

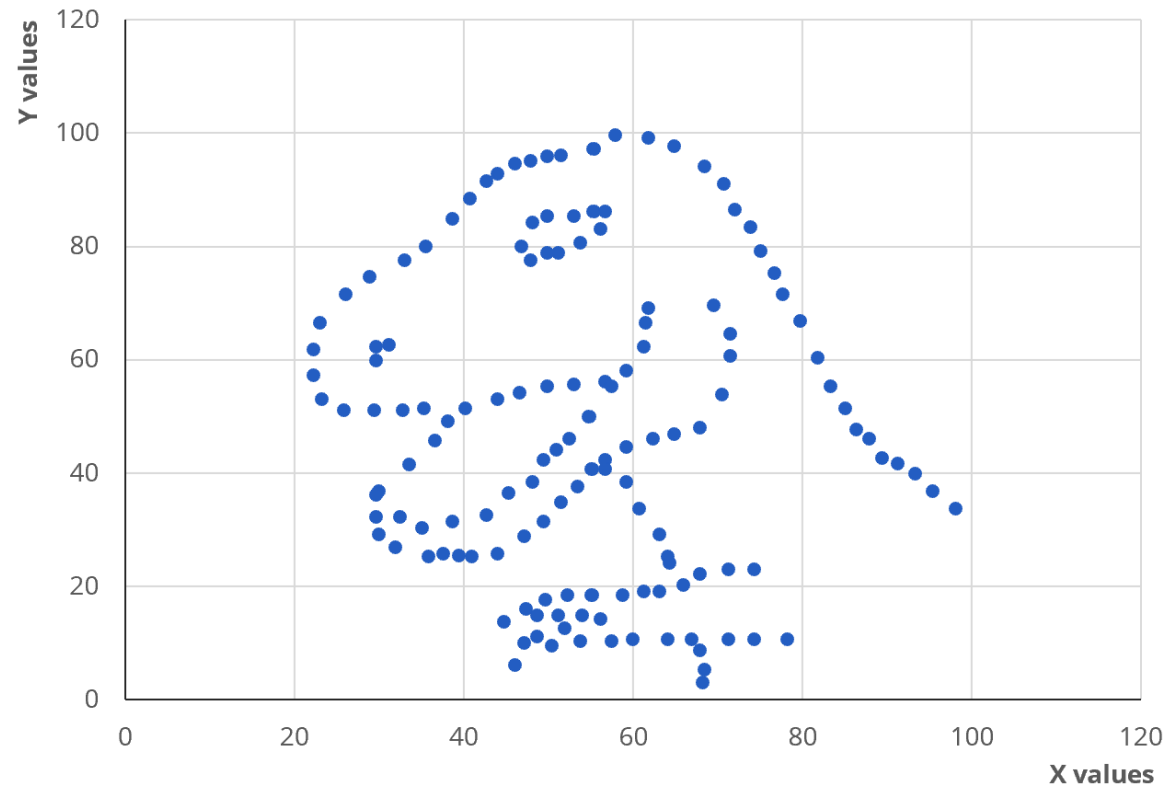
The background is a blue-tinted image of a newspaper page. At the top, a world map is visible. Below it, there's a large headline that reads "The Nobel Prize" followed by "114 years 108 prizes". There are several small portraits of people, likely Nobel laureates, arranged in a grid. The rest of the page is filled with columns of text, which are mostly illegible due to the blue tint and blurring.

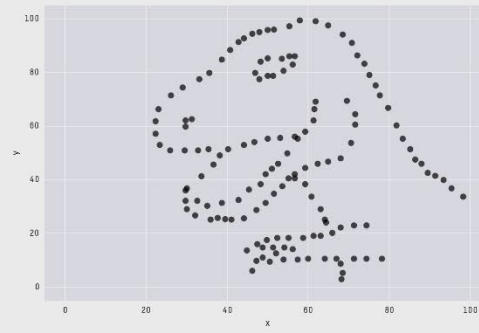
Better data visualization

Koen Van den Eeckhout - Baryon

X	Y
55.3846	97.1795
51.5385	96.0256
46.1538	94.4872
42.8205	91.4103
40.7692	88.3333
38.7179	84.8718
35.6410	79.8718
33.0769	77.5641
28.9744	74.4872
26.1538	71.4103
23.0769	66.4103
22.3077	61.7949
22.3077	57.1795
23.3333	52.9487
25.8974	51.0256
29.4872	51.0256
32.8205	51.0256
35.3846	51.4103
40.2564	51.4103
44.1026	52.9487
46.6667	54.1026

X Mean: 54.26
 Y Mean: 47.83
 X SD : 16.76
 Y SD : 26.93
 Corr. : -0.06





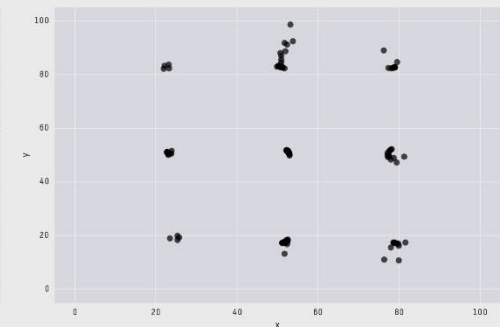
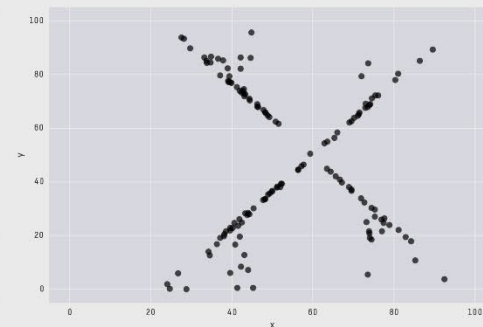
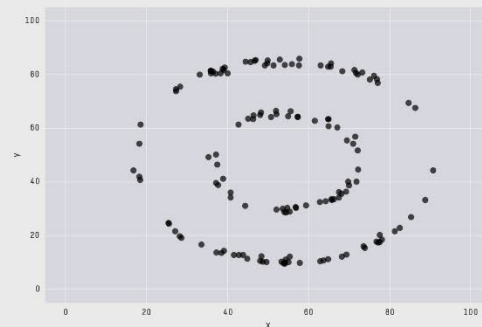
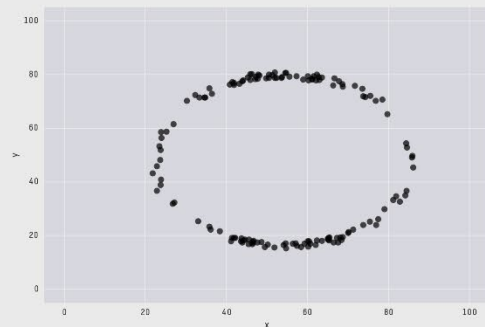
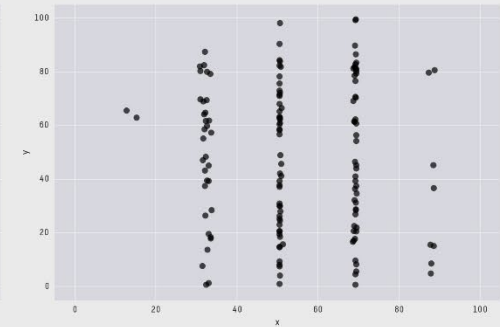
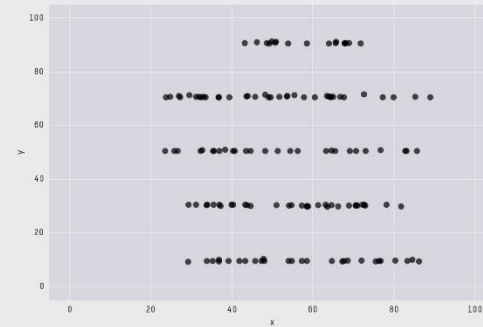
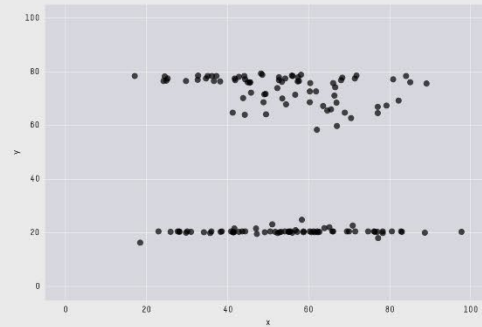
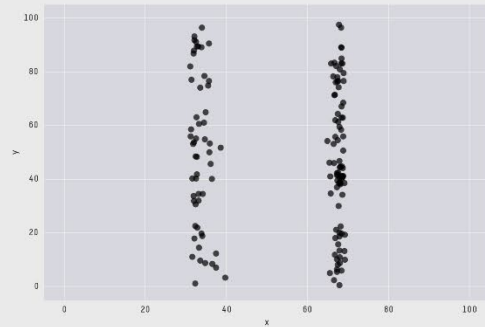
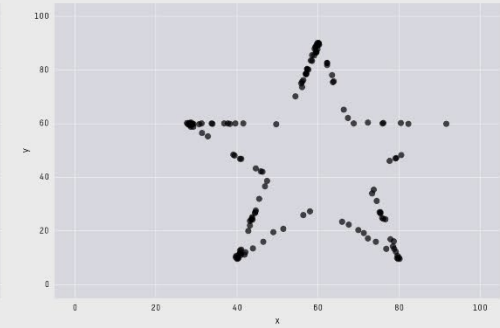
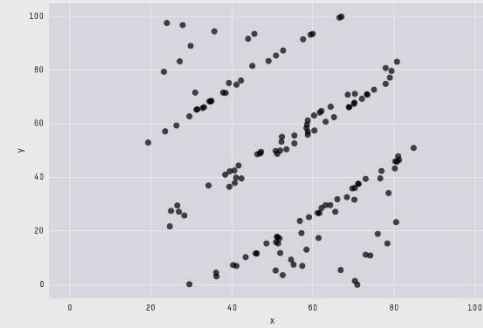
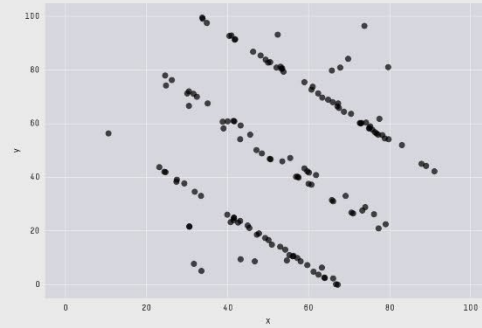
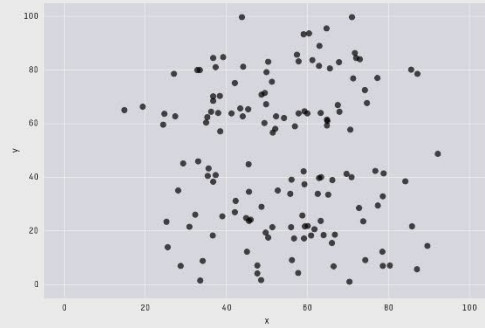
X Mean: 54.26

Y Mean: 47.83

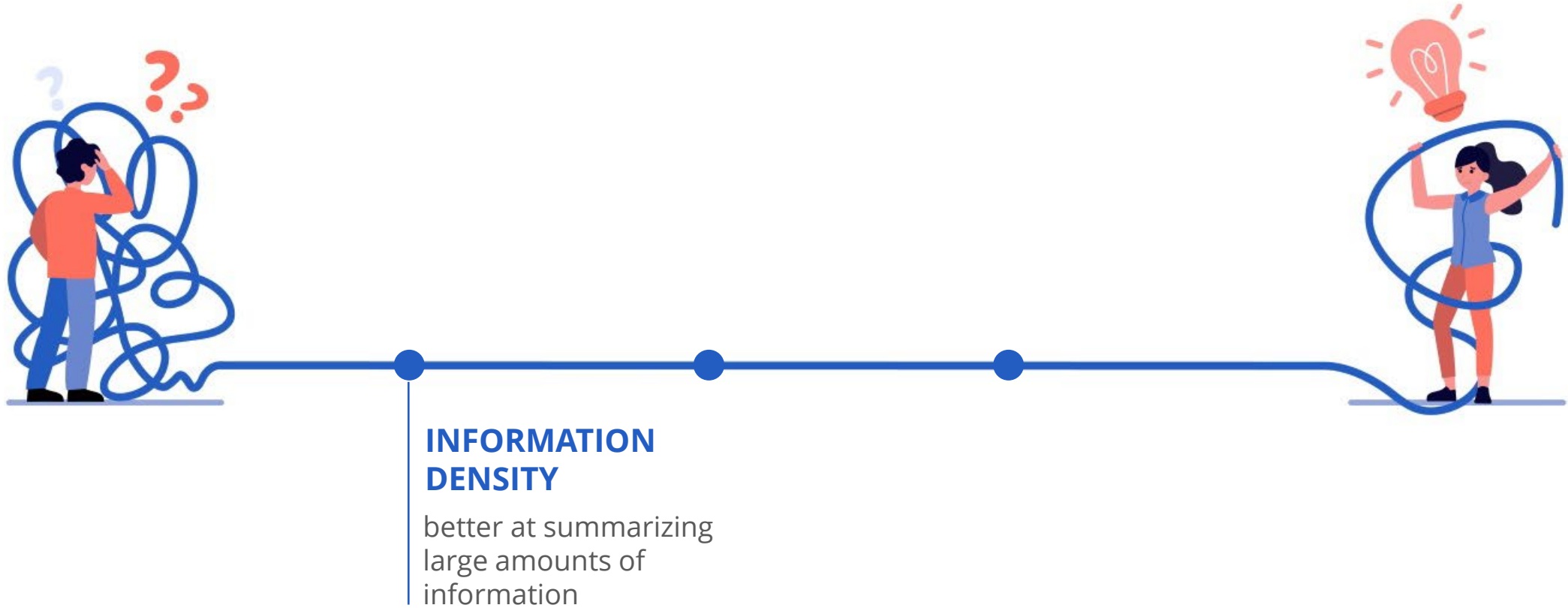
X SD : 16.76

Y SD : 26.93

Corr. : -0.06



Why visual data communication?



All the slides and all the links:

baryon.be/dataviz-resources



Introductions

2004 - 09

Engineering physics (UGent)

2009 - 13

PhD in physics (UGent)

2013 - 18

Post-doctoral researcher
Grants & incentives consultant
Founded **Baryon**

2019 - now

Expanding Baryon as an
information design agency

koen@baryon.be

Principles

What is a good data visual?

Telling a story

How charts work

Visual variables

Chart types

Beyond charts

Creating charts

Tools

Improving charts

Signal-to-noise ratio

Design components

Visualizing uncertainty

The background is a faded, grayscale image of a document, likely a Nobel Prize laureate list. It features a world map at the top with several locations highlighted in red. Below the map is a large table with many rows of text, organized into columns. To the right of the table, there are several small, square black-and-white portraits of individuals, each accompanied by a name and some text. The overall image has a historical and academic feel.

Principles

Why visual data communication?



INFORMATION DENSITY

better at summarizing
large amounts of
information

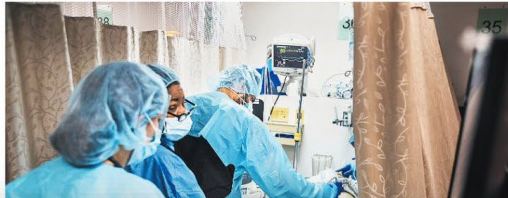
ATTRACTIVE

better at catching
the reader's
attention



Late Edition
Today, clouds giving way to some sunshine, morning rain, high 63. Tonight, clear early, increasing clouds late, low 44. Tomorrow, rain, high 52. Weather map appears on Page B16.

JOB LOSSES SOAR; U.S. VIRUS CASES TOP WORLD



New Data Shows Staggering Toll of Outbreak

This article is by Ben Casselman, Patricia Cohen and Tiffany Hsu.

More than three million people filed for unemployment benefits last week, sending a collective shudder throughout the economy that is unlike anything Americans have experienced.

The alarming numbers, in a report released by the Labor Department on Thursday, provide some of the first hard data on the economic toll of the coronavirus pandemic, which has shut down whole swaths of American life faster than government statistics can keep track.

Just three weeks ago, barely 200,000 people applied for jobless benefits, a historically low number. In the half-century that the government has tracked applications, the worst week ever, with 695,000 so-called initial claims, had been in 1982.

Thursday's figure of nearly 3.3 million set a grim record. "A large part of the economy just collapsed," said Ben Hertz, executive director of IHS Markit, a business data and analytics firm.

The numbers provided only the first hint of the economic calamity in progress. Even comparatively optimistic forecasters expect millions more lost jobs, and with them foreclosures, evictions and bankruptcies. Thousands of businesses have closed in response to the pandemic, and many will never reopen. Some economists say the decline in gross domestic product this year could rival the worst years of the Great Depression.

And there was fresh evidence on Thursday of the relentless course of the virus itself. Cases in the United States now exceed 80,000, the most of any nation, even China and Italy, according to a New York Times database. More than 1,000 deaths across the country have been linked to the virus. At least 160 million people have been infected.

Labeling Regions by Risk

President Trump told governors he planned to classify states according to the danger of coronavirus infection. Page A11.

Hospital, Visible War

plies Waning, Soldier On

They arranged one in front, like a New York One man on a ventilator for space in the ward, before paramedics heart attack patient, pointed to beds re- virus emergencies, a newly constructed re- suspected virus "our safe area," she use. Then she coe- (This is thought to e was really no way ed on Page A14

e You Out to the Ballgame

game between the New York Gotham and the Cincinnati Reds mattered, but in ineffable ways beyond the columns of wins and losses. It mattered so much that complaints about baseball's slow pace yielded to the universal wish that this game would last forever.

"I could've played into the night," said the redeemed Gotham left fielder Sammy Sosa, who missed part of last season after sneezing so hard that he strained a ligament in his back. "I didn't

Continued on Page A12

A Fan Writes a Fantasy for Opening Day

From the moment the first batter tipped his helmet — and a bird flew out — to the walk-off home run by a laboring pinch-hitter, this 11-inning affair redefined what constitutes a perfect game. No one cared about the outcome; the distraction was reward enough. Don't misunderstand. This

Continued on Page A12

THE NEW YORK TIMES

By DAN BARRY

Professional baseball greeted a new season this afternoon with an Opening Day game for the ages, an extra-timely masterpiece that vividly unfolded on the sun-dappled field of the imagination. The crack of the bat could almost be heard, the blur of white almost seen, the communal joy nearly felt.

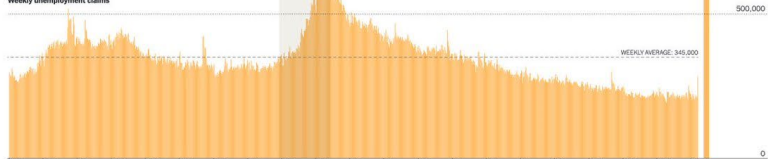
2008 RECESSION

Continued on Page A16

order medical supplies on Amazon after its leaders, lacking experience in disaster response, failed to prepare for the onslaught of patients at its medical centers. Ever since President Trump came into office, a record high turnover and unfilled jobs have emptied offices across wide sections of the federal bureaucracy. Now, current and former administration officials and disaster experts say the coronavirus has exposed those failings as never before.

Continued on Page A16

Weekly unemployment claims



Note: Official figures are seasonally adjusted. Source: Department of Labor

THE NEW YORK TIMES

BUSINESS B1-9

Armed With Sewing Machines
With hospitals desperate for masks, people are putting out their sewing machines to fill the void. PAGE B4

A Gusher Can't Be Contained
A chaotic mismatch between supply and demand for oil means the world is running out of places to store it. PAGE B9



PAGE A18

INTERNATIONAL A18-20

Maduro Is Indicted in U.S.
Federal prosecutors accused the Venezuelan president, whom the U.S. no longer recognizes, of participating in a narco-terrorism conspiracy. PAGE A20

Netanyahu Rival Relents
The Israeli prime minister was set to maintain power after his rival reversed course, citing the pandemic. PAGE A19

Brushing Aside a Slaughter
Russia and China, which often revel in grudges against other countries, are employing selective memory to address a massacre that occurred on their border in 1990. PAGE A19

NATIONAL A21-23

New Focus on Health System
The pandemic gives added urgency to a central issue that was already a main talking point for Joseph R. Biden Jr. and other Democrats. PAGE A21

Starting Over on Foster Care
A lawsuit led New Mexico to remake its failing system into one advocates hope will serve as a national model. PAGE A22

SPORTS/FRIDAY B1-15

Slow to Embrace a Delay
Athletes question why U.S. Olympic leaders took so long to join calls to postpone the Tokyo Games. PAGE B1

WEEKEND ARTS C1-16

For Pint-Size Paleontologists
Like dinosaurs? Have crayons? Take a peek at two pages inspired from The New York Times for Kids. PAGE C3

It's Virtually Perfect
Donald Judd's installation, below, at the Guggenheim Gallery is impressive, in person or, for now, online. PAGE C13



OBITUARIES A24-25

Chronicle of U.S. History
Richard Blevins's books on Nixon, Clinton and others could be as inspiring as his column. He was 83. PAGE A24

Globetrotters' Dean of Drizzle
Fred "Clucky" Neal dazzled fans with his ball-handling wizardry in more than 6,000 games. He was 77. PAGE A25

EDITORIAL, OP-ED A26-27

Paul Krugman PAGE A27



Why visual data communication?



INFORMATION DENSITY

better at summarizing large amounts of information

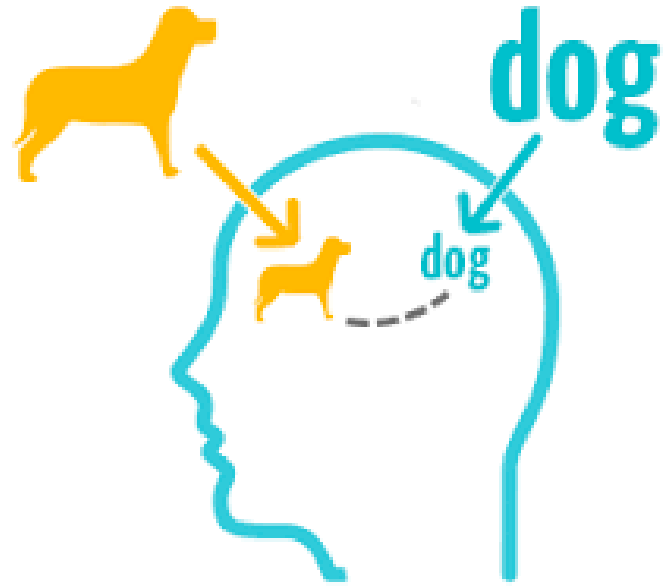
ATTRACTIVE

better at catching the reader's attention

EASIER TO UNDERSTAND

thanks to dual coding and better knowledge retention





DUAL-CODING THEORY

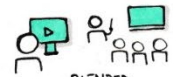
a combination of
visual stimuli (pictures) and **verbal stimuli** (words)
stimulates the brain to make connections

Meester App

ONDERWIJSTECHNOLOGIE ANNO 2018

WETENSCHAPS-
CAFÉ

25 SEPTEMBER
★ 2018



• BLENDED
LEARNING •



• FLIPPING
THE CLASSROOM •



• MOOCs •



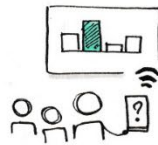
• VIRTUAL
REALITY •



• DIGIBORD •

POPULAIRE TYPES
ONDERWIJSTECHNOLOGIE

GROB-
POTENTIEEL!



ACTIEF
MAKEN VAN
HOORCOLLEGES

STEM-
BANKJES

SILENT
QUESTIONS



ENKEL
LEERKRACHT

OF



ENKEL
TECHNOLOGIE

OF



LEERKRACHT
+ TECH

BESTE
OPTIE!



PROFESSIONALISERING

DE SLEUTEL OM
LEERMOTIVATIE DOOR
ONDERWIJSTECHNOLOGIE
TE DOEN STUGEN



MOTIVATIE

DANKZIJ
TECHNOLOGIE



VALKUILEN

- DUUR
- TIJDSINTENSIEF
- NIET ELKE LEERLING
HEEFT TOEGANG
- HOE BEST INZETTEN?
- BLOKKEN VAN 50 MINUTEN
- OVERVOLLE LEERPLANNEN
- AFLEIDING

LOOP ROND
ALS LEERKRACHT
EN LEG DE
VOORDELEN UIT

• ONGELUKHEID
VERSTERKEN

• MINDSET EN
EXPERTISE

ZELDEN
EEN
PROBLEEM!



Tammy
SCHELLENS

UNIVERSITEIT GENT



Els
DE LATTIER

ARTEVELDEHOGESCHOOL

! meer cafés op
WWW.WETENSCHAPSCAFÉ.BE



Sketchnoting:

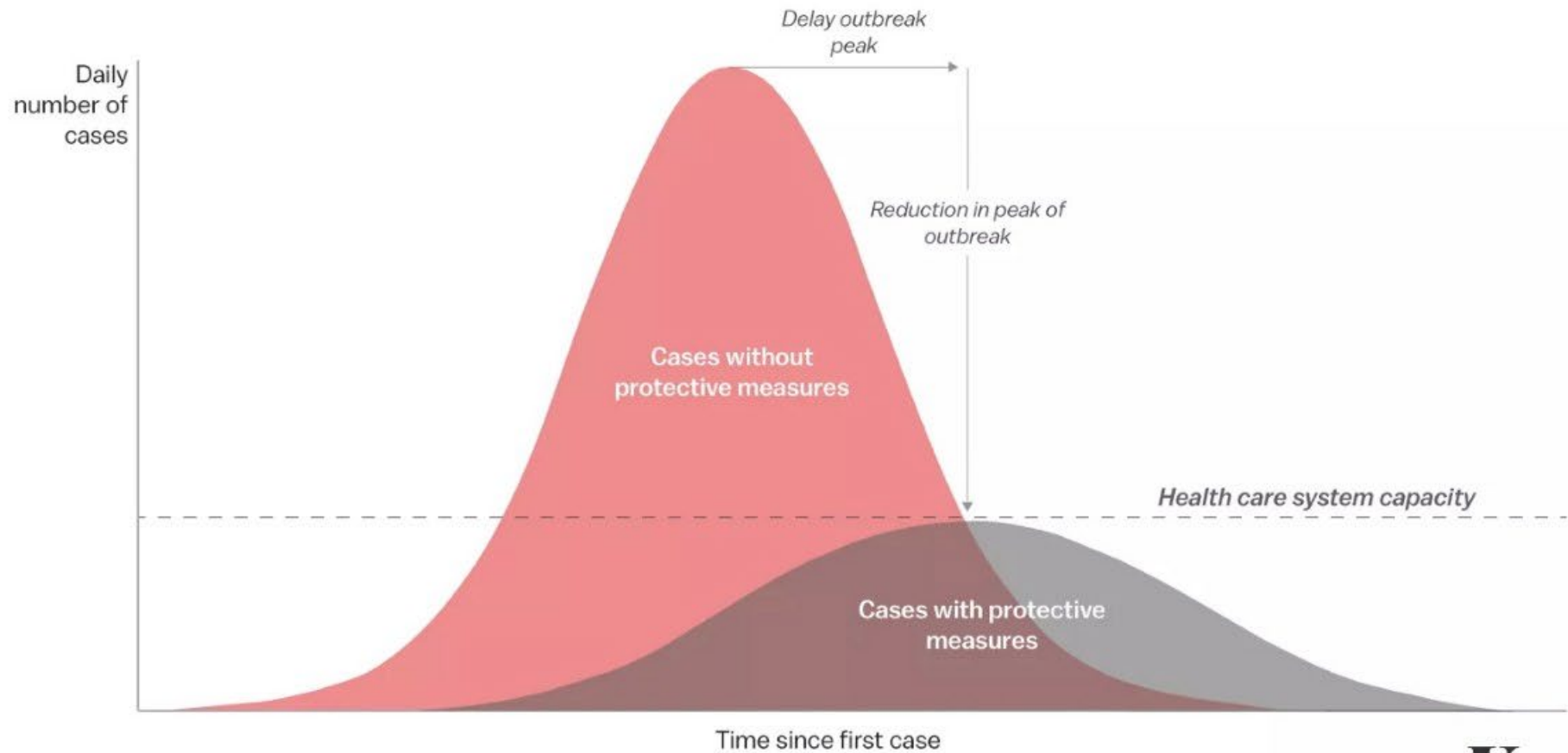
@koen_vde

www.baryon.be

SKETCHNOTING

combining simple illustrations
with small amounts of text
= a great way of note-taking

Flattening the curve



Source: CDC

Vox

How should I protect myself?

There are some basic precautions you can take, which are the same as what you should be doing every day to stave off other respiratory diseases. You've seen the guidance before: Wash your hands. Cover your nose and mouth when you sneeze. And when you stay home from work or school and drink lots of fluids.

The CDC recommends washing with soap and water for at least 20 seconds after using the bathroom, before eating and after blowing your nose or sneezing. It also advises not to touch your eyes, nose, or mouth, and to clean objects and surfaces you touch often.

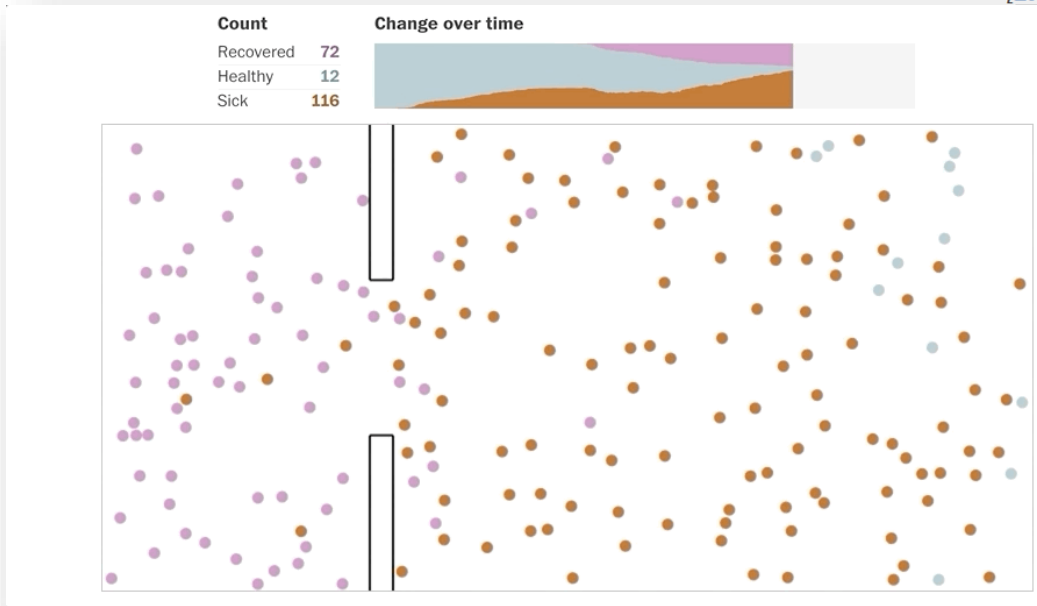
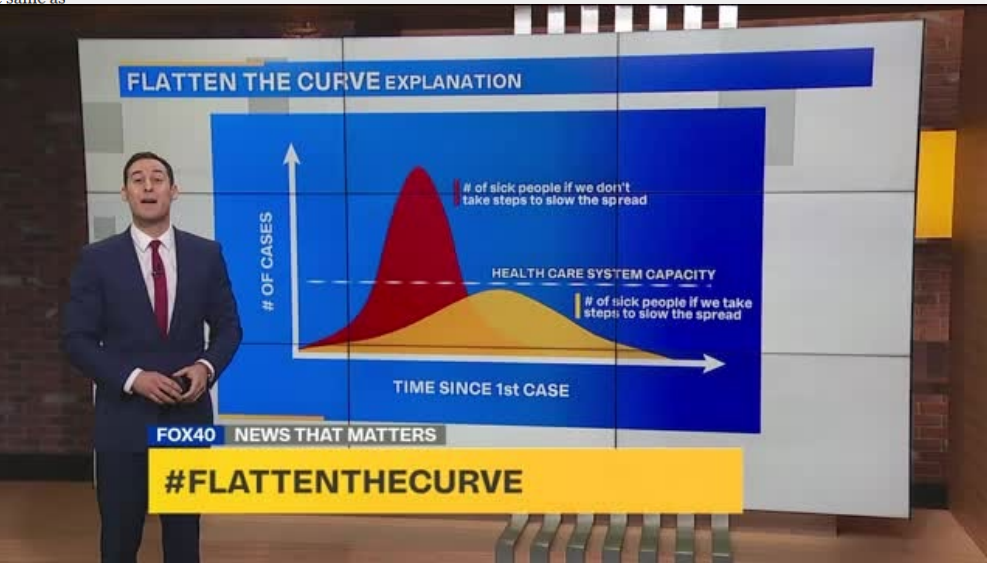
[Read more about preparing for coronavirus here.](#)

[Return to top](#)

Where has it spread in the world?



Country	Change from Sept. 21			
	Reported cases ▼	Total	Pct.	Deaths
U.S.	7,082,976	▲ 272,069	+4%	204,370
India	6,074,702	▲ 587,122	+11%	95,542
Brazil	4,732,309	▲ 187,680	+4%	141,741
Russia	1,154,299	▲ 49,251	+4%	20,299
Colombia	813,056	▲ 47,980	+6%	25,488
Peru	800,142	▲ 31,247	+4%	32,142
Mexico	730,317	▲ 29,737	+4%	76,430



Why outbreaks like coronavirus spread exponentially, and how to “flatten the curve”

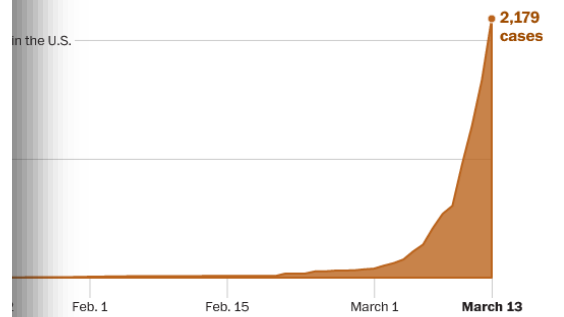
By Harry Stevens March 14, 2020

PLEASE NOTE

The Washington Post is providing this story for free so that all readers have access to this important information about the coronavirus. For more free stories, [sign up for our daily Coronavirus Updates newsletter.](#)

After the first case of covid-19, the disease caused by the new strain of coronavirus, was announced in the United States, reports of further infections trickled in slowly. Two months later, that trickle has turned into a steady current.

[\[Lea en español | Leggi in italiano | اقرأ هذا المقال بالعربية | Lire en français | 日本語で読む | به فارسی بخوانید | Leia em português | В русском | Lesen Sie auf Deutsch | Lees in het Nederlands | Prečitajte si po Slovensky | বাংলায় পড়ুন | हिंदी में पढ़ें\]](#)



explore the number of cases over time.

called **exponential curve** has experts worried. If the number of cases were to continue to double every three days, there would be about a hundred million cases in the United States by May.

WashPost PR Blog

The Washington Post to expand graphics and design teams with 14 new positions

The new roles will allow The Post to produce more visual journalism in response to news developments.

By WashPostPR

June 26, 2020



The Washington Post today announced plans to add 14 new positions to its design teams, expanding its visual journalism to communicate information in new and powerful ways. The job postings will be accessible at careers.washingtonpost.com in the coming weeks.



NIEUWS > DOSSIERS

Het jaar in datajournalistiek



©Mediafin

28 december 2020 12:02

De beste datavisualisaties en -analyses waar De Tijd dit jaar aan gewerkt heeft.

Sign in

Contribute →

The Guardian
For 200 years

News Opinion Sport Culture Lifestyle



Guardian Masterclasses

Data visualisation: A six-week visual storytelling programme

Over six consecutive weeks, this high-impact and practical workshop will give you the tools to transform your datasets into stunningly memorable visuals - with experts Adam Frost and Tobias Sturt

Online workshop

Dates: Six consecutive Thursdays, from 4 November until 9 December 2021

Times: 2pm-5pm (GMT)



Off the Charts launches next week. It's a newsletter containing the best of our data journalism from the team behind @EconDailyCharts. Sign up: econ.st/3qhaNGW

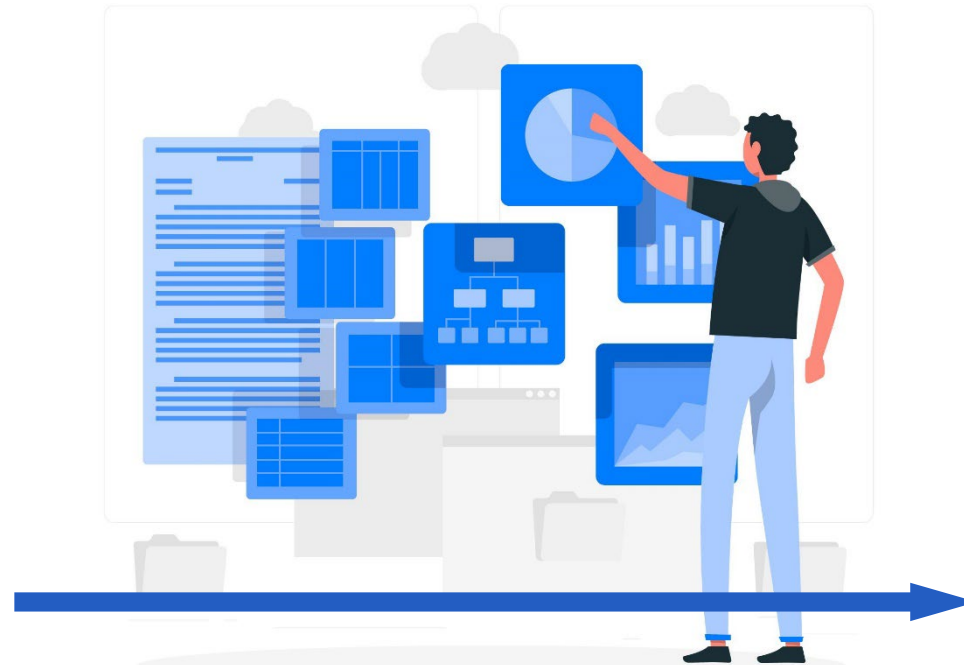
[Tweet vertalen](#)

We're launching a data newsletter

Off the Charts

The Economist

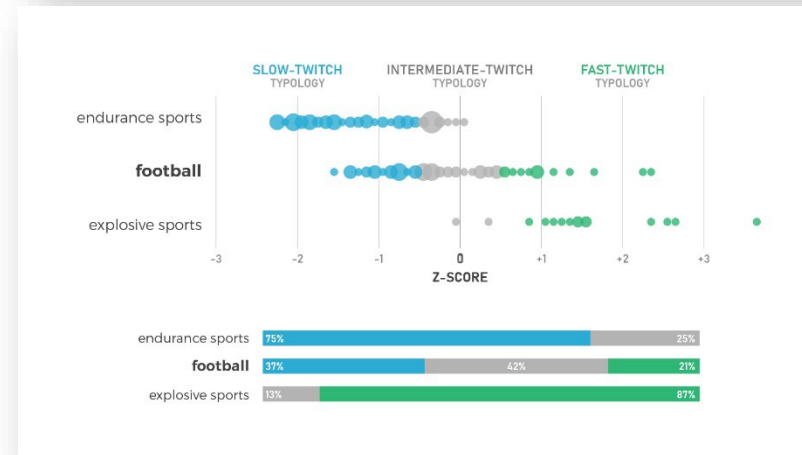
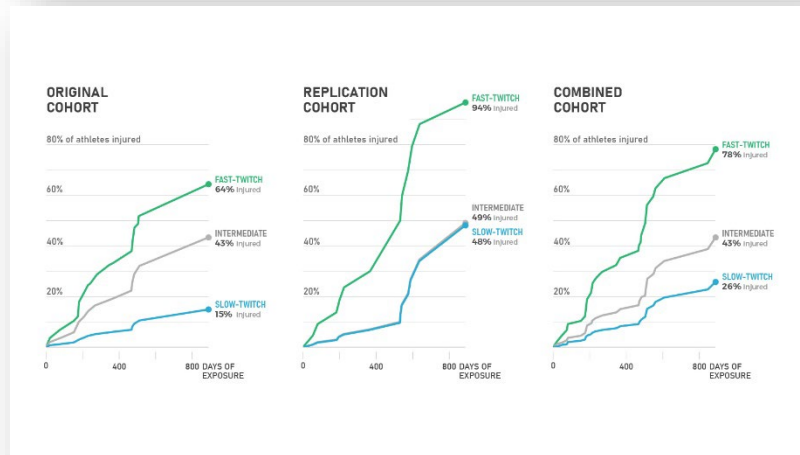
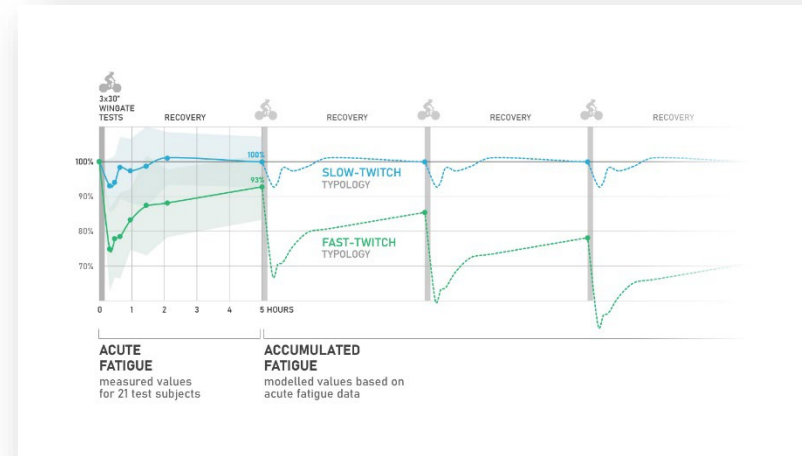
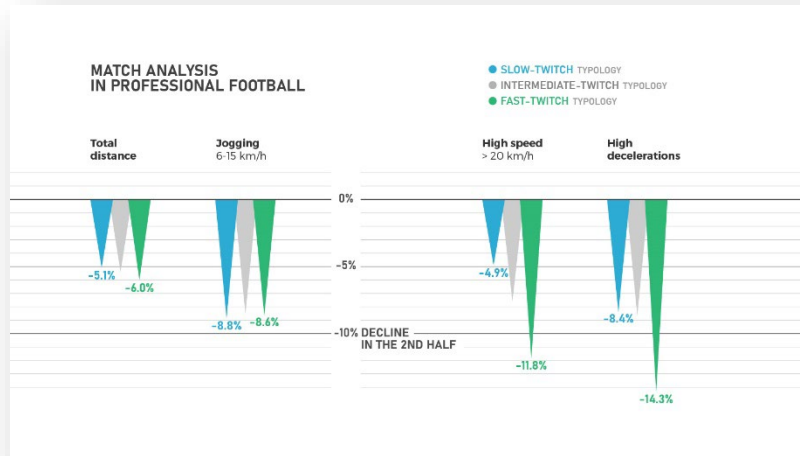
journalists
financial institutions
researchers
marketing agencies
organisations
governments
technical start-ups
food producers
mobile health apps
...



complex insights
large amounts of data
technical information

readers
clients
general public
platform users
members
consumers
patients
students
management
...

What is a good data visualization?



What is a good data visualization?

Group exercise (20 minutes)

Each group receives 8 **data visuals** to discuss

As a group, choose your **most** and **least favorite data visual** and explain **why**

What is a good data visualization?

Group discussion

A good chart shows the data,
a great chart tells a story

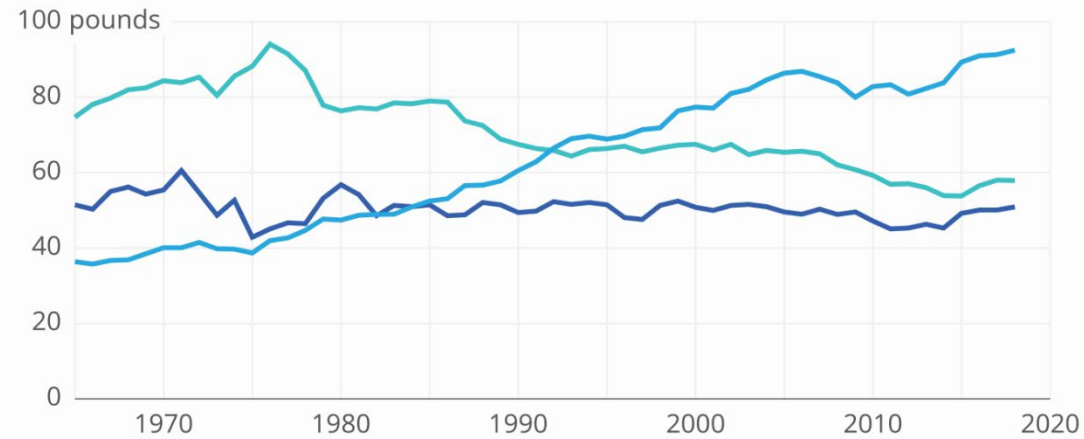
~~data~~



story

US per capita consumption of poultry and livestock

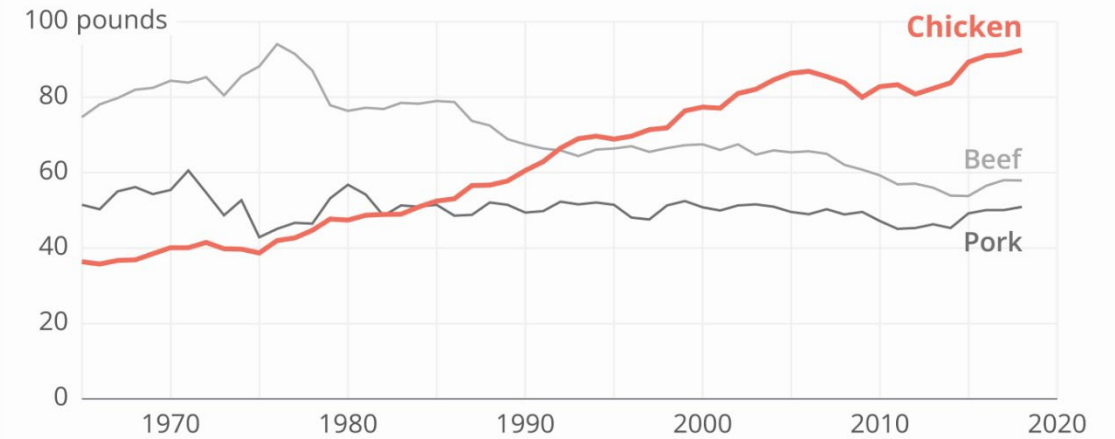
■ Pork ■ Beef ■ Chicken



Data: National Chicken Council

Americans are eating more chicken than ever before

U.S. per capita consumption of chicken has more than doubled since 1965.



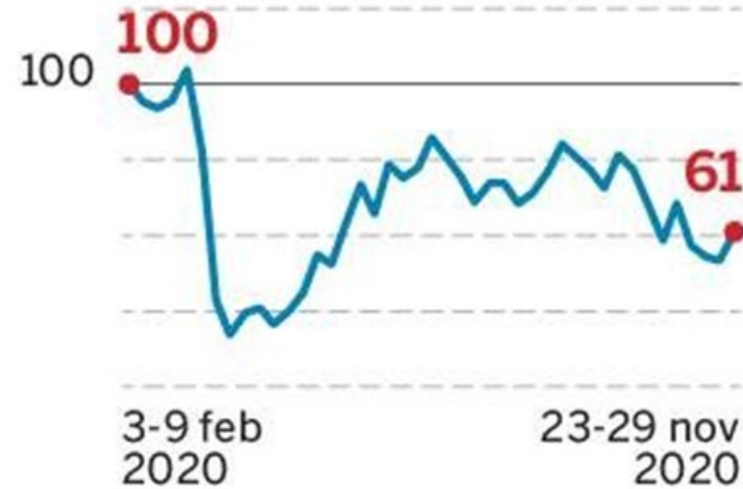
Data: National Chicken Council

**There's no such thing as
an objective data visual**



Aantal geldafhalingen aan automaten

(index, 3 feb = 100)



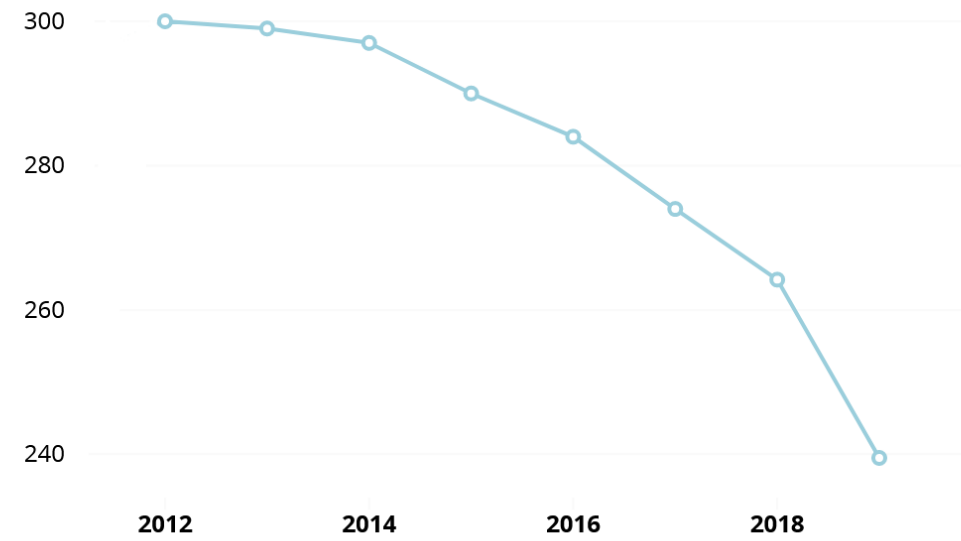
DS Infografiek | Bron: Febelfin

**(number of cash
withdrawals from ATMs)*

Source: [De Standaard](#),
22 December 2020

CASH WITHDRAWALS

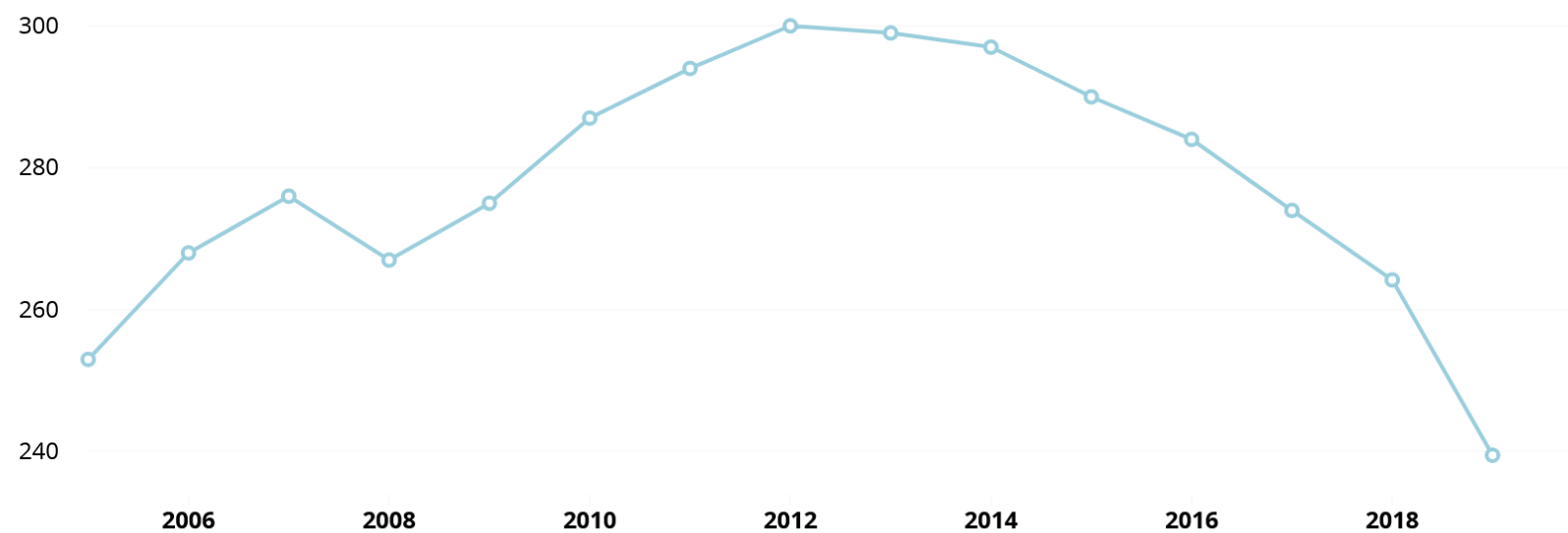
[close](#)



Febelfin-Enquête / Vademecum T10.5

CASH WITHDRAWALS

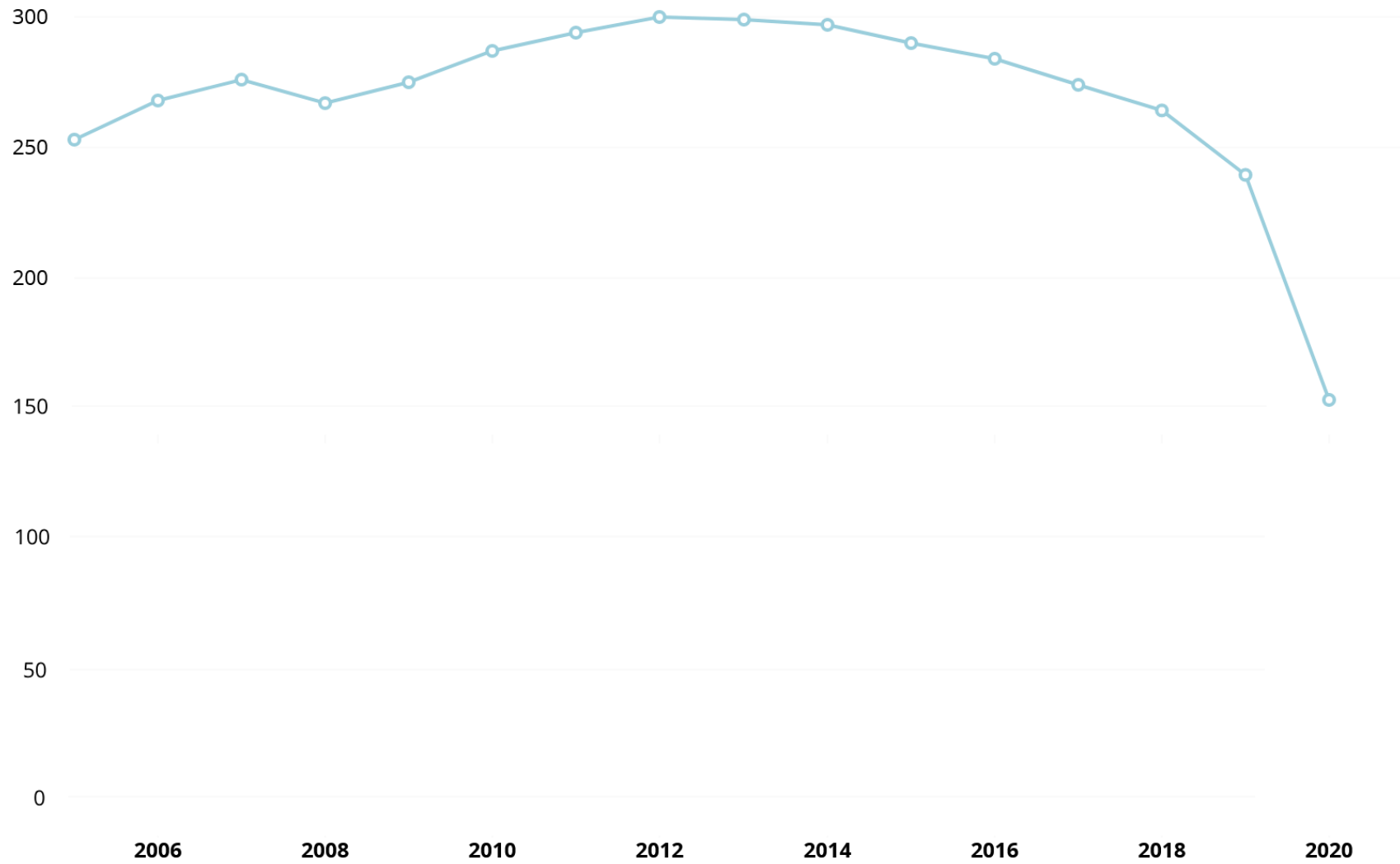
[close](#)



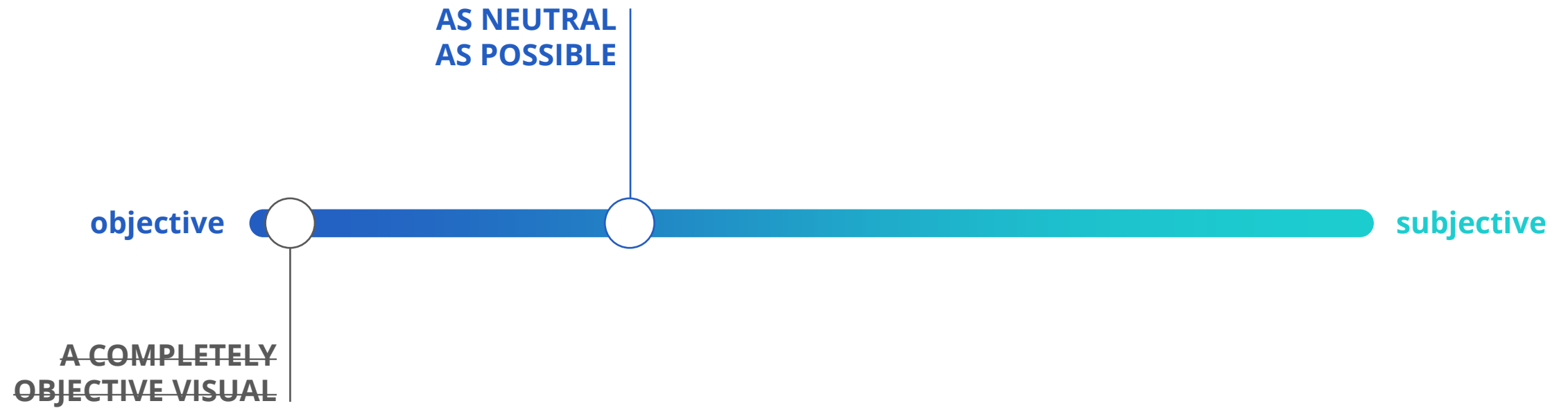
Febelfin-Enquête / Vademecum T10.5

[close](#)

CASH WITHDRAWALS



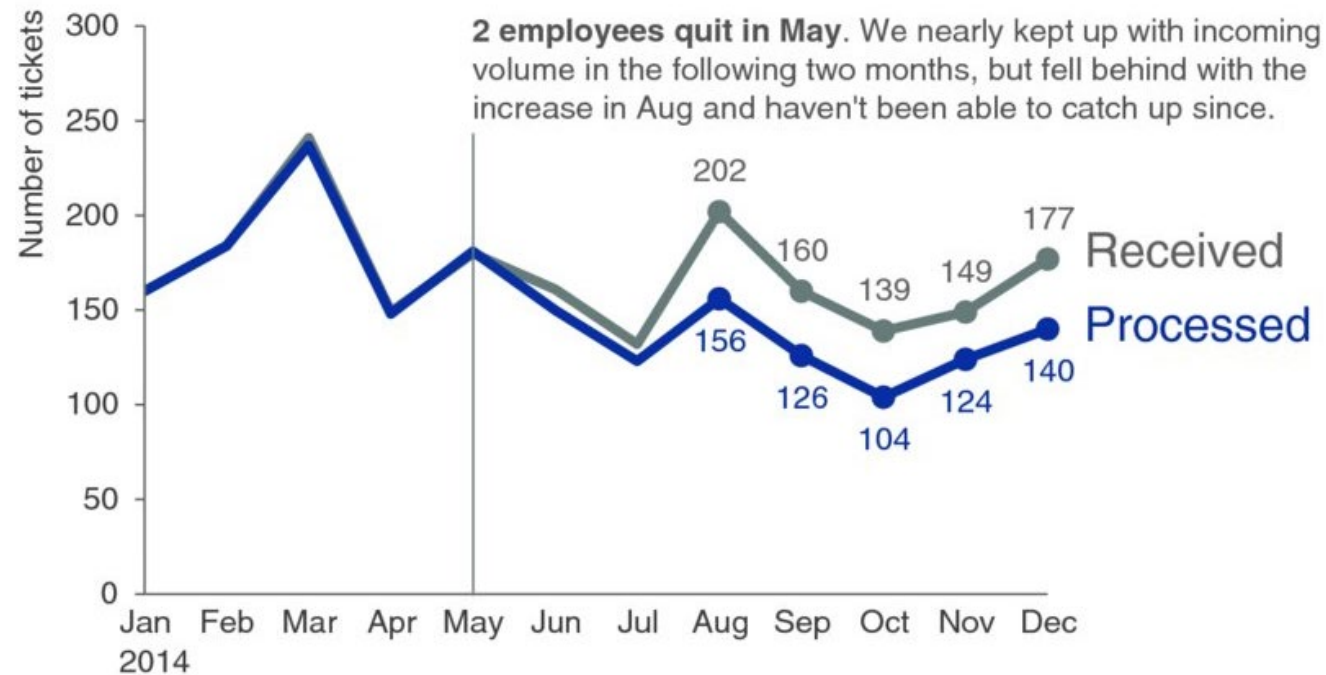
Which chart do you want?



Please approve the hire of 2 FTEs

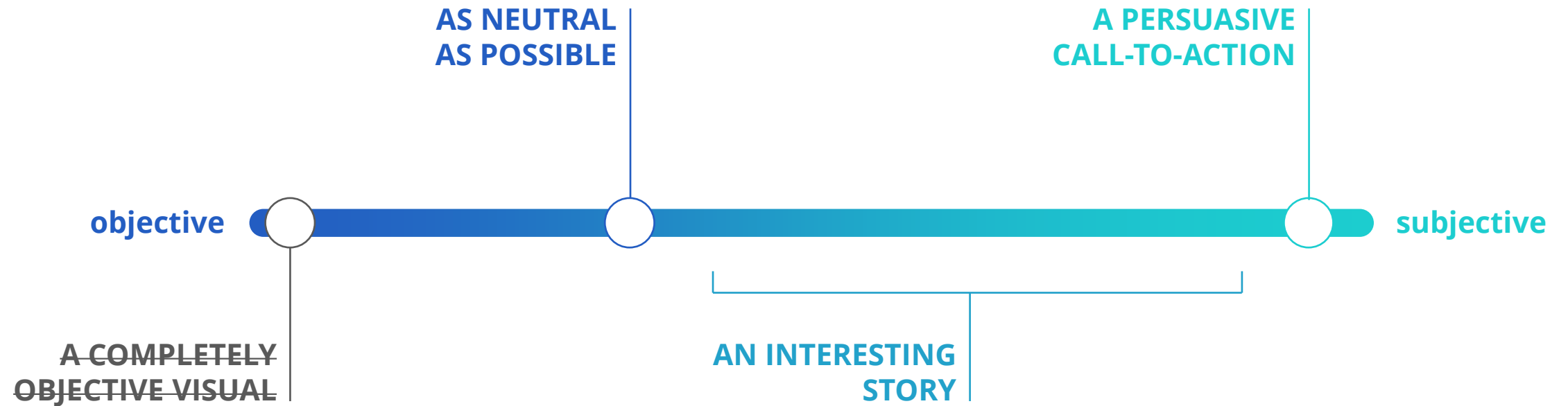
to backfill those who quit in the past year

Ticket volume over time

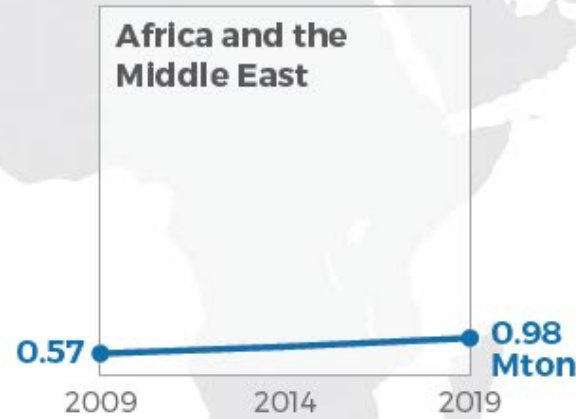
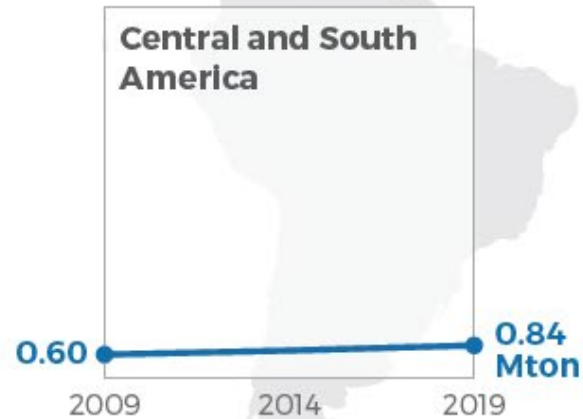
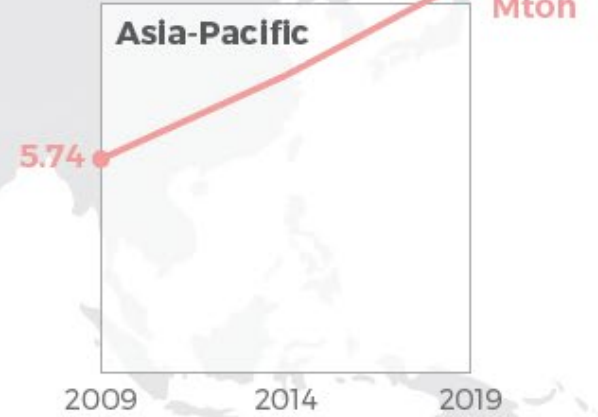
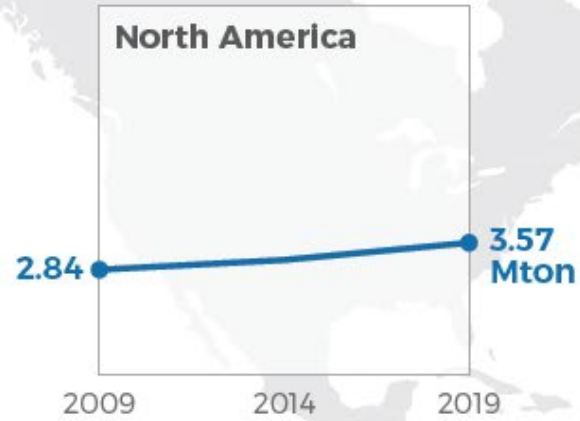


Data source: XYZ Dashboard, as of 12/31/2014 | A detailed analysis on tickets processed per person and time to resolve issues was undertaken to inform this request and can be provided if needed.

Which chart do you want?



Asia-Pacific will continue to be the biggest demand region



So, what's your story?

define your goals

define your audience

define your message

Who is my audience?

What do they want to know?

What do they need to do?

How much time do they have?

What are their biases?

How frequently will they look at this?

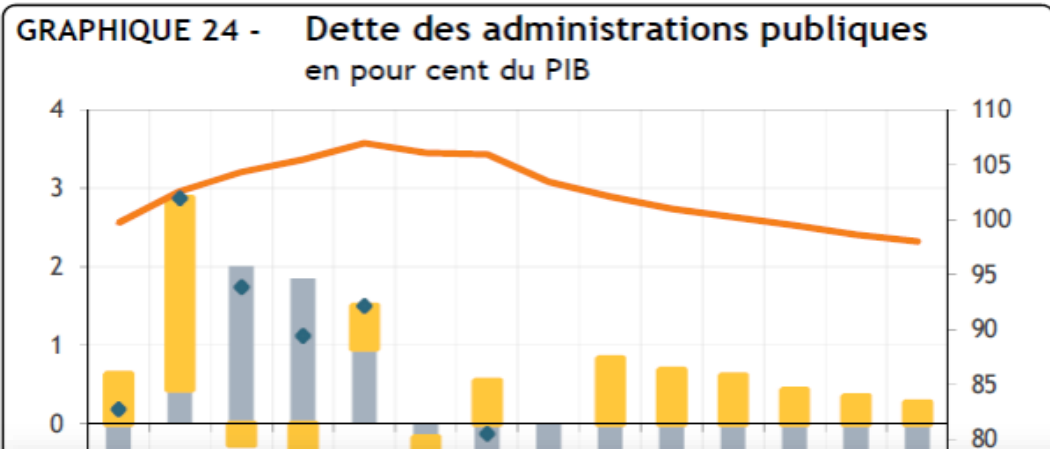
So, what's your story?

define your goals

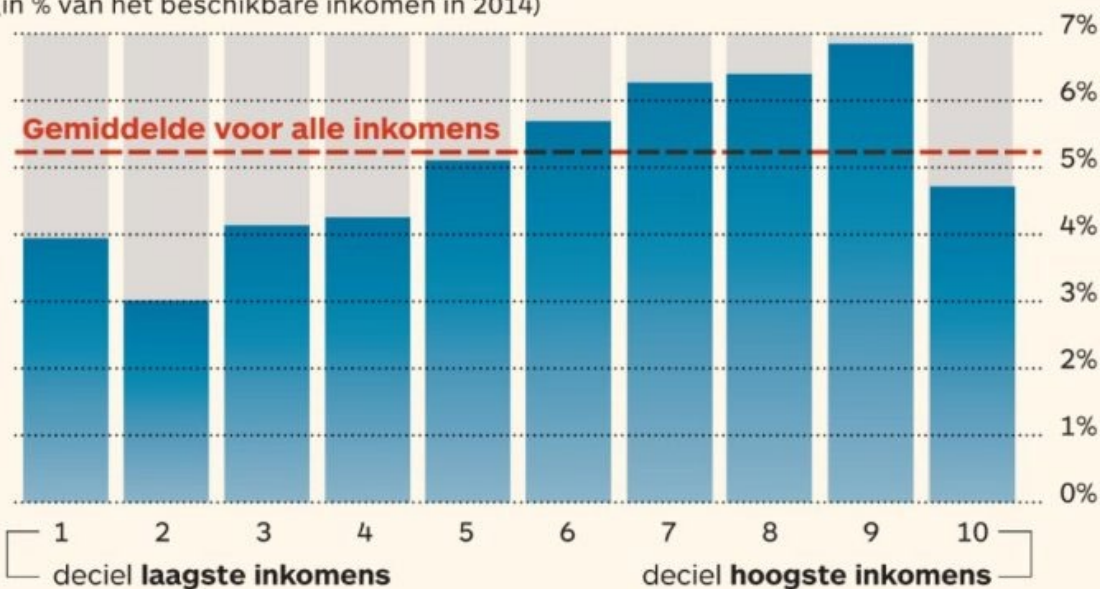
define your audience

define your message

→ *limit yourself!*

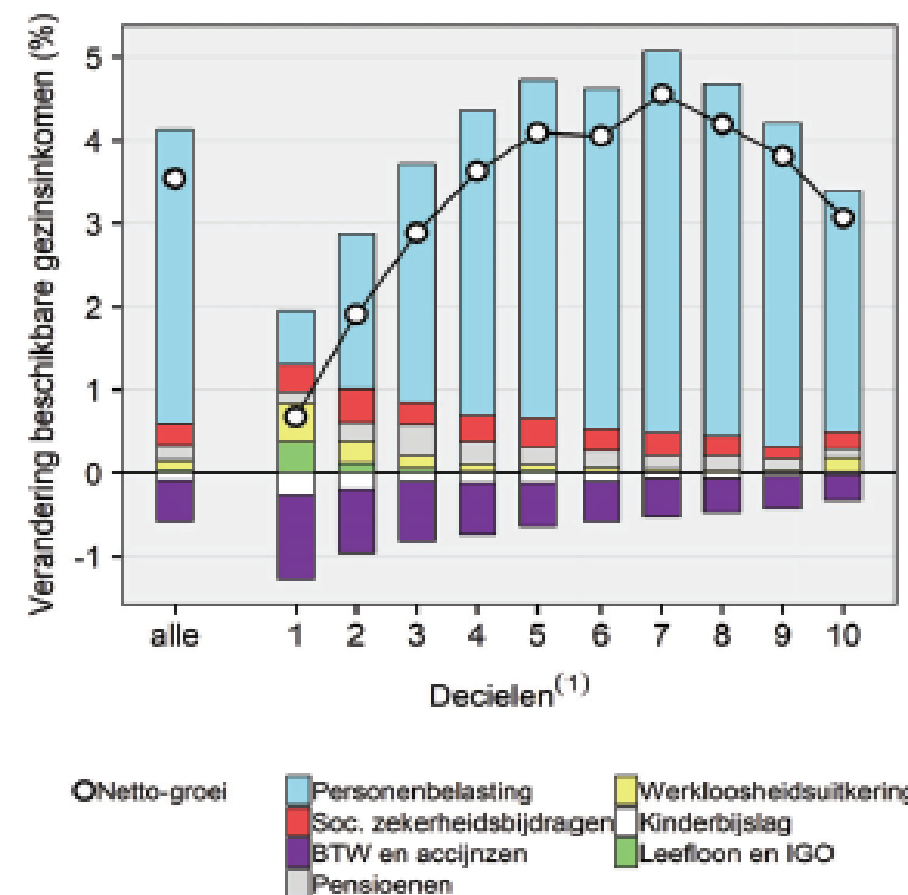


Veranderingen in koopkracht, 2014-2020
(in % van het beschikbare inkomen in 2014)



Bronnen: KU Leuven en Planbureau

Figuur 2: Veranderingen in koopkracht, 2014-2020 (in % van het beschikbare inkomen in 2014)



Principles

What is a good data visual?

Telling a story

How charts work

Visual variables

Chart types

Beyond charts

Creating charts

Tools

Improving charts

Signal-to-noise ratio

Design components

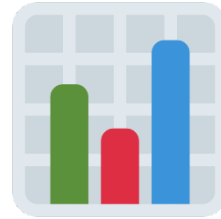
Visualizing uncertainty



How charts work

graphical representation categories

What do we want to do
with our data?



visual variables

How can we turn
raw numbers
into shapes?

The graphical representation categories

comparison

part-to-whole comparison

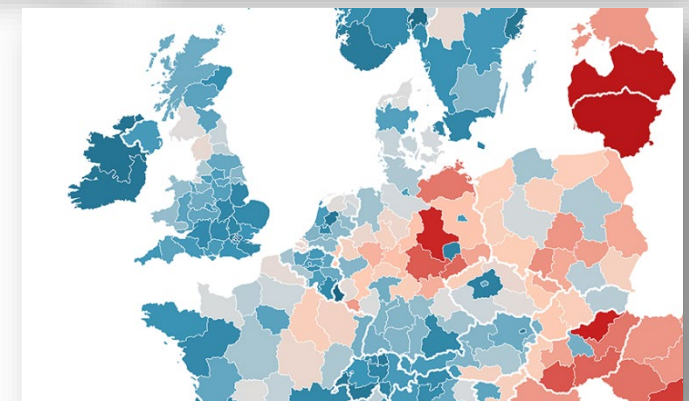
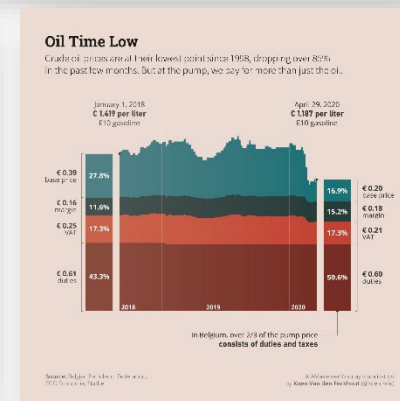
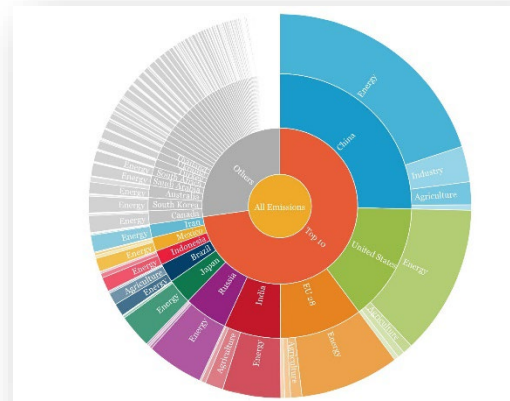
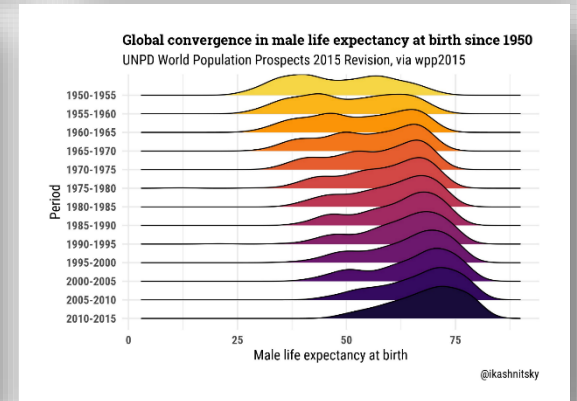
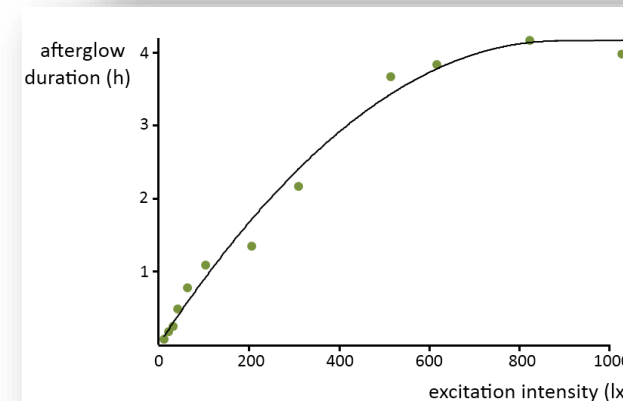
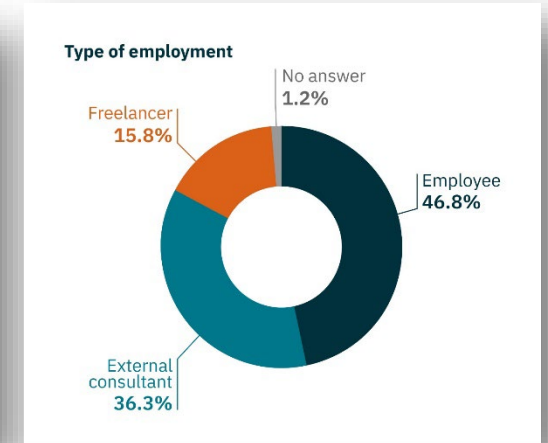
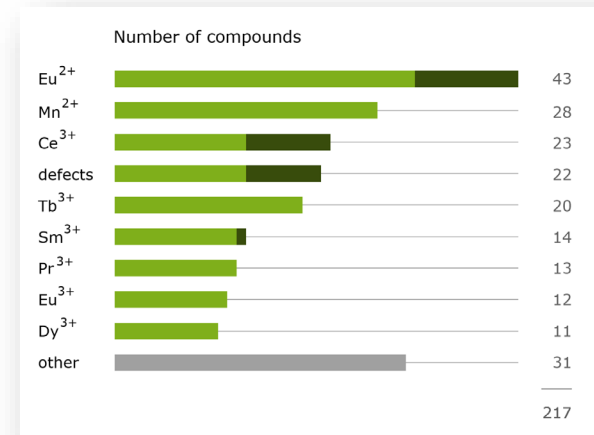
distribution

correlation

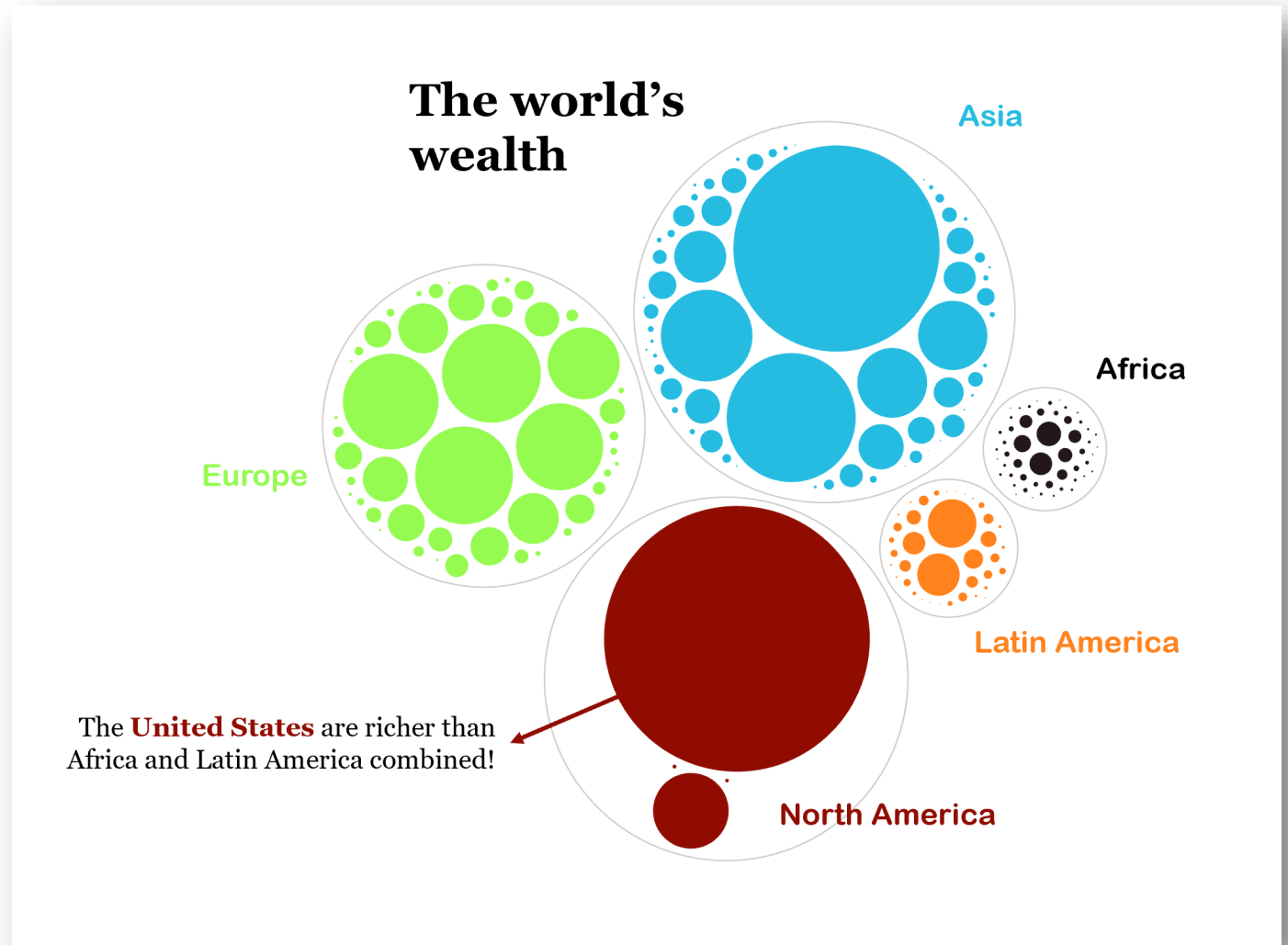
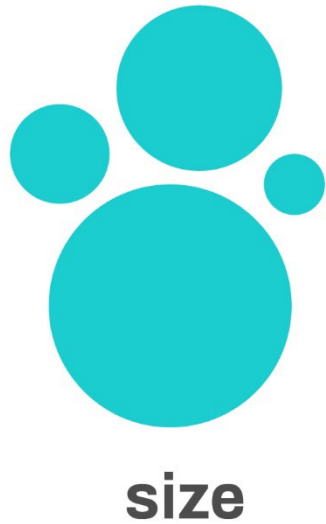
hierarchy

evolution

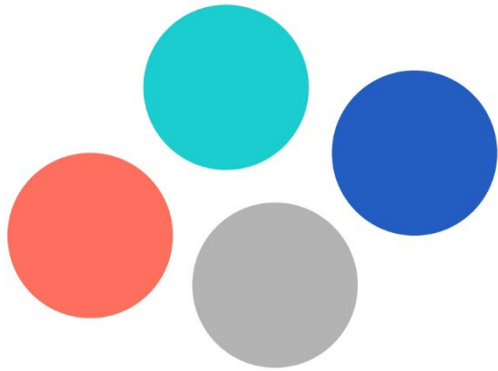
spatial distribution



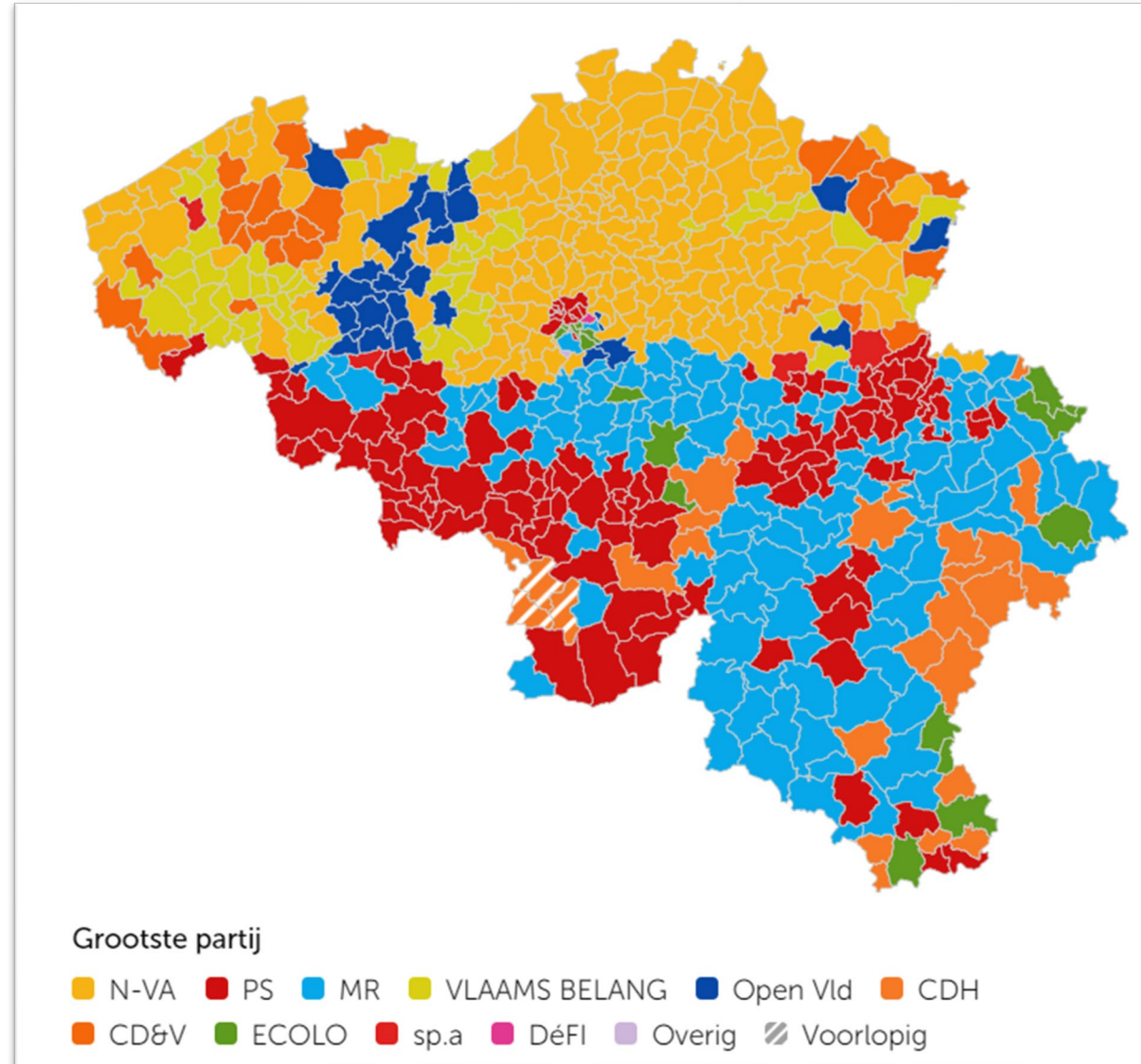
The visual variables



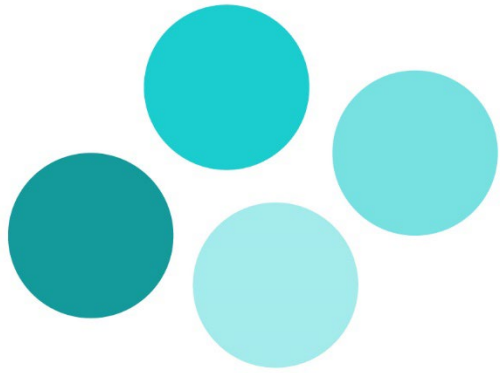
The visual variables



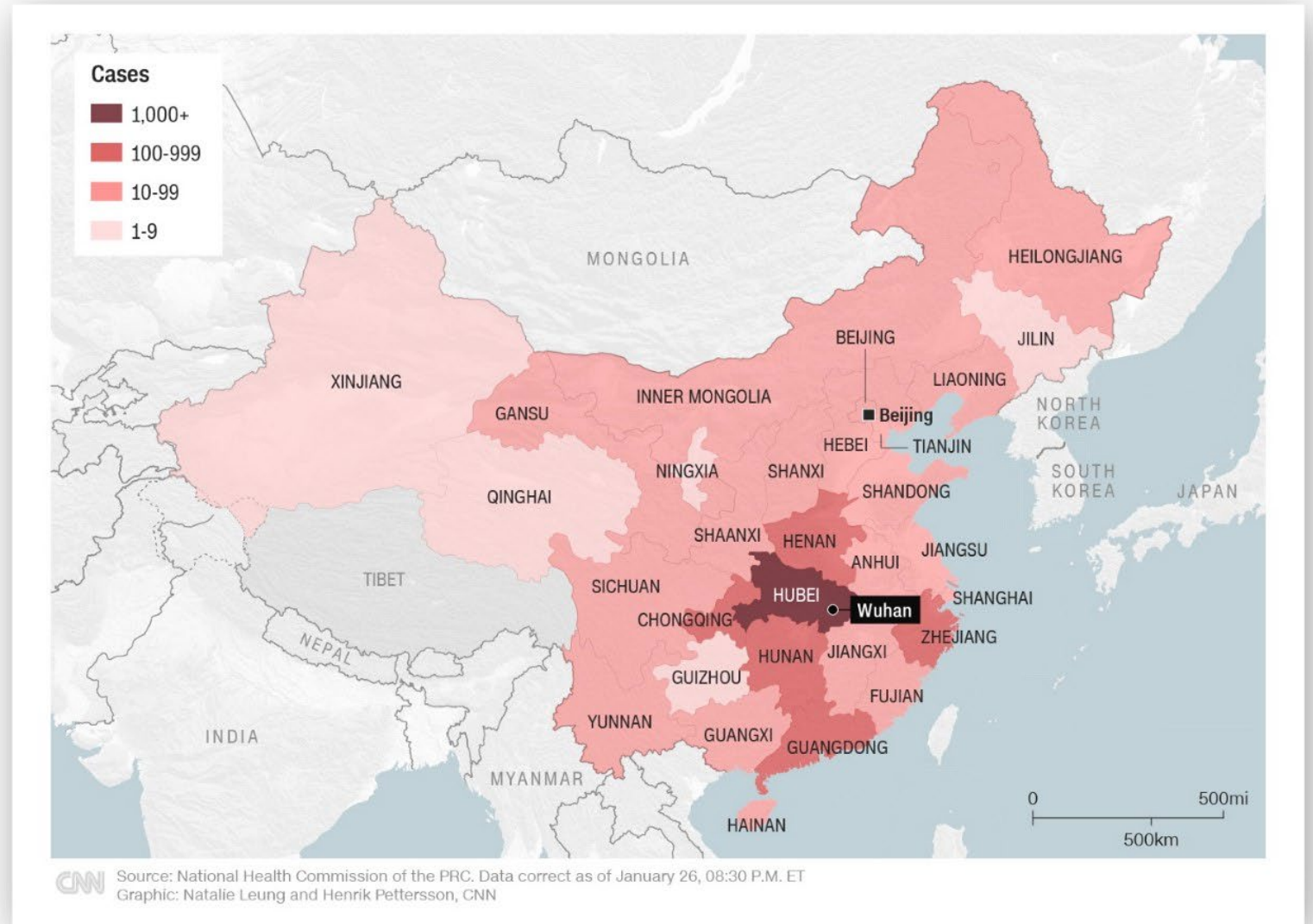
color hue



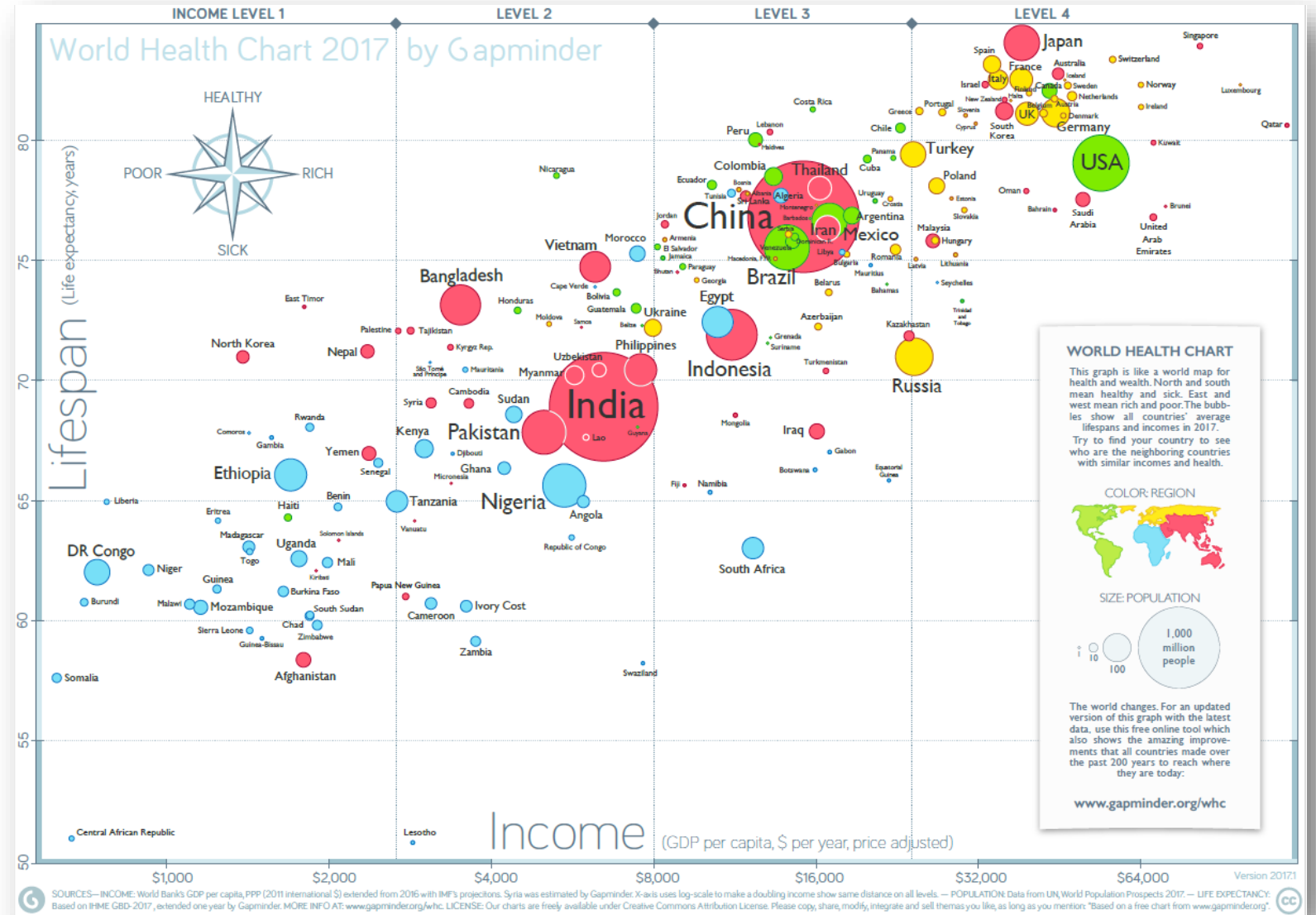
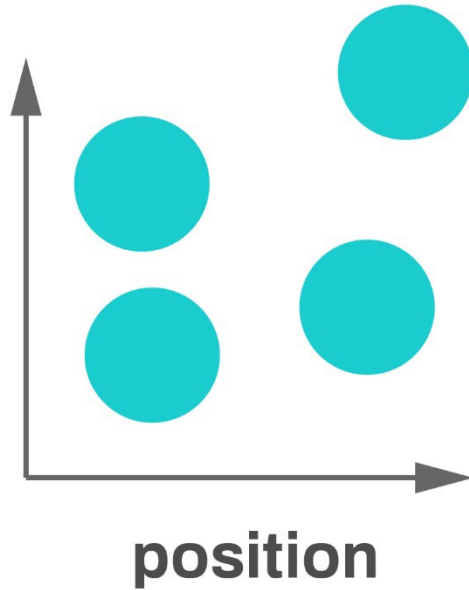
The visual variables



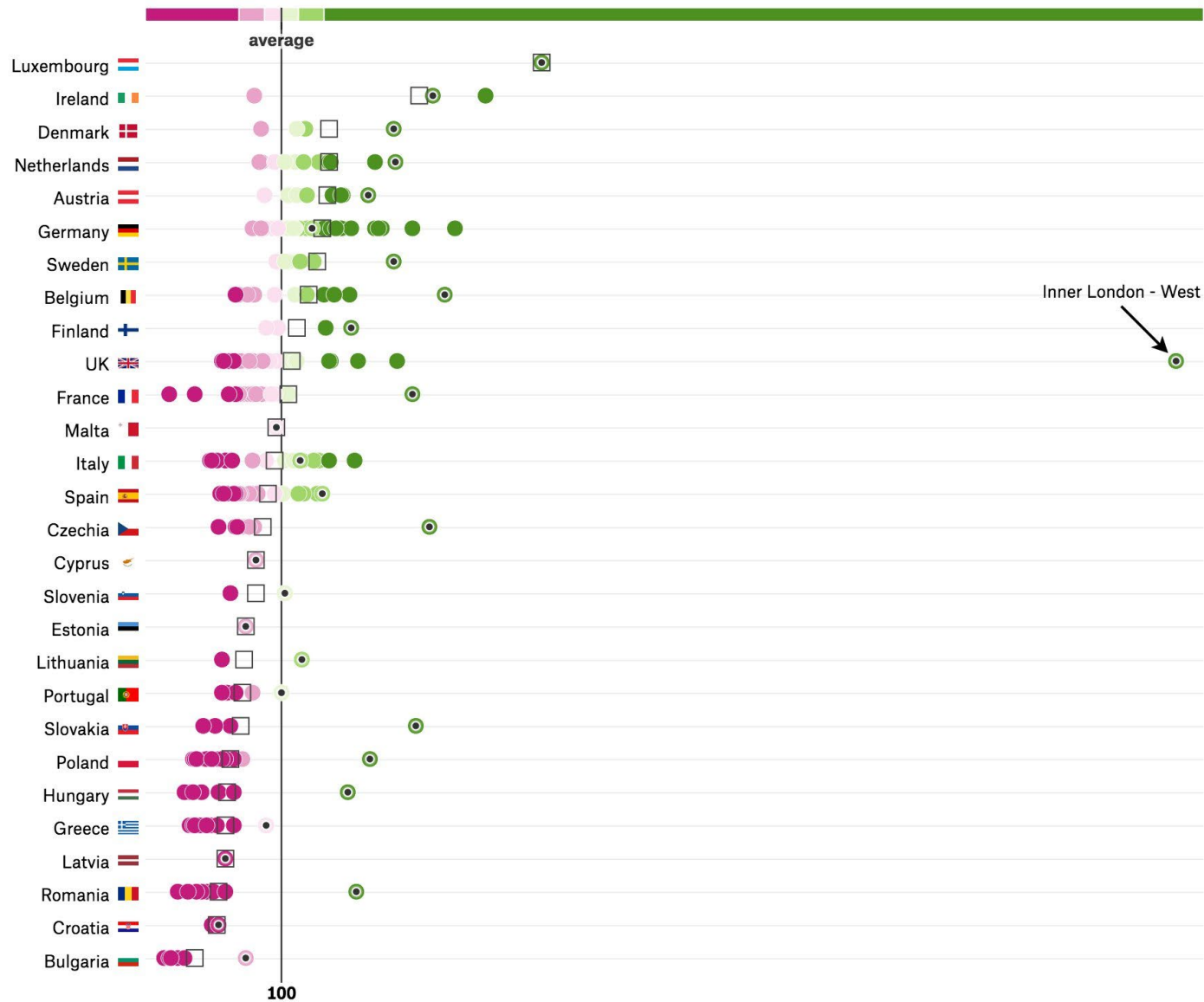
color brightness



The visual variables



EU regions, by economic development

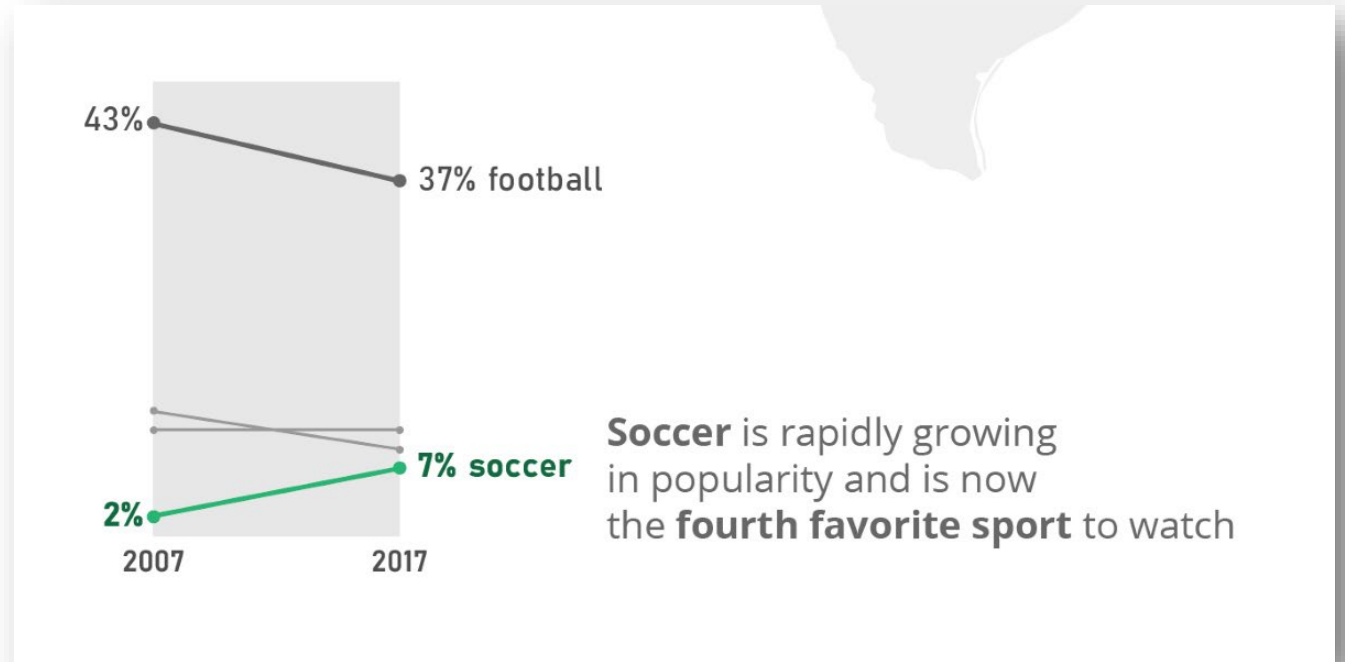


The region of Inner London-West is an outlier: its GDP is more than 600% of the EU average and, consequently, receives little in EU catch-up funds. Let's zoom in so we can see more details for the other regions.

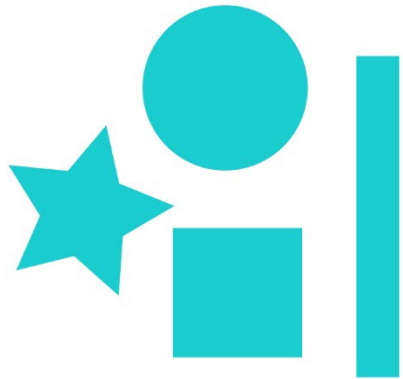
The visual variables



orientation



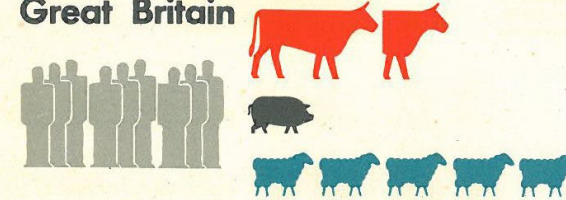
The visual variables



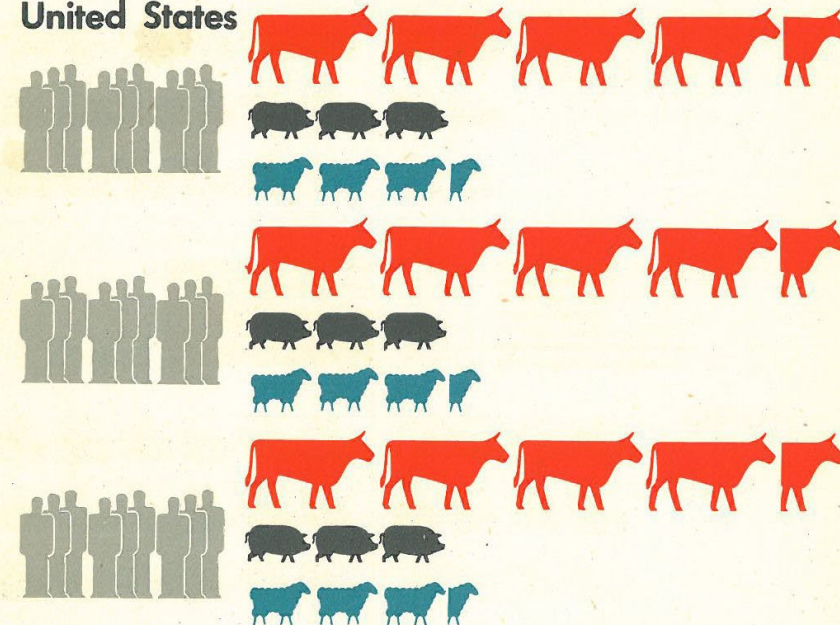
shape

Population and Live Stock

Great Britain



United States

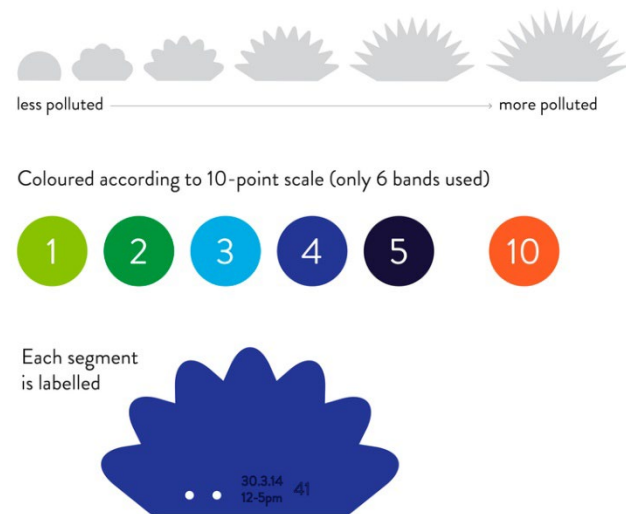
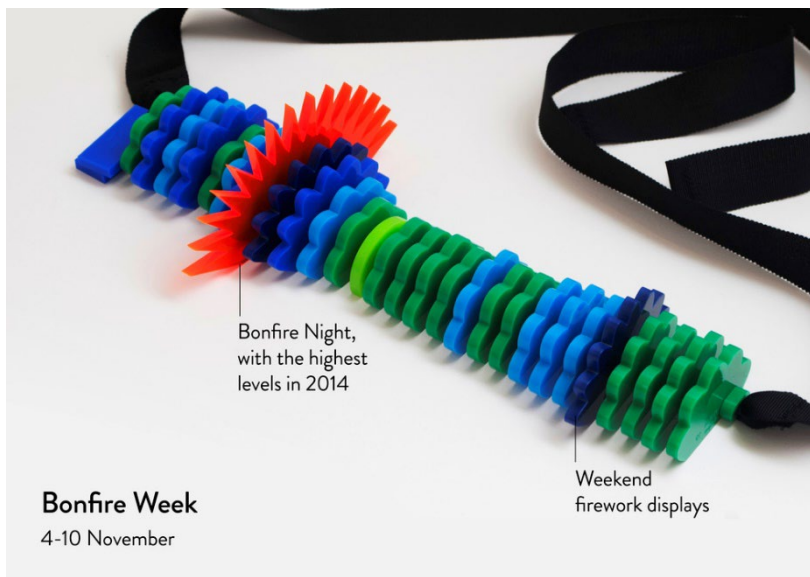


Each grey figure represents 5 million population
Each complete red symbol represents 5 million cattle
Each complete black symbol represents 5 million pigs
Each complete blue symbol represents 5 million sheep

Average for 1935 - 1939



There are more cattle and pigs per head of population in America than Britain, but sheep—only 5 in U.S. for every 9 in Britain—are a different story, and provide the tender home-grown leg of mutton prized by the British.

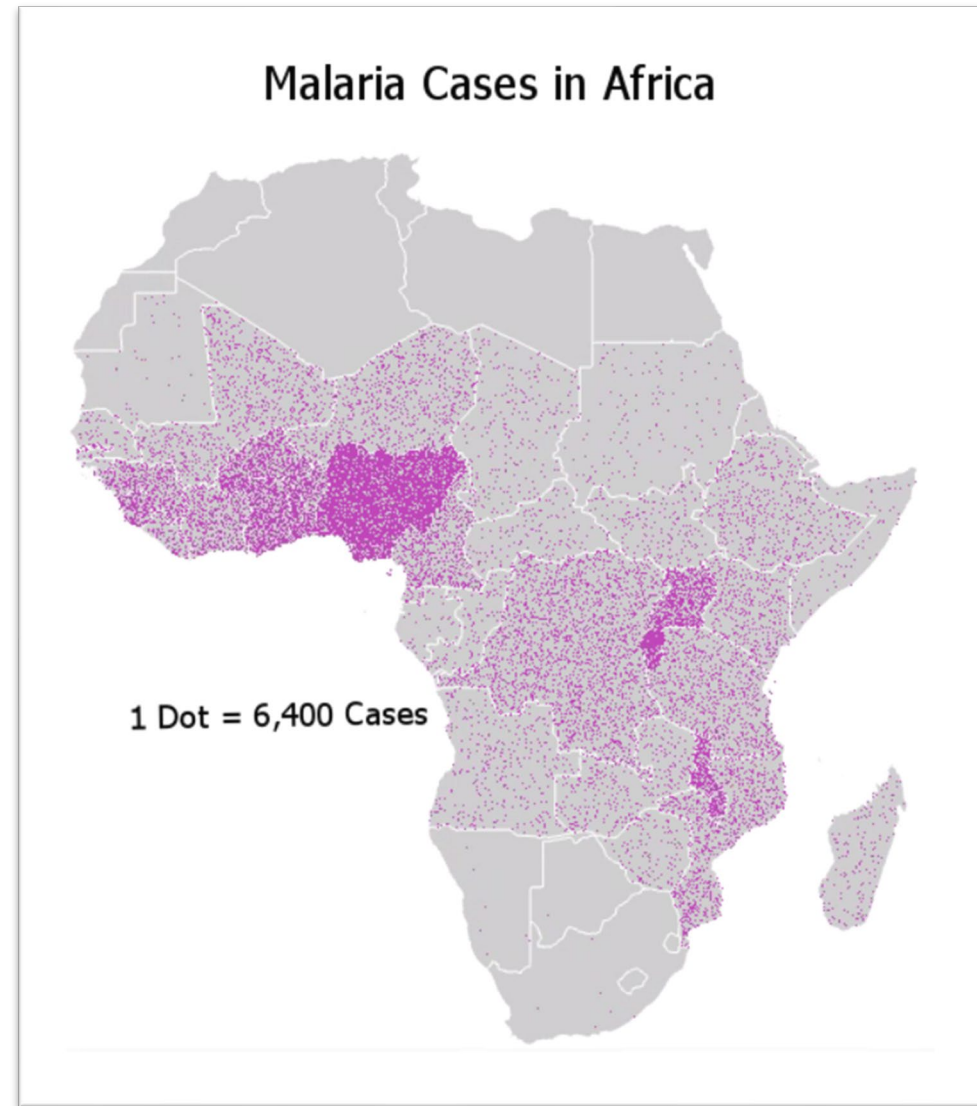


<http://www.stefanieposavec.com/airtransformed>

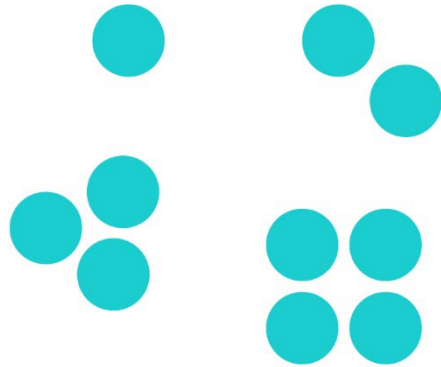
The visual variables



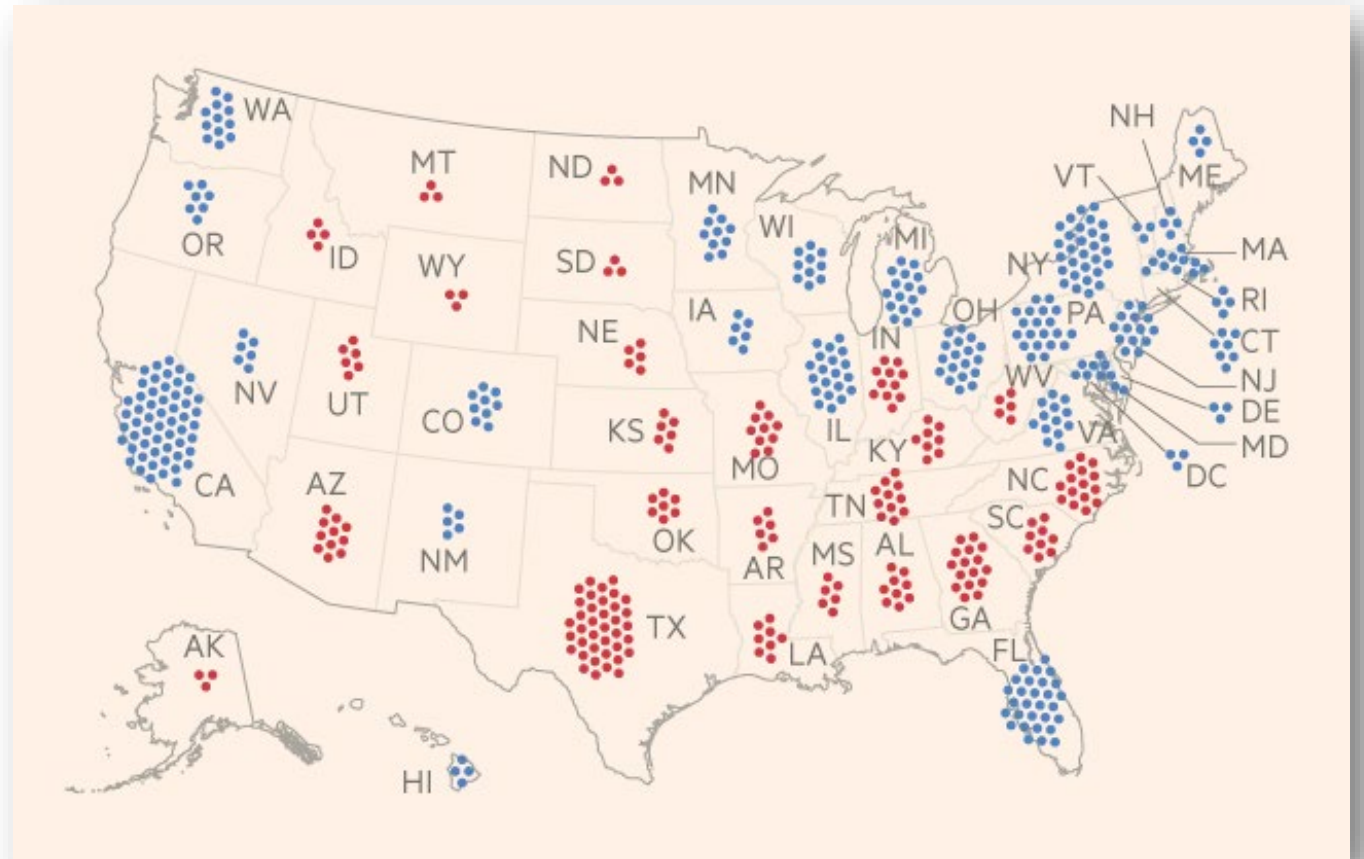
texture



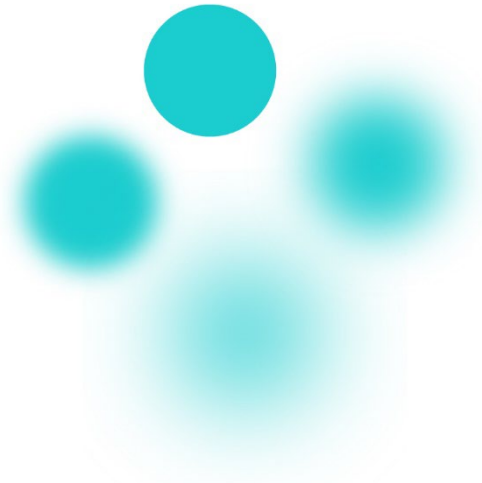
The visual variables



numerosity



The visual variables



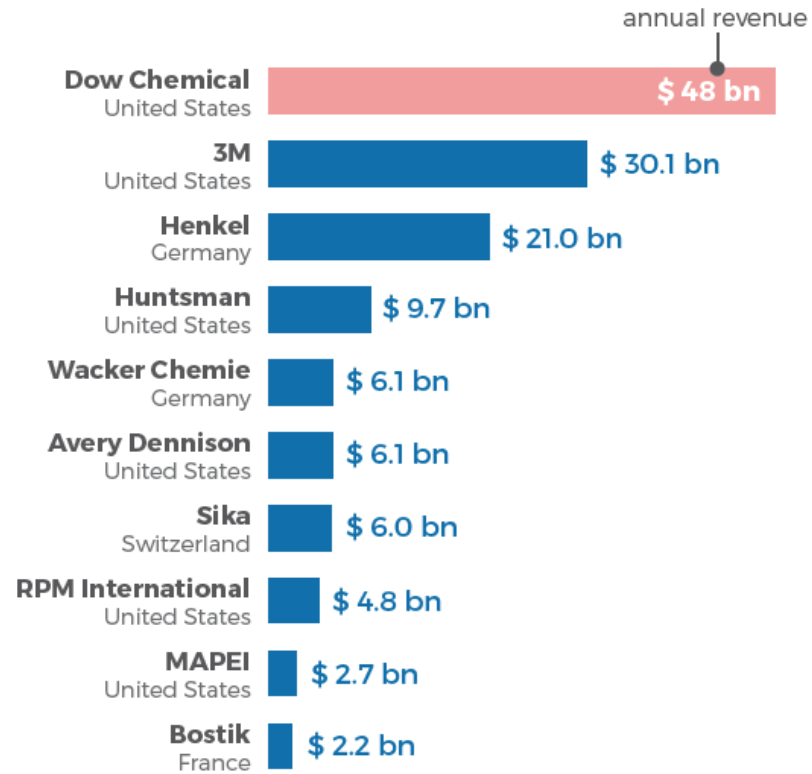
fuzziness



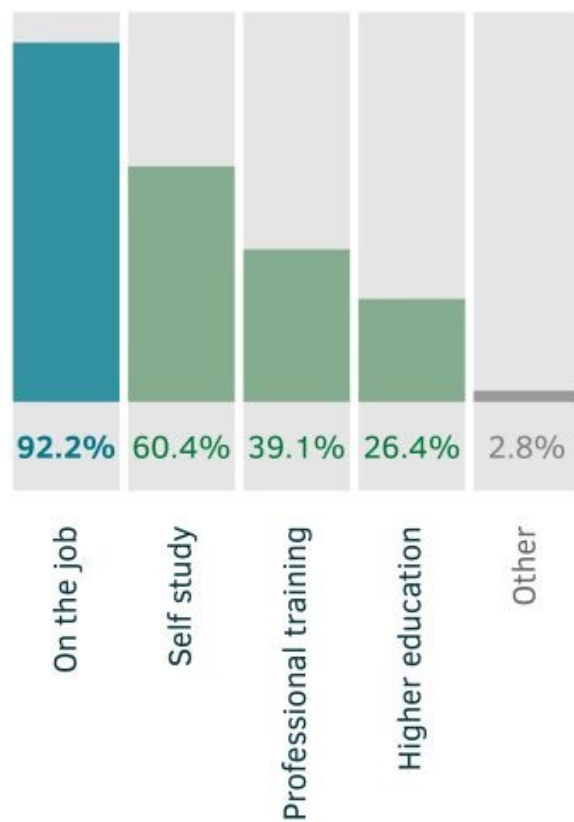
Common chart types

Common chart types

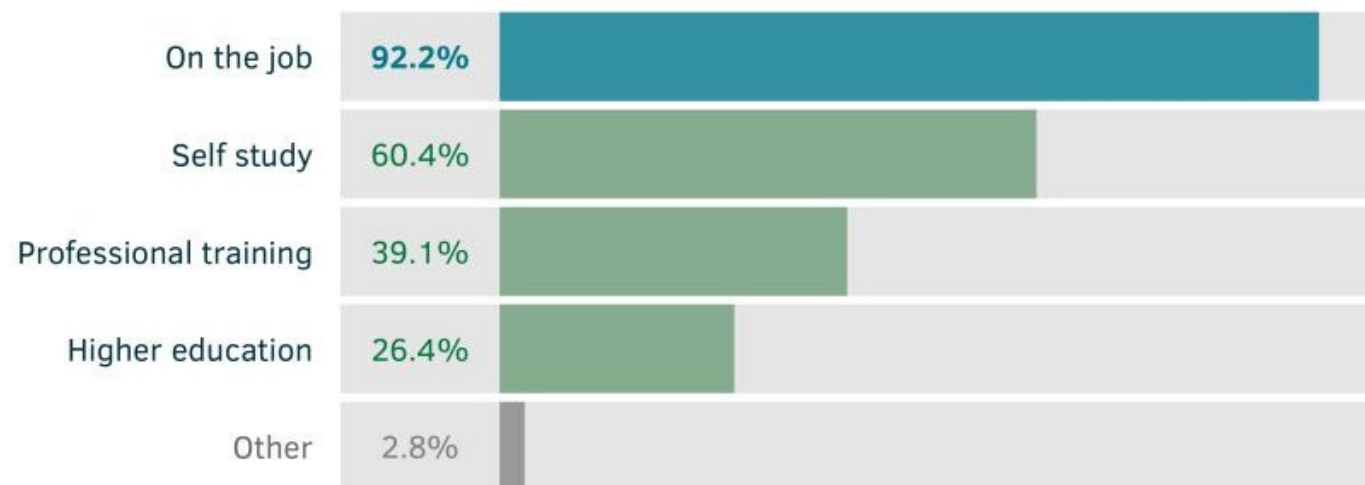
Bar charts: comparison using size



Where did you learn your skills?

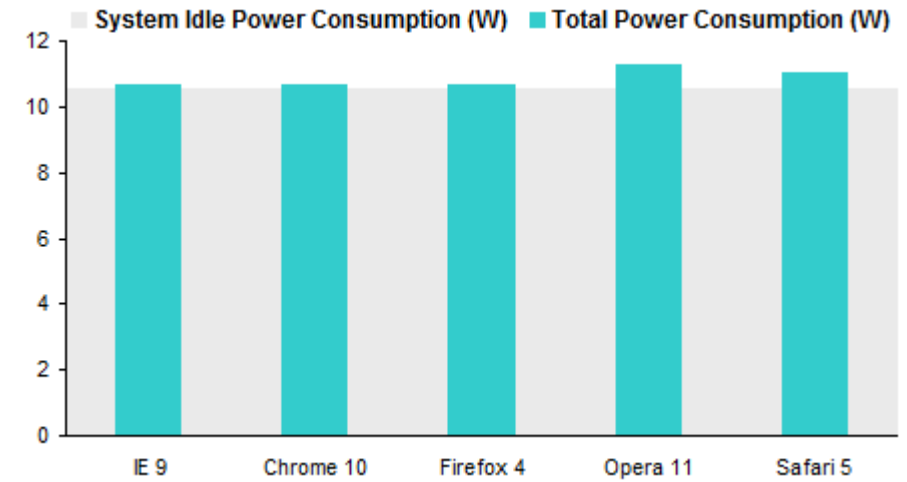
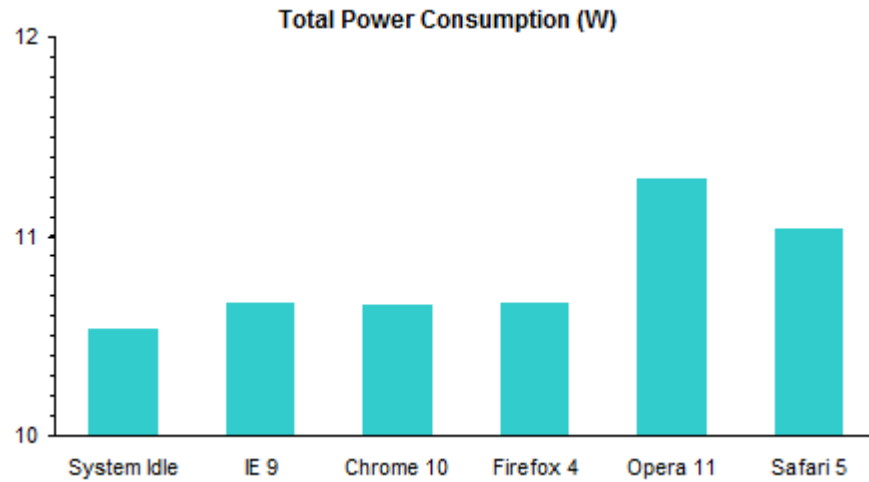


Where did you learn your skills?



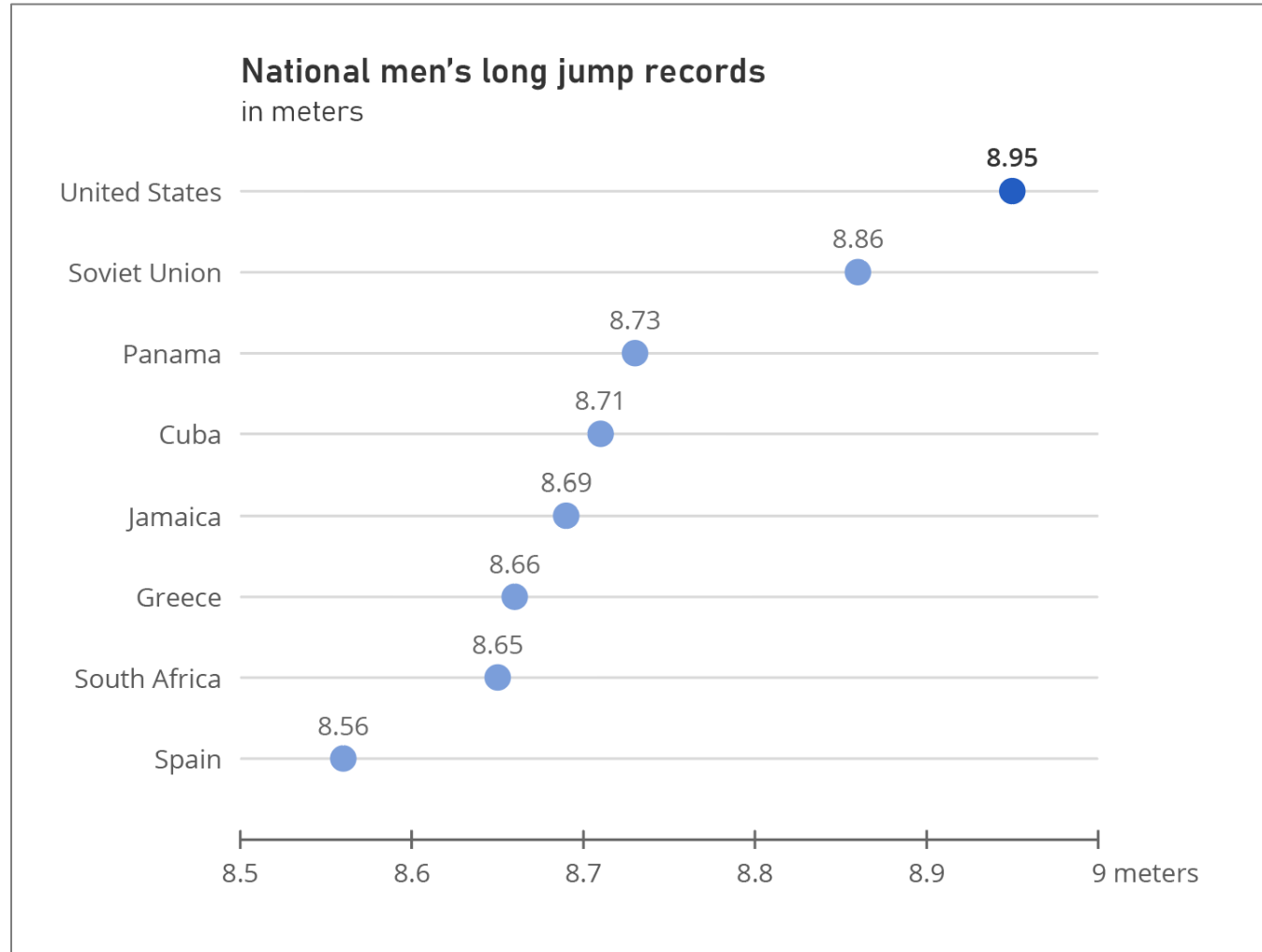
Pitfall

Bar chart not starting from zero



Alternative solution

Use a dot plot



Pitfall

Equidistant labels for non-equidistant data



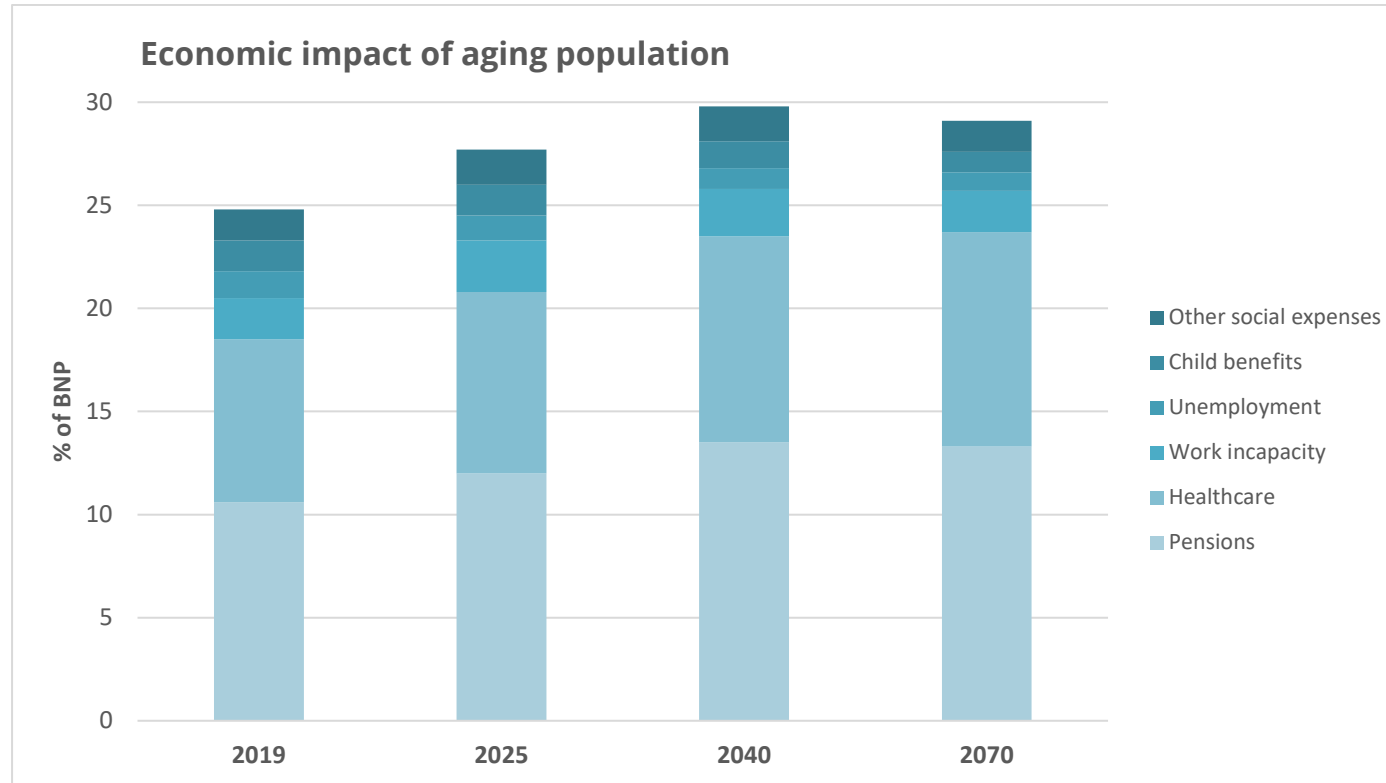
Alternative solution

Use non-equidistant labels



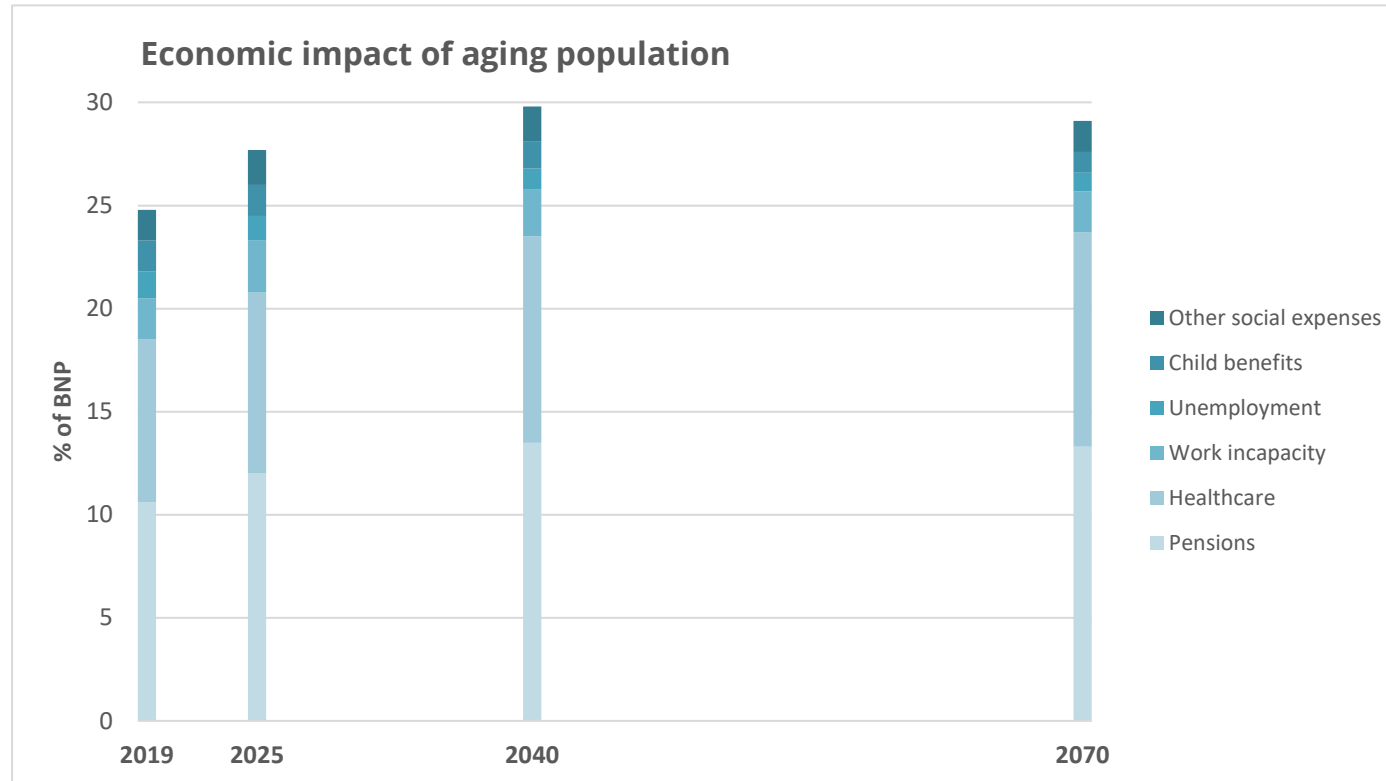
Pitfall

Equidistant labels for non-equidistant data



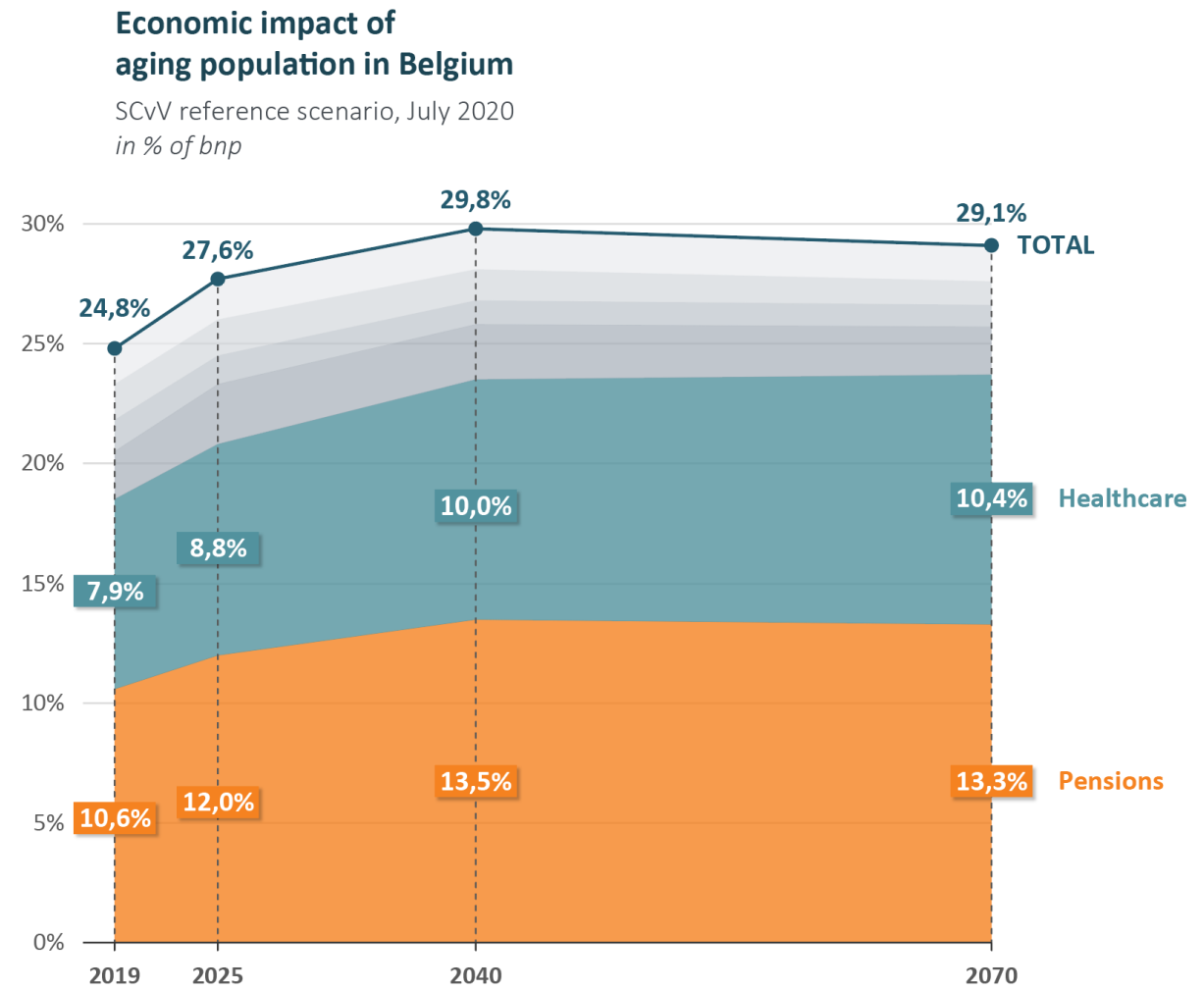
Alternative solution

Use non-equidistant labels



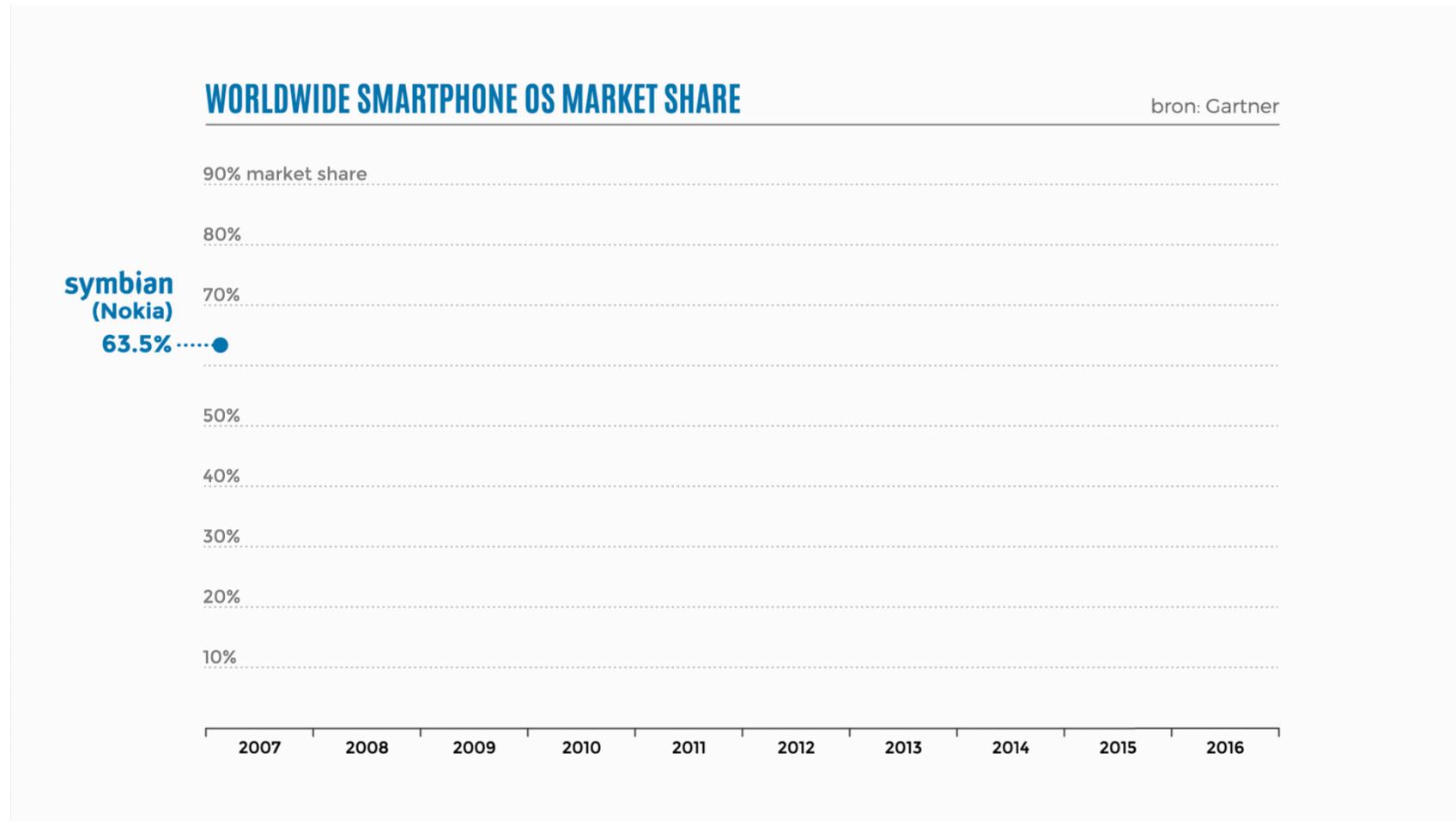
Alternative solution

Use an area chart or line chart



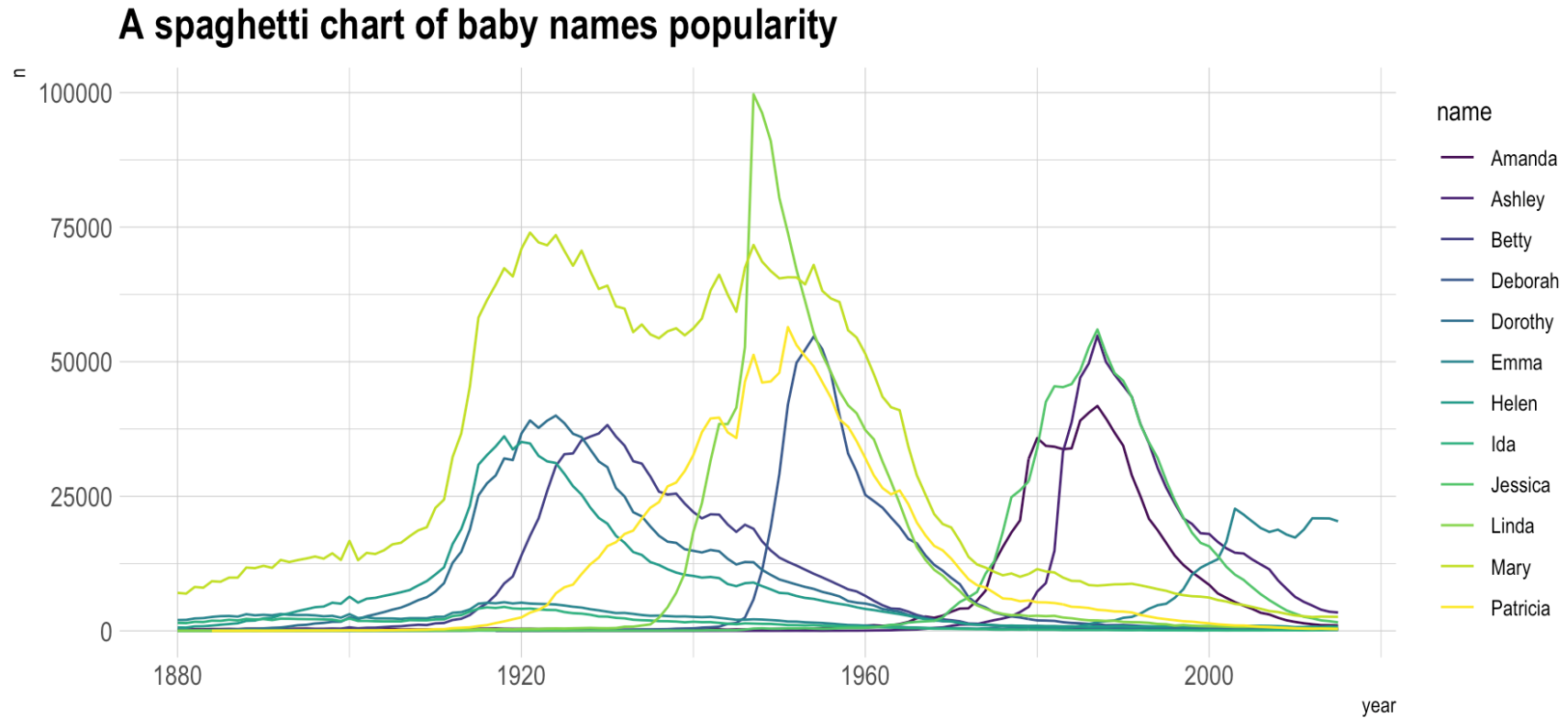
Common chart types

Line charts: **evolution** using **position** and **orientation**



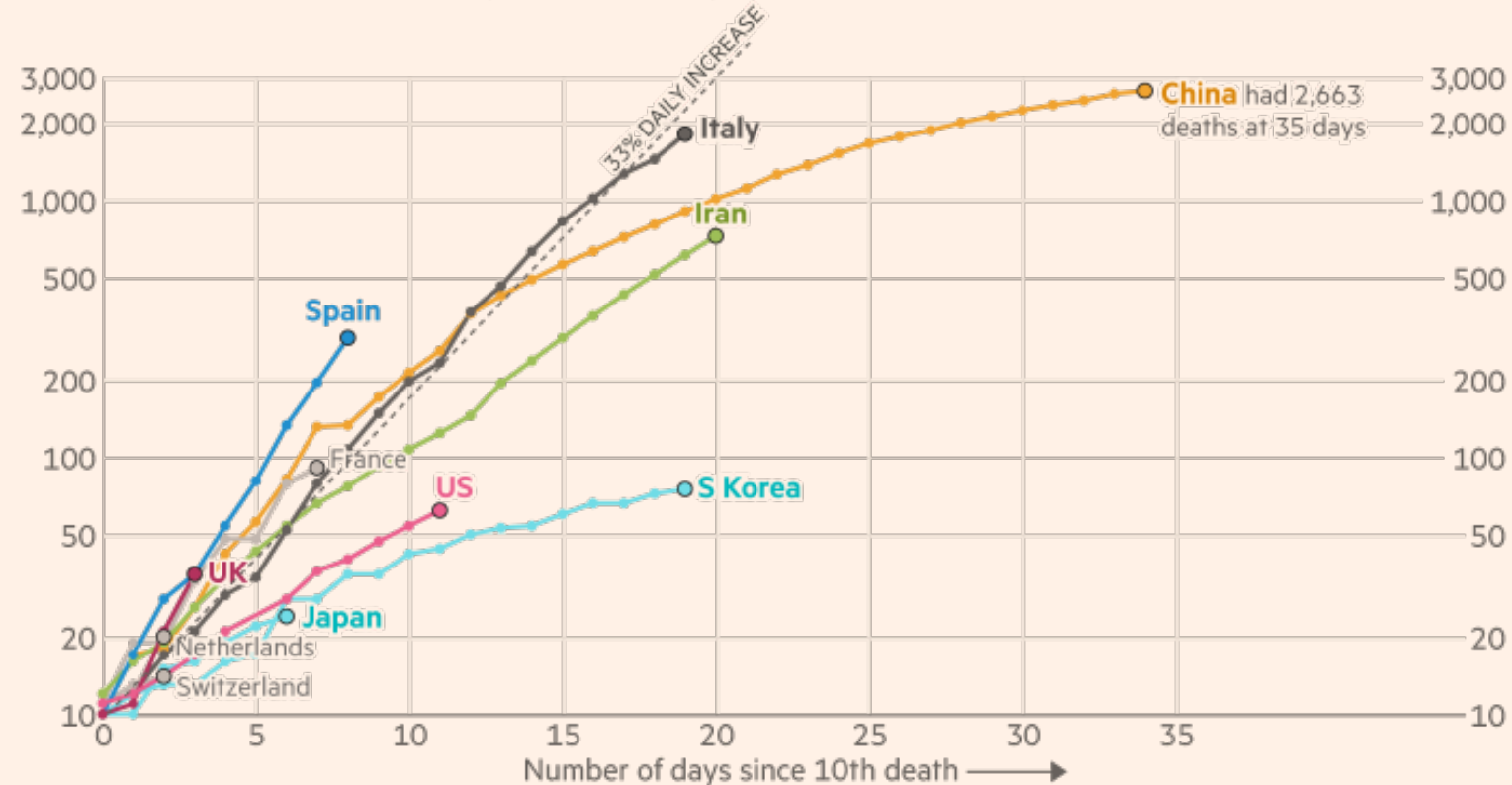
Pitfall

Line graph spaghetti



Coronavirus deaths in Italy and Spain are increasing much more rapidly than they did in China

Cumulative number of deaths, by number of days since 10th death



FT graphic: John Burn-Murdoch / @jburnmurdoch

Source: FT analysis of Johns Hopkins University, CSSE. Data updated March 15, 17:00 GMT

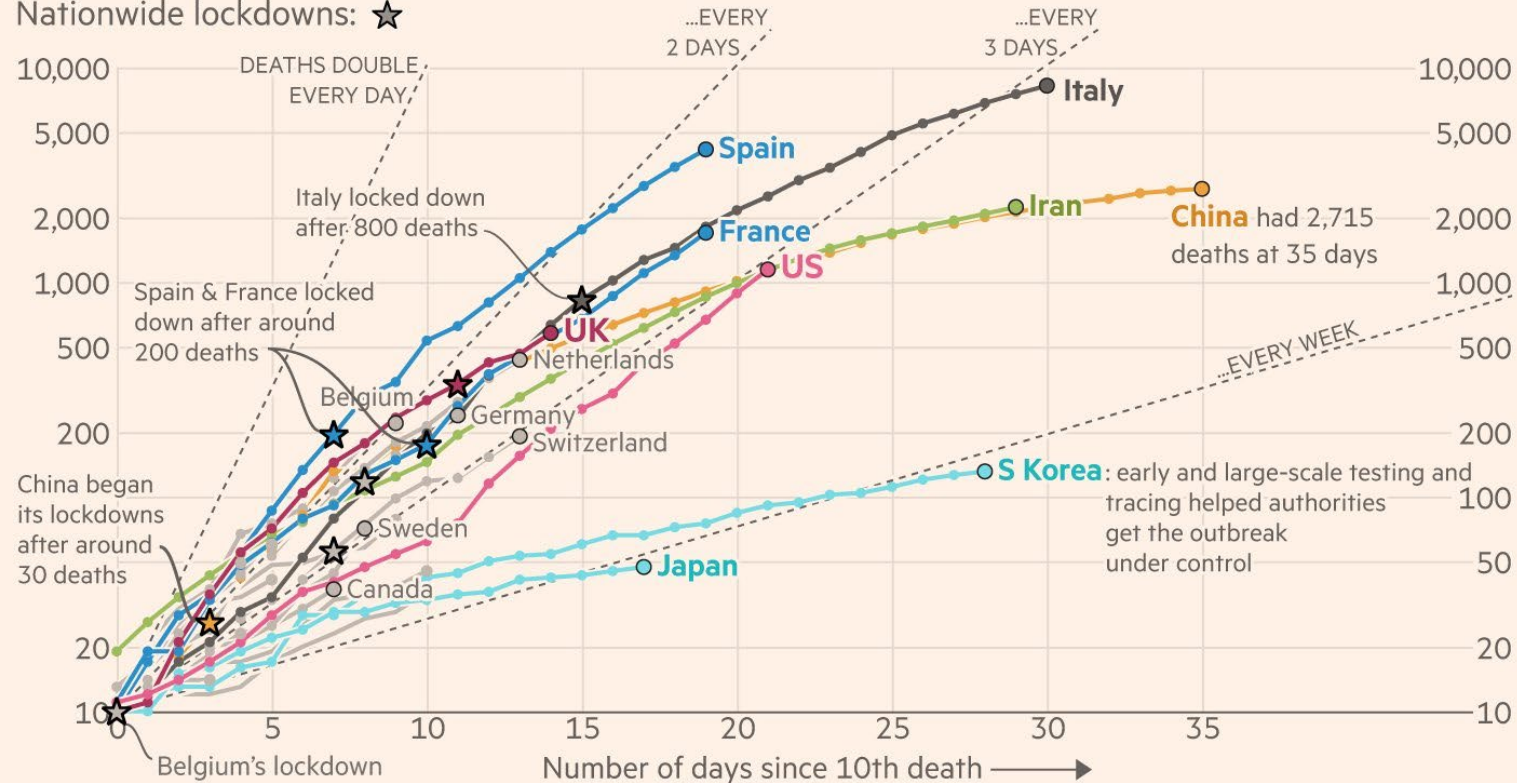
© FT

Financial Times,
March 15, 2020

Coronavirus deaths in Italy, Spain, the UK and US are increasing more rapidly than they did in China

Cumulative number of deaths, by number of days since 10th death

Nationwide lockdowns: ★



FT graphic: John Burn-Murdoch / @jburnmurdoch

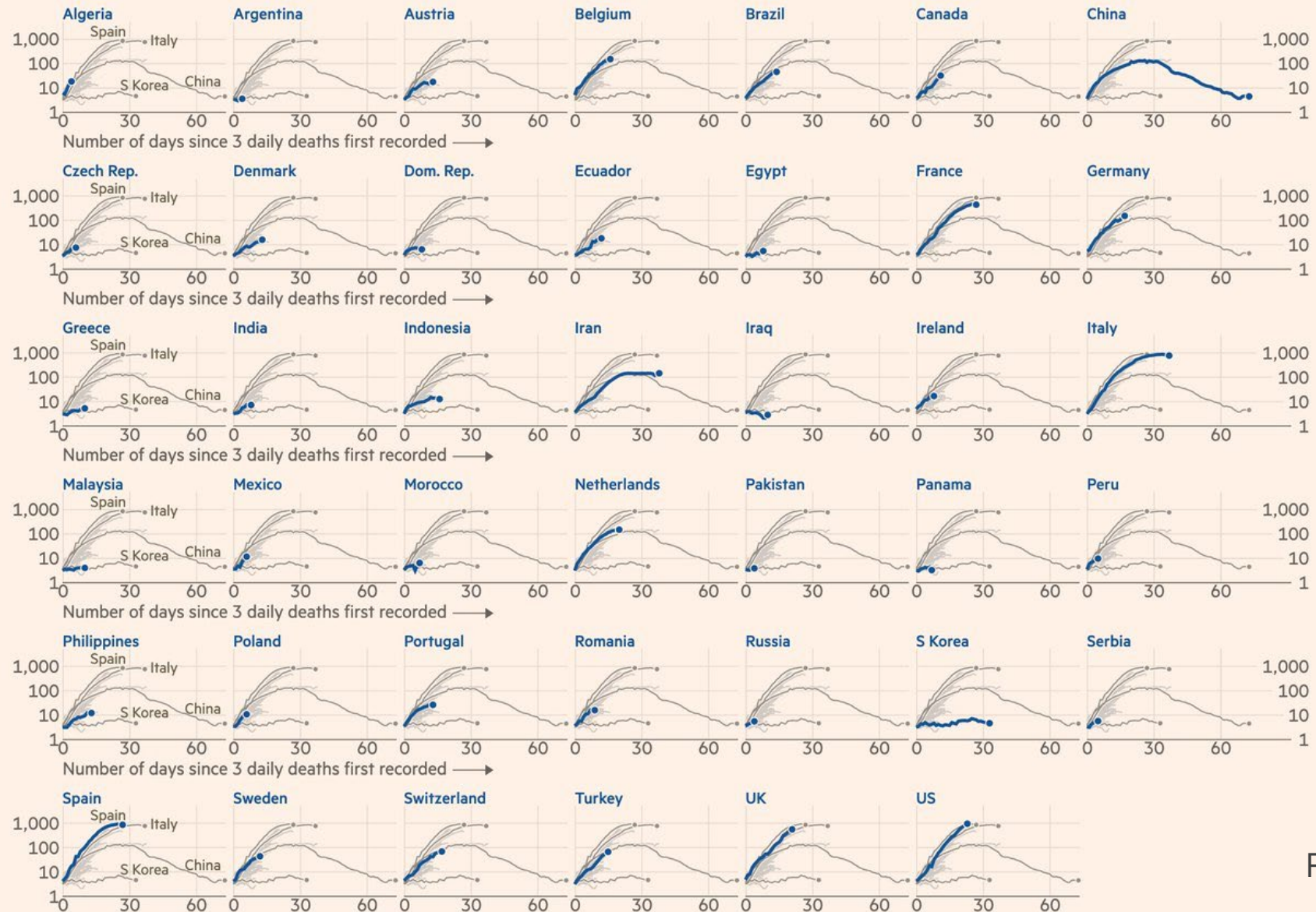
Source: FT analysis of Johns Hopkins University, CSSE; Worldometers; FT research. Data updated March 26, 19:00 GMT

© FT

Financial Times,
March 26, 2020

Daily death tolls are still accelerating in most countries

Daily deaths with coronavirus (7-day rolling average), by number of days since 3 daily deaths first recorded



FT graphic: John Burn-Murdoch / @burnmurdoch

Source: FT analysis of European Centre for Disease Prevention and Control; Worldometers; FT research. Data updated April 05, 19:00 GMT

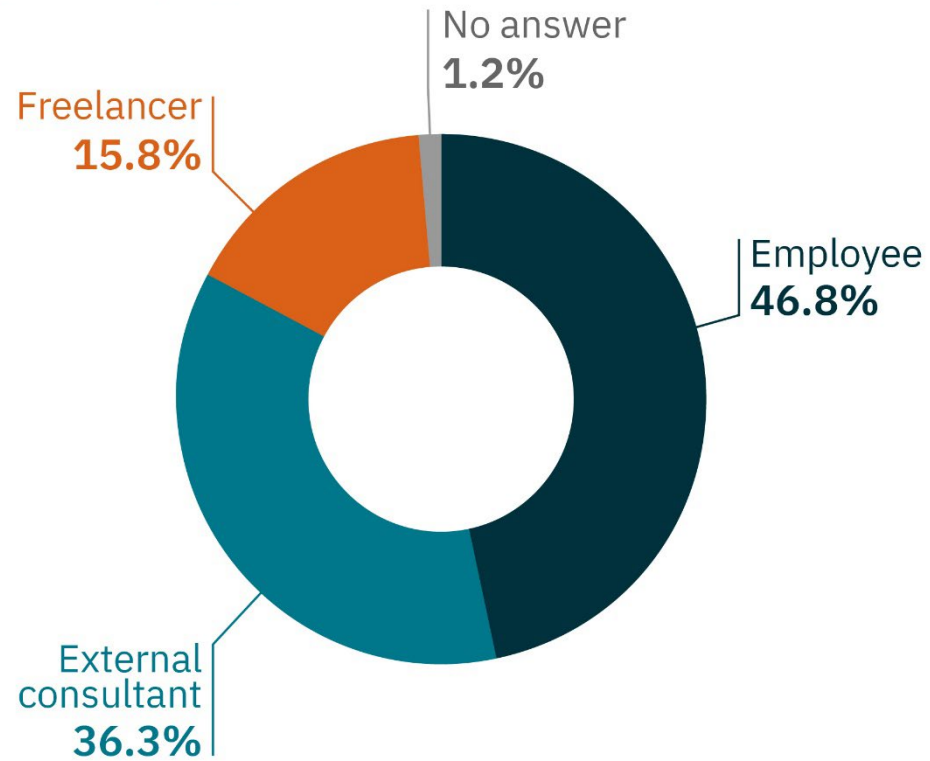
© FT

Financial Times,
April 5, 2020

Common chart types

Pie charts: part-to-whole using size

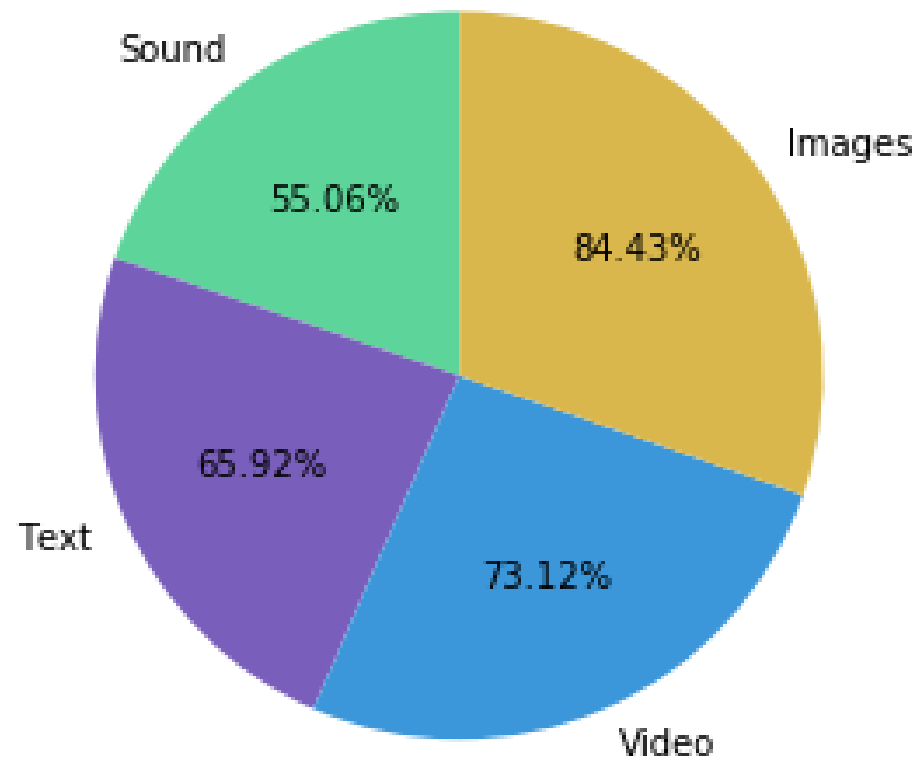
Type of employment



Pitfall

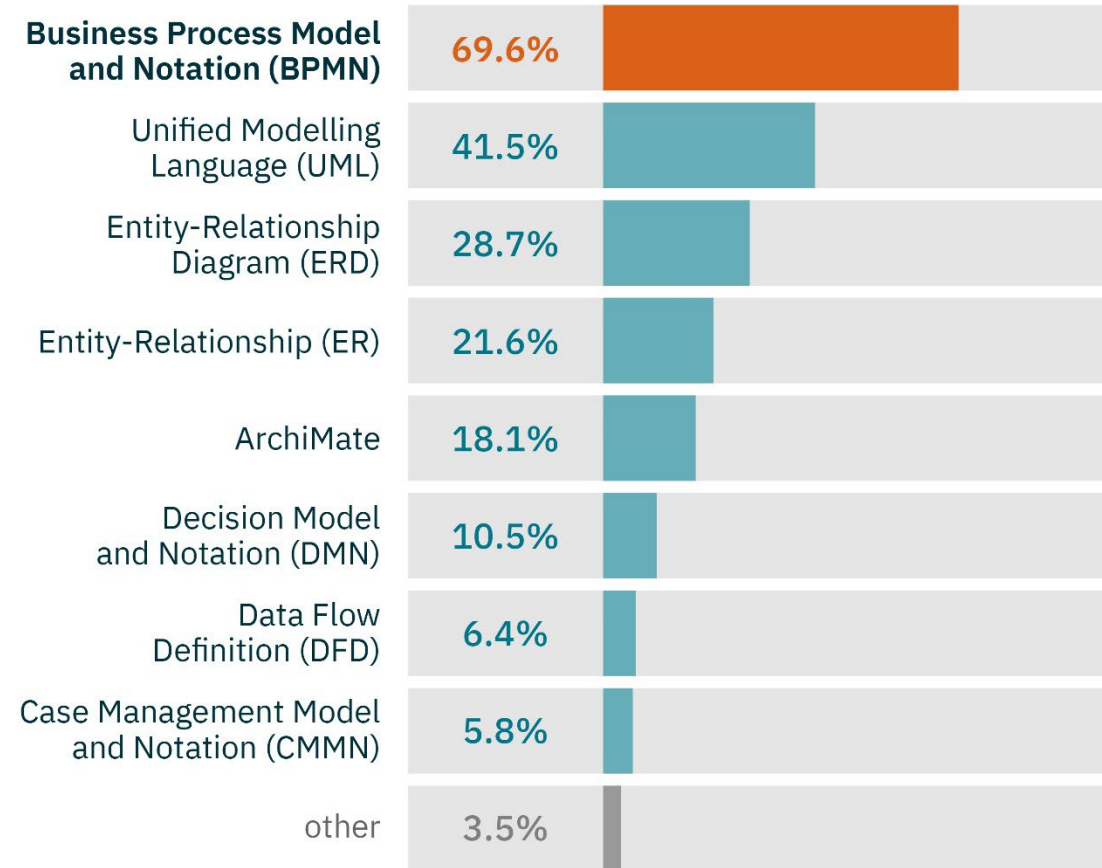
It doesn't add up

 What apps do users use each week?



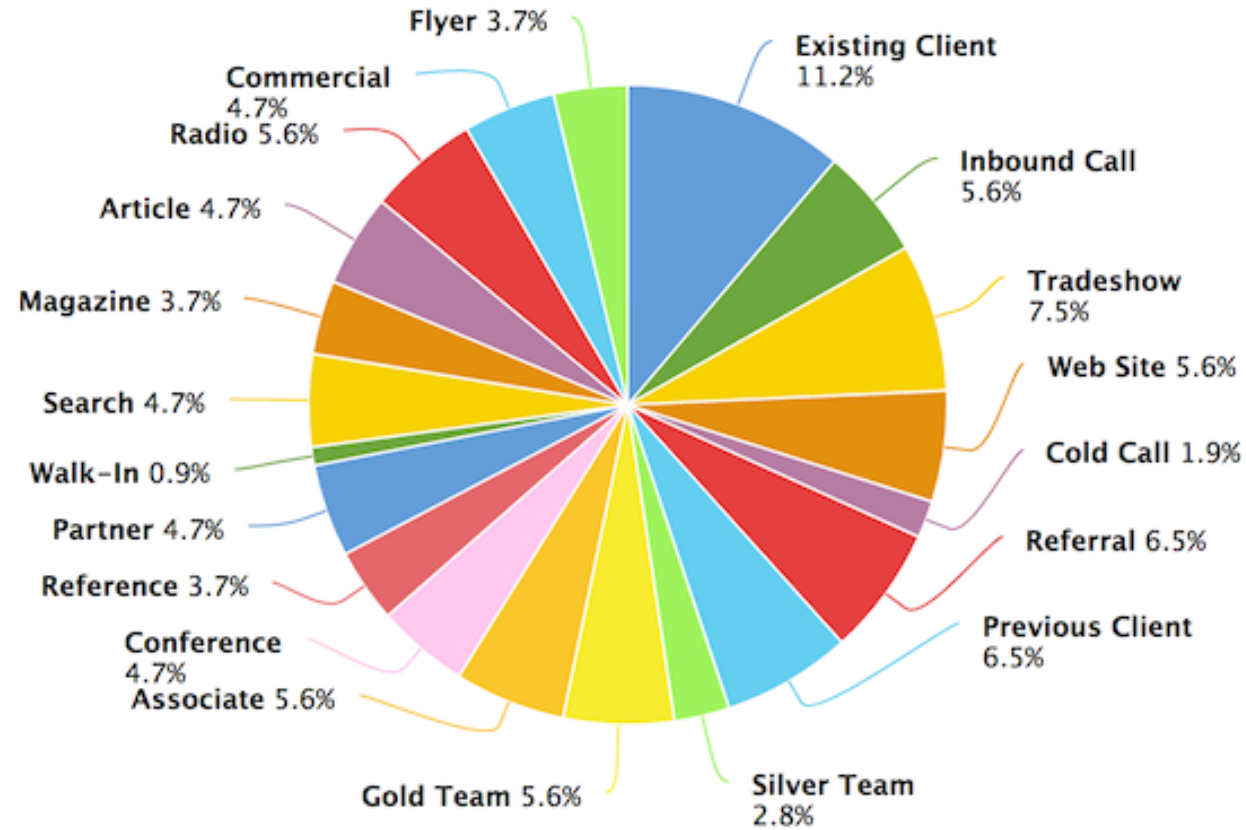
Alternative solution

Use a bar chart



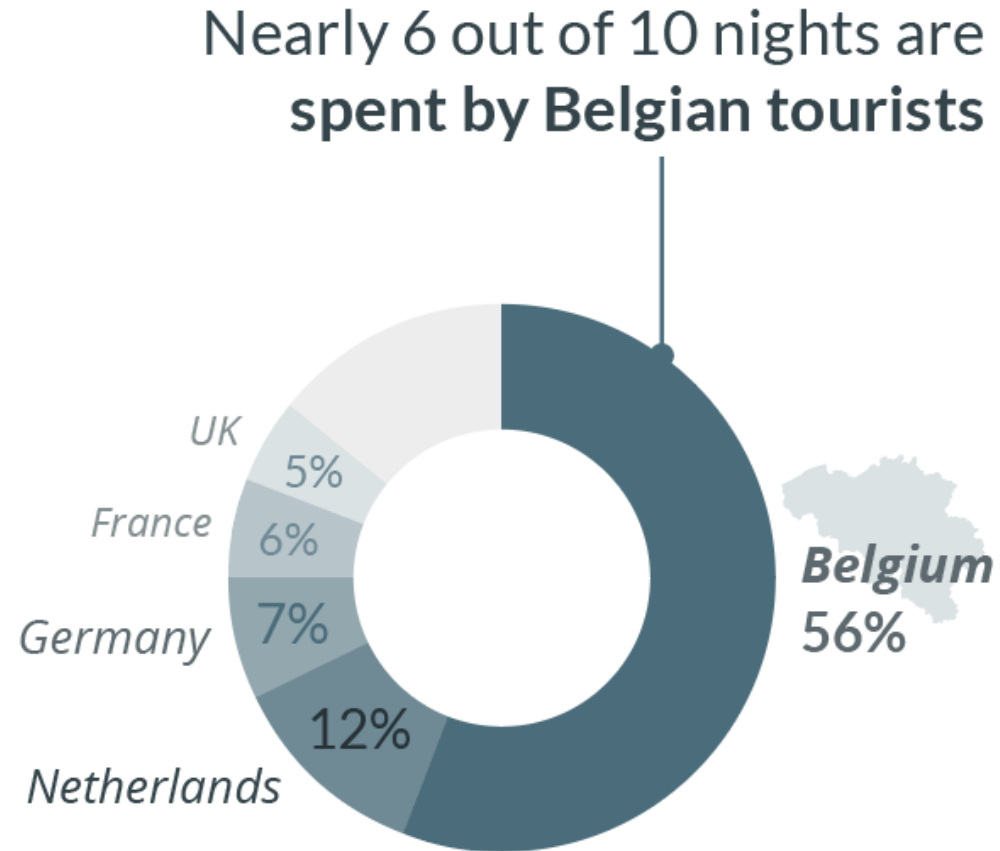
Pitfall

Too many categories



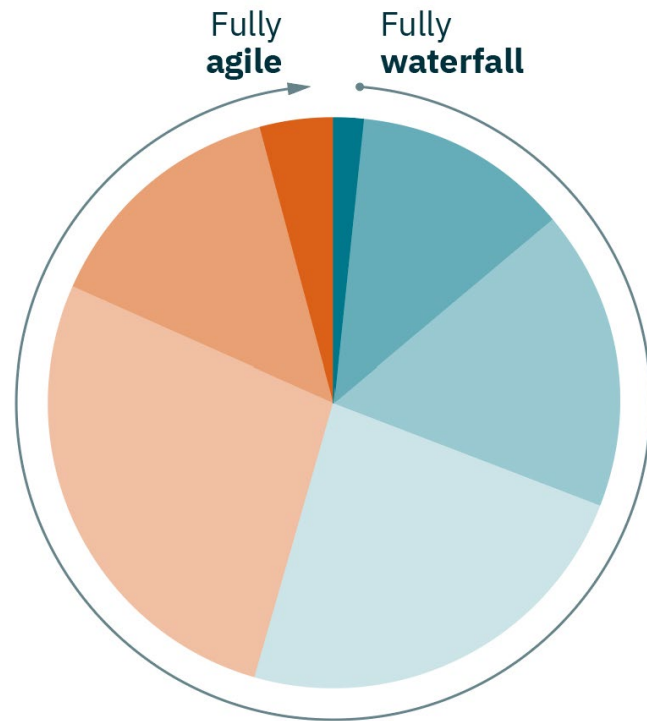
Alternative solution

Group categories together



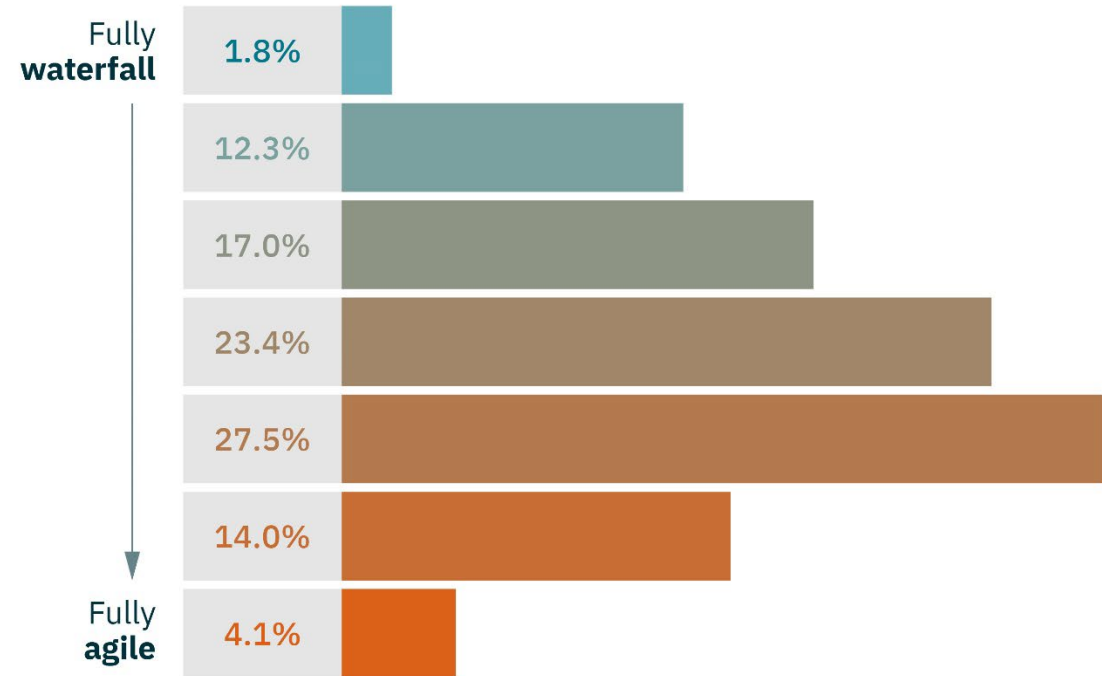
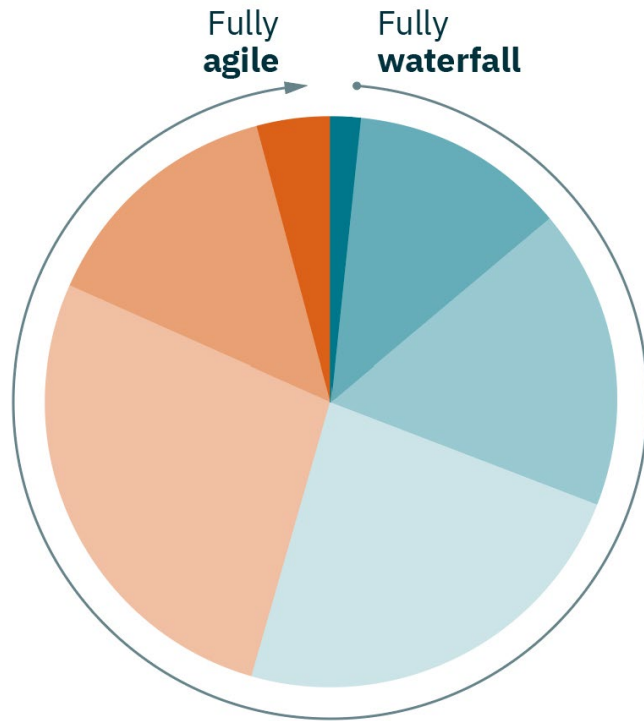
Pitfall

Difficult to compare



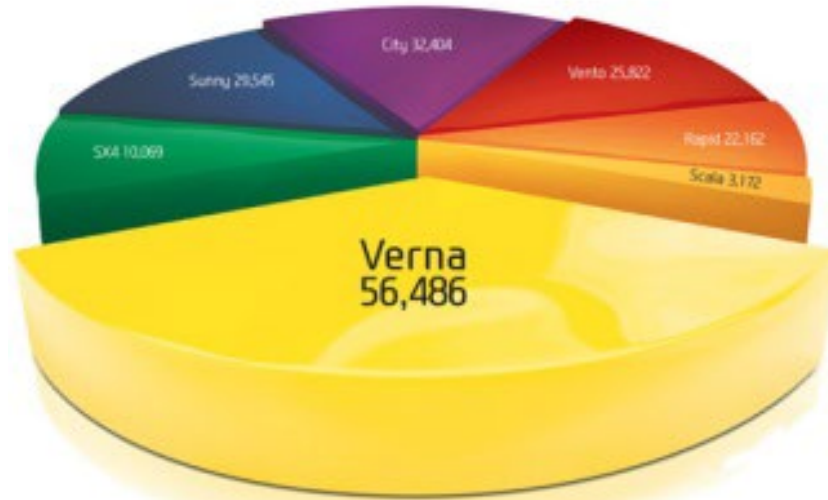
Alternative solution

Use a bar chart



Pitfall

3D pie charts



JAN-DEC 2012
Cumulative Sales Figures
Source: SIAM Data

The new **FLUIDIC**
VERNA
It sets you thinking

The chartbuster rules.

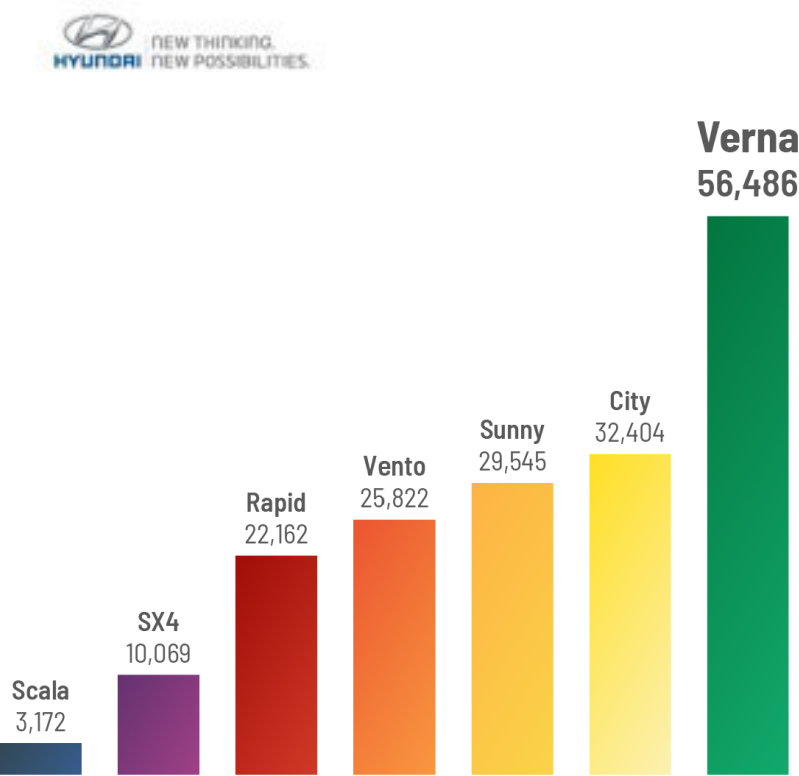
The Verna stays the undisputed No. 1 in its segment.

With its inimitable styling and superior design, the Verna has emerged as the largest selling car in its segment by a large margin. And it's not just the car that's made us the leader, it's also discerning people like you. No wonder the competition's been left behind. Far far behind.



Alternative solution

Use a bar chart



JAN-DEC 2012 Cumulative Sales Figures
Source: SIAM Data

The new FLUIDIC
VERNA
It sets you thinking

The chartbuster rules.

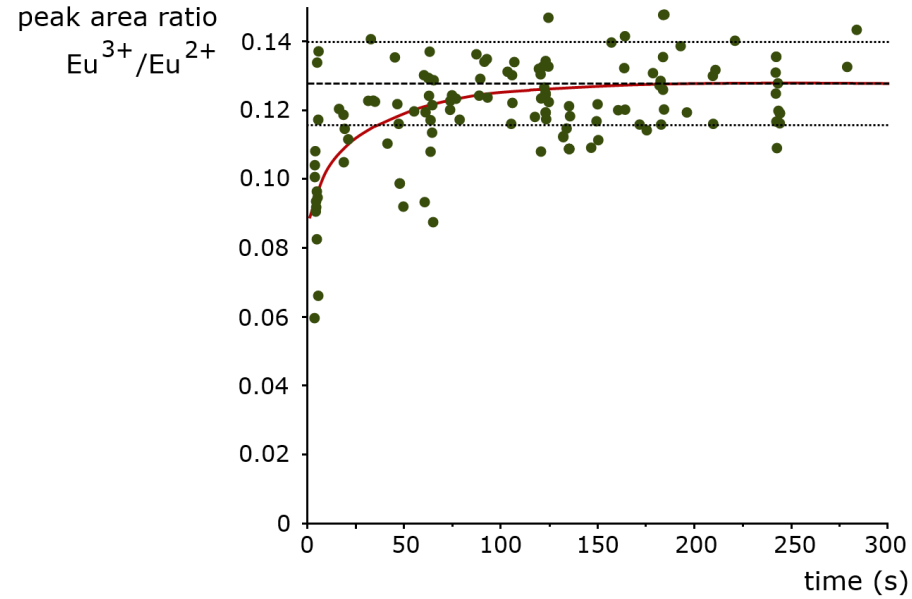
The Verna stays the undisputed No. 1 in its segment.

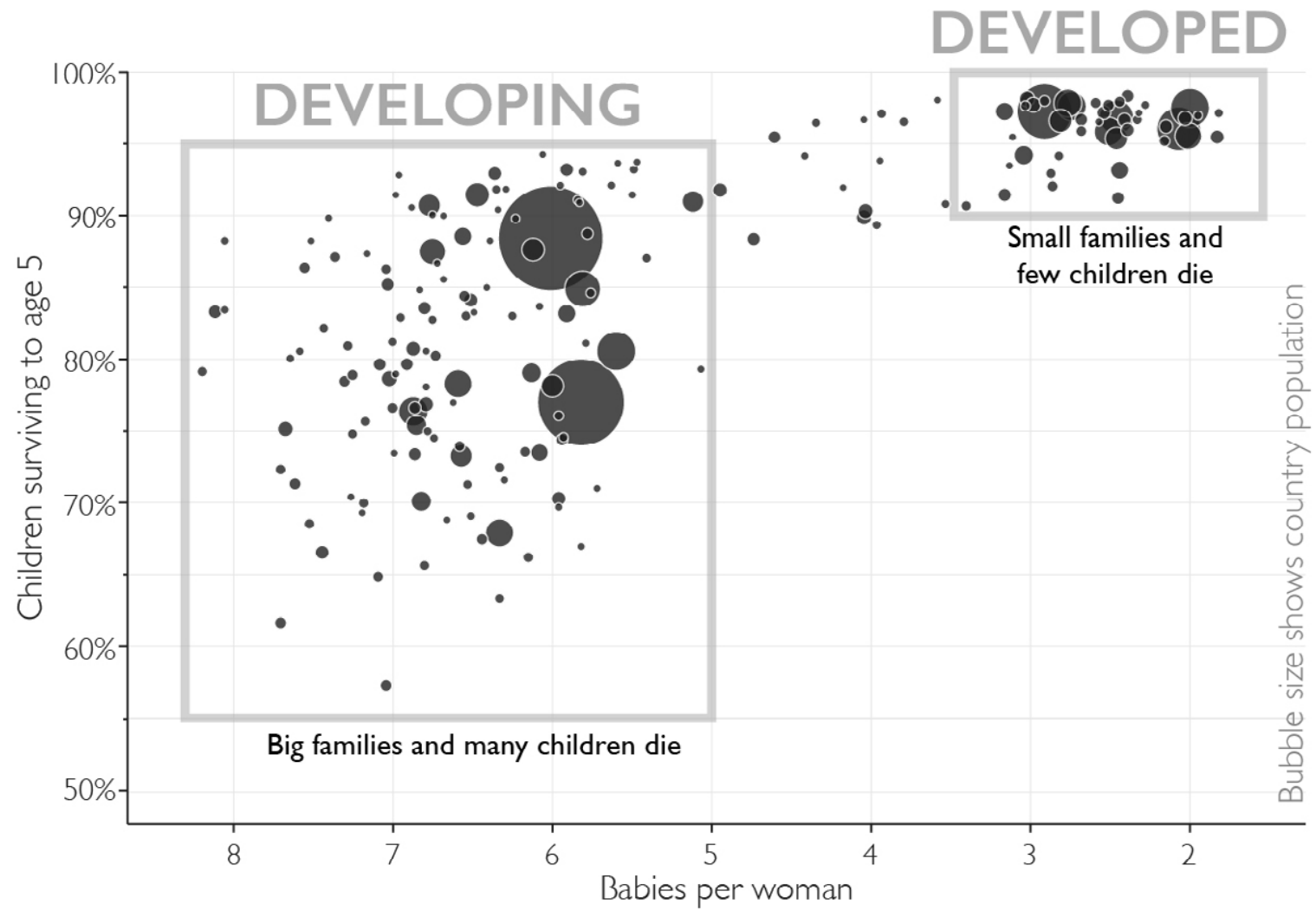
With its inimitable styling and superior design, the Verna has emerged as the largest selling car in its segment by a large margin. And it's not just the car that's made us the leader, it's also discerning people like you. No wonder the competition's been left behind. Far far behind.

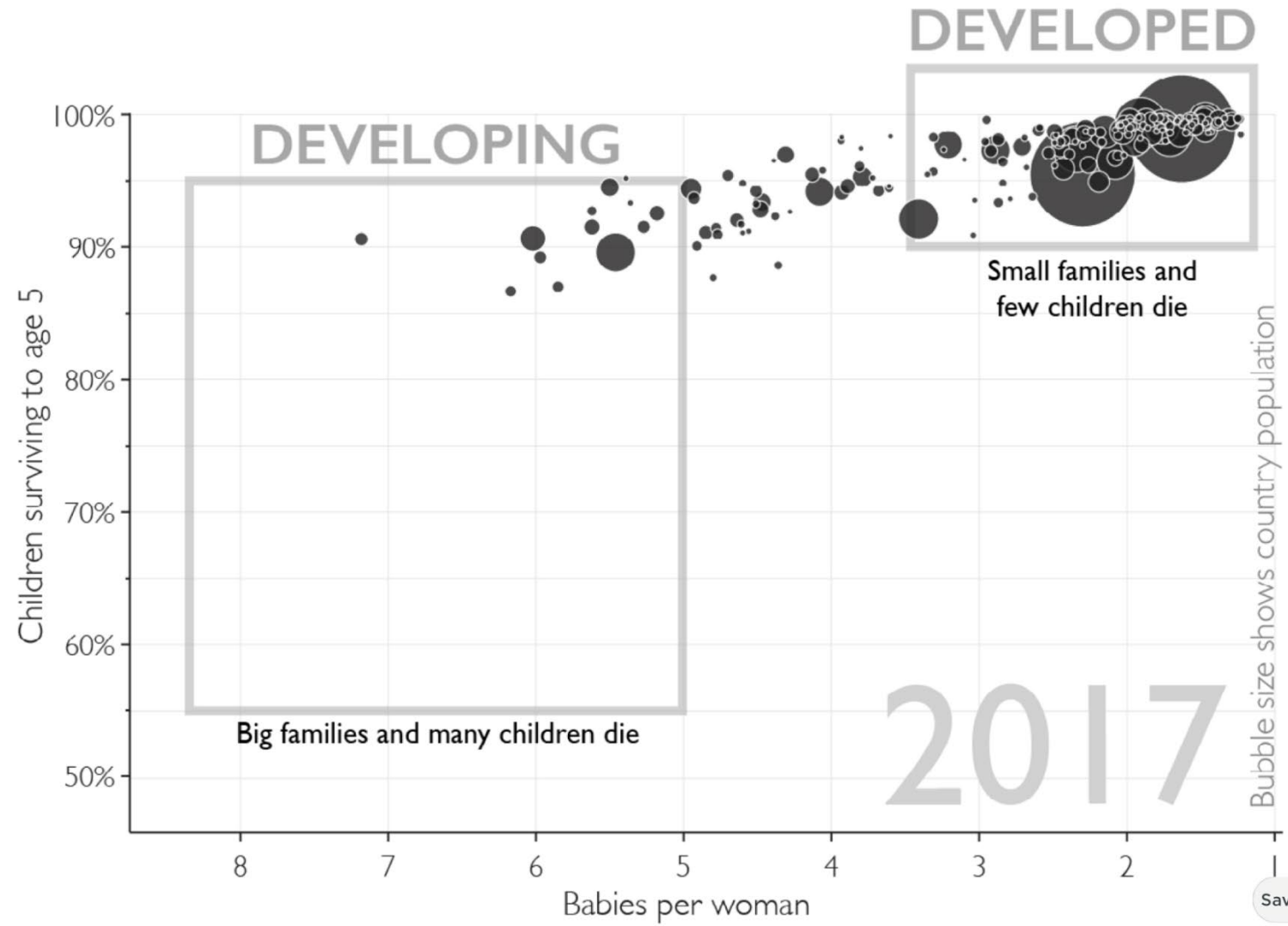


Common chart types

Scatter plots: correlation and distribution using position



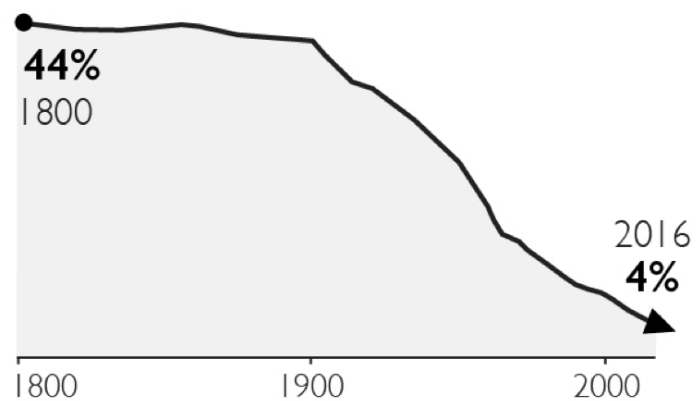




Sources: UN-IGME, UN-Pop[1,3] & Gapminder[6]

CHILDREN DYING

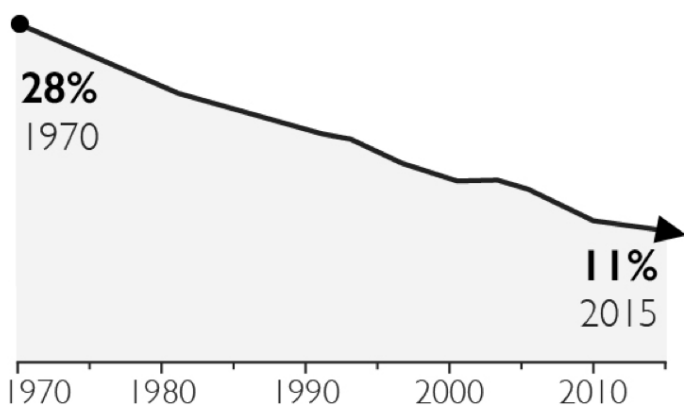
Percent dying before their fifth birthday



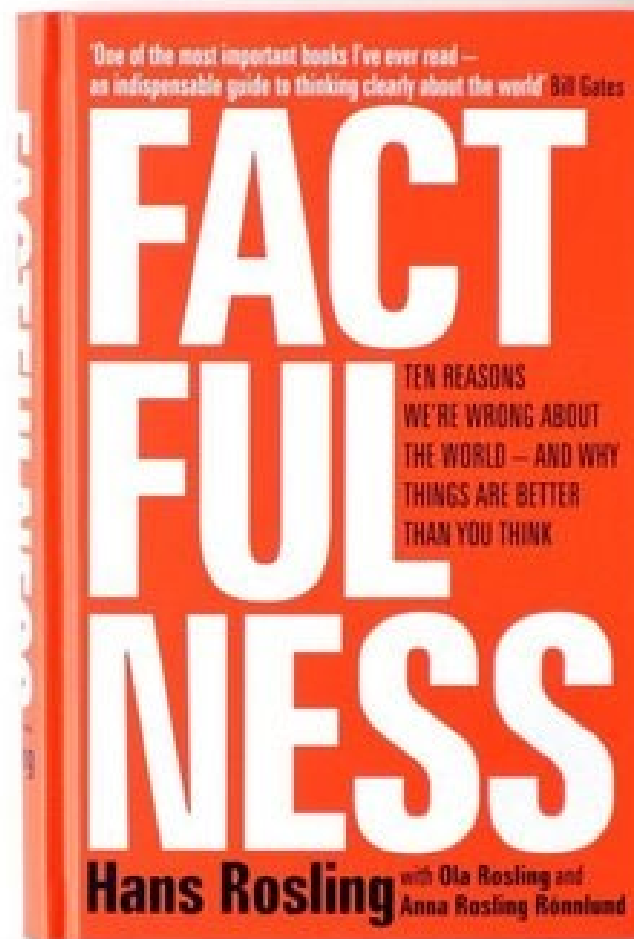
Source: Gapminder[6] based on UN-IGME & HMD

HUNGER

Share of people undernourished



Source: Gapminder[18] based on FAO[1,3]



Less common chart types

Search by Function

View by List



www.datavizcatalogue.com

Treemap



Description

Treemaps are an alternative way of visualising the hierarchical structure of a [Tree Diagram](#) while also displaying quantities for each category via area size. Each category is assigned a rectangle area with their subcategory rectangles nested inside of it.

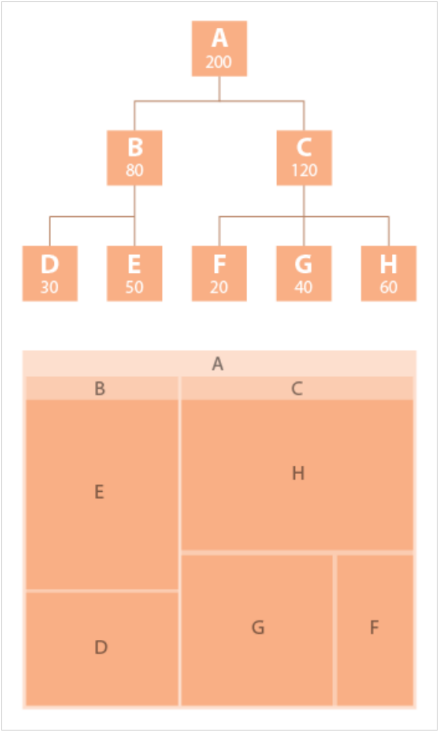
When a quantity is assigned to a category, its area size is displayed in proportion to that quantity and to the other quantities within the same parent category in a part-to-whole relationship. Also, the area size of the parent category is the total of its subcategories. If no quantity is assigned to a subcategory, then it's area is divided equally amongst the other subcategories within its parent category.

The way rectangles are divided and ordered into sub-rectangles is dependent on the tiling algorithm used. Many tiling algorithms have been developed, but the "squarified algorithm" which keeps each rectangle as square as possible is the one commonly used.

Ben Shneiderman originally developed Treemaps as a way of visualising a vast file directory on a computer, without taking up too much space on the screen. This makes Treemaps a more compact and space-efficient option for displaying hierarchies, that gives a quick overview of the structure. Treemaps are also great at comparing the proportions between categories via their area size.

The downside to a Treemap is that it doesn't show the hierarchal levels as clearly as other charts that visualise hierarchal data (such as a Tree Diagram or Sunburst Diagram).

Anatomy



Functions

- Comparisons
- Hierarchy
- Part-to-a-whole
- Proportions

Similar Charts



Tools to Generate Visualisation

- [AnyChart \(code\)](#)
- [amCharts \(code\)](#)
- [D3 \(code\)](#)
- [Datamatic](#)
- [Google Charts \(code\)](#) or [Google Docs Infogram](#)
- [jChartFX \(JavaScript plugin\)](#)
- [JSCharting \(JS Library\)](#)
- [RAWGraphs](#)
- [Slemma](#)
- [Vega \(code\)](#)
- [Vizzlo](#)
- [ZingChart \(code\)](#)

Examples

- [Region-wise Literacy Rates in 2015, World Population - FusionCharts](#)
- [Top 10 Chinese Exports to the World - AnyChart](#)
- [Treemap - Datamatic](#)

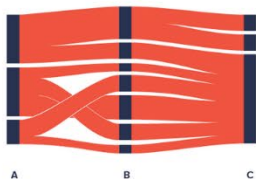


Need to access this page offline?
Download the eBook from here.

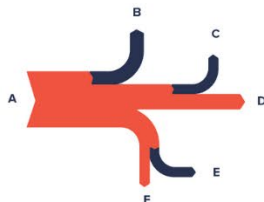


Merchandise & other related dataviz products can be found at the store

Alluvial Diagram



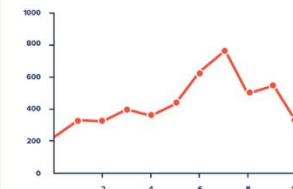
Sankey Diagram



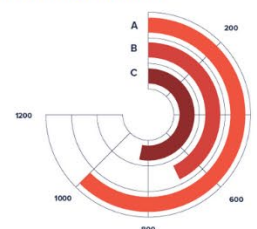
Donut Chart



Line Graph



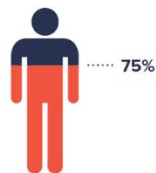
Radial Bar Chart



Polar Area Chart



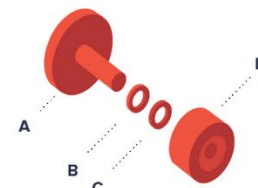
Pictorial Fraction Chart



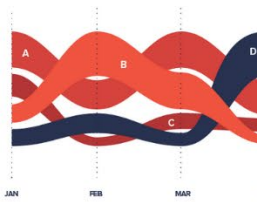
Radial Histogram



Exploded View Drawing



Sorted Stream Graph



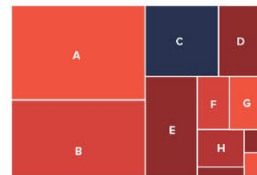
Flow Map



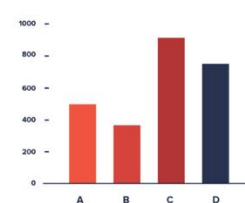
Sunburst Diagram



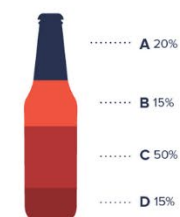
Treemap



Bar Chart (Vertical)



Pictorial Stacked Chart





Filter by chart name or AKA

Reference Type: ○ Example ● Solution | Chart Families: ● Categorical ● Hierarchical ● Relational ● Temporal ● Spatial

	Amazon QuickSight	ArcGIS	ChartJS	Charticulator	D3.js	Data Illustrator	Datawrapper	Flourish	FusionCharts	Gephi	Google Charts	Google Data Studio	Highcharts	Infogram	JetPack Data	JMP	Keshif	Kibana	Leaflet.js	Mapbox	Matplotlib
Bar chart	●			●	●●●	○	●●●	○	○		●●	○	●●●	○	●○	●	●	●			●○
Clustered bar chart	●				●	○	●●●	○	○		●●				○	●	●	●			●
Bullet chart				●	●		●●		○							●					
Waterfall chart				●	●				○		●		○	○							
Radar chart			○		●				○				○								○
Polar chart			●	●	●								○								○
Connected dot plot					●●	○	●●●	●													
Pictogram					○									○				●			
Proportional shape chart					●●●	○		●○	○		●										
Word cloud					●									○	●			●			●●
Heat map	●			●	○	○			○				○			●		●			●●
Matrix chart				●	○			○				○					●				
Dot plot					●		●●	●								●●		○			

1) Choose your chart

What would you like to show?



2) Design your chart

Let your data speak



Use this chart for analysing communicating monitoring confusing

Find more tips to choose and design your Perfect Chart at:

www. **Chart.Guide** /poster

info@Chart.Guide

/Chart.Guide

@Chart.Guide

/Chart.Guide

Copyright poster and chart design: www.Chart.Guide - Poster version: 4.0.2

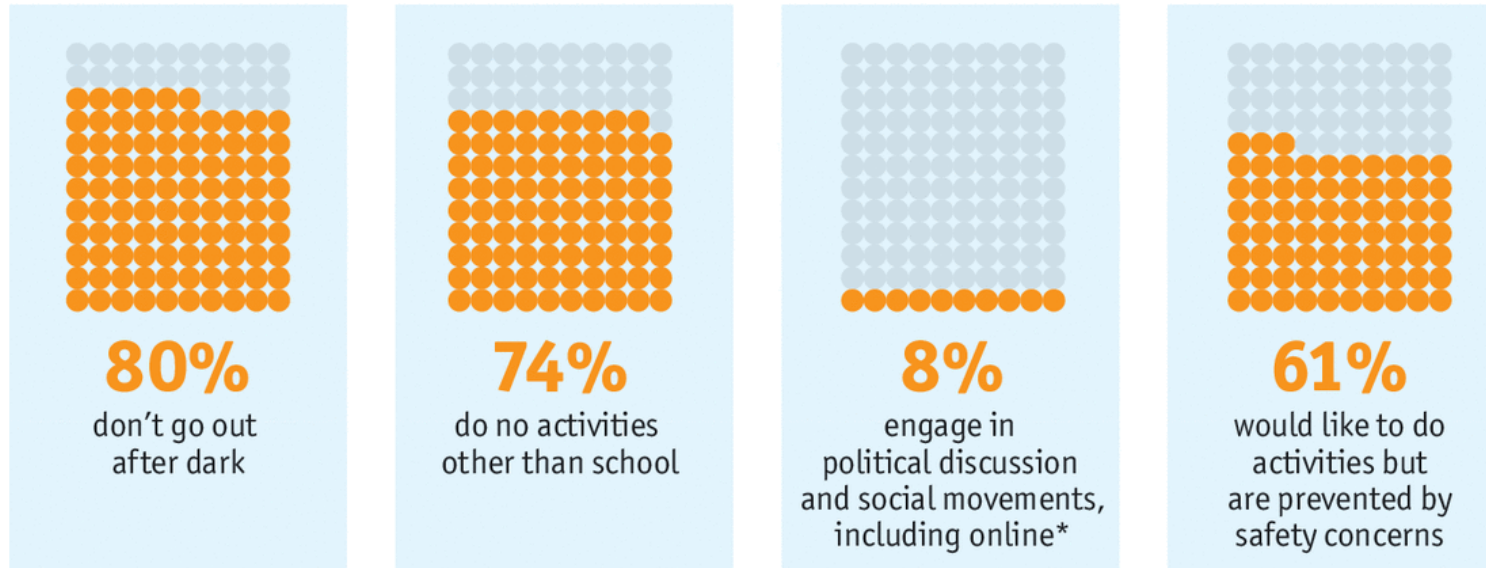
<https://chart.guide/>

Less common chart types

Waffle charts

Subdued

Of 120 surveyed Syrian teenagers:



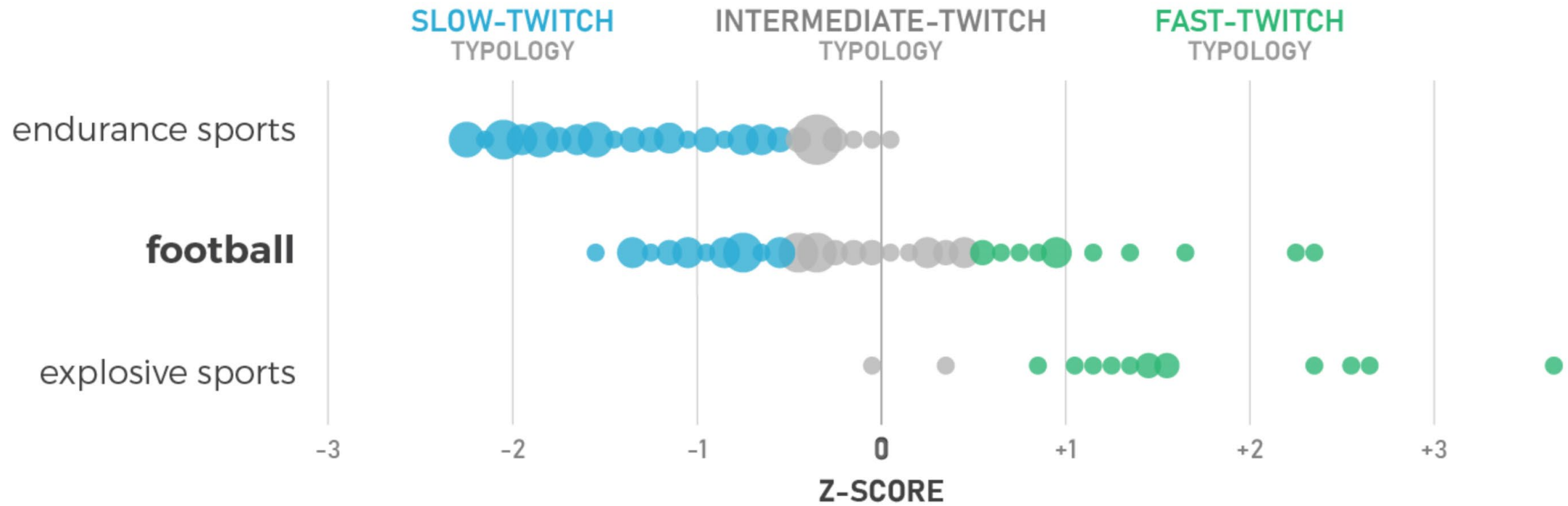
Source: Mercy Corps

**Economist* estimate based on the report

Economist.com

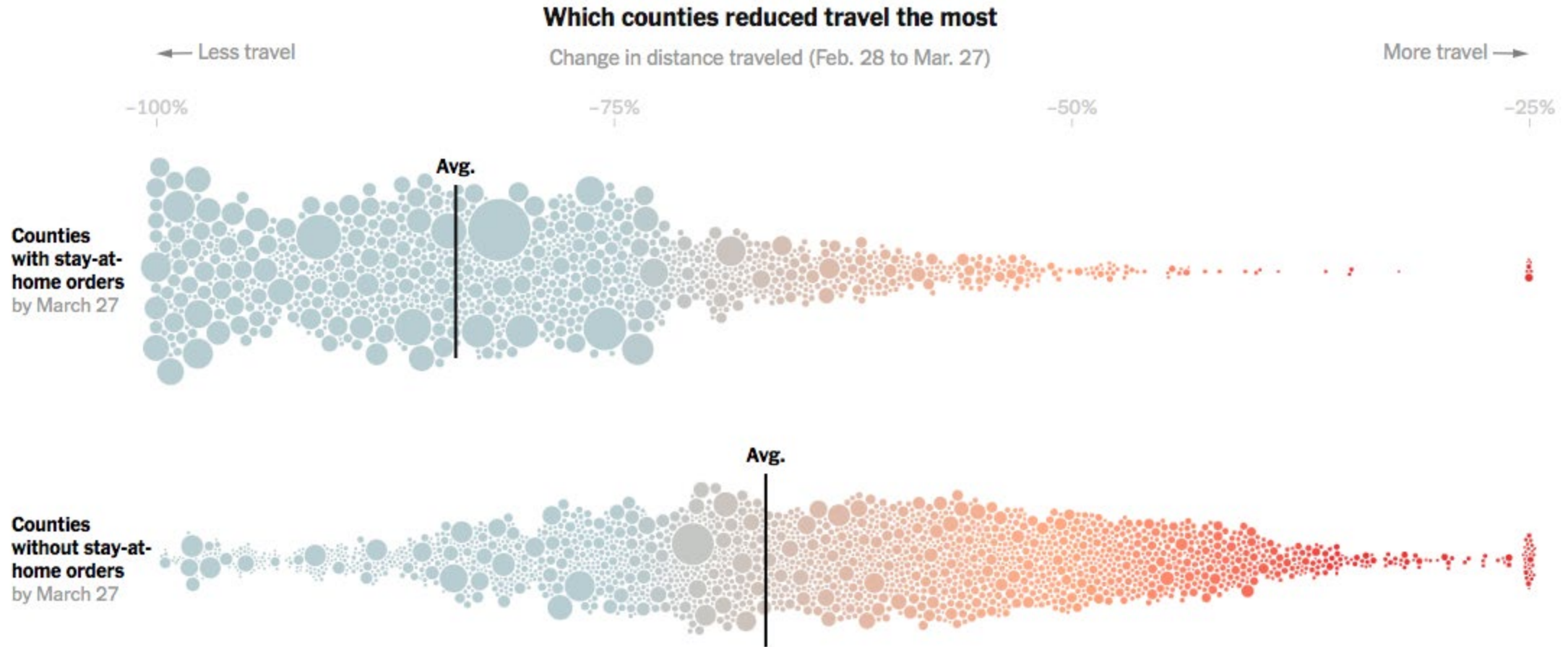
Less common chart types

Strip charts



Less common chart types

Beeswarm plots

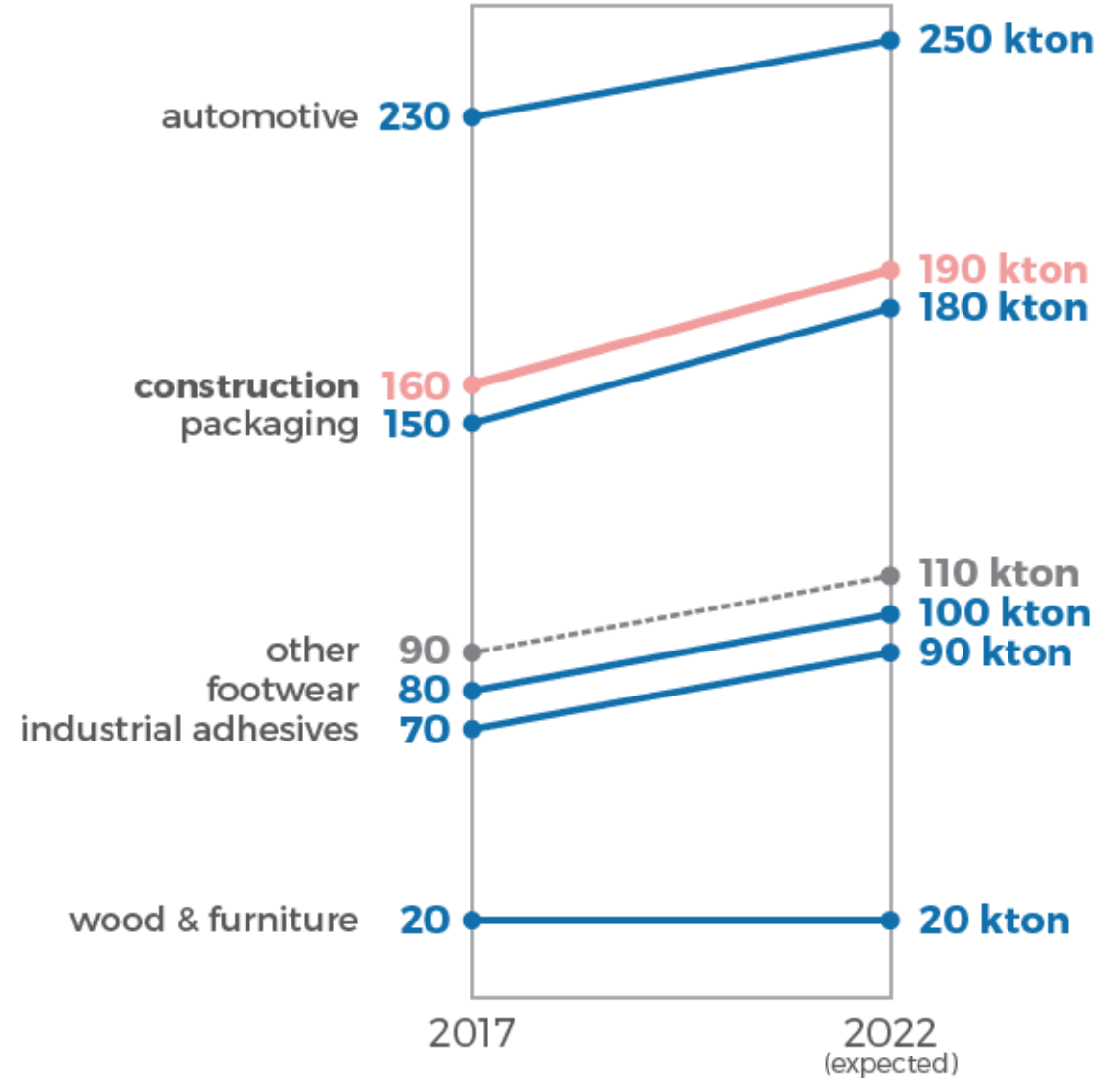


<https://www.nytimes.com/interactive/2020/04/02/us/coronavirus-social-distancing.html>

Less common chart types

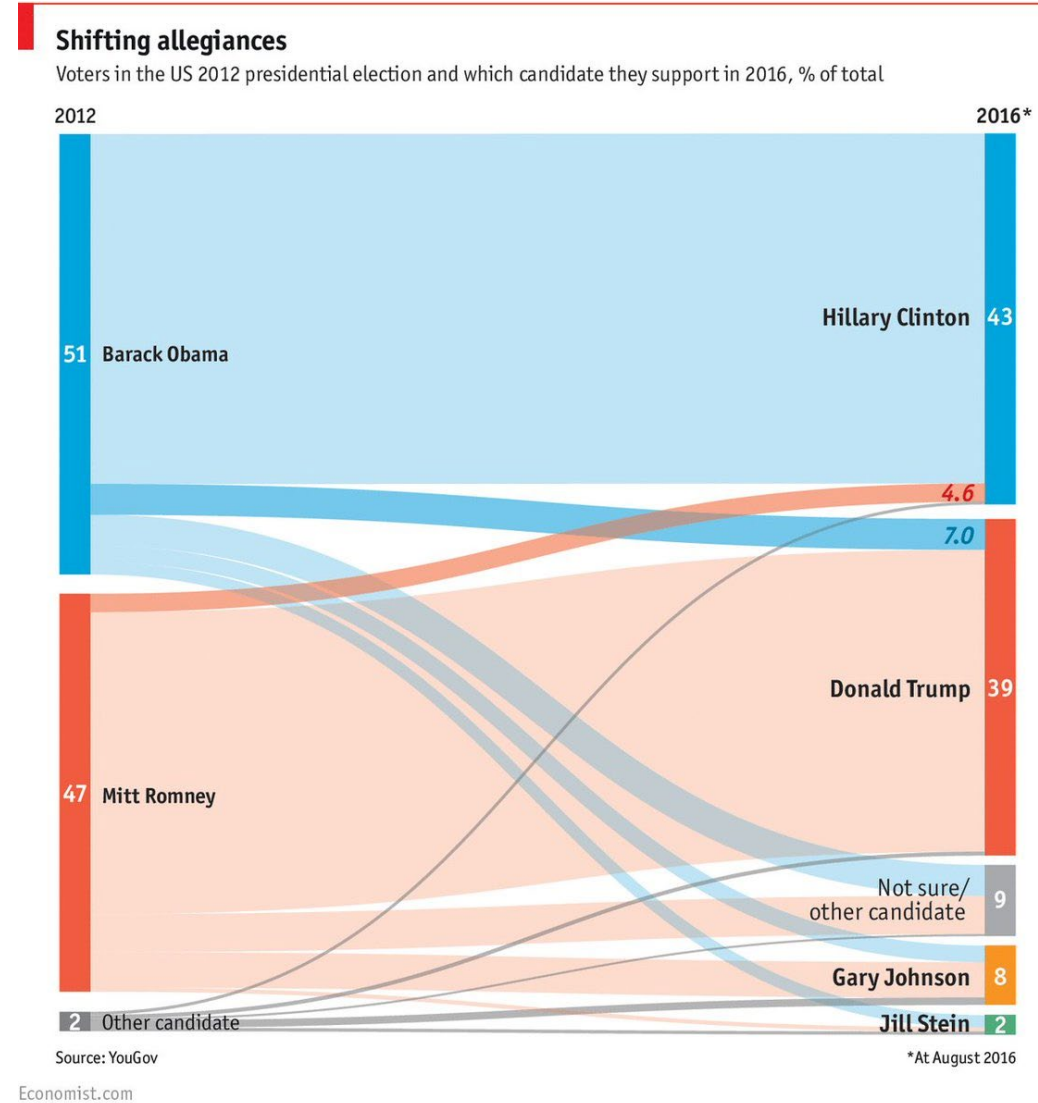
Slopegraphs

The market demand for construction sealants is the second largest and fastest growing

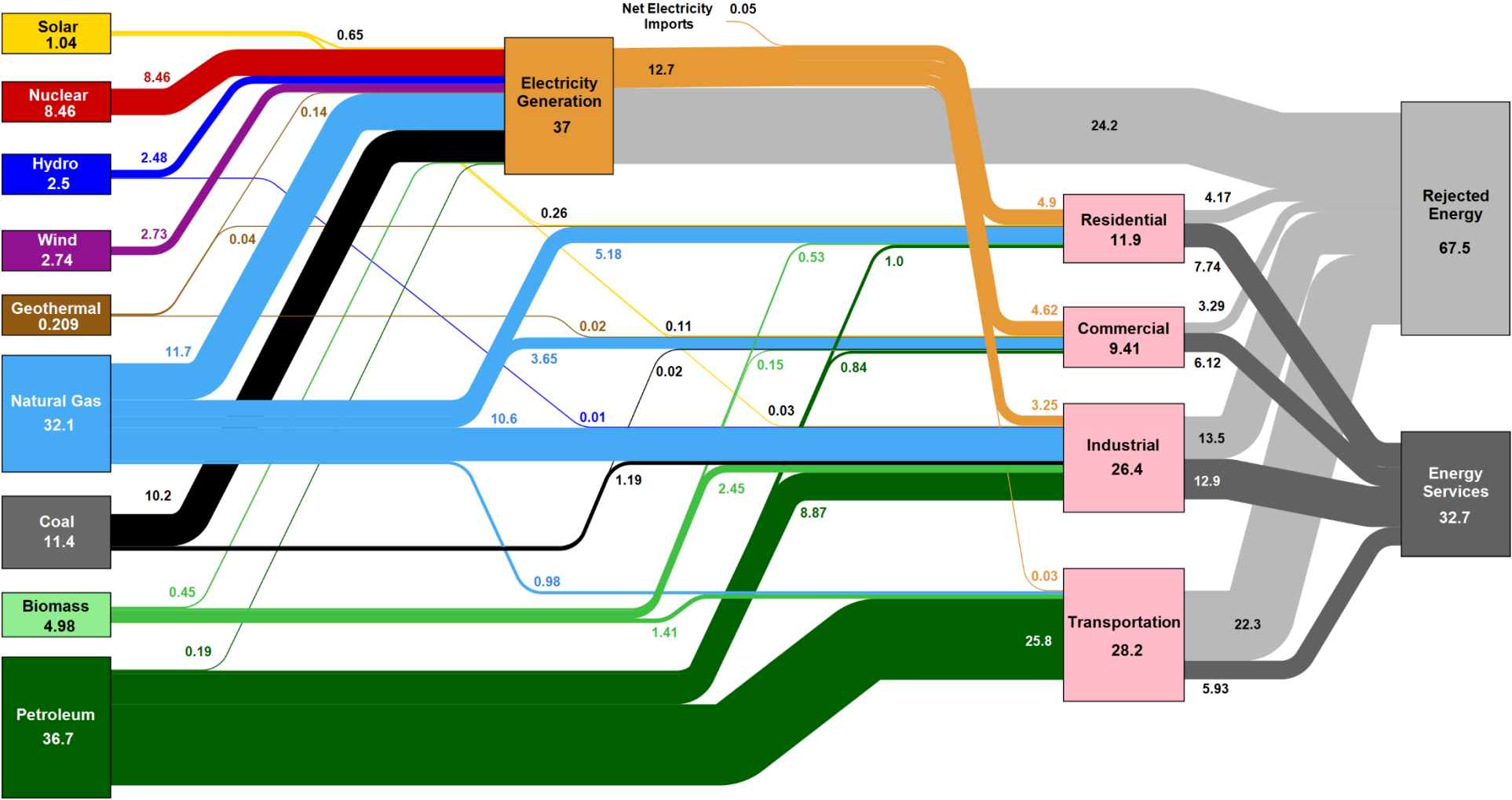


Less common chart types

Sankey diagrams



Estimated U.S. Energy Consumption in 2019: 100.2 Quads



Source: LLNL March, 2020. Data is based on DOE/EIA MER (2019). If this information or a reproduction of it is used, credit must be given to the Lawrence Livermore National Laboratory and the Department of Energy, under whose auspices the work was performed. Distributed electricity represents only retail electricity sales and does not include self-generation. EIA reports consumption of renewable resources (i.e., hydro, wind, geothermal and solar) for electricity in BTU-equivalent values by assuming a typical fossil fuel plant heat rate. The efficiency of electricity production is calculated as the total retail electricity delivered divided by the primary energy input into electricity generation. End use efficiency is estimated as 65% for the residential sector, 65% for the commercial sector, 21% for the transportation sector and 49% for the industrial sector, which was updated in 2017 to reflect DOE's analysis of manufacturing. Totals may not equal sum of components due to independent rounding. LLNL-MI-410527

Chart type exploration

Group exercise (15 minutes)

Explore one or more of the following **chart type collections**:

www.datavizcatalogue.com

<http://chartmaker.visualisingdata.com>

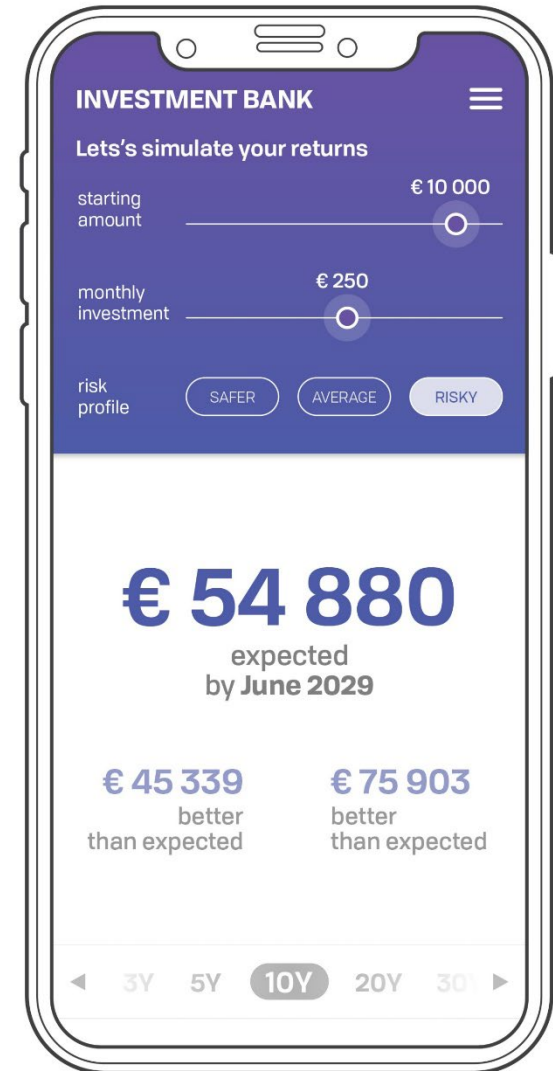
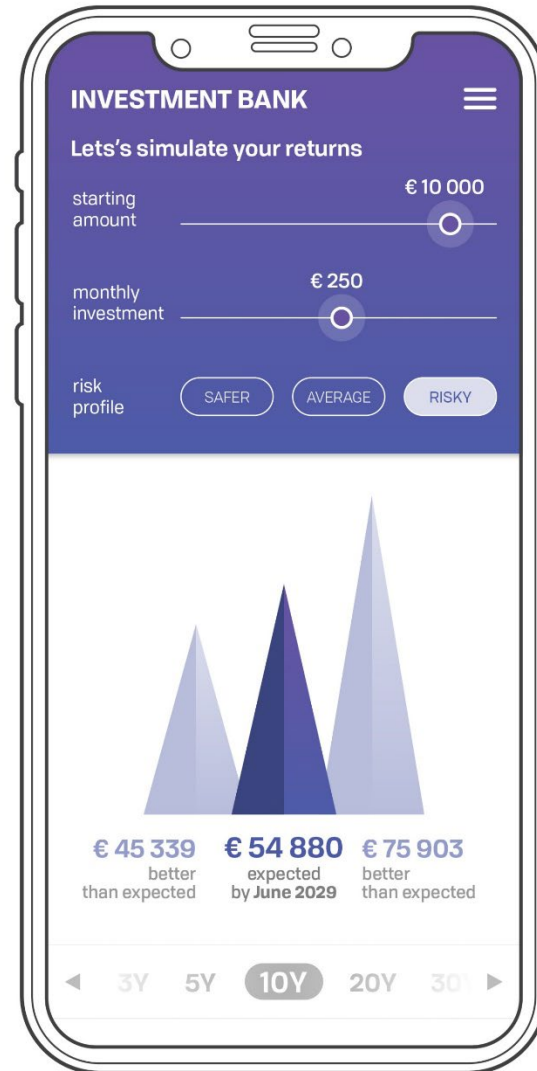
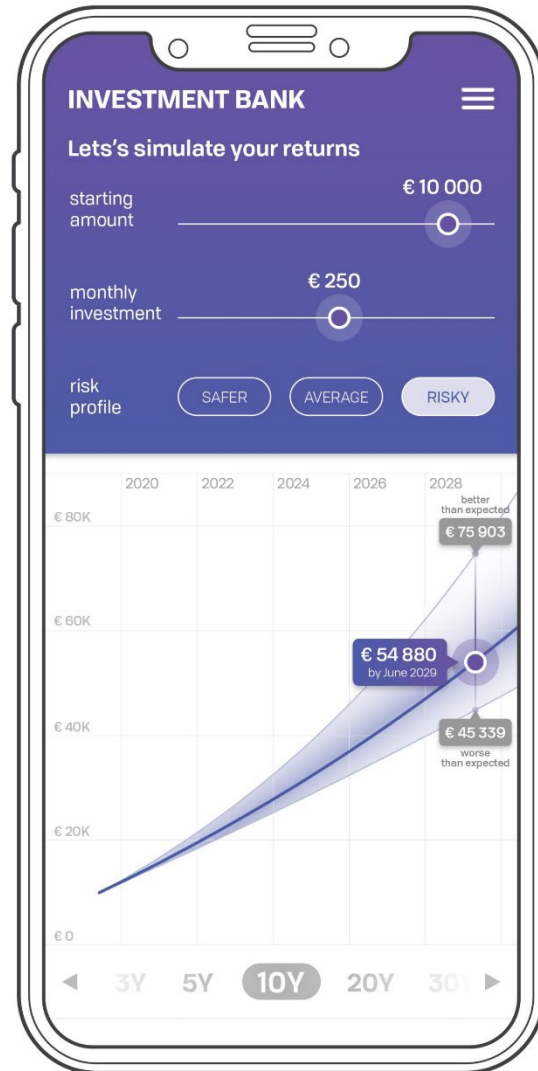
<https://chart.guide/>

Browse around, get familiar, explore examples

Discuss: Which chart types could be relevant for your daily practice? Why?

Beyond charts

Do I really need a chart?



Maybe a table is sufficient?

UPDATED JAN. 12, 2021, AT 12:03 AM

Club Soccer Predictions

Forecasts and Soccer Power Index (SPI) ratings
for 39 leagues, updated after each match.

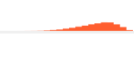
See also: [How this works](#) [Global club soccer rankings](#)

England: Premier League ▾

Standings Matches

 **PREMIER LEAGUE**
2020-21

England
Updated Jan. 4, 2021, at 4:56 p.m.

TEAM	TEAM RATING		AVG. SIMULATED SEASON		END-OF-SEASON PROBABILITIES			
	SPI	OFF. DEF.	GOAL DIFF.	PTS.	EVERY POSITION	RELEGATED	QUALIFY FOR UCL	WIN PREMIER LEAGUE
 Man. City 29 pts	93.7	2.9 0.2	+49	83		<1%	97%	69%
 Liverpool 33 pts	88.6	2.6 0.4	+36	74		<1%	80%	15%
 Man. United 33 pts	84.5	2.5 0.6	+23	72		<1%	70%	10%
 Tottenham 29 pts	81.6	2.3 0.6	+23	65		<1%	39%	2%
 Chelsea 26 pts	85.8	2.4 0.5	+25	64		<1%	33%	1%
 Leicester 32 pts	79.1	2.1 0.6	+14	64		<1%	29%	1%
 Aston Villa 26 pts	78.5	2.2 0.7	+16	60		<1%	18%	<1%
 Everton 29 pts	74.5	2.0 0.7	+3	58		<1%	10%	<1%
 Arsenal 23 pts	80.5	2.2 0.6	+8	57		<1%	8%	<1%

More info: fivethirtyeight.com

Company	LatestWeek Volume	PriorWeek Volume	Change	% Change	Volume Trend Last 31 days as of 31-10-2018
	16,356,600	8,707,400	7,649,200	87.85%	
	195,375,400	103,700,700	91,674,700	88.40%	
	198,068,600	174,145,400	23,923,200	13.74%	
	60,965,900	29,933,500	31,032,400	103.67%	
	6,393,500	8,870,600	2,477,100	27.92%	
	288,745,200	199,505,500	89,239,700	44.73%	
	52,925,900	50,509,900	2,416,000	4.78%	
	228,612,200	161,738,200	66,874,000	41.35%	

Unemployment rate in selected countries

January-August 2020, sorted by the unemployment rate in January.

country	Jan ▲	Feb	Mar	Apr	May	Jun	Jul	Aug
Japan	2.4%	2.4%	2.5%	2.6%	2.9%	2.8%	2.9%	3.0%
Netherlands	3.0%	2.9%	2.9%	3.4%	3.6%	4.3%	4.5%	4.6%
Germany	3.4%	3.6%	3.8%	4.0%	4.2%	4.3%	4.4%	4.4%
Mexico	3.6%	3.6%	3.2%	4.8%	4.3%	5.4%	5.2%	5.0%
US	3.6%	3.5%	4.4%	14.7%	13.3%	11.1%	10.2%	8.4%
South Korea	4.0%	3.3%	3.8%	3.8%	4.5%	4.3%	4.2%	3.2%
Denmark	4.9%	4.9%	4.8%	4.9%	5.5%	6.0%	6.3%	6.1%
Belgium	5.1%	5.0%	5.0%	5.1%	5.0%	5.0%	5.0%	5.1%
Australia	5.3%	5.1%	5.2%	6.4%	7.1%	7.4%	7.5%	6.8%
Canada	5.5%	5.6%	7.8%	13.0%	13.7%	12.3%	10.9%	10.2%
Finland	6.8%	6.9%	7.0%	7.3%	7.5%	7.8%	8.0%	8.1%

Source: [OECD](#) • [Get the data](#) • Created with [Datawrapper](#)

Day	Fat	Carbs	Protein
Monday	70g	94g	81g
Tuesday	65g	85g	95g
Wednesday	88g	71g	105g
Thursday	57g	102g	78g
Friday	73g	96g	84g
Average	74g	85g	88g

Name (Symbol)	Div	Vol	Yld	P/E	Day Last	% Change
SkyHighCorp (SHC)	--	3143	--	76	21.25	+ .25
LowDownInc (LDI)	2.35	2735	5.7	18	41.00	- .50
ValueNowInc (VNI)	1.00	1894	4.5	12	22.00	+ .10
DoinBadlyCorp (DBC)	--	7601	--	--	33.50	- .75

Proportional	Tabular
390,209,000	390,209,000
112,371,000	112,371,000

☐ Invoice	Invoice date	Due date	Status	Amount
☐ #09293	05/10/2019	05/10/2019	Unpaid	\$2,350.00
☐ #98273	05/10/2019	05/10/2019	Paid	\$750.83
☐ #19293	05/10/2019	05/10/2019	Pending	\$1,200.00
☐ #12839	05/11/2019	05/11/2019	Paid	\$2,500.00
☐ 81727	05/11/2019	05/11/2019	Unpaid	\$3,200.00

Principles

What is a good data visual?

Telling a story

How charts work

Visual variables

Chart types

Beyond charts

Creating charts

Tools

Improving charts

Signal-to-noise ratio

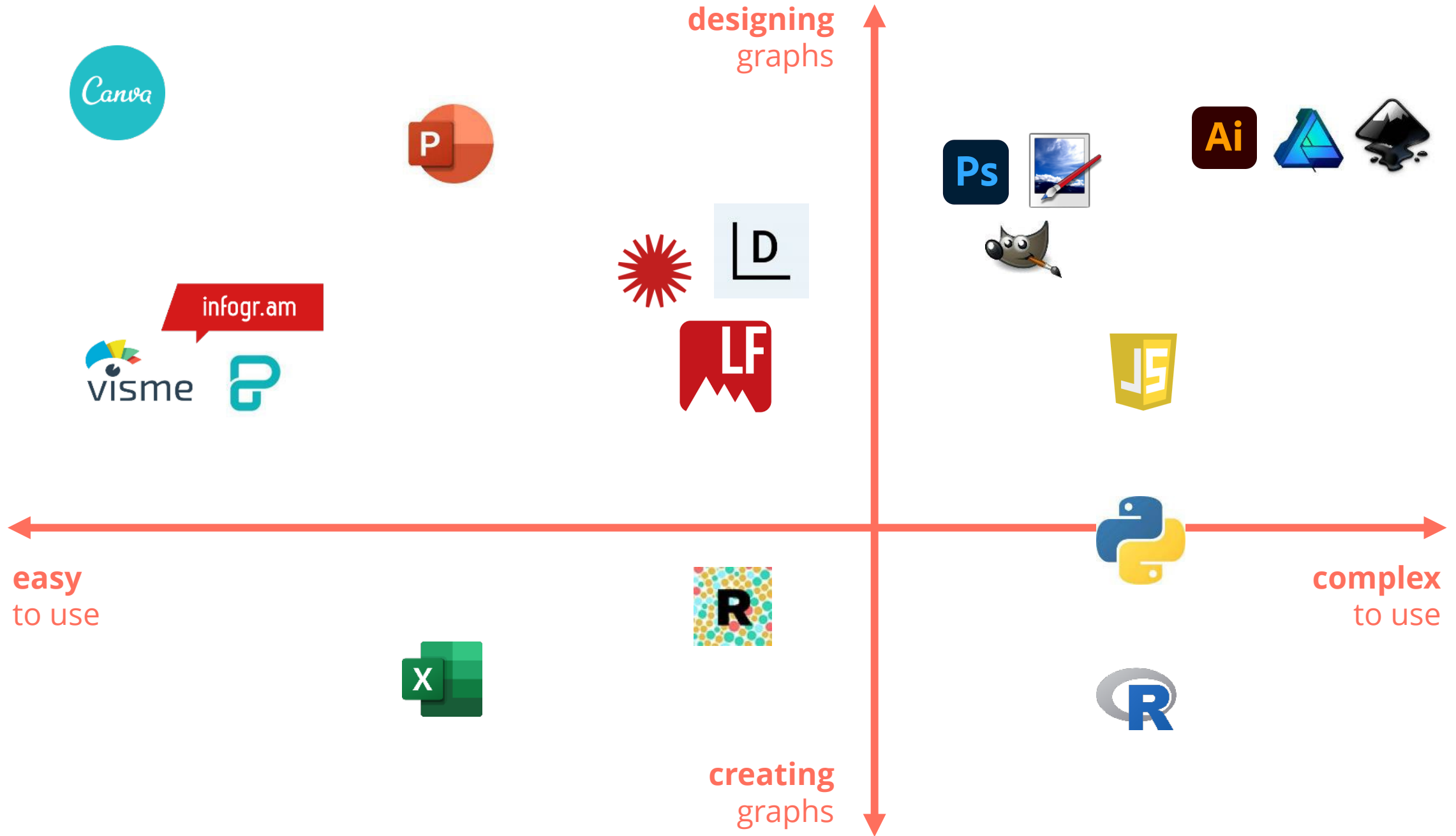
Design components

Visualizing uncertainty

The background is a blurred, high-angle view of a newspaper page. At the top, a world map is visible. Below it, a large headline reads "The Nobel Prize" followed by "114 years, 108 prizes". Several small black and white portraits of men are arranged in a row. The bottom half of the page is dominated by a large, dense area of vertical lines, resembling a bar chart or a list of names. The entire image has a reddish-orange tint.

Creating charts

Which tools do you currently use
to produce data visuals?



online drag-and-drop tools



designing
graphs



easy
to use

complex
to use



creating
graphs

Canva

lots of templates, fonts, images,... - also in free version

easy to use – drag and drop

very limited chart options

Infogram

better for charts, even real-time/interactive

no downloads in free version

Piktochart

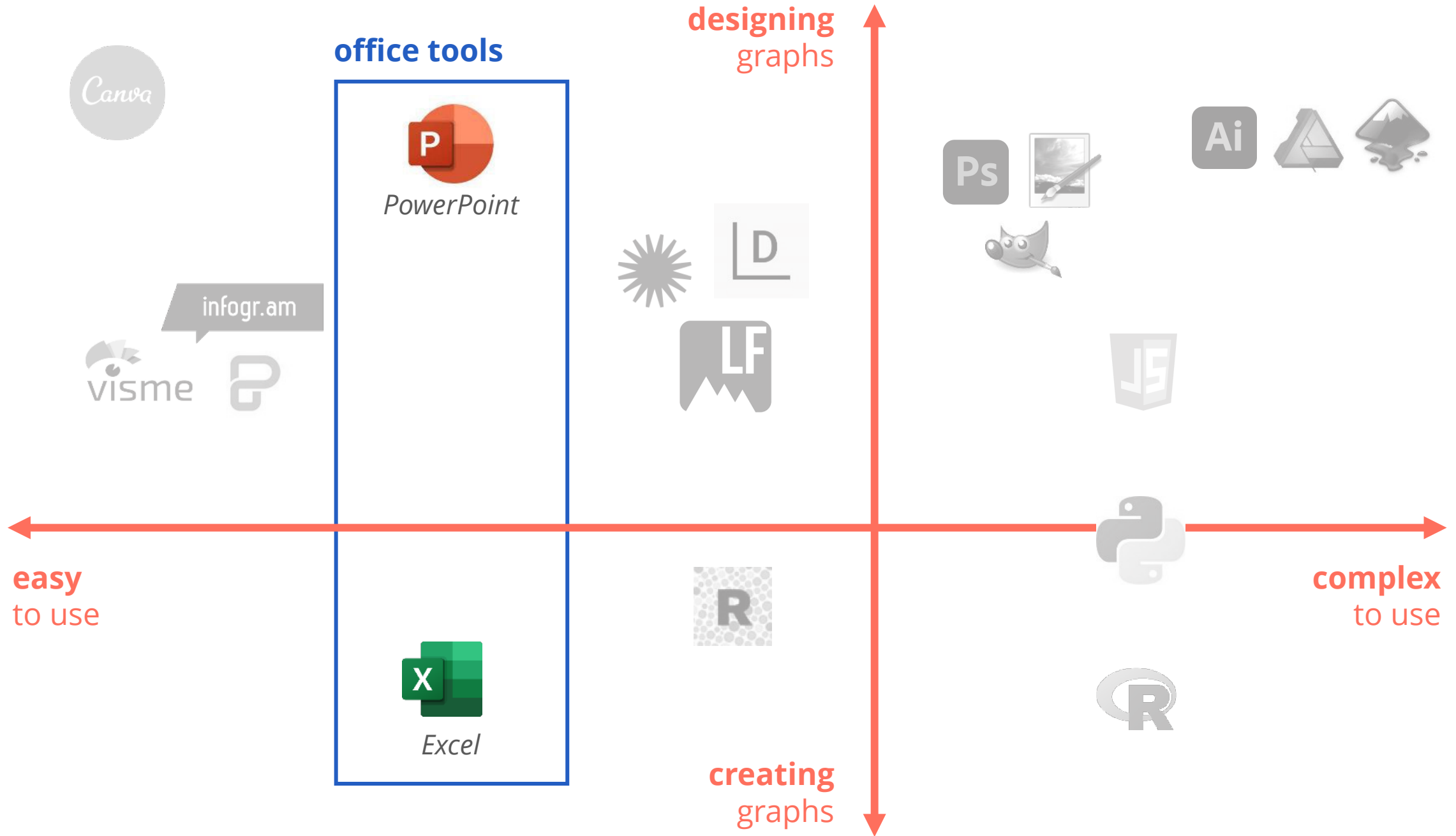
pretty complete for starters, good chart options

limited number of visuals in free version

Visme

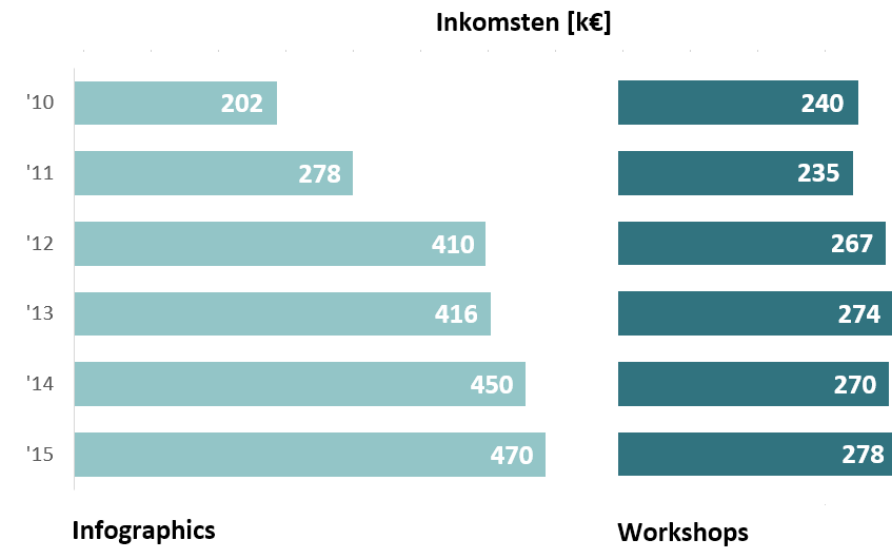
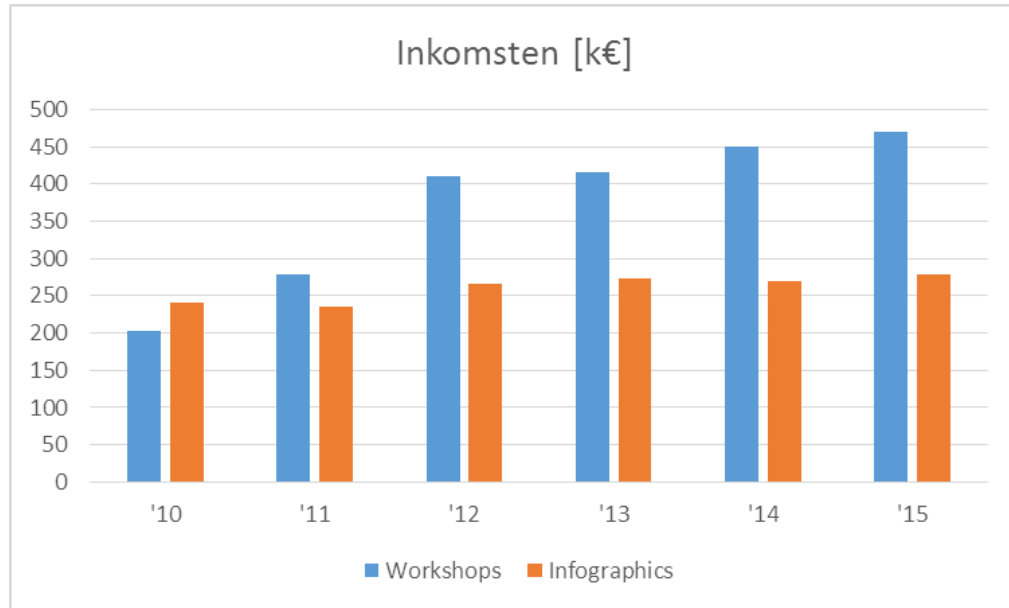
not too expensive, similar options to Piktochart

limited number of visuals in free version



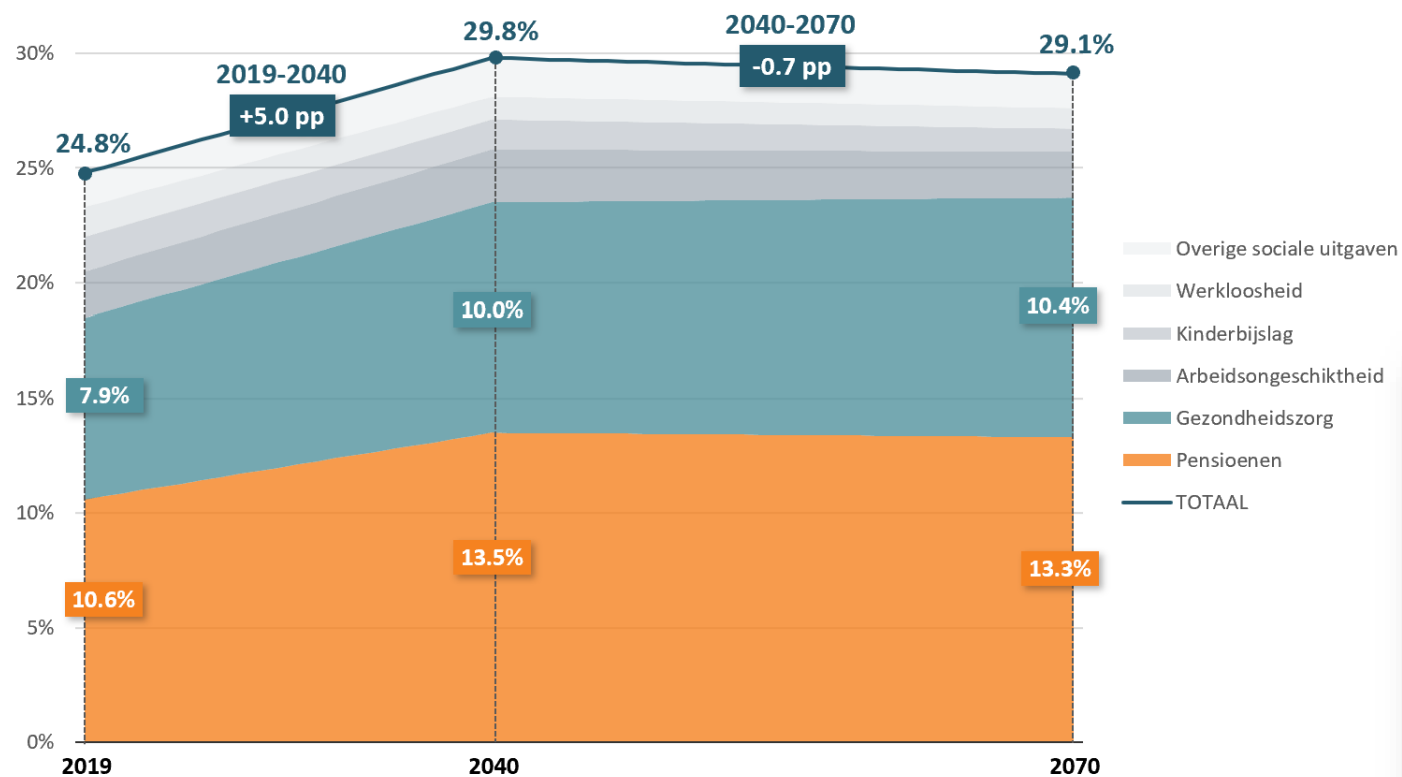
Available tools

Excel



Evolutie van de budgettaire kosten van de vergrijzing op lange termijn

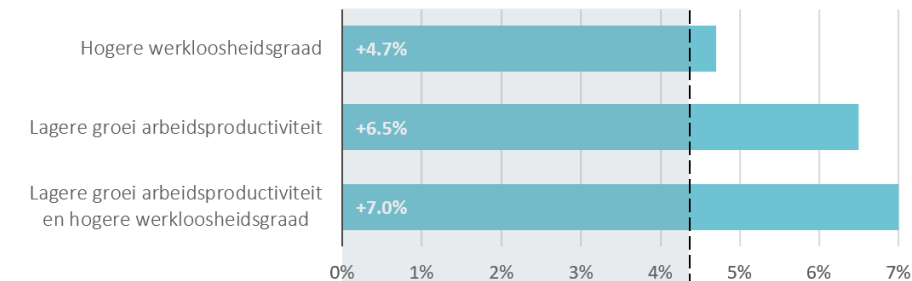
Volgens het SCvV-referentiescenario van juli 2020
in procent van het bbp



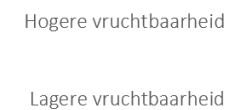
Evolutie van de budgettaire kosten van de vergrijzing tussen 2019 en 2070

Volgens het referentie- en alternatieve scenario's
in procentpunt van het bbp

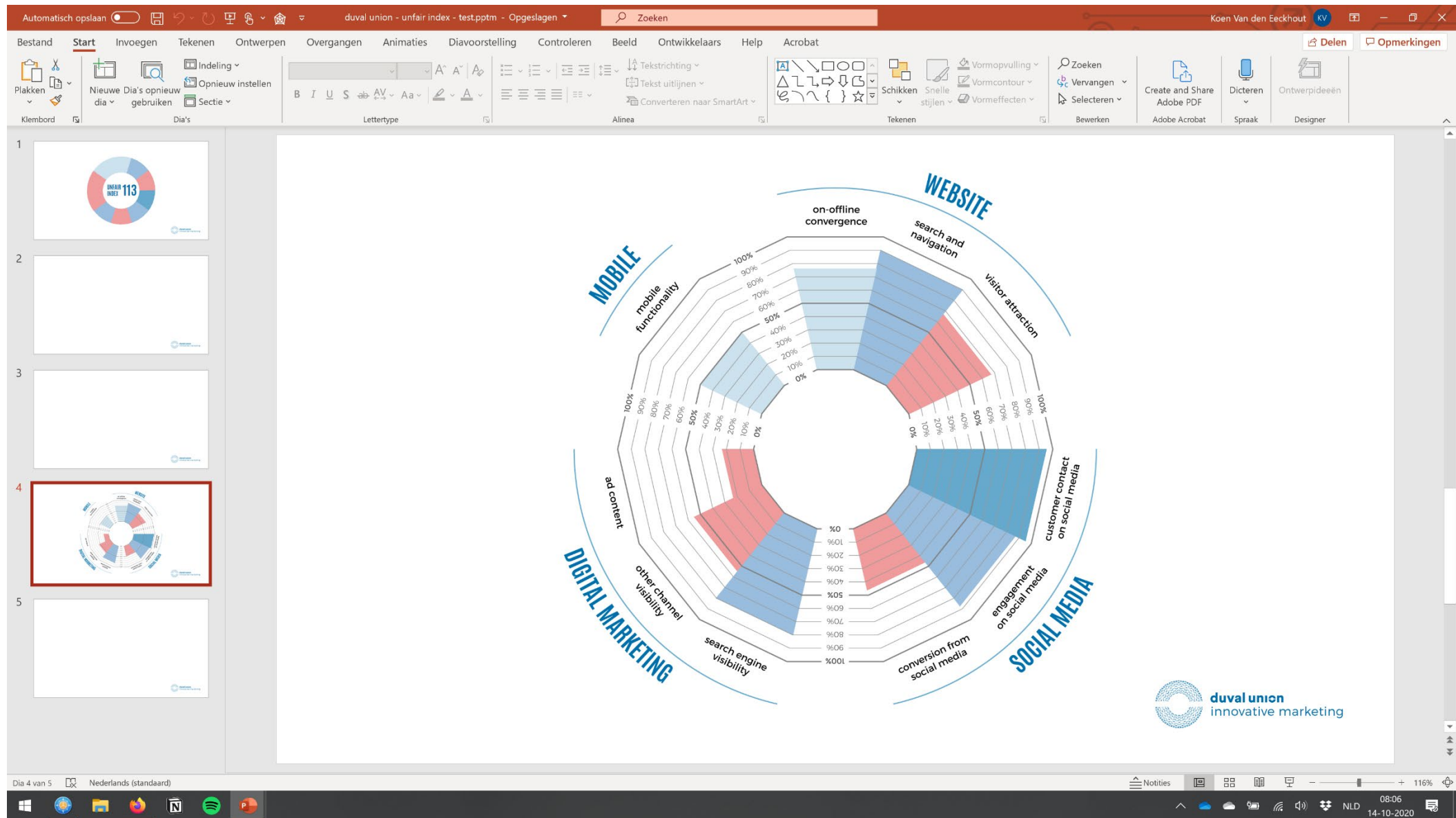
Macro-economische factoren



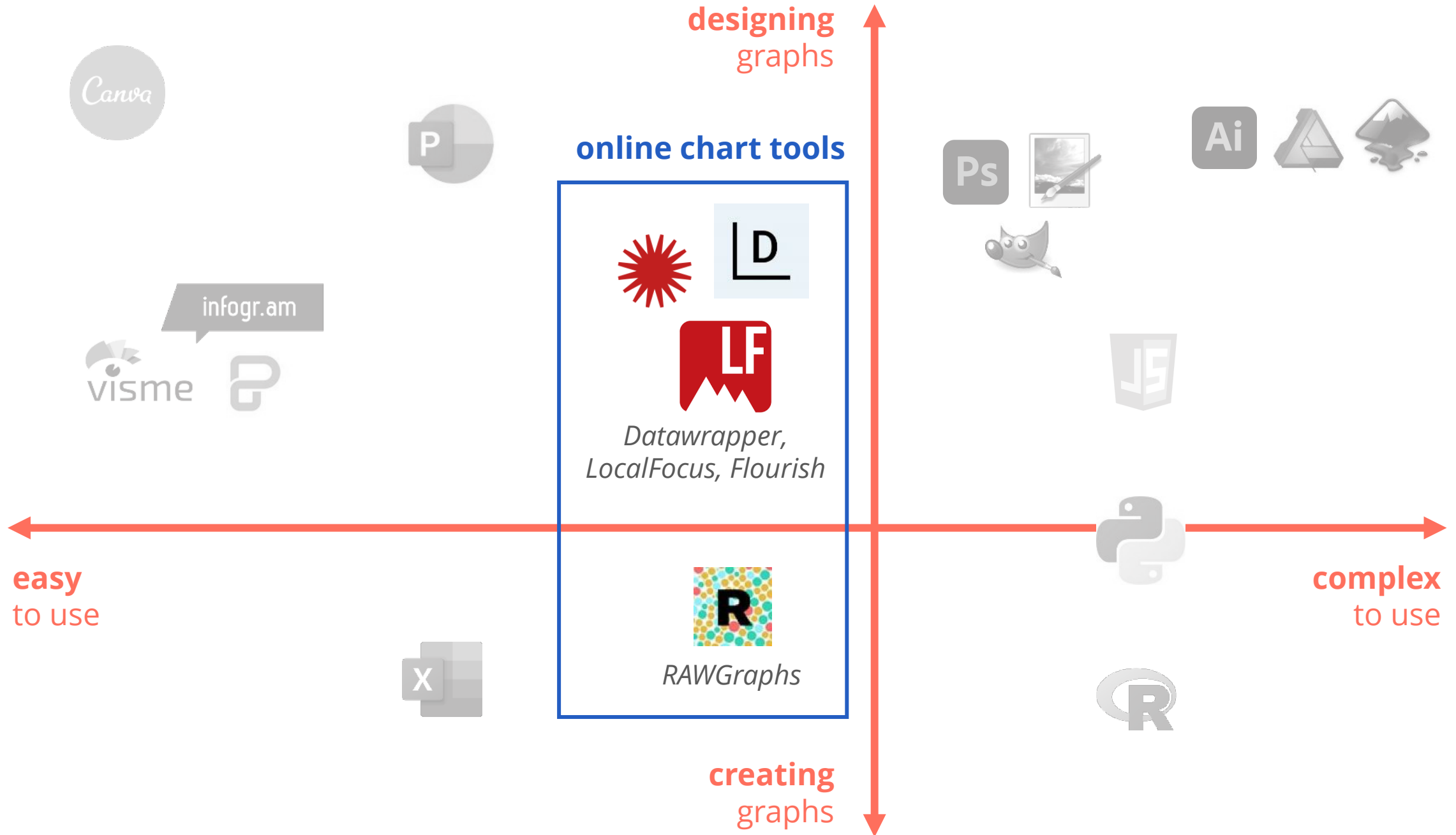
Demografische factoren



Referentiescenario
+4.3%



Alternative: **PowerPoint** or similar



1. Load your data

DATA PARSING OPTIONS

Column separator Thousands separator Decimals separator Date Locale

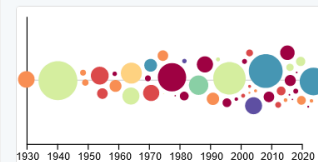
DATA TRANSFORMATION

Stack on [Reset](#)[Change data](#)

#	year	state	state_po	party_simplified	party_detailed	# number of votes
1	1976	Alabama	AL	Democrat	Democrat	659170
2	1976	Alabama	AL	Republican	Republican	504070
3	1976	Alabama	AL	Other	American Independent	9198
4	1976	Alabama	AL	Other	Prohibition	6669
5	1976	Alabama	AL	Other	Communist Party Use	1954
6	1976	Alabama	AL	Libertarian	Libertarian	1481
7	1976	Alabama	AL	Other		308

4287 rows (30009 cells) have been successfully parsed, now you can choose a chart!

2. Choose a chart

Show 

Beeswarm plot

It displays the distribution of items over a continuous dimensions. Each (line) is represented with a dot placed on the horizontal axis. The vertical dimension is used to avoid overlaps among circles, showing their distribution. The area of dots can be used to encode a further quantitative dimension and a quantitative or categorical dimension with color.

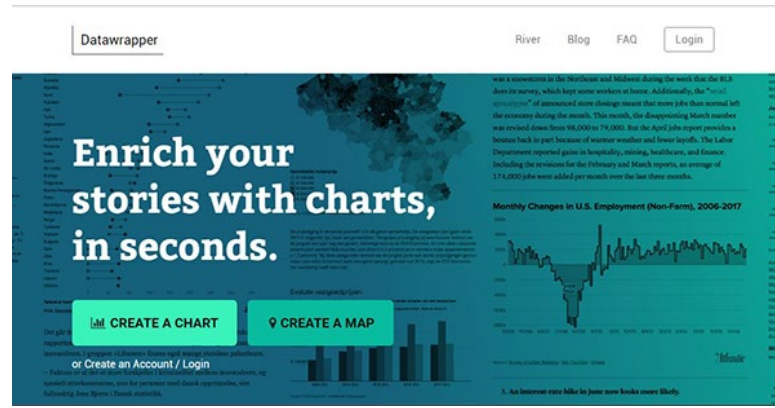
[Code](#) [Tutorial](#)**Alluvial Diagram**
Correlations, proportions**Arc Diagram**
Networks**Bar chart**
Correlations**Multi-set bar chart**
Correlations, proportions**Stacked bar chart**
Correlations, proportions**Beeswarm plot**
Distributions, time series, proportions**Box plot**
Distributions**Bubble chart**
Correlations, proportions**Bumpchart**
Time series, correlations, proportions**Circle Packing**
Hierarchies, proportions**Circular dendrogram**
Hierarchies, proportions**Contour plot**
Correlations, distributions**Convex hull**
Correlations, proportions**Linear dendrogram**
Hierarchies, proportions**Hexagonal binning**
Correlations, distributions**Line chart**
Time series, correlations**Matrix Plot**
Correlations, time series, proportions**Radar Chart**
Correlations

great for
out-of-the-box
chart types

<https://app.rawgraphs.io/>

Interactivity

Datawrapper
datawrapper.de

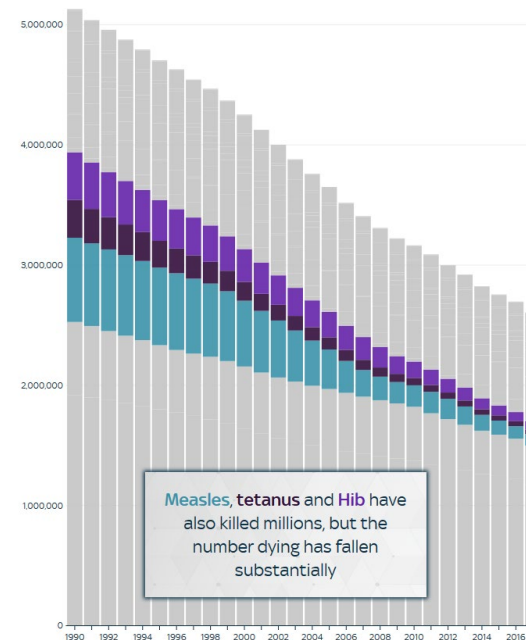


<https://baryon.be/files/MM/2020/W04/>

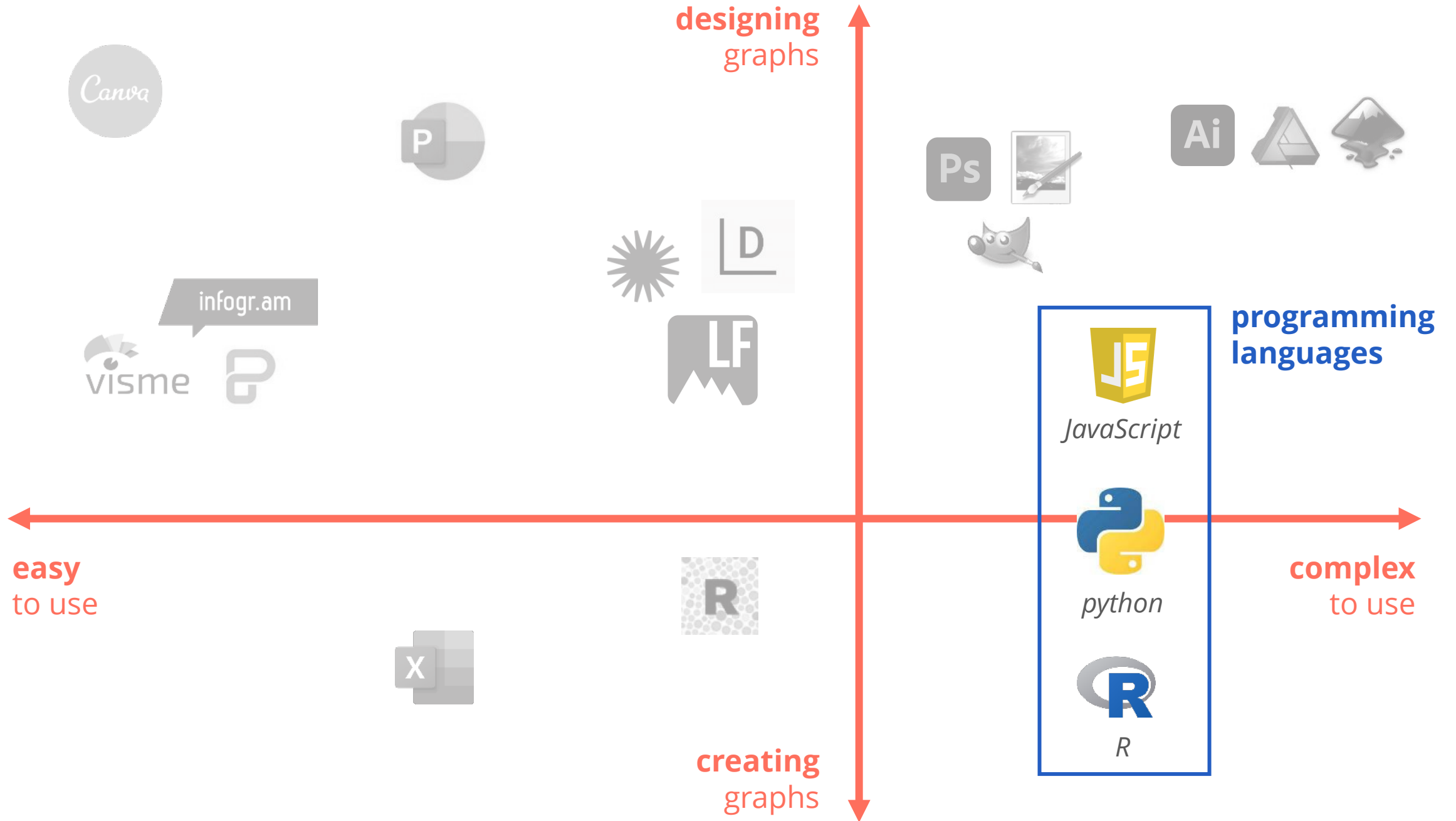
<https://baryon.be/data-visualization-tools-datawrapper/>

great for tooltips and maps

Flourish
flourish.studio

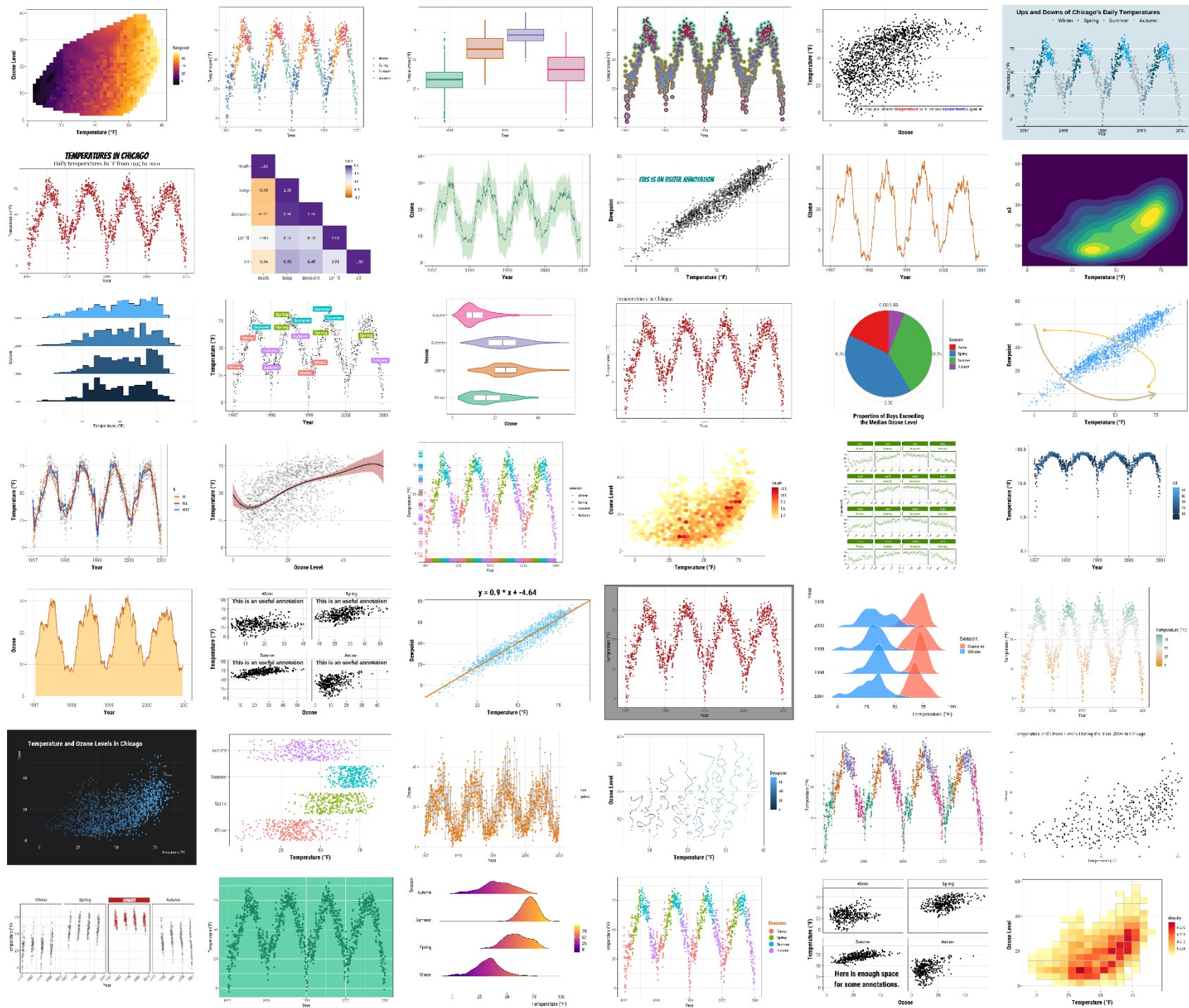


great for storytelling



ggplot2

<https://www.cedricscherer.com/2019/08/05/a-ggplot2-tutorial-for-beautiful-plotting-in-r/>



Python

Matplotlib

<https://matplotlib.org/>

Seaborn

<http://web.stanford.edu/~mwaskom/software/seaborn/index.html>

Plotly

<https://plot.ly/python/>



JavaScript

d3.js

<https://d3js.org/>

Highcharts

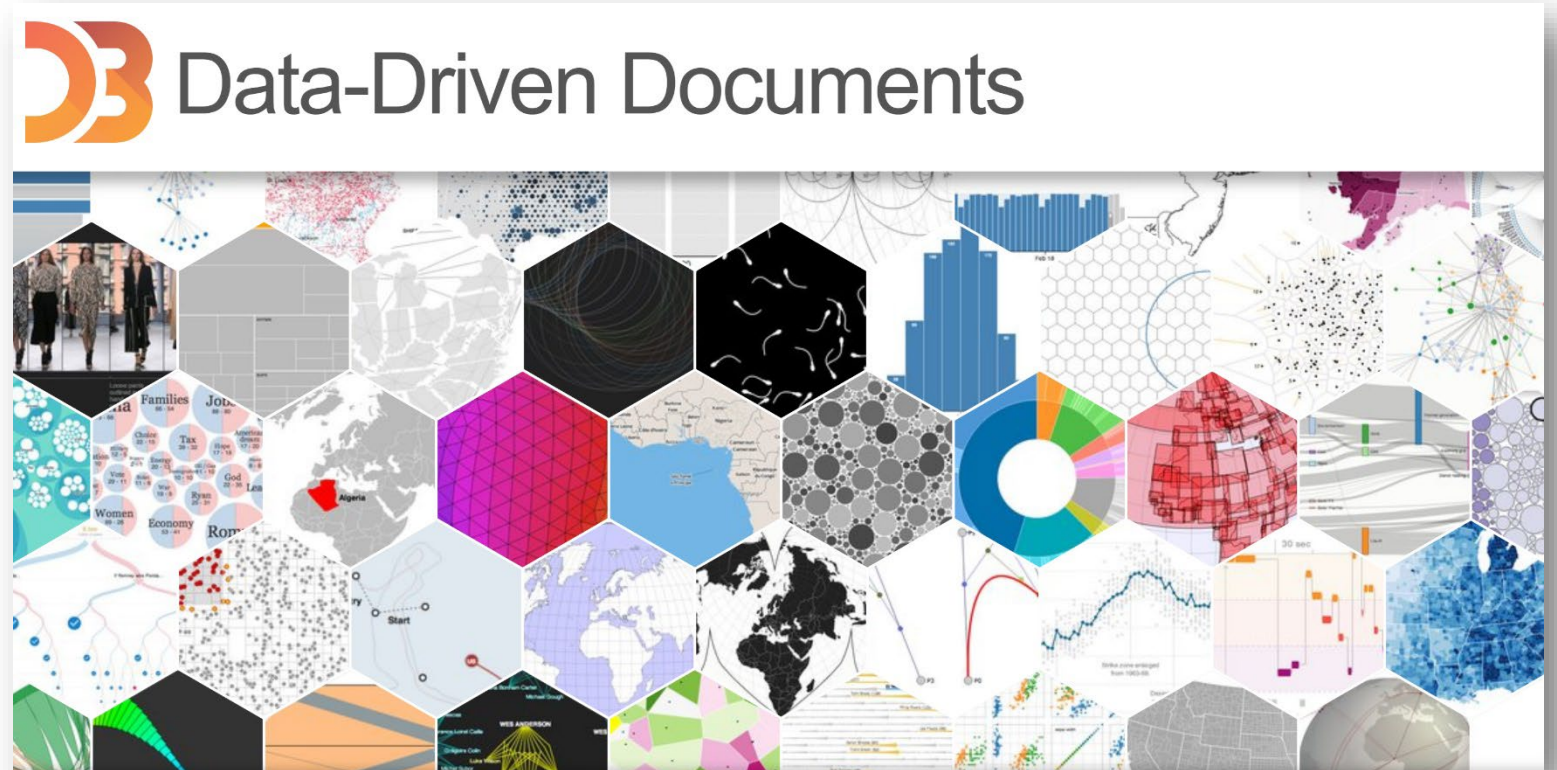
<https://www.highcharts.com/docs/index>

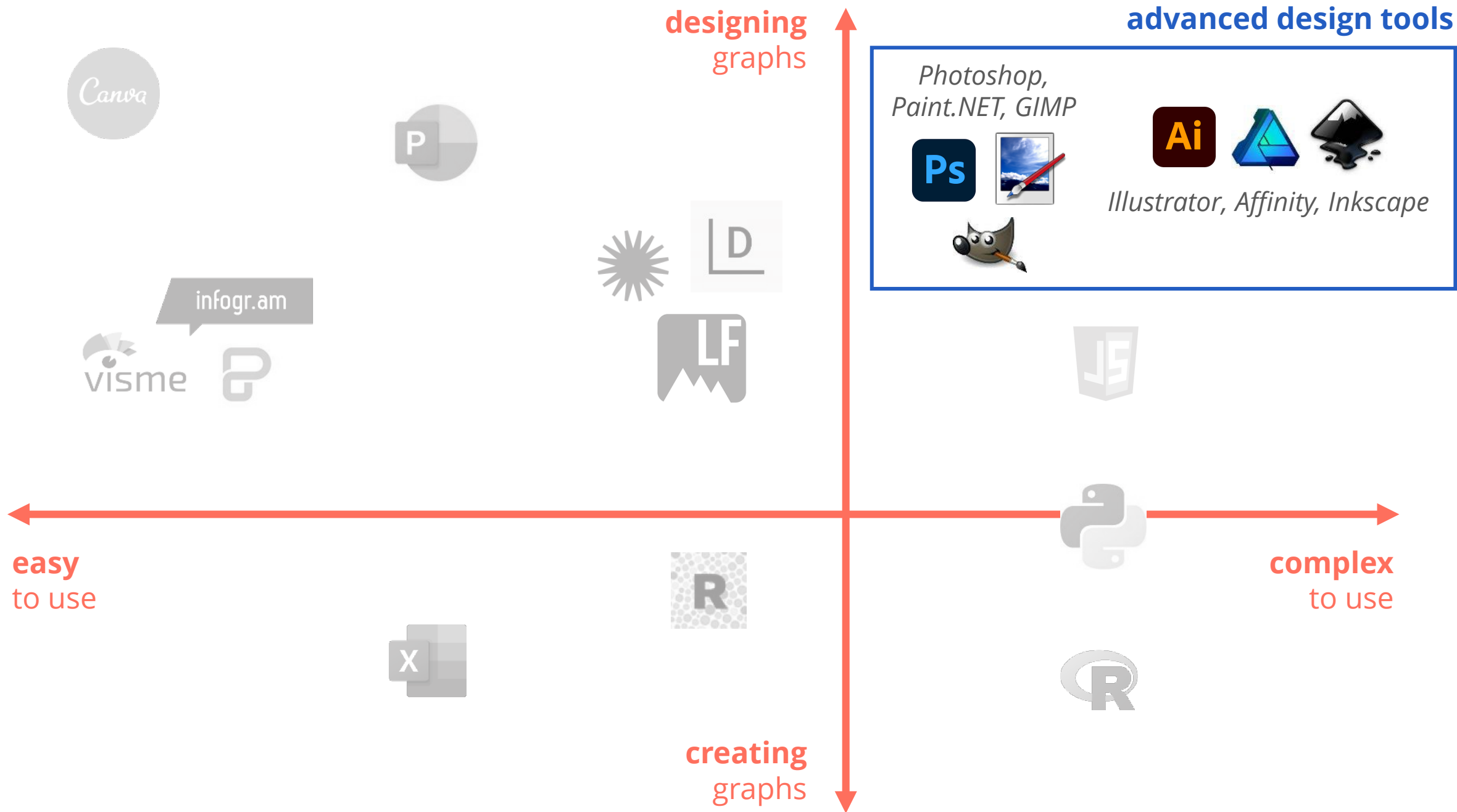
Chart.js

<https://www.chartjs.org/>

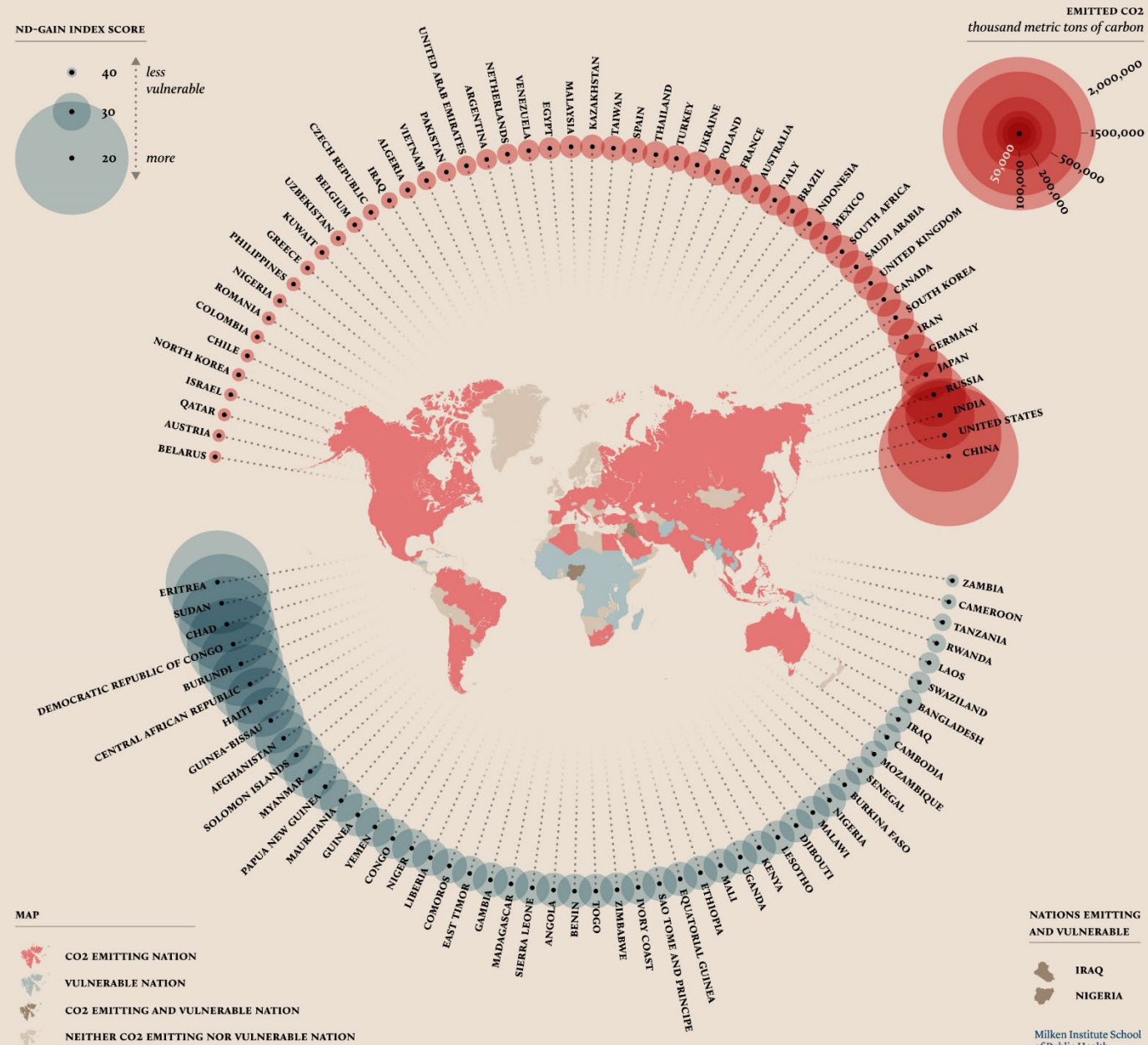
Leaflet

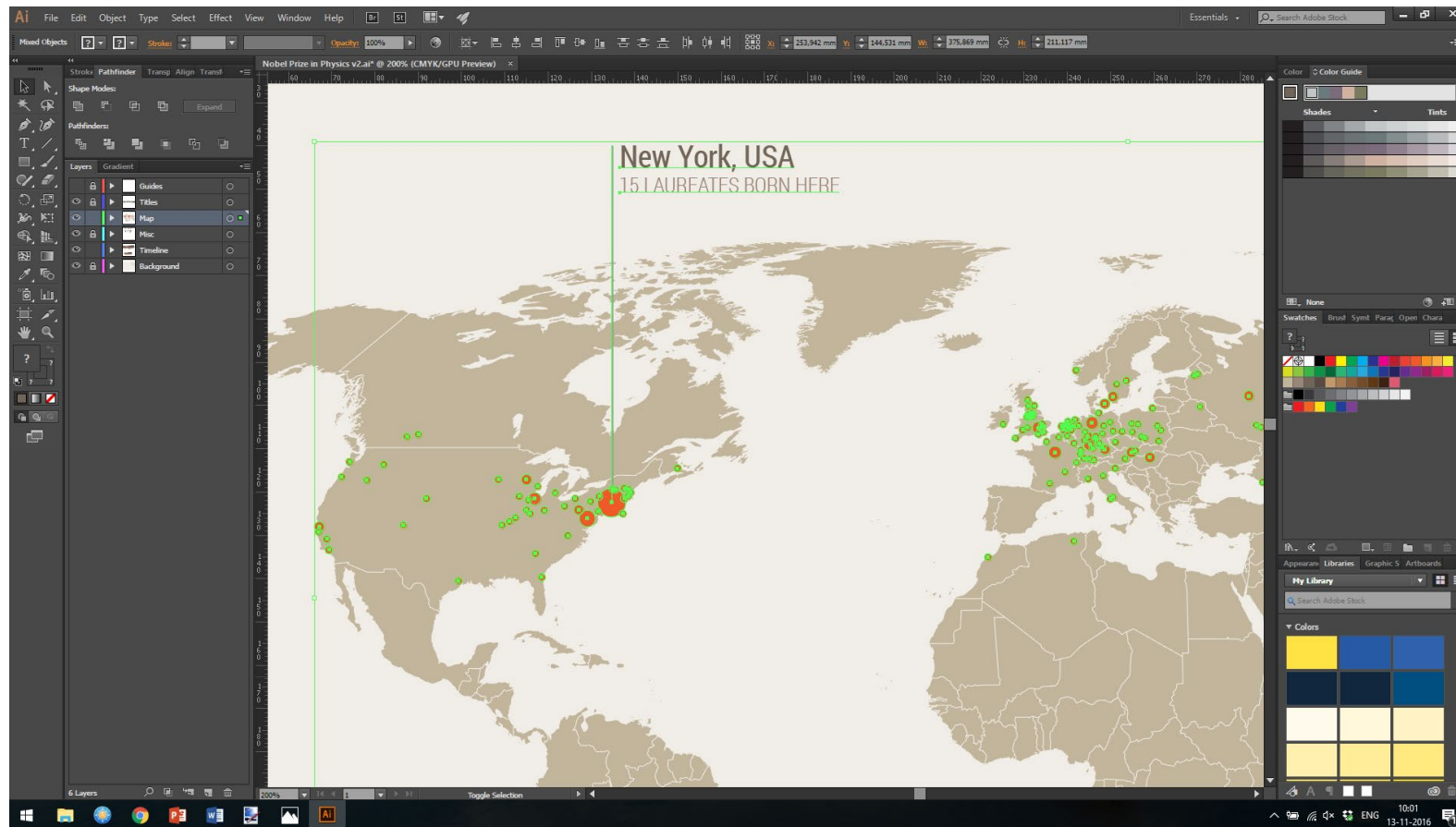
<https://leafletjs.com/>





CO2 EMISSION VS. VULNERABILITY TO CLIMATE CHANGE, BY NATION (2010)





Adobe Illustrator

“industry standard”
extremely powerful
steep learning curve
expensive subscription



AFFINITY
Designer

[MORE INFO](#)

Bring your visions to life with the ultimate graphic design and illustration app.



macOS

ONLY €54.99

[BUY NOW](#)



Windows

ONLY €54.99

[BUY NOW](#)



iPad

ONLY €21.99

[BUY NOW](#)

Alternative: **Affinity Designer**

nearly as powerful as Adobe Illustrator

still a steep learning curve

one-off payment (approx. €55)



INKSCAPE
Draw Freely.

♥ Help us make Inkscape awesome! ♥

English

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Register

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CONTRIBUTE

DEVELOP

SUPPORT US



INKSCAPE 1.0.1
Draw Freely.



GNU/Linux



Linux based Free Desktop
Systems

Windows



Microsoft's Windows Desktop

macOS (10.11-10.15)



disk image (dmg)

Source Archive



xz tarball

Release Notes

Inkscape 1.0.1 is mainly a stability and bugfix release. It also comes with a few new features that hadn't been stable enough to make it into Inkscape 1.0.

New Features

Inkscape 1.0.1

All Platforms

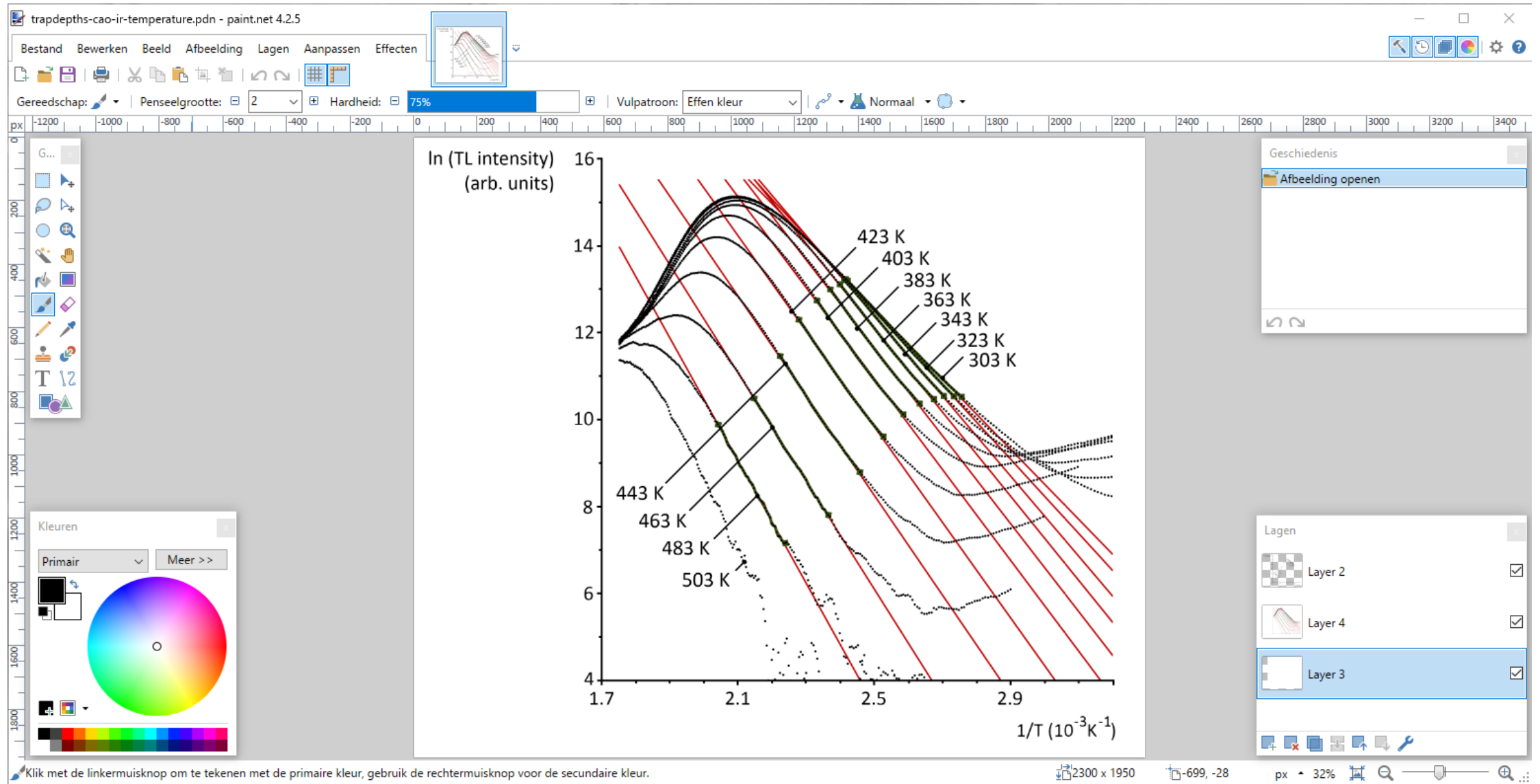
Responsible People

Manager: [Marc Jeanmougin](#)

Revisions

Alternative: **Inkscape**

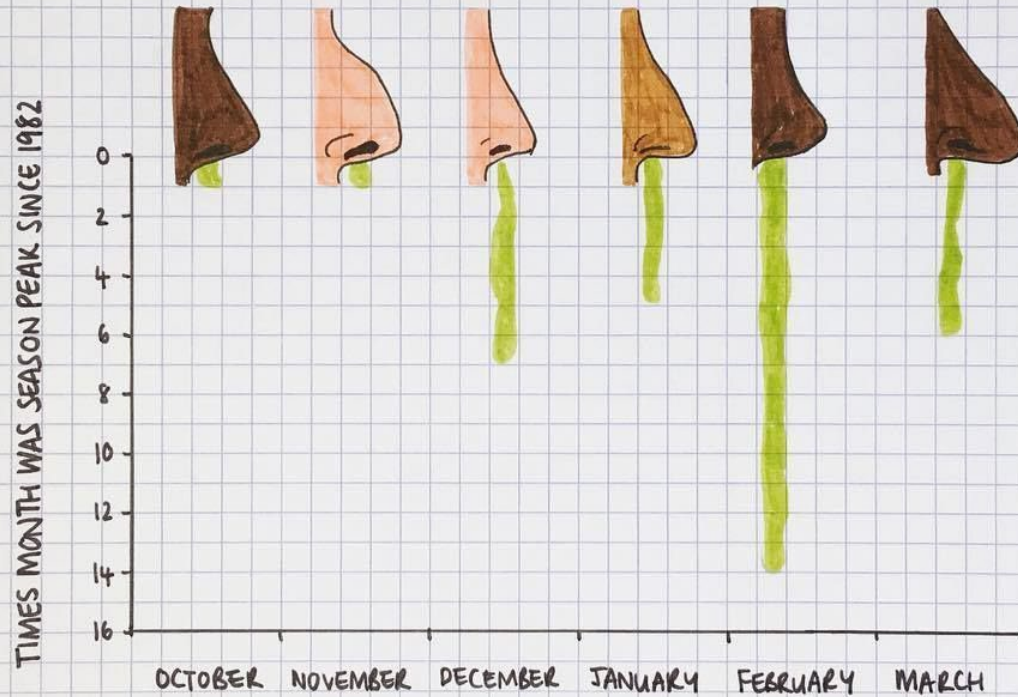
<https://inkscape.org/release/inkscape-1.0.1/>



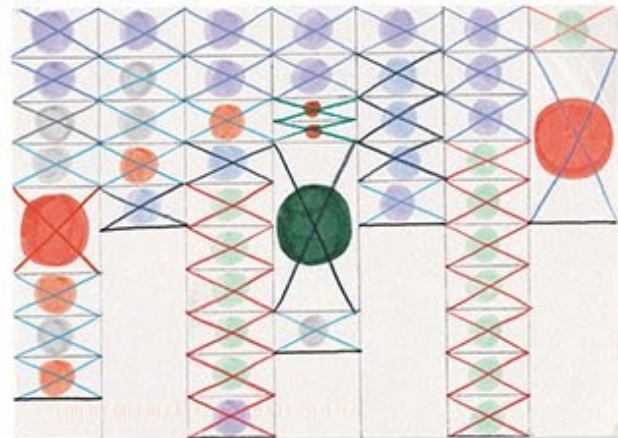
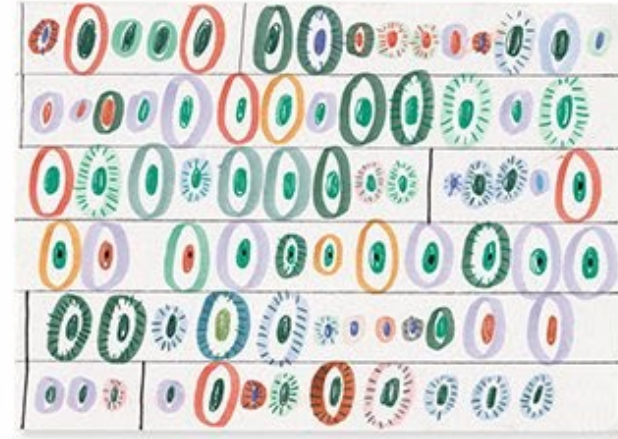
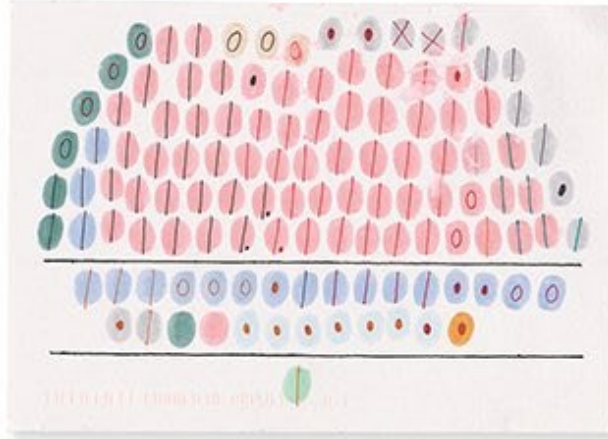
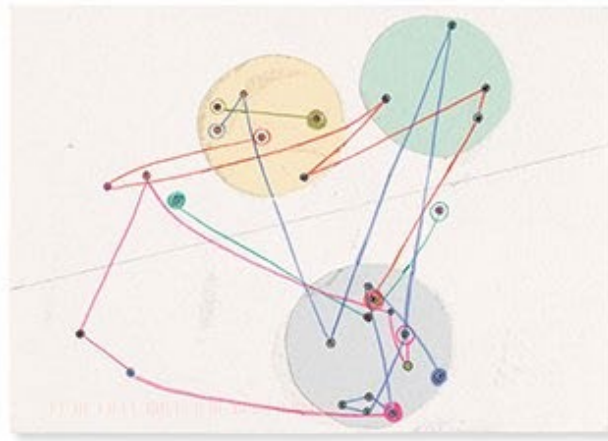
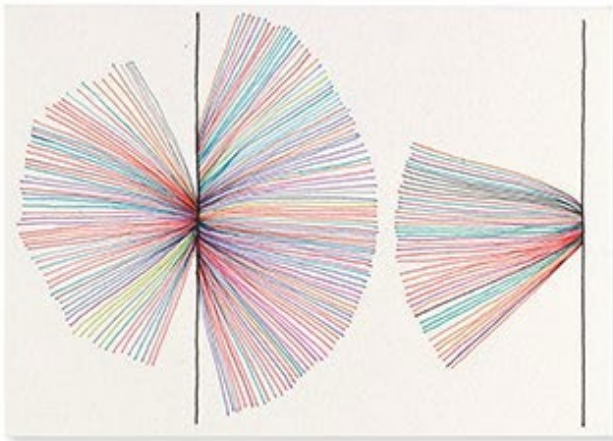
Alternative: **Paint.NET** or similar

<https://www.getpaint.net/>

Peak Month of Flu Viruses



Mona Chalabi



POLLUTION



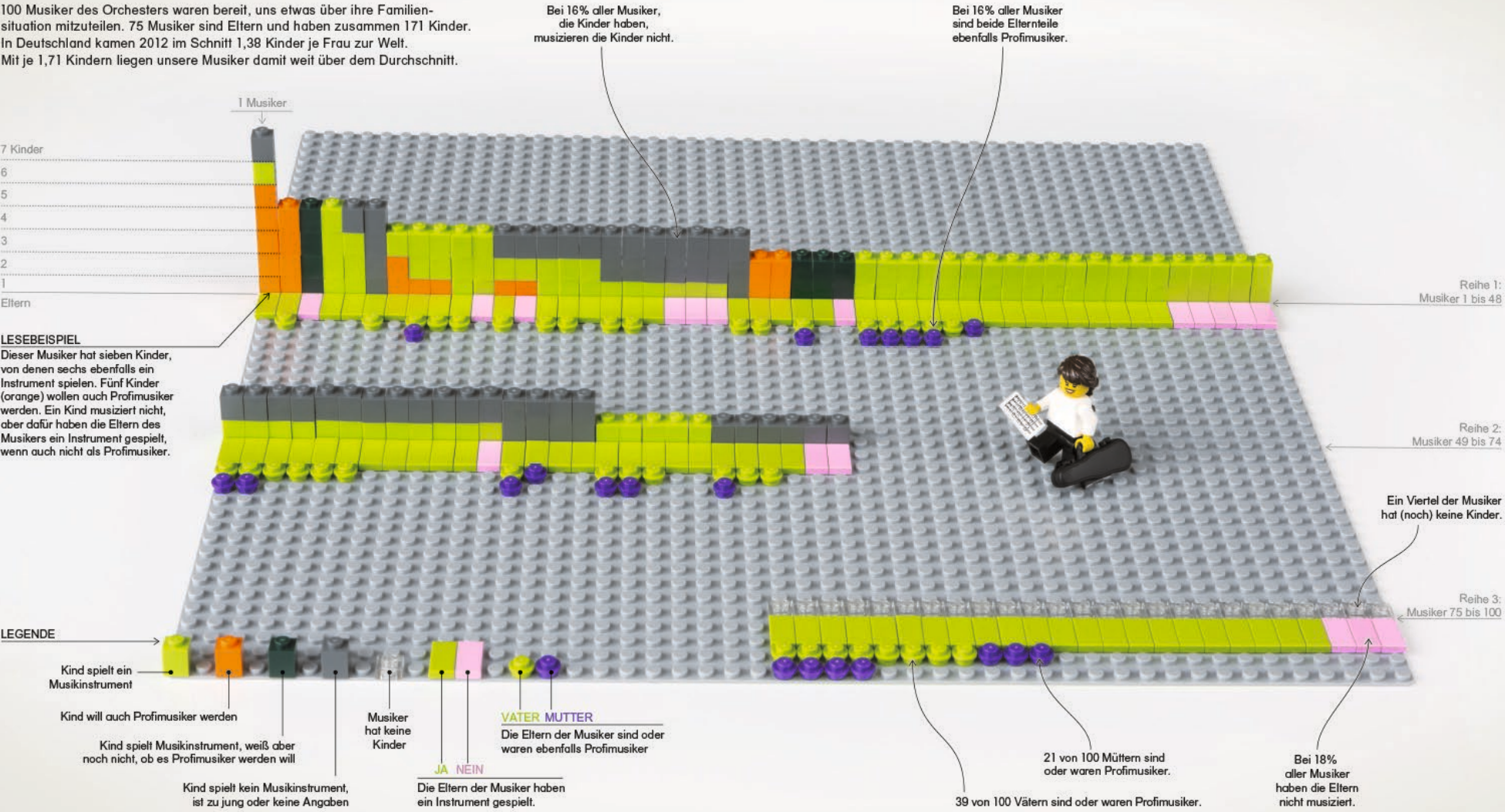
Fish Pillars
These pills represent the relative amounts of four pharmaceutical drugs found in fish pulled from Chicago's North Shore Channel and tested by Baylor scientists.

PHOTOGRAPH COURTESY OF BAYLOR
SCIENCE CENTER. PILLS FROM LEFT TO RIGHT: OXAZEPAM,
NORFLOXACIN, DIPHENHYDRAMINE, CARBAMAZEPINE.
ART: TONY HARRIS. AND OTHER: JACQUES-HECTOR HENRI
GODIN & JACQUES-HECTOR HENRI, JACQUES-HECTOR

The traditional foe of water quality is waste from factories and farms, but now environmental regulators are eyeing a new pollution source: our medicine chests. Fish caught downstream from sewage treatment plants in five U.S. cities contained traces of pharmaceuticals and toiletries, Baylor University researchers found in a recent study. You'd have to eat tons of fish for such small concentrations to affect human health, but the products could pose a threat to marine life. To assess the risk, the EPA has expanded monitoring to 160 sites, with results due in 2011.

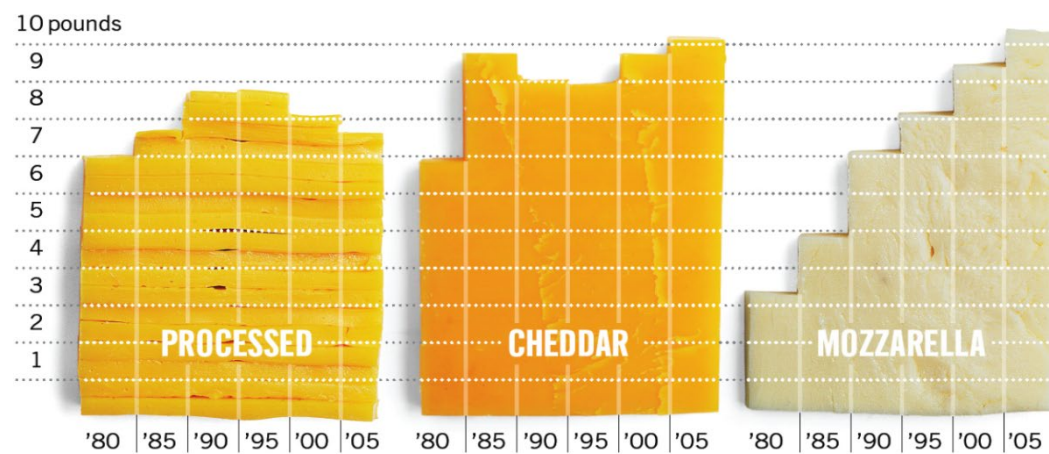
Die Kinder und Eltern der Musiker

100 Musiker des Orchesters waren bereit, uns etwas über ihre Familien-situation mitzuteilen. 75 Musiker sind Eltern und haben zusammen 171 Kinder. In Deutschland kamen 2012 im Schnitt 1,38 Kinder je Frau zur Welt. Mit je 1,71 Kindern liegen unsere Musiker damit weit über dem Durchschnitt.





Per capita cheese consumption in the U.S.





Filter by chart name or AKA

Reference Type: ○ Example ● Solution | Chart Families: ● Categorical ● Hierarchical ● Relational ● Temporal ● Spatial

	Amazon QuickSight	ArcGIS	ChartJS	Charticulator	D3.js	Data Illustrator	Datawrapper	Flourish	FusionCharts	Gephi	Google Charts	Google Data Studio	Highcharts	Infogram	JetPack Data	JMP	Keshif	Kibana	Leaflet.js	Mapbox	Matplotlib
Bar chart	●			●	●●●	○	●●●	○	○		●●	○	●●●	○○	●○	●	●	●			○○●
Clustered bar chart	●				●	○	●●●	○	○		●●				○○	●	●	●			●
Bullet chart				●	●		●●		○							●					
Waterfall chart				●	●				○		●		○	○							
Radar chart			○		●				○				○								○
Polar chart			●	●	●								○○								○○
Connected dot plot					●●	○	●●●	●													
Pictogram					○									○				●			
Proportional shape chart					●●●	○		●○	○		●										
Word cloud					●									○	●			●			●●
Heat map	●			●	○○●	○			○				○○			●		●			●●
Matrix chart				●	○			○				○					●				
Dot plot					●		●●○	●								●●		○			

Demo

Visualizing 40 Years of Music Industry Sales



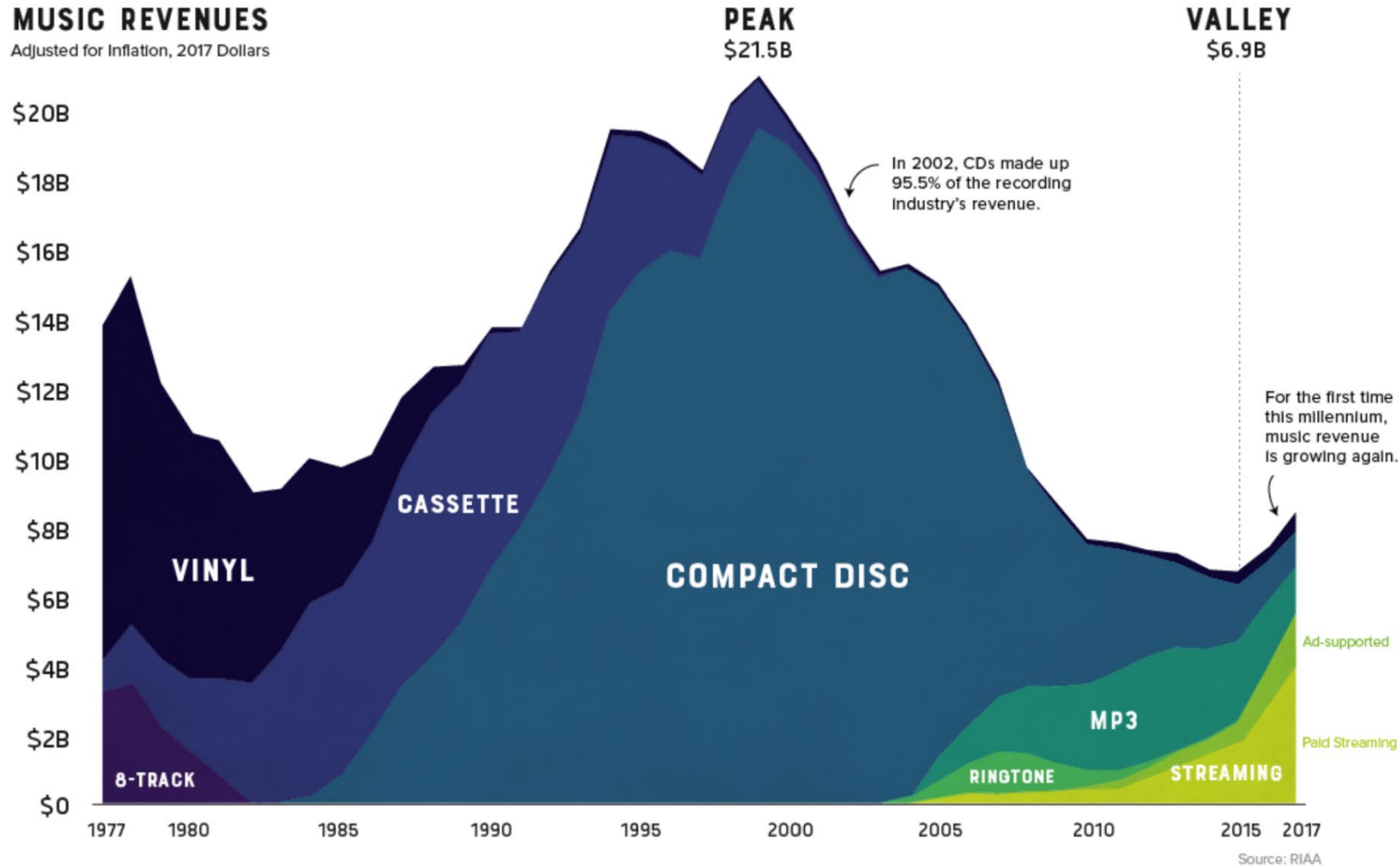
Published 3 years ago on October 6, 2018

By Nick Routley

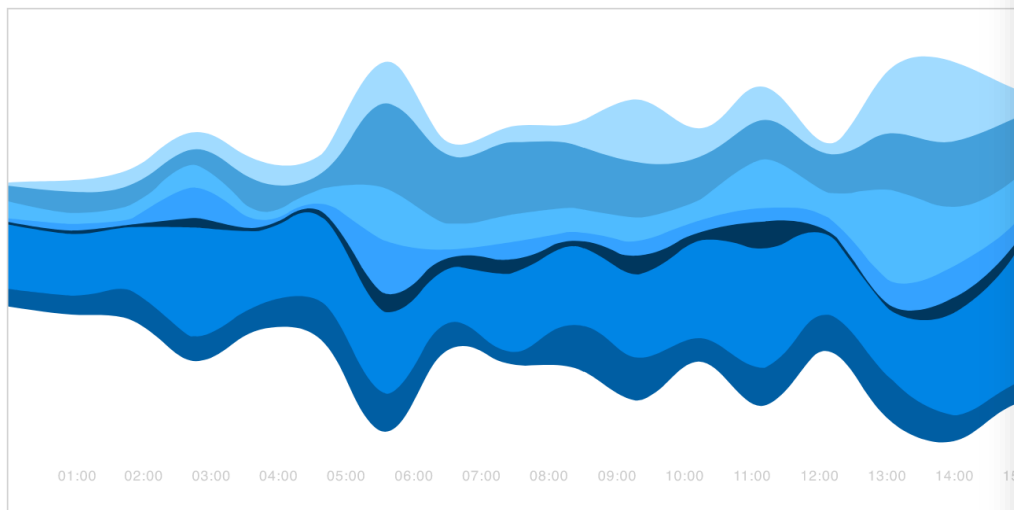


MUSIC REVENUES

Adjusted for Inflation, 2017 Dollars



Stream Graph



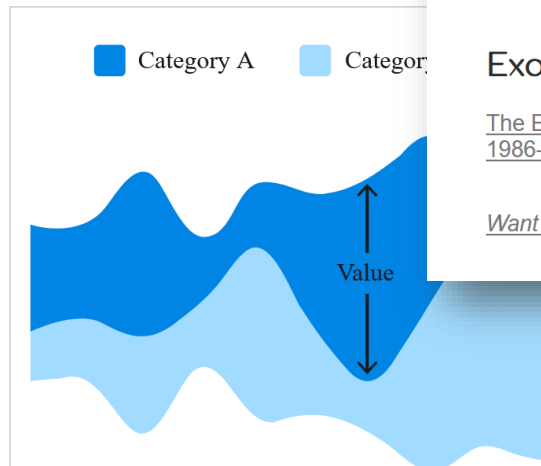
Description

Also known as a *ThemeRiver*.

This type of visualisation is a variation of a [Stacked Area Graph](#), but instead of plotting values against a fixed, straight axis, a Stream Graph has values displaced around a varying central baseline. Stream Graphs display the changes in data over time of different categories through the use of flowing, organic shapes that somewhat resemble a river-like stream. This makes Stream Graphs aesthetically pleasing and more engaging to look at.

In a Stream Graph, the size of each individual stream shape is proportional to the values in each category. The axis that a Stream Graph flows parallel to, is used for the timescale. Colour can be used to either distinguish each

Anatomy



Functions

[Data over time](#) [Patterns](#)

Similar Charts



[Stacked Area Graph](#)

Tools to Generate Visualisation

[Bob Rudis' GitHub \(code\)](#)

[D3 \(code\)](#)

[Infogram](#)

[JSFiddle \(code\)](#)

[Lee Byron's GitHub \(code\)](#)

[NVD3.js \(code\)](#)

[plotDB](#)

[RAWGraphs](#)

[Stream graph generator \(code\)](#)

Examples

[The Ebb and Flow of Movies: Box Office Receipts 1986-2008, The New York Times](#)

[Want your work linked on this list? Click Here](#)



Need to access this page offline?
[Download the eBook from here.](#)



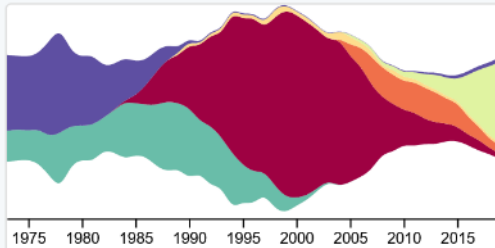
Merchandise & other related dataviz
products can be found at the store

RAWGraphs

RAWGraphs 2.0 beta

Ab

2. Choose a chart



Streamgraph (area chart)

It allows the comparison of multiple categories over a continuous dimension.

[Code](#) [Tutorial](#)

Show All charts ▼



Alluvial Diagram
Correlations, proportions



Arc Diagram
Networks



Bar chart
Correlations



Multi-set bar chart
Correlations, proportions



Stacked bar chart
Correlations, proportions



Beeswarm plot
Distributions, time series, proportions



Box plot
Distributions



Bubble chart
Correlations, proportions



Bumpchart
Time series, correlations, proportions



Circle Packing
Hierarchies, proportions



Circular dendrogram
Hierarchies, proportions



Contour plot
Correlations, distributions



Convex hull
Correlations, proportions



Linear dendrogram
Hierarchies, proportions



Gantt chart
Time series, correlations



Hexagonal binning
Correlations, distributions



Horizon graph
Time series, correlations



Line chart
Time series, correlations

Time to play

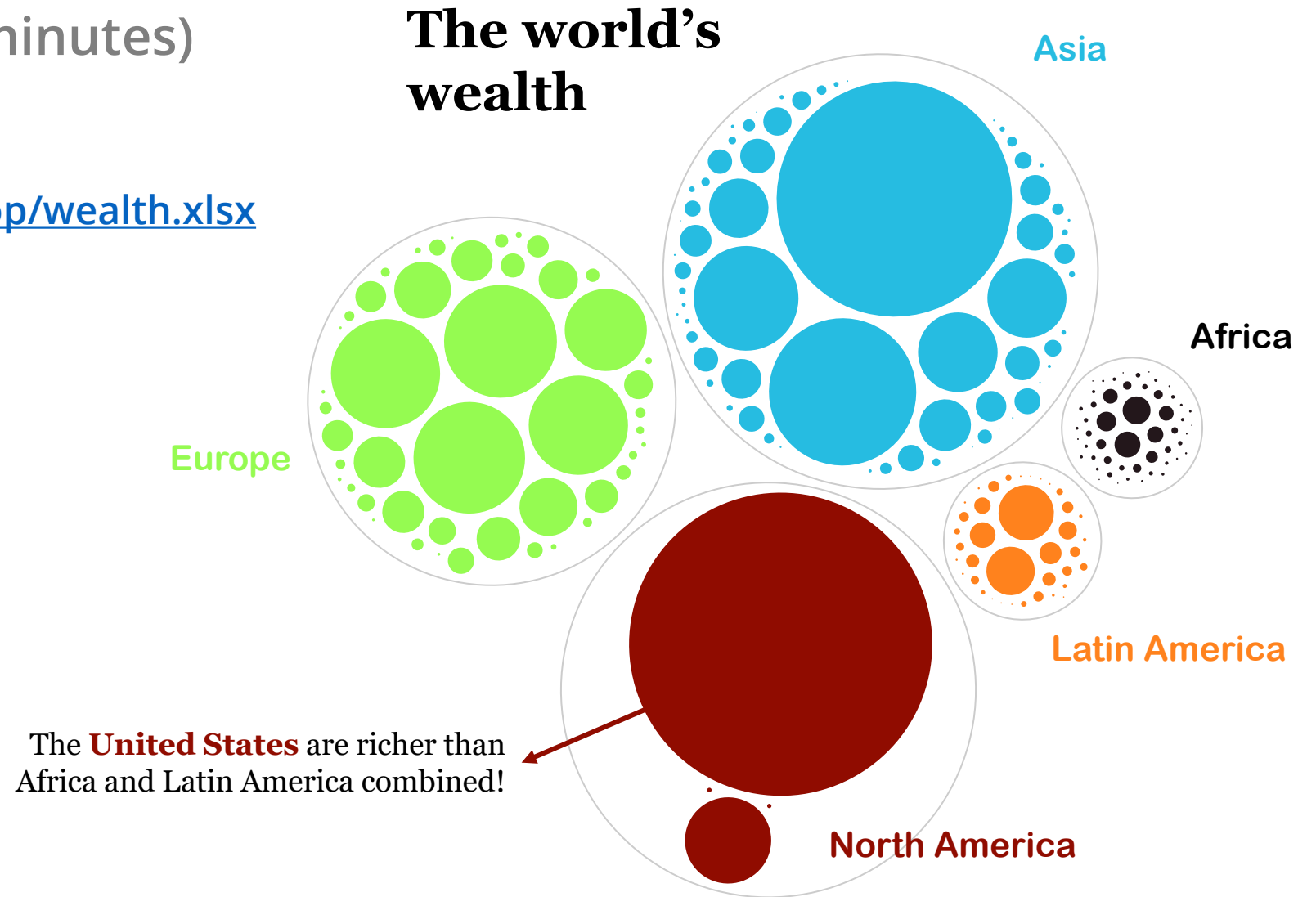
Individual exercise (15 minutes)

Download the data file

<https://baryon.be/files/workshop/wealth.xlsx>

Use RAWgraphs and PowerPoint to mimic the chart on the right

Or feel free to play around and explore a tool of your choice





Improving charts

Principles

What is a good data visual?

Telling a story

How charts work

Visual variables

Chart types

Beyond charts

Creating charts

Tools

Improving charts

Signal-to-noise ratio

Design components

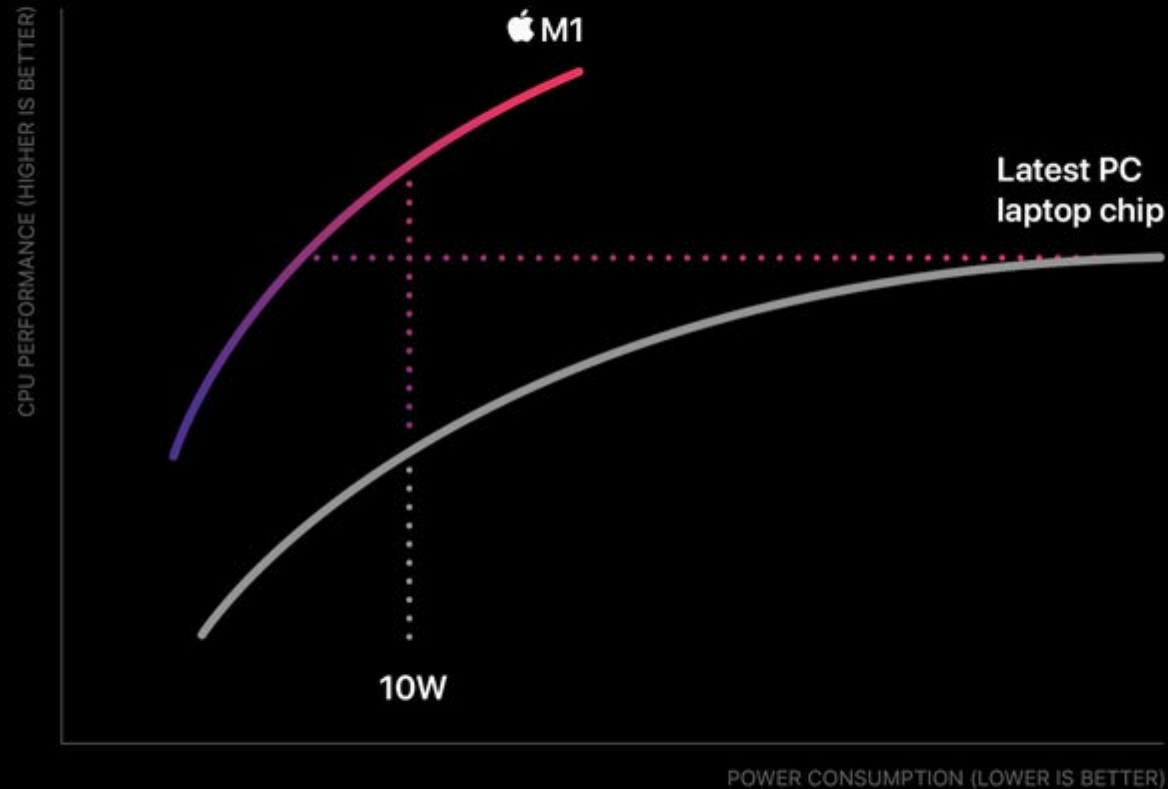
Visualizing uncertainty

Signal-to-noise ratio



GPS

CPU performance vs. power



Up to

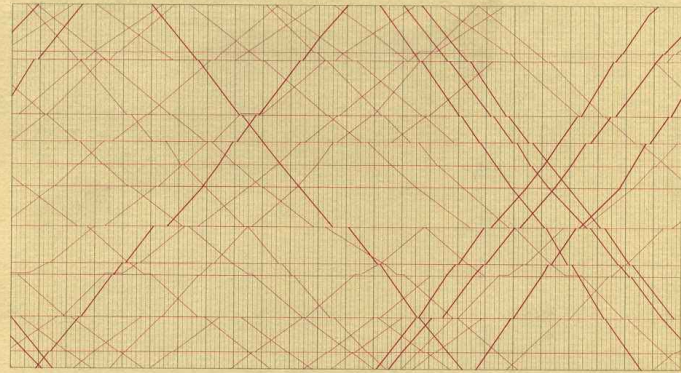
2x

faster CPU
performance¹

Matches peak PC
performance using

25%

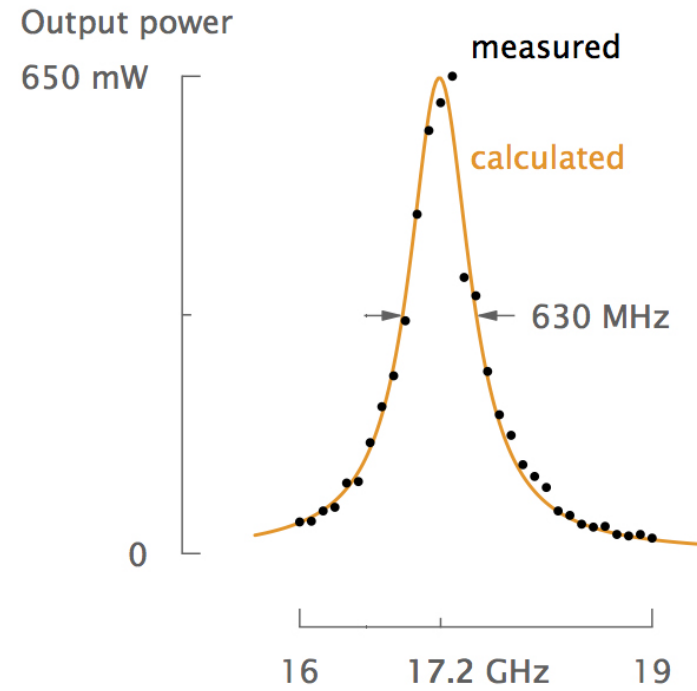
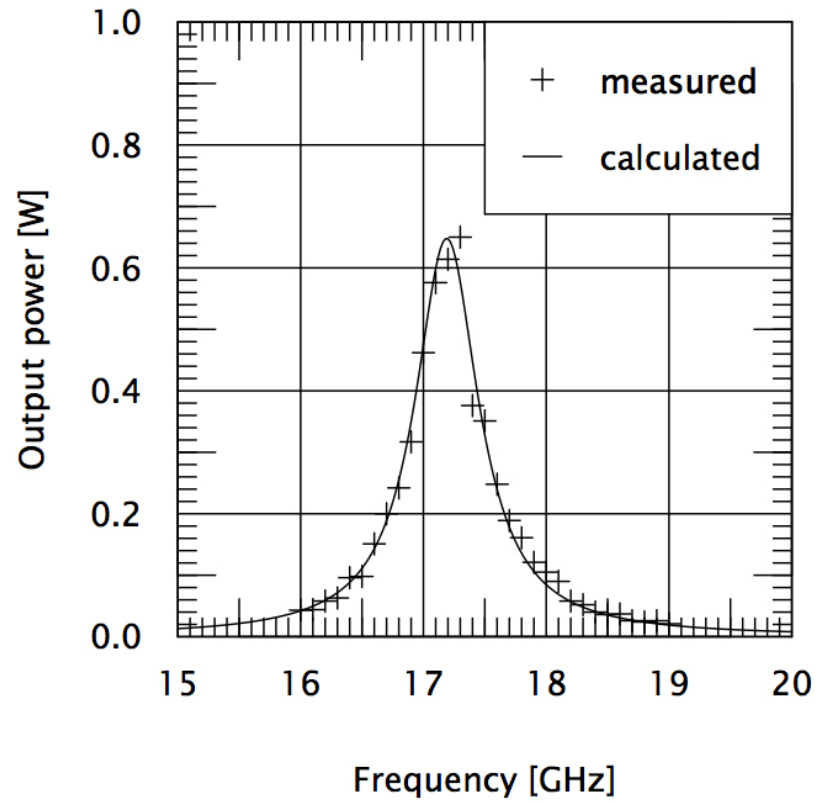
of the power¹



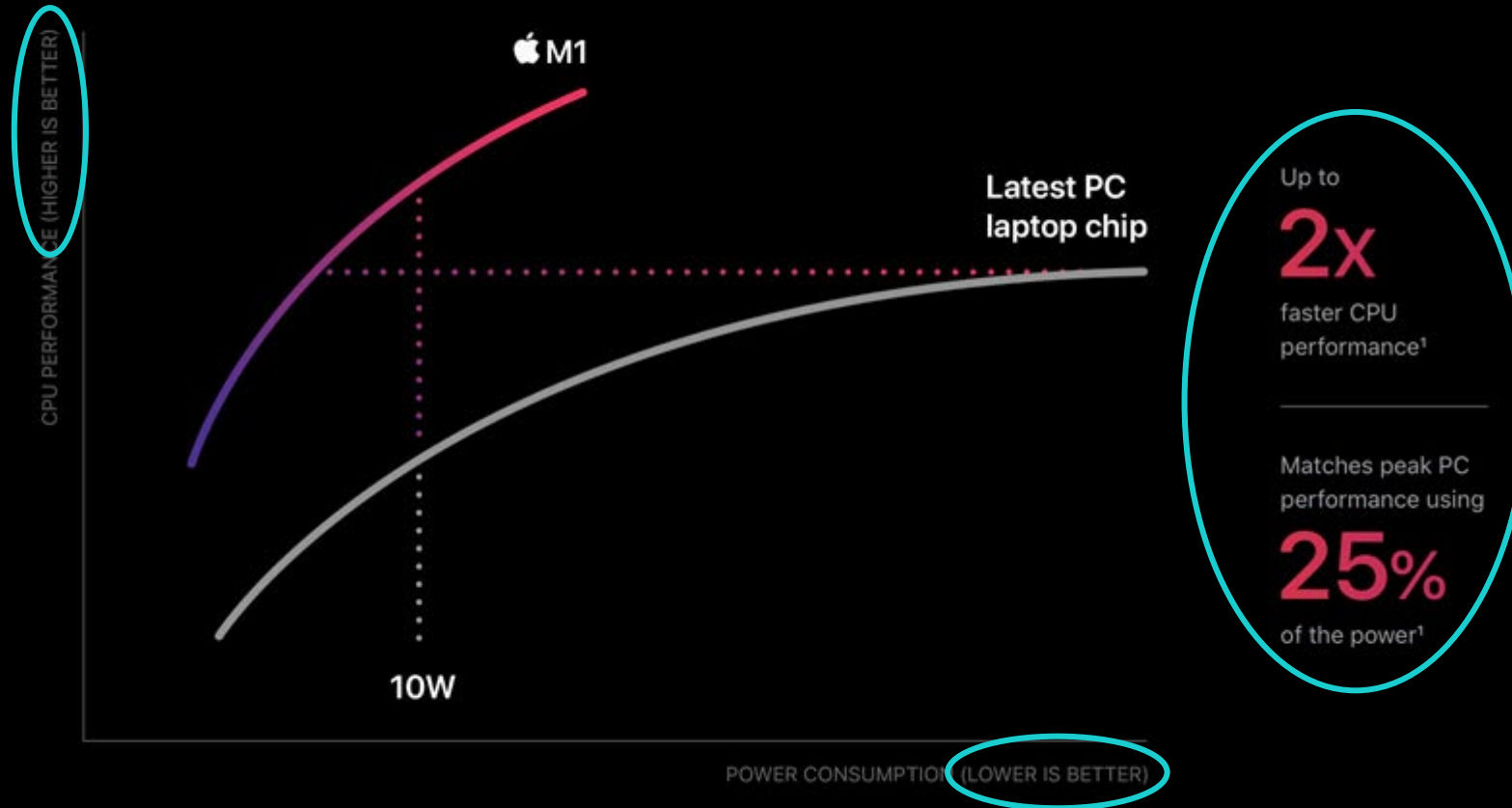
The Visual Display
of Quantitative Information

EDWARD R. TUFTE

“Maximize the **data-ink ratio**”



CPU performance vs. power

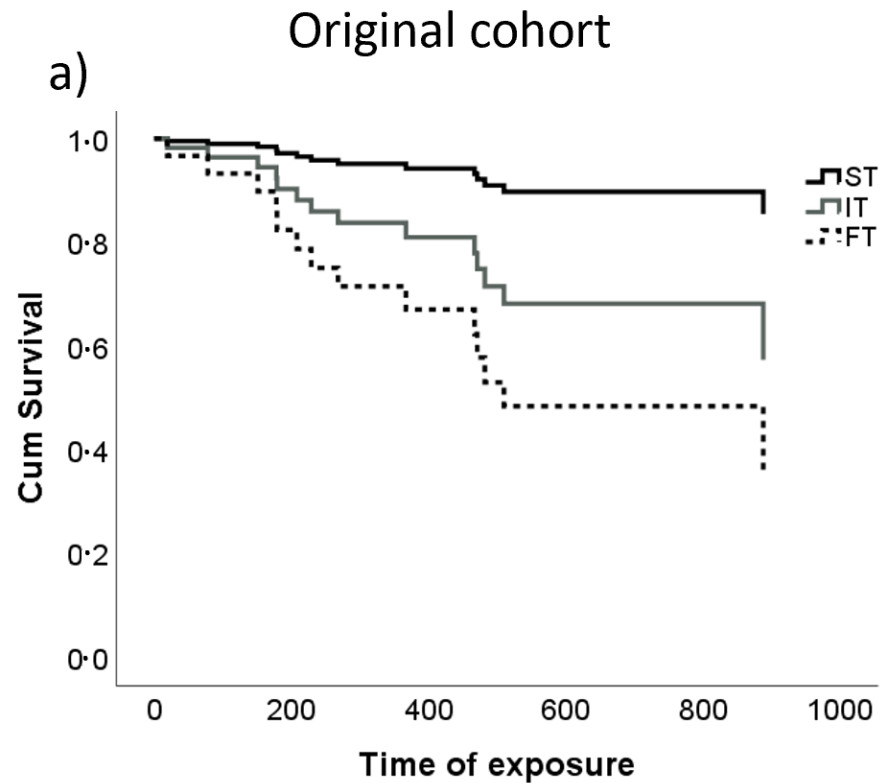


Noise = physical noise

elements which are on the visual
but are not helpful

+ mental noise

thinking work required
from your audience



ORIGINAL COHORT

Increased injury rates in athletes with fast-twitch muscle typology

'so what' title

talking about injuries, not 'survival'

linear interpolation gives a better idea than stepwise

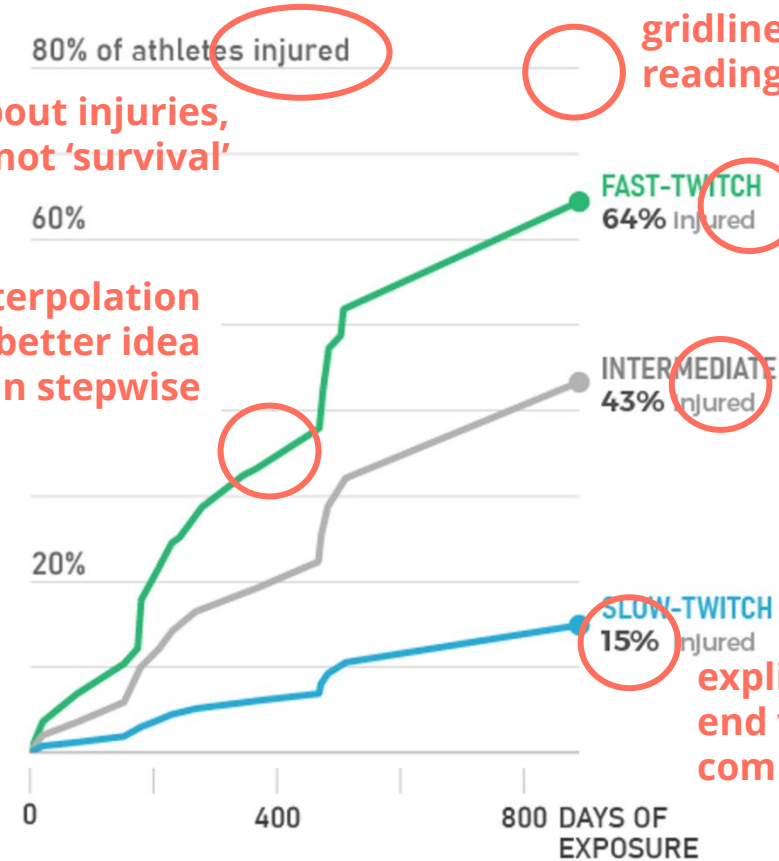
80% of athletes injured

gridlines help reading the data

no abbreviations, explanatory annotations

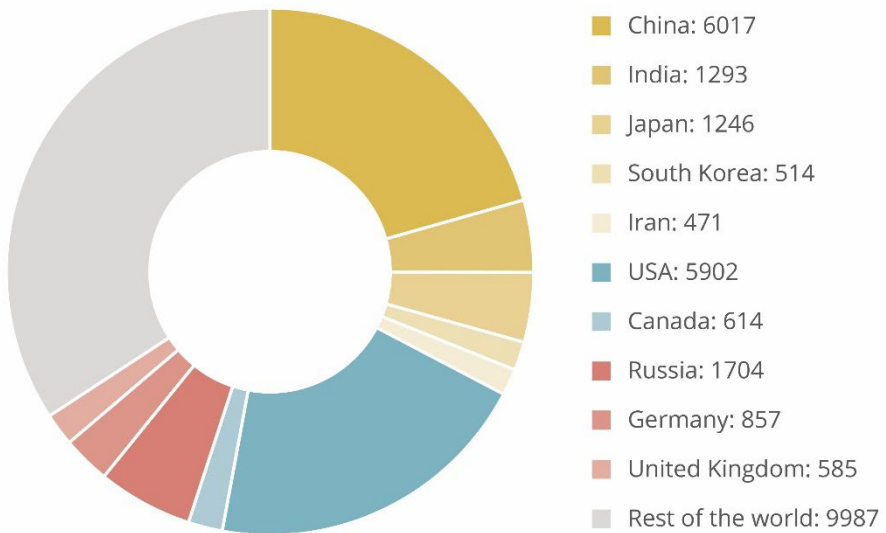
no legends, direct labeling

explicitly mention end values for easier comparison



World carbon dioxide emissions from the consumption and flaring of fossil fuels

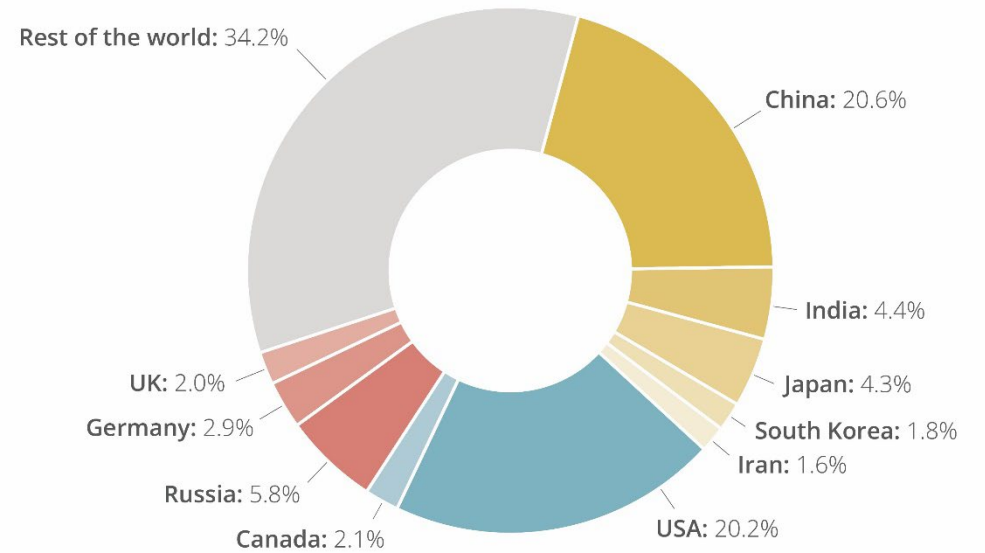
Million metric tons of carbon dioxide, in 2006



Source: Energy Emission Administration

Global share of CO₂ emissions (2006)

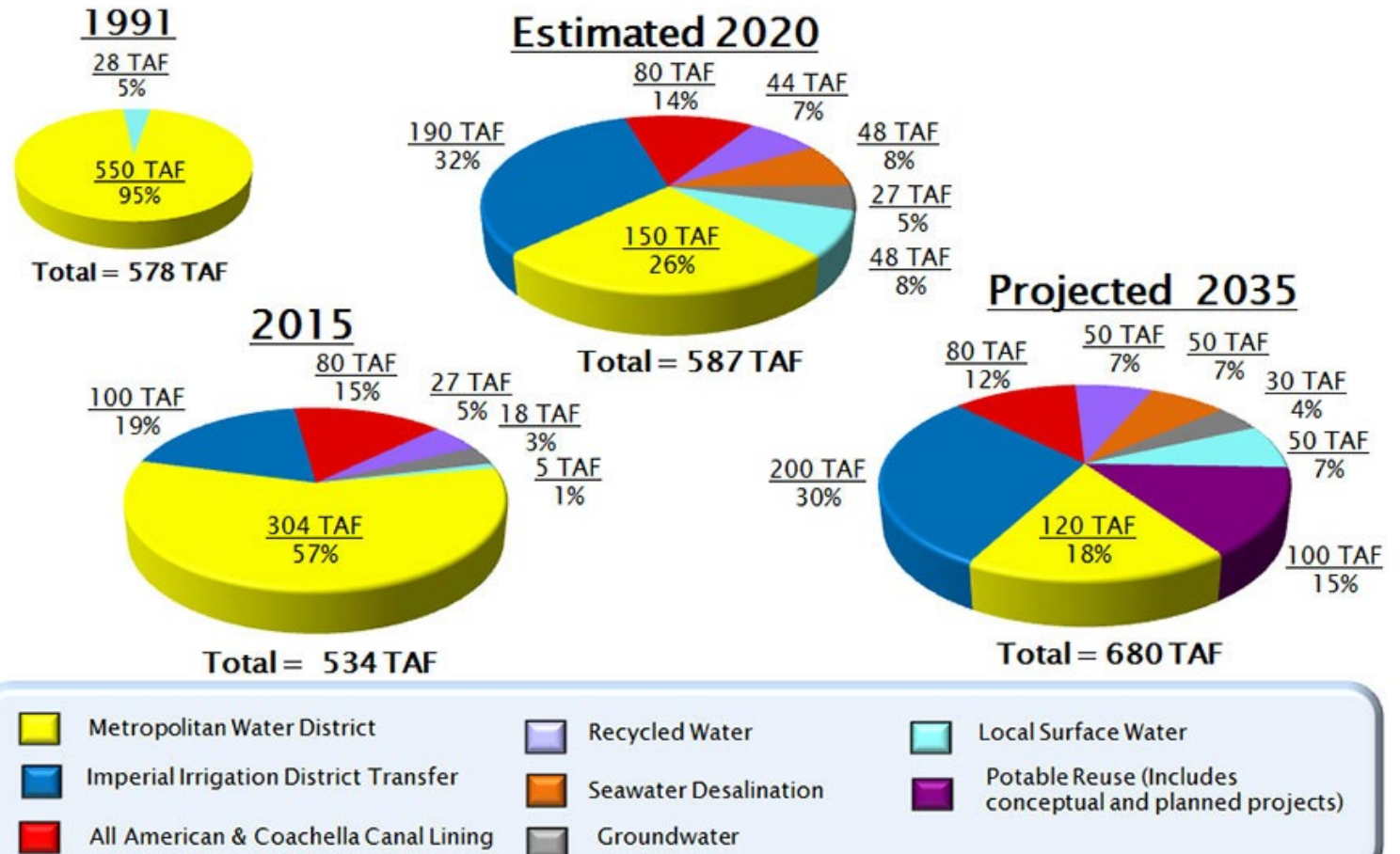
Carbon dioxide emissions are dominated by China and the USA



Source: Energy Emission Administration

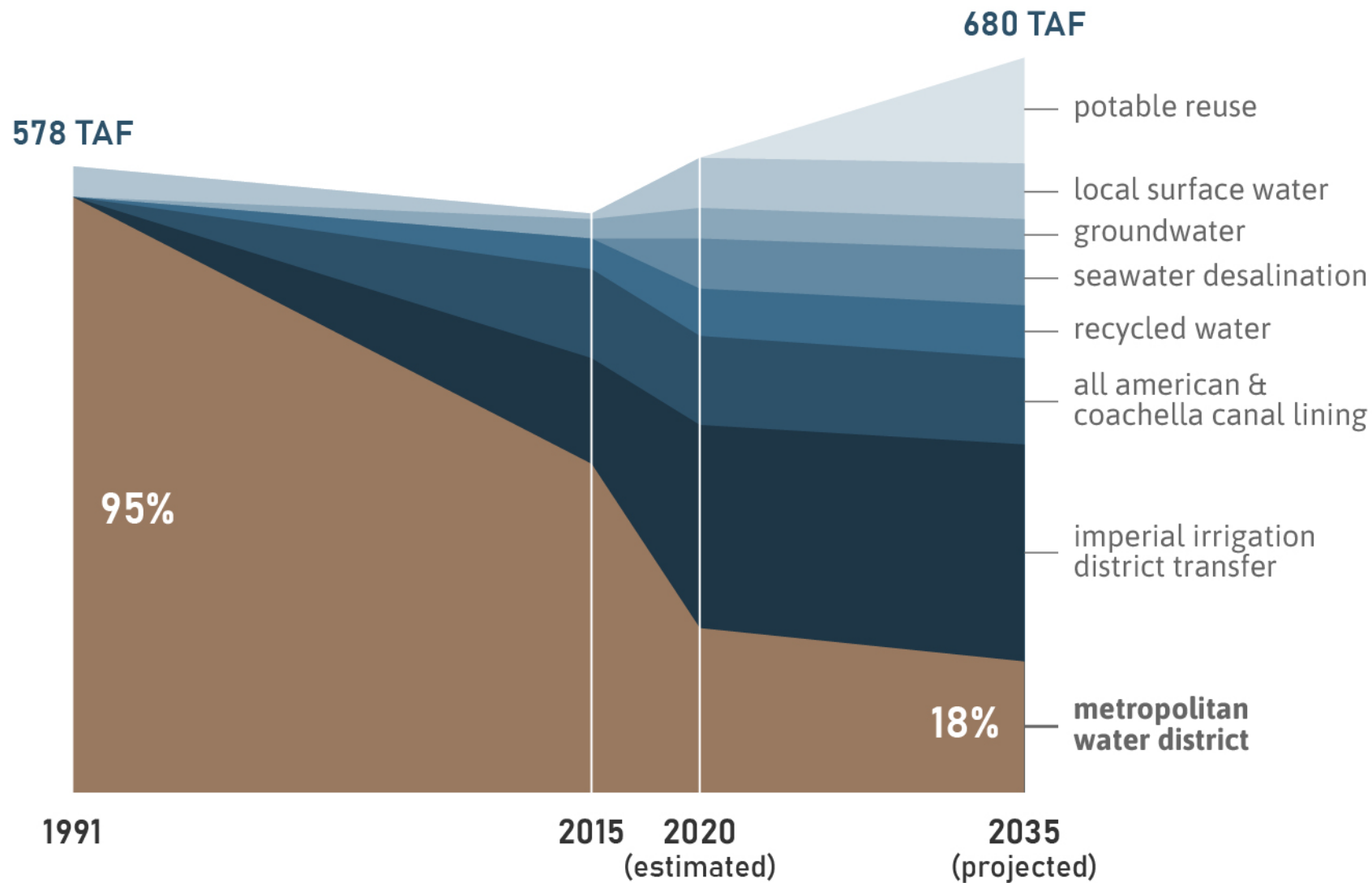
What would you change?

Increasing San Diego County's Water Supply Reliability through Supply Diversification



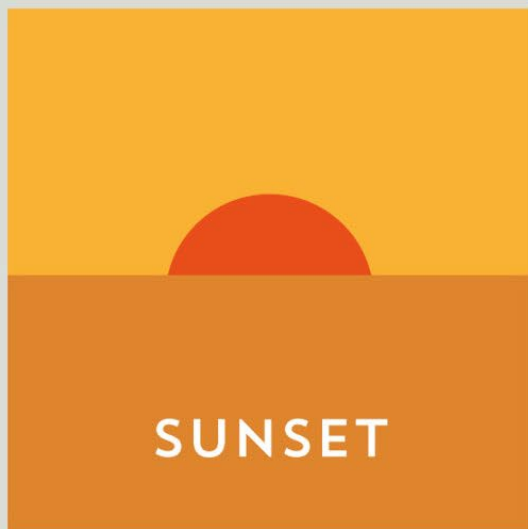
TAF=Thousand Acre-Feet

Supply diversification will increase San Diego County's water supply reliability

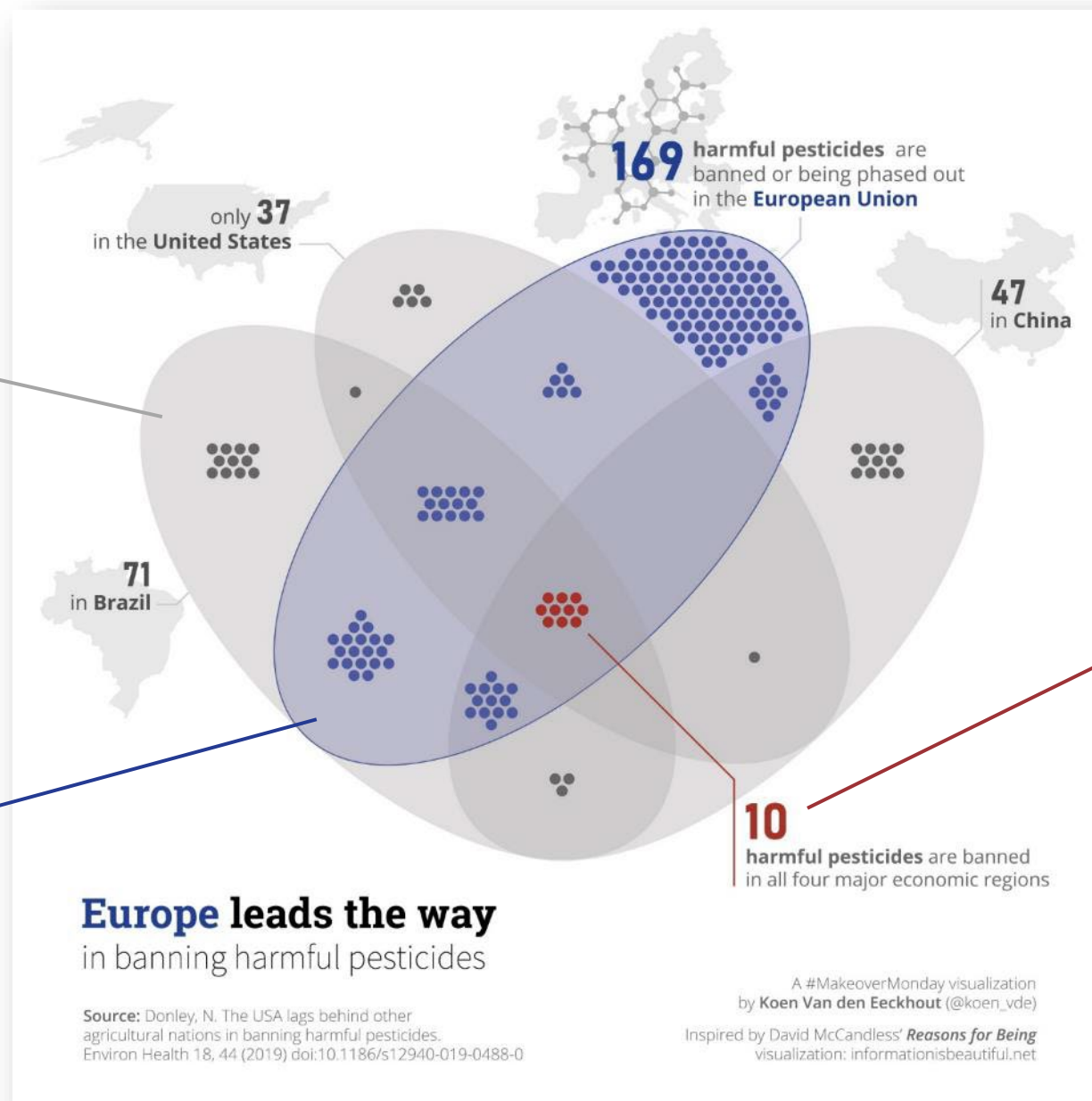


Design components

THE IMPORTANCE OF
COLOUR



STEPHENWILDISH.CO.UK

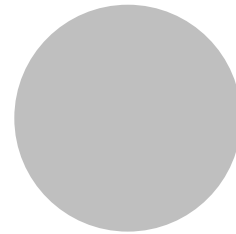
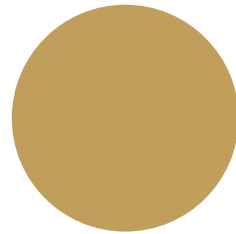
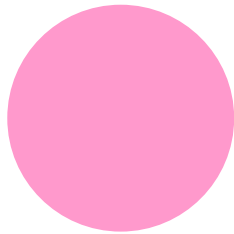
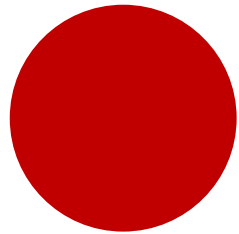
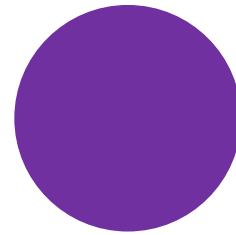
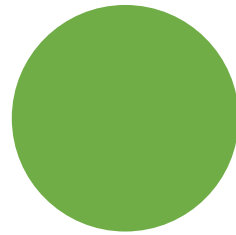
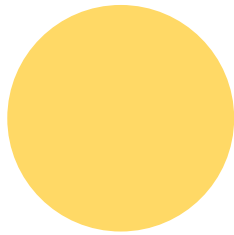
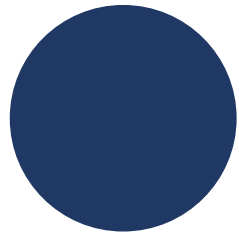


*background
color*

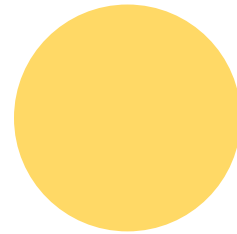
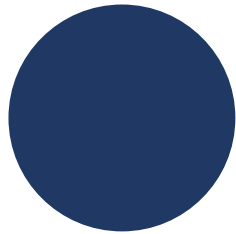
*thematic/structural
color*

*accent
color*

What do colours mean?

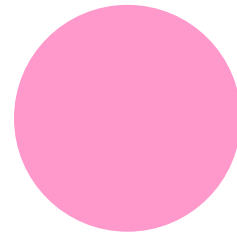
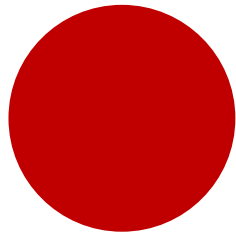


*trust,
stability*



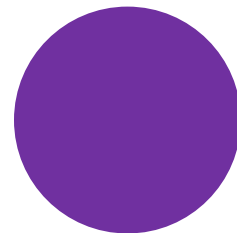
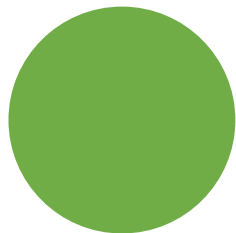
*happiness,
warmth*

*energy,
passion*



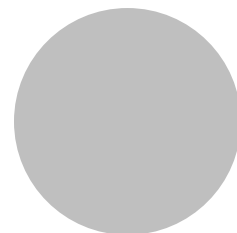
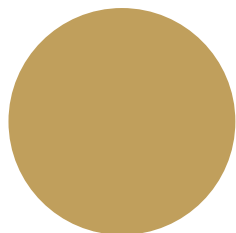
*sensitive,
love*

*friendly,
natural*

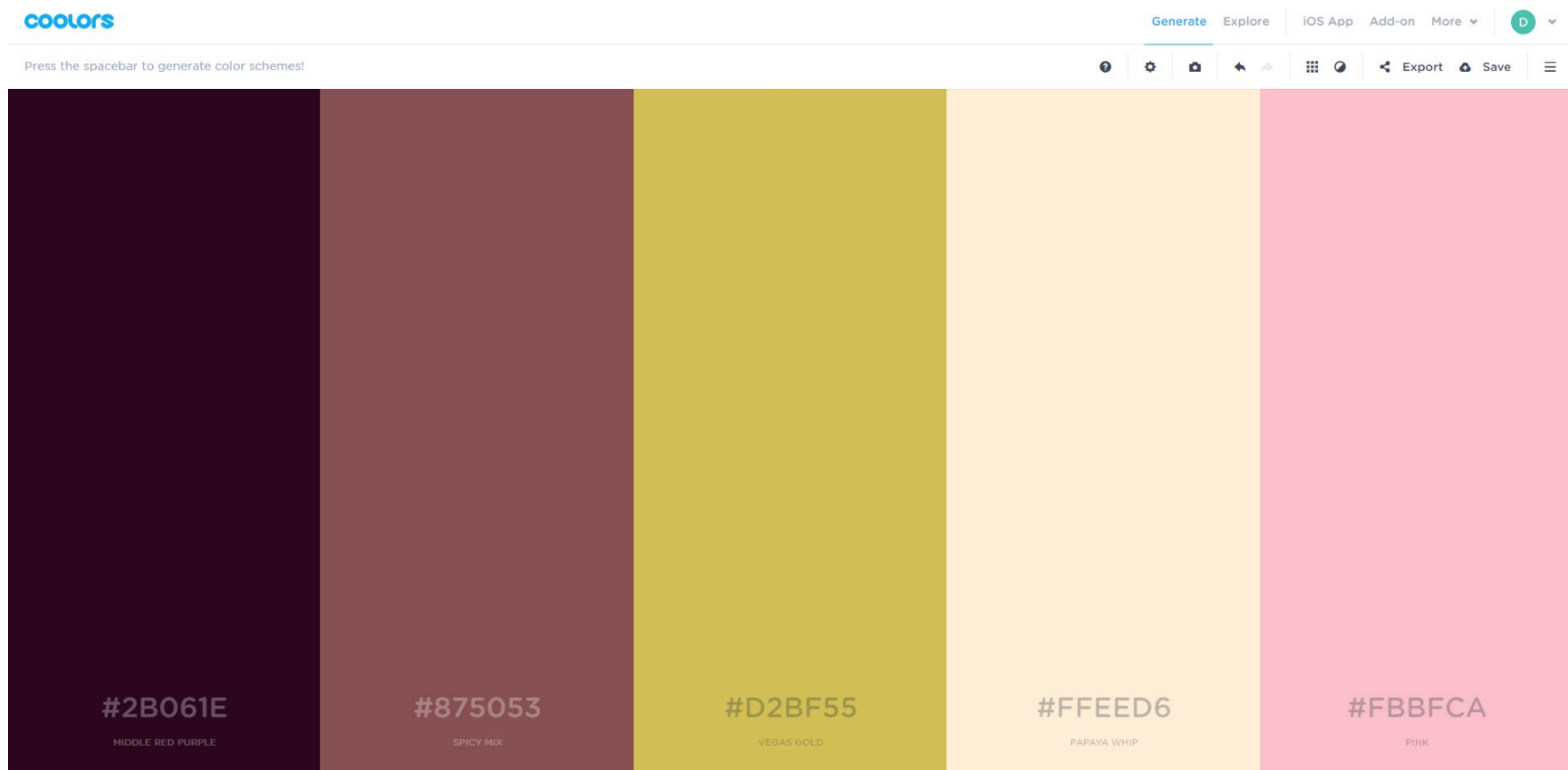


*rich,
mystery*

*history,
intelligence*



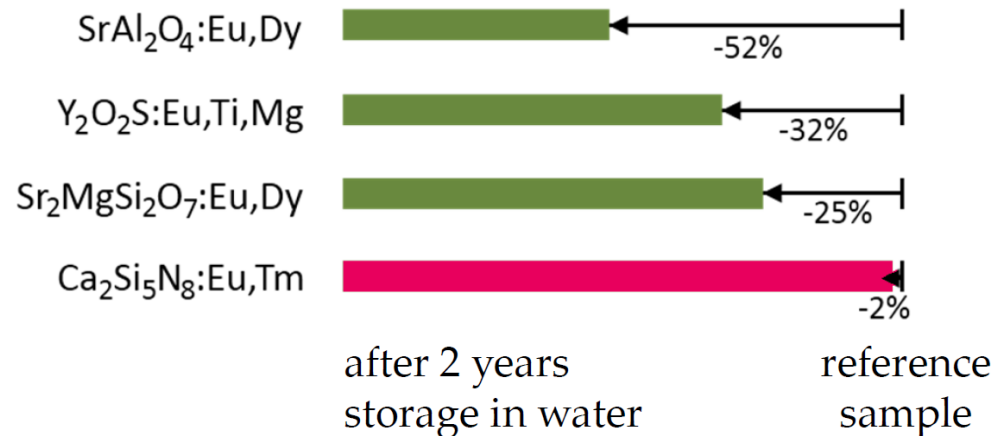
*neutral,
calm*



coolors.co

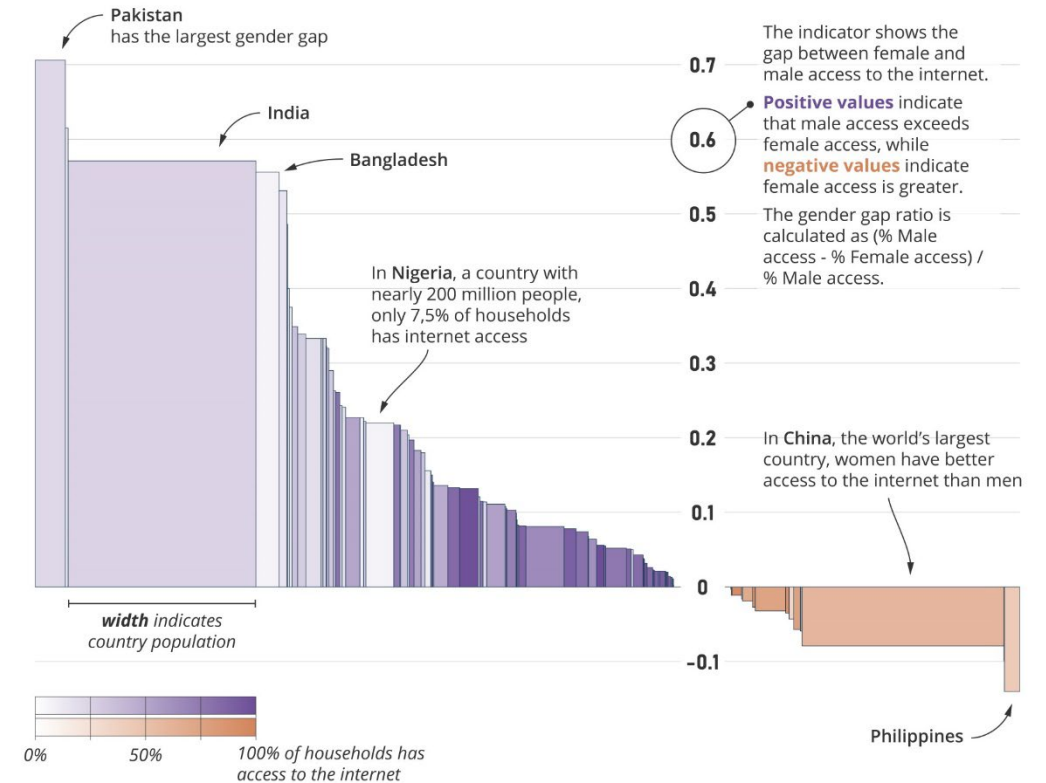
Clever color use

Compared to other common host materials, the nitrido-silicates are **very stable** and hence well suited for *in vivo* applications.



The digital divide

In most countries, **men** have better access to the internet than **women**



Source: The Economist Intelligence Unit Inclusive Internet Index 2020, International Telecommunication Union, Gallup World Poll

A #MakeoverMonday visualization by Koen Van den Eeckhout (@koen_vde)



Welcome!

VISUALIZATION TYPES

Bar Charts

Column Charts

Line & Area Charts

Pie & Donut Charts

Scatterplots

What to consider when choosing colors for data visualization



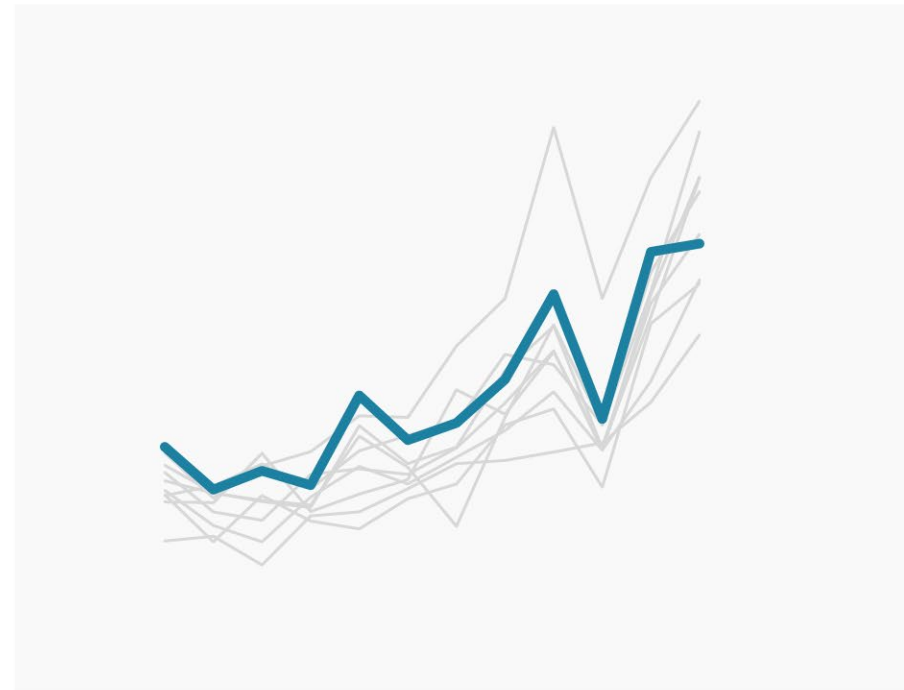
Data Visualisation can be defined as representing numbers with shapes – and no matter what these shapes look like (areas, lines, dots), they need to have a color. Sometimes colors just make the shapes visible, sometimes they encode data or categories themselves. We'll focus mostly on the latter in this article. But we'll also take a general look at colors and what to consider when choosing them:

<https://academy.datawrapper.de/article/140-what-to-consider-when-choosing-colors-for-data-visualization>

gray is the most powerful color



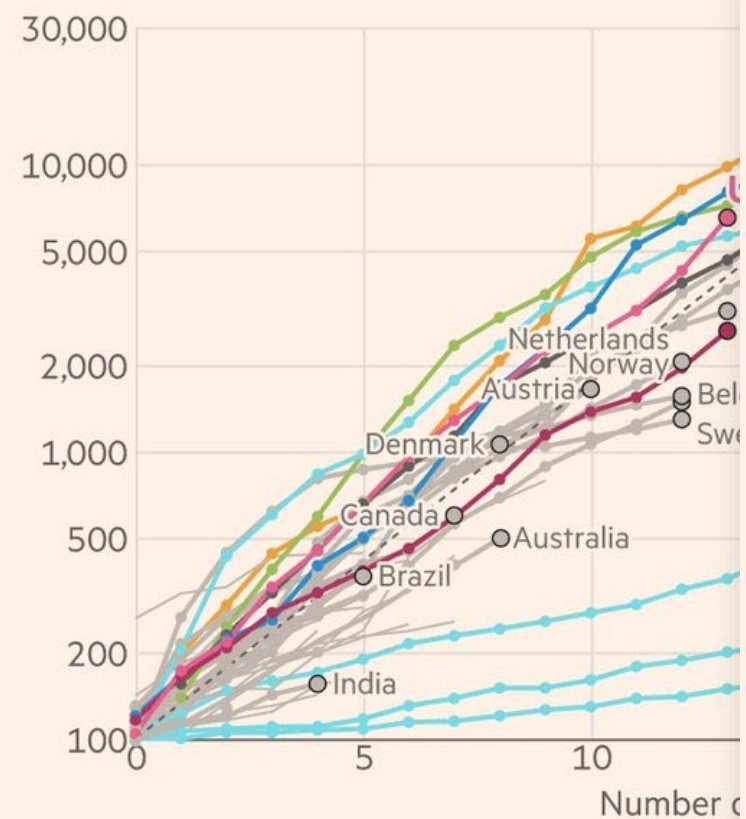
NOT IDEAL



BETTER

Most western countries are on track to reach 10,000 cases and Singapore have limited the spread

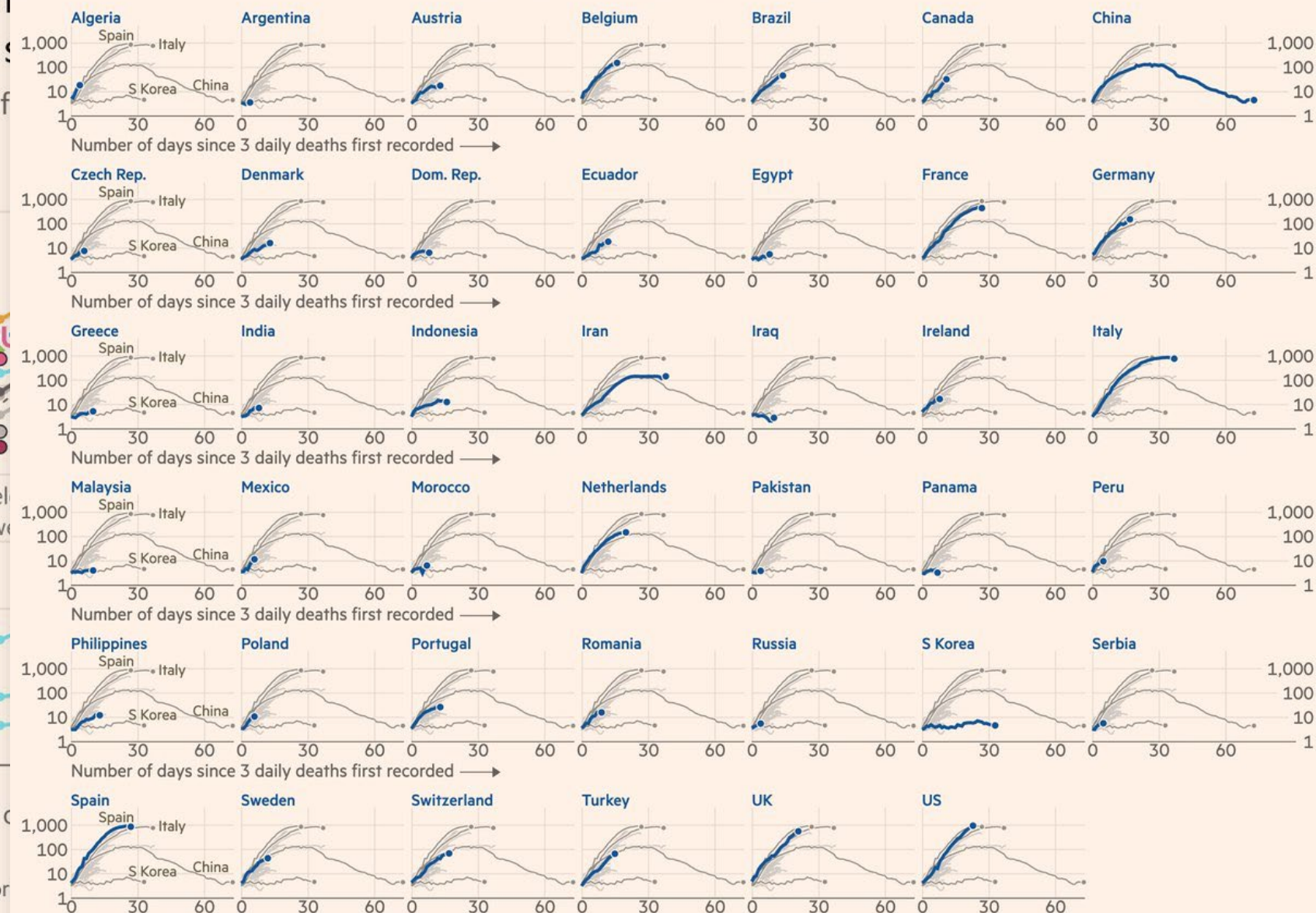
Cumulative number of cases, by number of days since 3 daily deaths first recorded



FT graphic: John Burn-Murdoch / @jburnmurdoch
Source: FT analysis of Johns Hopkins University, CSSE; Worldometers; FT research. Data updated April 05, 19:00 GMT
© FT

Daily death tolls are still accelerating in most countries

Daily deaths with coronavirus (7-day rolling average), by number of days since 3 daily deaths first recorded



FT graphic: John Burn-Murdoch / @jburnmurdoch
Source: FT analysis of European Centre for Disease Prevention and Control; Worldometers; FT research. Data updated April 05, 19:00 GMT
© FT

use consistent colors



NOT IDEAL



BETTER

use logical colors

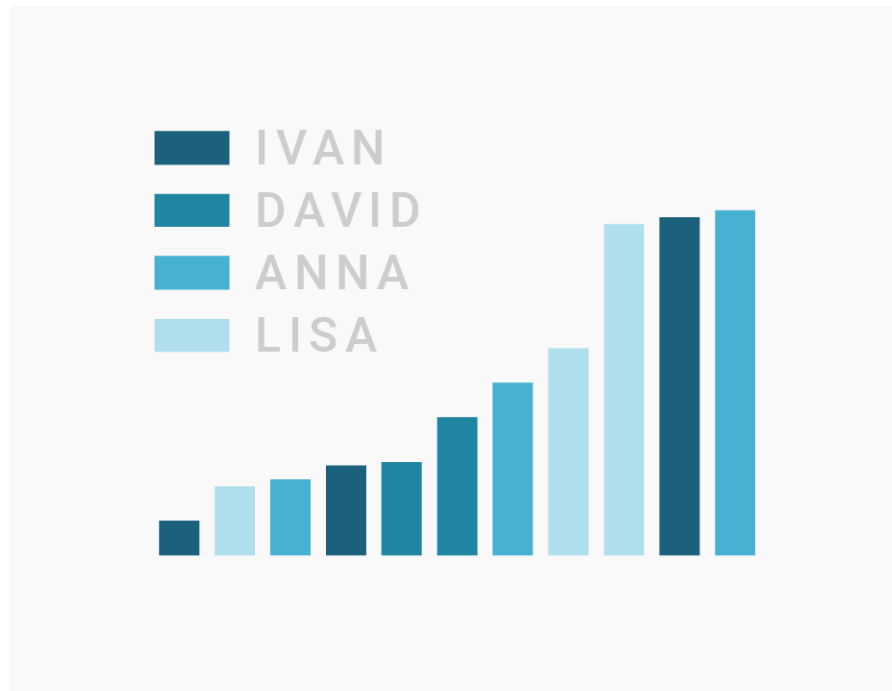


NOT IDEAL

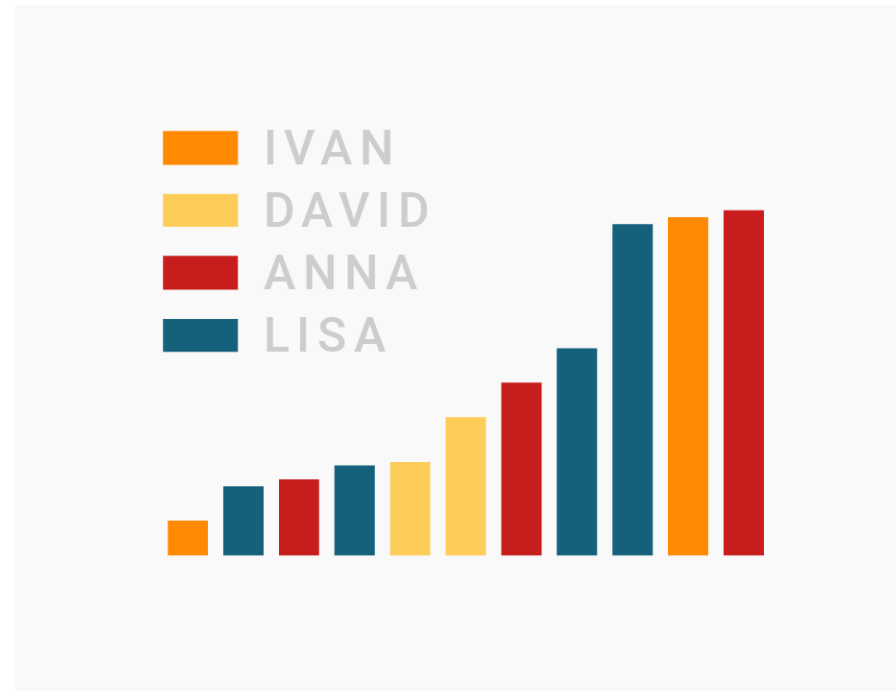


BETTER

don't use gradient colors for categories



NOT IDEAL

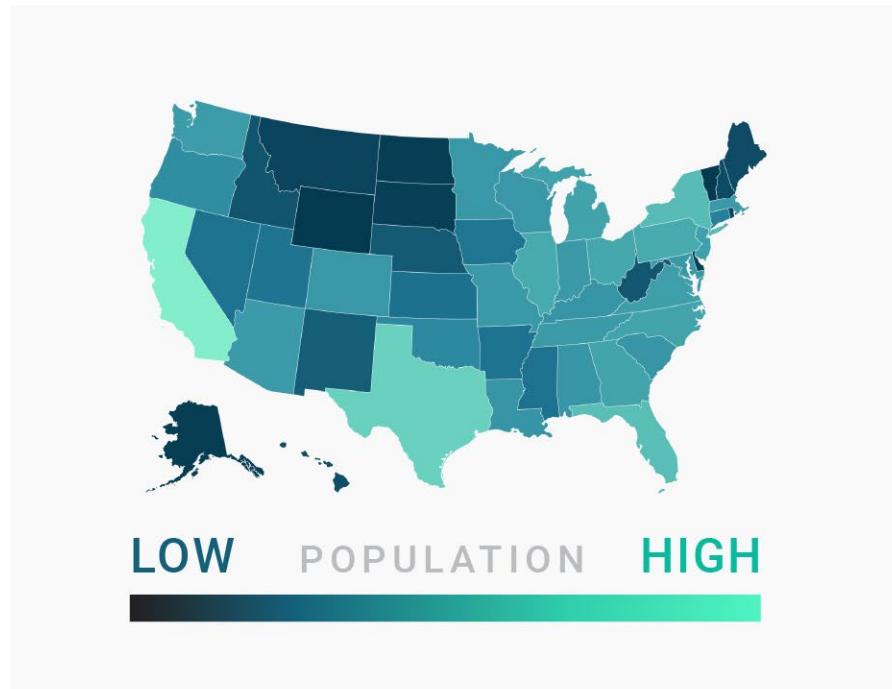


BETTER

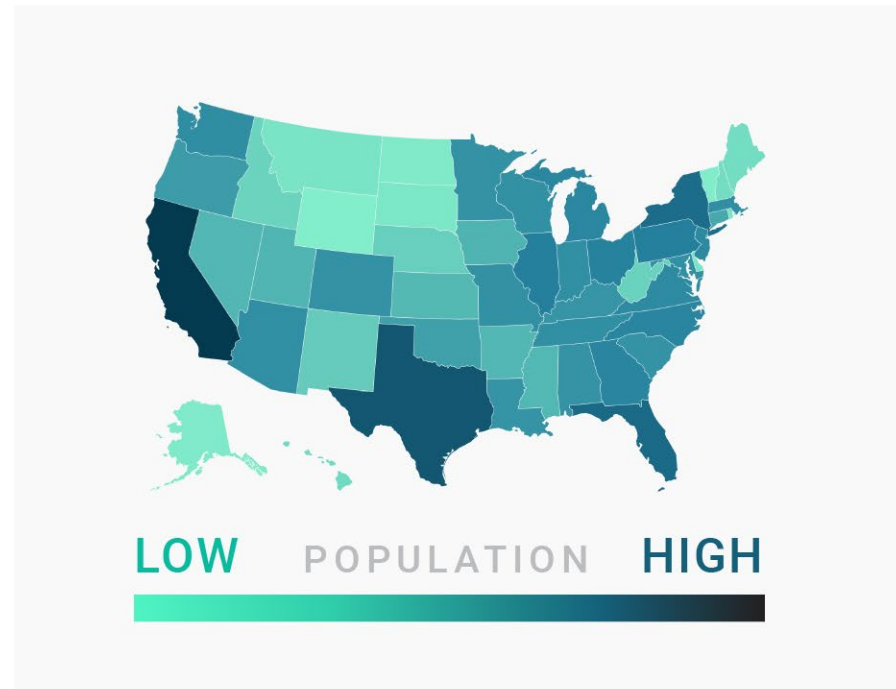
Different types of color scales

Categorical		→	<i>different hues</i>
Sequential		→	<i>from light to dark</i>
Diverging		→	<i>dark - light - dark</i>

dark colors = high values*



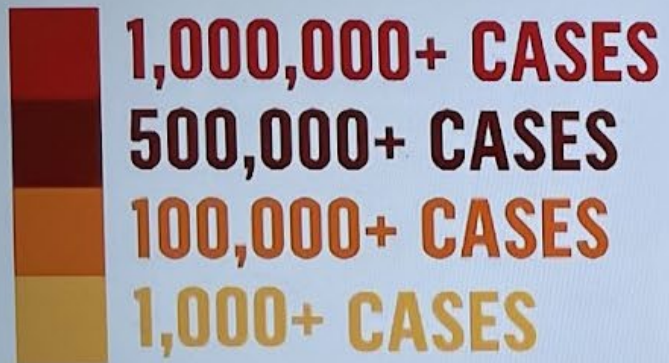
NOT IDEAL



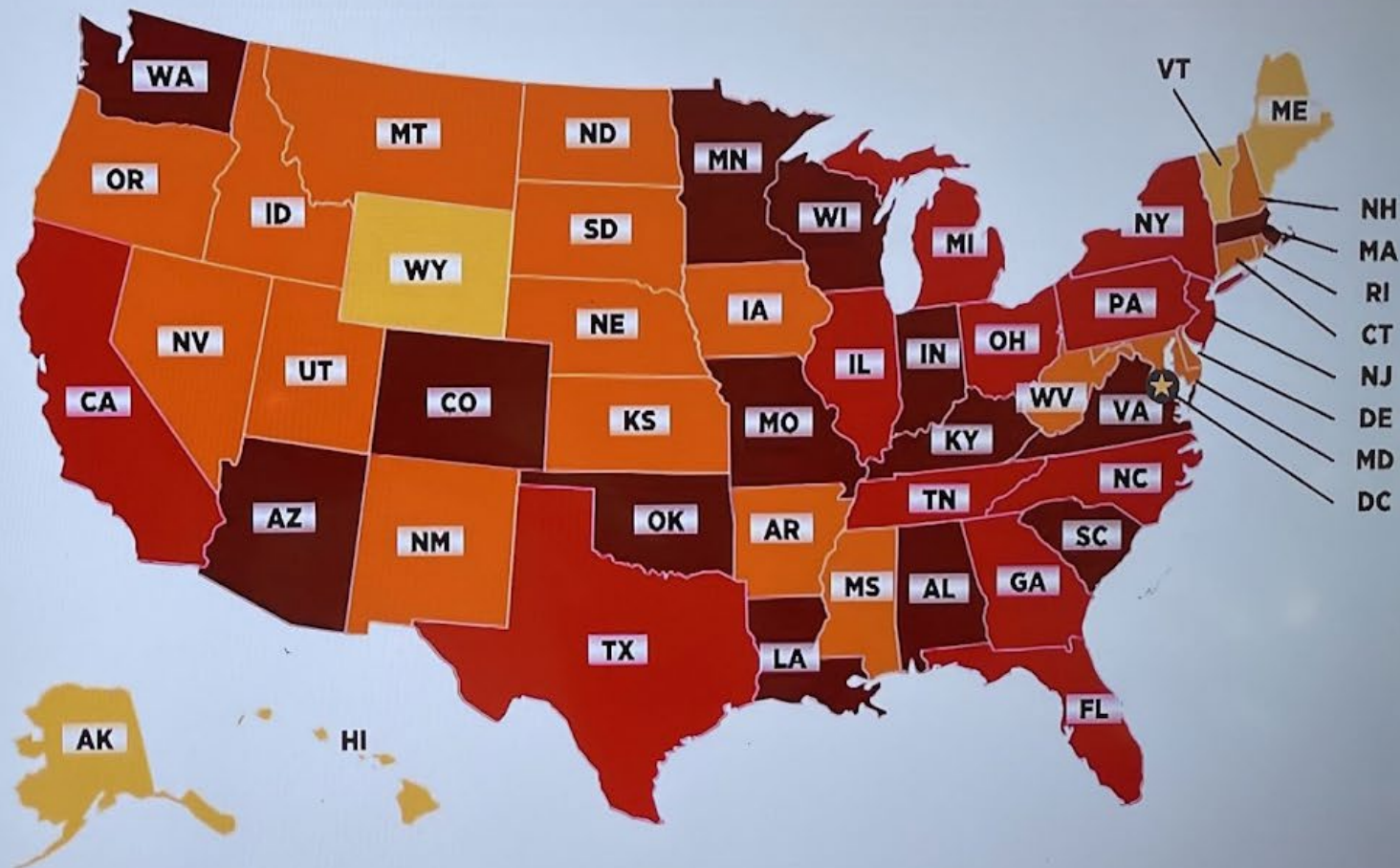
BETTER

**on a light background*

38,227,970 CONFIRMED CASES



TOTAL FATALITIES
634,698

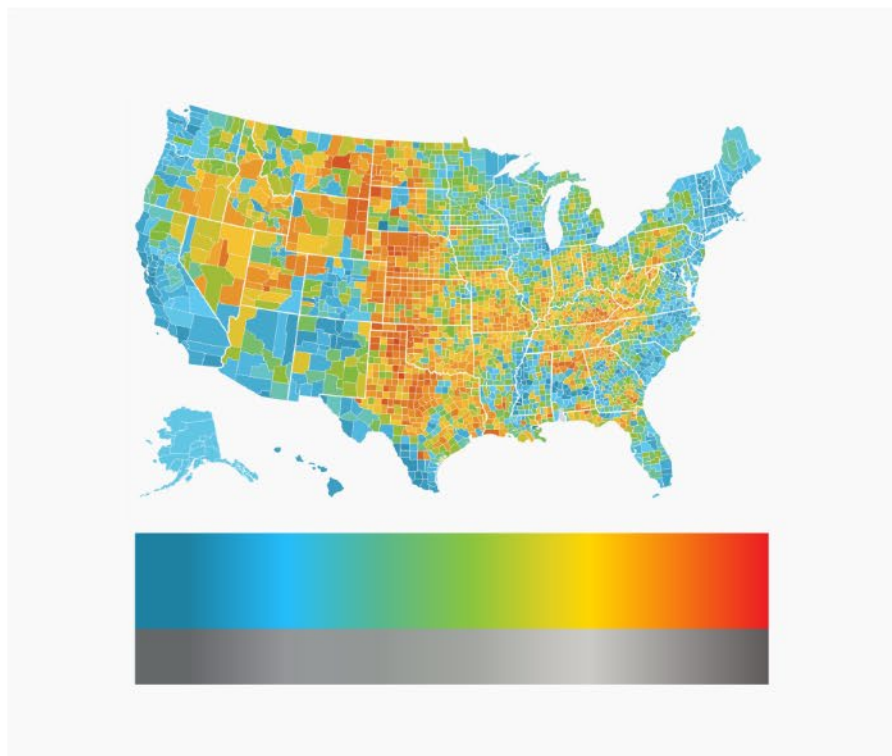


SOURCE: NBC NEWS | UPDATED 8/25/2021 3:09 AM ET

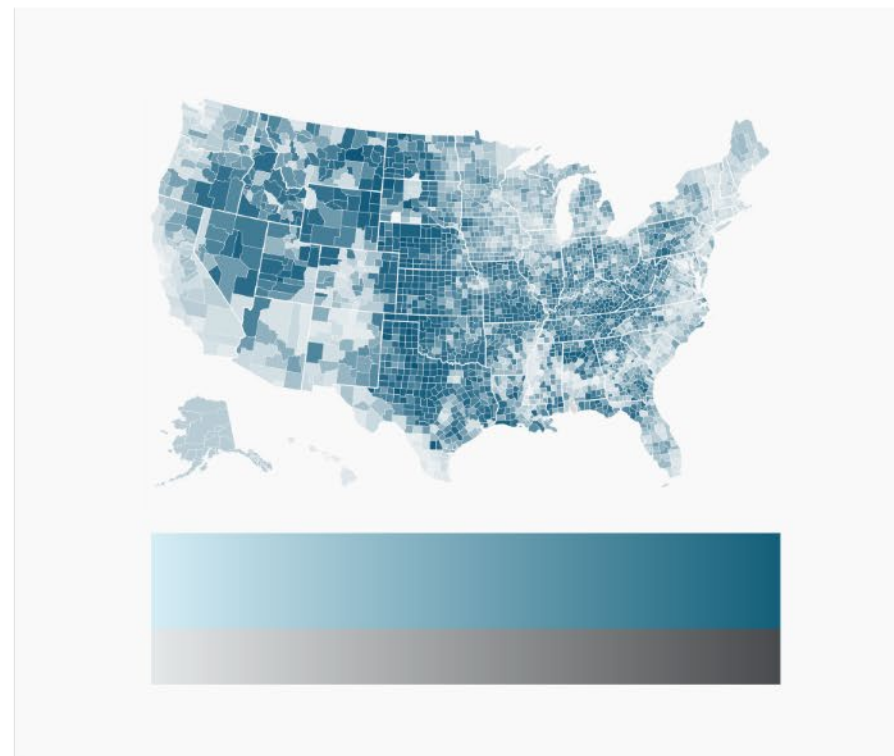
 **MSNBC**

LIVE > 7:38 AM ET

rainbow scales can be confusing



NOT IDEAL



BETTER

Helpful tools

chroma.js: a nice tool to create a sequential color scheme

Chroma.js Color Palette Helper

This [chroma.js](#)-powered tool is here to help us [mastering multi-hued, multi-stops color scales](#).

1 What kind of palette do you want to create?

Palette type: ☒ sequential ☐ diverging

Number of colors:

2 Select and arrange input colors

3 Check and configure the resulting palette

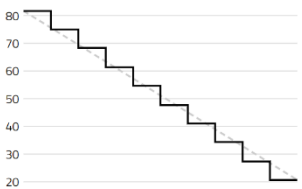
☒ correct lightness ☒ bezier interpolation

☒ This palette is colorblind-safe.

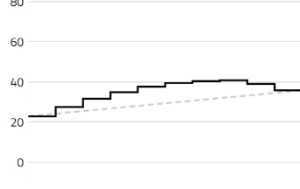
simulate: ☒ normal ☐ deut. ☐ prot. ☐ trit.



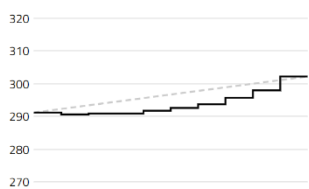
lightness



saturation



hue



[chroma.js palette helper \(vis4.net\)](https://vis4.net/chroma.js-palette-helper/)

Color Brewer: a good source for strong color schemes

Number of data classes: [how to use](#) [updates](#) [downloads](#) [credits](#)

COLORBREWER 2.0
color advice for cartography

Nature of your data:
☒ sequential ☐ diverging ☐ qualitative

Pick a color scheme:

Multi-hue:  Single hue: 

Only show:
☐ colorblind safe
☐ print friendly
☐ photocopy safe

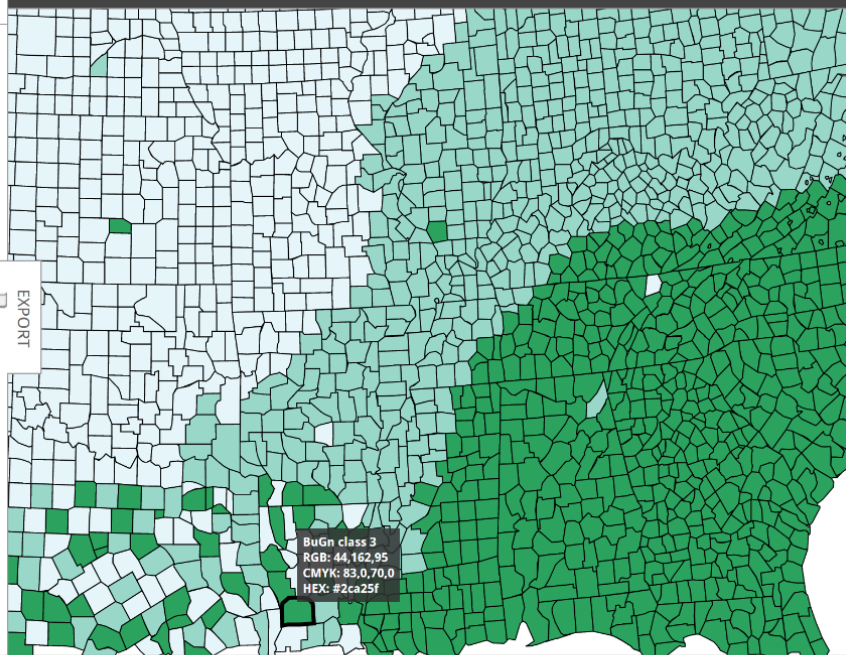
Context:
☐ roads
☐ cities
☒ borders

Background:
☒ solid color ☐ terrain
color transparency

3-class BuGn

HEX

EXPORT



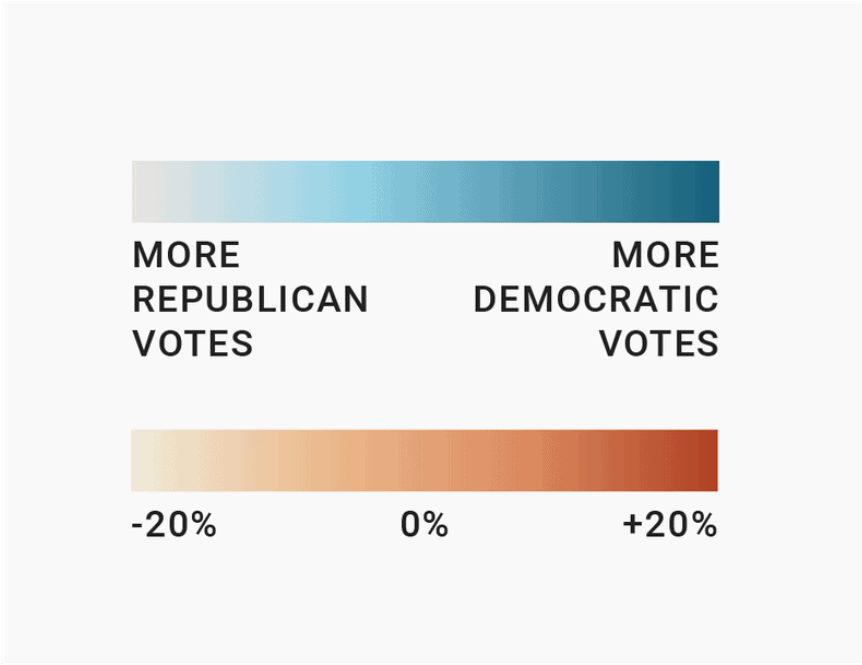
BuGn class 3
RGB: 44,162,95
CMYK: 83,0,70,0
HEX: #2ca25f

© Cynthia Brewer, Mark Harrower and The Pennsylvania State University
[Source code and feedback](#)
[Back to Flash version](#)
[Back to ColorBrewer 1.0](#)

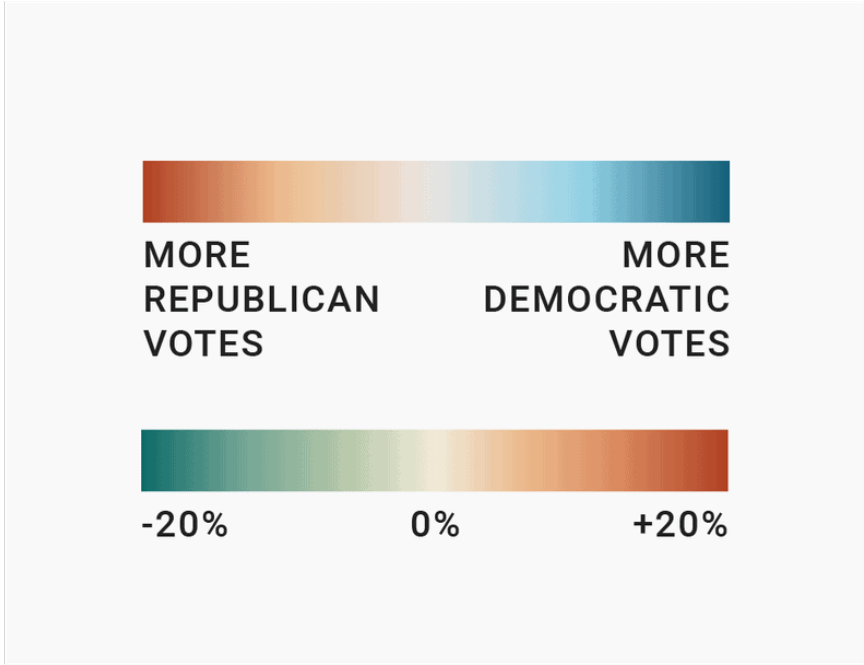
[axismaps](#)

<https://colorbrewer2.org>

Use **diverging scales** when
there's a logical 'middle point'



NOT IDEAL

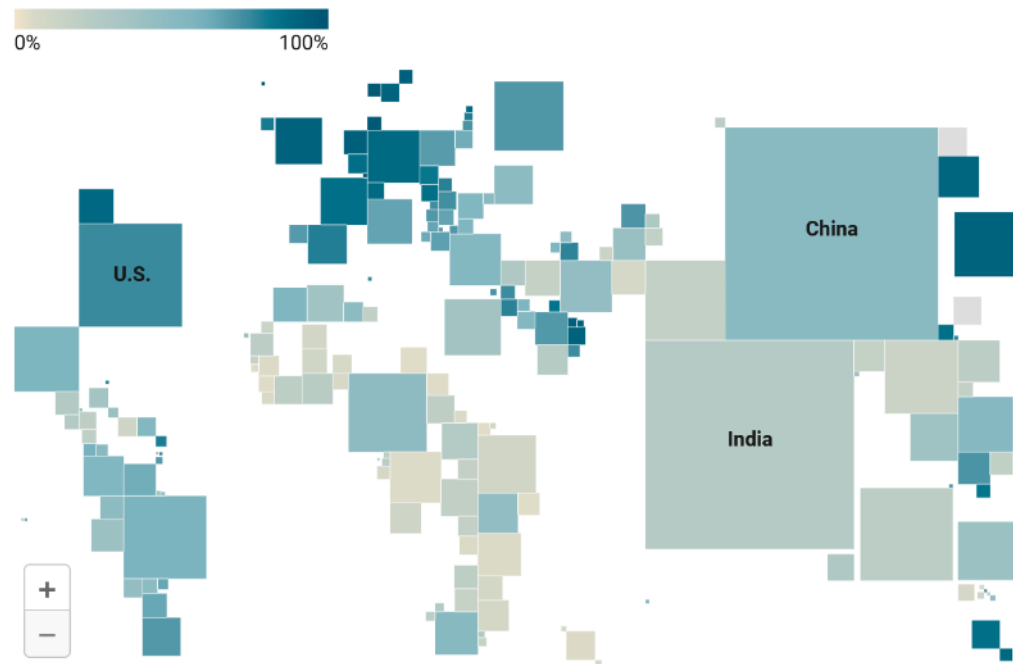


BETTER

...or when you want to highlight **low values** or **details**

The internet was mostly used by the Western World in 2015

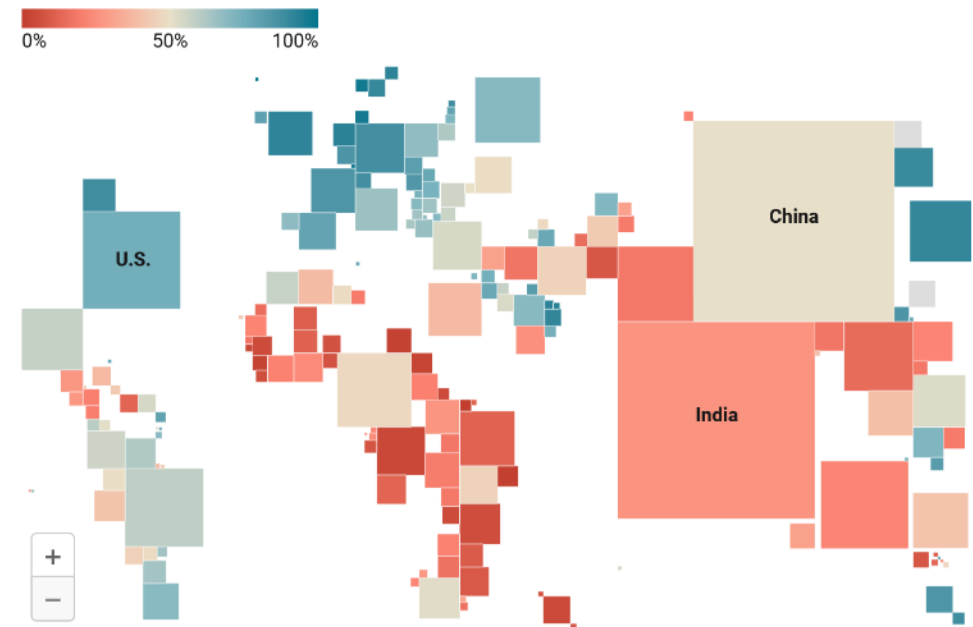
Share of individuals who have used the Internet in the last 3 months (via a computer, mobile phone, personal digital assistant, games machine, digital TV etc.), in selected countries, 2015



Map: Lisa Charlotte Rost, Datawrapper • Source: [Our World in Data](#) • [Get the data](#) • Created with [Datawrapper](#)

In most African and Asian countries, less than half of the population was using the internet in 2015.

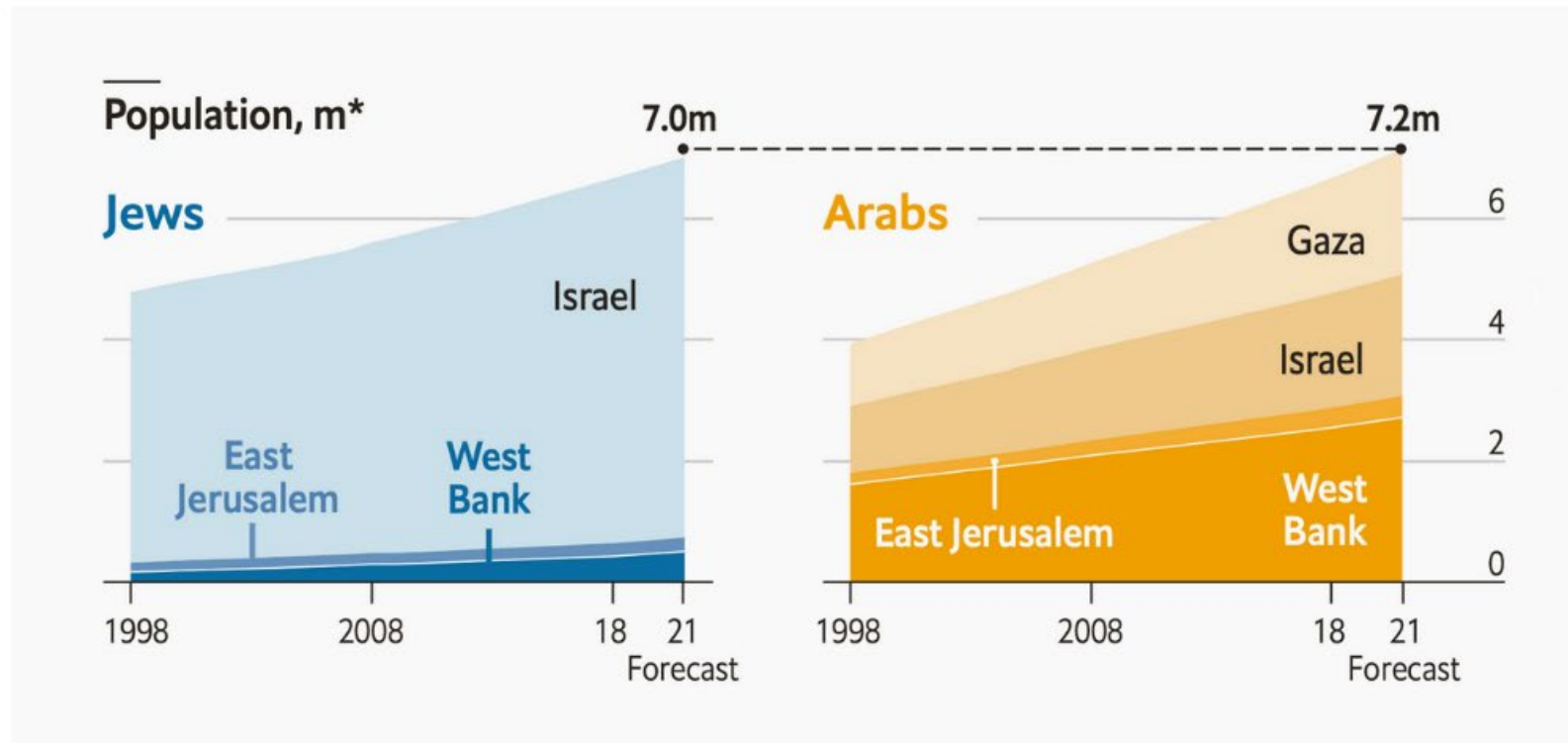
Share of individuals who have used the Internet in the last 3 months (via a computer, mobile phone, personal digital assistant, games machine, digital TV etc.), in selected countries, 2015



Map: Lisa Charlotte Rost, Datawrapper • Source: [Our World in Data](#) • [Get the data](#) • Created with [Datawrapper](#)

Final remarks

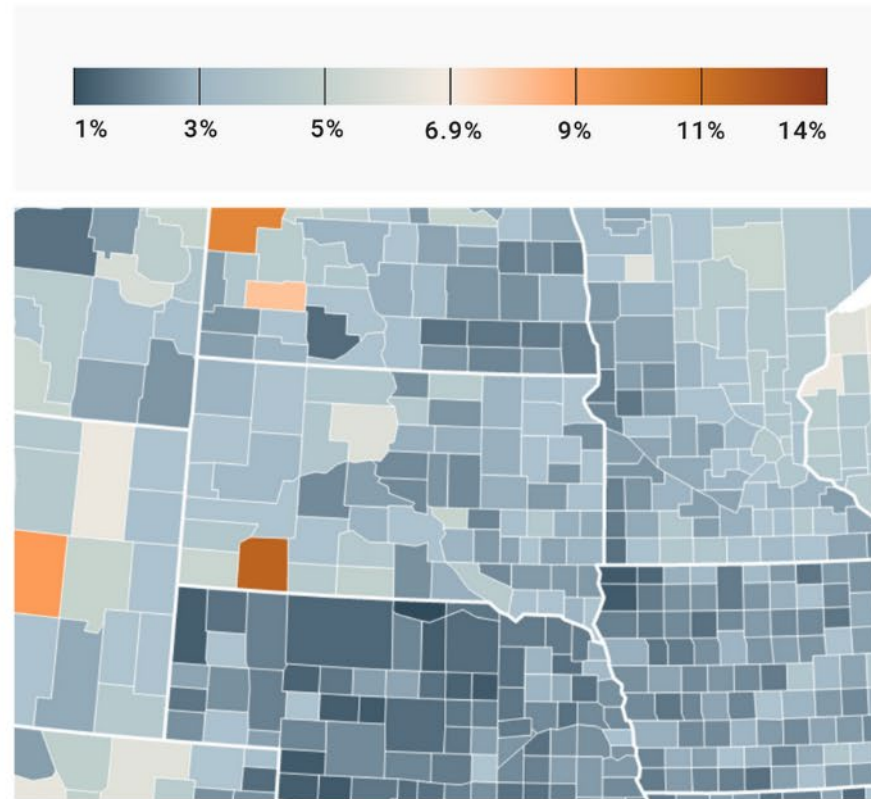
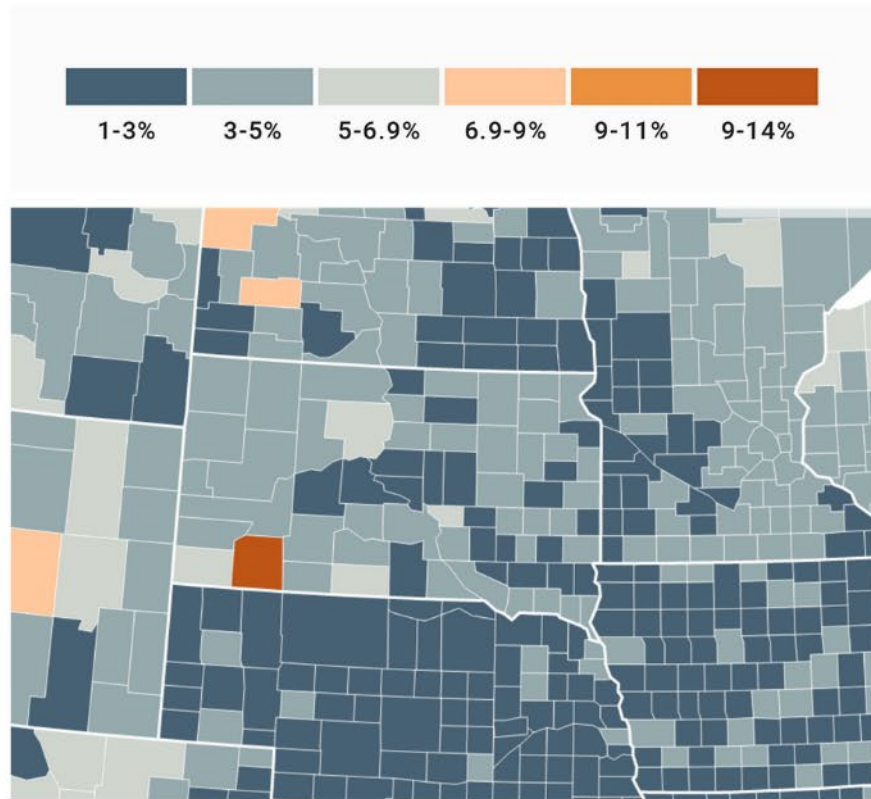
- Use hues to distinguish between categories, and shades to distinguish between subcategories



Population in occupied territories, grouped by religious affiliation, by The Economist ([PDF](#))

Final remarks

- **Classed** scale: easier to read data
- **Unclassed** scale: easier to do your own interpretation

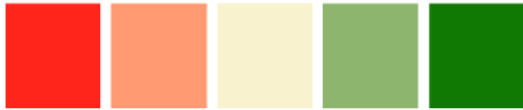


South Dakota and surrounding states. Left: map with six classes. Right: unclassified map.

Final remarks

- **Accessibility:** check whether your color scheme is suitable for colorblind people

original



protanomaly



original



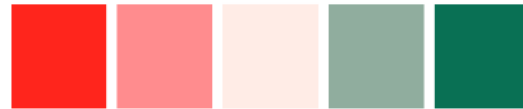
protanomaly



deuteranomaly



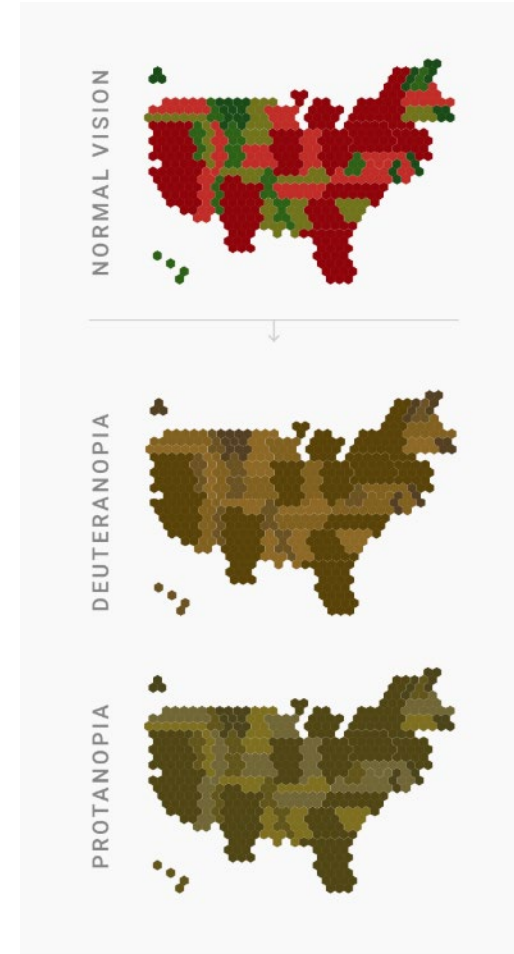
tritanomaly



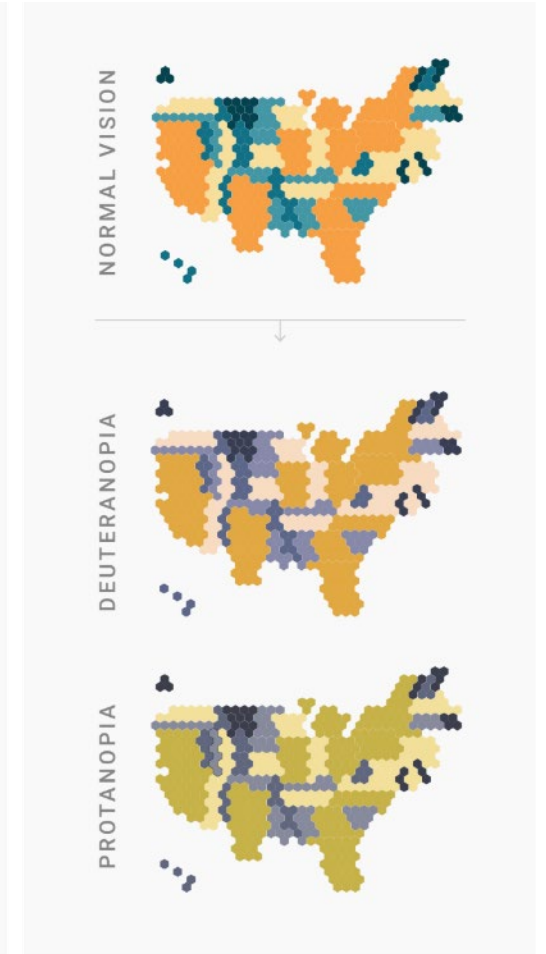
deuteranomaly



tritanomaly



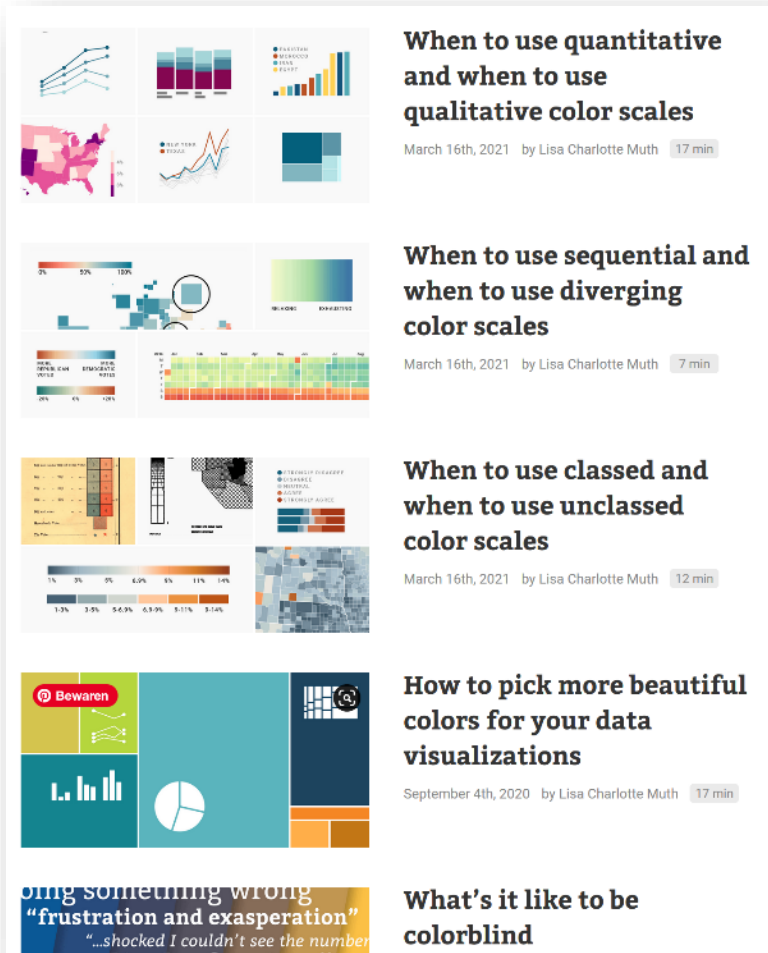
NOT IDEAL



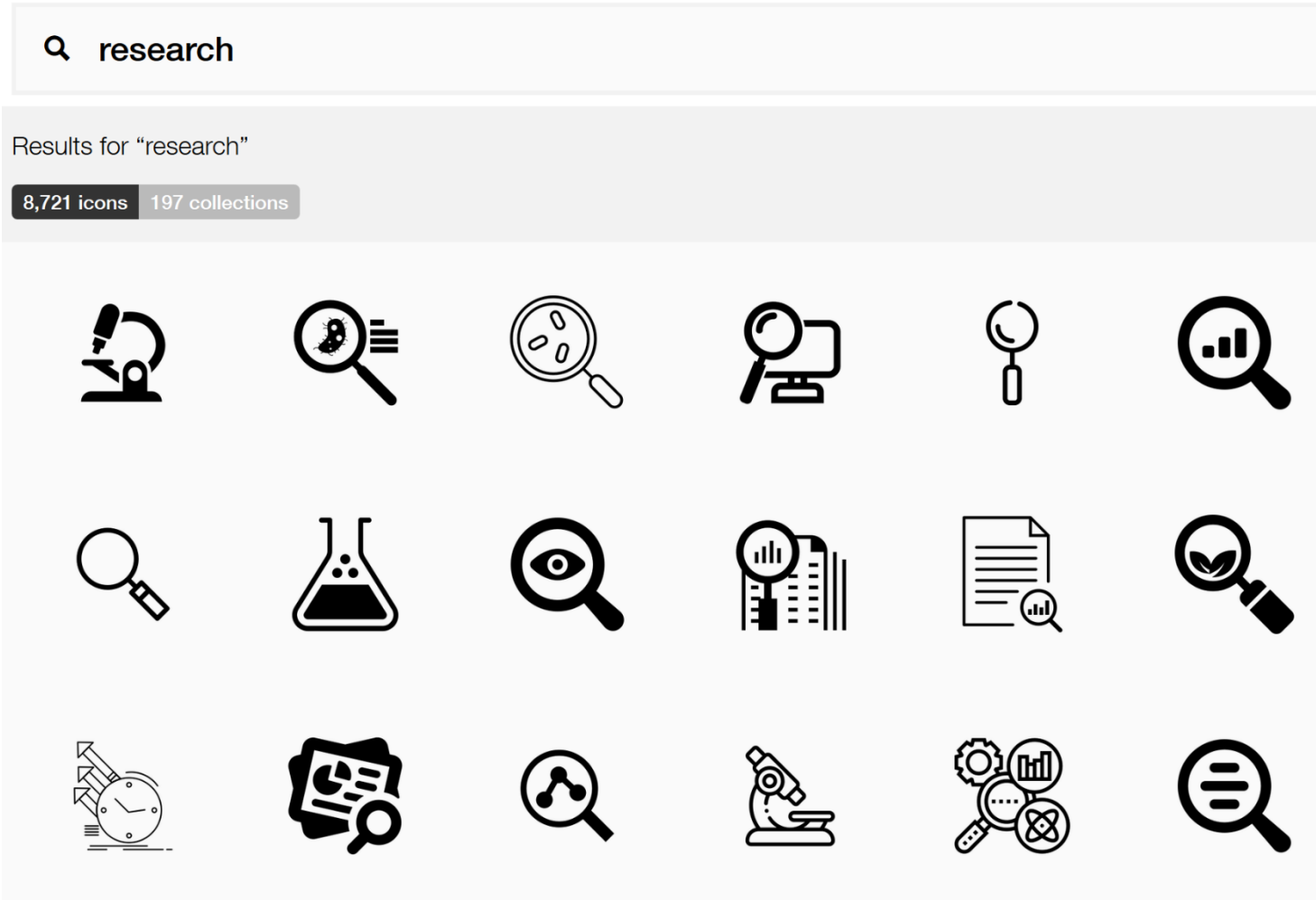
BETTER

Final remarks

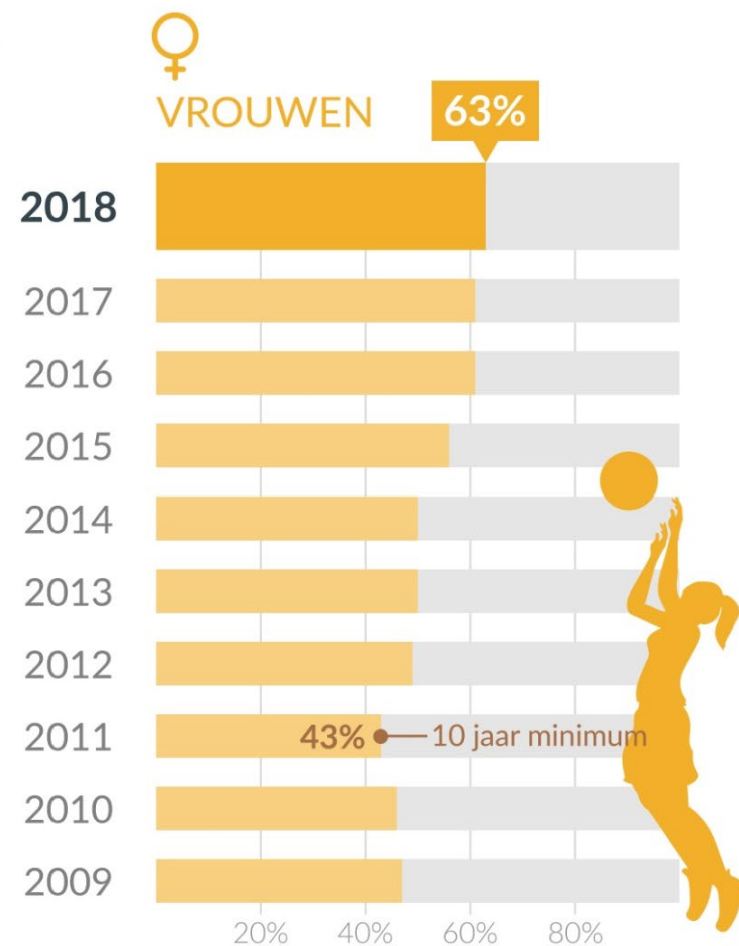
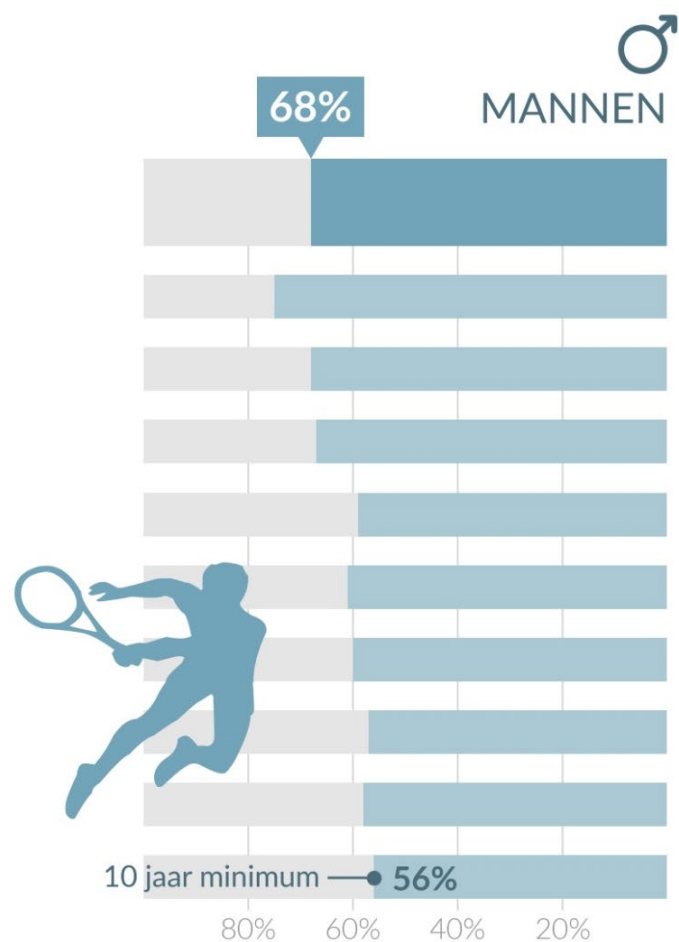
- Read <https://blog.datawrapper.de/category/color-in-data-vis/> , it's the ultimate source for information on color use in dataviz



Icons



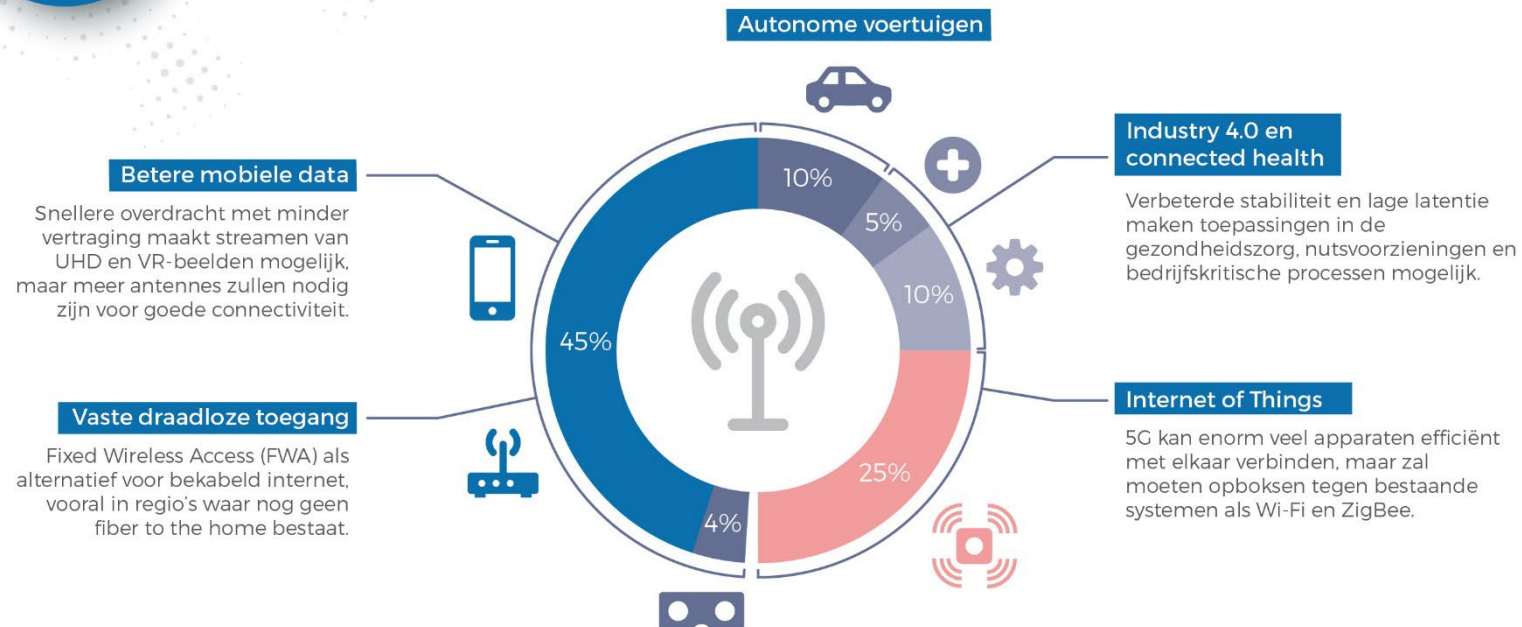
thenounproject.com





DE BELANGRIJKSTE USE CASES VOOR 5G

VOLGENS TELECOM PROFESSIONALS



bron: Informa, McKinsey



* The most important use cases for 5G

TYPOGRAPHY

Typography

Typography

TYPOGRAPHY

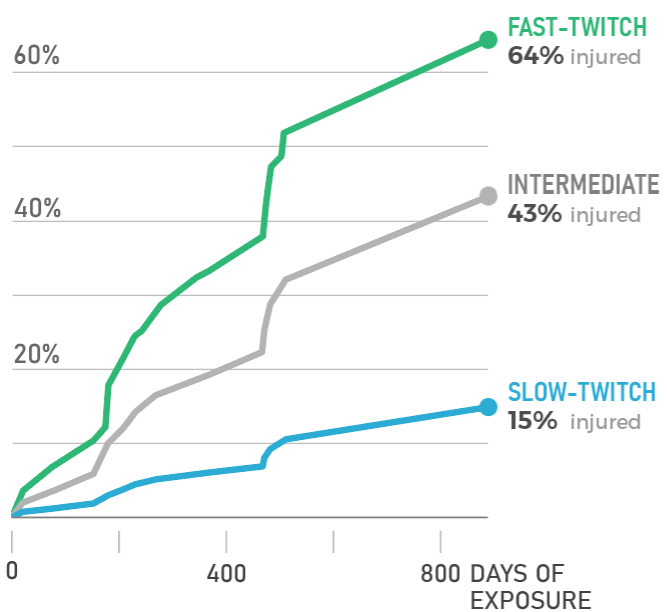
Typography

Typography

**What is important
for a good dataviz font?**

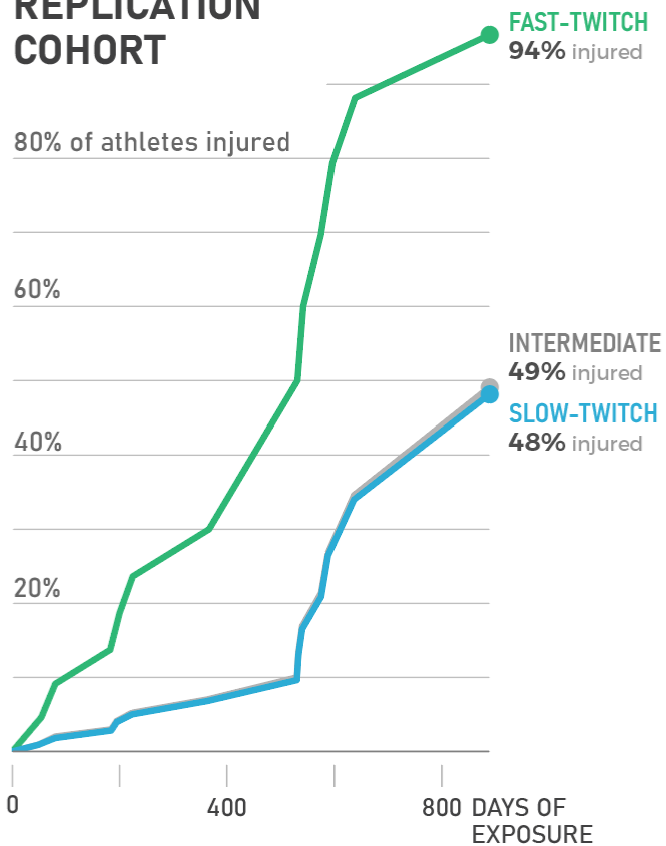
ORIGINAL COHORT

80% of athletes injured



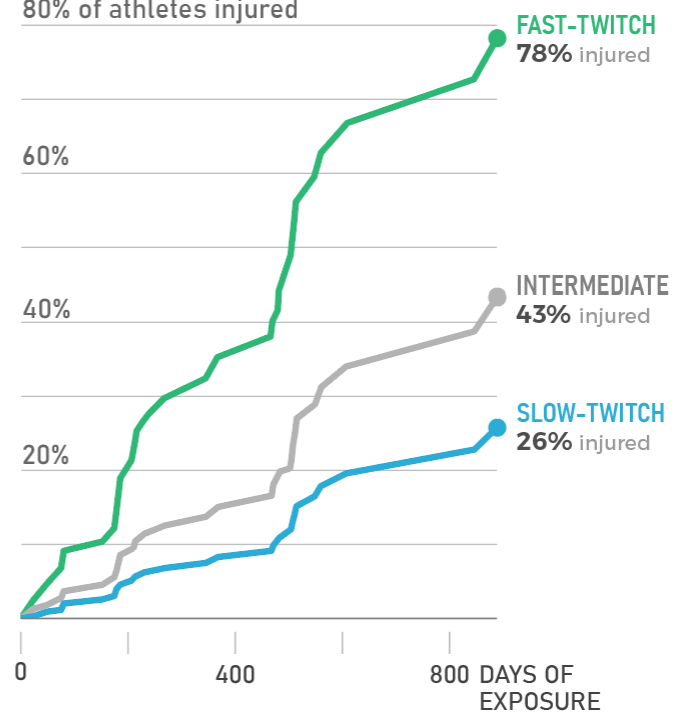
REPLICATION COHORT

80% of athletes injured



COMBINED COHORT

80% of athletes injured



Some personal favorites

Assistant

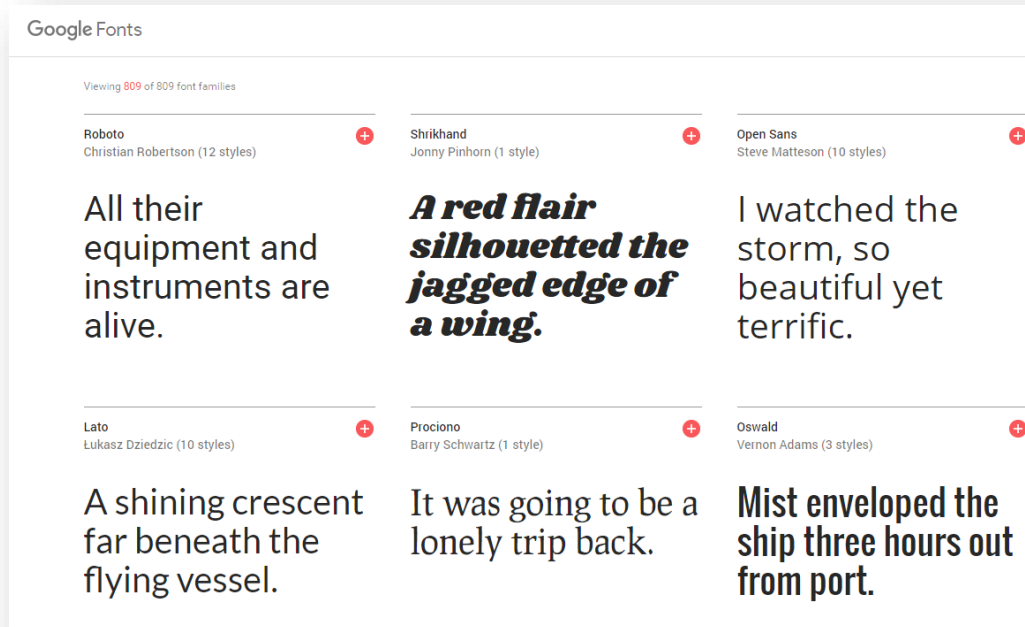
Bahnschrift

Lato

Noto Sans

Roboto

Source Sans Pro

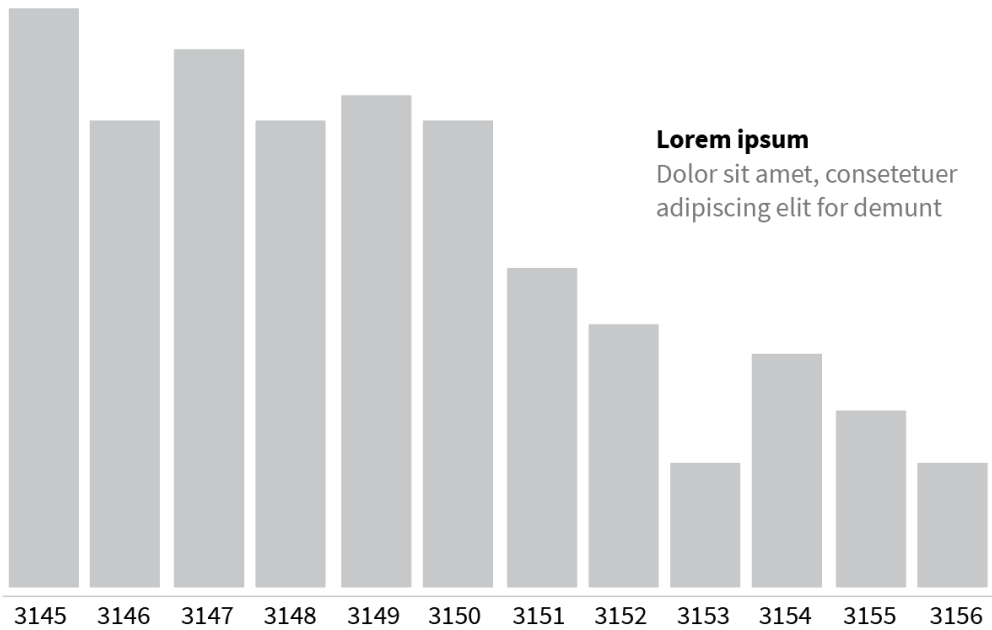


fonts.google.com

Font hierarchy

Lorem Ipsum Dolor

Lorem ipsum dolor sit amet, consectetur adipiscing elit



Notes: wikipedia and census.org

Header Text Merriweather, 22px/26px, black

Subheader Text
Source Sans Pro, 14px/18px, regular

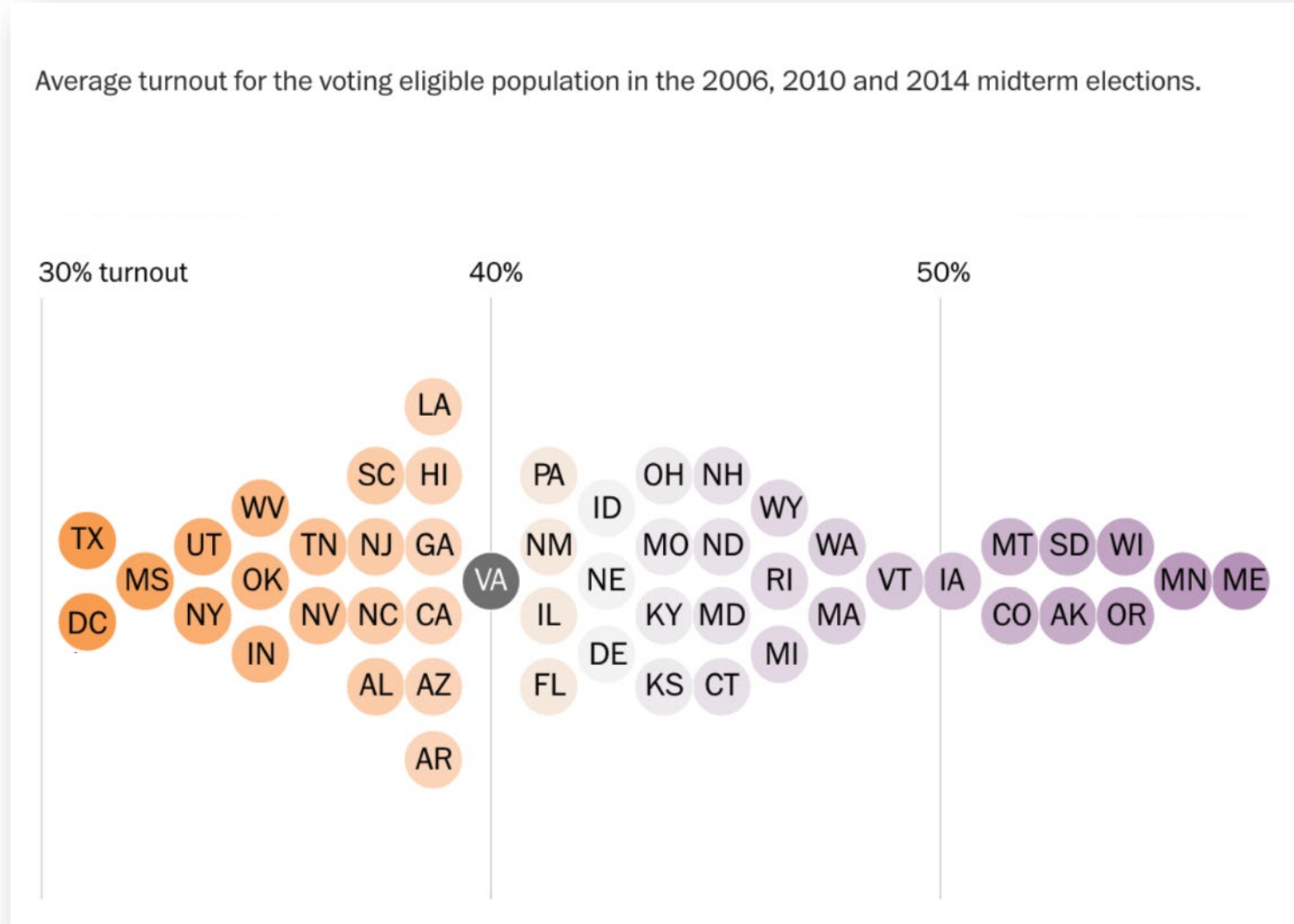
Callout Text
Source Sans Pro, 14px/18px, mixed

Label/Axis Text
Source Sans Pro, 14px/18px, regular

Notes/Sources Text
Source Sans Pro, 14px/18px, regular, #777

Annotations

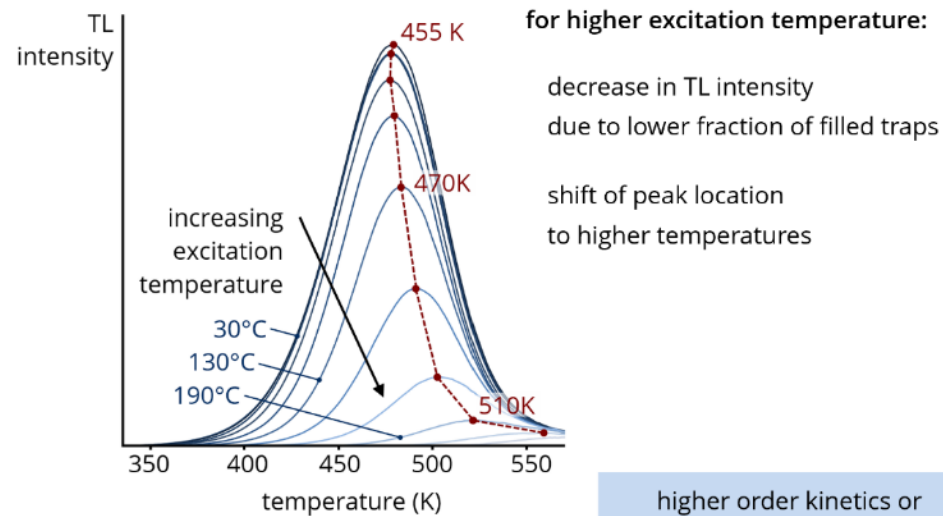
Well-crafted titles, captions and annotations can make a visual 'self-contained'



Font size

Adapt to the situation – a presentation is different from an article, a poster or a social media post!

Changing the excitation temperature
reveals non-first order behaviour



higher order kinetics or
multiple traps are required
to describe the TL behaviour

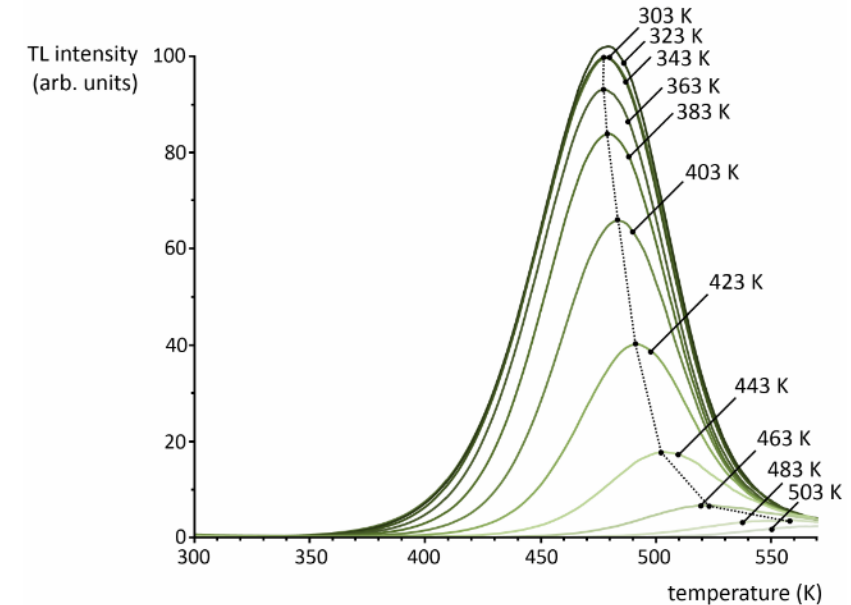
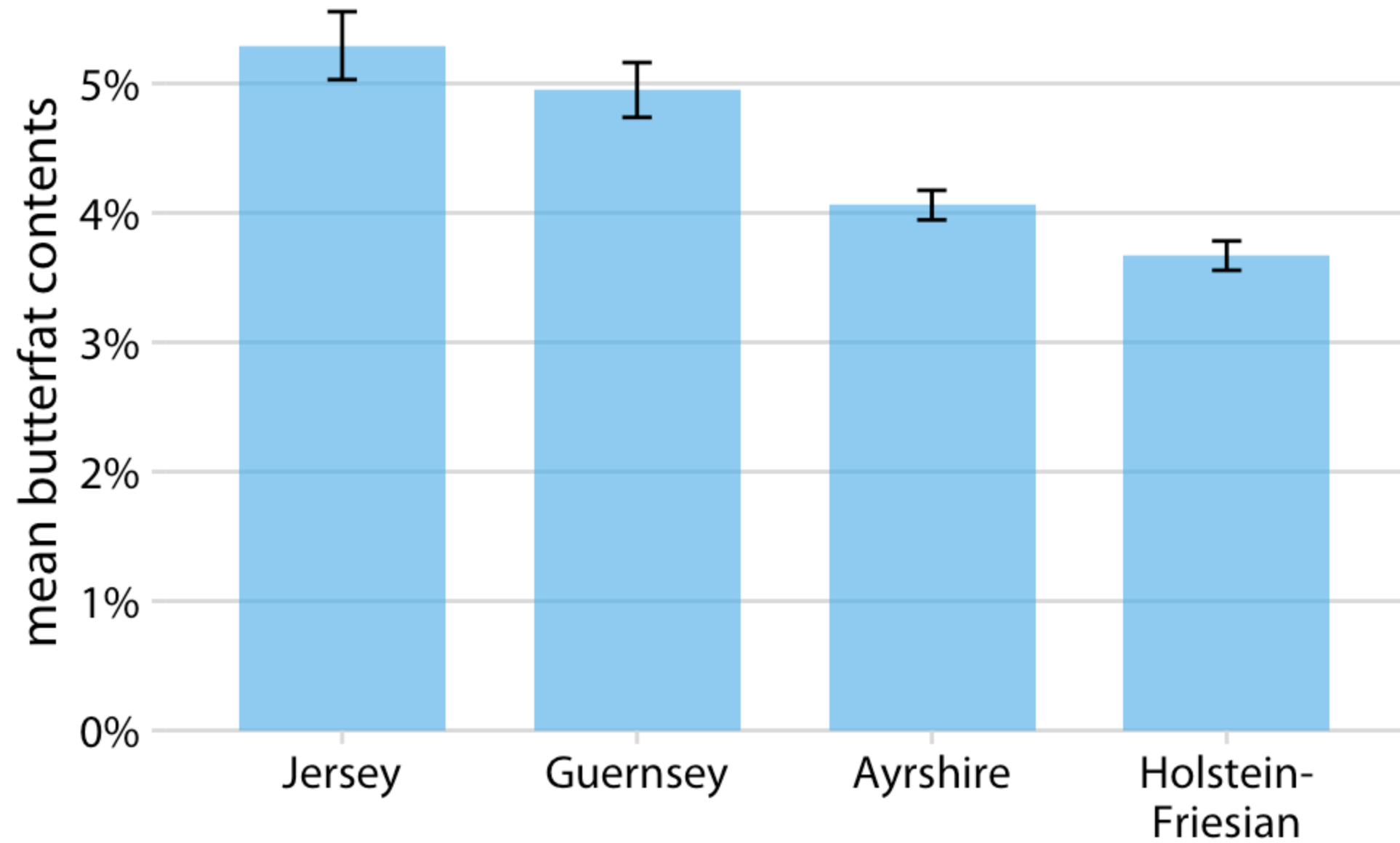
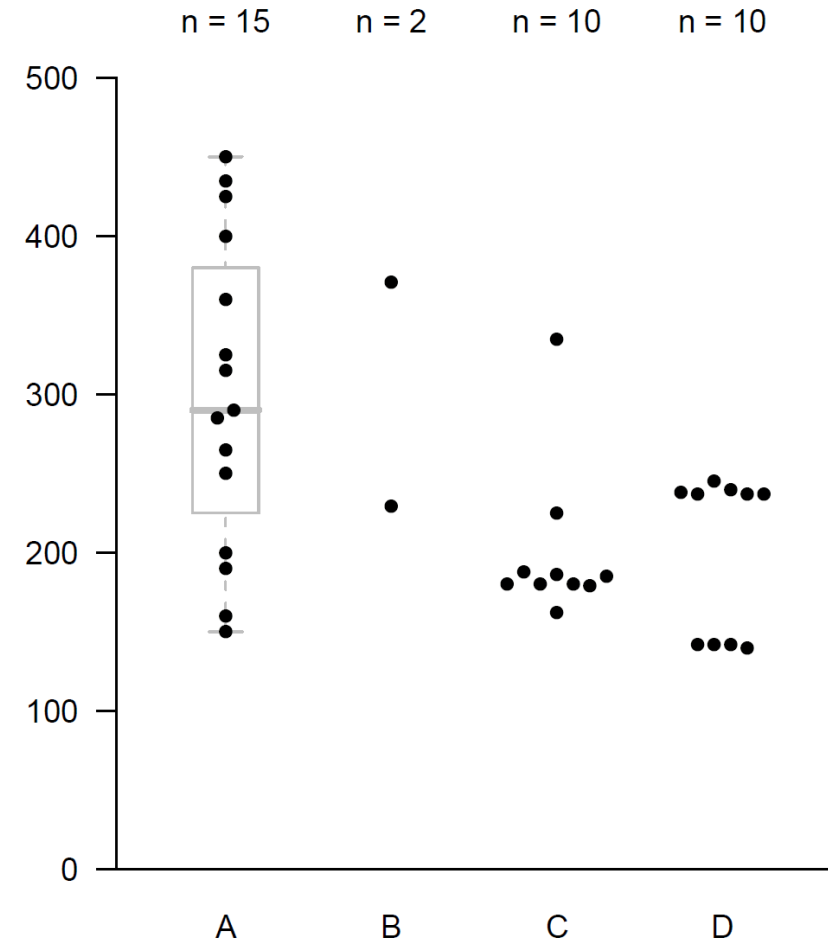
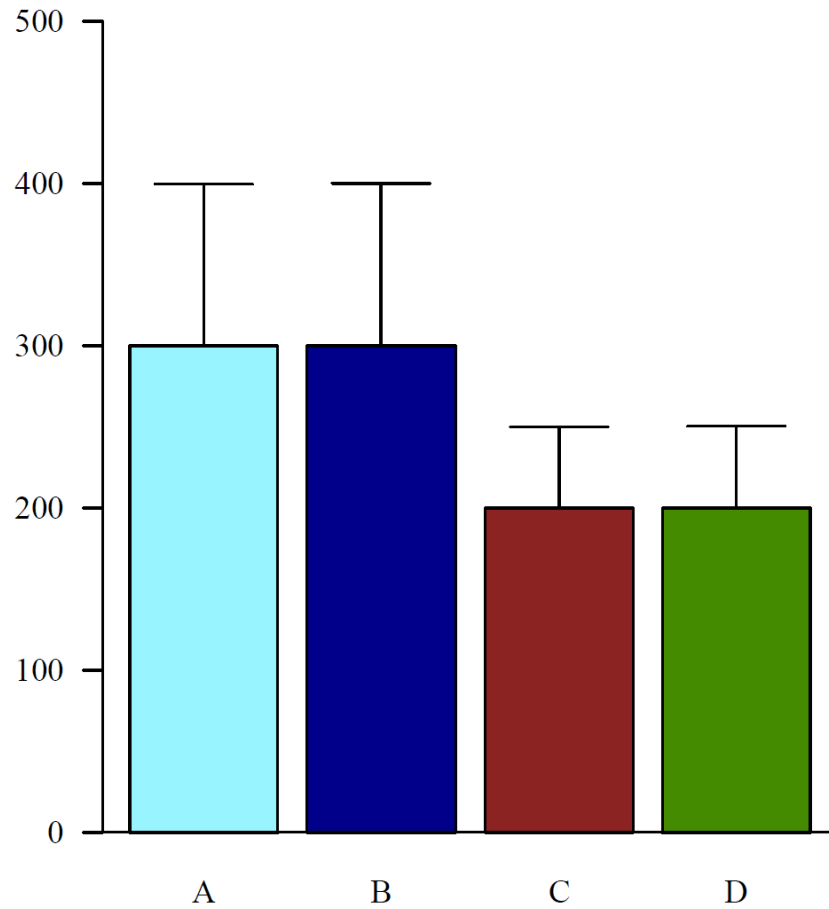


Figure 5.19: TL intensity of $\text{CaAl}_2\text{O}_4:\text{Eu,Nd}$ for various excitation temperatures, T_{exc} , as indicated. Samples were excited at T_{exc} by 365 nm light for 60 s. The TL measurement started 5 s after the excitation at a heating rate of 5 K/s.

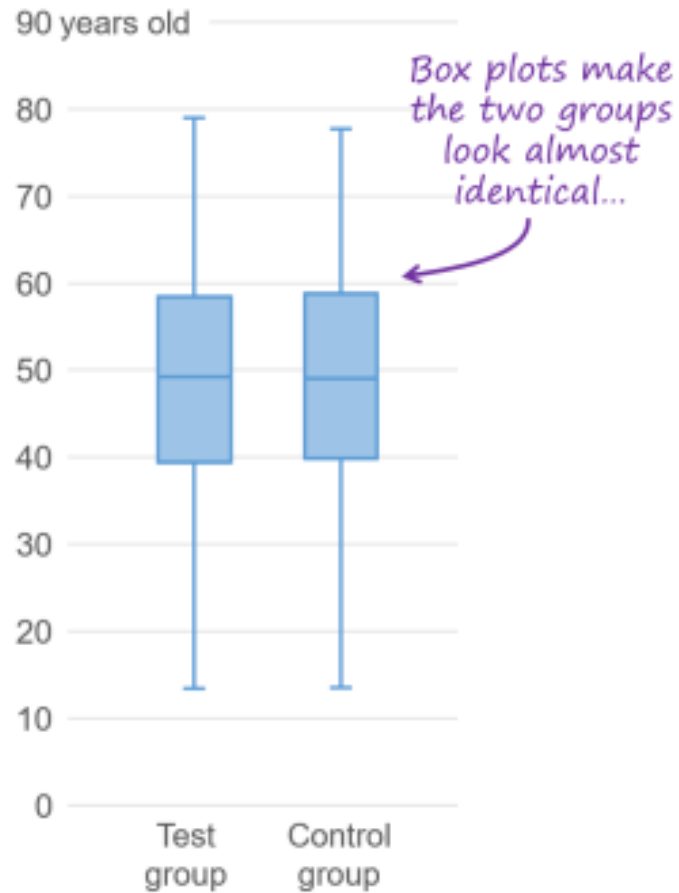
Visualizing uncertainty



"dynamite" plot

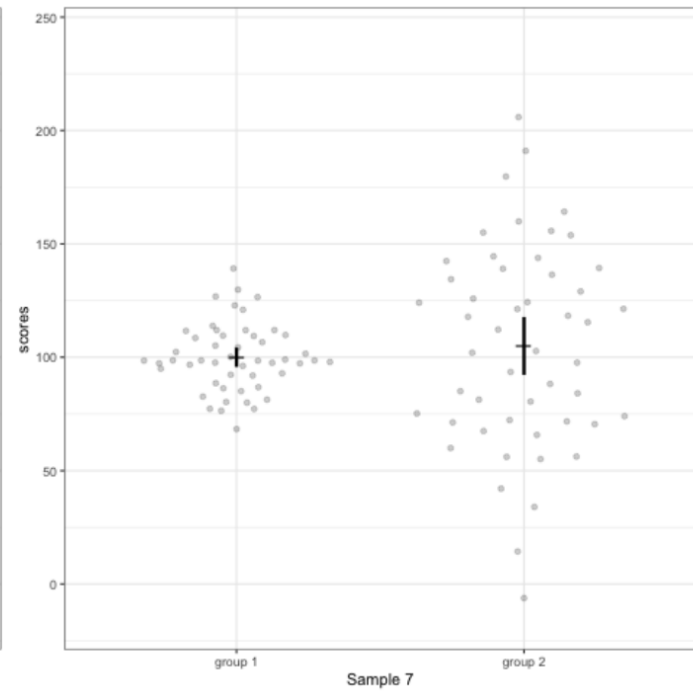
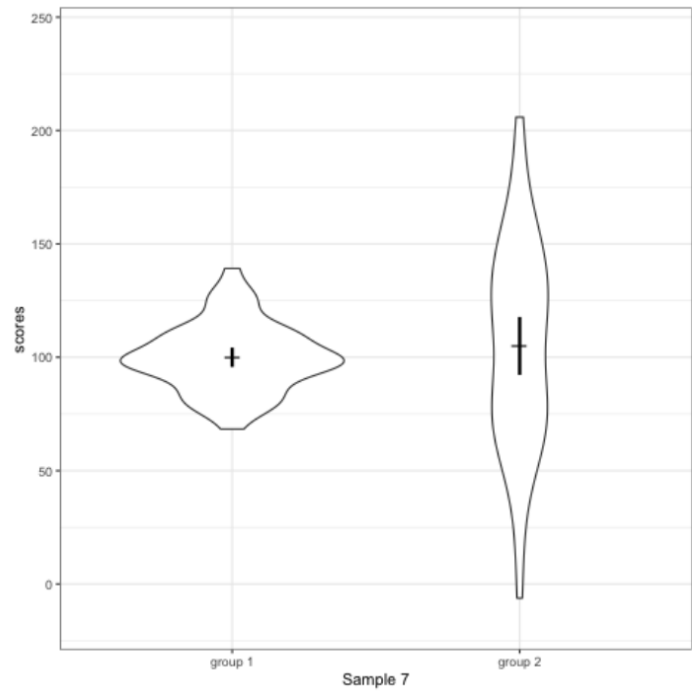
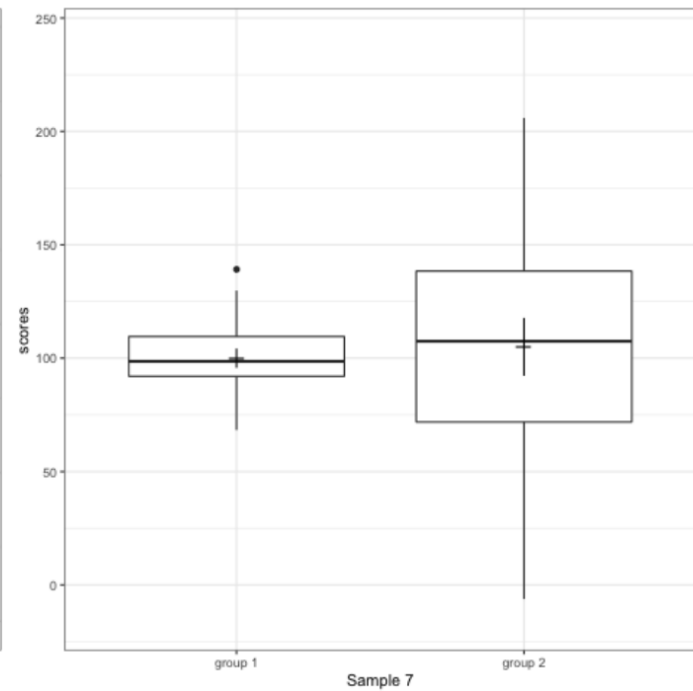
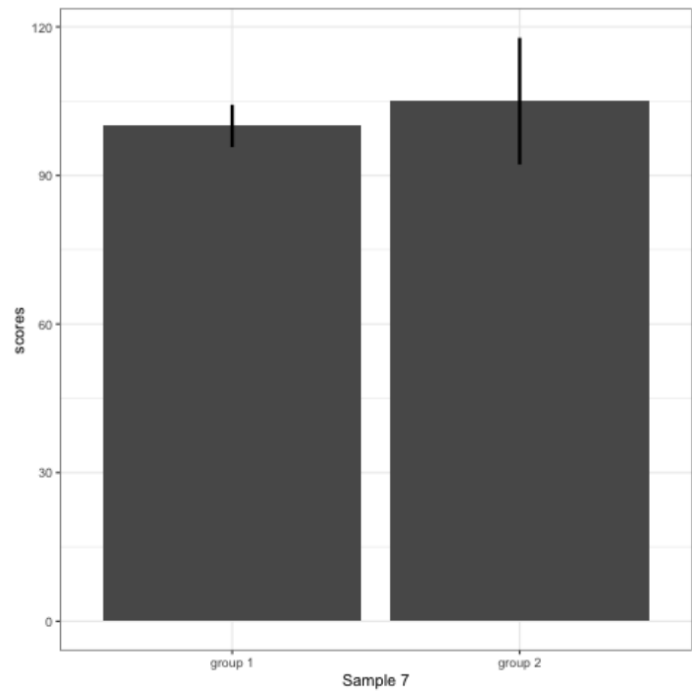


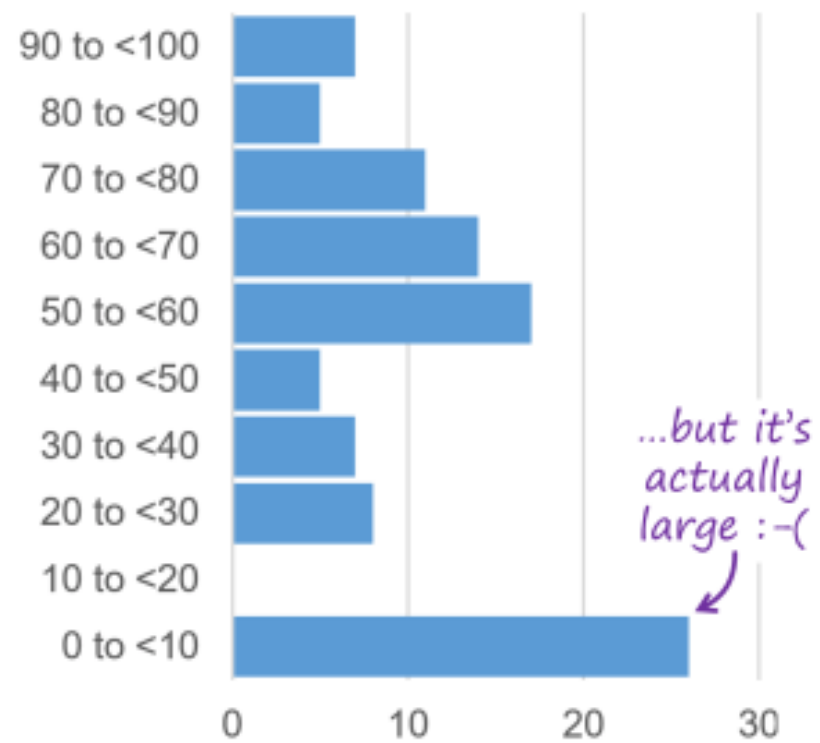
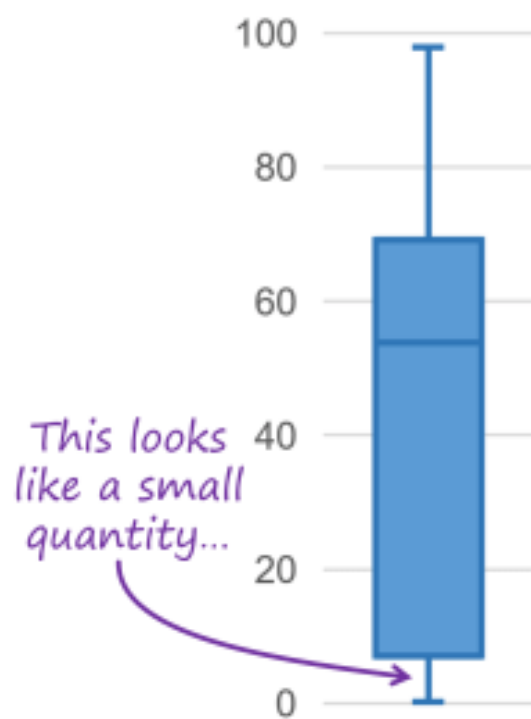
Study Participants by Age

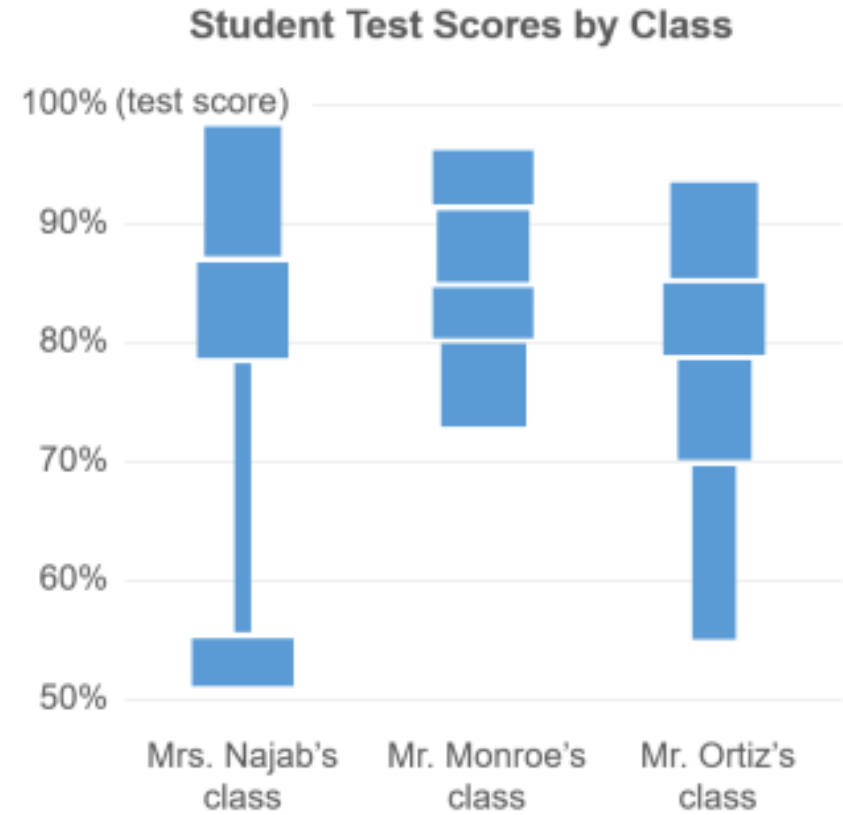
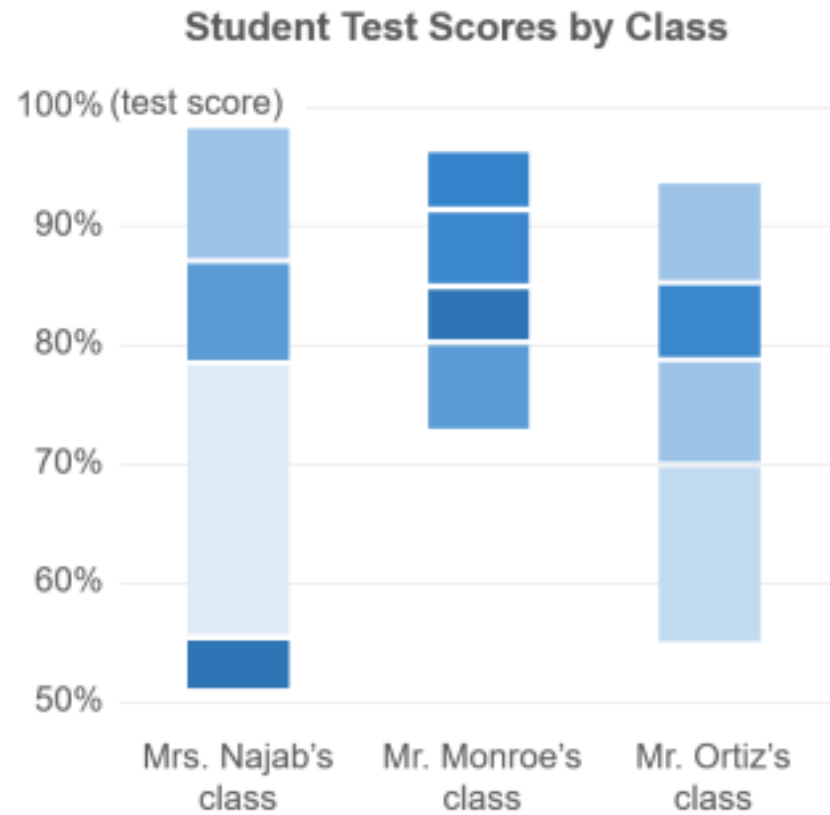


Study Participants by Age

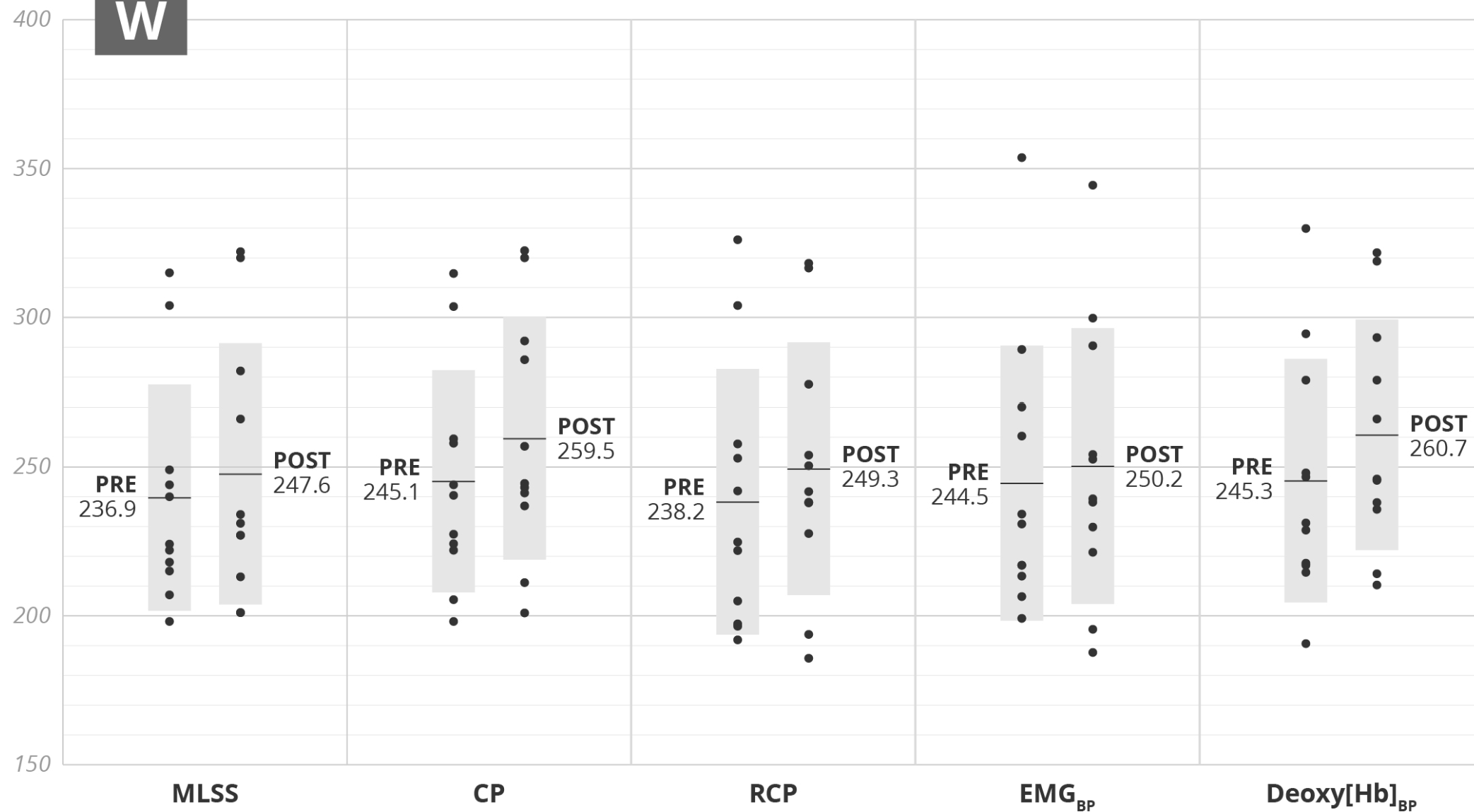








W



Stephen Curry

GOLDEN STATE WARRIORS
POINT GUARD
27 YEARS OLD



WEIGHTED AVERAGE OF
PAST THREE SEASONS

● BAD ○ AVG. ● GOOD

PERCENTILE

50TH

VITALS

Height	6' 3"
Weight	185
Draft position	7

●	○	○	○
●	○	○	○
○	○	○	●

SCORING

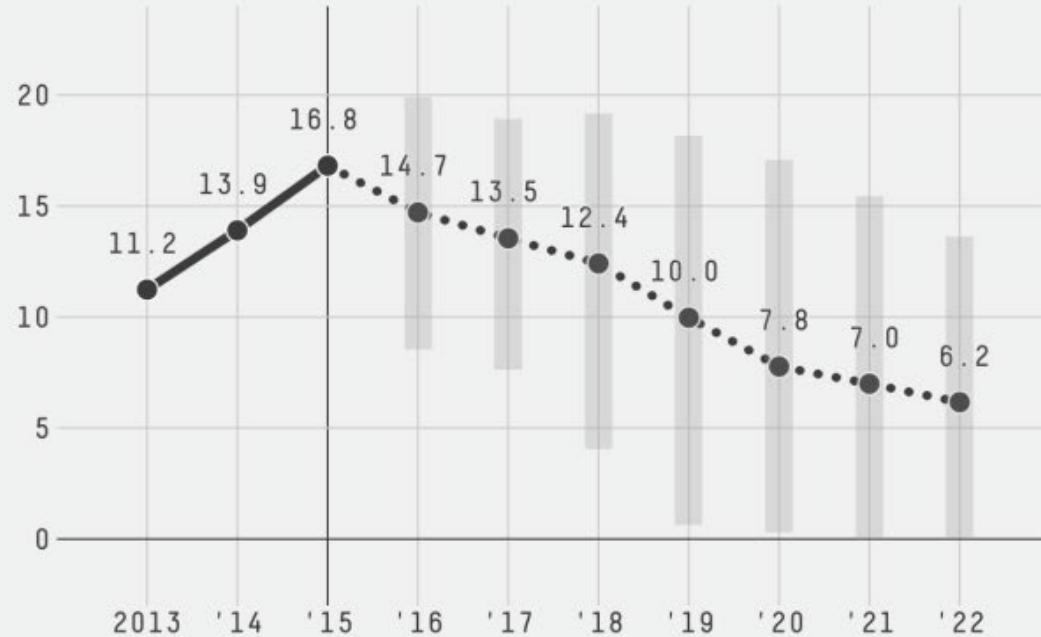
True shooting %	62%
Free throw %	90%
Usage %	28%

○	○	○	●
○	○	○	●
○	○	○	●

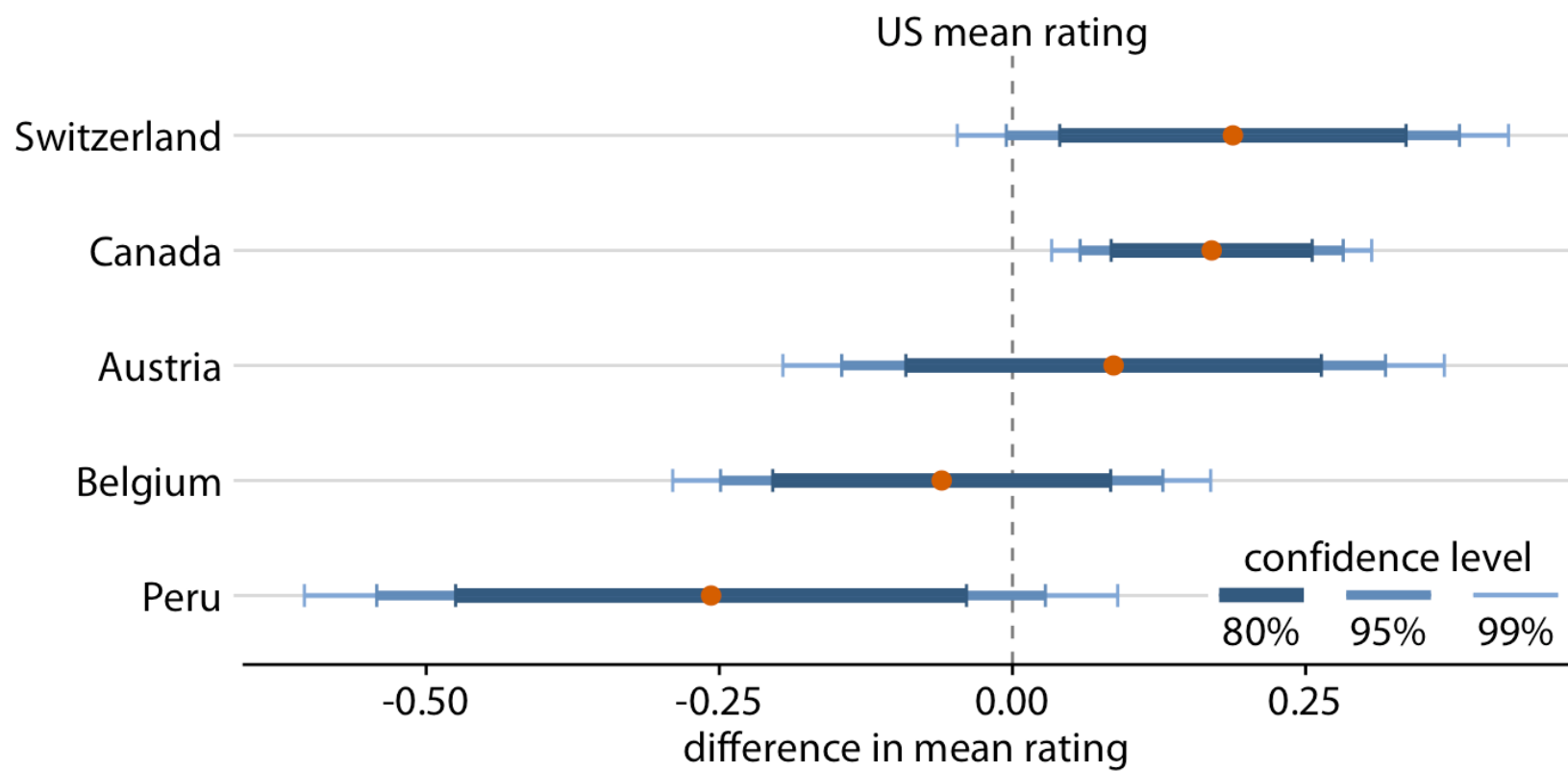
WINS ABOVE REPLACEMENT PROJECTION

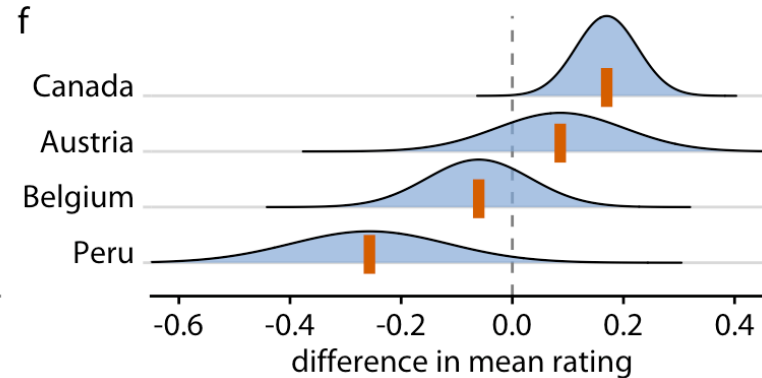
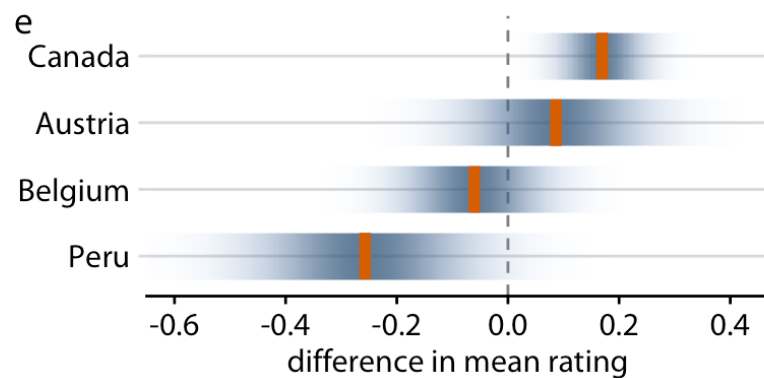
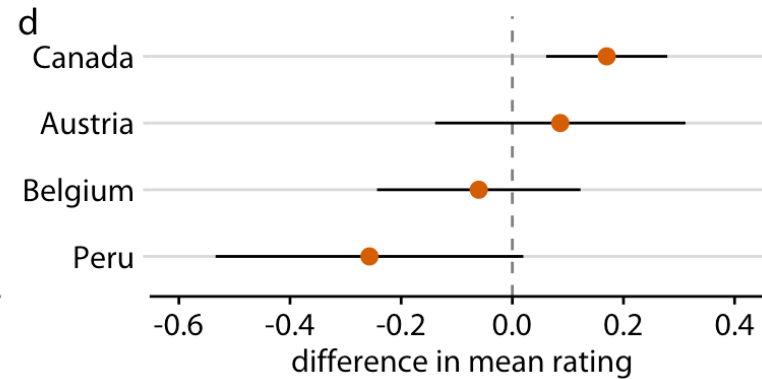
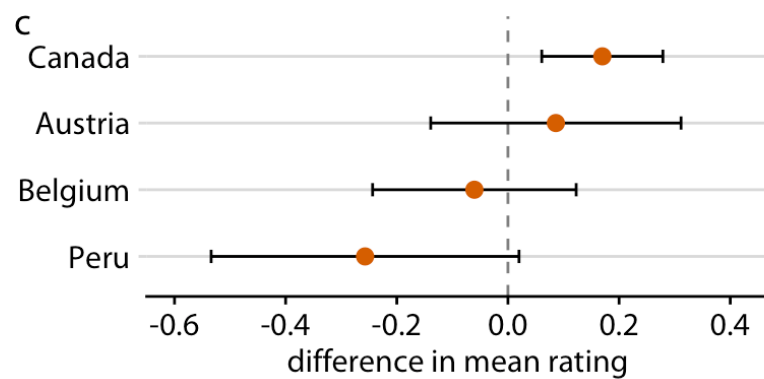
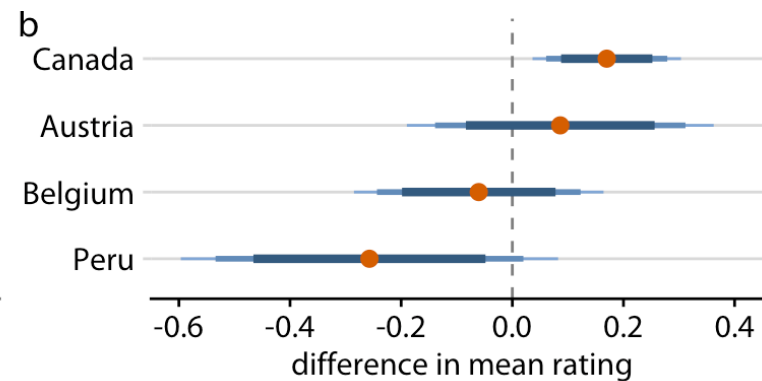
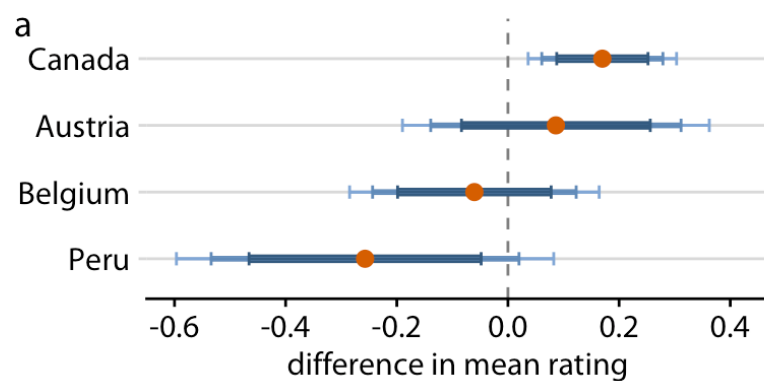
CATEGORY: MVP CANDIDATE

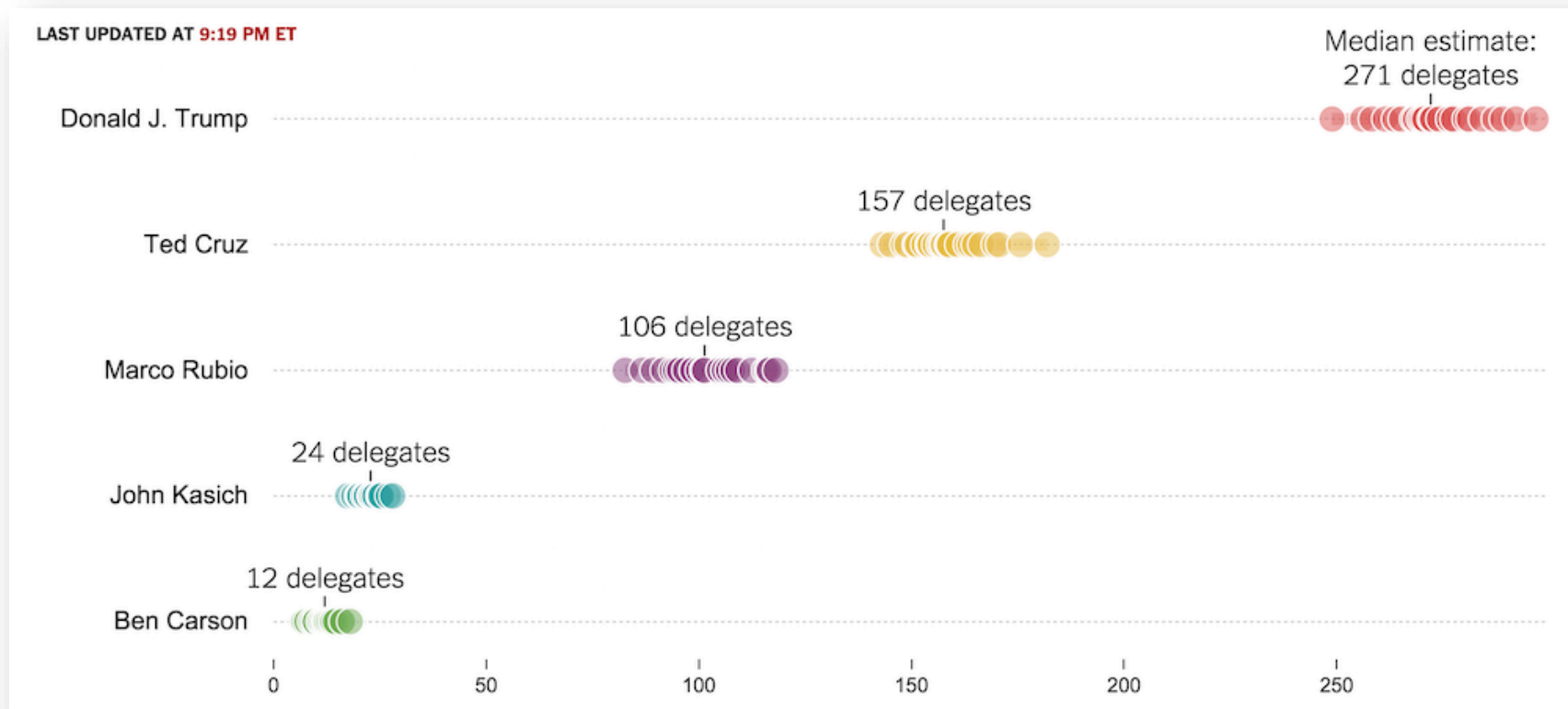
90TH—
10TH—
CONFIDENCE INTERVAL
..... PROJECTION



PERFORMANCE OF THE 10 MOST COMPARABLE PLAYERS



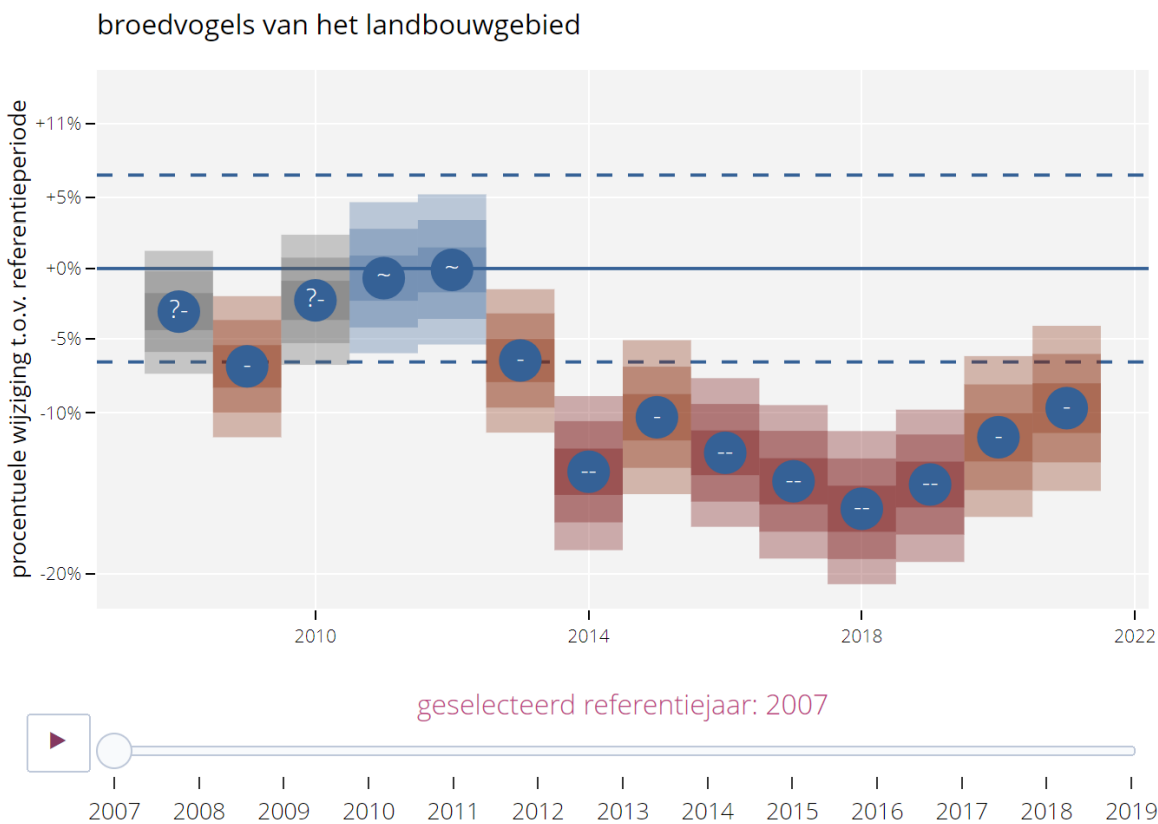




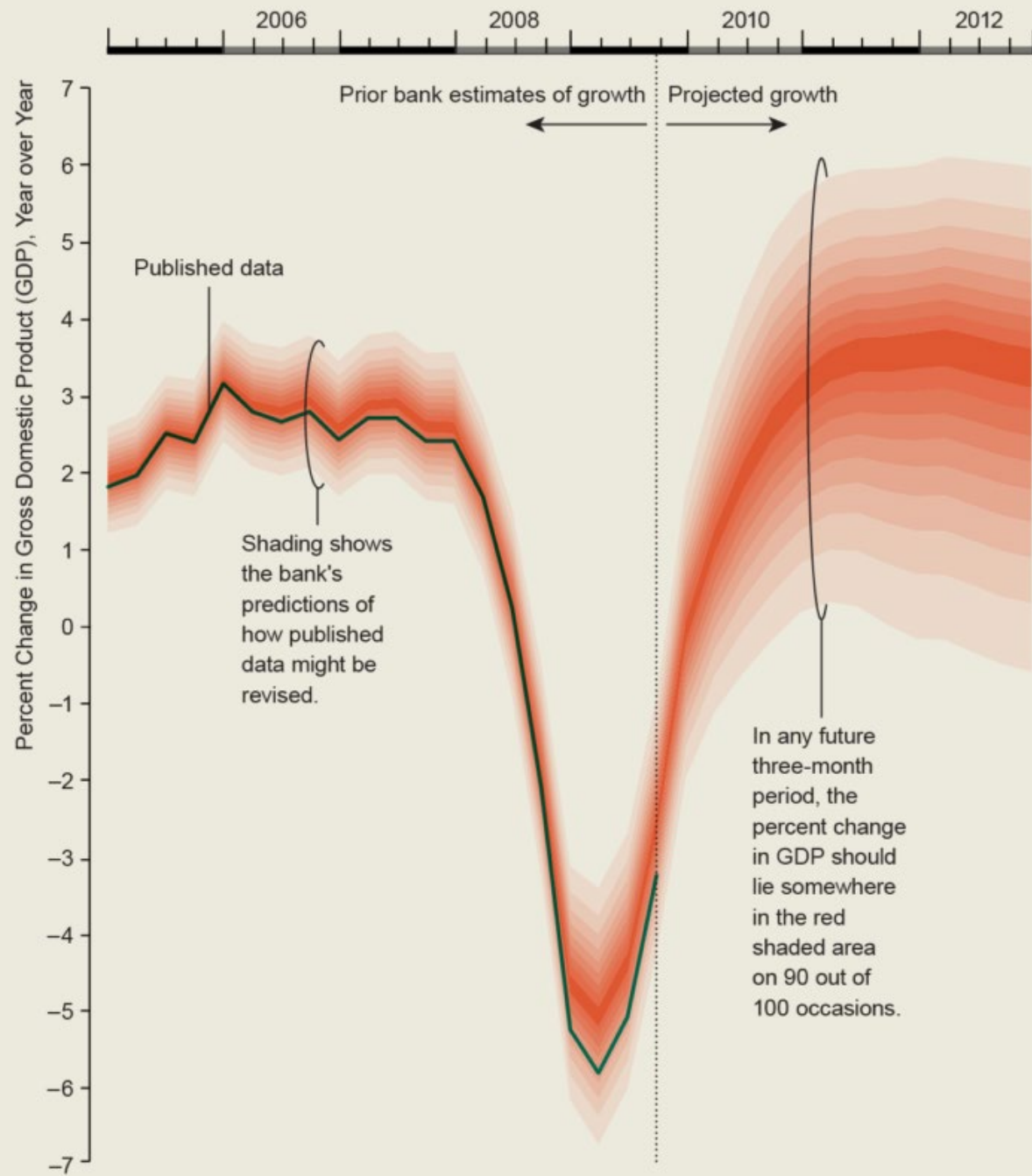
Akkervogels volgens de Algemene Broedvogelmonitoring Vlaanderen

Publicatiedatum: 2022-03-24T10:00:00+01:00

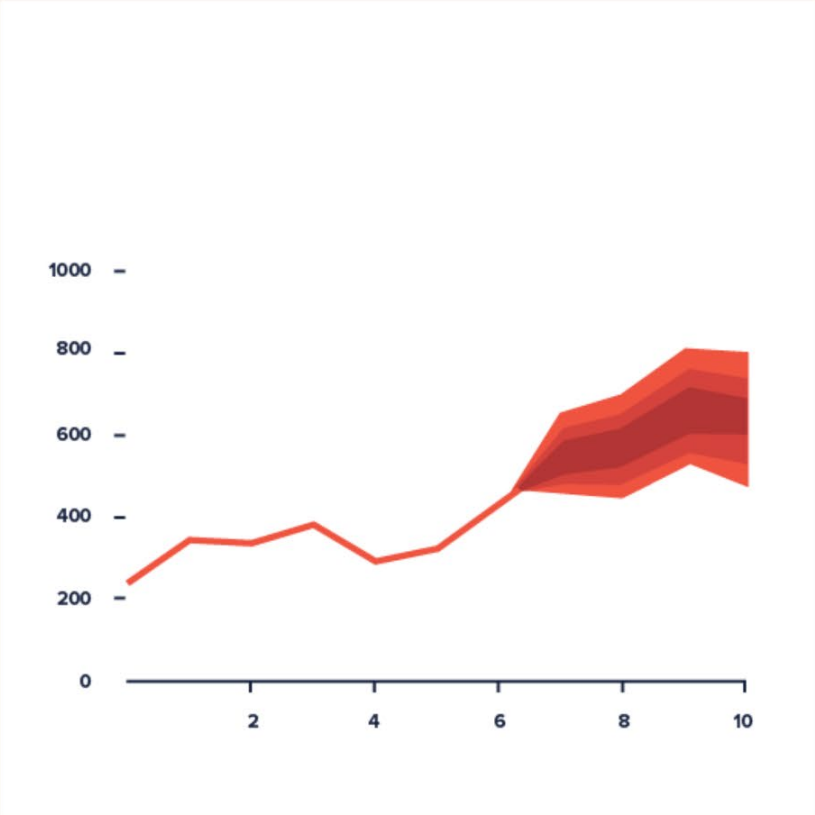
De soorten van het landbouwgebied schommelden in de periode 2007-2012. Na een sterke daling in de periode 2013-2018, lijken de aantallen sinds 2019 heel langzaam wat te herstellen, maar ze bevinden zich nog ruim onder die van de start van het ABV-project in 2007.



Gebruikte drempelwaarden classificatie: referentie = 0%, ondergrens = -6.6% en bovengrens = +7.0%.



Fan Chart (Time Series)



Also called: fan graph

A *fan chart* is a chart that joins a line graph for observed past data, and a range area chart for future predictions.

Predictions are shown as ranges for possible values of future data together with a line showing a central estimate or most likely value for the future outcomes. As predictions become increasingly uncertain the further into the future one goes, these forecast ranges spread out, creating distinctive wedge or “fan” shapes, hence the term. Alternative forms of the chart can also include uncertainty for past data, such as preliminary data that is subject to revision.

[Read more about fan charts here](#)

FAMILY

Plot

FUNCTION

Trend over time

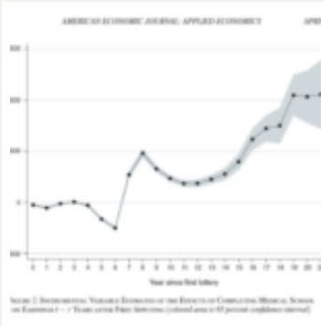
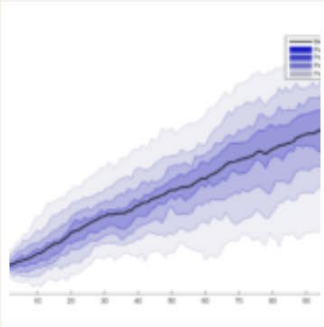
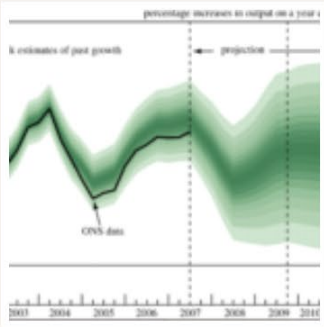
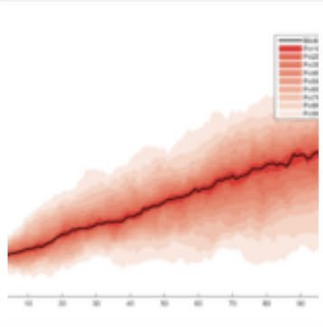
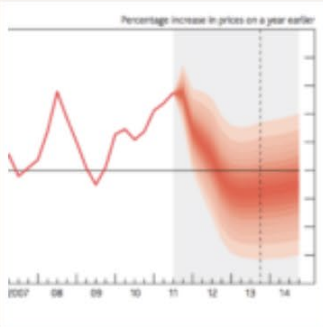
SHAPE



INPUT

X	Y ₁	Y ₂	>
1	30	28	
2	34	22	
3	38	26	
v			

EXAMPLES





Thank you!

All the slides and all the links:

<https://baryon.be/dataviz-resources>

Koen Van den Eeckhout – koen@baryon.be - @koen_vde