



Going beyond bars and lines: effective, non-standard data visualisation

Direction Access to and Reuse of Public Information

Unit EU Open Data and CORDIS

Sector EU Open Data



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This publication is used to support a webinar that will be recorded and made available to the participants.

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Conference EU DataViz in 2019



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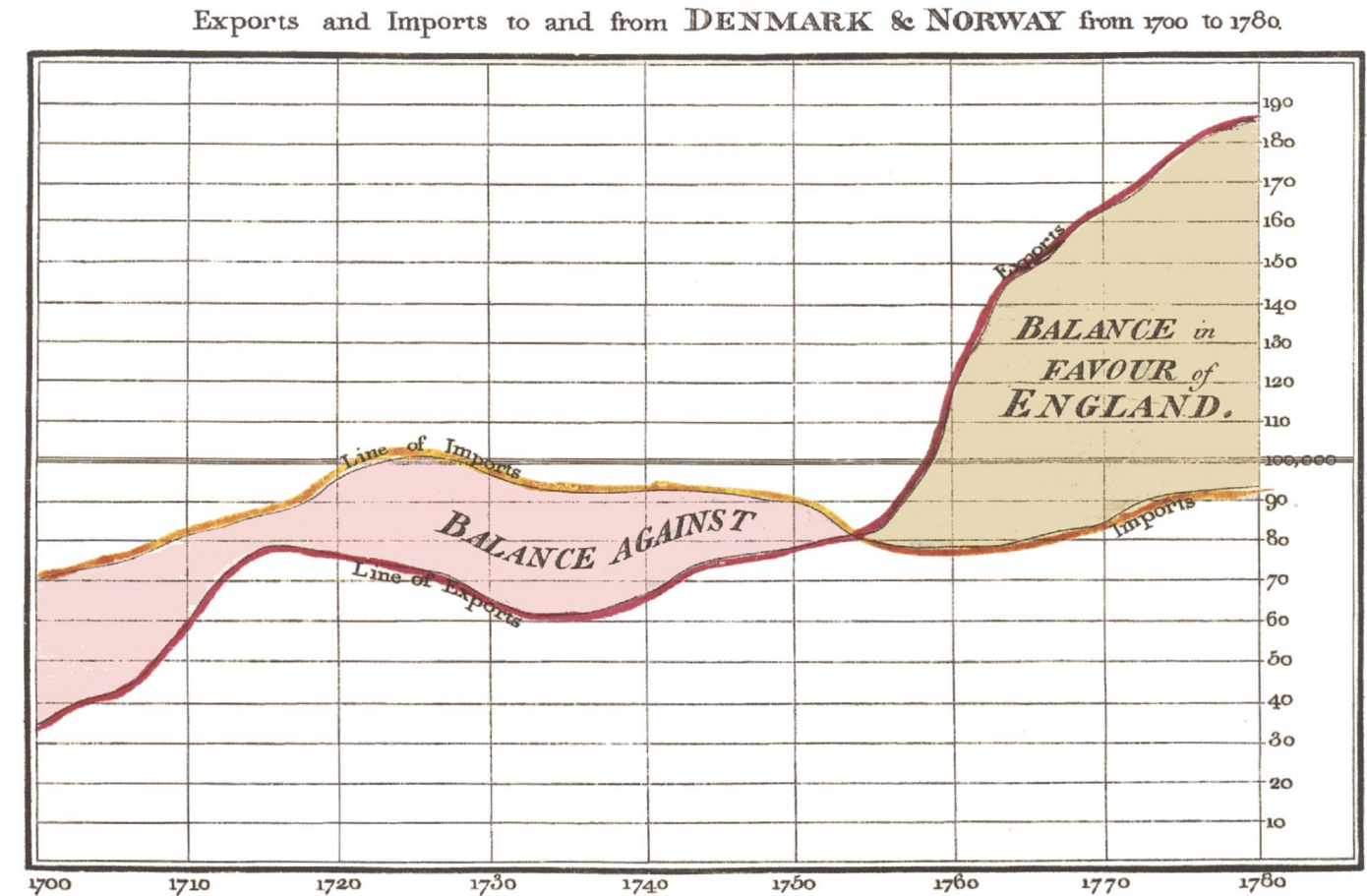


1. **INTRODUCTION**



Introduction Xenographics

William Playfair



The Bottom line is divided into Years, the Right hand line into 10,000 each.
Published as the Act directs, 14th May 1786. by W^m Playfair

Neale sculpt 392 Strand, London.





Introduction Xenographics

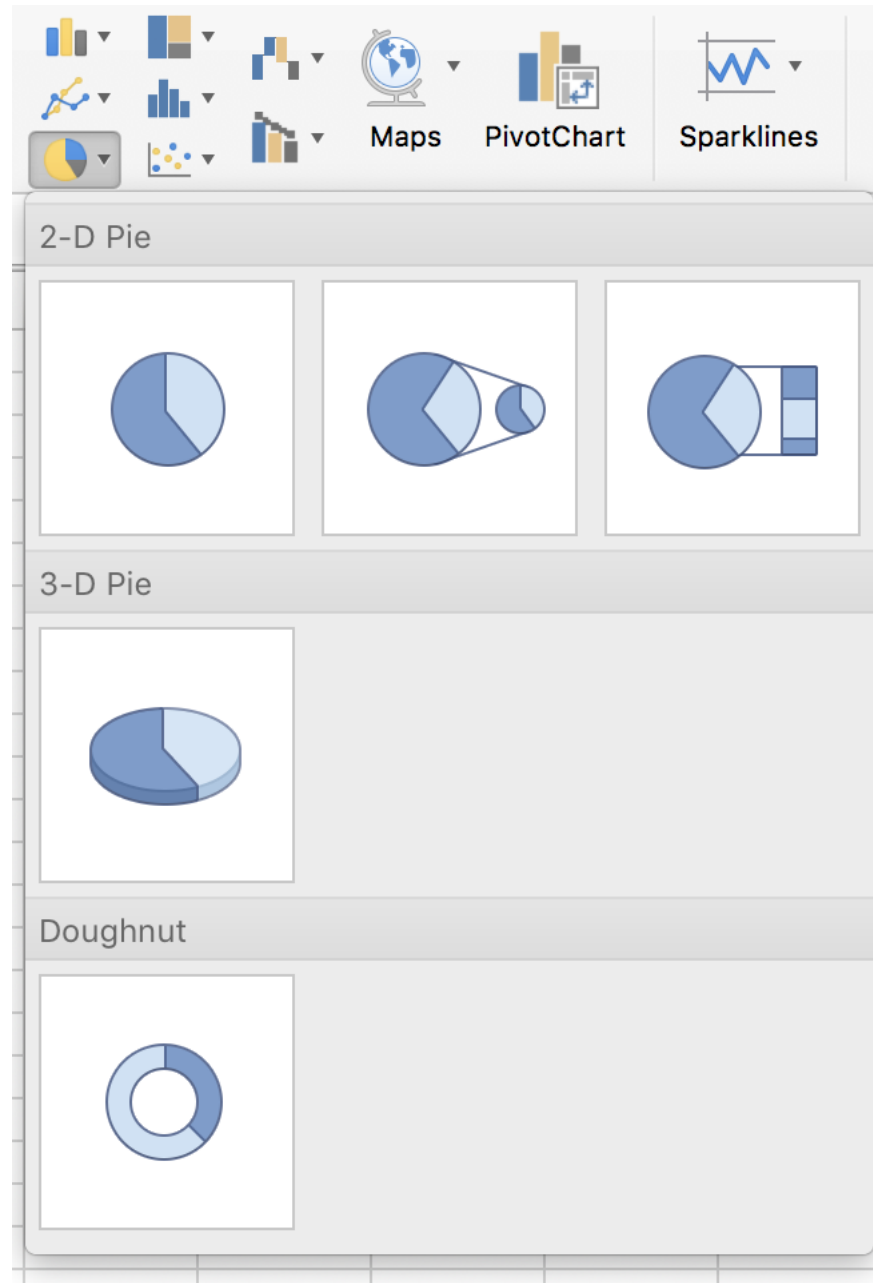
William Playfair

“It remains only for me to request that those who do not, at the first sight, understand the manner of inspecting the Charts, will read with attention the few lines of directions, after which they will find all the difficulty entirely vanish.”



Introduction Xenographics

Tool chart templates
limit what we make,
and limit what we can
imagine in data
visualisation



Introduction Xenographics

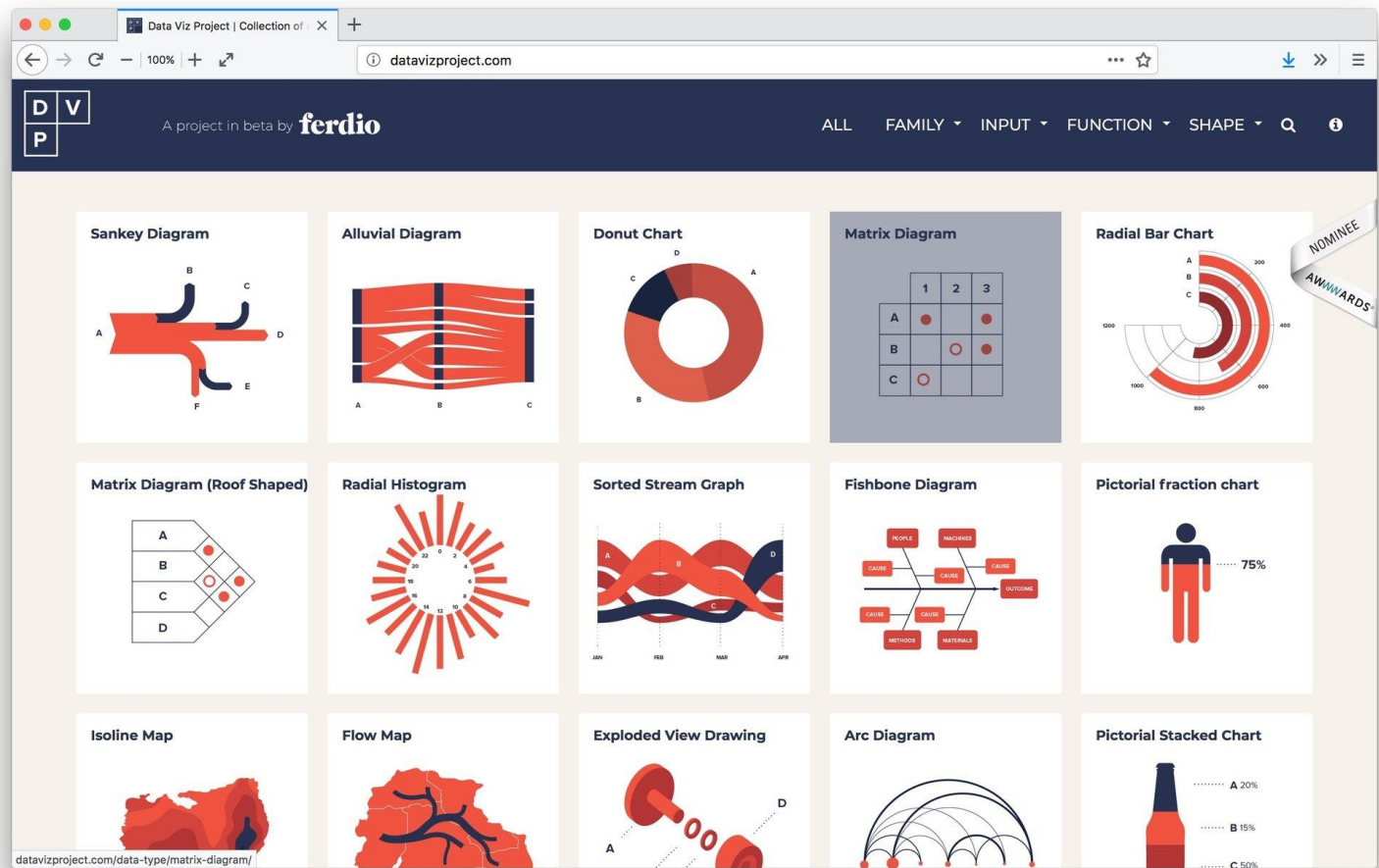
Alberto Cairo

“Readers often have the unrealistic expectation that any graphic should be understandable without effort. We designers have fed that expectation, and we must stop.”



Introduction Dataviz catalogue

[Dataviz Project](#)



2. **CREATIVE WITH DOTS**

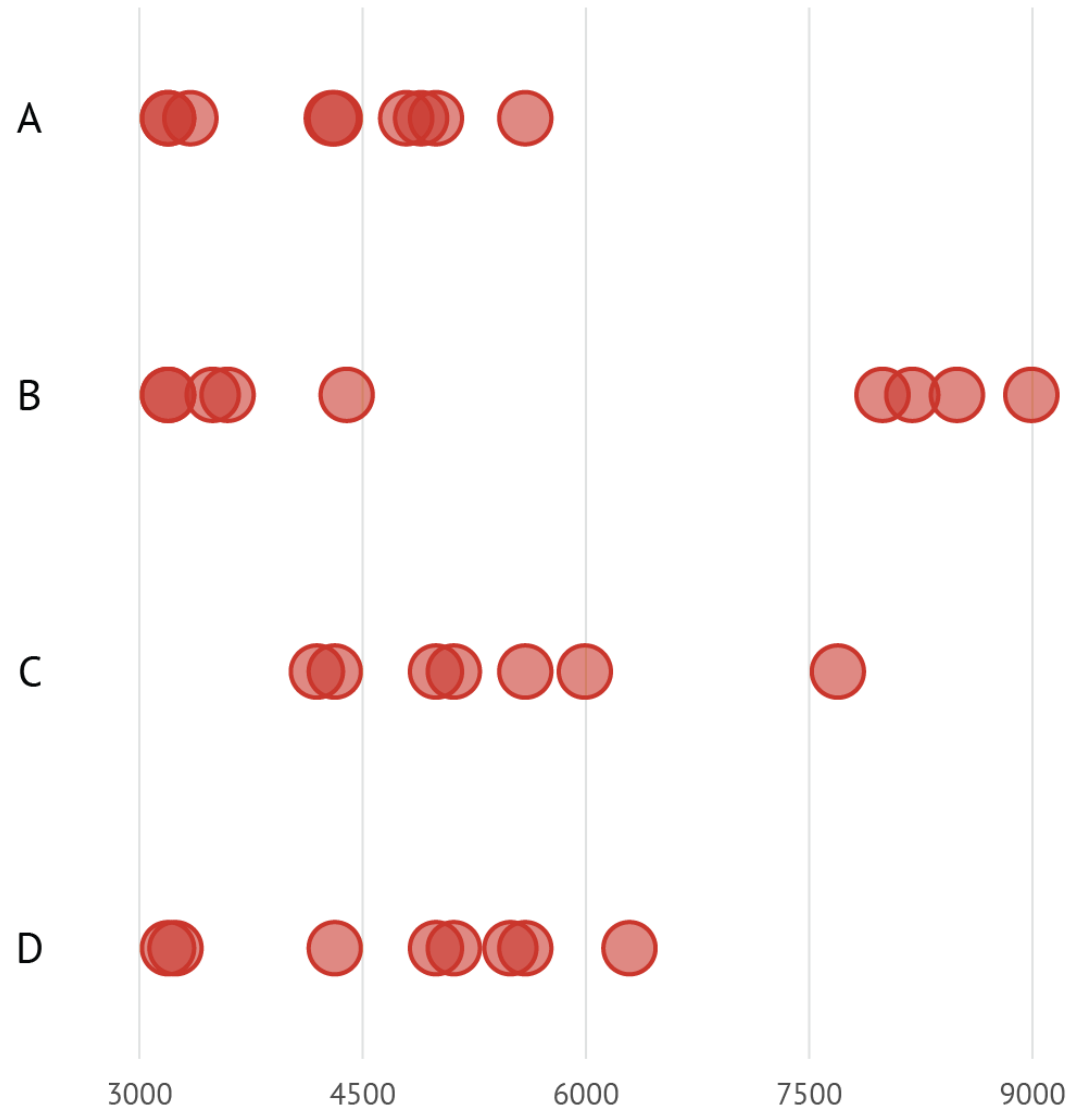


Creative with dots

Dot plot

Unidimensional scatter plot

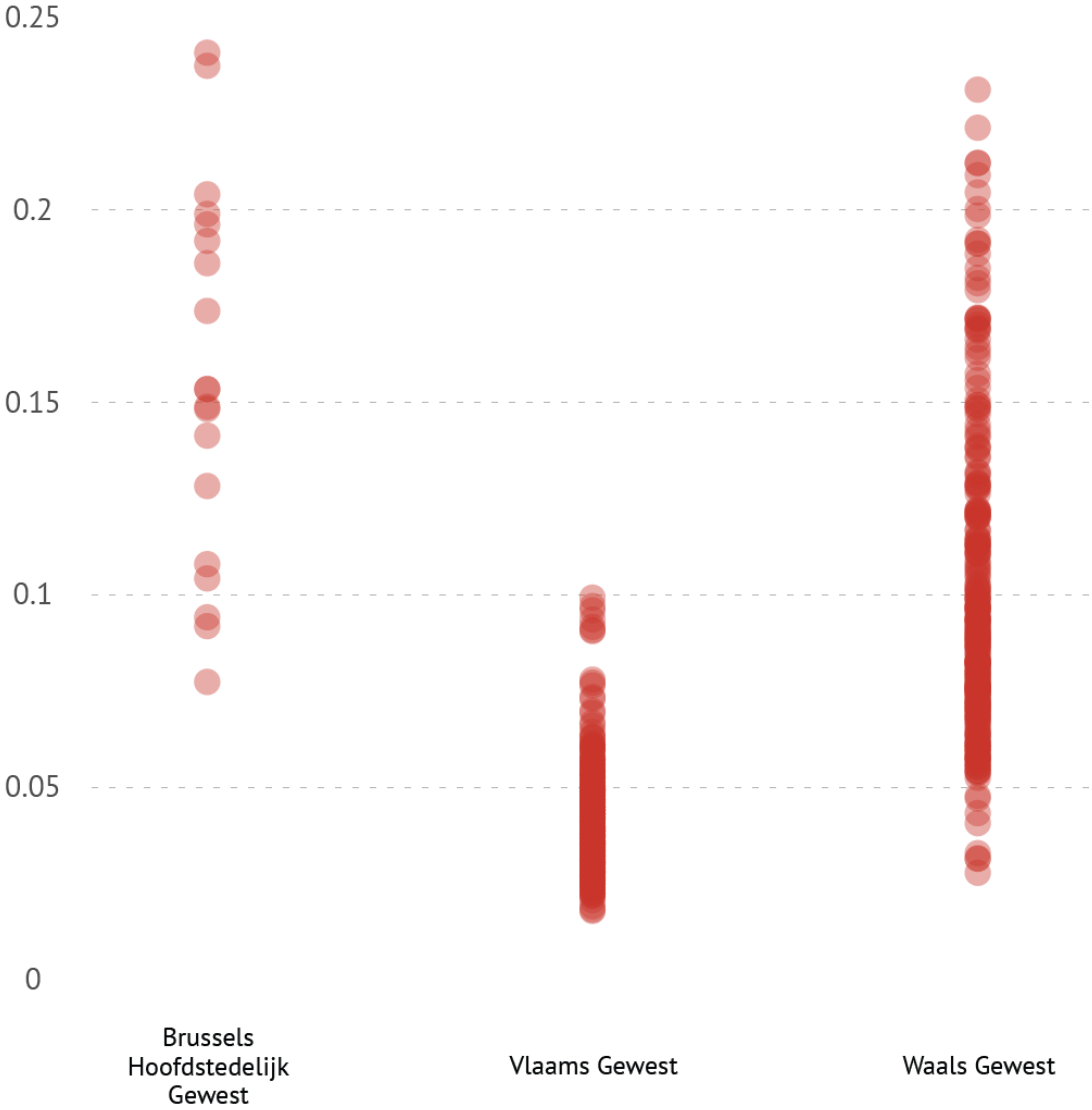
Alternative to grouped bar chart



Creative with dots

Dot plot

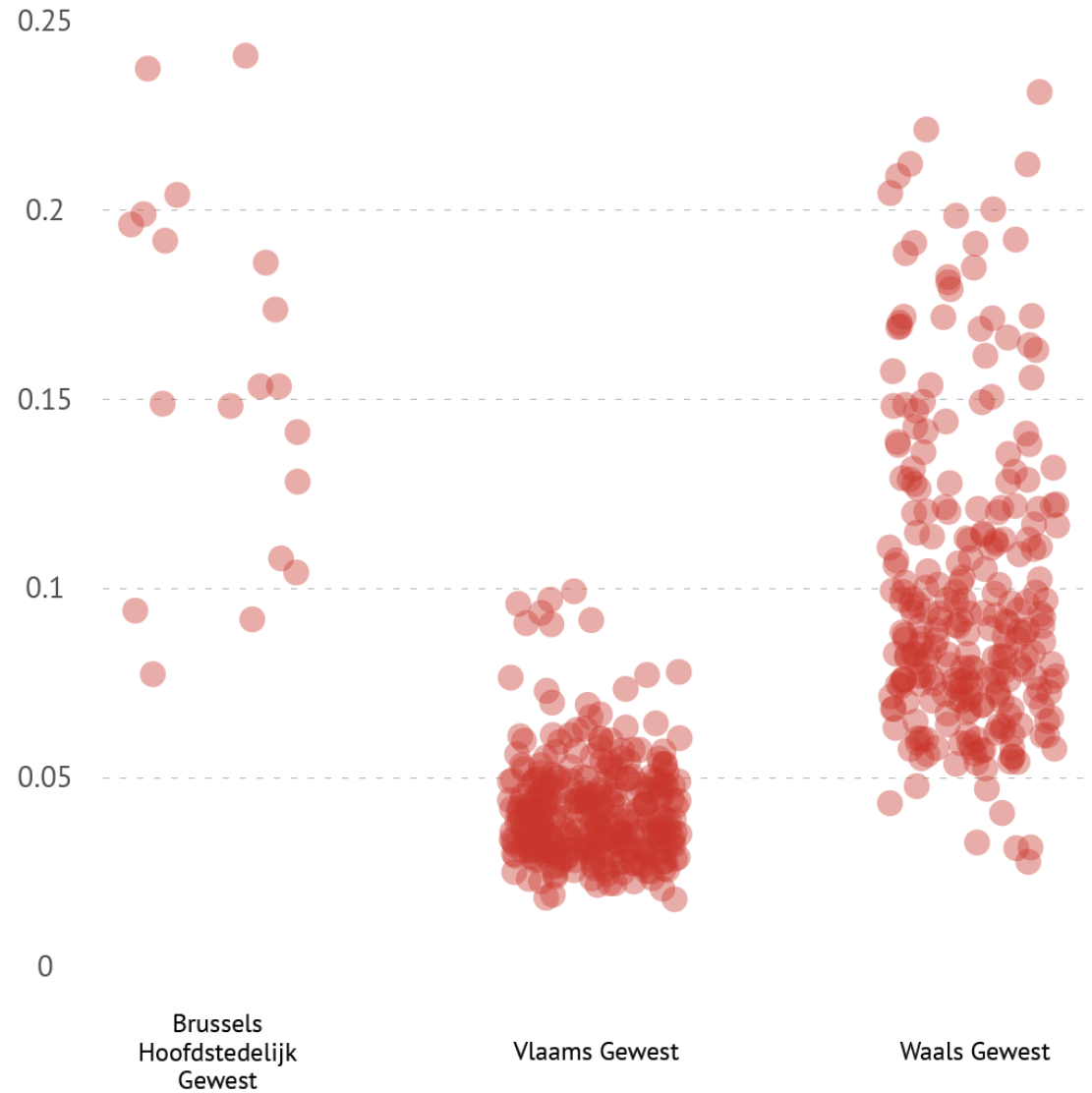
Handling overlap:
transparency



Creative with dots

Dot plot

Handling overlap:
jittering



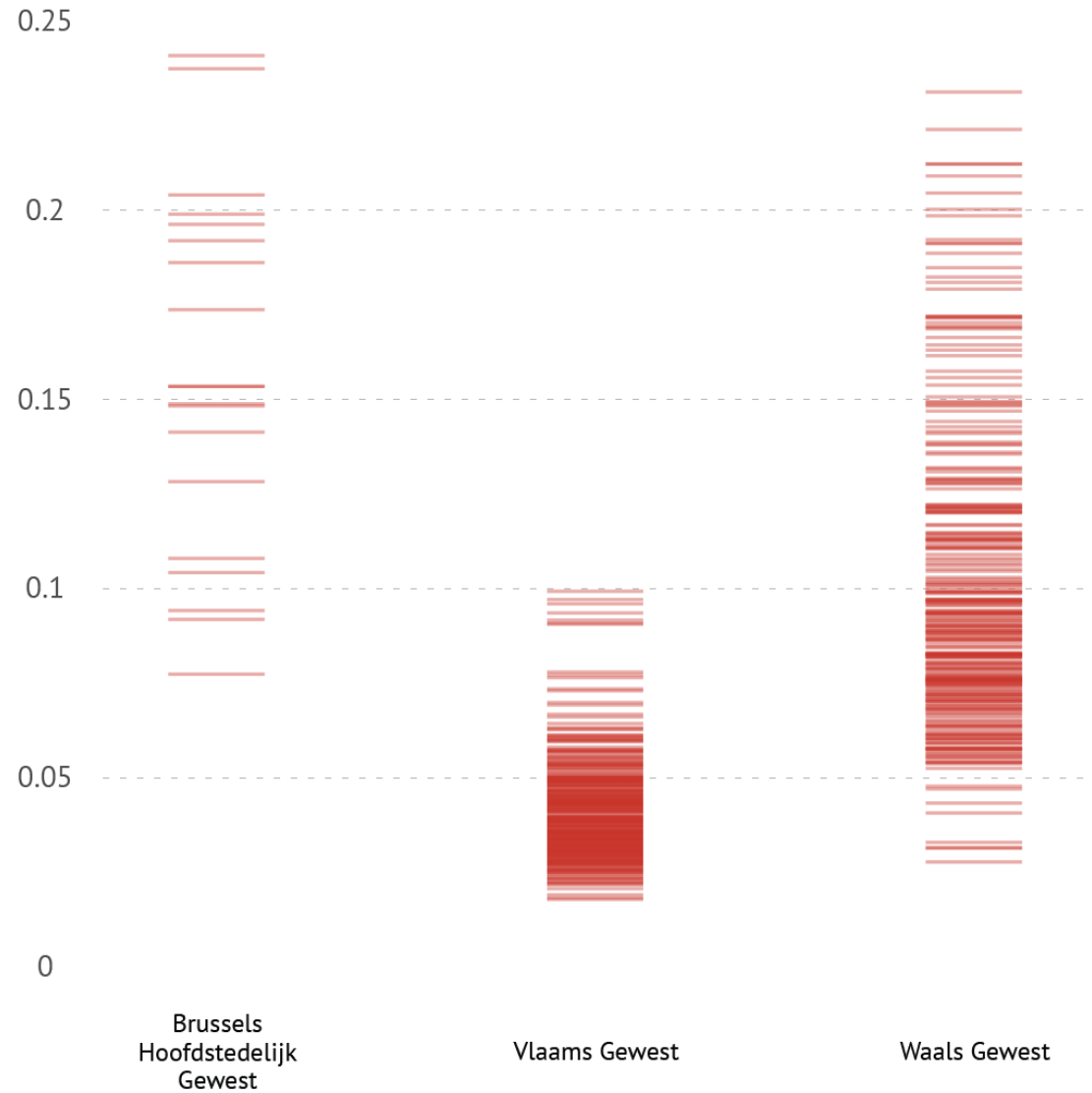
Creative with dots

Dot plot

Handling overlap:
strips

Aka barcode plot

Example: [FT US election poll tracker](#)



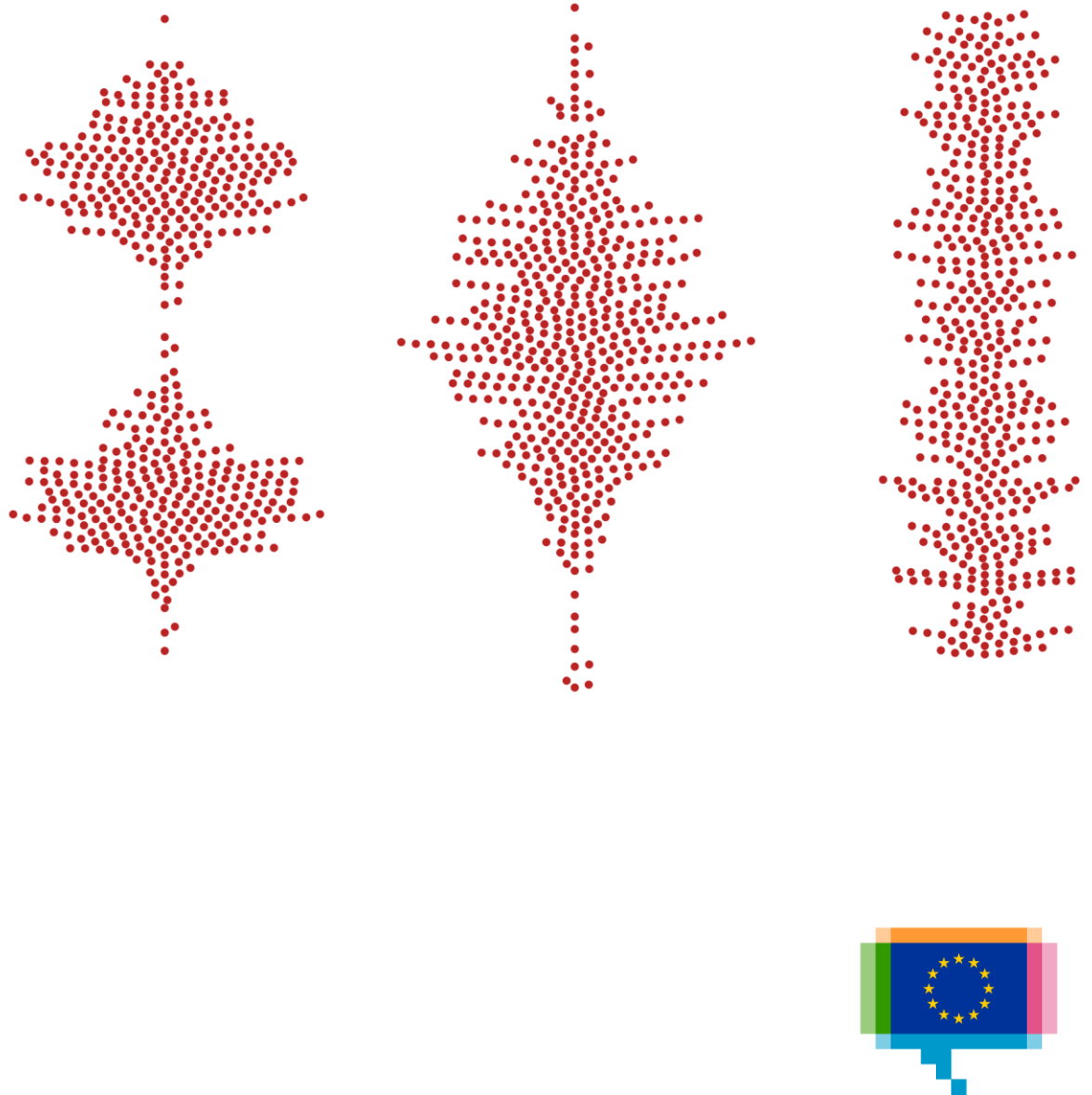
Creative with dots

Beeswarm plot

Dots are stacked

Better visualisation of distributions

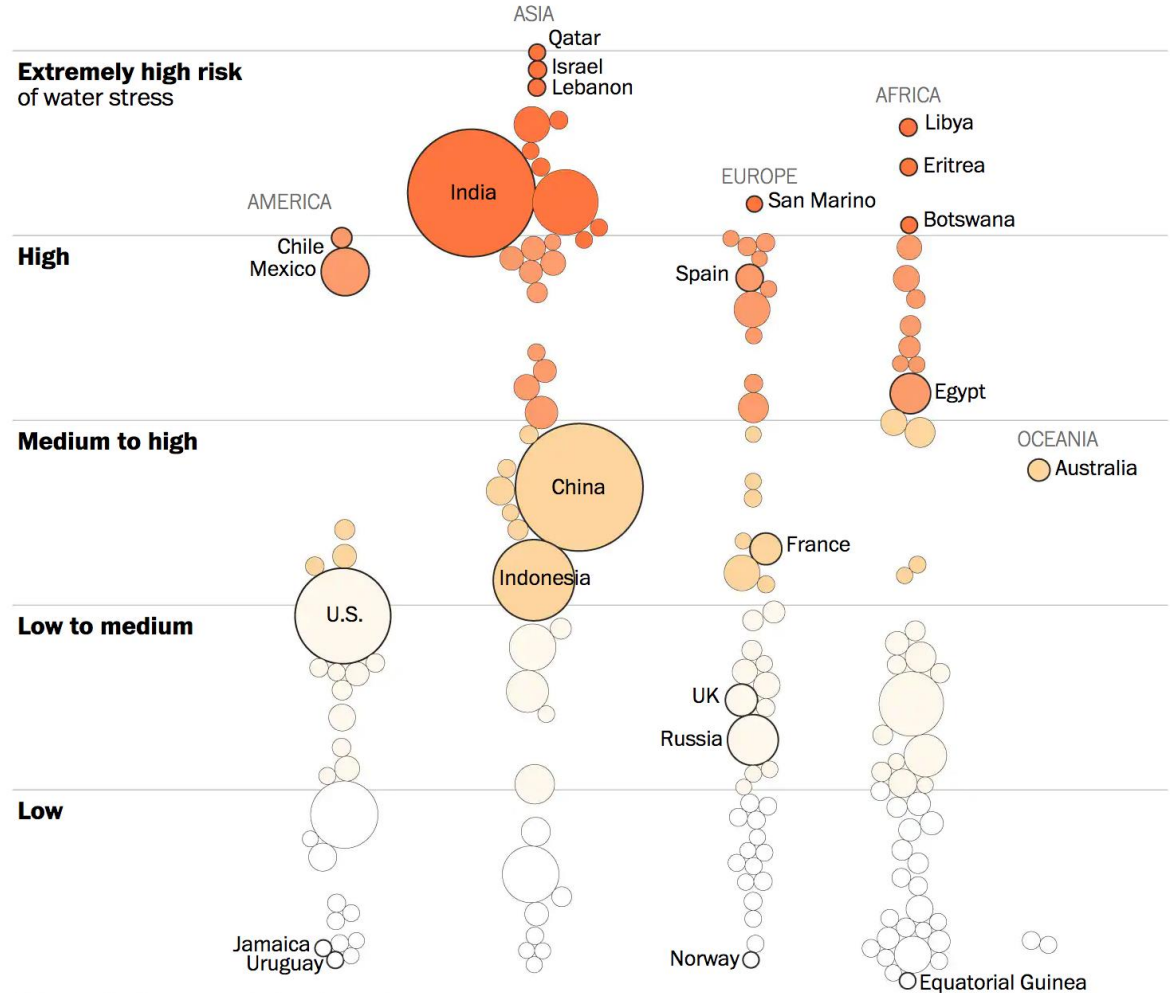
Example: [Summer Olympics medal tally](#)



Creative with dots

Beeswarm plot

Variation: map value
to radius of dots



China and India are not displayed to scale.



Creative with dots

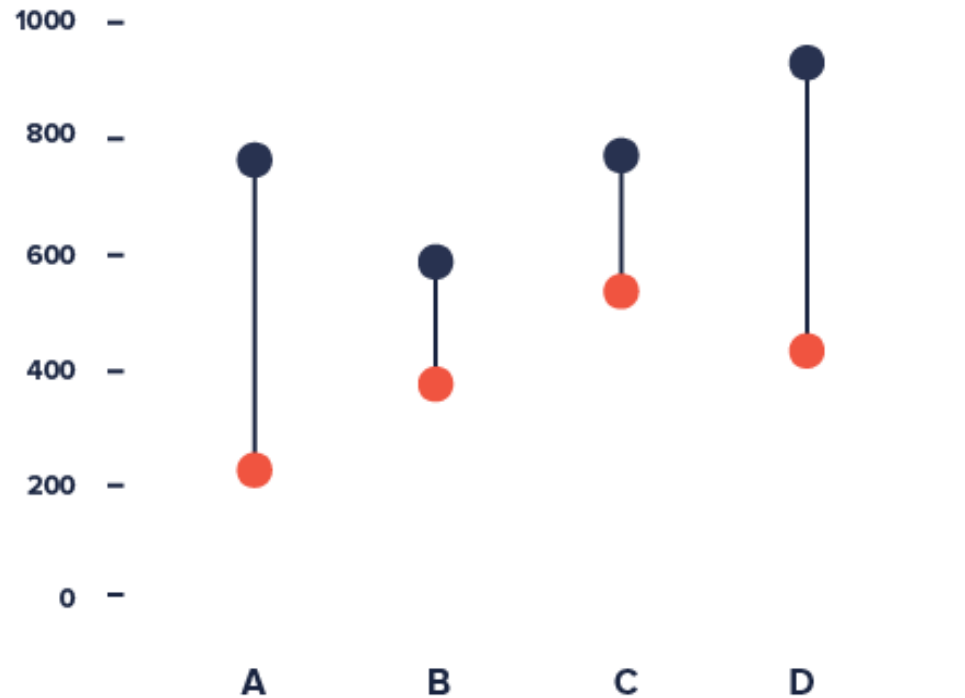
Dumbbell chart

Good for showing gaps and ranges

Can be horizontal

Also known as connected dot plot

Example: [Gender Pay Gap](#)



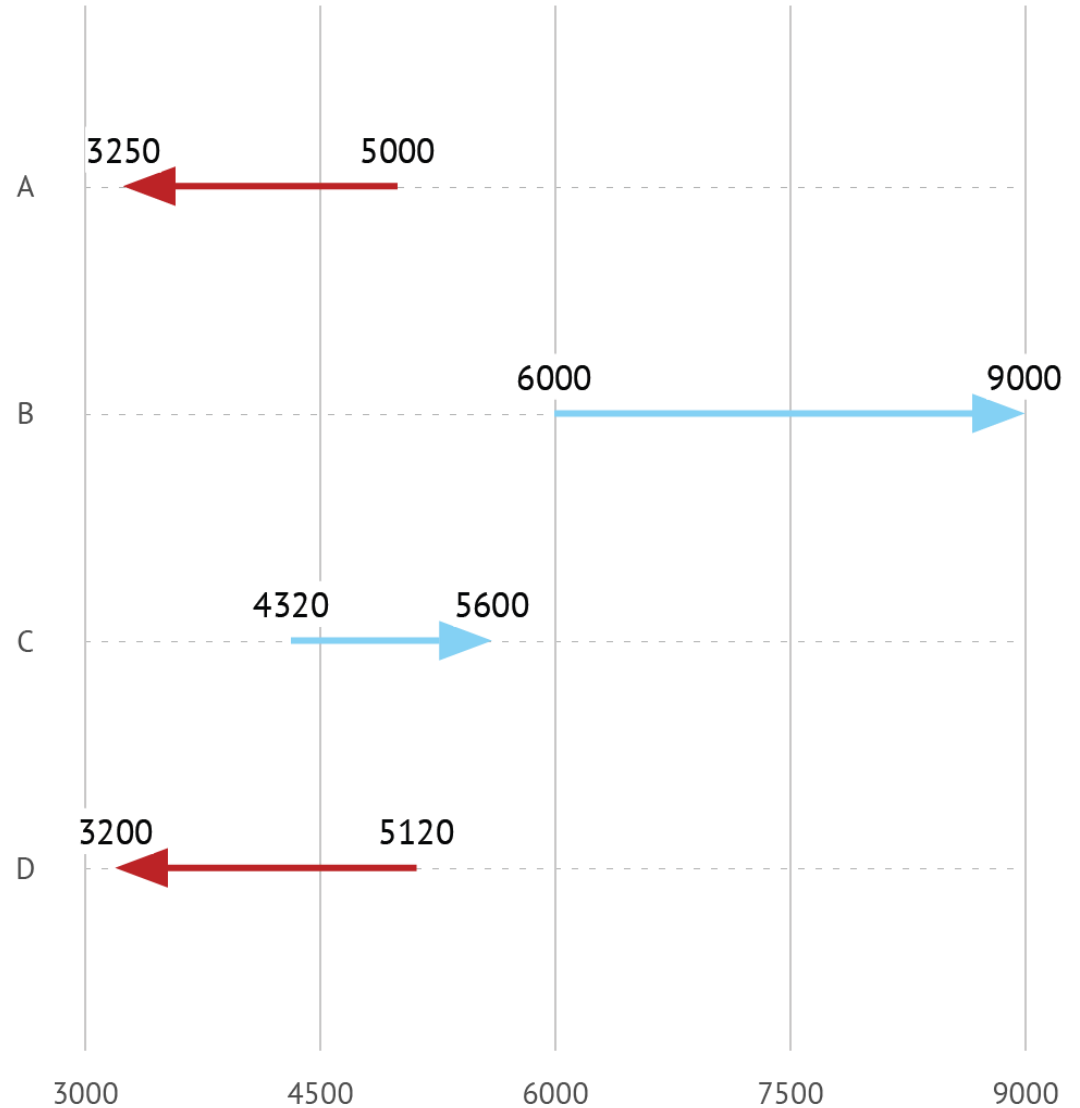
Creative with dots

Dumbbell chart

Variation: arrow chart

Example:

Where the one percent
have gained the most

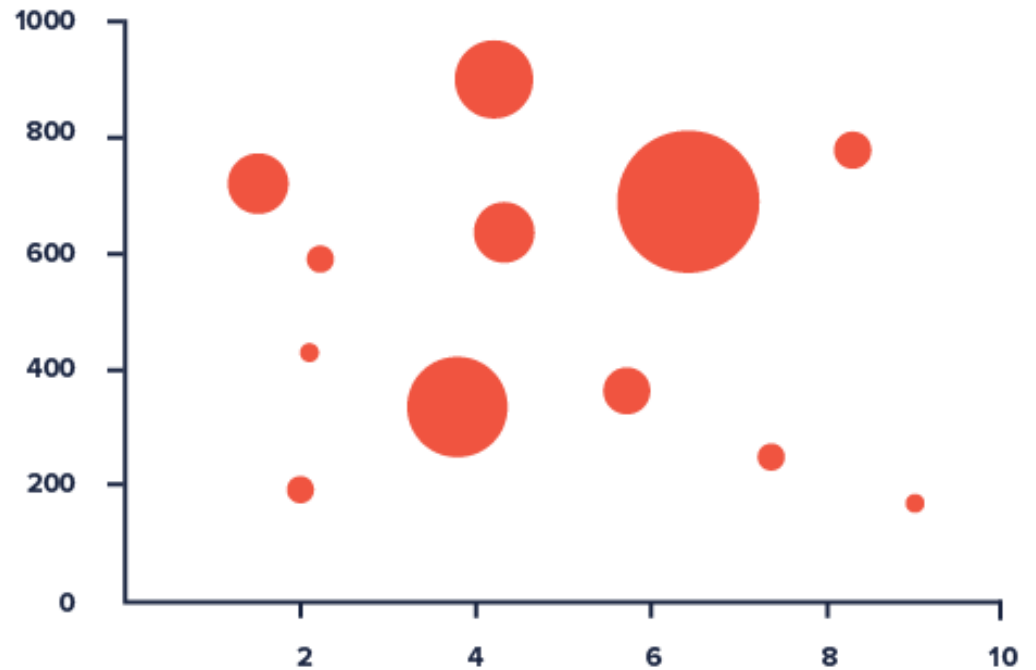


Creative with dots

Bubble chart

Can show 5 dimensions

Example: [Gapminder](#)



3.

CREATIVE WITH BARS



Bars

Bullet chart

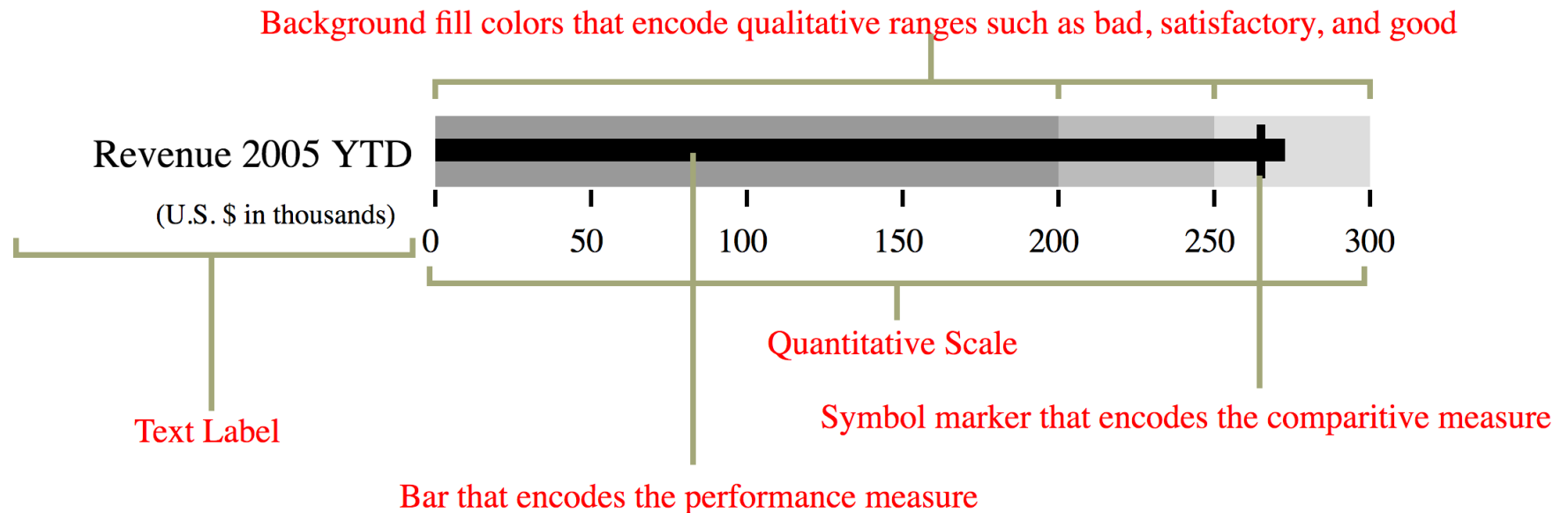
For showing progress
and status



Bars

Bullet chart

For showing progress
and status



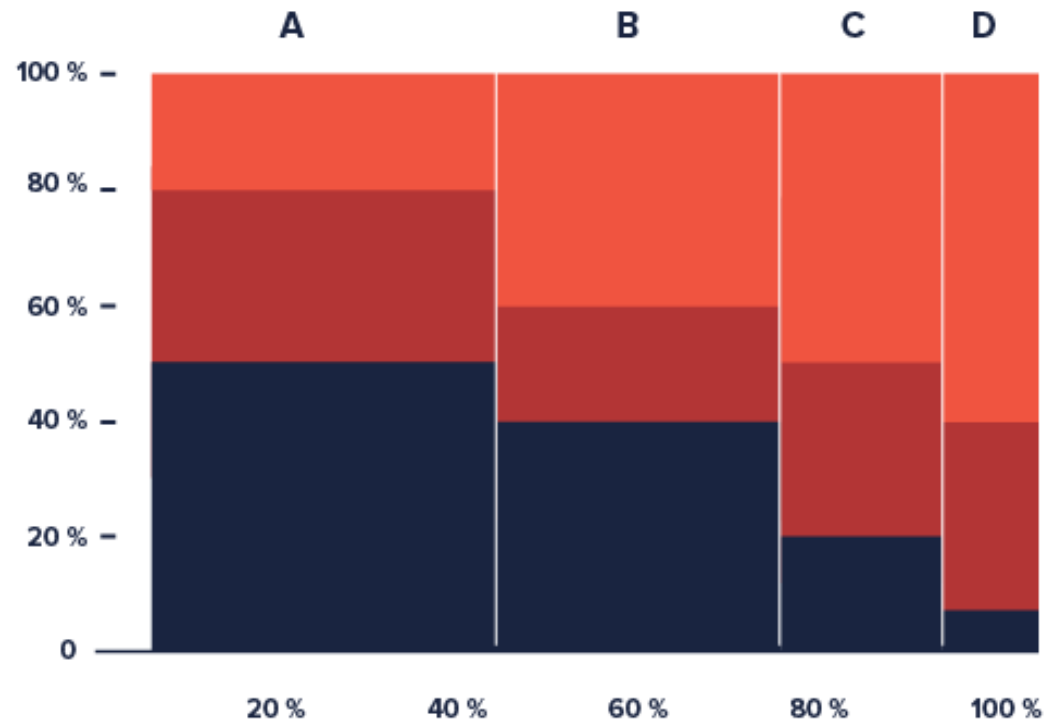
Bars

Marimekko

Aka Mekko chart,
Mosaic plot

Example:

[Population in poverty](#)



4.

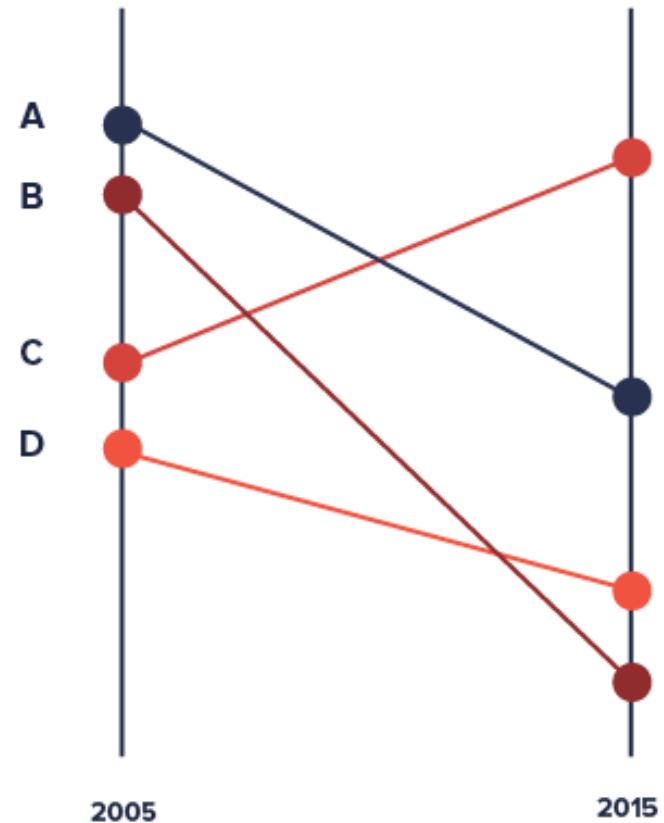
CREATIVE WITH TIME



Time Slopechart

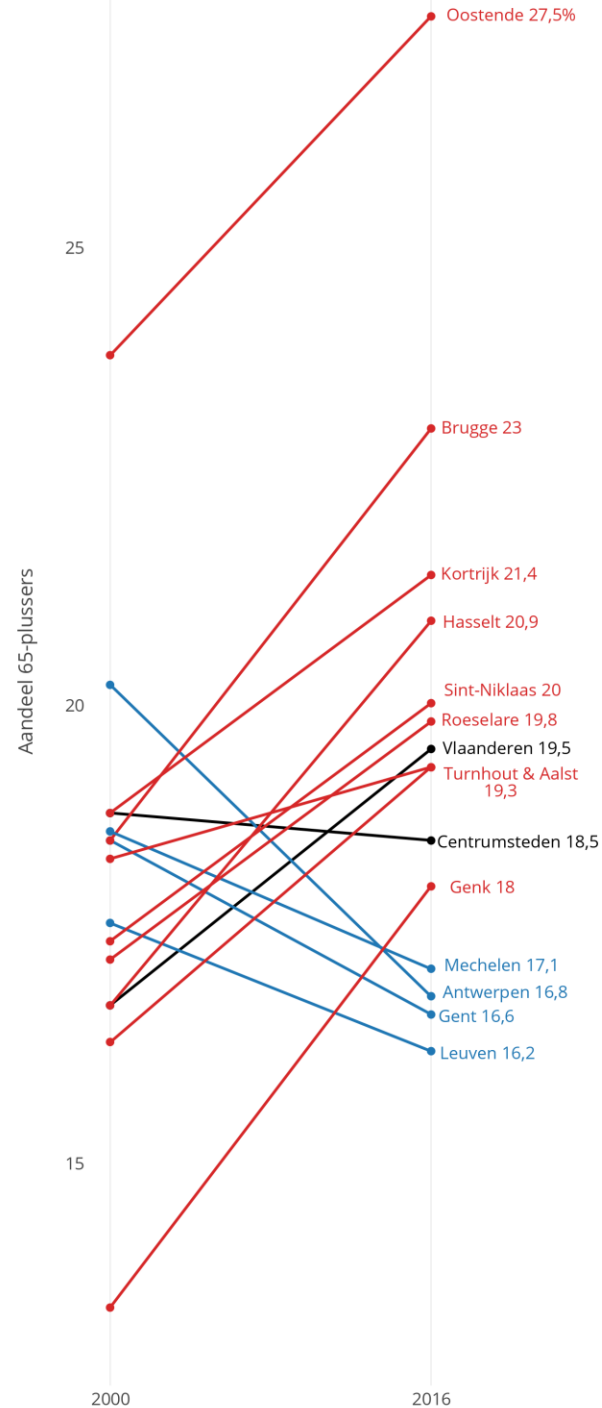
Compare 2 moments in
time

Alternative to arrow
chart



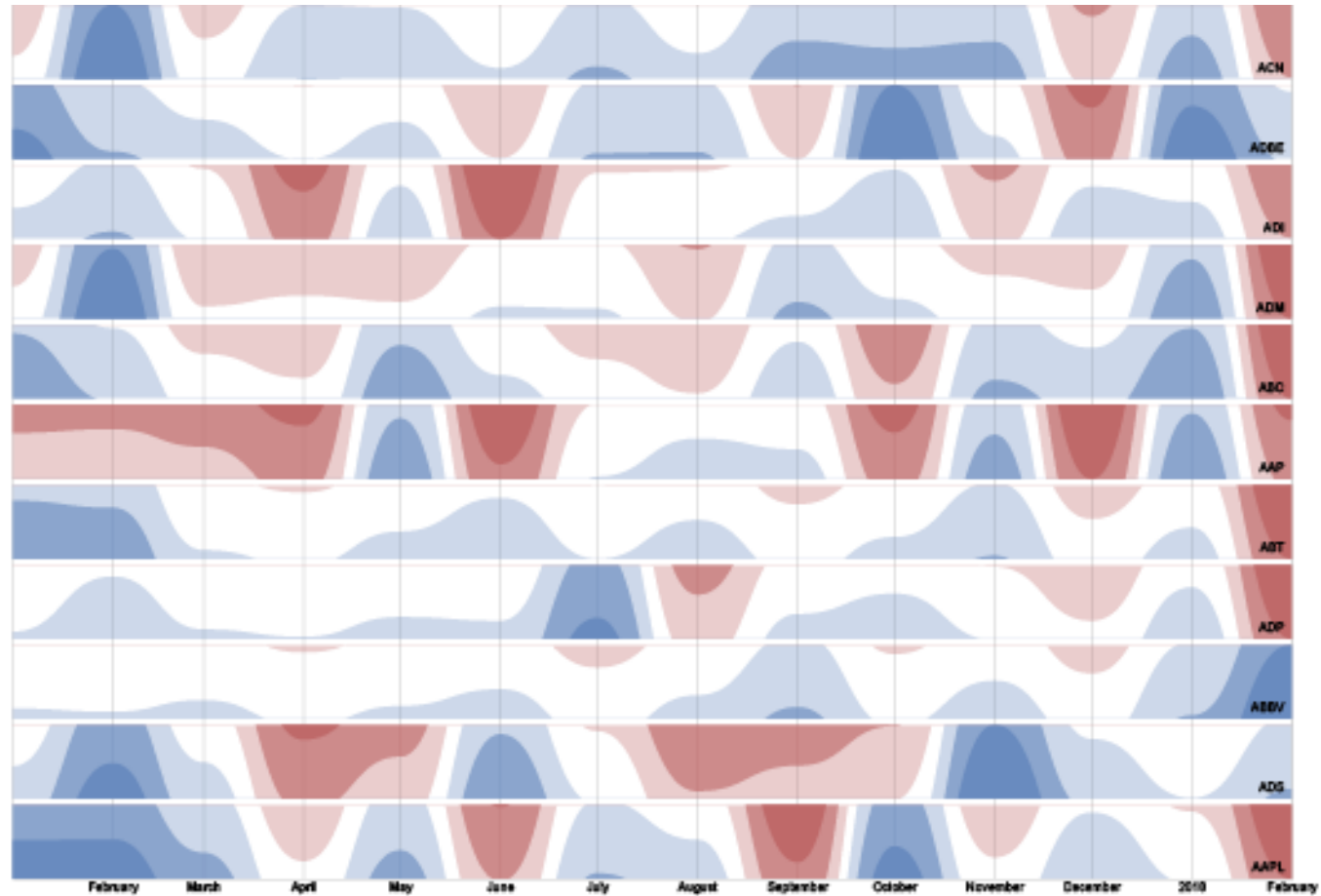
Time Slopechart

Example: share of
elderly people in 13
Flemish cities



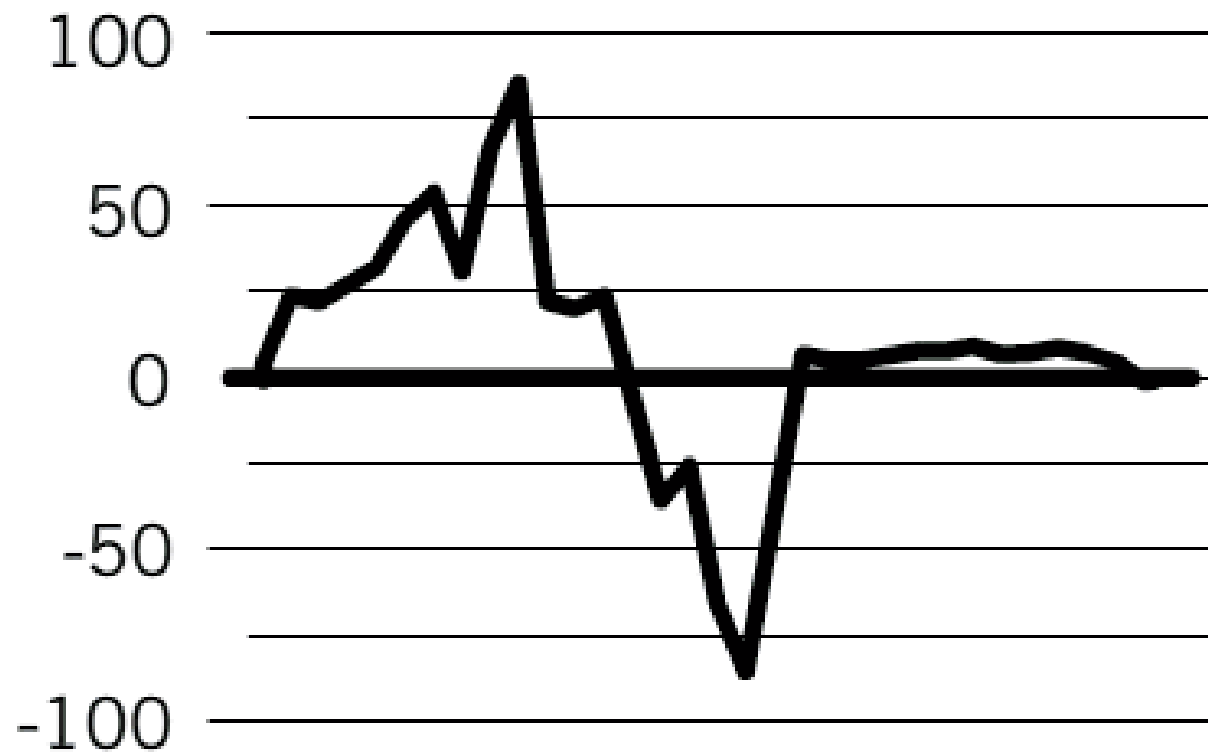
Time Horizon chart

Area charts with high
data density



Time Horizon chart

Area charts with high
data density

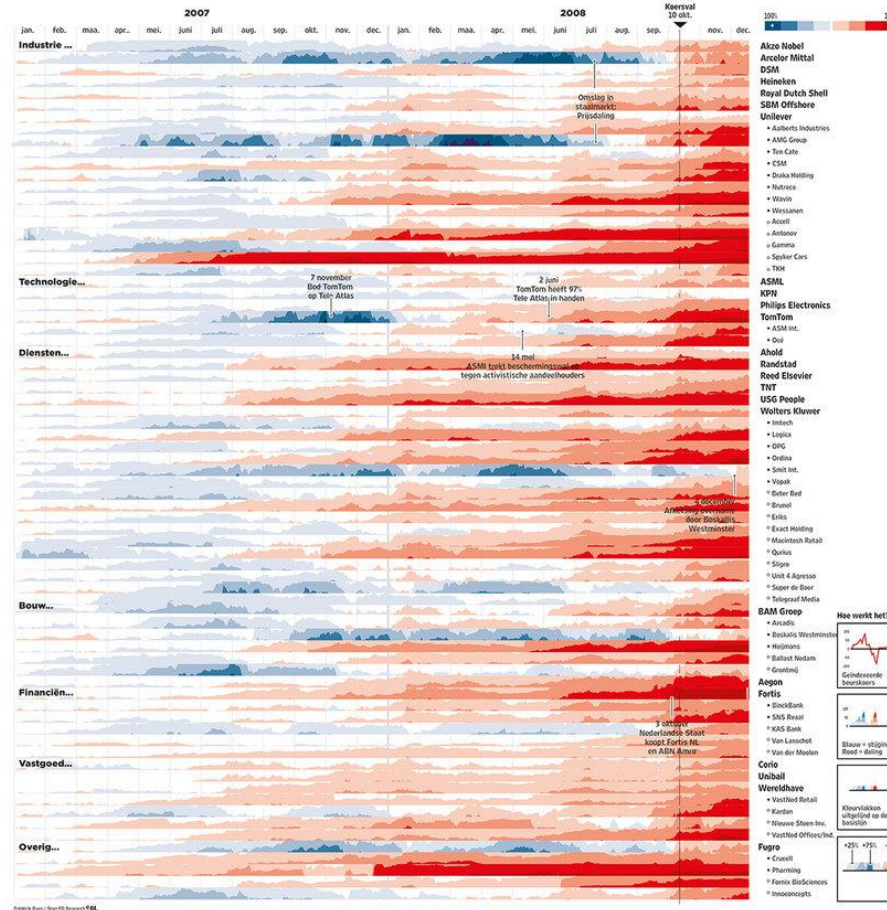


Time Horizon chart

Area charts with high
data density

Hoe de kredietcrisis de beurs besmette

De kredietcrisis heeft alle fondsen in de AEX, Midcap (•) en Smallcap (•) zonder uitzondering getroffen. Ten opzichte van 2 januari 2007 scoren vandaag alle fondsen lager.



Van een internetzeepbel naar een terroristische aanslag in New York



WIM KOK
PvdA

Op elf september 2001 vlogen twee vliegtuigen de Twin Towers, twee kantoorgebouwen in New York binnen. De wereld-economie staat er dan al niet goed voor vanwege het knappen van de internetzeepbel. Deze terroristische aanslag doet een extra duit in het al te en de groei komt tot stilstand. De effecten van de aanslag worden direct gevoeld door de financiële sector in de Verenigde Staten. Grote investeringsbanken hebben in of op steunverpand van de twee torens hun kantoren. Vanwege de ineenstorting van de gebouwen en de 'fall out' daarvan kan er niet optimaal gewerkt worden. Toch slagen de meeste financiële instellingen erin, ook de Nederlandse met hun Amerikaanse dochters hun activiteiten

voort te zetten. Maar de psychologische schade is enorm. Dat leidt tot een recessie in de Verenigde Staten en in Europa. Met de soepele houding van Alan Greenspan, de voorzitter van de Federal Reserve het Amerikaanse setel van centrale banken, duurt die in de VS aanzienlijk korter. Voor een aantal analisten is de soepele houding van die tijd een van de oorzaken van de malaise die we nu doormaken. ECB-voorzitter Willem Duisenberg laat de teugels niet vieren. De Amerikaanse Dow Jones Index verliest in twee jaar een derde van zijn waarde. Tussen 2000 en 2001 verliest de Nederlandse beursgraadmeter de AEX index de helft. Bedrijven die in 2001 naar de beurs gaan, zijn op een hand te tellen.



Twin Towers in New York

len. KPN is de enige die flink geld ophaalt via de aandelenmarkt €6,4 miljard, maar het telecombedrijf moet wel vanwege de enorme schulden dat het heeft. De hoge bedragen die het voor de UMTS-licenties heeft moeten betalen, hebben er flink ingehakt. De UMTS-veilingen leveren de staat en daarmee belastingbetaler veel geld op. Maar ook andere bedrij-

ven zijn door de internettype diep in de schulden geraakt, dat zij hun investeringen de komende jaren op een laag pitje zetten. Dat is slecht voor de economische groei en de werkgelegenheid. Dan wordt op 1 januari 2002 de euro ingevoerd en de consumenten krijgen last 'gevoelsinflatie'. Consumenten ervaren dat alles veel duurder is geworden. Dat wordt tegengesproken door de Nederlandse Bank en het ministerie van Financiën. Minister Gerrit Zalm moet veel uitleggen. Toch vinden bepaalde sectoren dat het tijd is om een ronde van prijsverhogingen door te voeren. De Nederlandse horeca greft toe de introductie van de gewone schappelijke Europese munt gebruikt te hebben om hun marges te verbeteren.

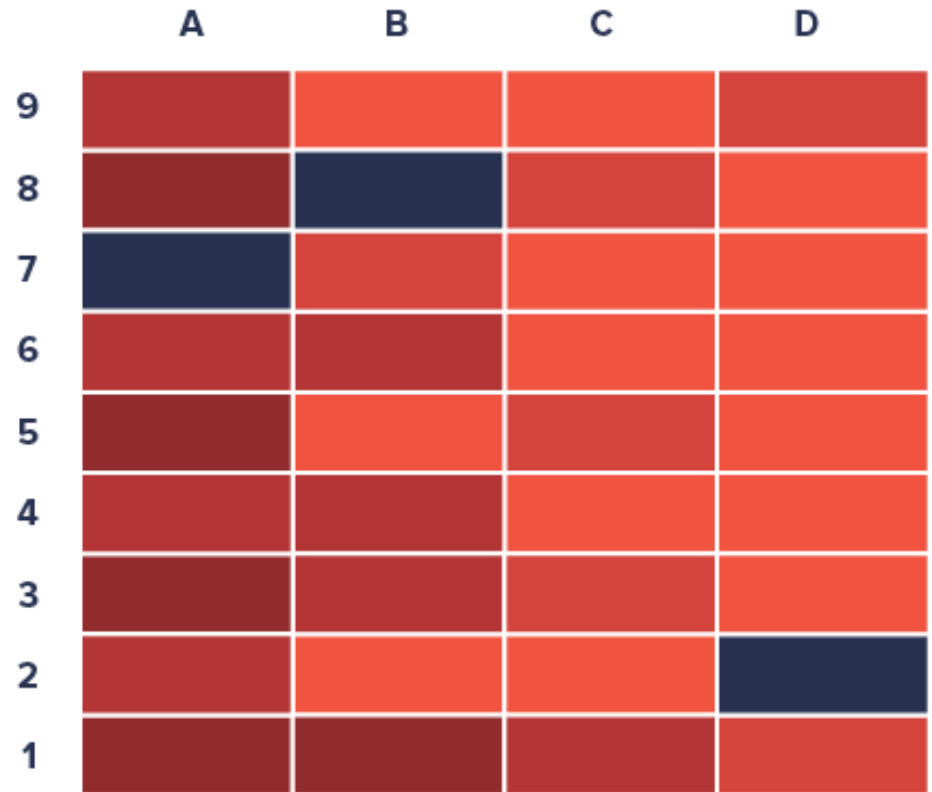
Internethype



Time Heatmap

Example:

[The impact of vaccines](#)



Time Connected scatterplot

Evolution of 2
numerical values over
time

Examples:

The direction of your
country

Research



VISUALS | Hannah Fairfield

Driving Safety, in Fits and Starts

AMERICANS drive a staggering number of miles — close to three trillion every year, according to the government. (That is half a light-year, or 120 million trips around the world.) And although traffic accidents remain a major public safety problem, the biggest killer of people ages 5 to 34, vehicle travel is far safer than it was a few decades ago.

Several factors appear to account for the sharp decline in fatalities. Technology (like anti-lock brakes and air bags) and road behavior (like wearing seat belts and driving sober) have both improved greatly since 1950.

Americans almost always drive more each year than the previous one — at least until recently, when the recession curtailed road habits. And the auto fatality rate has been decreasing since the 1960s, when cars with massive engines carried their unbuckled passengers on primarily two-lane roads.

The safety data is usually charted as deaths per miles traveled. But what happens when the metrics are teased apart, and familiar data is charted in an unfamiliar way?

Plotting the two most important variables against each other — miles traveled versus deaths per 100,000 population — yields a pattern that looks like a plateau followed by a steep drop. It evokes the theory of punctuated equilibrium, proposed by the paleontologists Stephen Jay Gould and Niles Eldredge, which suggests that instead of continuous gradual evolution, change occurs abruptly after periods of virtual stasis.

“You see fatalities drop after a breakthrough in new technologies or behaviors, and then plateau until the next one,” said David L. Strickland, administrator of the National Highway Traffic Safety Administration. “It takes time for new safety technologies to work their way into the whole fleet of cars on the road.”

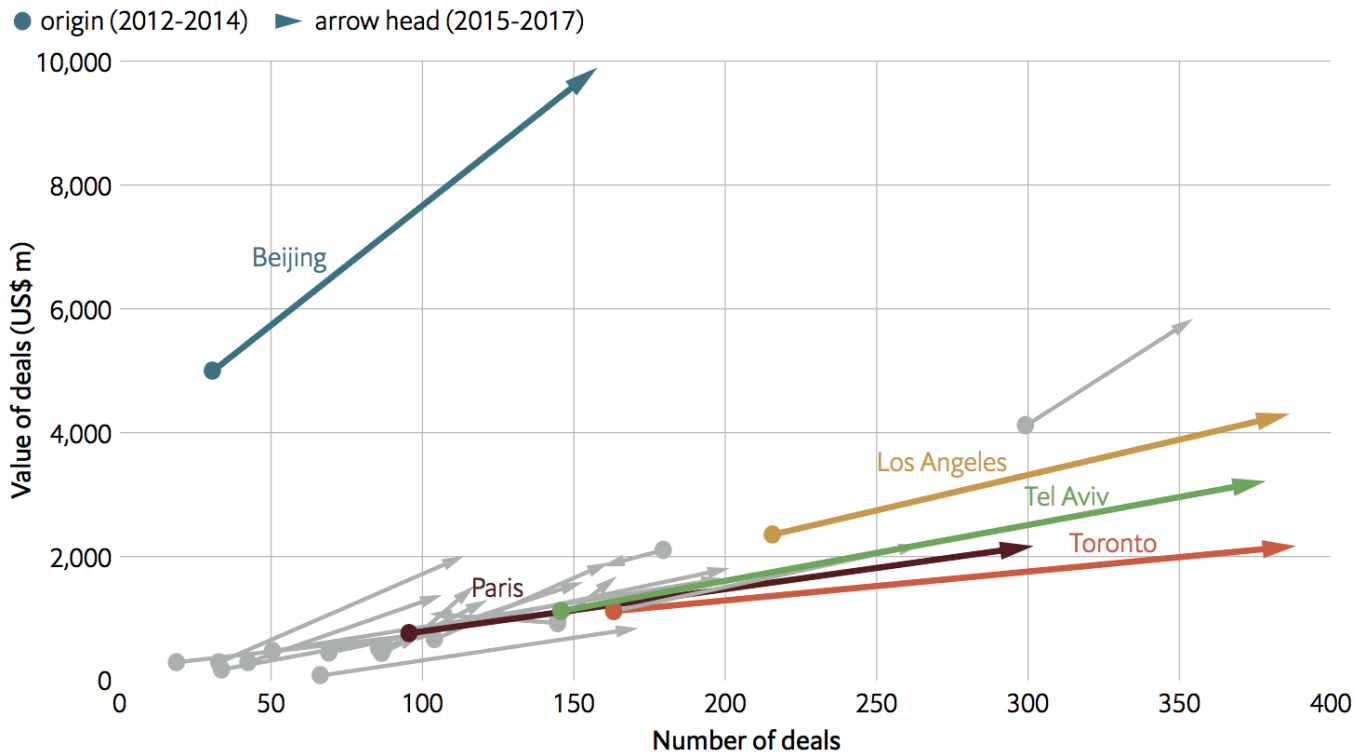
Sources: National Highway Traffic Safety Administration; Federal Highway Administration

THE NEW YORK TIMES



Time Connected scatterplot

Figure 1: Growth in VC deal activity, 2012-14 to 2015-17, 24 cities



The chart indicates the pronounced trajectory in deal activity of the top cities. Grey arrows indicate deal activity for the remaining 19 cities.

Source: Crunchbase, The Economist Intelligence Unit





5.

COMPONENTS & HIERARCHY



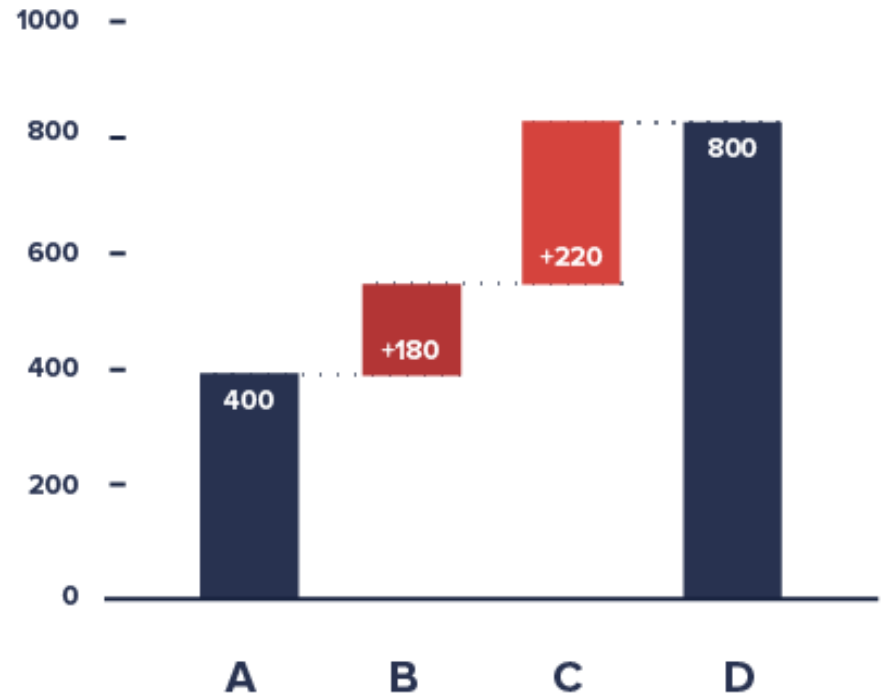
Components

Waterfall chart

Shows net result

Example:

Evolution de la masse
des glaciers

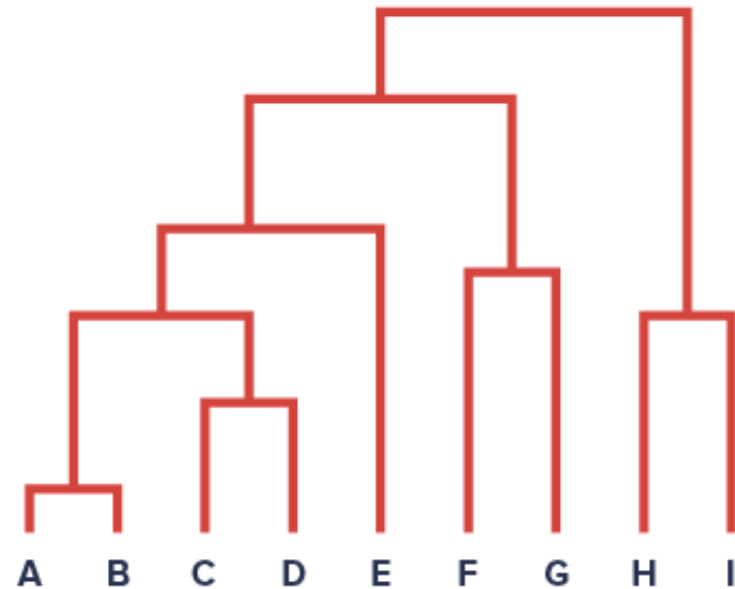


Hierarchy

Dendrogram

Shows multilevel
hierarchy

Example: [The 200+
beer brands of SAB
Inbev](#)

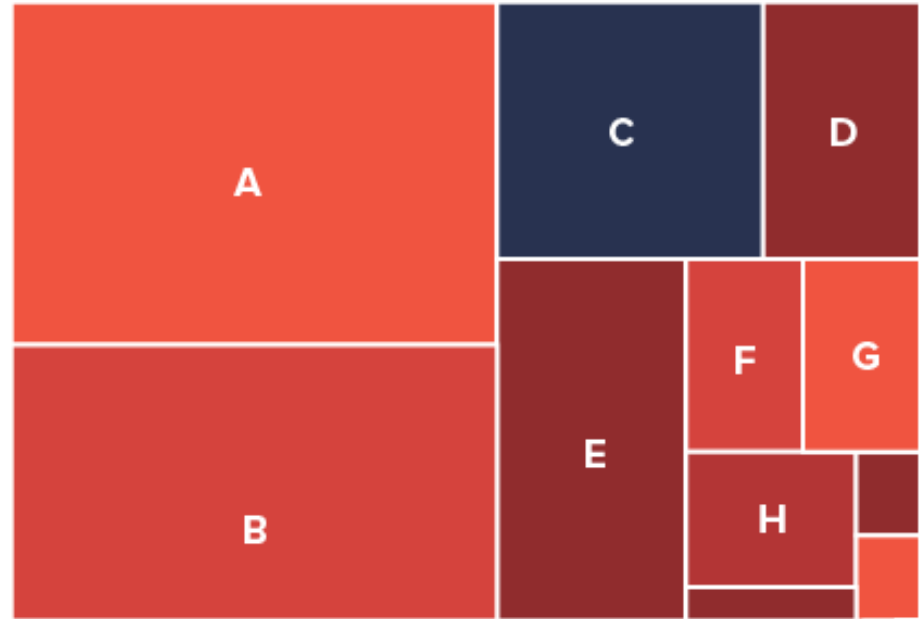


Hierarchy Treemap

Shows multilevel
hierarchy + numbers

Example:

[Every job in America](#)



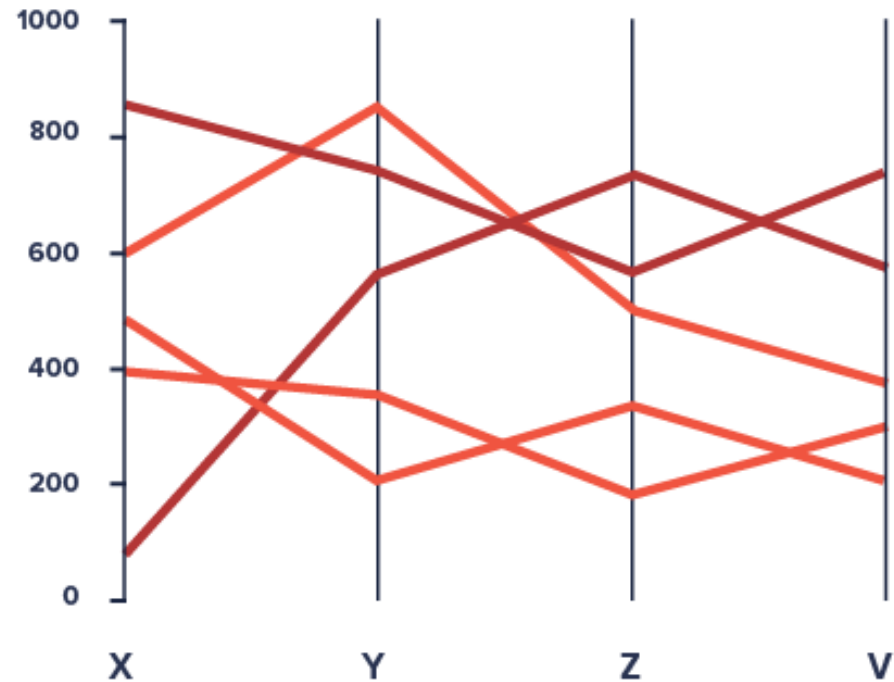
6.

MULTIDIMENSIONAL DATA



Multidimensional Parallel coordinates

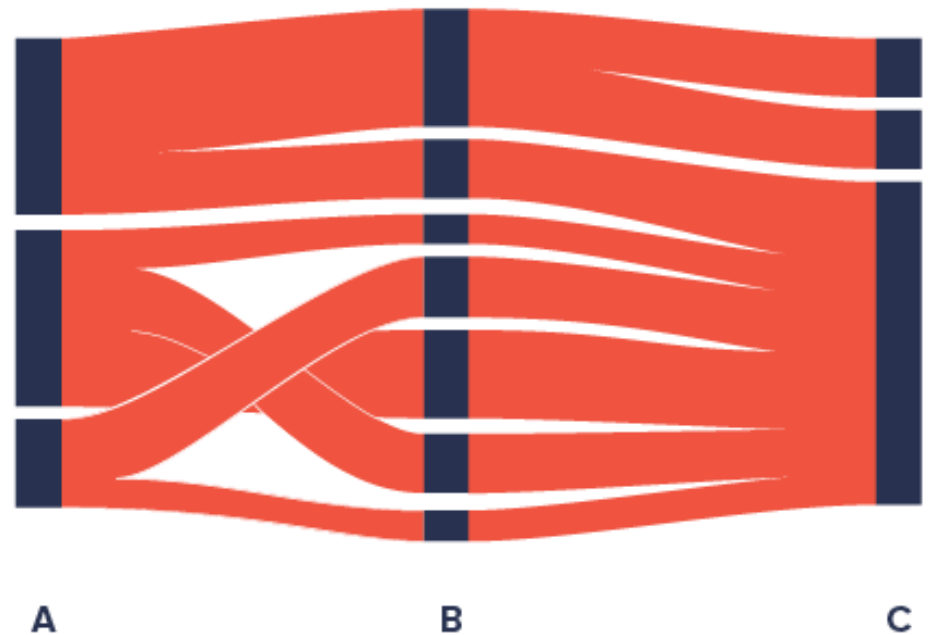
Example: [Marathon
trainings](#)



Multidimensional Alluvial diagram

Aka Sankey diagram
and parallel sets

[How to make an
alluvial diagram with
RAWGraphs](#)



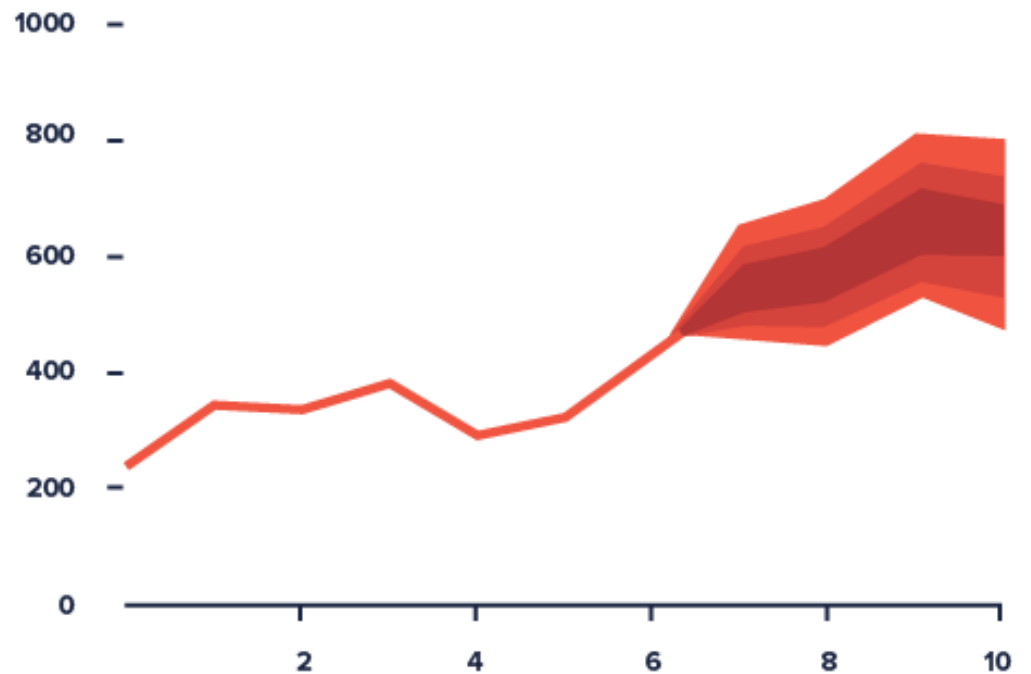
7.

UNCERTAINTY



Uncertainty Fan chart

Communicates
uncertainty in
projections



Uncertainty Fan chart

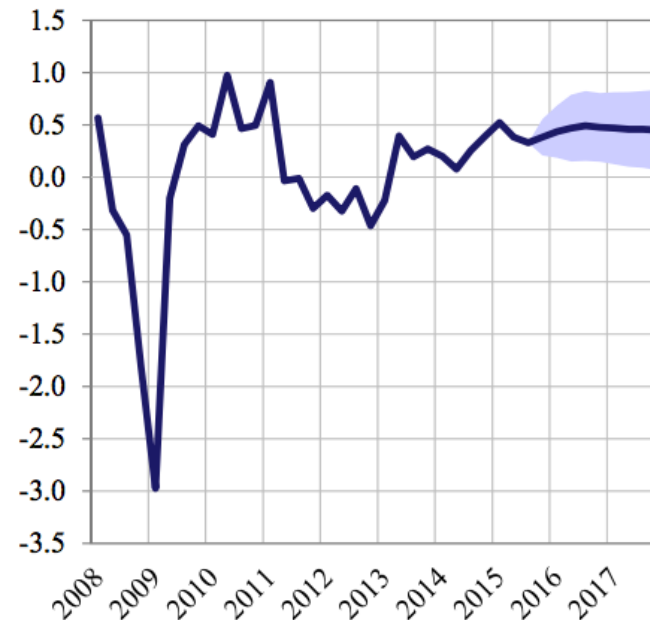
Communicates
uncertainty in a
projection

Chart 1 Macroeconomic projections¹⁾

(quarterly data)

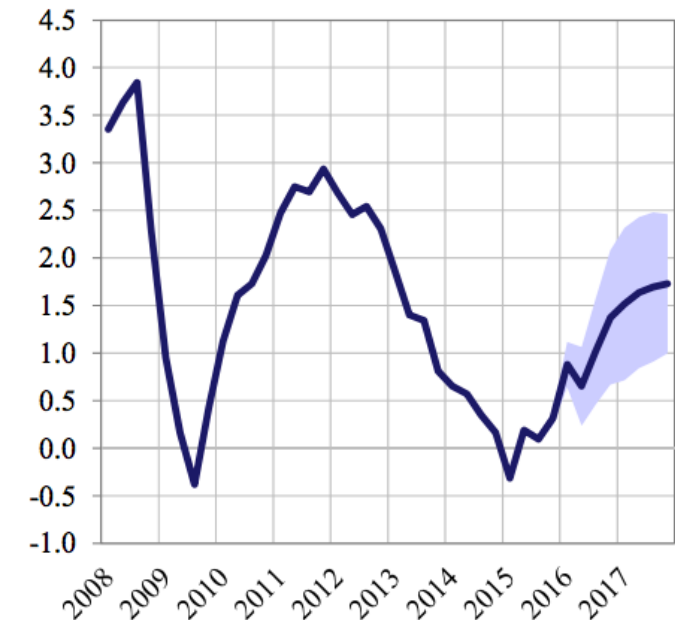
Euro area real GDP²⁾

(quarter-on-quarter percentage changes)



Euro area HICP

(year-on-year percentage changes)

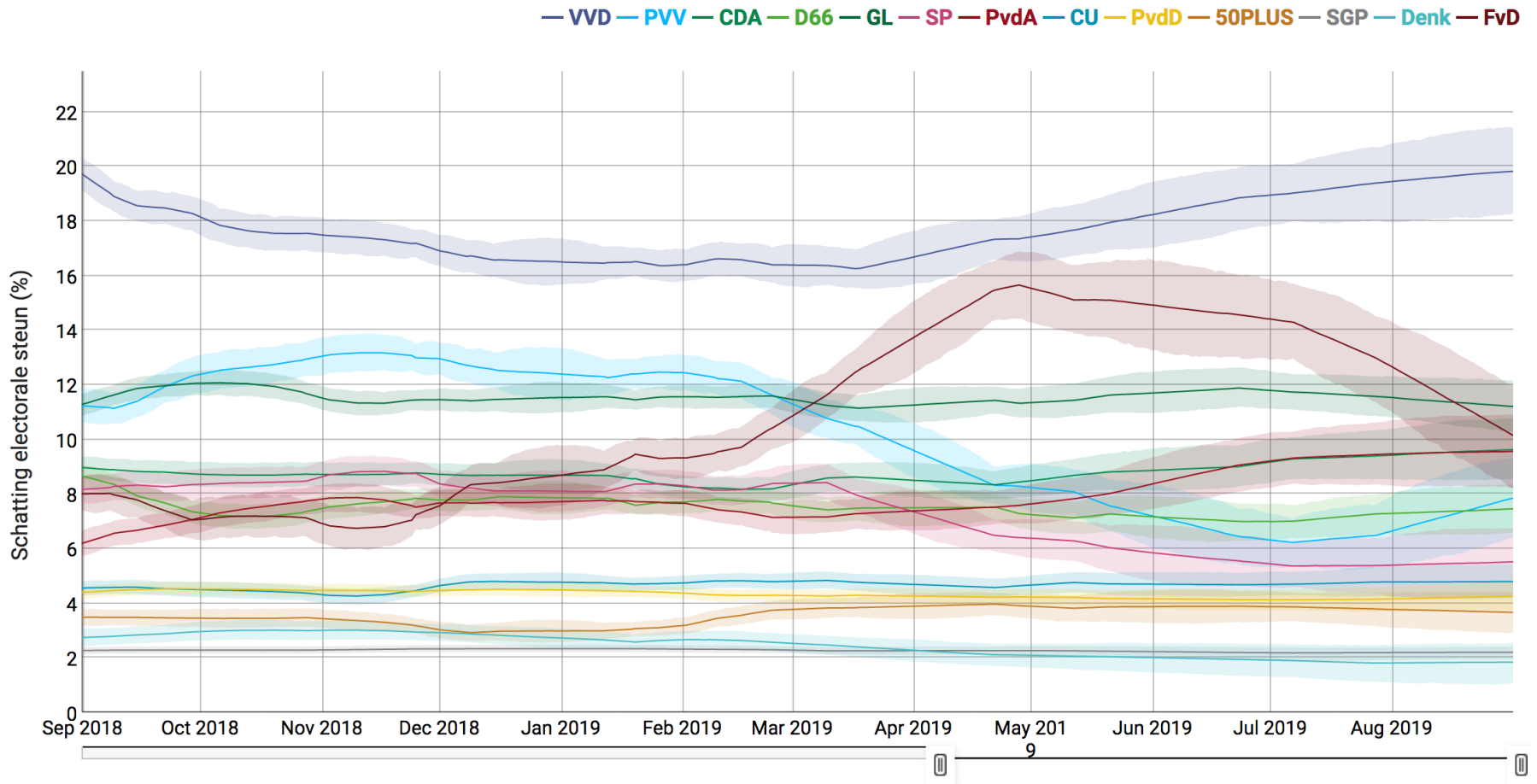


1) The ranges shown around the central projections are based on the differences between actual outcomes and previous projections carried out over a number of years. The width of the ranges is twice the average absolute value of these differences. The method used for calculating the ranges, involving a correction for exceptional events, is documented in *New procedure for constructing Eurosystem and ECB staff projection ranges*, ECB, December 2009, available on the ECB's website.

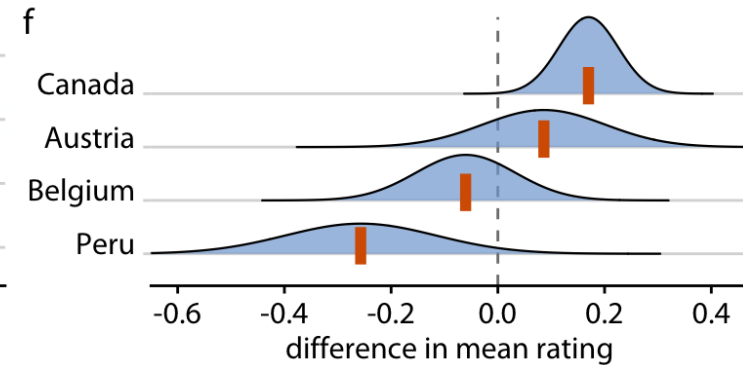
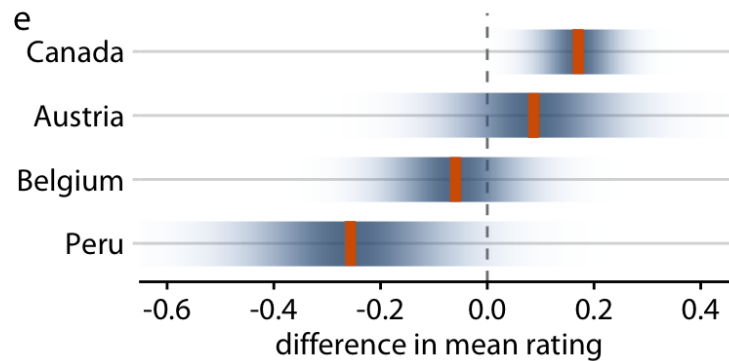
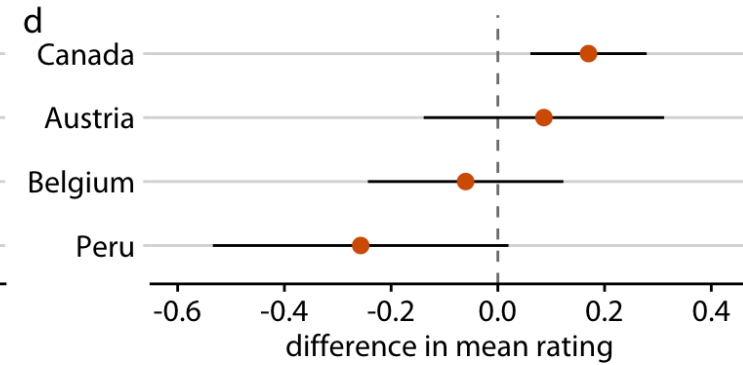
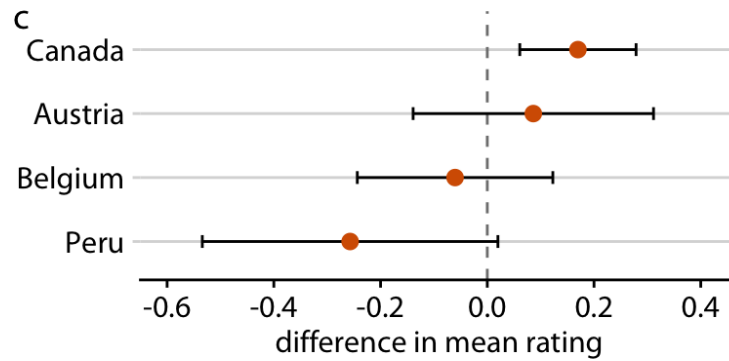
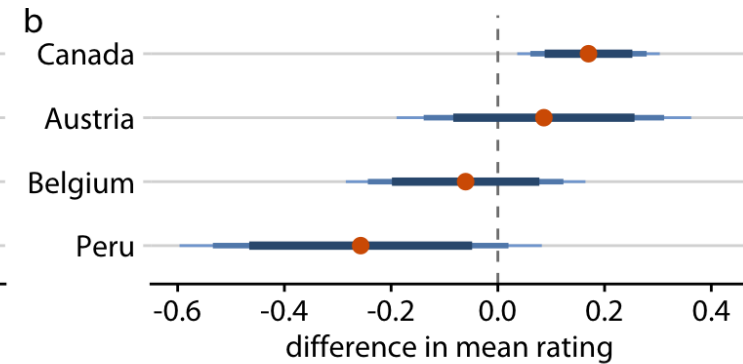
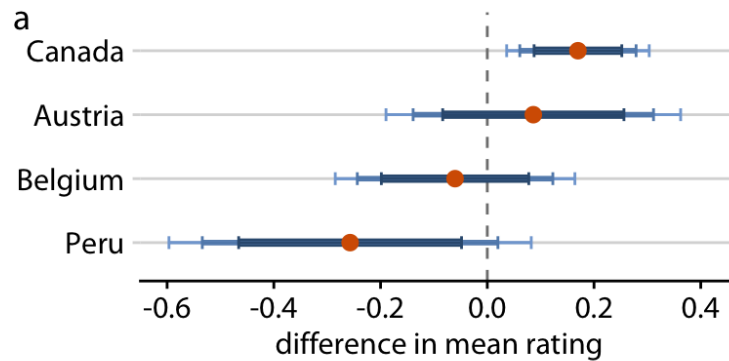
2) Working day-adjusted data.



Uncertainty Confidence bands



Uncertainty Confidence intervals





8.

INTRODUCING NEW CHART TYPES TO READERS

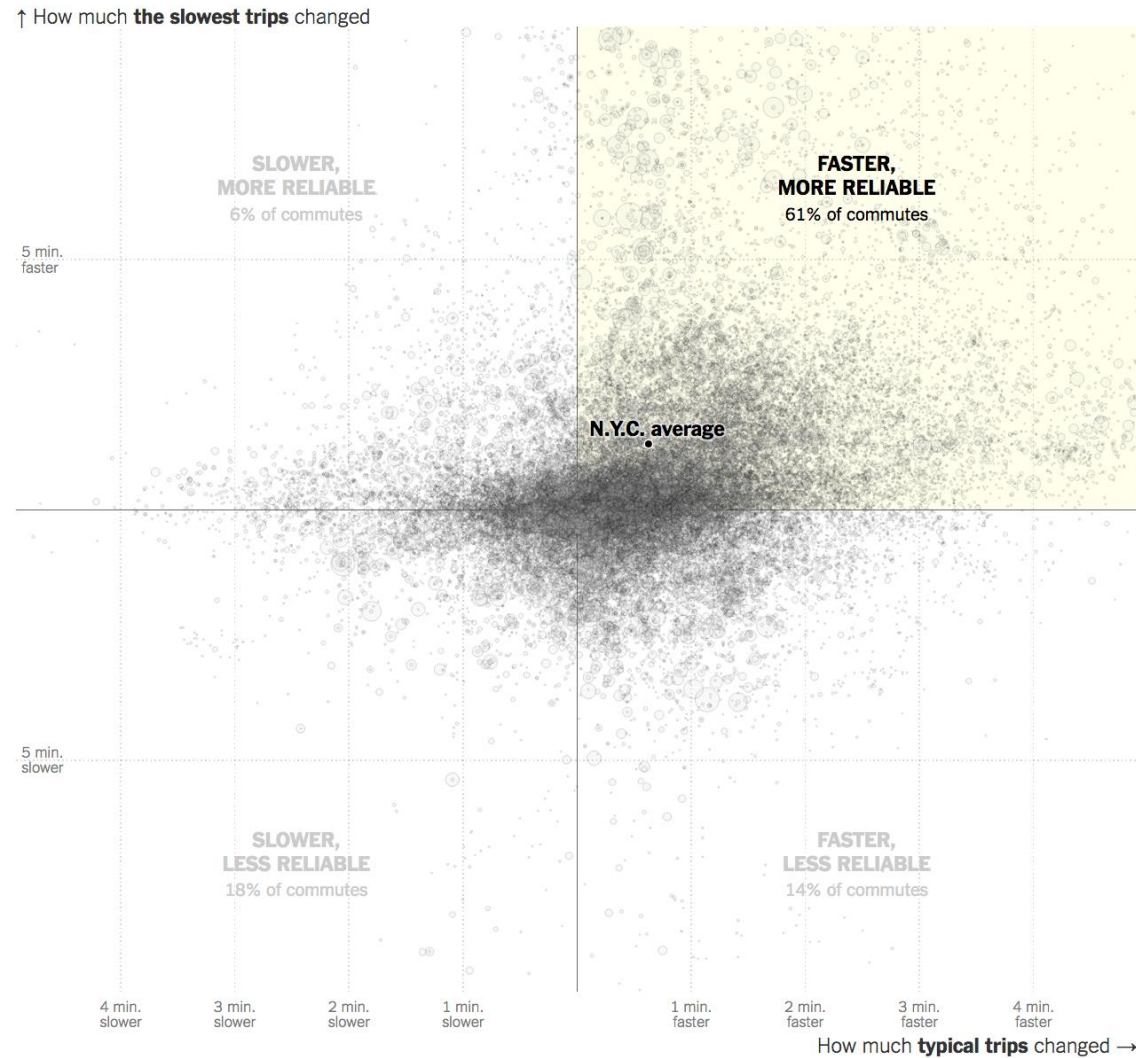


Introducing charts

Add a 'How to read this chart' description

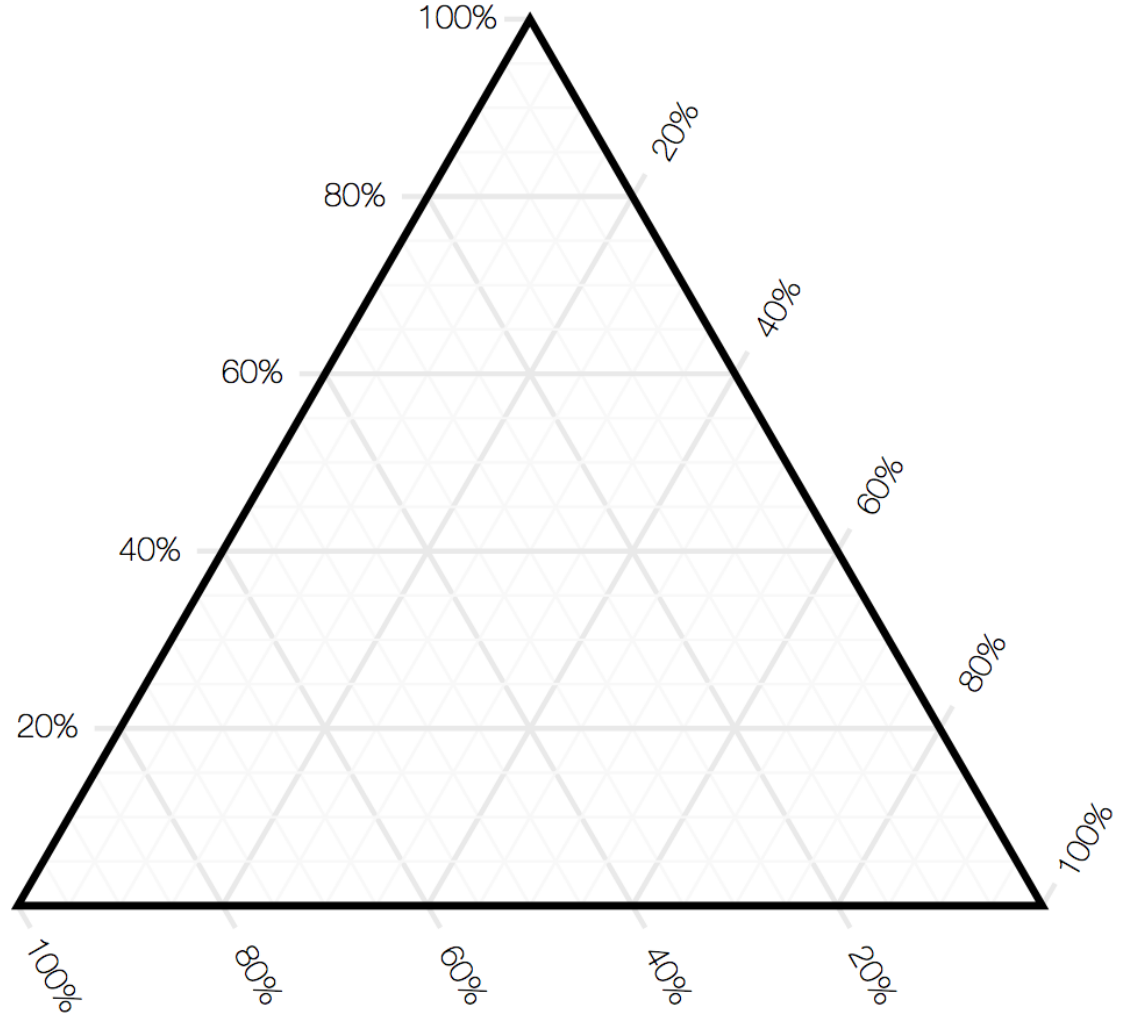
Add human readable axis labels

Add explanatory annotations



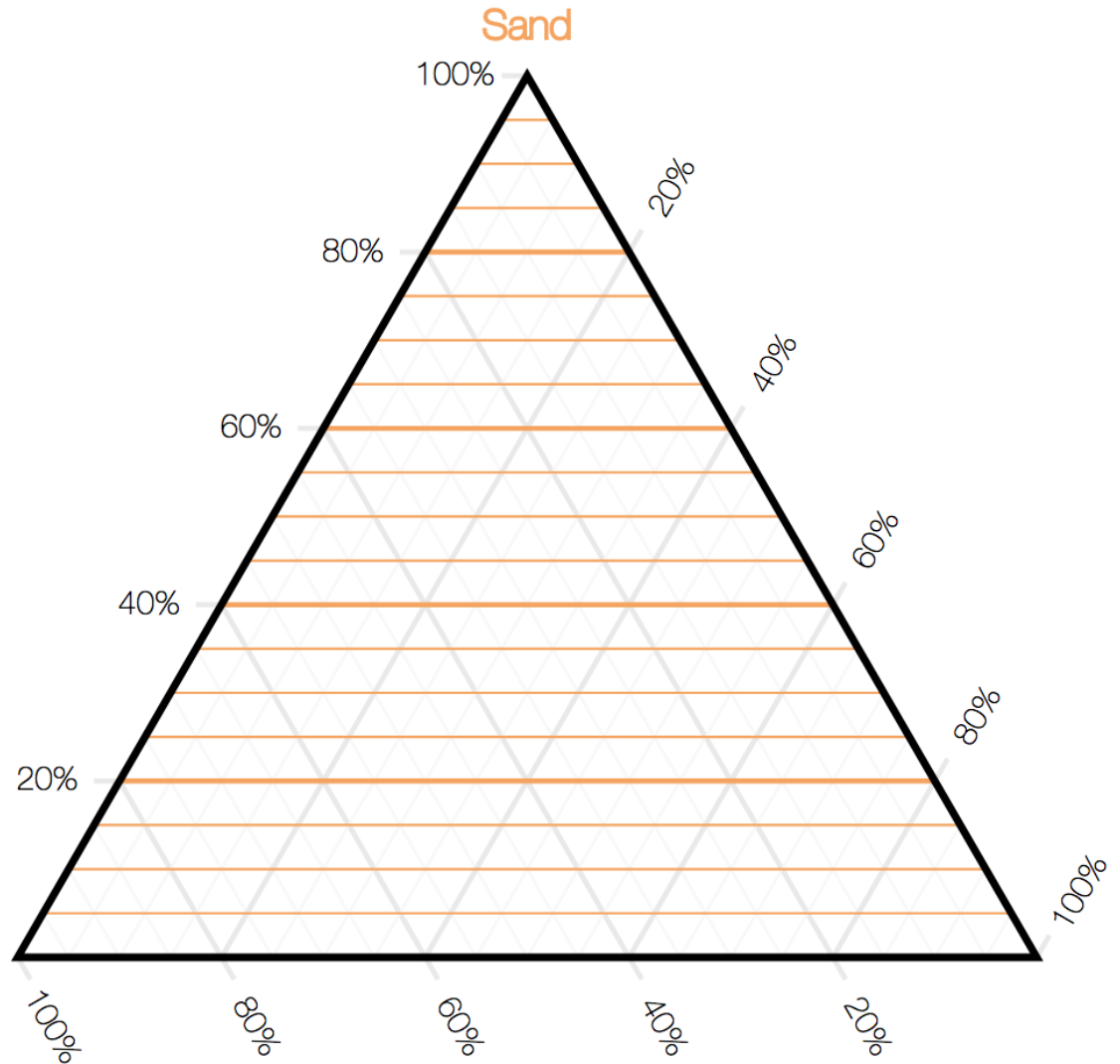
Introducing charts

Add chart elements
sequentially



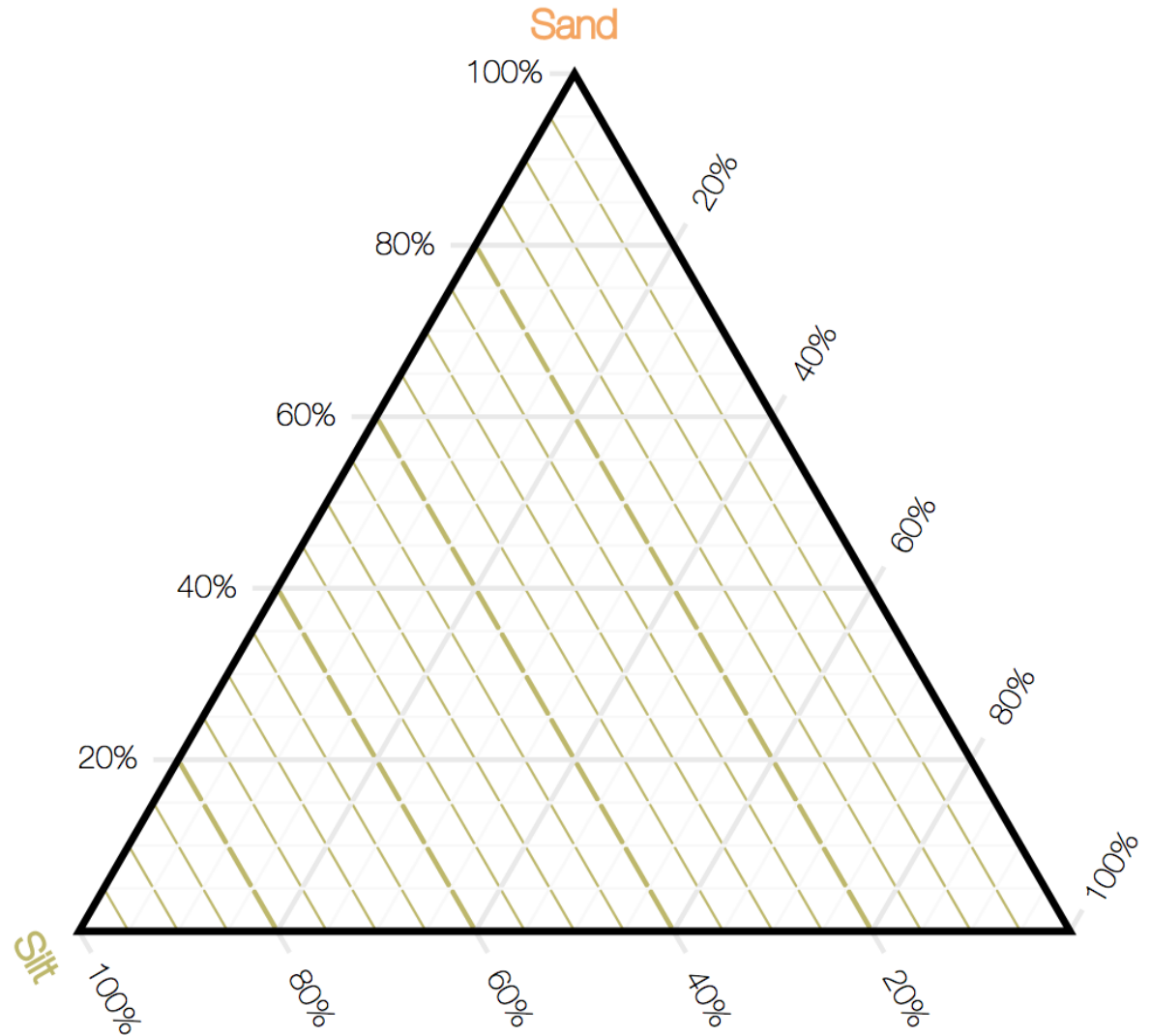
Introducing charts

Add chart elements
sequentially



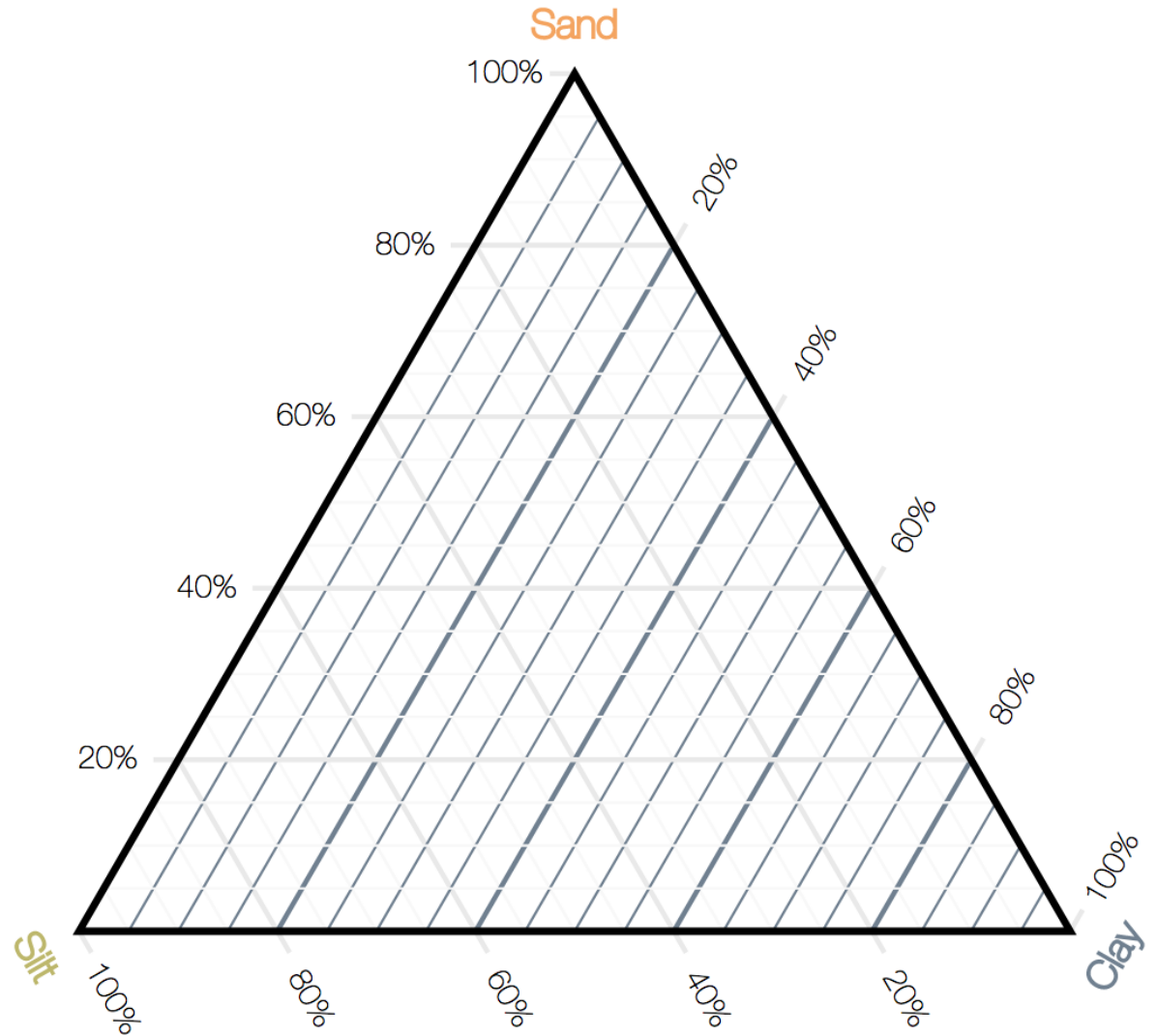
Introducing charts

Add chart elements
sequentially



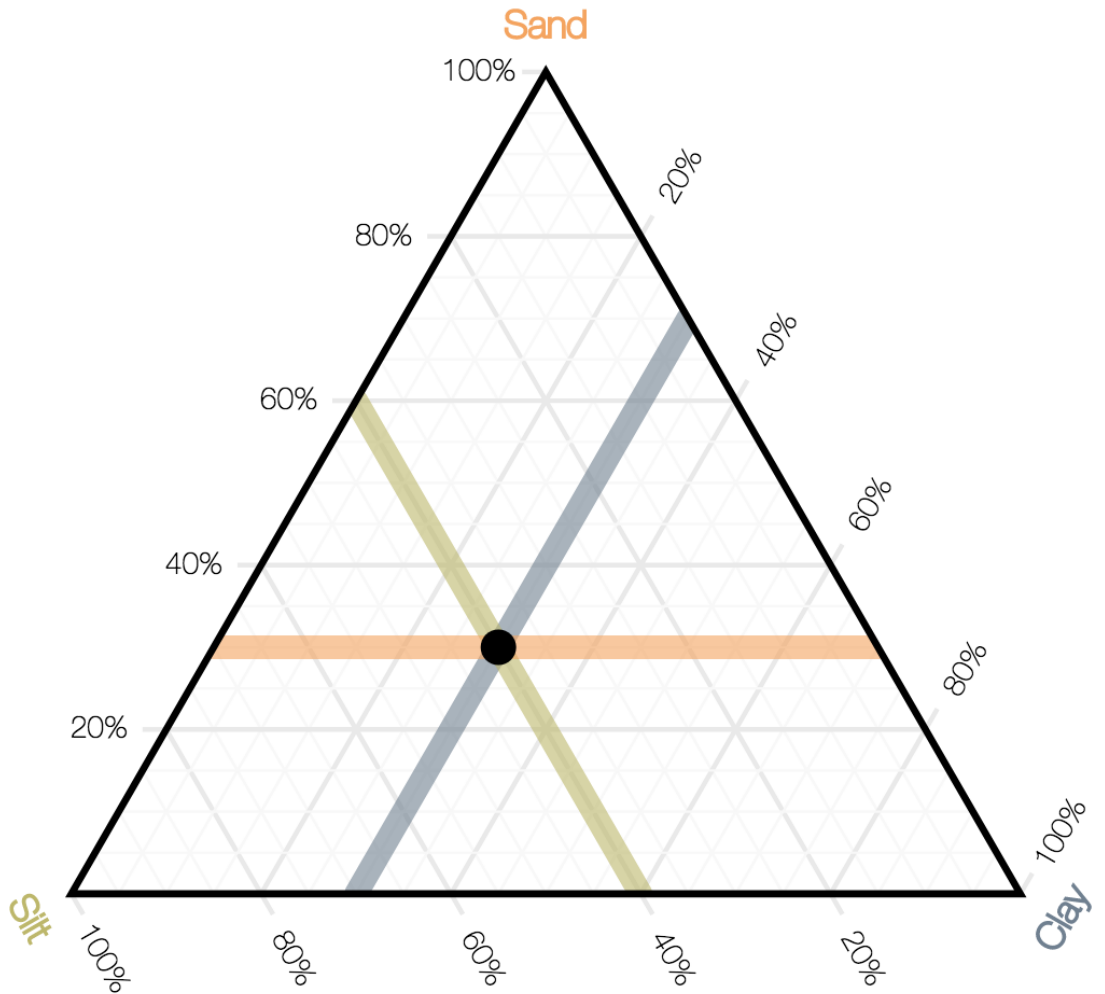
Introducing charts

Add chart elements
sequentially



Introducing charts

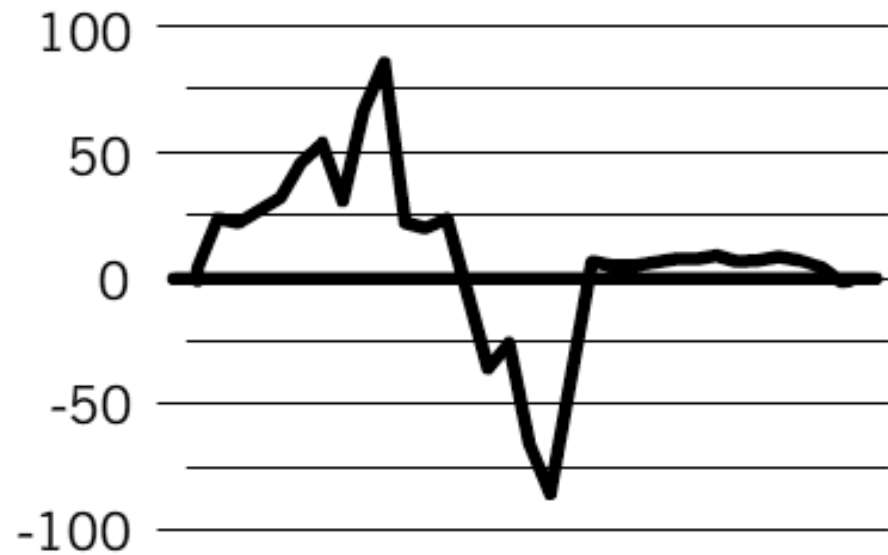
Add chart elements
sequentially



Introducing charts

Make a gif or video

[How does a Hovmöller diagram work?](#)



8.

TOOLS

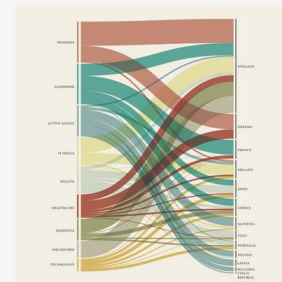
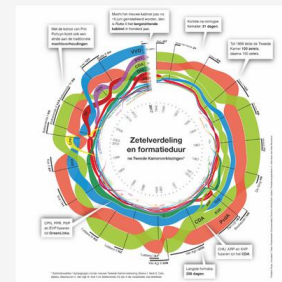
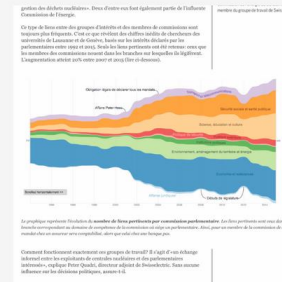
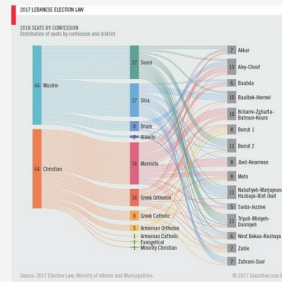
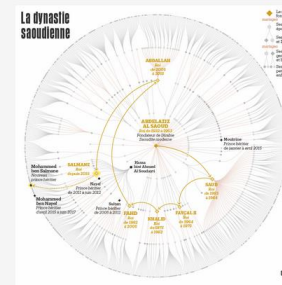
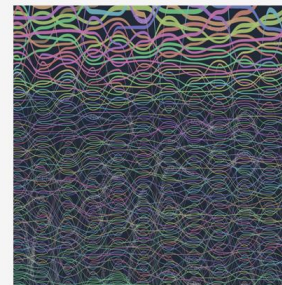
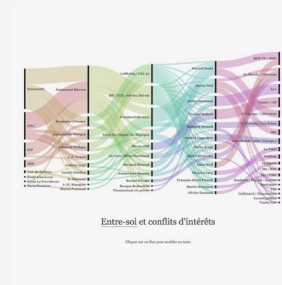
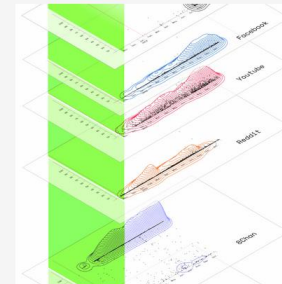
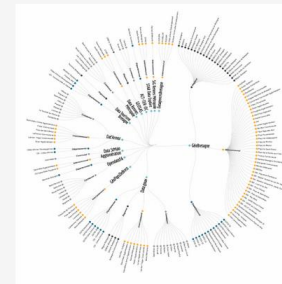
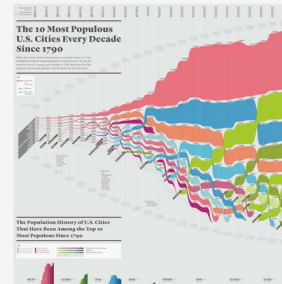


Tool

RAWGraphs

rawgraphs.io

“The missing link
between spreadsheets
and data visualisation”

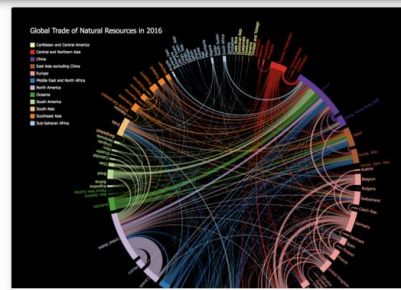


Tool

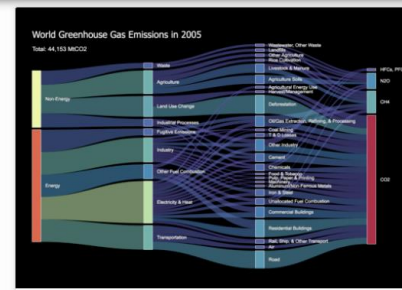
Charticulator

charticulator.com

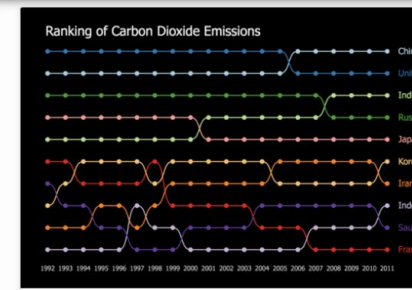
“Create bespoke chart designs without programming”



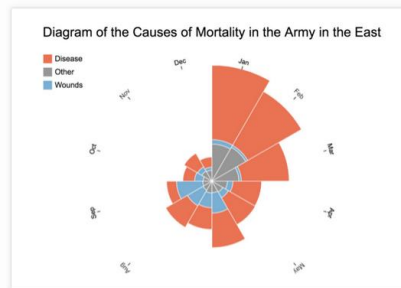
Global trade of natural resources in 2016



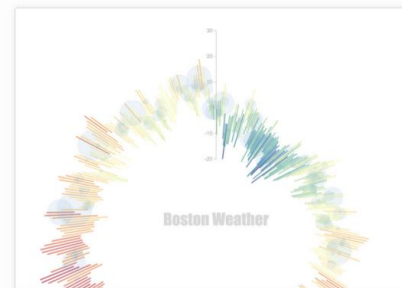
World greenhouse gas emissions



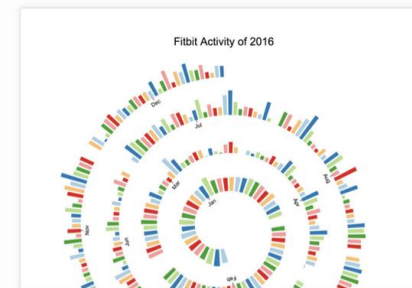
Ranking of carbon dioxide emissions of selected countries



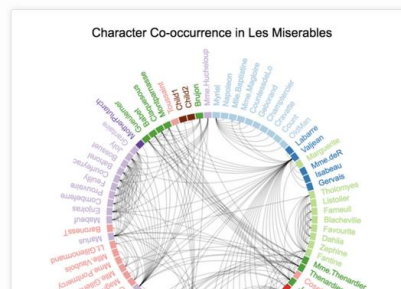
Causes of Mortality over time (Reproduction of the Nightingale chart)



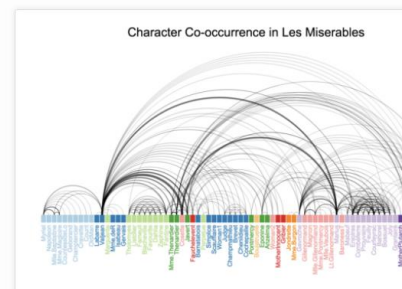
Boston weather in a year



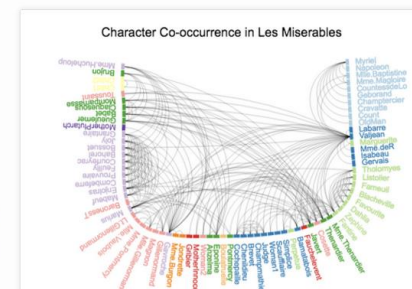
Spiral Bar Chart



Character co-occurrence in *Les Misérables* (Circular layout)



Character co-occurrence in *Les Misérables* (Linear layout)



Character co-occurrence in *Les Misérables* (A custom curve layout)

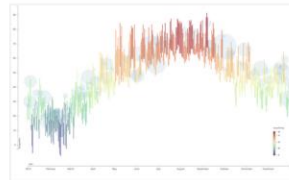


Tool

Data Illustrator

data-illustrator.com

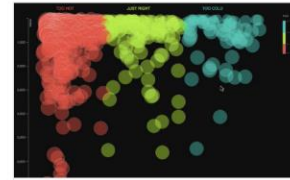
“Create infographics
and data visualisations
without programming”



Boston Weather

Daily max and min temperatures and precipitation in Boston for year 2015

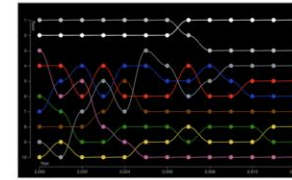
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Goldilocks Worlds

1780 confirmed planets beyond our solar system, which are habitable?

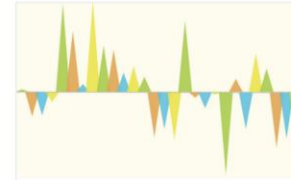
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Color Popularity in New Cars

The untangling of color popularity among new cars in North America

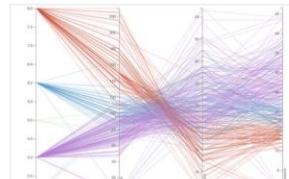
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Donors Choose

The chances of completion for projects on DonorsChoose.org

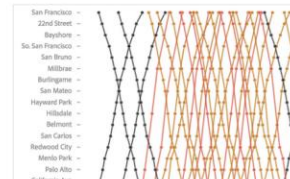
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Features of Cars

Parallel coordinates plot of features of 406 cars

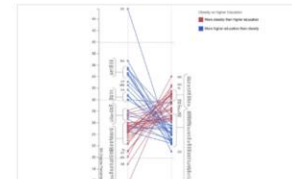
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Caltrain Schedule

Stations and arrival time information for the Caltrains

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Obesity and Education

Slope graph on percentages of obesity and higher education in US states

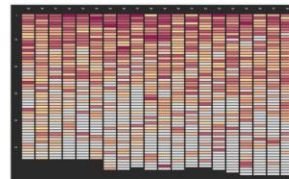
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Mobile OS Usage

Mobile operating system usage from 2008 to 2014

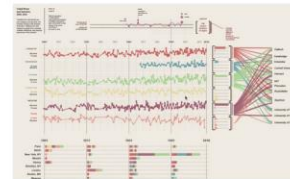
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NBA Redraft

Twenty years of NBA draft picks from 1989 to 2008

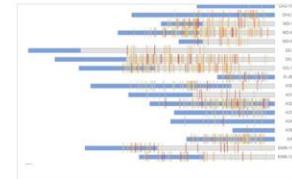
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Nobel Prizes and Laureates

All Nobel laureates in a data-rich and complex graphics

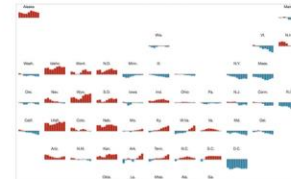
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Life of a Plane

The life span of plane models, with information on incidents and fatal injuries

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Red and Blue America

Partisan Voter Index (PVI) for each US state over the years

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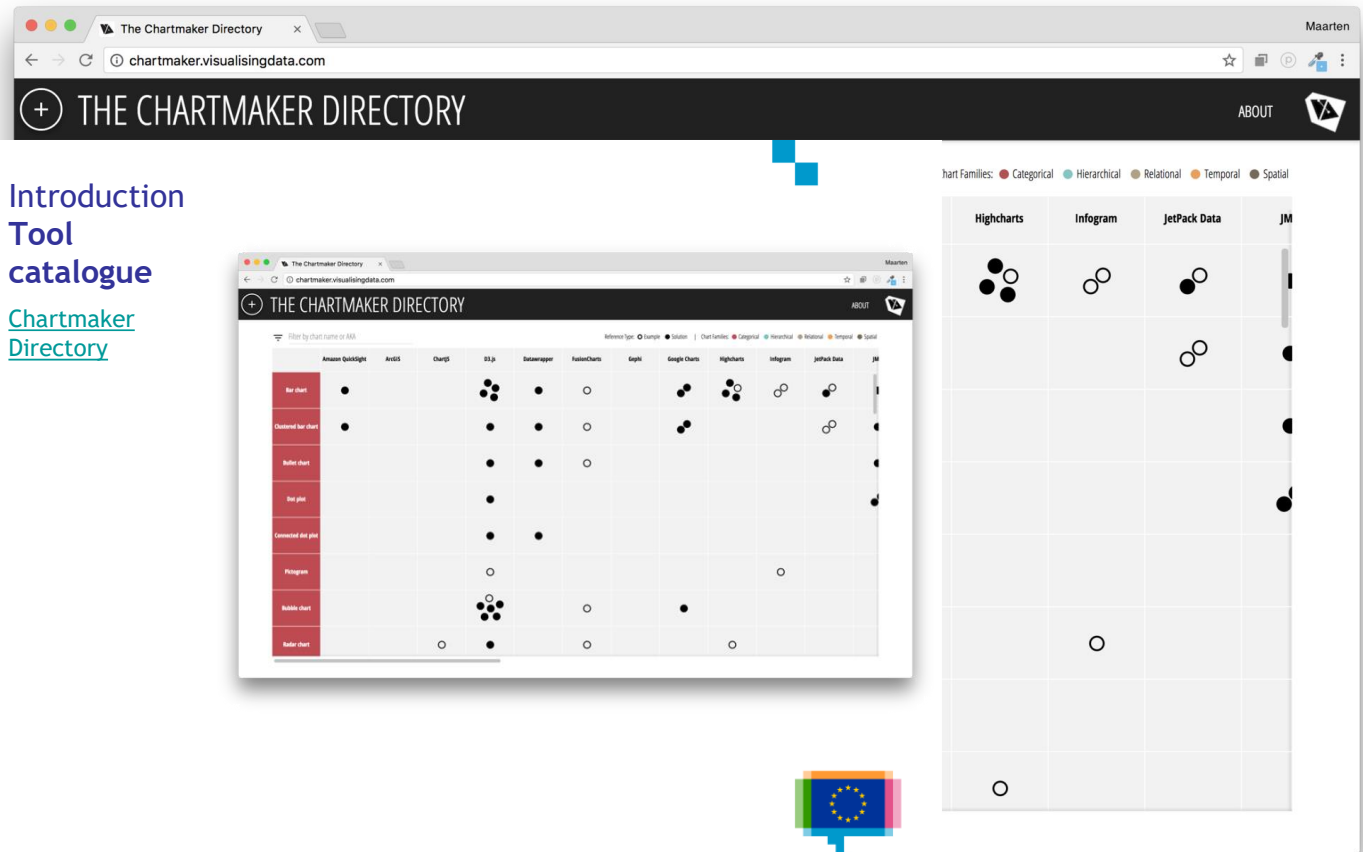


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Q&A





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