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MONASH
INFORMATION
TECHNOLOGY

FIT3179 Data Visualisation

Week 6: More Visualisation Idioms

GROUP OF EIGHT AUSTRALIA

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Lecture Overview

- More visualisation idioms
- Student Presentations

Quiz this week! Due Sunday 5 pm.

Presentations next Week!

Presentation next week

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Based on the Allocate+ tutorial class list, the students in the CLAYTON Lab 10 (Monday 6PM–8PM) and Lab 11 (Thursday 3PM–5PM) will present in Week 7.

All students: Read the instructions on the weekly forum and post your visualisation research and analysis there.

Due date: 1 hour before the lecture starts or the beginning of your weekly lab session, whichever is earlier.

Content: see next slide

Presentations

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- High quality, inspirational interactive visualisation.
- Needs to tell a story and be of considerable complexity and interest.
- Prefer an idiom discussed this week, but you are not restricted to these types.
- Analyse:
  - **Interactivity:** How is interactivity used?
  - **Story:** How and what story is this visualisation telling?
  - **Critique:** What could be improved? Point out aspects related to figure-ground, use of colour, layout, typography, label placement, etc. that are not well done.

Visual vocabulary

Designing with data

There are so many ways to visualise data - how do we know which one to pick? Use the categories across the top to decide which data relationship is most important in your story, then look at the different types of chart within the category to form some initial ideas about what might work best. This list is not meant to be exhaustive, nor a wizard, but is a useful starting point for making informative and meaningful data visualisations.

FT graphic: Alan Smith, Chris Campbell, Ian Bott, Liz Faunce, Graham Parrish, Billy Ehrenberg, Paul McCallum, Martin Stabe
Inspired by the Graphic Continuum by Jon Schwabish and Severino Ribecca

ft.com/vocabulary

Deviation

Emphasise variations (+/-) from a fixed reference point. Typically the reference point is zero but it can also be a target or a long-term average. Can also be used to show sentiment (positive/neutral/negative).

Example FT uses
Trade surplus/deficit, climate change

Diverging bar

A simple standard bar chart that can handle both negative and positive magnitude values.

Diverging stacked bar

Perfect for presenting survey results which involve sentiment (eg disagree/neutral/agree).

Spine

Splits a single value into two contrasting components (eg male/female).

Surplus/deficit filled line

The shaded area of these charts allows a balance to be shown – either against a baseline or between two series.

Correlation

Show the relationship between two or more variables. Be mindful that, unless you tell them otherwise, many readers will assume the relationships you show them to be causal (i.e. one causes the other).

Example FT uses
Inflation & unemployment, income & life expectancy

Scatterplot

The standard way to show the relationship between two continuous variables, each of which has its own axis.

Column + line timeline

A good way of showing the relationship between an amount (columns) and a rate (line).

Connected scatterplot

Usually used to show how the relationship between 2 variables has changed over time.

Bubble

Like a scatterplot, but adds additional detail by sizing the circles according to a third variable.

XY heatmap

A good way of showing the patterns between 2 categories of data, less good at showing fine differences in amounts.

Ranking

Use where an item's position in an ordered list is more important than its absolute or relative value. Don't be afraid to highlight the points of interest.

Example FT uses
Wealth, deprivation, league tables, constituency election results

Ordered bar

Standard bar charts display the ranks of values much more easily when sorted into order.

Ordered column

See above.

Ordered proportional symbol

Use when there are big variations between values and/or seeing fine differences between data is not so important.

Dot strip plot

Dots placed in order on a strip are a space-efficient method of laying out ranks across multiple categories.

Slope

Perfect for showing how ranks have changed over time or vary between categories.

Lollipop

Lollipops draw more attention to the data value than standard bar/column and can also show rank and value effectively.

Bump

Effective for showing changing rankings across multiple dates. For large datasets, consider grouping lines using colour.

Distribution

Show values in a dataset and how often they occur. The shape (or 'skew') of a distribution can be a memorable way of highlighting the lack of uniformity or equality in the data.

Example FT uses
Income distribution, population (age/sex) distribution

Histogram

The standard way to show a statistical distribution – keep the gaps between columns small to highlight the 'shape' of the data.

Dot plot

A simple way of showing the change or range (min/max) of data across multiple categories.

Dot strip plot

Good for showing individual values in a distribution, can be a problem when too many dots have the same value.

Barcode plot

Like dot strip plots, good for displaying all the data in a table, they work best when highlighting individual values.

Boxplot

Summarise multiple distributions by showing the median (centre) and range of the data

Violin plot

Similar to a box plot but more effective with complex distributions (data that cannot be summarised with simple average).

Population pyramid

A standard way for showing the age and sex breakdown of a population distribution; effectively, back to back histograms.

Cumulative curve

A good way of showing how unequal a distribution is: y axis is always cumulative frequency, x axis is always a measure.

Frequency polygons

For displaying multiple distributions of data. Like a regular line chart, best limited to a maximum of 3 or 4 datasets.

Change over Time

Give emphasis to changing trends. These can be short (intra-day) movements or extended series traversing decades or centuries: Choosing the correct time period is important to provide suitable context for the reader.

Example FT uses
Share price movements, economic time series

Line

The standard way to show a changing time series. If data are irregular, consider markers to represent data points.

Column

Columns work well for showing change over time – but usually best with only one series of data at a time.

Column + line timeline

A good way of showing the relationship over time between an amount (columns) and a rate (line).

Slope

Good for showing changing data as long as the data can be simplified into 2 or 3 points without missing a key part of story.

Area chart

Use with care – these are good at showing changes to total, but seeing change in components can be very difficult.

Candlestick

Usually focused on day-to-day activity, these charts show opening/closing and high/low points of each day.

Fan chart (projections)

Use to show the uncertainty in future projections - usually this grows the further forward to projection.

Connected scatterplot

A good way of showing changing data for two variables whenever there is a relatively clear pattern of progression.

Calendar heatmap

A great way of showing temporal patterns (daily, weekly, monthly) – at the expense of showing precision in quantity.

Priestley timeline

Great when date and duration are key elements of the story in the data.

Circle timeline

Good for showing discrete values of varying size across multiple categories (eg earthquakes by continent).

Vertical timeline

Presents time on the Y axis. Good for displaying detailed time series that work especially well when scrolling on mobile.

Seismogram

Another alternative to the circle timeline for showing series where there are big variations in the data.

Magnitude

Show size comparisons. These can be relative (just being able to see larger/bigger) or absolute (need to see fine differences). Usually these show a 'counted' number (for example, barrels, dollars or people) rather than a calculated rate or per cent.

Example FT uses
Commodity production, market capitalisation

Column

The standard way to compare the size of things. Must always start at 0 on the axis.

Bar

See above. Good when the data are not time series and labels have long category names.

Paired column

As per standard column but allows for multiple series. Can become tricky to read with more than 2 series.

Paired bar

See above.

Marimekko

A good way of showing the size and proportion of data at the same time – as long as the data are not too complicated.

Proportional symbol

Use when there are big variations between values and/or seeing fine differences between data is not so important.

Isotype (pictogram)

Excellent solution in some instances – use only with whole numbers (do not slice off an arm to represent a decimal).

Lollipop

Lollipop charts draw more attention to the data value than standard bar/column – does not have to start at zero (but preferable).

Radar

A space-efficient way of showing value of multiple variables- but make sure they are organised in a way that makes sense to reader.

Parallel coordinates

An alternative to radar charts – again, the arrangement of the variables is important. Usually benefits from highlighting values.

Bullet

Good for showing a measurement against the context of a target or performance range.

Grouped symbol

An alternative to bar/column charts when being able to count data or highlight individual elements is useful.

Part-to-whole

Show how a single entity can be broken down into its component elements. If the reader's interest is solely in the size of the components, consider a magnitude-type chart instead.

Example FT uses
Fiscal budgets, company structures, national election results

Stacked column

A simple way of showing part-to-whole relationships but can be difficult to read with more than a few components.

Marimekko

A good way of showing the size and proportion of data at the same time – as long as the data are not too complicated.

Pie

A common way of showing part-to-whole data – but be aware that it's difficult to accurately compare the size of the segments.

Donut

Similar to a pie chart – but the centre can be a good way of making space to include more information about the data (eg total).

Treemap

Use for hierarchical part-to-whole relationships; can be difficult to read when there are many small segments.

Voronoi

A way of turning points into areas – any point within each area is closer to the central point than any other centroid.

Arc

A hemicycle, often used for visualising political results in parliaments.

Gridplot

Good for showing % information, they work best when used on whole numbers and work well in multiple layout form.

Venn

Generally only used for schematic representation.

Waterfall

Can be useful for showing part-to-whole relationships where some of the components are negative.

Spatial

Aside from locator maps only used when precise locations or geographical patterns in data are more important to the reader than anything else.

Example FT uses
Population density, natural resource locations, natural disaster risk/impact, catchment areas, variation in election results

Basic choropleth (rate/ratio)

The standard approach for putting data on a map – should always be rates rather than totals and use a sensible base geography.

Proportional symbol (count/magnitude)

Use for totals rather than rates – be wary that small differences in data will be hard to see.

Flow map

For showing unambiguous movement across a map.

Contour map

For showing areas of equal value on a map. Can use deviation colour schemes for showing +/- values

Equalised cartogram

Converting each unit on a map to a regular and equally-sized shape – good for representing voting regions with equal value.

Scaled cartogram (value)

Stretching and shrinking a map so that each area is sized according to a particular value.

Dot density

Used to show the location of individual events/locations – make sure to annotate any patterns the reader should see.

Heat map

Grid-based data values mapped with an intensity colour scale. As choropleth map – but not snapped to an admin/political unit.

Flow

Show the reader volumes or intensity of movement between two or more states or conditions. These might be logical sequences or geographical locations.

Example FT uses
Movement of funds, trade, migrants, lawsuits, information; relationship graphs.

Sankey

Shows changes in flows from one condition to at least one other; good for tracing the eventual outcome of a complex process.

Waterfall

Designed to show the sequencing of data through a flow process, typically budgets. Can include +/- components.

Chord

A complex but powerful diagram which can illustrate 2-way flows (and net winner) in a matrix.

Network

Used for showing the strength and inter-connectedness of relationships of varying types.

Selection of an Idiom

Vis catalogues

- https://datavizproject.com
- https://datavizcatalogue.com
- https://ft.com/vocabulary

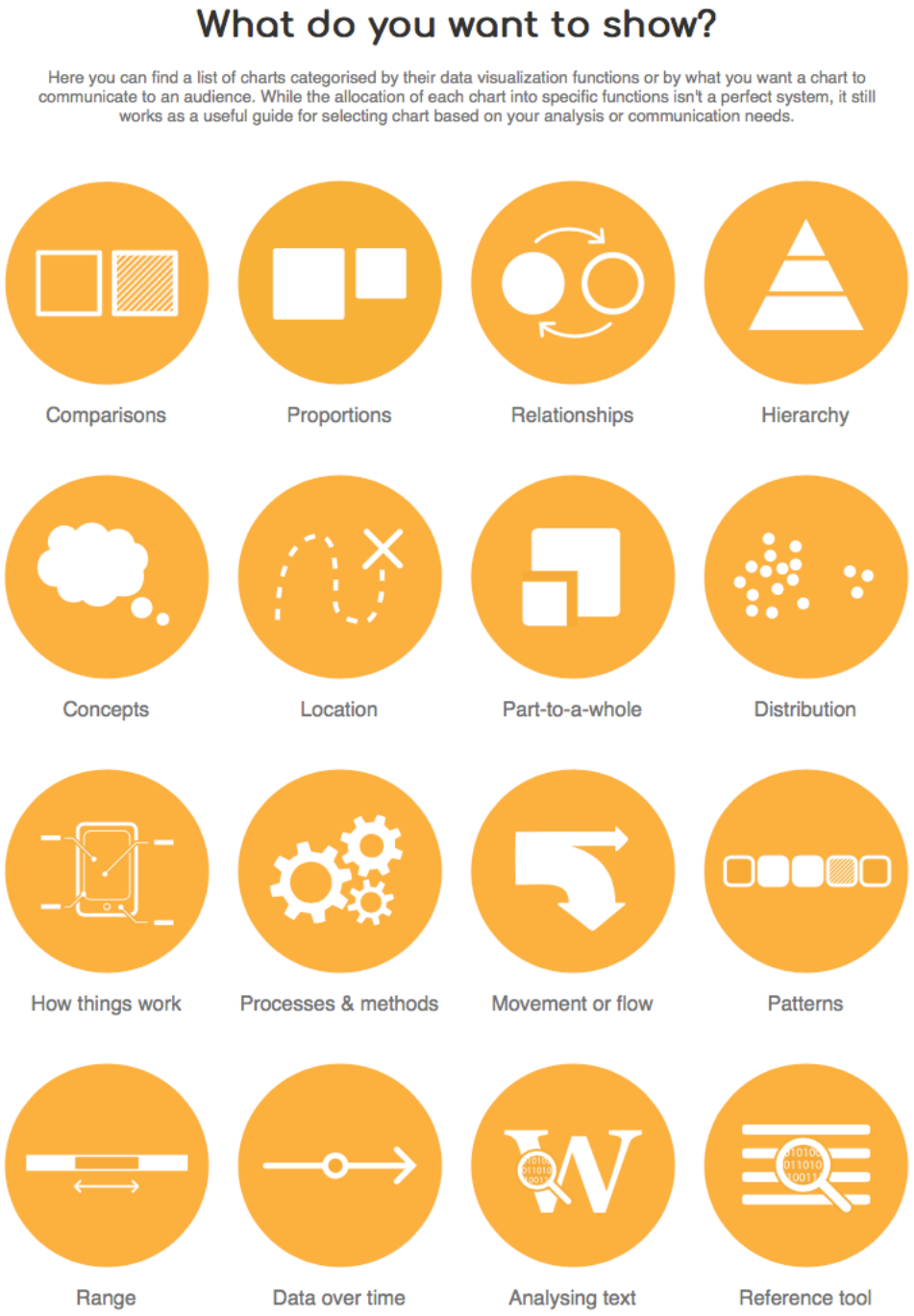


Tableau Chart Catalog

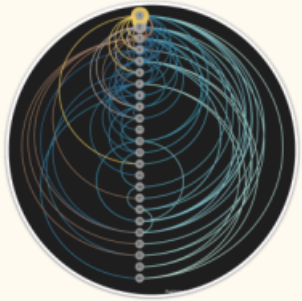
Examples Created in Tableau by the Tableau Community

This catalog provides a list of different chart types with links to actual visualizations built in Tableau and published on Tableau Public. This was developed as a resource for the Tableau community for inspiration and to assist in the understanding of how these chart types might be used in actual use cases. All visualizations on this page are being provided with the permission of the original author and are available for download from Tableau Public. Click on the image to open the actual visualization in a separate browser window. (Note: inclusion does not mean the chart is the best choice for the data represented. Also note that the originator of each chart may not necessarily be represented; these are simply examples).

For more information on chart type usage and blog posts on how to create these charts, please see the Visual Vocabulary by Andy Kriebel, the Tableau Reference Guide from Jeff Shaffer (Data Plus Science) and the Tableau Cookbook from Josh Weyburne.

Search For Chart Type

Arc Diagram

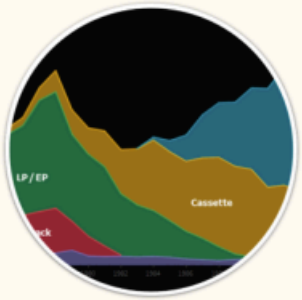


By James Smith

Area Chart

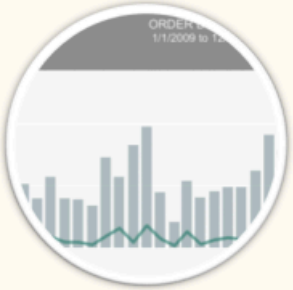
By Bo McCready

Area Chart (Stacked)



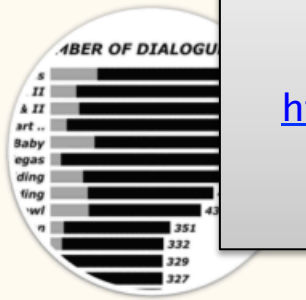
By Kevin Flerlage

Bar Chart

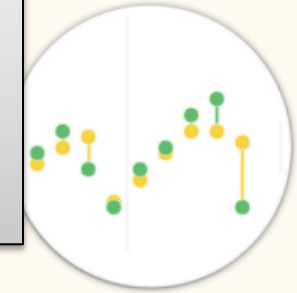


By Bridget Cogley

Bar Chart (Sta



Barbell Chart



Have a look at the Tableau Chart Catalog!

https://public.tableau.com/views/TheTableauChartCatalog/TableauChartExamples

Idiom: Dot Matrix Chart

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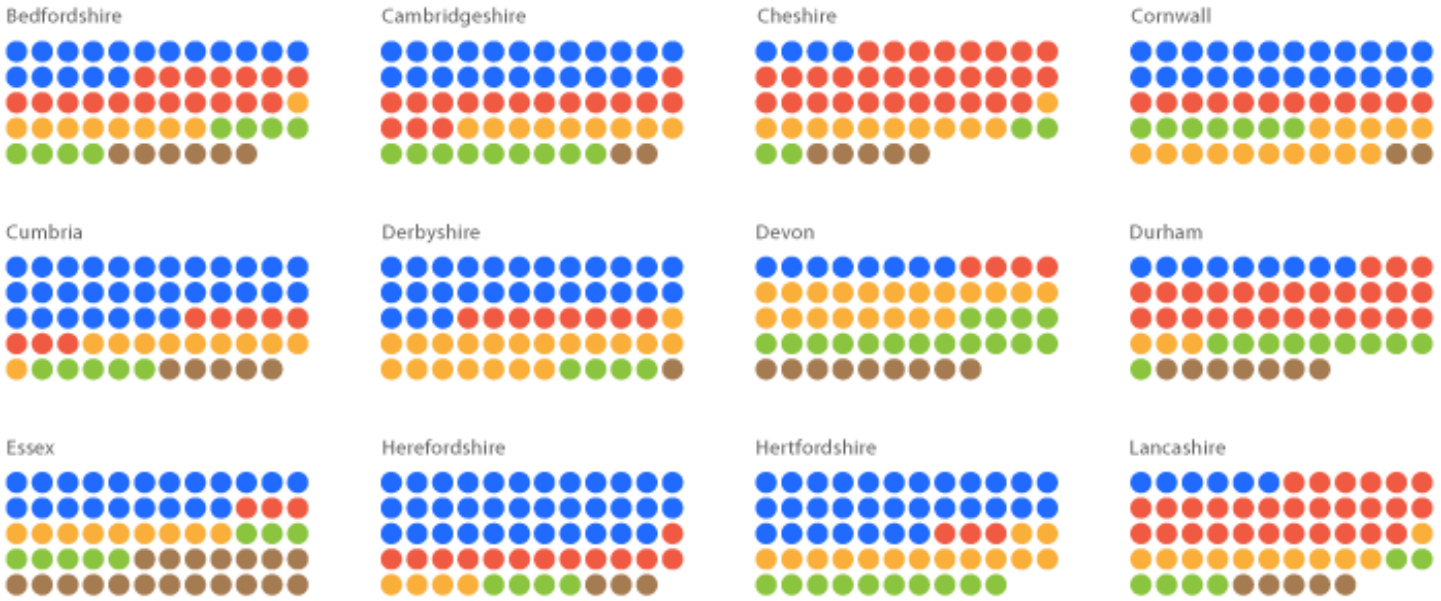


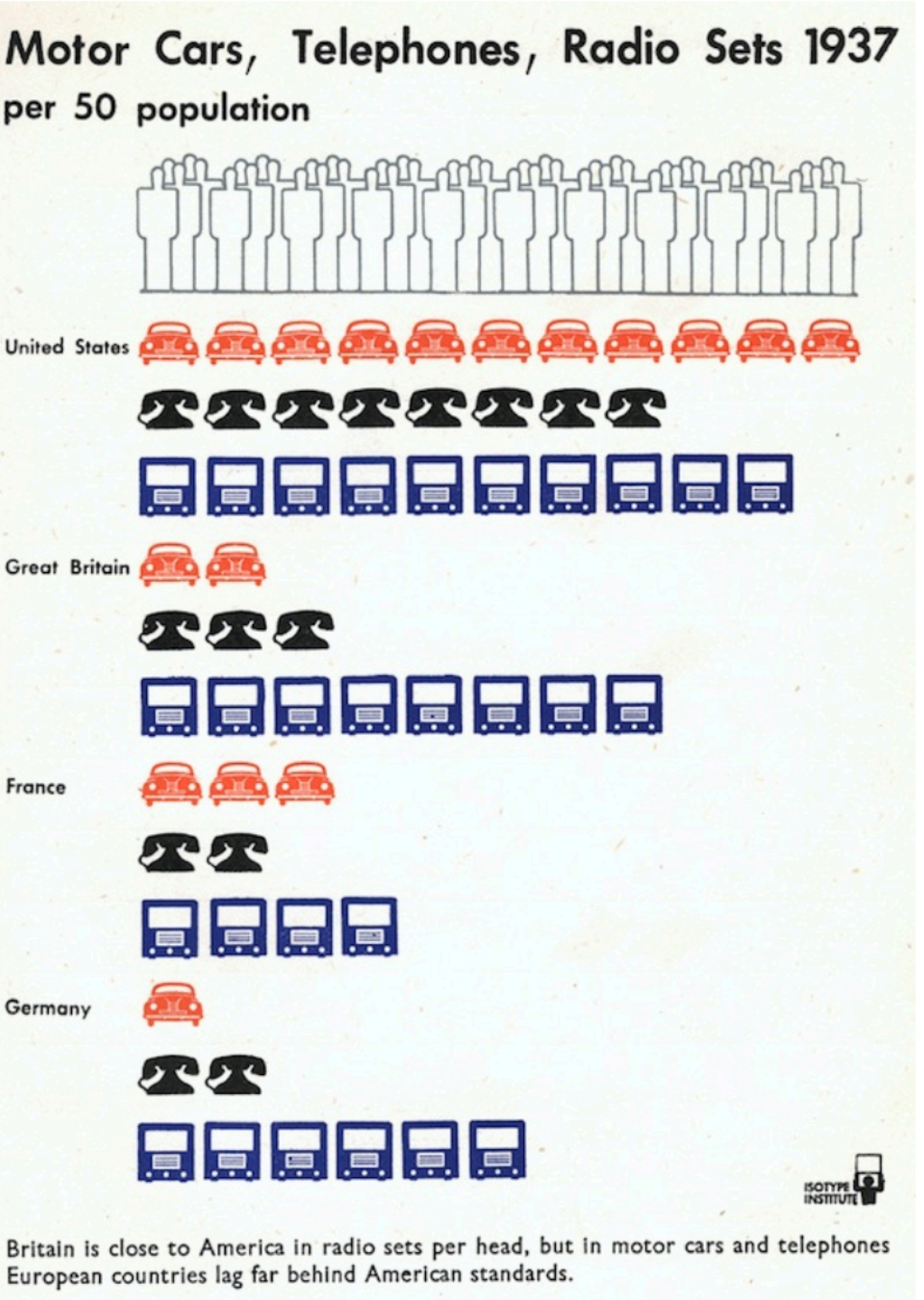
Idiom: ISOTYPE

- What?
  - 1 quant attribute
- Why?
  - Tasks: Compare, lookup values, Find biggest / smallest
- How?
  - Marks: pictographs
  - Channels: number of pictographs

ISOTYPE: International System Of TYpographic Picture Education

Made popular by Otto Neurath in the 1920s and later.

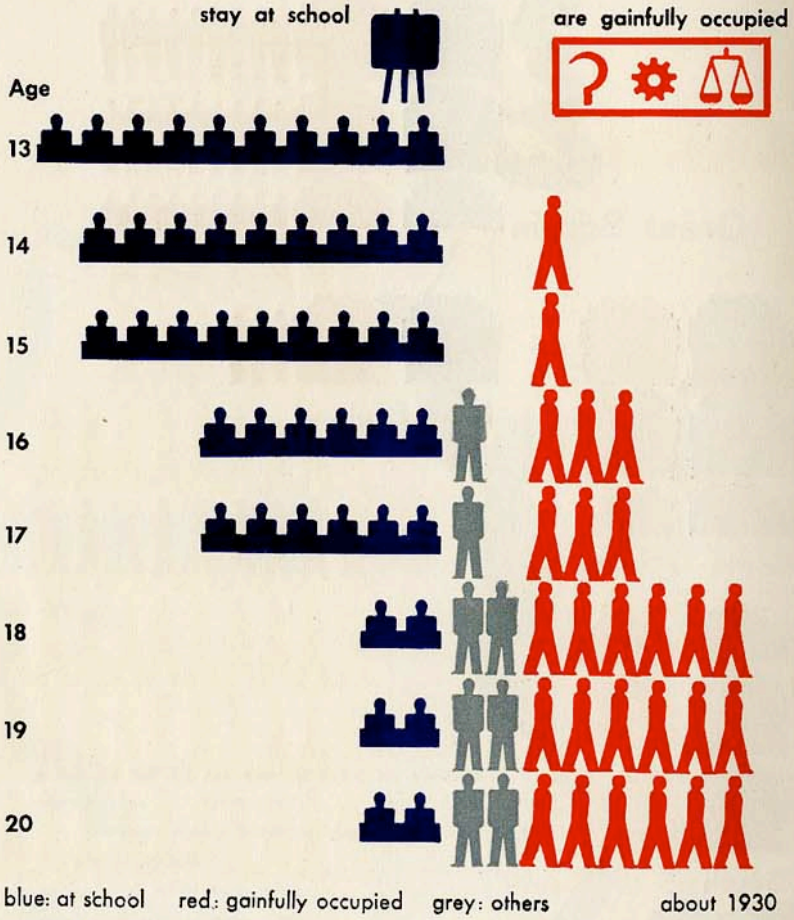
One symbols (pictograph or pictorial symbol) represents a fixed quantity; stacked to show total.



The Young Population aged 13-20

United States

How many out of ten in each age group

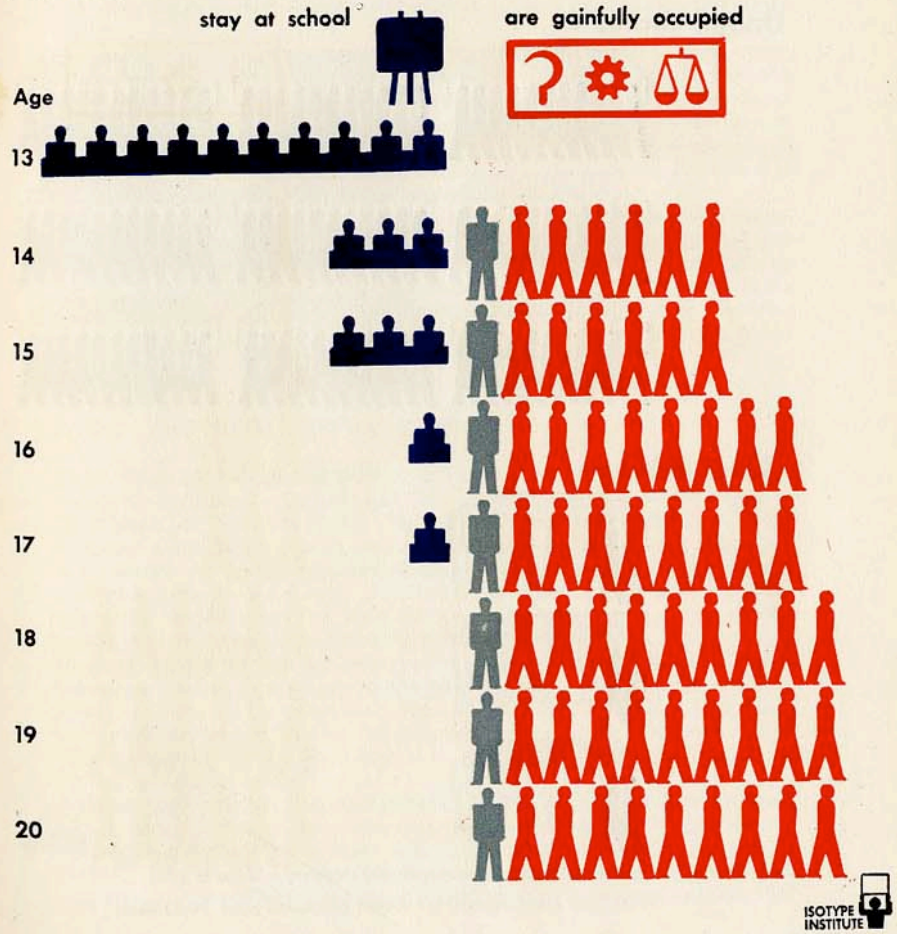


blue: at school red: gainfully occupied grey: others about 1930

Starting at age thirteen and comparing the next age groups 14 to 15, 16 to 17, and 18 to 20, the proportion going to work for money in both countries steps up, while the proportion

Great Britain

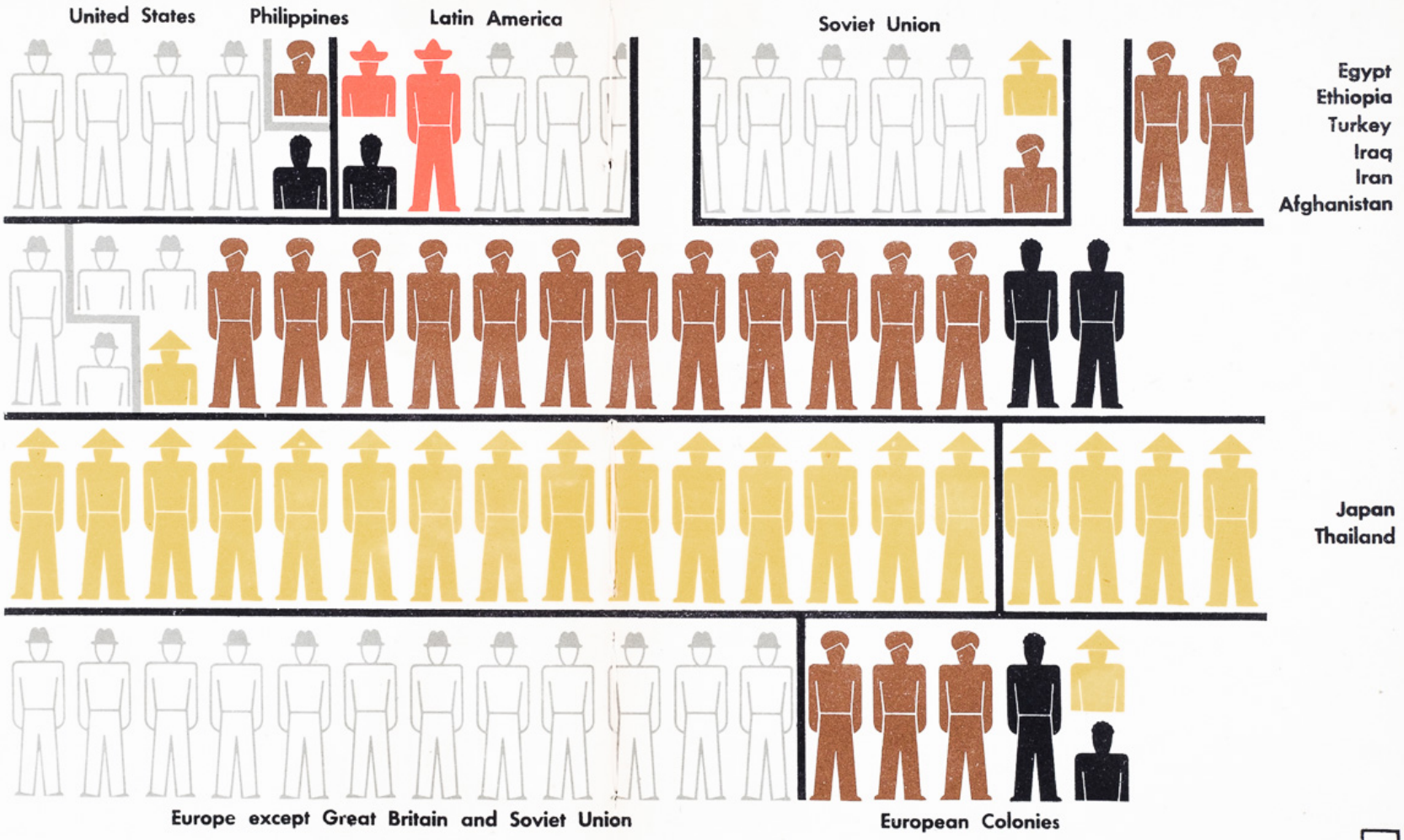
How many out of ten in each age group



ISOTYPE INSTITUTE

at school or college steps down. But at the age 14 to 15 the stepping is much greater in Britain, and less than 10 per cent. continue education after seventeen.

United States and Great Britain in the World



Each complete figure represents 30 million population

Here we are—the peoples of the world—black, white, yellow and brown. The man and a half in Latin America are Red Indians ; there are so few left in the United States that it would be difficult to carve a man up small enough to show them. The brown men are mostly Indians. It is surprising to find that there are more Negroes in the British Empire than in the United States.

ISOTYPE

ISOTYPE

Study by Haroz et al., 2015. CHI '15 Proceedings of the 33rd Annual ACM Conference on Human Factors in Computing Systems, (pp. 1191–1200).

ISOTYPE Visualization – Working Memory, Performance, and Engagement with Pictographs

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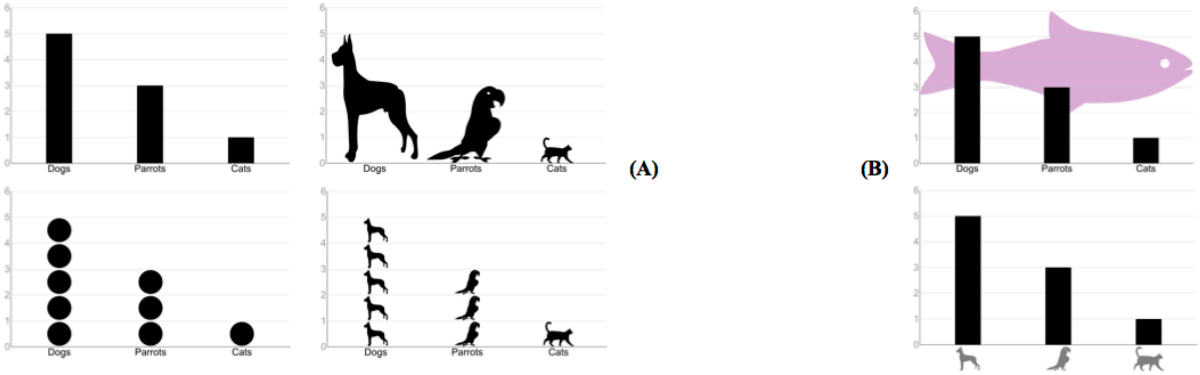

Fig. 1. Pictographic charts have been used for decades. (A) Which chart above most effectively conveys information? Which data is easiest to remember during a demanding task? Which is most engaging? (B) How integrated must a pictograph be to benefit the user? Do purely decorative background images offer the same benefits as simple axis labels? Or must they be used to convey data?

ABSTRACT
Although the infographic and design communities have used simple pictographic representations for decades, it is still unclear whether they can make visualizations more effective. Using simple charts, we tested how pictographic representations impact (1) memory for information just viewed, as well as under the load of additional information, (2) speed of finding information, and (3) engagement and preference in seeking out these visualizations. We find that superfluous images can distract. But we find no user costs – and some intriguing benefits – when pictographs are used to represent the data.

Author Keywords
Visualization; Psychophysics; Working Memory; User Performance; Pictograph; Embellishment; ISOTYPE

INTRODUCTION
The International System Of TYpographic Picture Education (ISOTYPE) uses simple pictographic elements to convey many types of information, including numerical data. Otto and Marie Neurath defined the term in the 1920s [21], though this type of chart was first described by Willard Brinton in 1914 [6]. Together with Gerd Arntz, the Neuraths created many ISOTYPE designs over several decades [1].

The goal was a universally understandable system for communicating quantities of commercial, social, or economic information (e.g., automobile production or number of children born per year). Symbols, each representing a fixed quantity, were stacked to provide an intuitive representation of a total amount (Fig. 2). Gerd Arntz's pictographs – simplified icons with minimal color – are highly recognizable and are still used in signs, traffic icons, and warning labels.

While the design community has largely embraced the simple style of ISOTYPE for pictographic embellishments [7, 17], the visualization and HCI communities tend to regard pictographs as 'chart junk' – a distraction from the data itself [24]. Here we examine how ISOTYPE-style embellishment affects viewer memory, speed, and engagement within simple visualizations.

Recent work suggests that extraneous pictographic information can indeed improve the effectiveness of visualizations. Bateman et al. found that visualizations that integrate

ISOTYPE

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GUIDELINES

Based on our findings in the studies, we suggest the following guidelines for using ISOTPYE displays.

(1) Superfluous pictographs are a distraction

Pictographs do not impair the viewer as long as they are used to represent data. But including an unnecessary background image in a visualization appears to be distracting, and it may divert attention away from the data. Even replacing text labels with pictographs makes encoding less efficient (at least when the text labels are unambiguous).

(2) Redundantly code length and (small) number

Break up large length-defined objects (such as the bars in a bar chart) into a few smaller items. One way of doing so is to use 'Tufte-style' gridlines [24], which are white lines superimposed over a (black) bar chart. This approach divides the bars at regular intervals allowing a user to also make a number estimate rather than only a length judgment. For small values below 4-5, number estimation is quick and accurate. However, because this performance diminishes rapidly for larger values, gridlines that break the bars into more than a few sections are unlikely to be beneficial.

(3) Use pictographs for demanding tasks

When working memory is under load, the data in ISOTYPE visualizations is recalled more accurately than with simple bar charts. Presenting successive visualizations of different information (such as visualizing sales of different products or showing food preferences in different regions) may benefit from ISOTYPE. In spite of the additional visual complexity, the information is recalled more accurately.

(4) ISOTYPE engages readers

Visualizations rarely exist in isolation. They are often embedded among additional content such as text and other visualizations that compete for a user, reader, or viewer's attention. ISOTYPE visualizations offer a way through this assortment to engage with a potential viewer. People are inclined, at least initially, to direct their focus towards a visualization with pictographic data compared with a simple bar chart or text.

Study by Haroz et al., 2015. CHI.

Note: (2) Is likely due to **subitizing**: the perception of a small number of objects without the need to count or estimate; typically 4 or 5 objects are subitised. See https://en.wikipedia.org/wiki/Subitizing

Idiom: Venn diagram (or Set Diagram)

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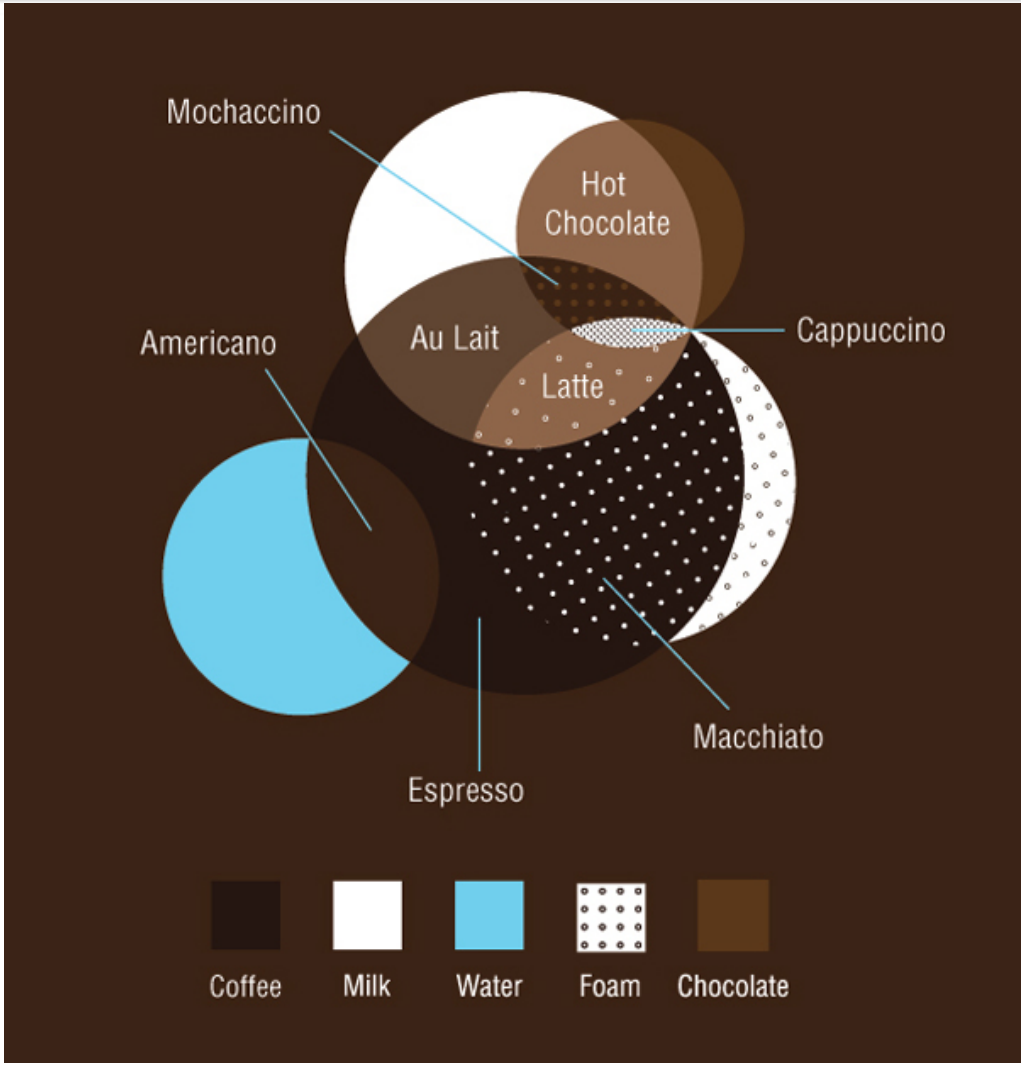
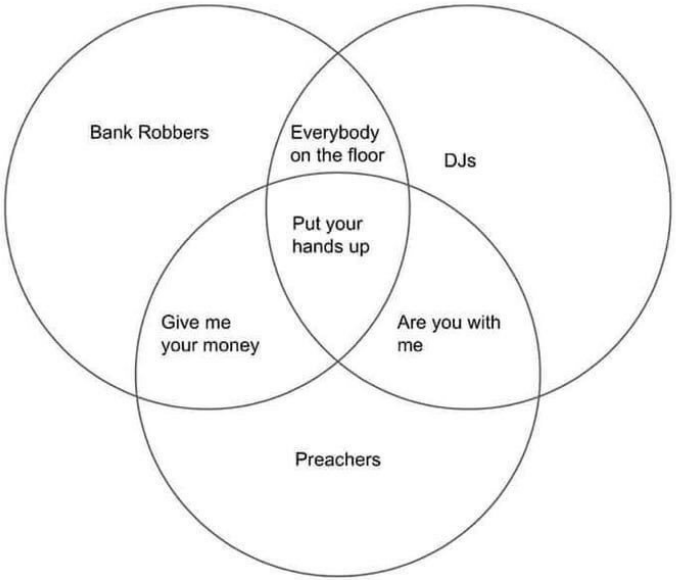
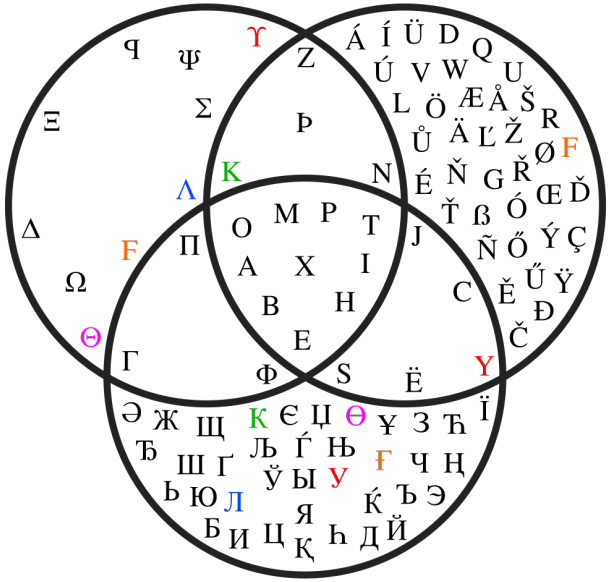
- What?
  - Logical relations among sets
- How?
  - Marks: overlapping circles.
  - Channels: position

Show set relationships, not quantities.



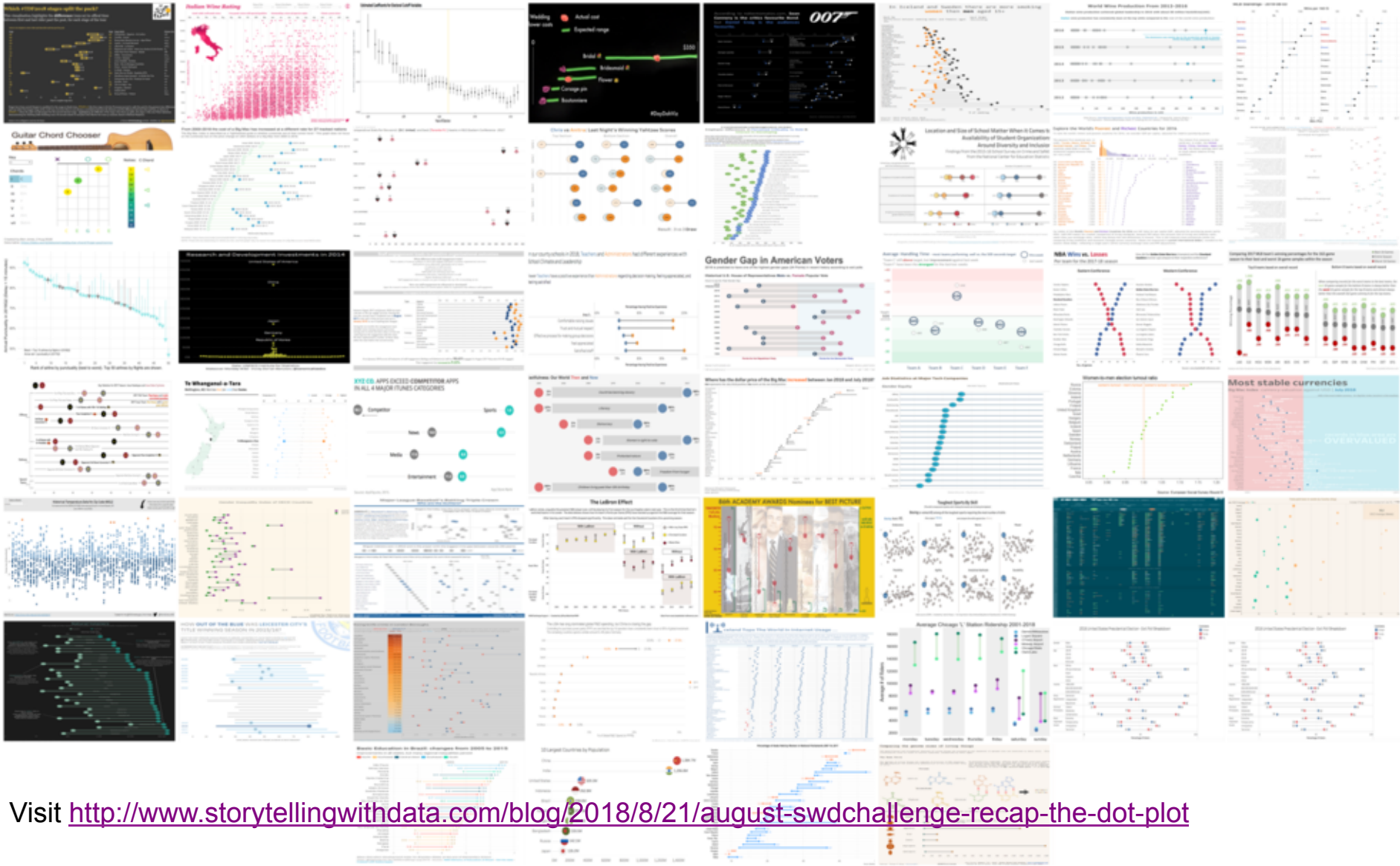
Idiom: Venn diagram (or Set Diagram)





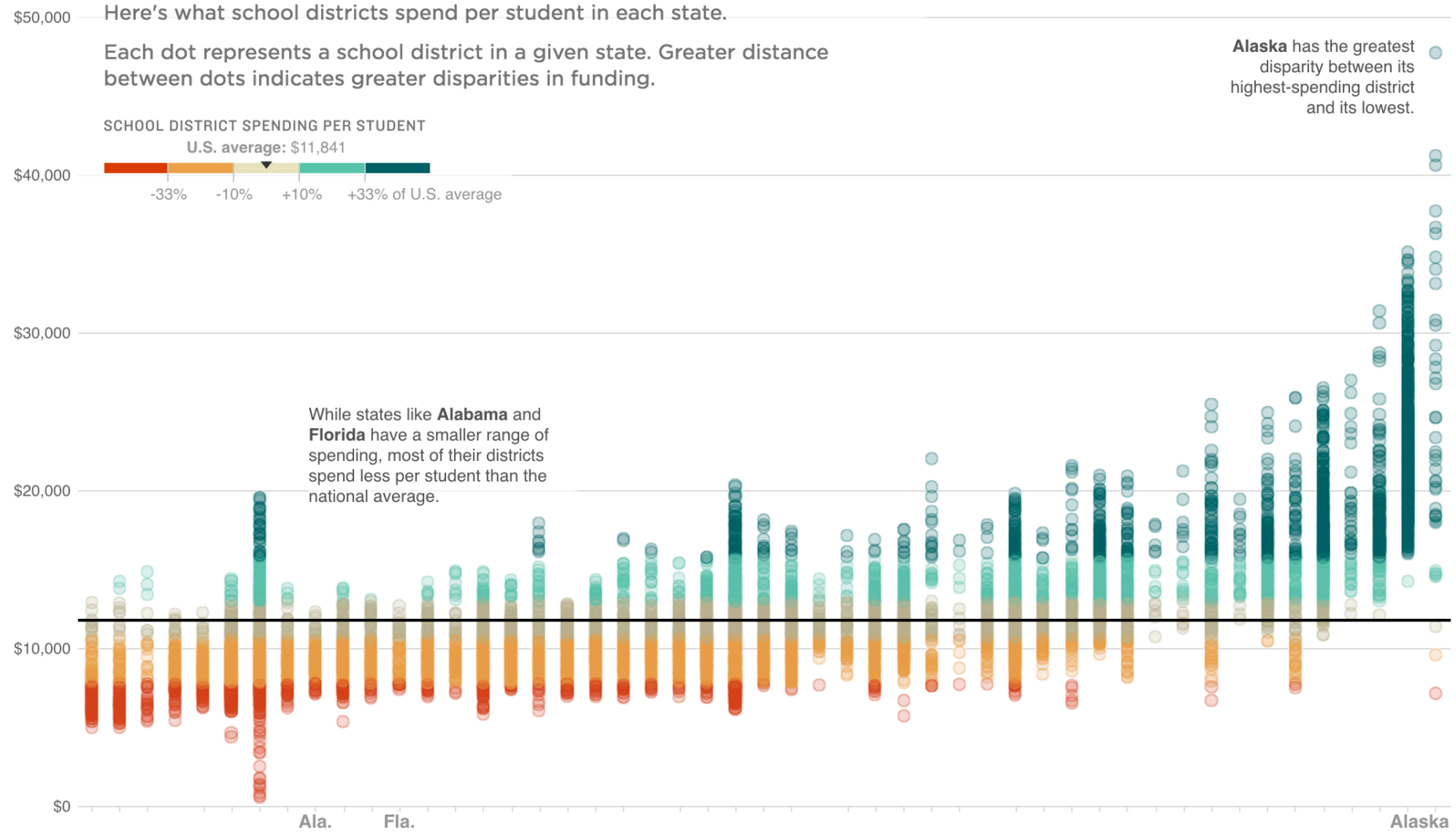
Uppercase letter glyphs shared by the Greek, Latin and Cyrillic alphabets.
Source: https://en.wikipedia.org/wiki/Venn_diagram

Idiom: dot plot



Visit http://www.storytellingwithdata.com/blog/2018/8/21/august-swdchallenge-recap-the-dot-plot

Idiom: dot plot



Notes

This Education Week analysis of federal and state data excludes extreme outliers as well as districts with fewer than 200 students. Hawaii and Washington, D.C., are excluded because each has only one school district.

Source: Education Week analysis of federal and state data.

Credit: Katie Park, Alyson Hurt and Lisa Charlotte Rost/NPR

https://www.npr.org/2016/05/01/476224759/is-there-a-better-way-to-pay-for-americas-schools

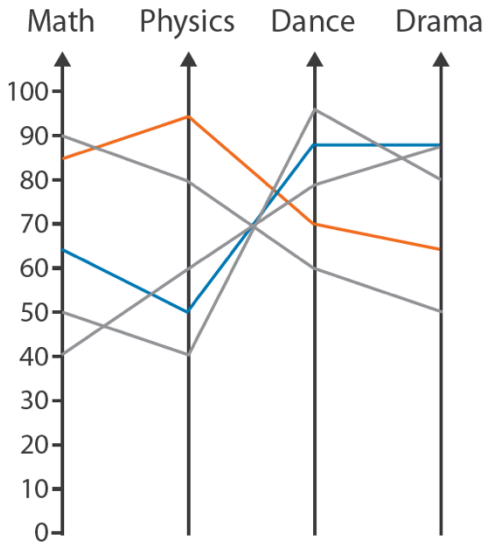
Idiom: parallel coordinates

- What?
  - Table of attributes
    - Works with quantitative, categorical, ordered, etc.
- Why?
  - Task: find correlation, trends, outliers.
- How?
  - One axis per attribute
    marks are one line per data item
    intersection with axis gives value.
  - Axes can use different units and scales.
  - Scalability:
    hundreds of items (interaction and clever rendering techniques can boost this)

Table

Math	Physics	Dance	Drama
85	95	70	65
90	80	60	50
65	50	90	90
50	40	95	80
40	60	80	90

Parallel Coordinates



VAD: pg. 163

Total rows: 428 Total columns: 15

Data Set: SASHelp.Cars

Rows 1-100

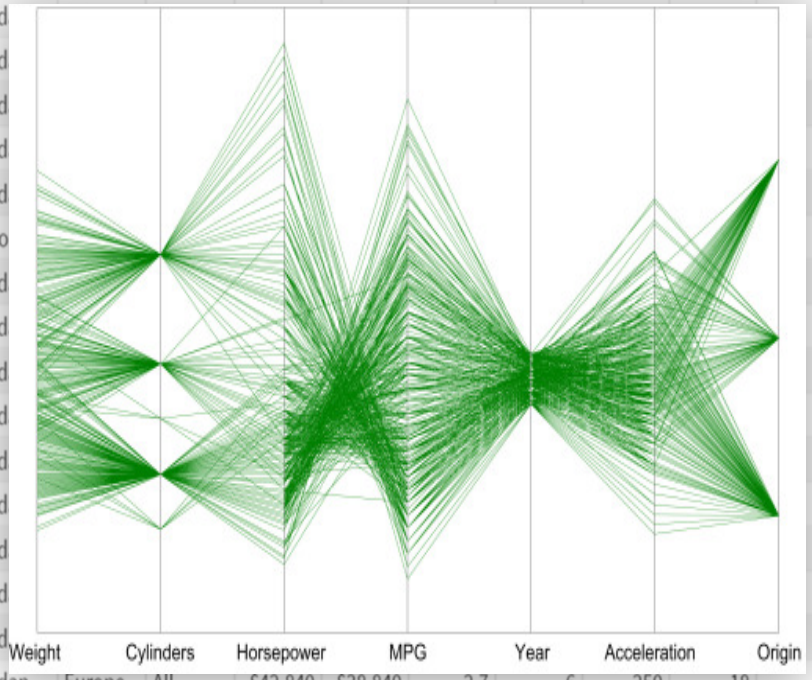
	Make	Model	Type	Origin	DriveT...	MSRP	Invoice	Engin...	Cylind...	Horse...	MPG_...	MPG_...	Weight	Wheel...	Leng...
1	Acura	MDX	SUV	Asia	All	$36,945	$33,337	3.5	6	265	17	23	4451	106	189
2	Acura	RSX Type	Sedan	Asia	Front	$23,820	$21,761	2	4	200	24	31	2778	101	172
3	Acura	TSX 4dr	Sedan	Asia	Front	$26,990	$24,647	2.4	4	200	22	29	3230	105	183
4	Acura	TL 4dr	Sedan	Asia	Front	$33,195	$30,299	3.2	6	270	20	28	3575	108	186
5	Acura	3.5 RL 4dr	Sedan	Asia	Front	$43,755	$39,014	3.5	6	225	18	24	3880	115	197
6	Acura	3.5 RL w/I	Sedan	Asia	Front	$46,100	$41,100	3.5	6	225	18	24	3893	115	197
7	Acura	NSX coup	Sports	Asia	Rear	$89,765	$79,978	3.2	6	290	17	24	3153	100	174
8	Audi	A4 1.8T 4d	Sedan	Europe	Front	$25,940	$23,508	1.8	4	170	22	31	3252	104	179
9	Audi	A41.8T co	Sedan	Europe	Front	$35,940	$32,506	1.8	4	170	23	30	3638	105	180
10	Audi	A4 3.0 4dr	Sedan	Europe	Front	$31,840	$28,846	3	6	220	20	28	3462	104	179
11	Audi	A4 3.0 Qu	Sedan	Europe	All	$33,430	$30,366	3	6	220	17	26	3583	104	179
12	Audi	A4 3.0 Qu	Sedan	Europe	All	$34,480	$31,388	3	6	220	18	25	3627	104	179
13	Audi	A6 3.0 4dr	Sedan	Europe	Front	$36,640	$33,129	3	6	220	20	27	3561	109	192
14	Audi	A6 3.0 Qu	Sedan	Europe	All	$39,640	$35,992	3	6	220	18	25	3880	109	192
15	Audi	A4 3.0 cor	Sedan	Europe	Front	$42,490	$38,325	3	6	220	20	27	3814	105	180
16	Audi	A4 3.0 Qu	Sedan	Europe	All	$44,240	$40,075	3	6	220	18	25	4013	105	180
17	Audi	A6 2.7 Tur	Sedan	Europe	All	$42,840	$38,840	2.7	6	250	18	25	3836	109	192
18	Audi	A6 4.2 Qu	Sedan	Europe	All	$49,690	$44,936	4.2	8	300	17	24	4024	109	193

Total rows: 428 Total columns: 15

Data Set: SASHelp.Cars

Rows 1-100

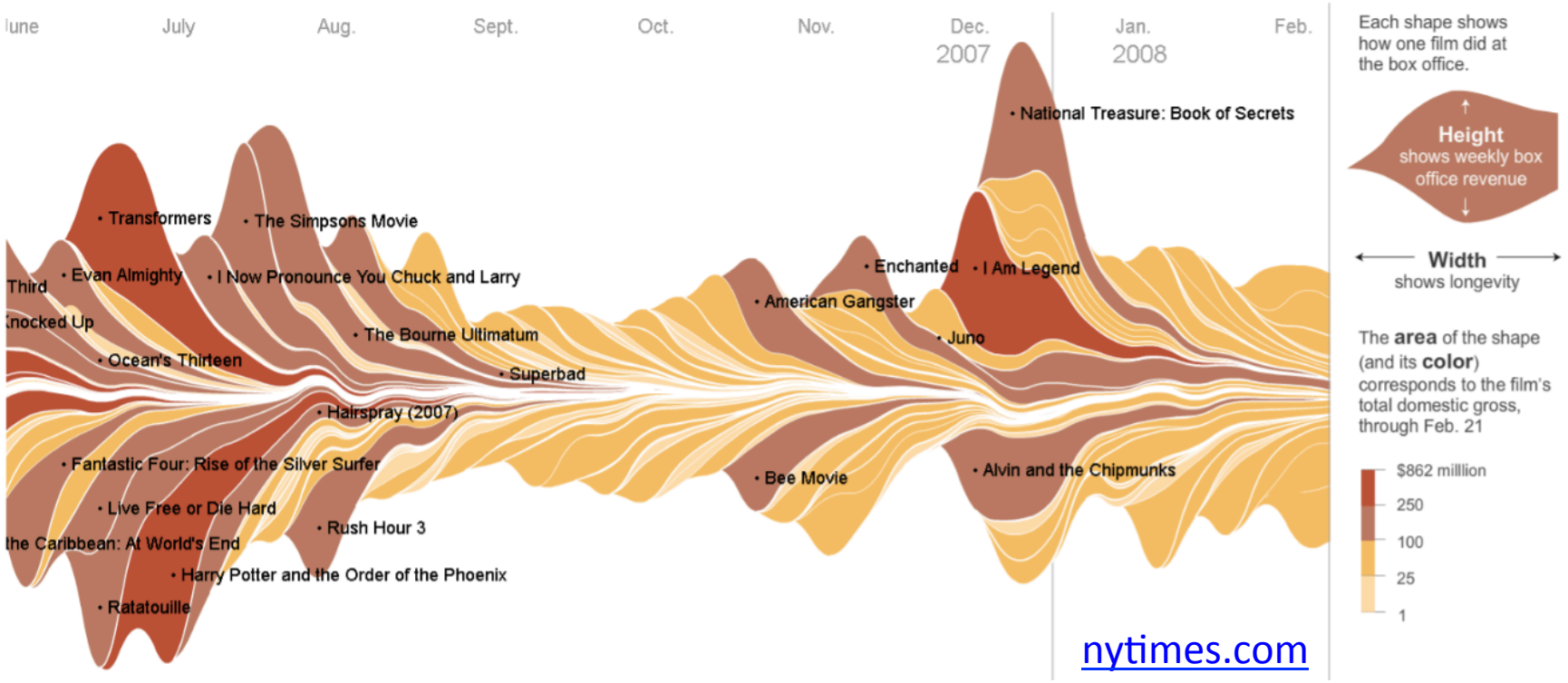
	Make	Model	Type	Origin	DriveT...	MSRP	Invoice	Engin...	Cylind...	Horse...	MPG_...	MPG_...	Weight	Wheel...	Leng...
1	Acura	MDX	SUV	Asia	All	$36,945	$33,337	3.5	6	265	17	23	4451	106	189
2	Acura	RSX Type	Sed									31	2778	101	172
3	Acura	TSX 4dr	Sed									29	3230	105	183
4	Acura	TL 4dr	Sed									28	3575	108	186
5	Acura	3.5 RL 4dr	Sed									24	3880	115	197
6	Acura	3.5 RL w/I	Sed									24	3893	115	197
7	Acura	NSX coup	Spo									24	3153	100	174
8	Audi	A4 1.8T 4d	Sed									31	3252	104	179
9	Audi	A41.8T co	Sed									30	3638	105	180
10	Audi	A4 3.0 4dr	Sed									28	3462	104	179
11	Audi	A4 3.0 Qu	Sed									26	3583	104	179
12	Audi	A4 3.0 Qu	Sed									25	3627	104	179
13	Audi	A6 3.0 4dr	Sed									27	3561	109	192
14	Audi	A6 3.0 Qu	Sed									25	3880	109	192
15	Audi	A4 3.0 cor	Sed									27	3814	105	180
16	Audi	A4 3.0 Qu	Sed									25	4013	105	180
17	Audi	A6 2.7 Tur	Sedan	Europe	All	$42,840	$38,840	2.7	6	250	18	25	3836	109	192
18	Audi	A6 4.2 Qu	Sedan	Europe	All	$49,690	$44,936	4.2	8	300	17	24	4024	109	193



Idiom: streamgraph: a variation of area graphs

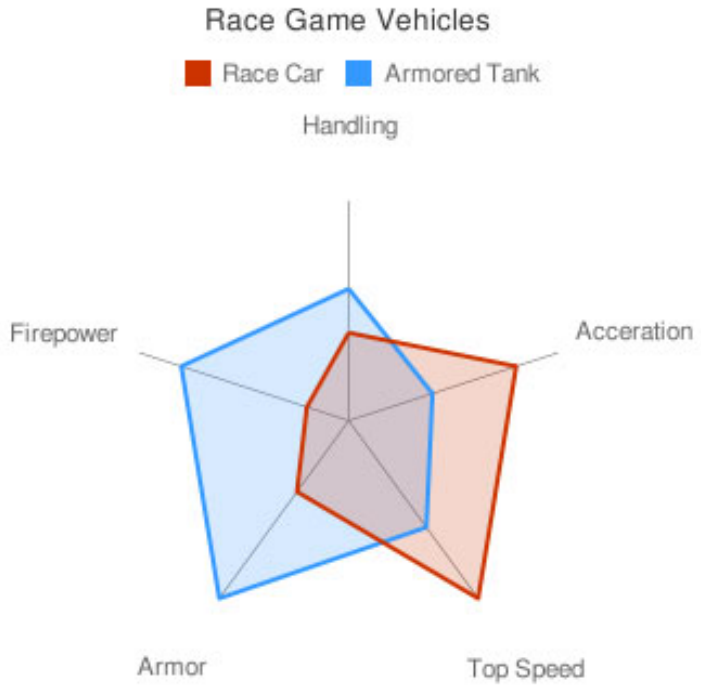
- What?
  - Data:
    - 1 categ key attrib (movie)
    - 1 ordered key attrib (time)
    - 1 quant value attrib (revenue)

Source: Stacked Graphs Geometry & Aesthetics. Byron and Wattenberg.
IEEE Trans. Visualization and Computer Graphics, 14(6): 1245–1252, (2008).



Idiom: Radar chart

- What?
  - Table (multiple attributes)
- How?
  - Marks: lines on radial axes.
  - Channels: hue

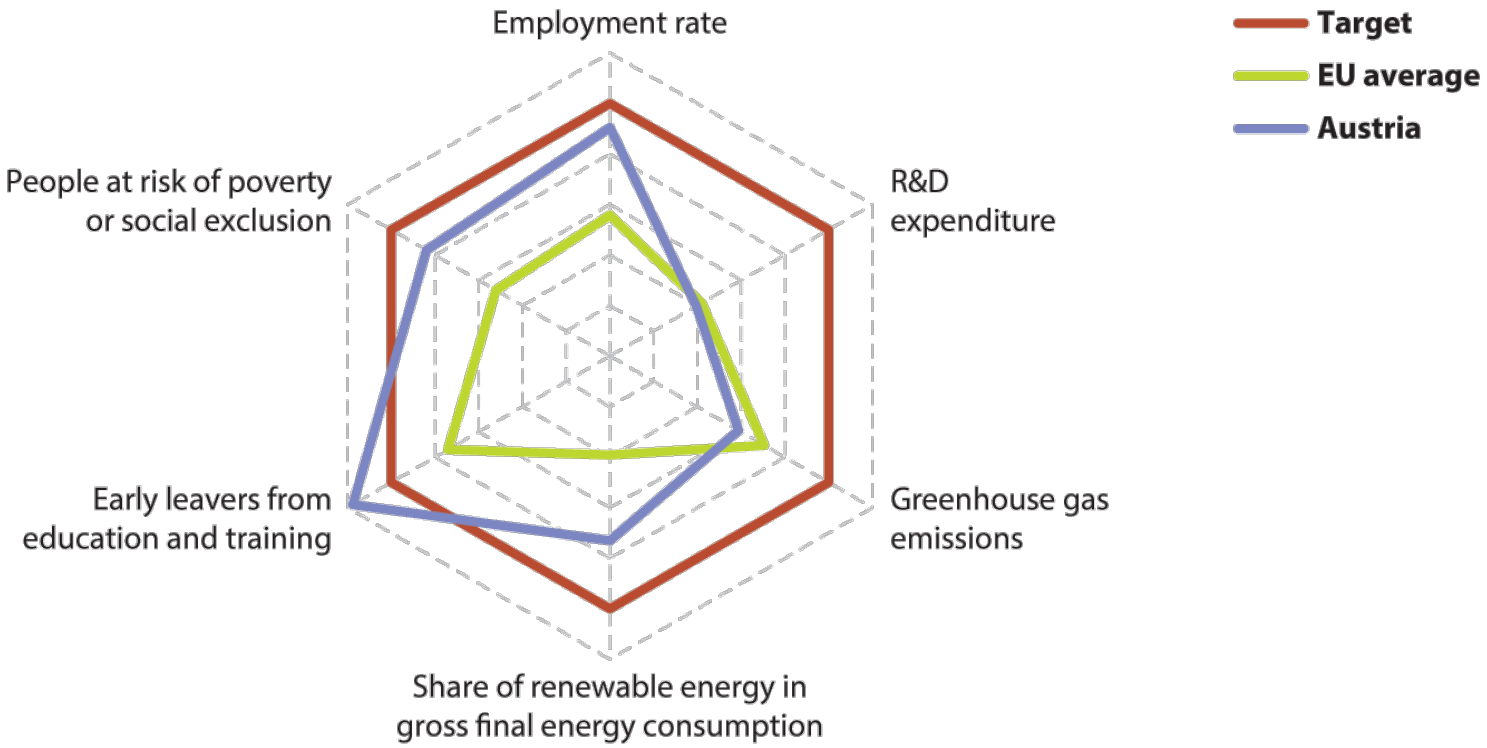


Relative position and order of axes often unrelated.

Alternative names: web chart, spider chart, star plot, cobweb, polar chart.

Like parallel coordinates but with polar arrangement.

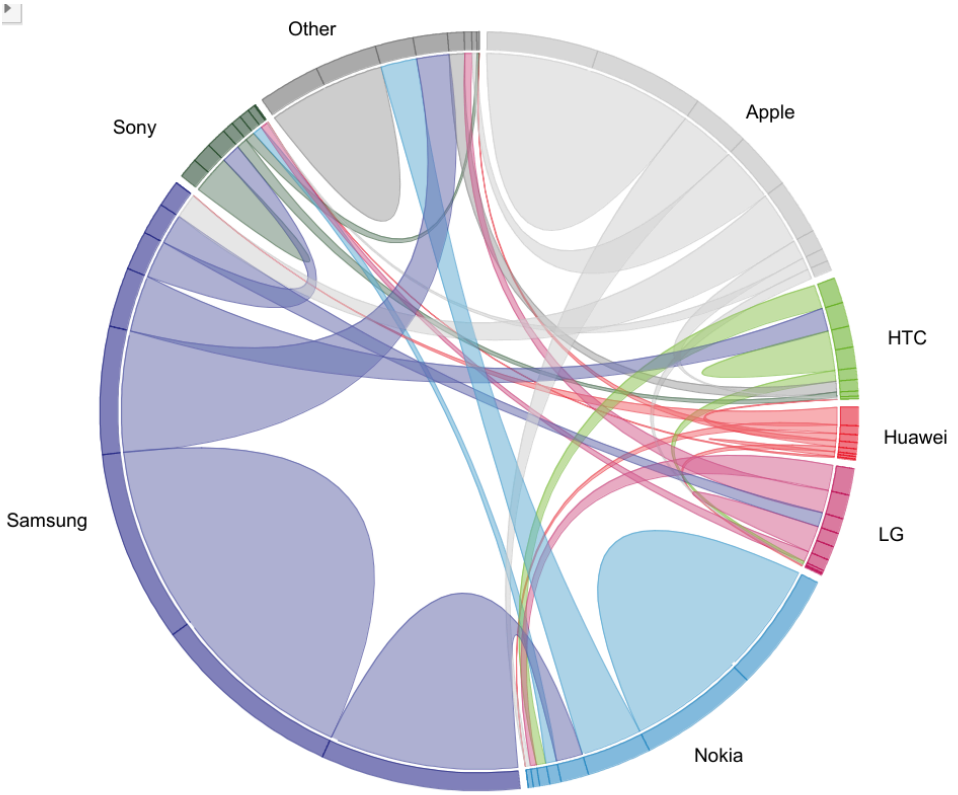
Idiom: Radar chart



Idiom: Chord Diagram

MONASH University

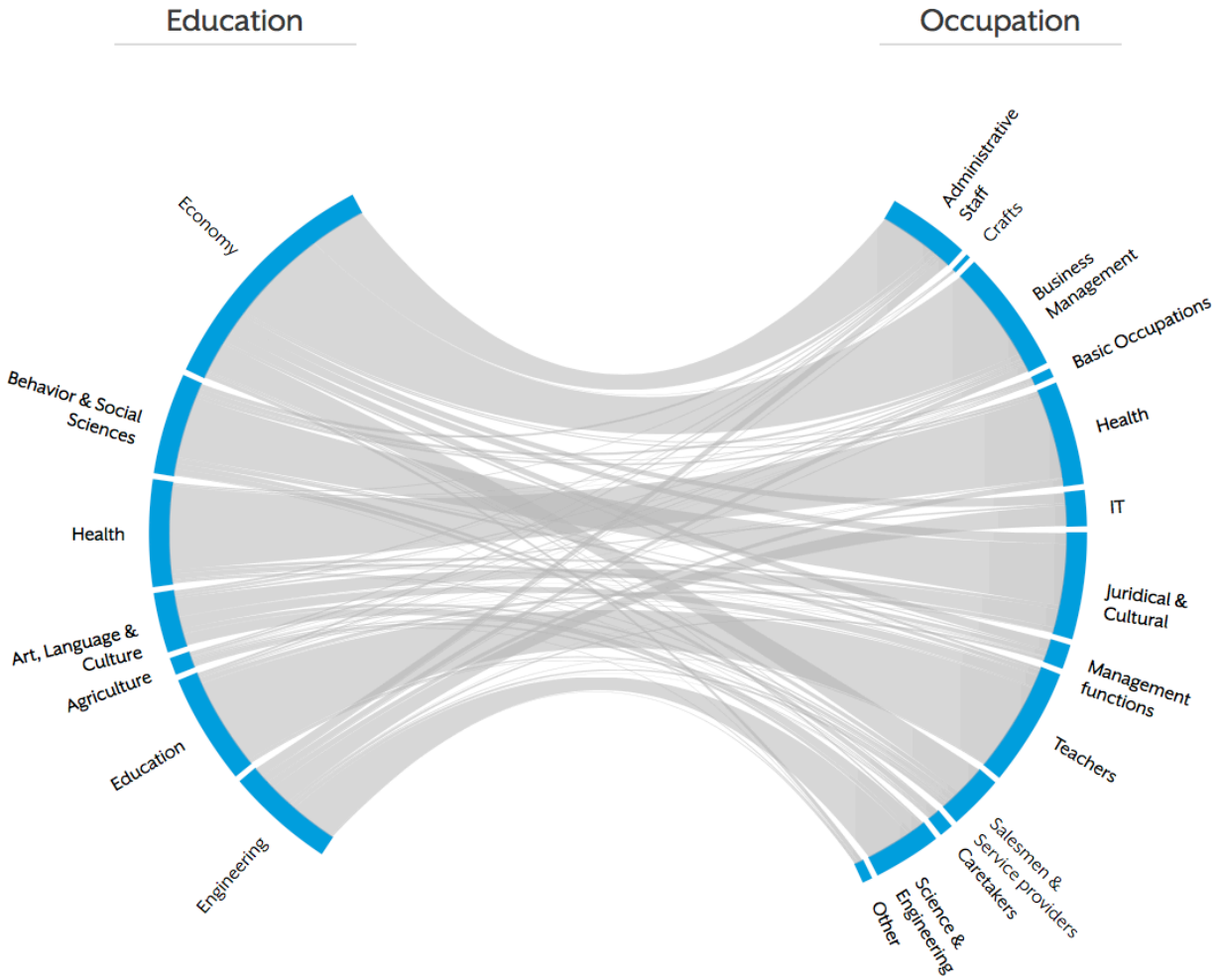
- What?
  - Network, edges can be quantitative
- How?
  - Marks: proportional curved lines (edges) and areas for nodes along the circle.
  - Channels: size, hue
  - Clutter can become a problem; use line bundling.



https://public.tableau.com/profile/nsalvate#!/vizhome/PhoneChord/ChordDiagramBarChart

Chord diagram in in Tableau:
http://www.datablick.com/blog/2015/08/27/diy-chord-diagrams-in-tableau-by-noah-salvaterra

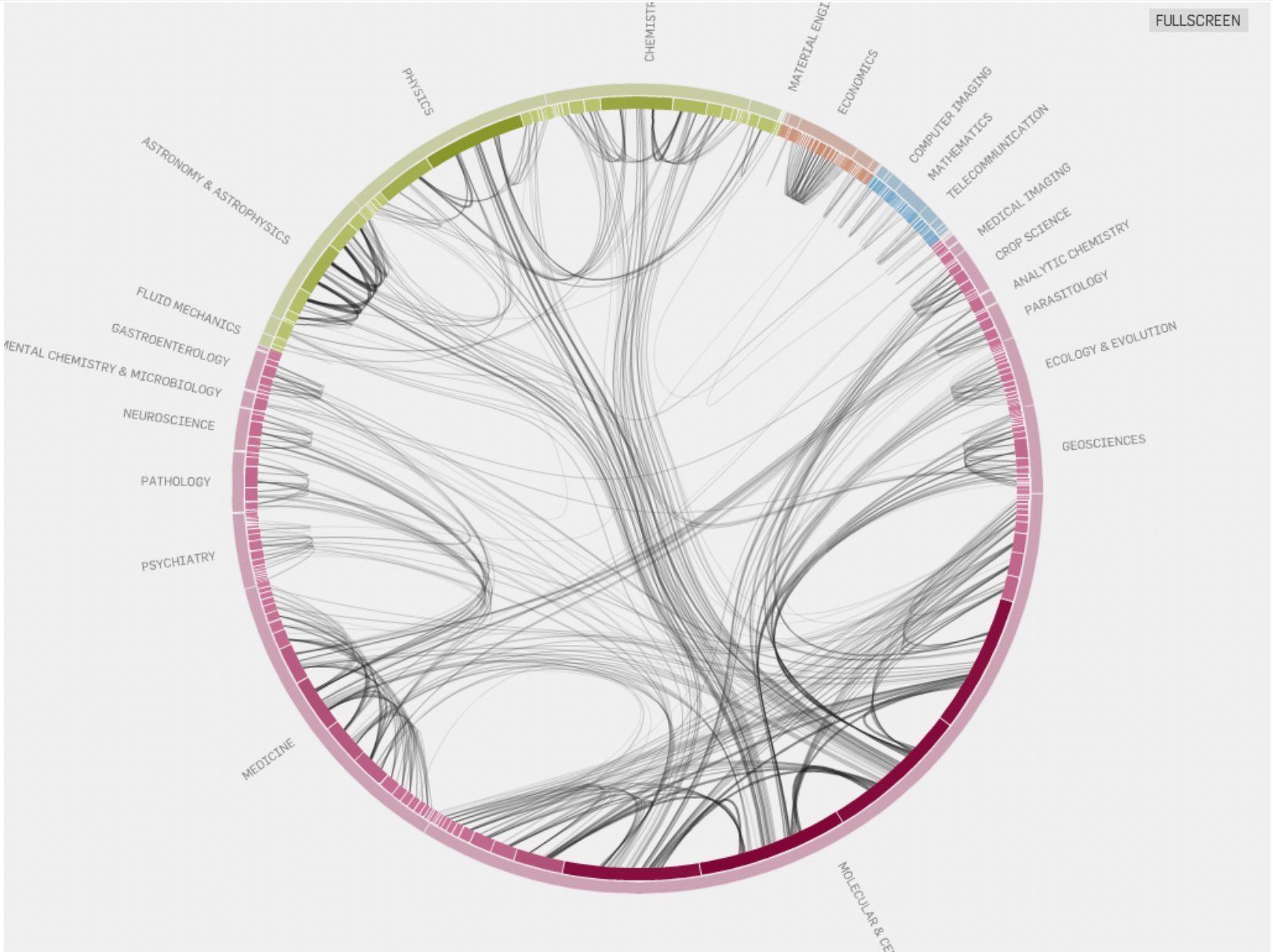
Idiom: Chord Diagram



https://www.visualcinnamon.com/2015/08/stretched-chord.html

Idiom: Chord Diagram with Bundling

MONASH University

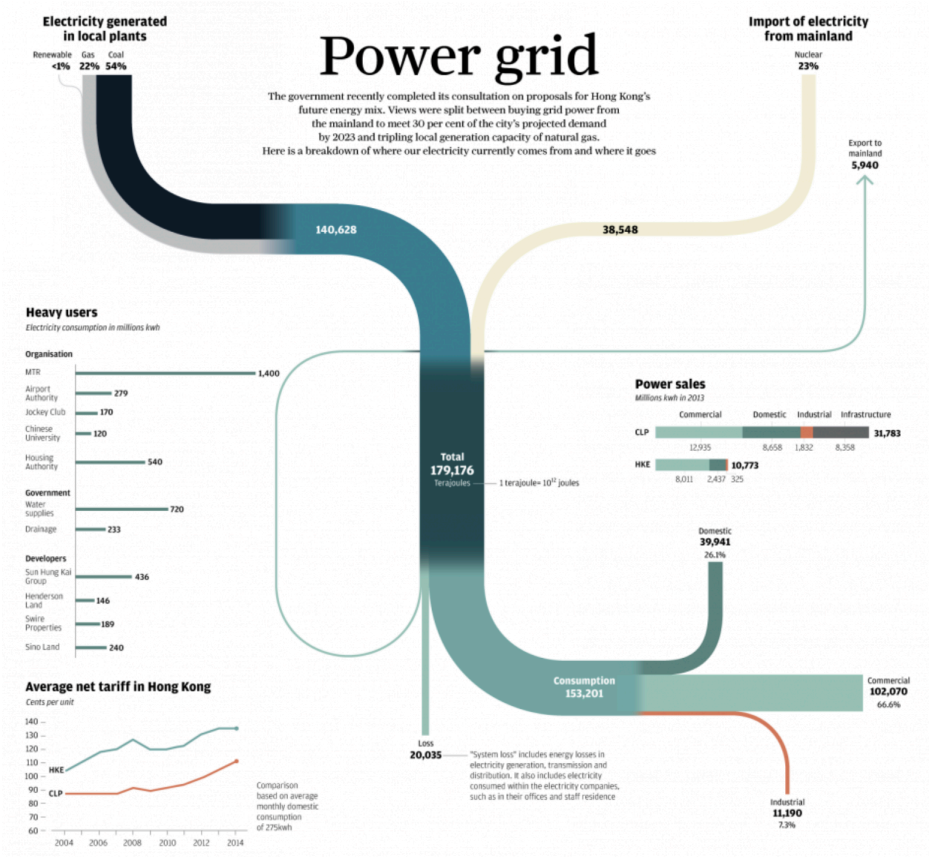


Idiom: Sankey

- What?
  - Flows in a network
- How?
  - Marks: proportional lines for edges, sometimes arrows.
  - Channels: size

Like flow maps but without geospatial reference.

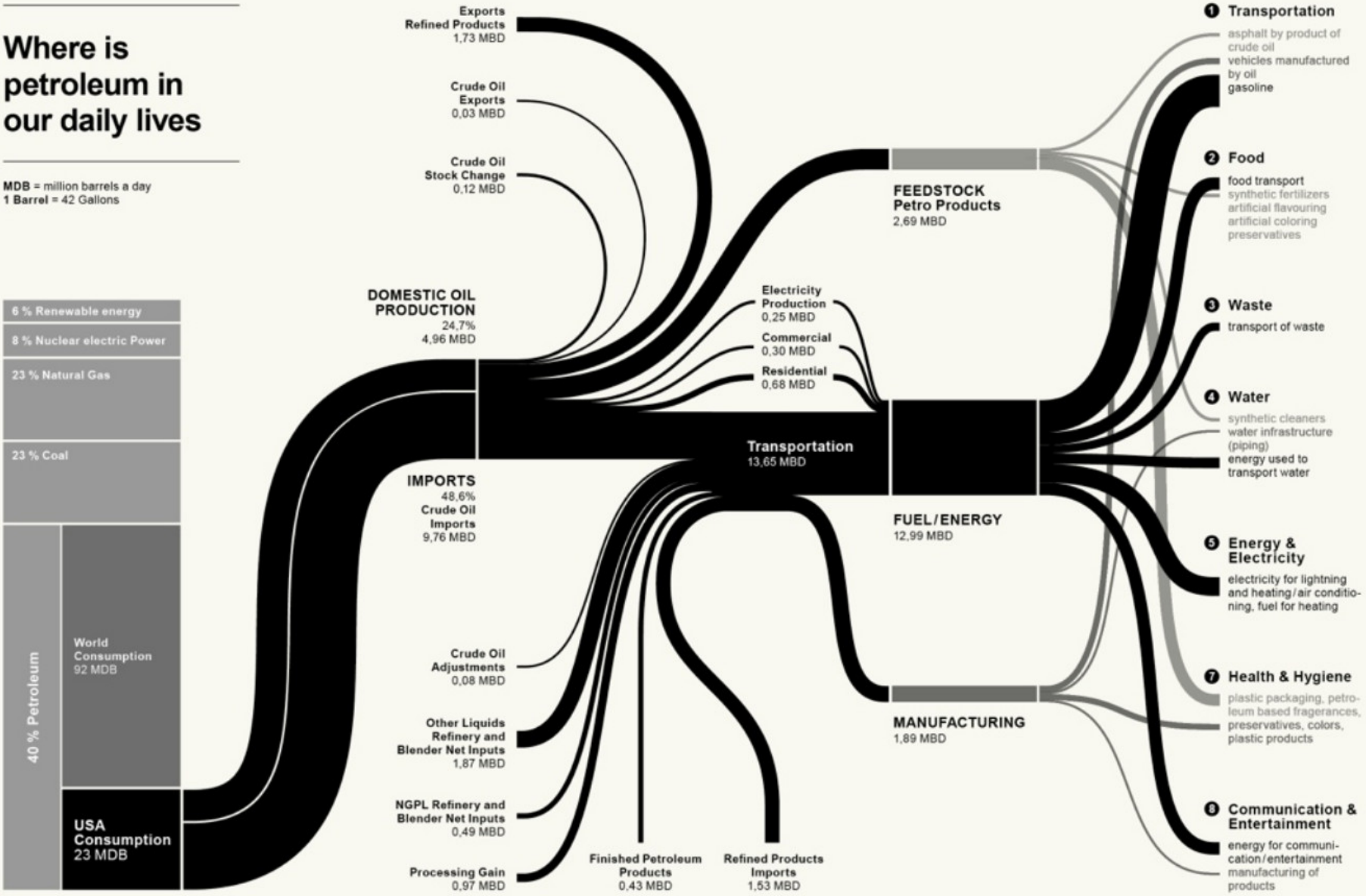
Flows split and merge.



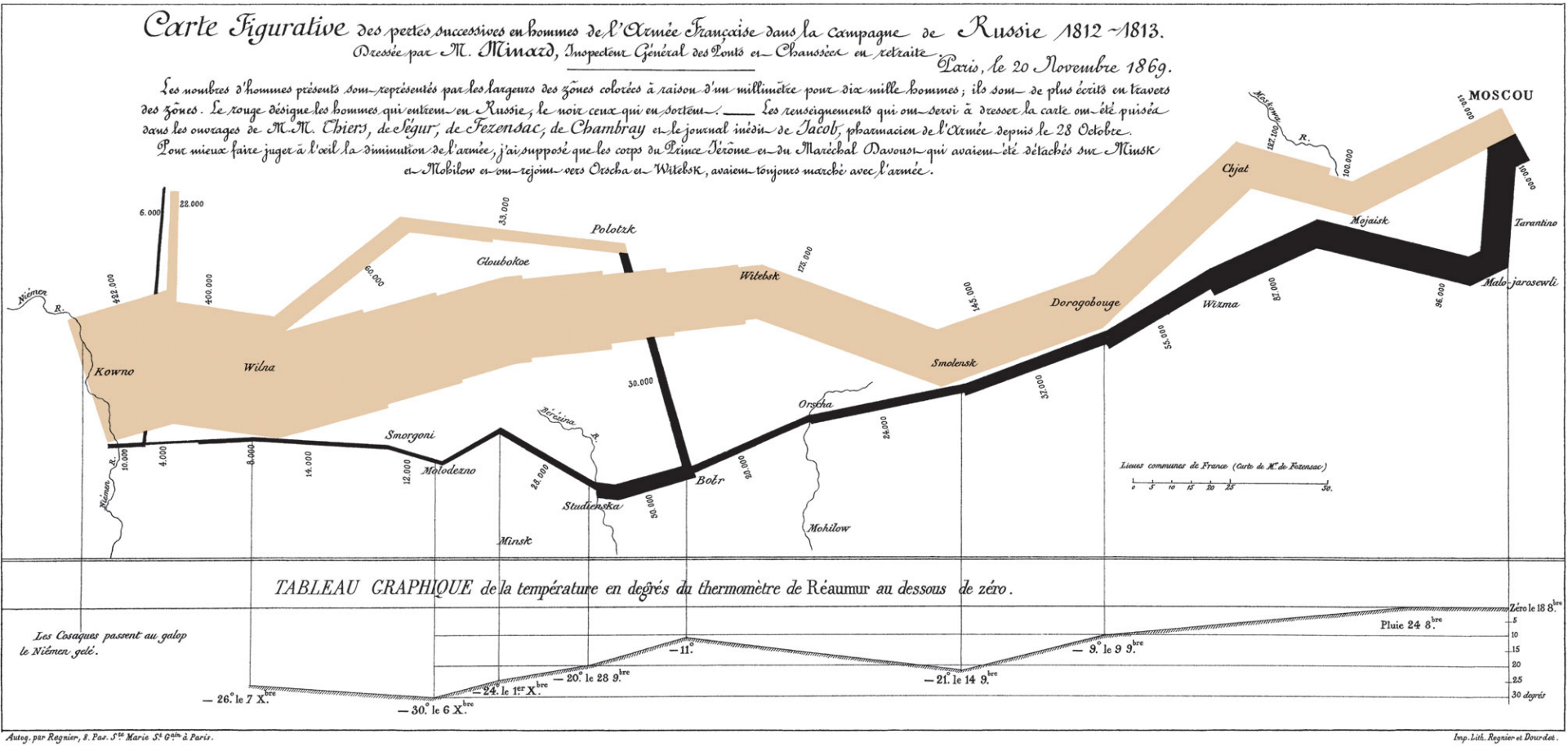
Sankey diagram in in Tableau: https://www.youtube.com/watch?v=1HwCzlA9hI4

Idiom: Sankey

MONASH University



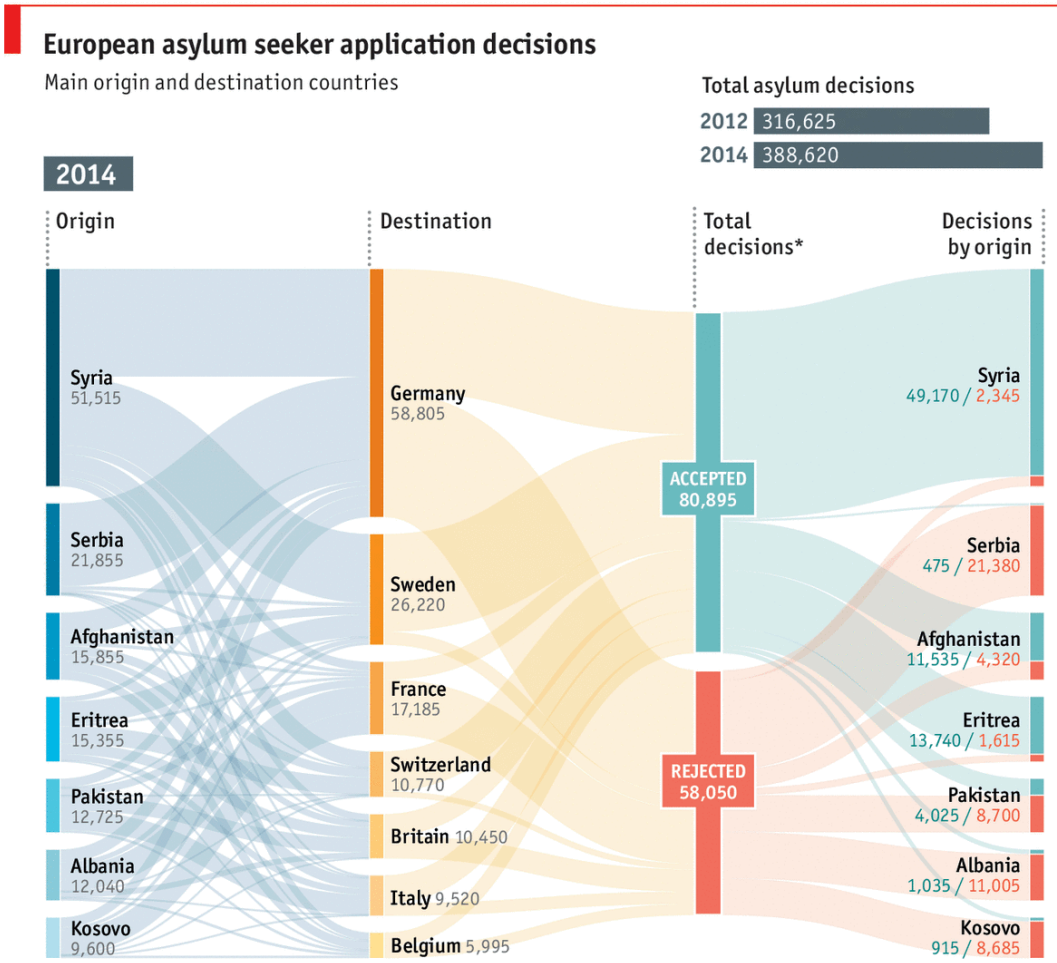
Idiom: A spatial Sankey diagram = flow map



Idiom: Alluvial diagram

- What?
  - Flows in a network
- How?
  - Marks: proportional lines for edges, nodes arranged along vertical lines.
  - Channels: size

Like Sankey, but more rigid layout.



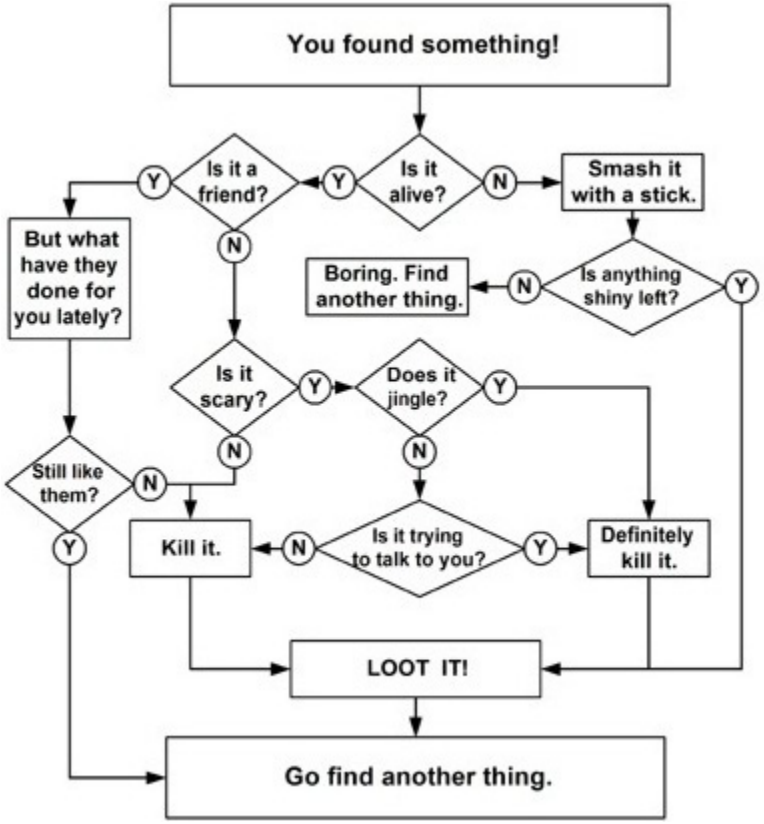
Alluvial diagram in in Tableau:
https://community.tableau.com/thread/152115

Idiom: Network Diagram

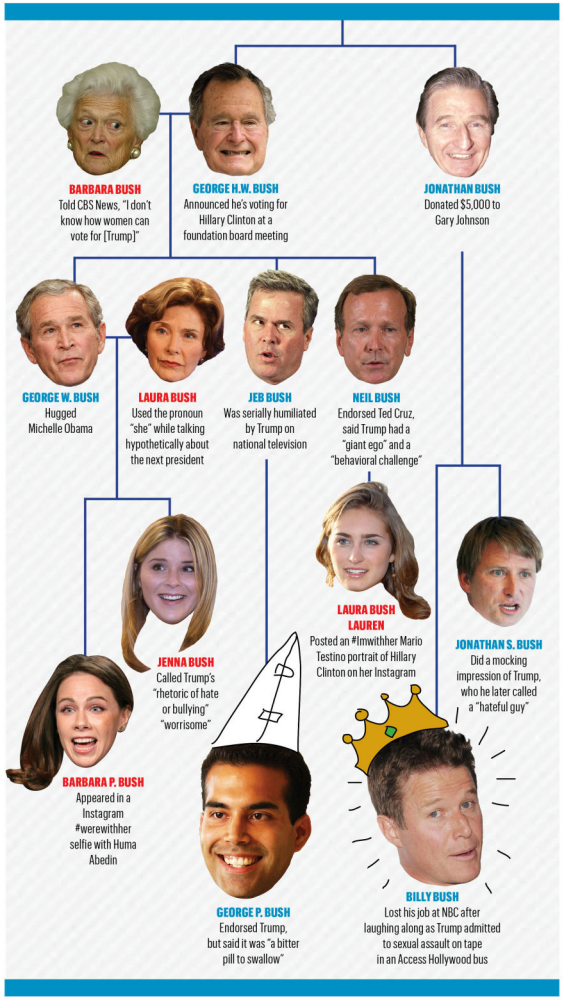
- What?
  - Network with attributes
- How?
  - Marks: lines for edges, points/areas for nodes
  - Channels: colour, size (line width and point size), shape

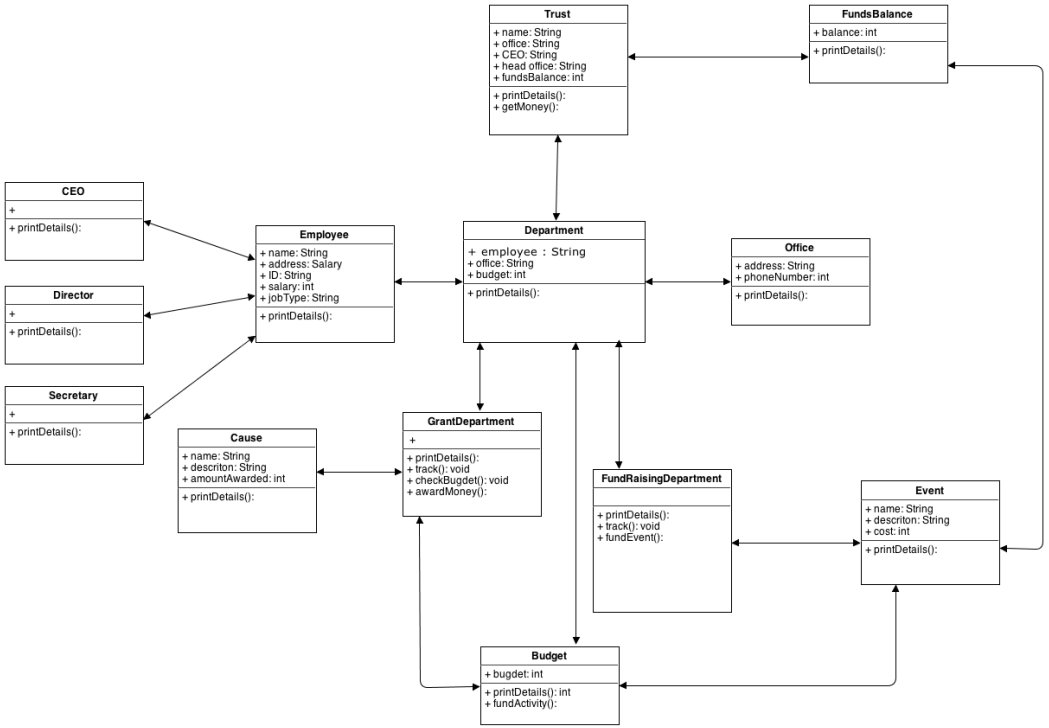
Family-tree, flow-charts, node-link diagram, UML diagram, etc.

Show relations among discrete entities.



Network Diagrams





Idiom: Graph Drawing for Network Diagram

MONASH University

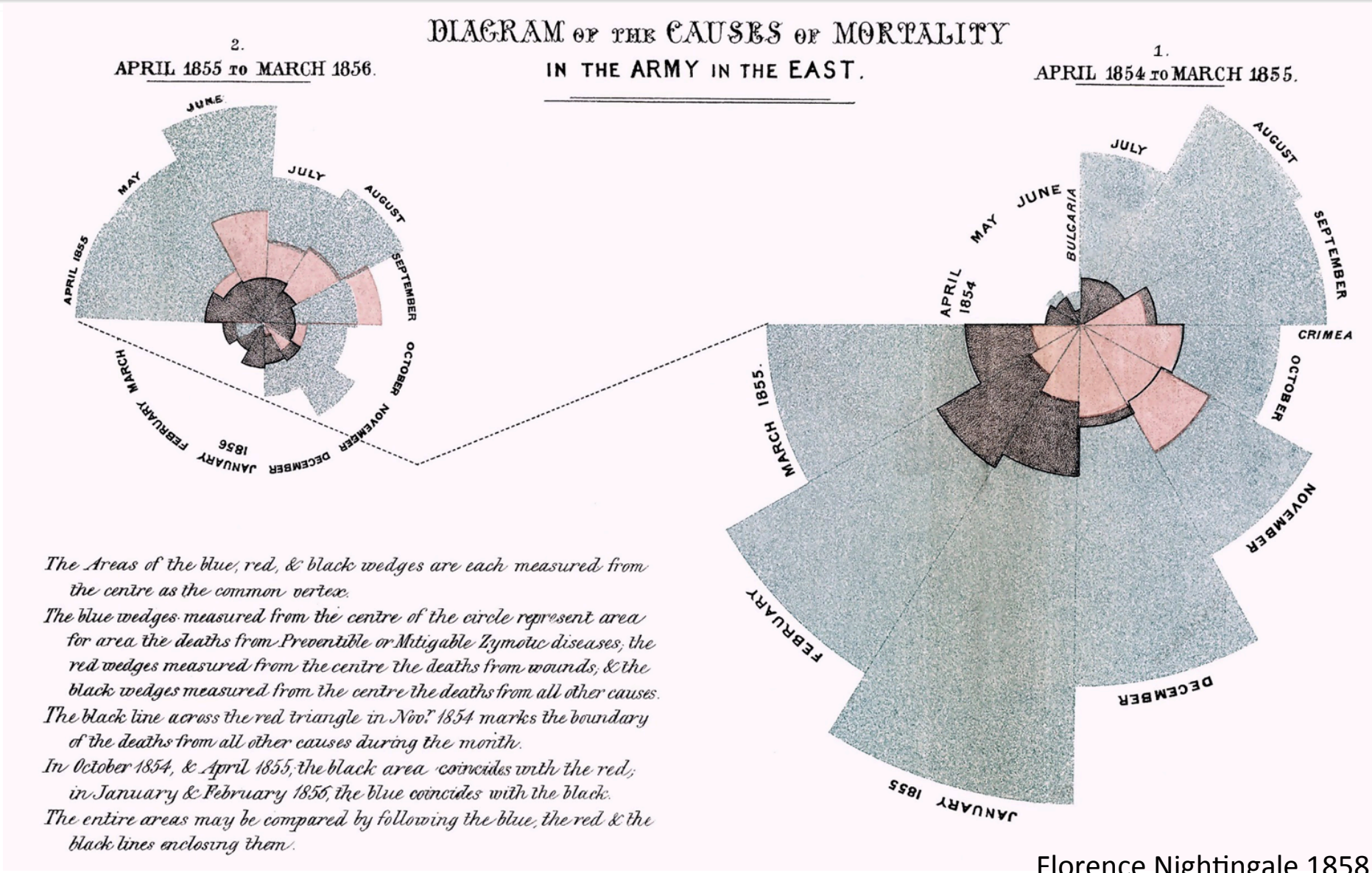
- What?
  - Network with attributes
- How?
  - Marks: lines for edges, points for nodes
  - Channels: colour, size (line width and point size)

Graph drawing: methods for arranging nodes and edges to depict a graph/network.

Very different layouts possible.

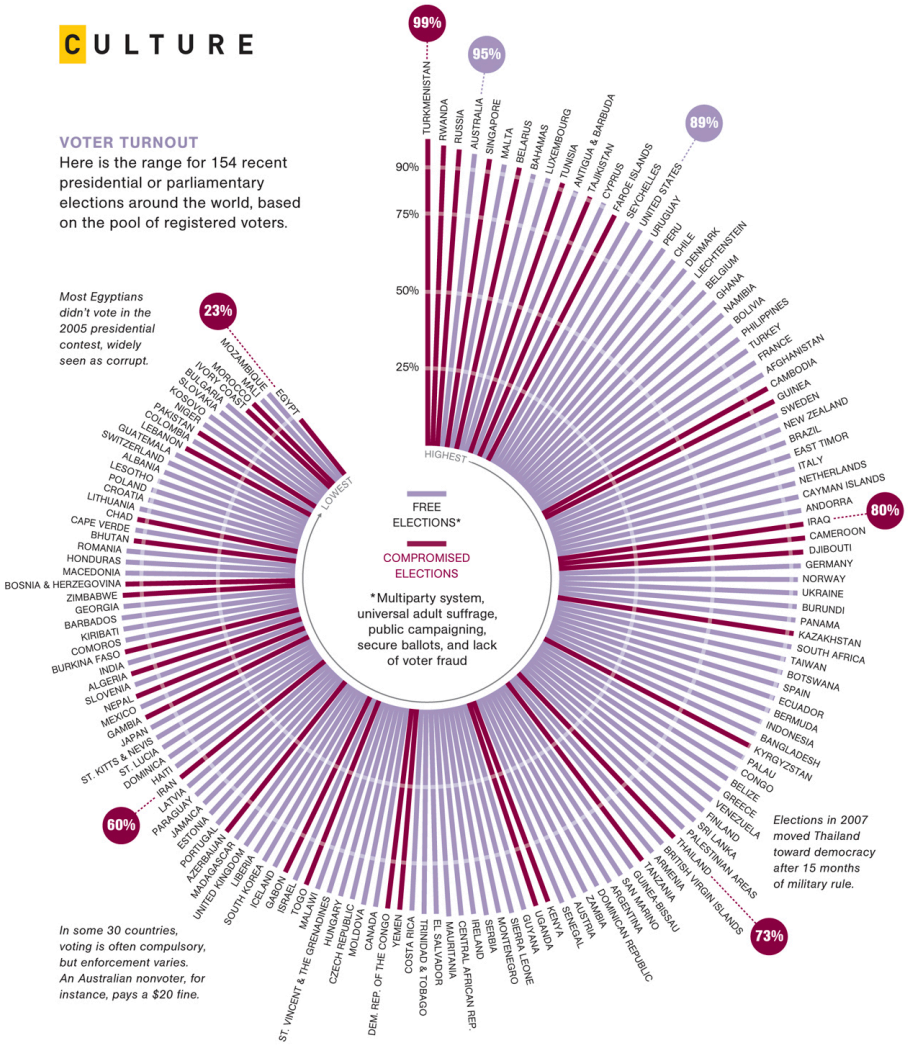
An important class: force-based layout methods. Repulsing and attracting forces between nodes and edges.

Idiom: Polar area chart – a variation of the pie chart
Also called Nightingale rose chart or coxcomb chart.



Florence Nightingale 1858

Idiom: Polar bar chart

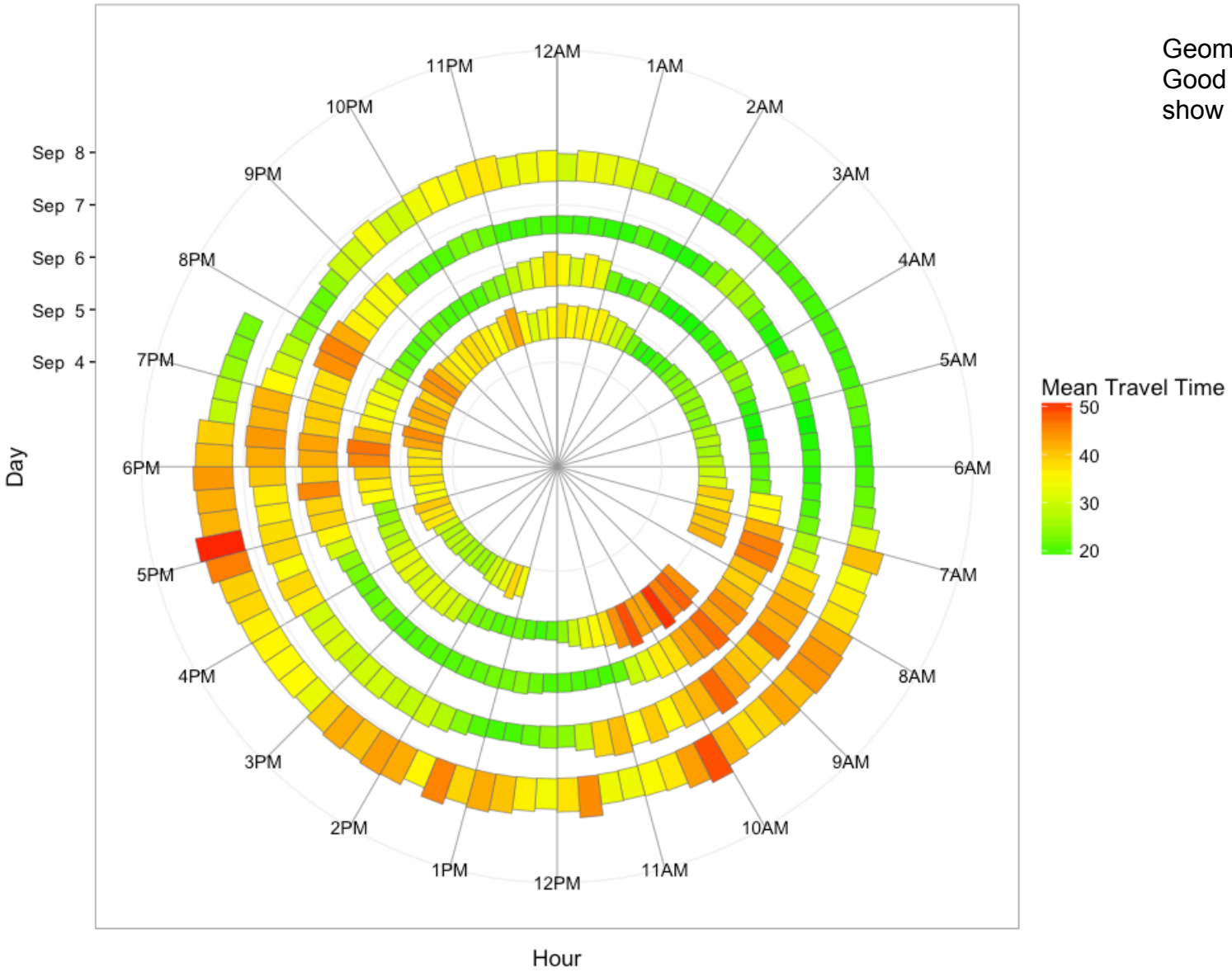


Electoral Collage

Voter turnout turns out to be a tricky topic. Turkmenistan and Rwanda are the leaders, but recent elections have been widely criticized. Australians must go to the polls or face a fine; they sometimes respond by casting blank ballots. And even though the 2004 U.S. presidential race had the best turnout since 1968, Americans are often seen as apathetic. For years U.S. turnout seemed to be plummeting toward the 50 percent mark, says political scientist Michael McDonald. The reason is that the entire voting age population was surveyed; booming immigration after 1970 created a big population that could not vote. Turnout of eligible U.S. voters has been fairly steady—and could be the greatest in a century this month. When interest is high, notes Rafael López-Pintor of the International Foundation for Electoral Systems, turnout soars. *—Shelley Sperry*

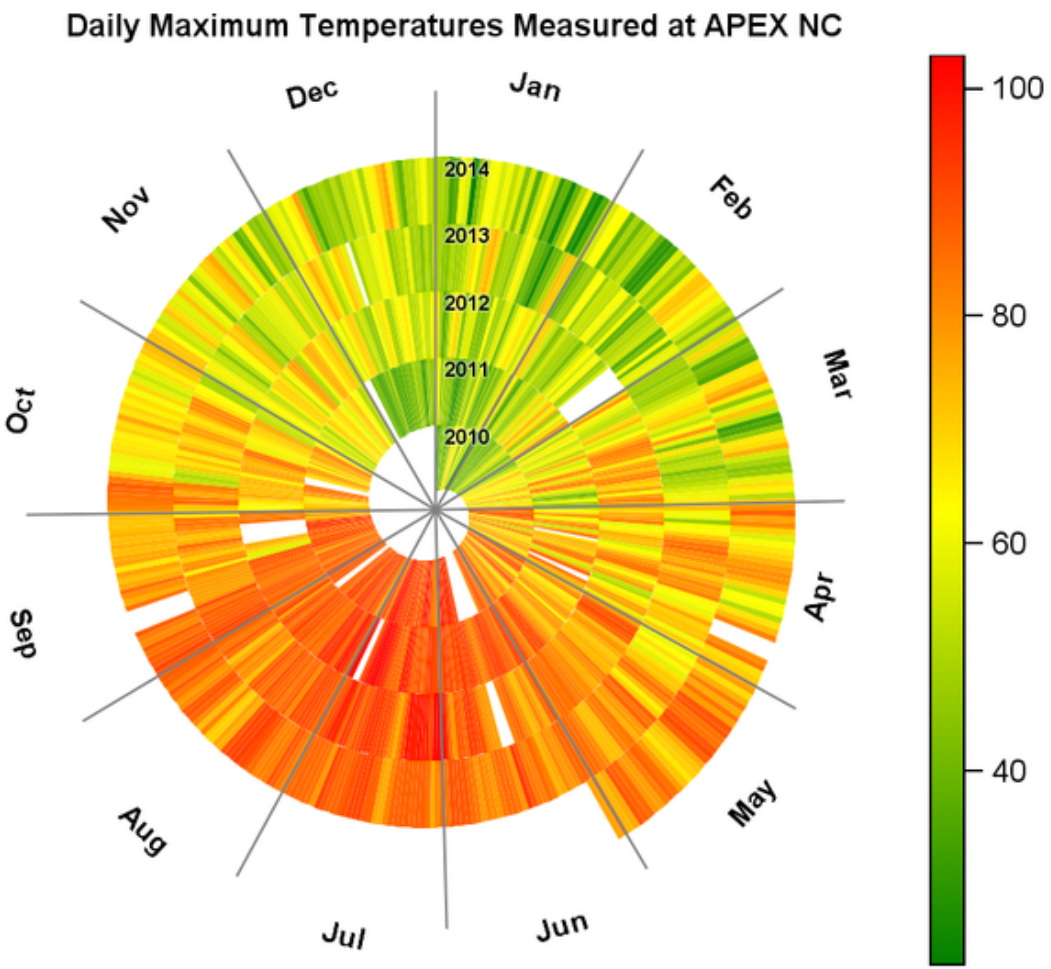
GRAPHIC: SEAN MCNAUGHTON, NG STAFF. SOURCES: INTERNATIONAL FOUNDATION FOR ELECTORAL SYSTEMS; FREEDOM HOUSE; INTERNATIONAL INSTITUTE FOR DEMOCRACY AND ELECTORAL ASSISTANCE

Idiom: Spiral plot



Geometry: Archimedean spiral. Good for large datasets to show cyclic patterns.

Idiom: Spiral plot

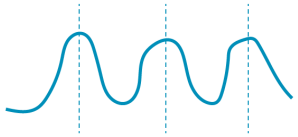


Geometry: Archimedean spiral. Good for large datasets to show cyclic patterns.

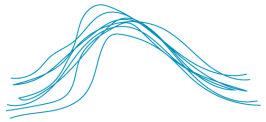
Other techniques for repeating things

Source: Nathan Yau
[Visualizing Patterns on Repeat: For when the same things keep happening over and over again.]

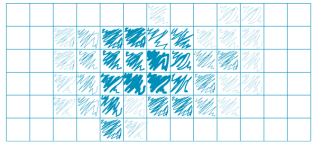
Annotation



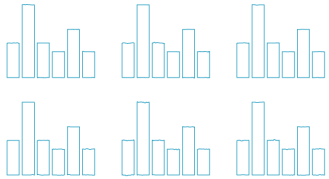
Overlaying time scales



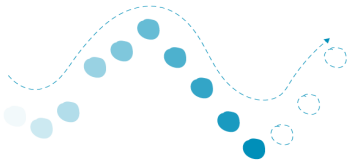
Aggregation



Small multiples

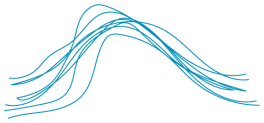


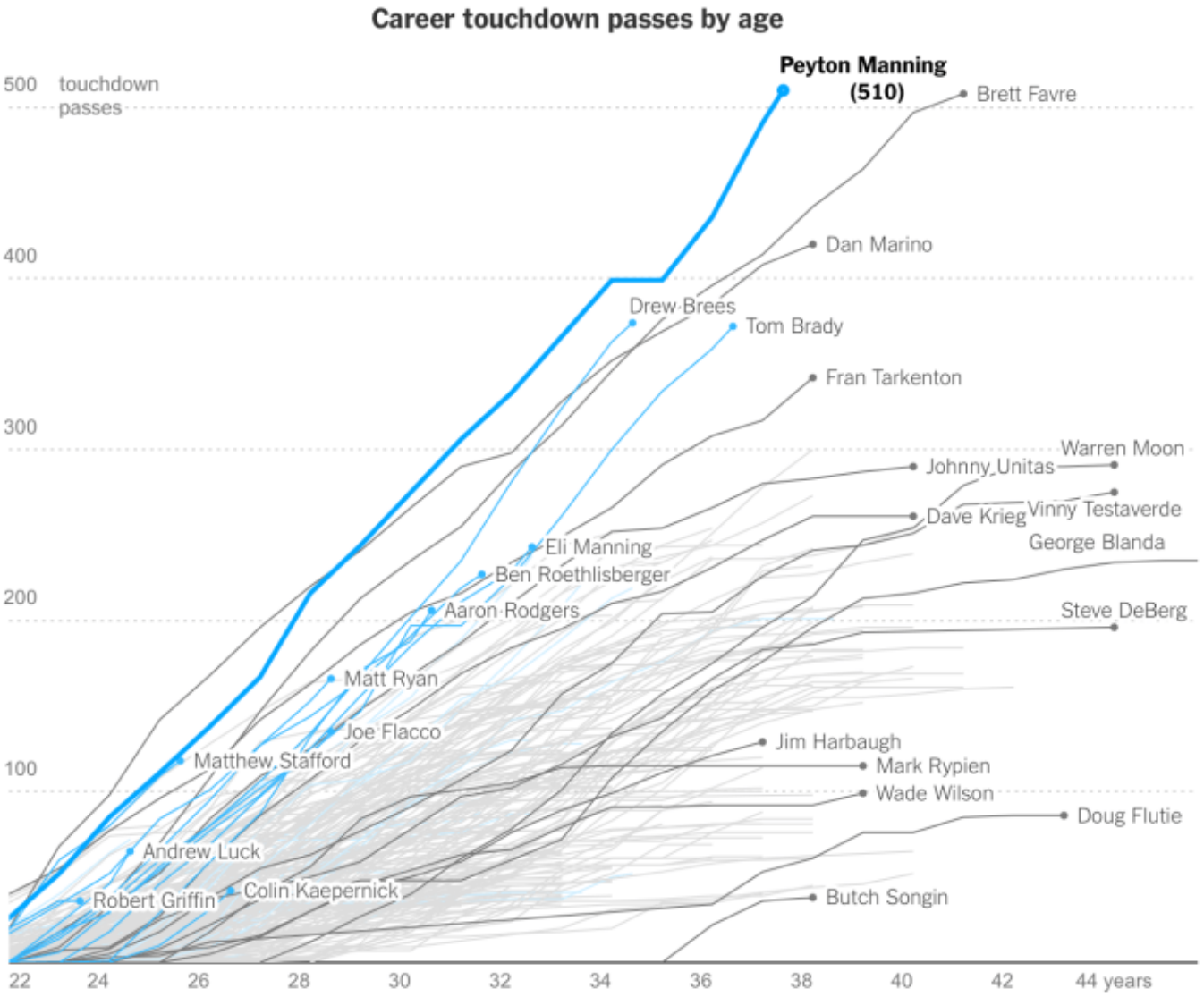
Animation



Overlaying time frames

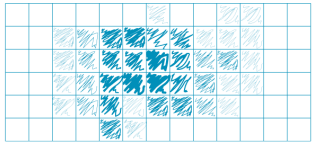
Source: Nathan Yau
[Visualizing Patterns on Repeat: For when the same things keep happening over and over again.]

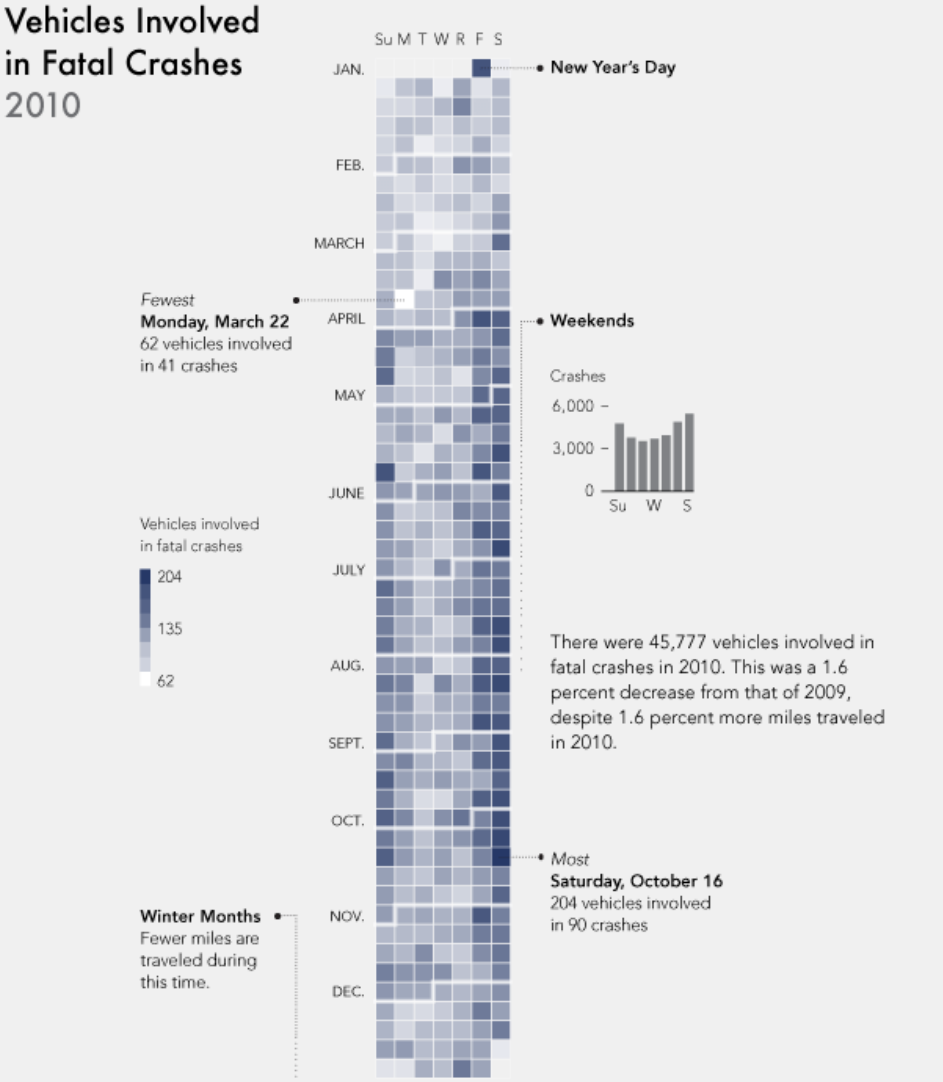




Aggregation

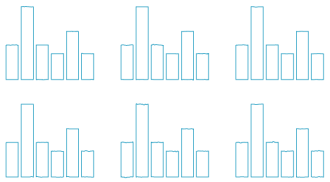
Source: Nathan Yau
[Visualizing Patterns on Repeat: For when the same things keep happening over and over again.]

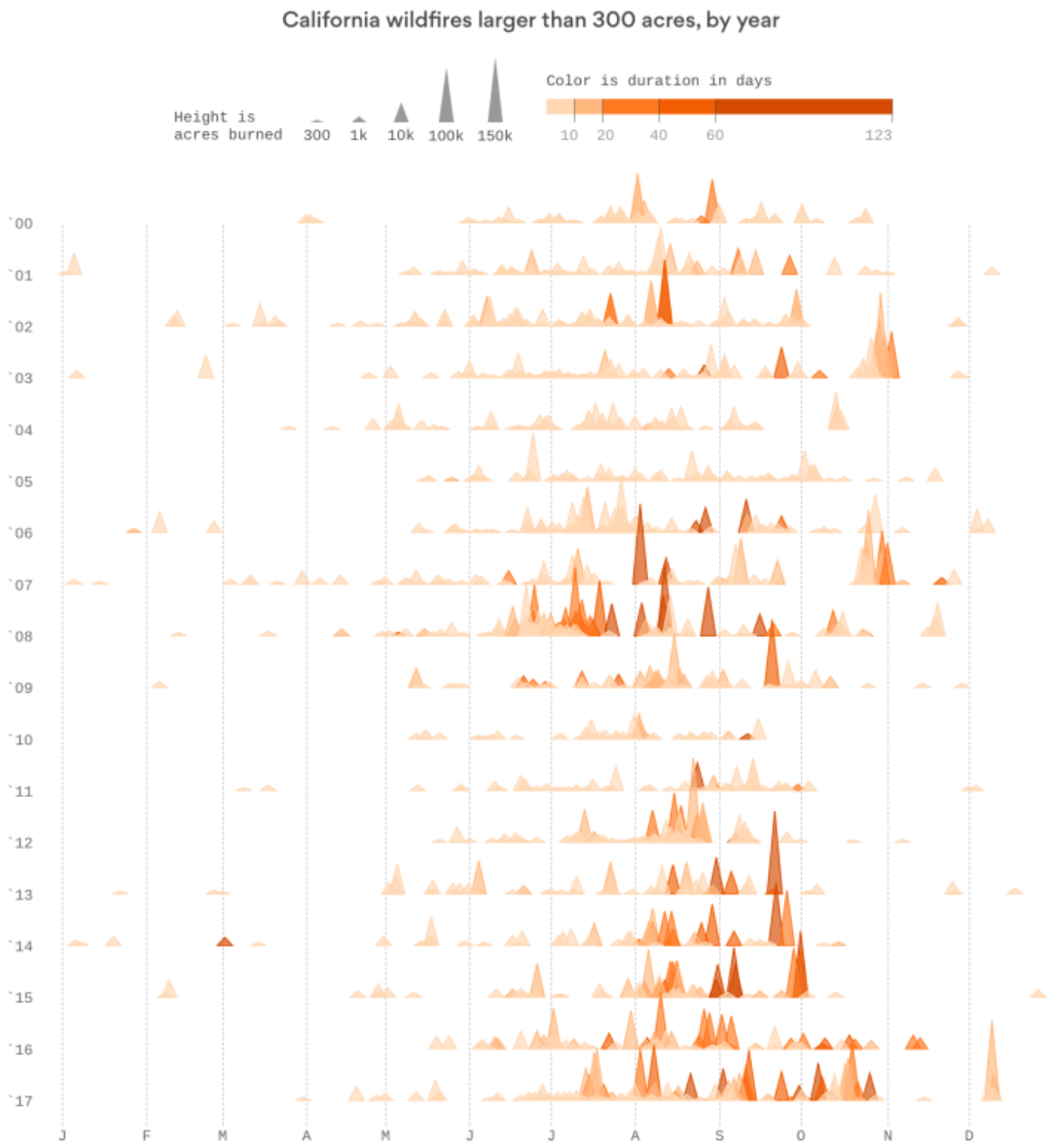




Small multiples

Source: Nathan Yau
[Visualizing Patterns on Repeat: For when the same things keep happening over and over again.]





Animation

Source: Nathan Yau
[Visualizing Patterns on Repeat: For when the same things keep happening over and over again.]