Frequency

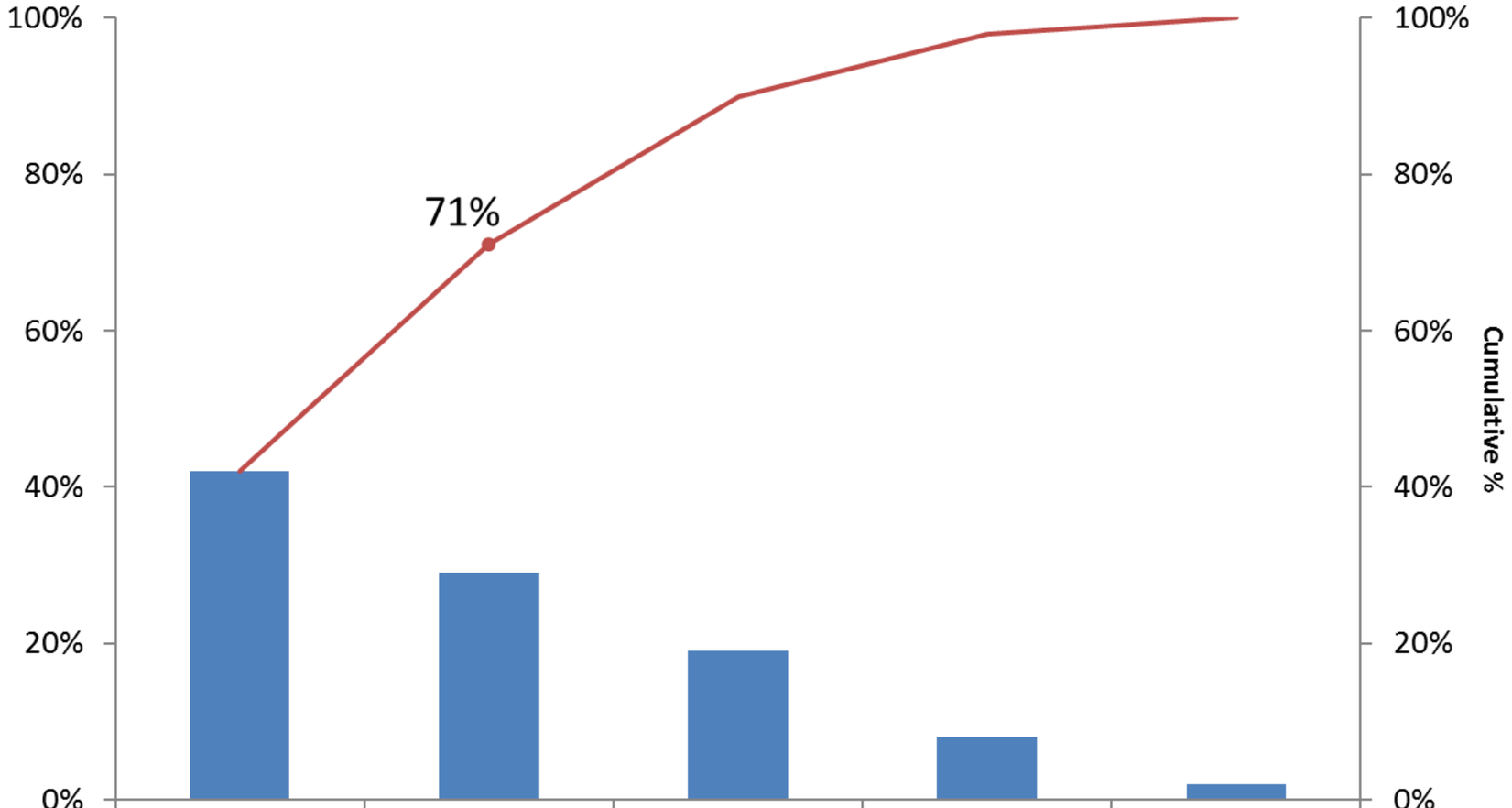
71% of occurrences are caused by low frequency



	Every Few Months	Never	Every Few Weeks	Every Few Days	Daily
Frequency	42%	29%	19%	8%	2%
Cumulative %	42%	71%	90%	98%	100%

Frequency

71% of occurrences are caused by low frequency



	Every Few Months	Never	Every Few Weeks	Every Few Days	Daily
Frequency	42%	29%	19%	8%	2%
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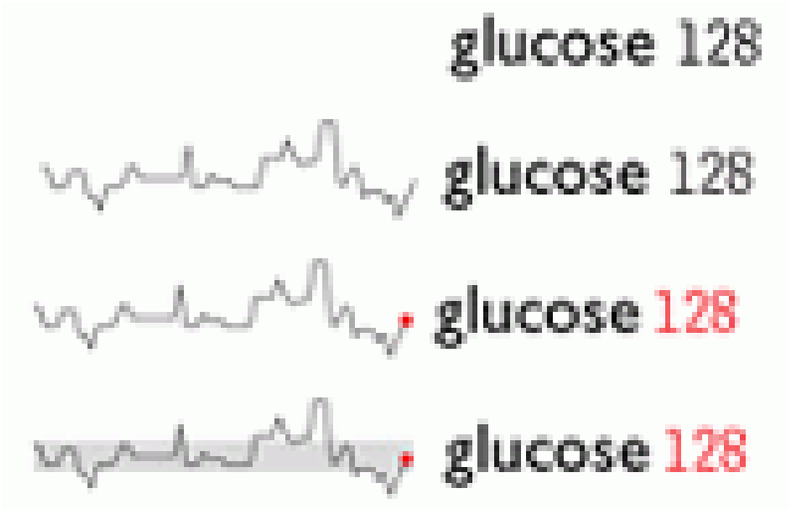
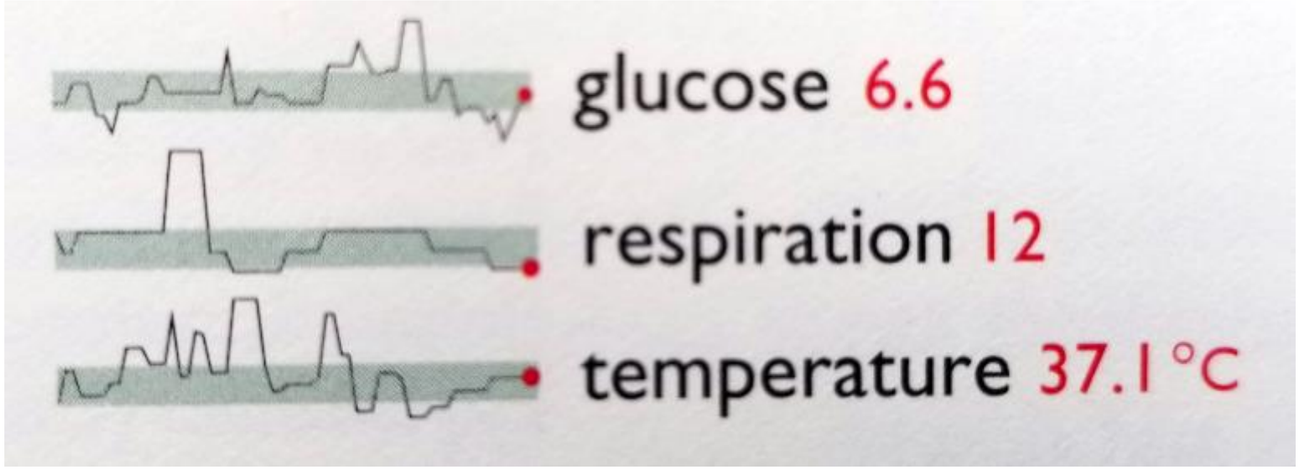
Sparklines

- Invented by Edward Tufte



Sparklines

- Small, high-resolution graphics embedded in a context of words, numbers, images. Sparklines are data-intense, design-simple, word-sized graphics.



Sparklines


2,922 Visits


1,694 Absolute Unique Visitors

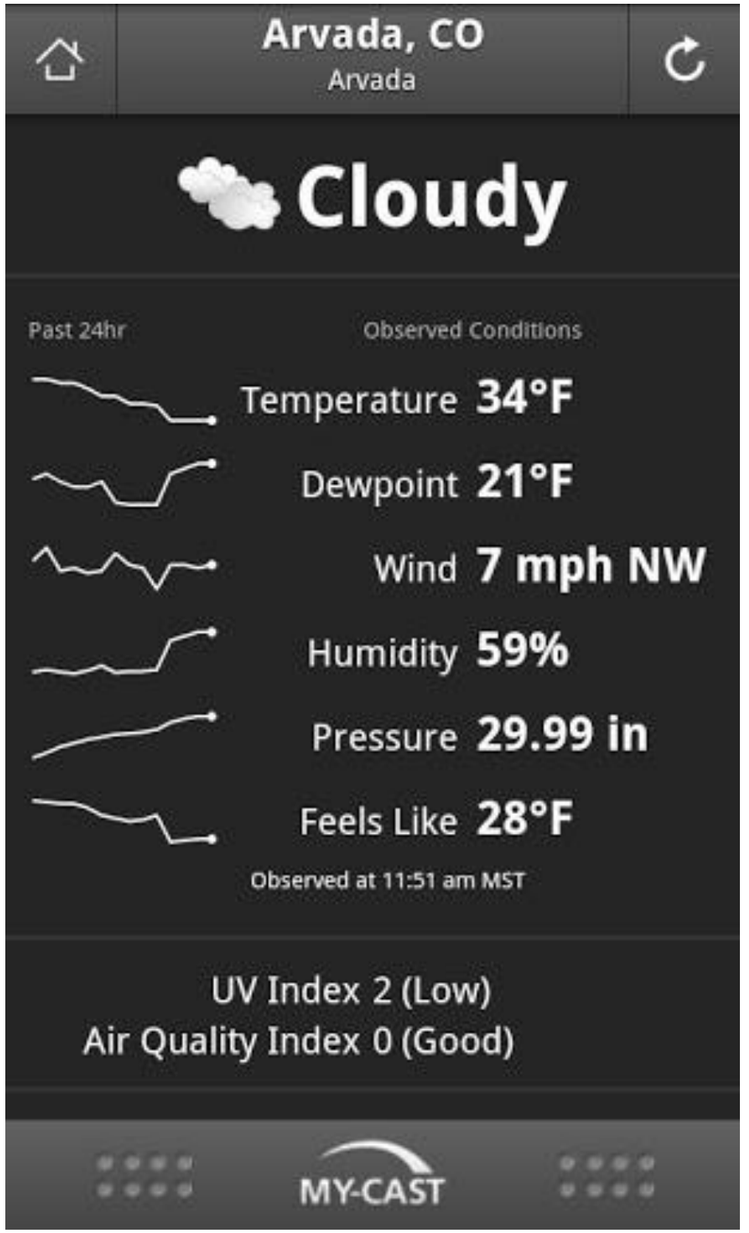

4,975 Pageviews


1.70 Average Pageviews


00:02:21 Time on Site


71.59% Bounce Rate


57.97% New Visits



Source: https://bestmobileappawards.com/app-submission/my-cast-weather

Sparktweets

@WSJ
Wall Street Journal

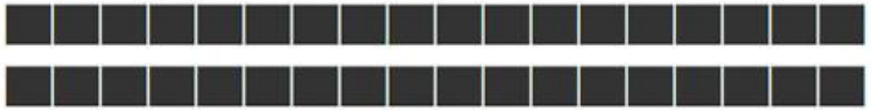
 Last 12 months of the U.S. unemployment rate, which rose to 9% in April. More data: http://on.wsj.com/jkZPs9

Fresh data on world primary energy use by %: Oil 34.77, Coal 29.36, NG 23.76 Nuke 5.47, Hydro 6.63 | spark:  @pkedrosky @alexkerin

@indians record 2011 to date:

#sparktweet

@timhaines  how hard I was laughing before and after reading that tweet #SparkTweet

'11 US Budget [■=$20B]: MassTransit _ Airports _ Highways _ | Defense

_ | #sparktweet #gov20 #opengov

My enthusiasm for @PJHarveyUK 's new album:  #sparktweet

Small Multiples

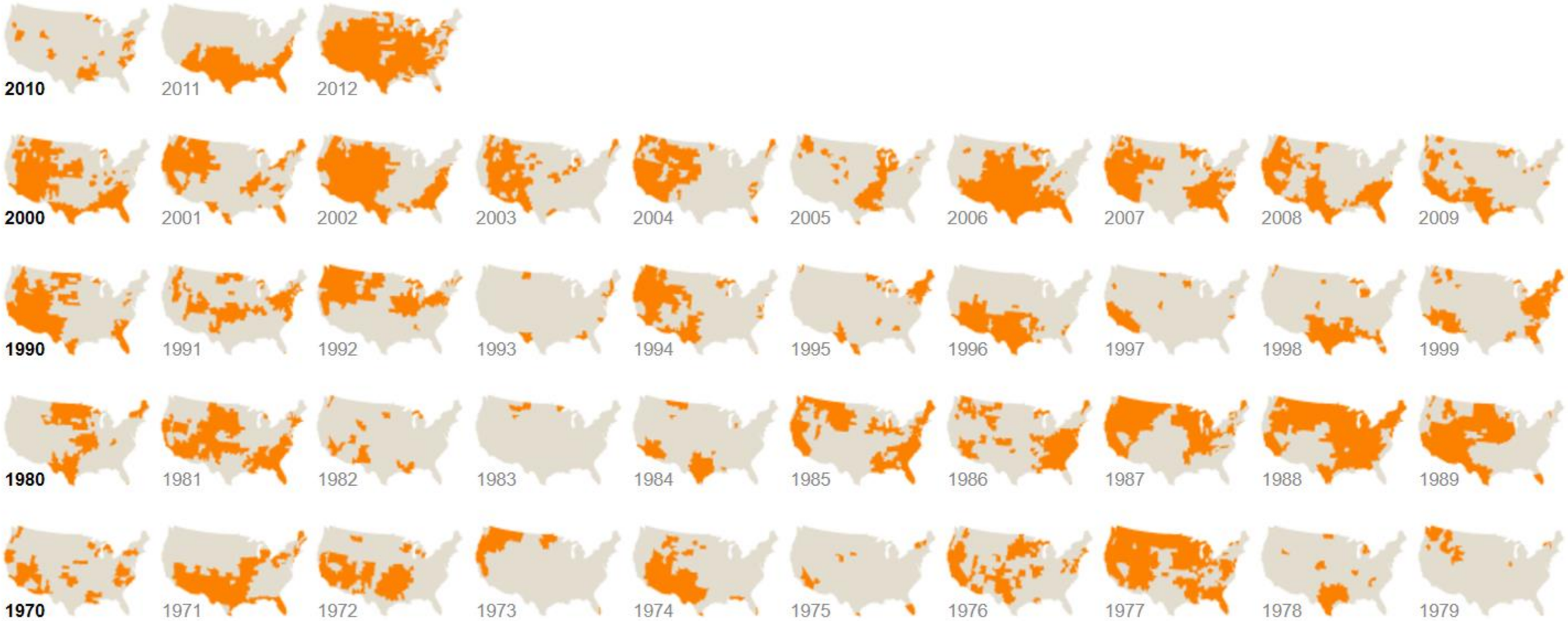
Invented by Edward Tufte

"Illustrations of postage-stamp size are indexed by category or a label, sequenced over time like the frames of a movie, or ordered by a quantitative variable not used in the single image itself."

Source: http://www.nytimes.com/interactive/2012/07/20/us/drought-footprint.html

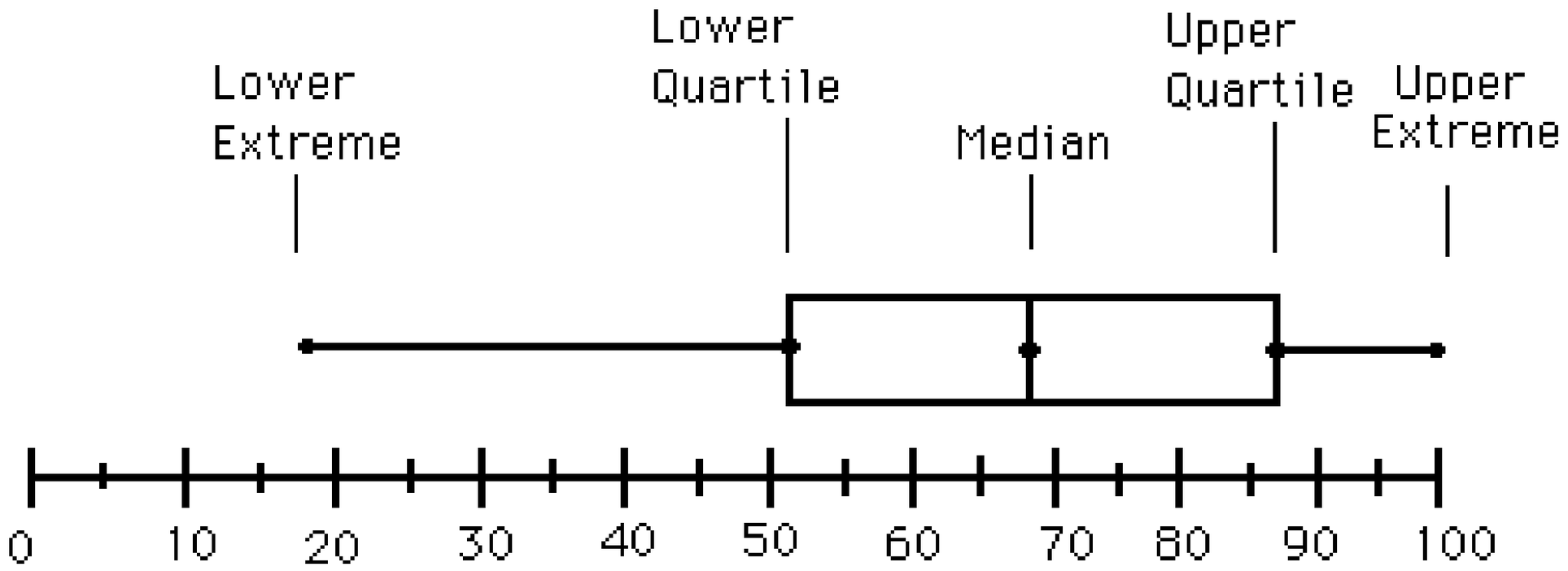
Drought's Footprint

More than half of the country was under moderate to extreme drought in June, the largest area of the contiguous United States affected by such dryness in nearly 60 years. Nearly 1,300 counties across 29 states have been declared federal disaster areas. Areas under moderate to extreme drought in June of each year are shown in orange below. Related Article »

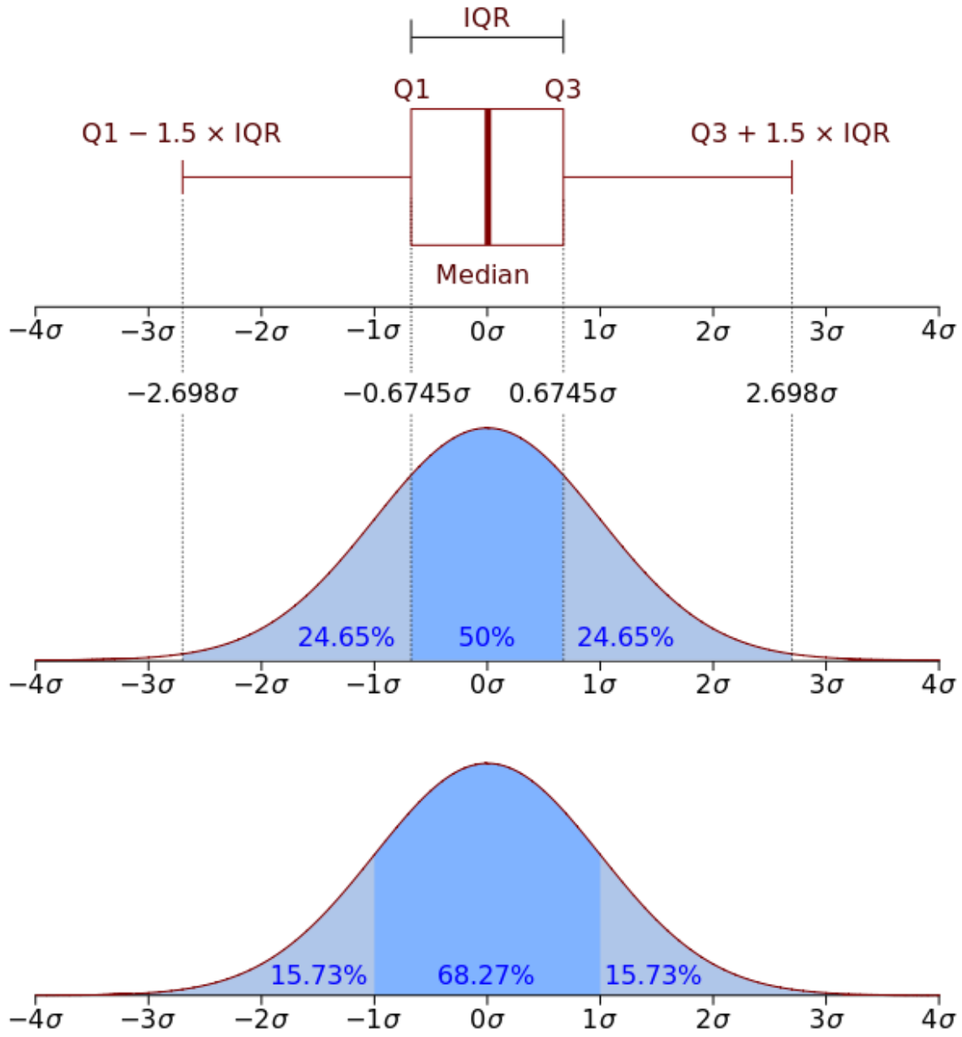


Source: http://www.nytimes.com/interactive/2012/07/20/us/drought-footprint.html

Box and Whiskers or Box Plot (Tukey):

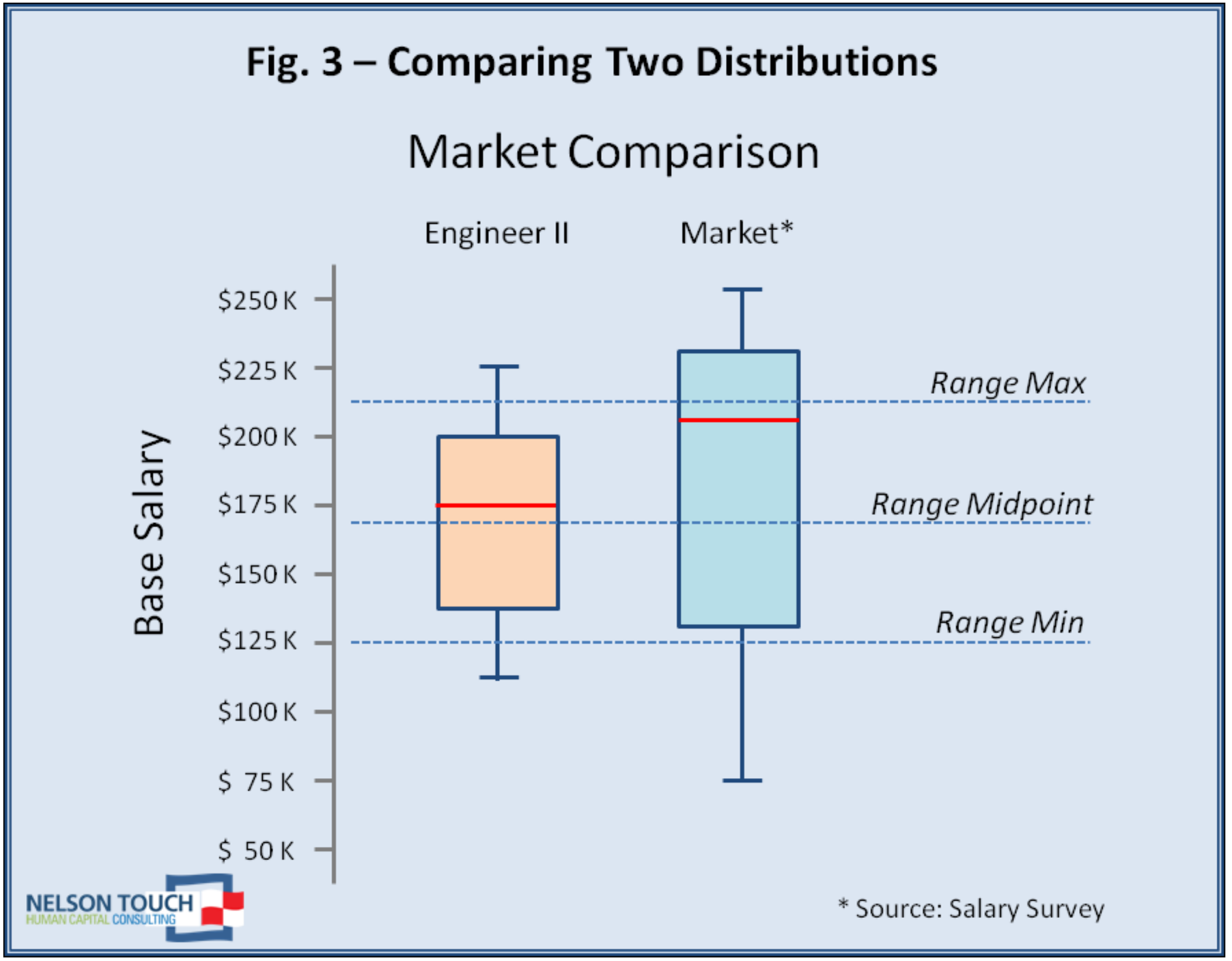


Box Plot vs. PDF

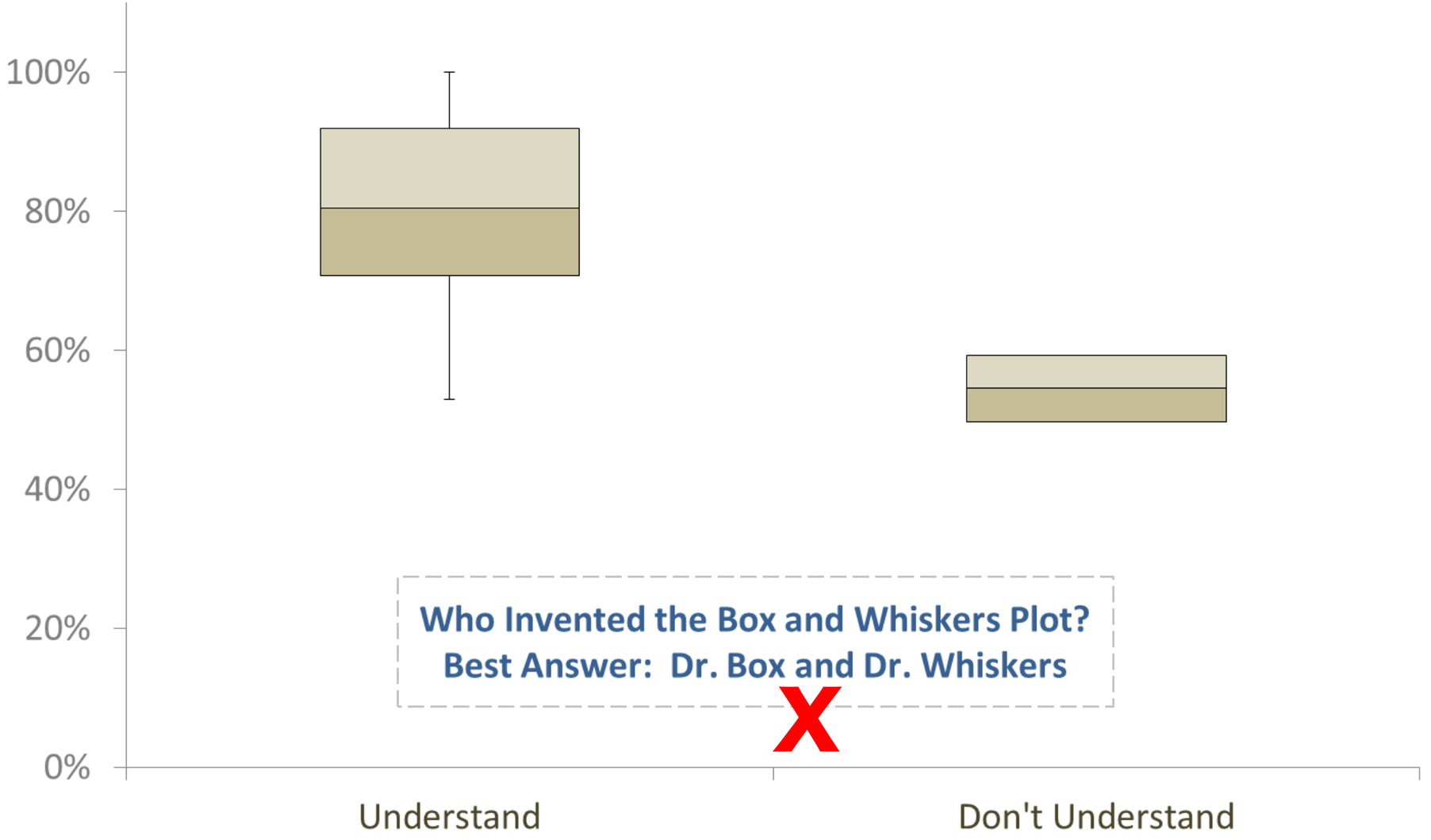


Source: https://en.wikipedia.org/wiki/Probability_density_function#/media/File:Boxplot_vs_PDF.svg

Fig. 3 – Comparing Two Distributions



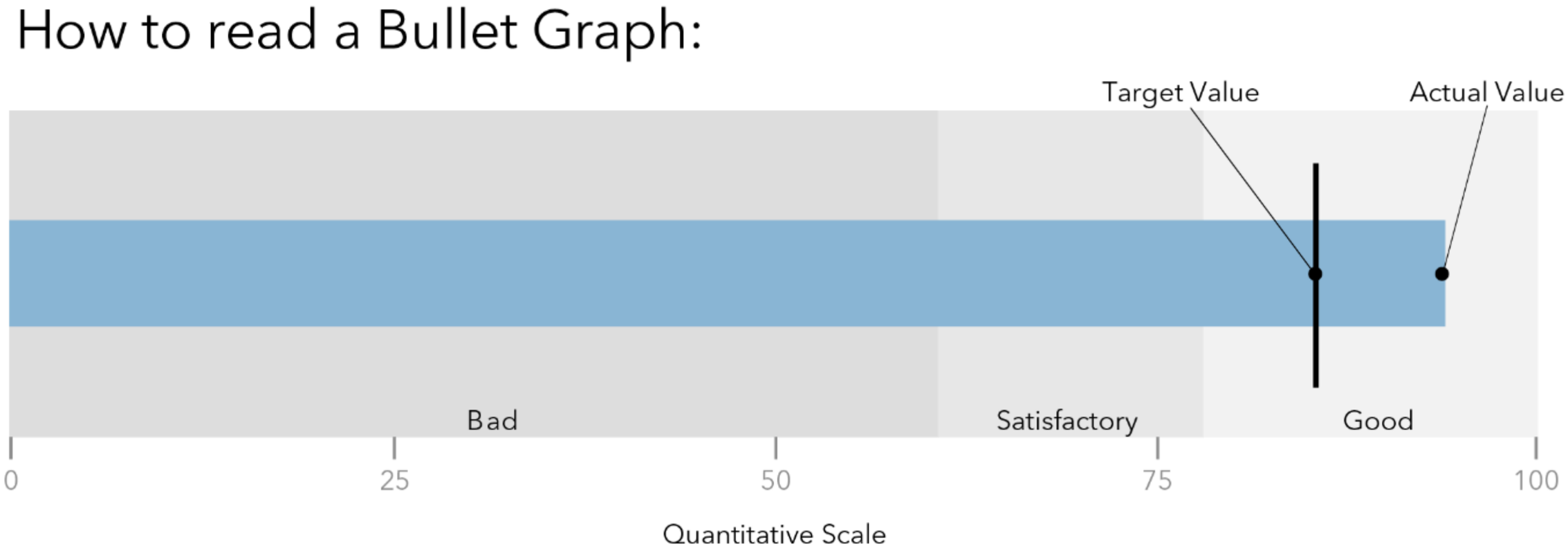
Exam Grades for Data Visualization Students who Understand a Box and Whiskers Plot



Created by Jeffrey A. Shaffer

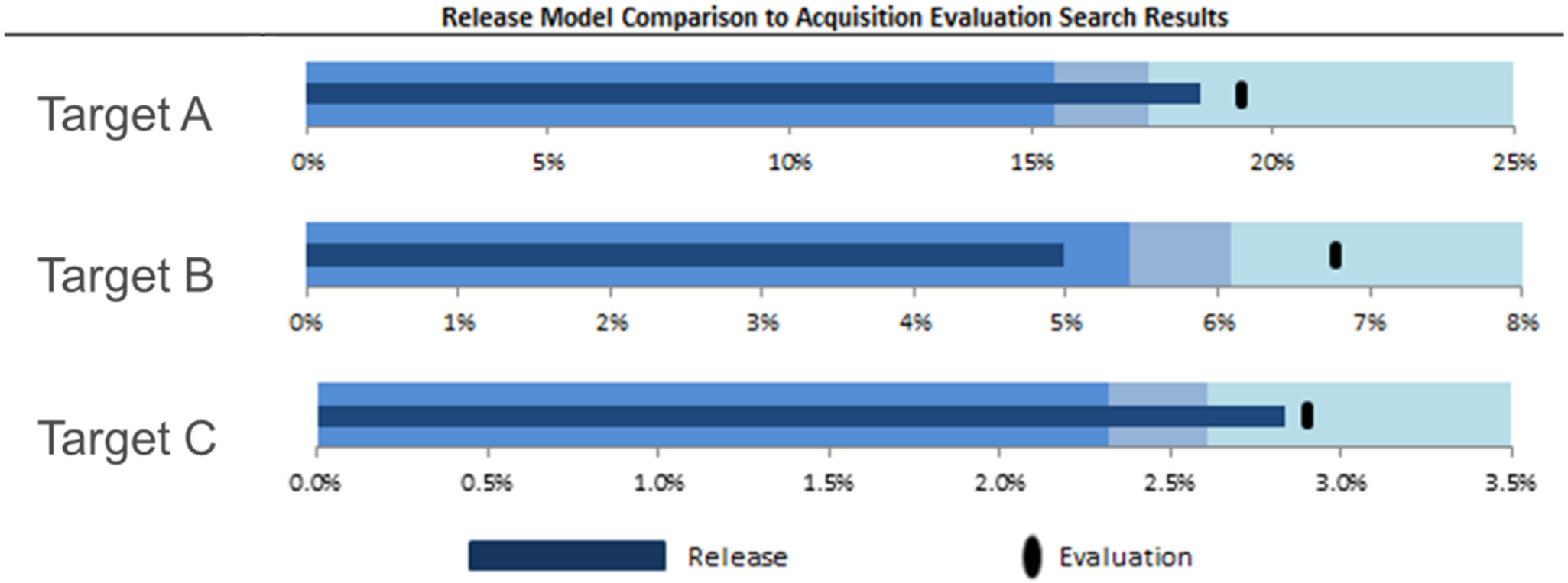
Bullet Graph (invented by Stephen Few)

Source: Public Domain
https://en.wikipedia.org/wiki/Bullet_graph#/media/File:Bullet_graphs_multiple.png



Source: *The Big Book of Dashboards* (Figure 1.36)

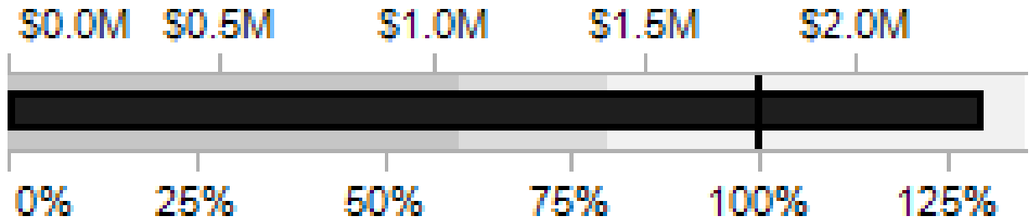
Bullet Graph (invented by Stephen Few)



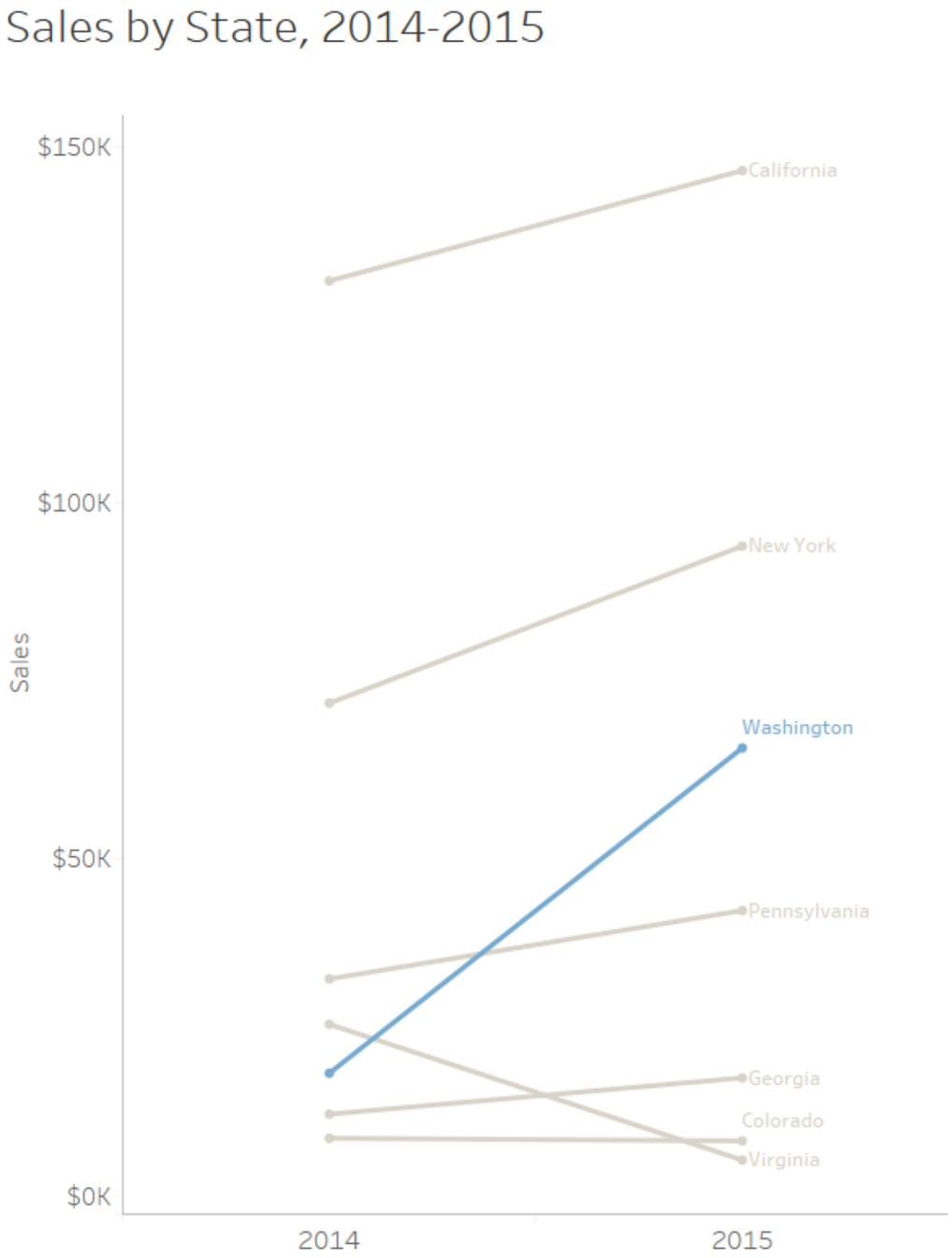
Variations on the Bullet Chart

Just actual to target
Easier to understand

Shows both value and %



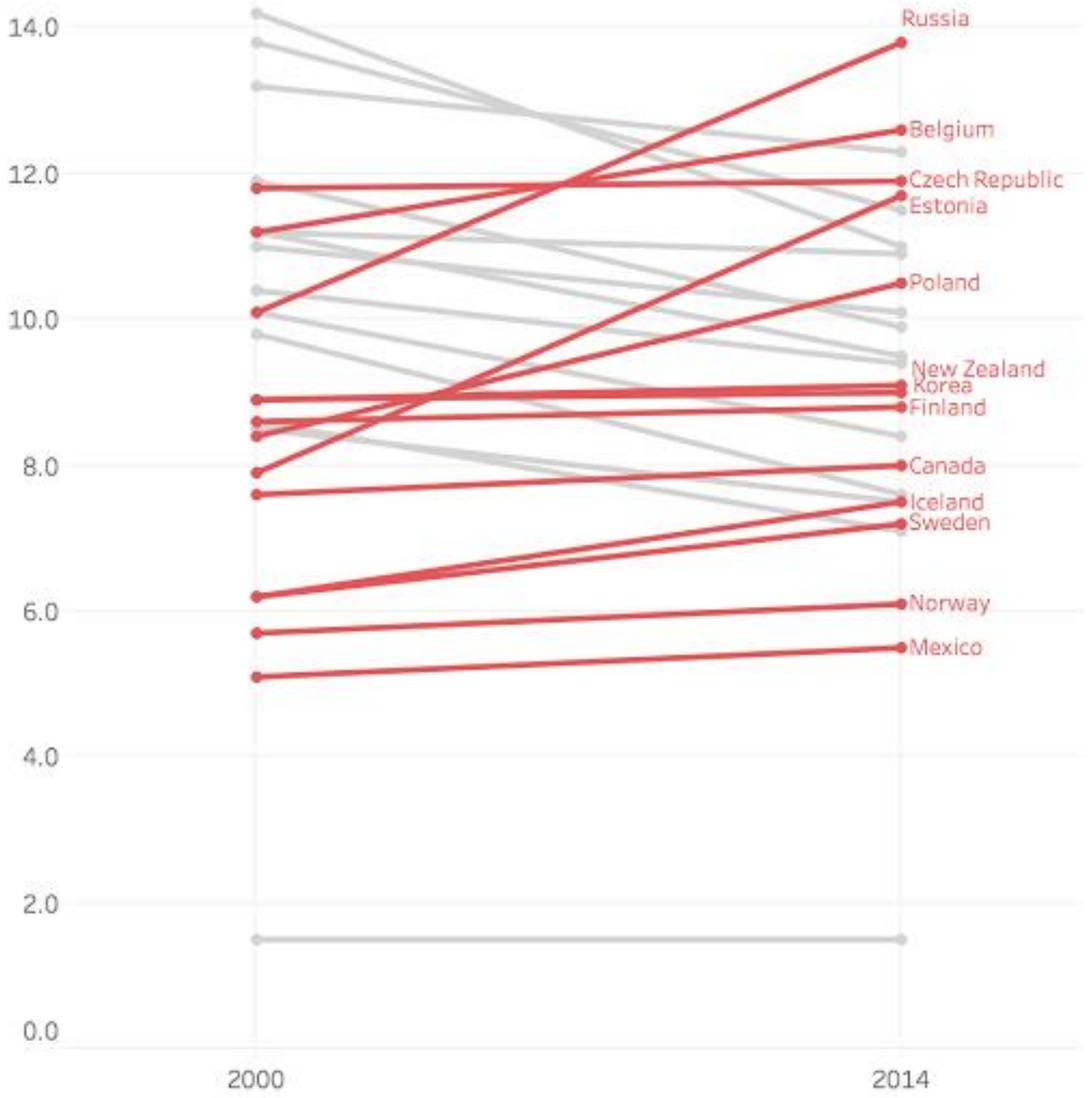
Slopegraph



Source: *The Big Book of Dashboards (Figure 1.21)*

Which OECD countries consumed more alcohol per person in 2014 than in 2000?

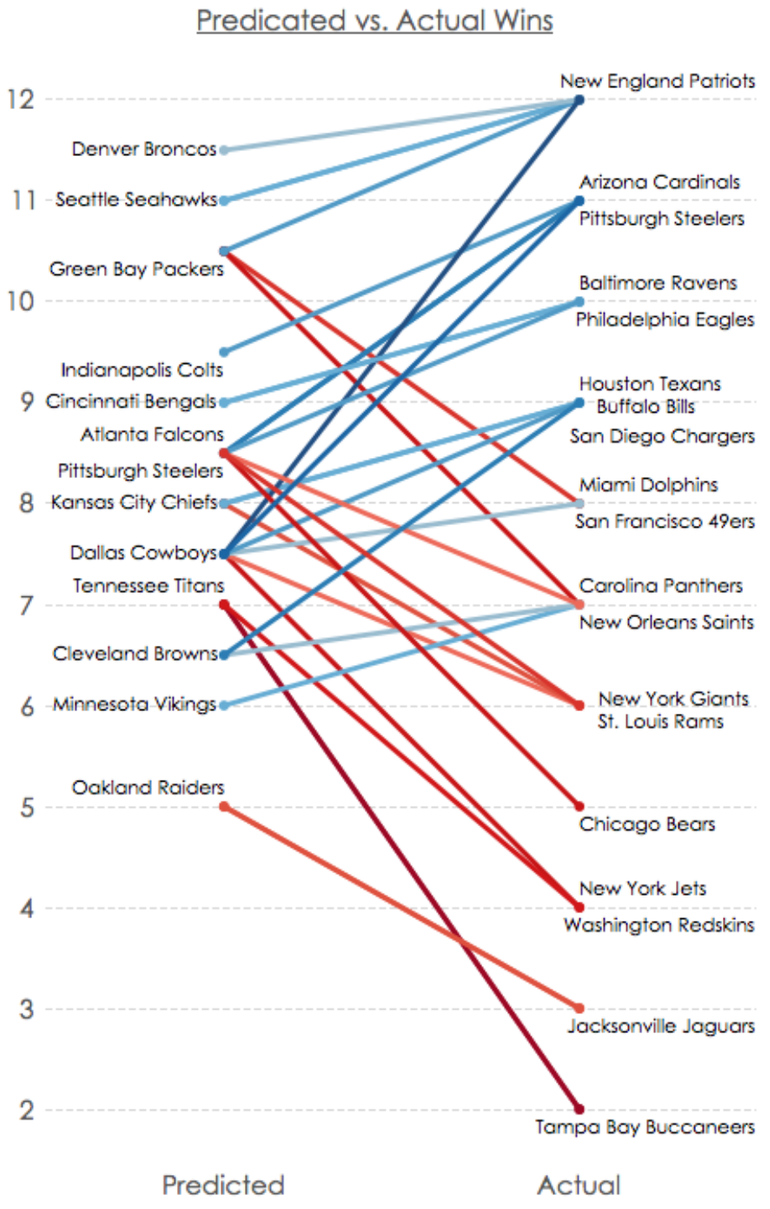
Annual consumption of pure alcohol in liters, per person, aged 15 years old and over.

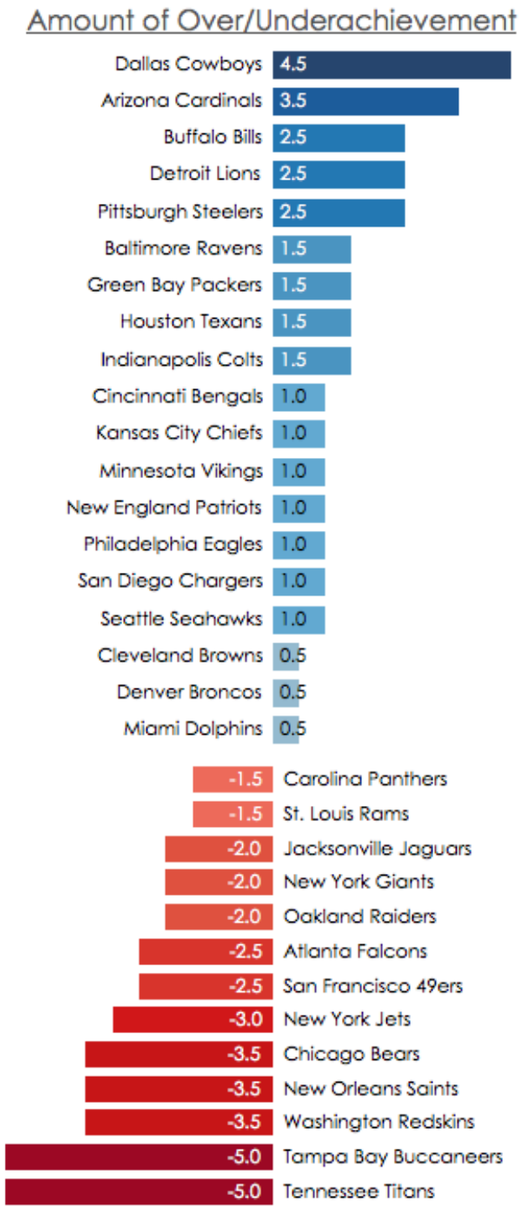


Source: OECD (http://stats.oecd.org/Index.aspx?DataSetCode=FAMILY)

Which NFL Teams Were the Biggest Overachievers and Underachievers in 2014?

Click any team to highlight



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