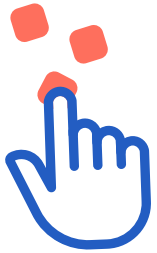
Turning research data into powerful visuals

Graphical representation of data

Koen Van den Eeckhout - Baryon



All the slides and all the links:

baryon.be/dataviz-resources

Session 1 — **Graphical representation of data**

homework assignment part 1

Session 2 — **Producing and designing data visuals**

homework assignment part 2

Session 3 — **Visualizing scientific research**

Introduction

The importance of data visualization

Historic data visuals

What is a good data visualization?

15’ break

Communication principles

Identifying your message

Adapting to the audience

Signal-to-noise ratio

Introductions

2004 - 09
Engineering physics (Ghent University)

2009 - 13
PhD in physics (Ghent University)

2013 - 18
Post-doctoral researcher (Ghent University)
Grants & incentives consultant (EY)
Founded **Baryon**

2019 - now
Expanding Baryon as an
information design agency

Koen Van den Eeckhout | koen@baryon.be

Introductions

What's your **name?**

What's your **research?**

Why are you here today?

X	Y
55.3846	97.1795
51.5385	95.0256
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
...	...

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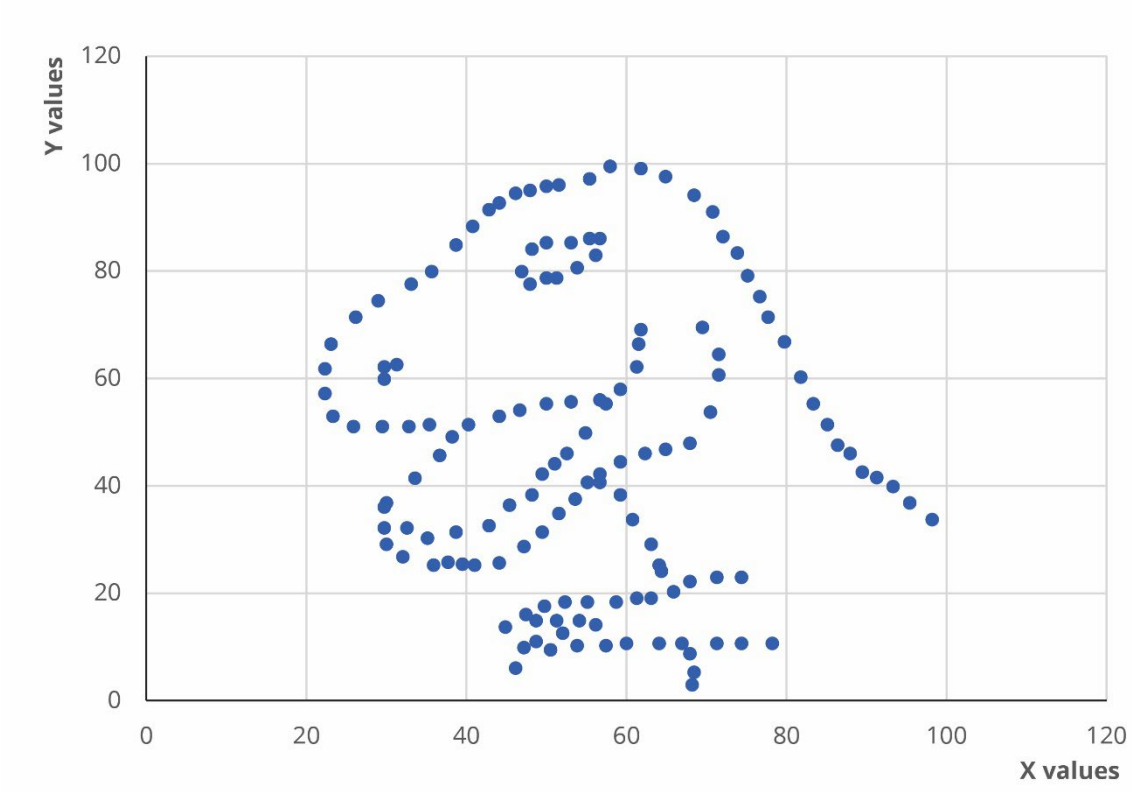
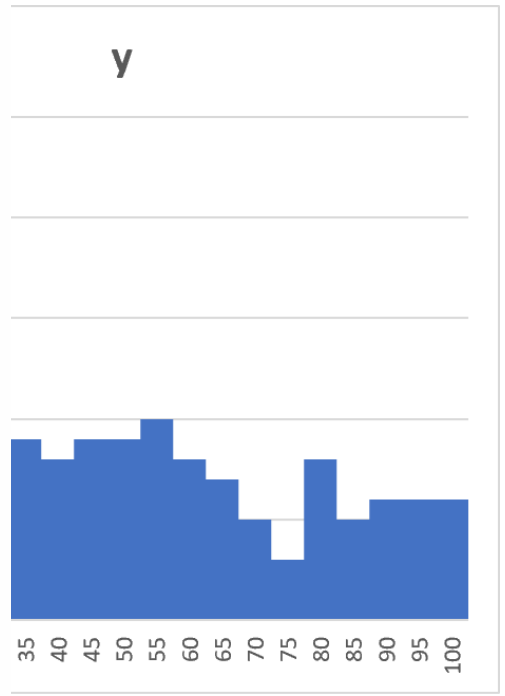
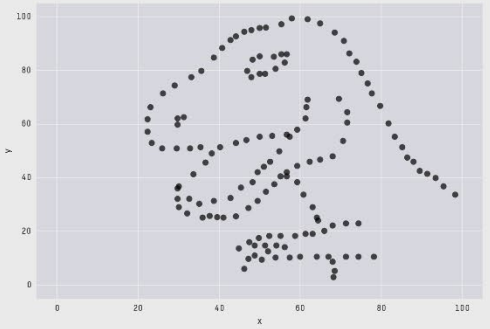




autodeskresearch.com/publications/samestats



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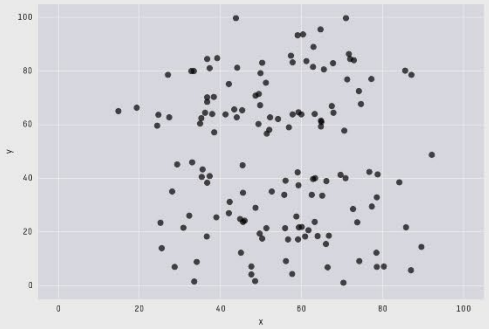
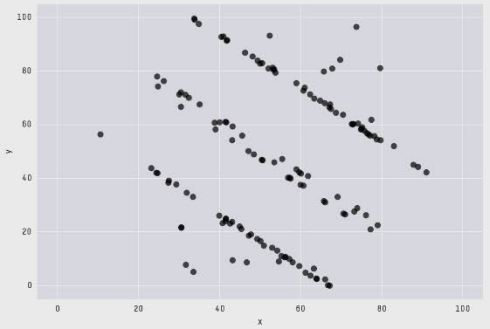
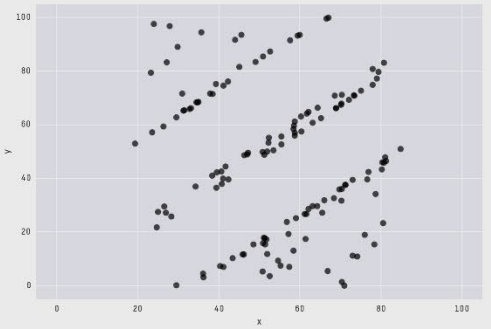
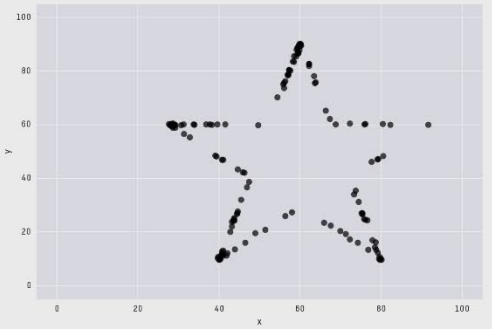
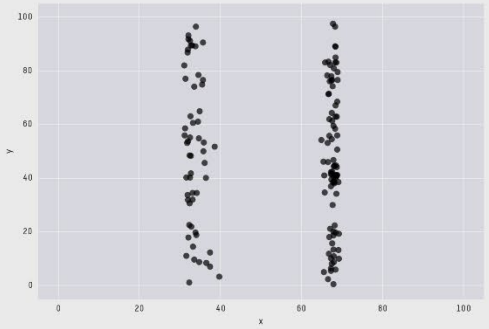
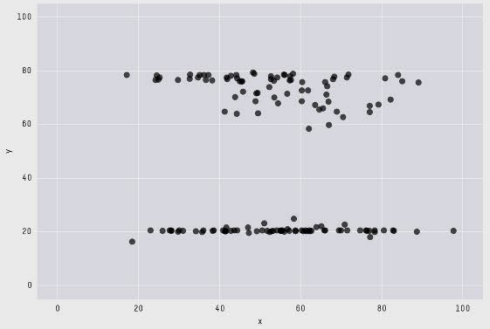
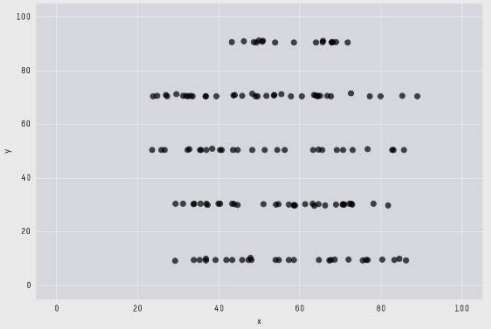
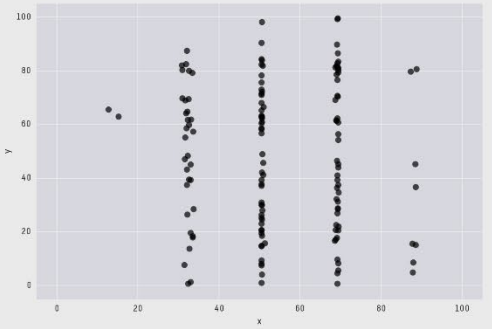
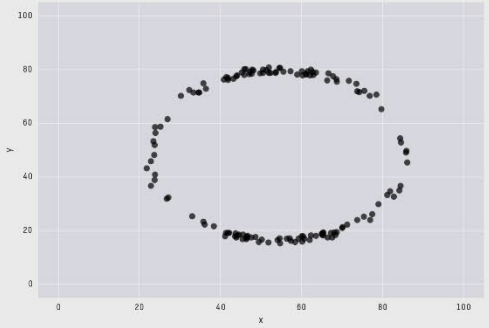
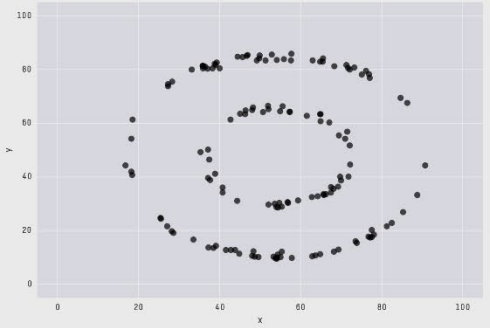
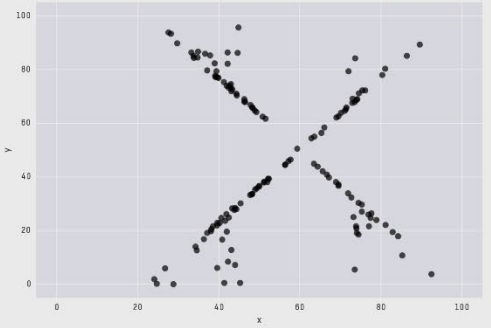
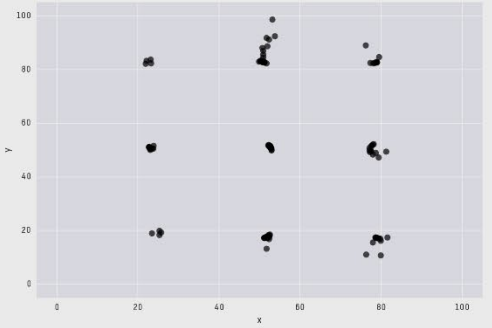

Why visual data communication?

INFORMATION DENSITY

better at summarizing large amounts of information

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ATTRACTIVE

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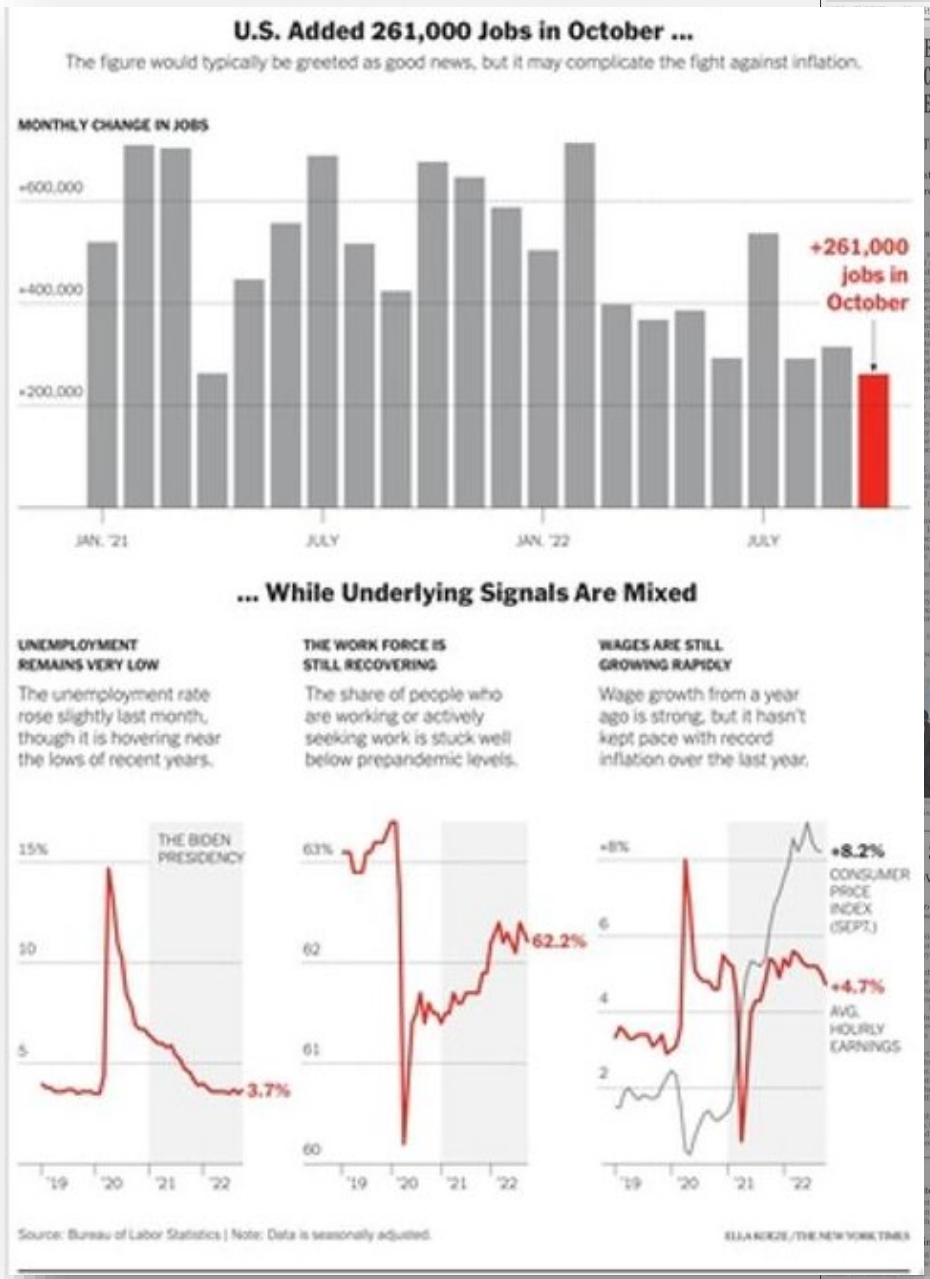


"All the News That's Fit to Print"

The New York Times

LATE EDITION

Today, patchy morning fog, then mostly sunny, warm, high 74. Tonight, clouds, breezy, mild. Low 63. Tomorrow, some rain, still warm, high 74. Weather map, Page A24.

9,598 © 2022 The New York Times Company NEW YORK, SATURDAY, NOVEMBER 5, 2022 $3.00

Musk's Layoffs Leave Twitter At Half Its Size

3,700 Lose Their Jobs in a Day of Chaos

This article is by ***Kate Conger, Ryan Mac*** *and* ***Mike Isaac.***

SAN FRANCISCO — When the ax came down at Twitter on Friday, it did not fall smoothly.

The first sign that some of the company's 7,500 employees had been laid off came when their email accounts were shut off late Thursday. Yet they received no official word about termination and some of their Slack accounts still worked. In Twitter's offices in Ireland and Britain, employees stayed up late waiting for the San Francisco headquarters to inform them of their job status. Some learned they were unemployed in the middle of their night.

The cuts were so haphazard that at one late-night meeting about the Twitter Blue subscription product, at least one worker was locked out of the company's systems during the call, according to three people with knowledge of the meeting and internal messages viewed by The New York Times.

Many employees vented on Twitter. Chris Younie, a member of the partnerships team based in London, discovered he had been laid off when he checked his corporate laptop and email account after midnight and could not access the internal systems.

"So grateful this is happening at 3am," Mr. Younie posted sarcastically on Twitter. "Really appreciate the thoughtfulness on the timing front guys."

By early Friday, the scale of the layoffs by Elon Musk, Twitter's new owner, was becoming clear: Roughly half of the company's work force, or about 3,700 jobs, had been eliminated, four people with knowledge of the matter said. The cuts hit across many divisions, including the engineering and machine learning teams, the trust and safety teams that manage content moderation, and the sales and advertising departments. Rarely have layoffs this deep been made by a single individual at a tech company.

The layoffs leave Twitter significantly changed just over a week after Mr. Musk closed his blockbuster $44 billion buyout of the company. The actions raise questions about how the world's richest man can effectively operate the social media service and carry

Continued on Page A11

ADVERTISER FLIGHT Elon Musk blamed pressure from activists for a drop in spending. PAGE B4

Job Data Stays Strong, Despite Inflation Curbs

U.S. Added 261,000 Jobs in October ...
The figure would typically be greeted as good news, but it may complicate the fight against inflation.
MONTHLY CHANGE IN JOBS
+261,000 jobs in October
JAN. '21
JULY
JAN. '22
JULY
... While Underlying Signals Are Mixed
UNEMPLOYMENT REMAINS VERY LOW
The unemployment rate rose slightly last month, though it is hovering near the lows of recent years.
THE WORK FORCE IS STILL RECOVERING
The share of people who are working or actively seeking work is stuck well below prepandemic levels.
WAGES ARE STILL GROWING RAPIDLY
Wage growth from a year ago is strong, but it hasn't kept pace with record inflation over the last year.
THE BIDEN PRESIDENCY
3.7%
62.2%
+8.2% CONSUMER PRICE INDEX (SEPT.)
+4.7% AVG. HOURLY EARNINGS
Source: Bureau of Labor Statistics | Note: Data is seasonally adjusted.
ELLA KORZE/THE NEW YORK TIMES

Fed Fears Wages and Prices Are Being Pushed Up

By SYDNEY EMBER

With less than a week until Election Day, a new economic report showed the strength of the job market despite policymakers' efforts to constrain it in their fight against inflation.

The employment figures immediately made their way into both parties' closing pitches to voters, with President Biden proclaiming that "our jobs recovery remains strong" even as Republicans said that the numbers were disappointing.

But the story is far more complex than any political statement would make it seem.

In normal times, the report from the Labor Department — which showed 261,000 jobs added in October, a low unemployment rate and rising wages — would be hailed as evidence of economic strength. Yet at a time when prices are climbing at their fastest rate in generations, robust gains last month might have been too much of a good thing. The Federal Reserve is worried that a hot job market is forcing employers to raise wages, which is leading to higher prices and more inflation.

The employment figures show that job growth is cooling, just very gradually, suggesting that a recession is not imminent. The gains were the weakest of the year and the lowest since December 2020.

"Today's report shows that the job market is losing altitude," said Daniel Zhao, an economist at the career site Glassdoor, "but isn't in danger of slamming into the ground yet."

The unemployment rate ticked up to 3.7 percent, from 3.5 percent in September. That rate is based on a different survey than the one that provides the hiring numbers, and the two reports sometimes diverge in ways that are hard for analysts to explain.

The Fed has been eager to see evidence that the labor market is softening and wage growth is moderating because that would help bring down inflation. Neither measure in Friday's report offered central bankers much comfort.

Although wage growth has subsided slightly compared with the trend a year ago, pay is rising at a level that the Fed and outside economists have said is inconsistent with its long-term inflation goals. Between September and October, wages climbed 0.4 percent, more than the increase the month before and the fastest monthly increase since July.

The share of adults participat-

Continued on Page A11

Wisconsin G.O.P. Could Clinch Veto-Proof Hold

By REID J. EPSTEIN

FRANKS FIELD, Wis. — The three counties in Wisconsin's far northwest corner make up one of the last patches of rural America that have remained loyal to Democrats through the Obama and Trump years.

But after voting Democratic in every presidential election since 1976, and consistently sending the party's candidates to the State Legislature for even longer, the area could now defect to the Republican Party. The ramifications would ripple far beyond the shores of Lake Superior.

If Wisconsin Democrats lose several low-budget state legislative contests here on Tuesday — which appears increasingly likely because of new and even more gerrymandered political maps — it may not matter who wins the $114 million two-way contest for governor between Gov. Tony Evers, a Democrat, and Tim Michels, a Republican. Those northern seats would put Republicans in reach of veto-proof supermajorities that would render a Democratic governor functionally irrelevant.

Even though Wisconsin remains a 50-50 state in statewide elections, Democrats would be on the verge of obsolescence.

"The erosion of our democratic institutions that Republicans are looking to take down should be

Continued on Page A14

DIVISIVE LIES Secretaries of state face partisan pressure. PAGE A15

AT RISK Moderate House Democrats try to buck trends. PAGE A15

AFRAID TO VOTE "2,000 Mules" left a scar on San Luis, Ariz. PAGE A17

Subway Crimes w Riders' Low Risk

Randomness of Attacks Is Heightening Fears

midterm election, safety on the state-run subway has emerged as a key issue in the unexpectedly tight race for governor.

While the chance of falling victim to violent crime on the subway remains low, according to a Times analysis, the topic provides fodder for television advertisements and campaign debates.

But the people who spend the most time in and around the system — M.T.A. workers, vendors, shopkeepers, buskers — may be uniquely qualified to assess the subway's problems and promise. In interviews over the past week, more than two dozen spoke to The New York Times, offering a nuanced portrait of a system that is both a bellwether and an engine

Continued on Page A21

'Soccer Moms' No More, Suburban Women Hold Key to Midterms

This article is by ***Dunn Goldstein, Robert Gebeloff, Allison McCann*** *and* ***Brent McDonald.***

The "soccer mom" was born a cliché.

Americans were introduced to her during the 1996 presidential race, when she was heralded by campaign consultants and the media as the new center of the American electorate — a white, married, minivan-steering, cleats-toting, home-owning swing voter, exhausted by culture wars and seeking optimistic, common-sense politics.

That year, so-called soccer moms broke for the Democratic incumbent, President Bill Clinton, over his Republican challenger, Bob Dole, a senator from Kansas. Mr. Clinton appealed to suburban women by signing a tough crime bill and promising to put reading tutors in schools.

A quarter century later, female suburban voters remain a key swing constituency and, amid the coronavirus pandemic, crime and education are again crucial concerns. But recent polls have shown that unlike in 1996, independent female voters are tilting toward Republicans.

Who are these influential voters? Does the "soccer mom" still exist? Did she ever?

Statistically, "soccer moms" were hardly a majority, even in the 1980s. Back then, nearly half of women living in the suburbs were unmarried, and traditional households — occupied by a married couple raising children — made up less than a third of the suburban landscape, according to a New York Times analysis of census data.

Today, even fewer suburban women are married and traditional households make up even less of a share of the typical suburban block. The white share of the suburban population has plummeted to 61 percent, from 84 per-

Continued on Page A12



From left: Olivia Kelly, Litzy Hernandez Cota and Celeste Giordano, who all live in swing states.


Why visual data communication?

ATTRACTIVE

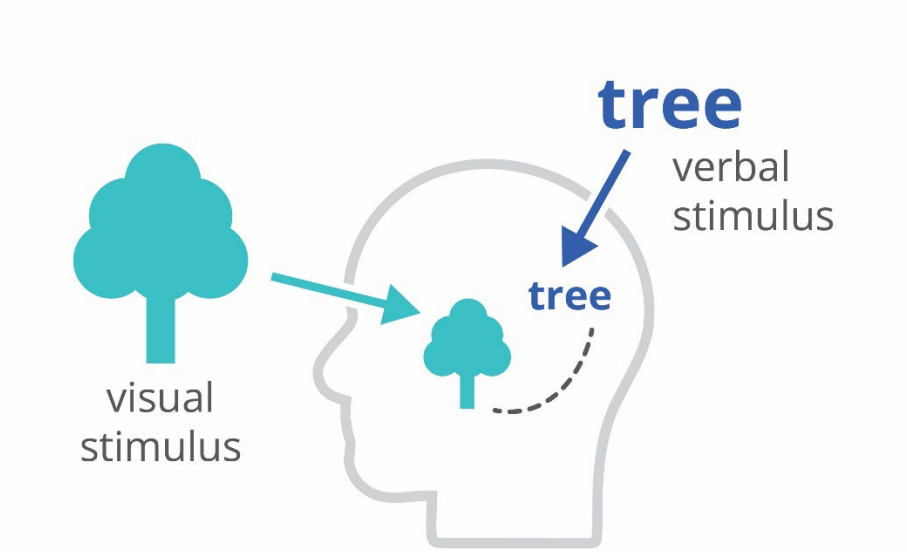
better at catching the reader's attention

INFORMATION DENSITY

better at summarizing large amounts of information

EASIER TO UNDERSTAND

thanks to dual coding and better knowledge retention

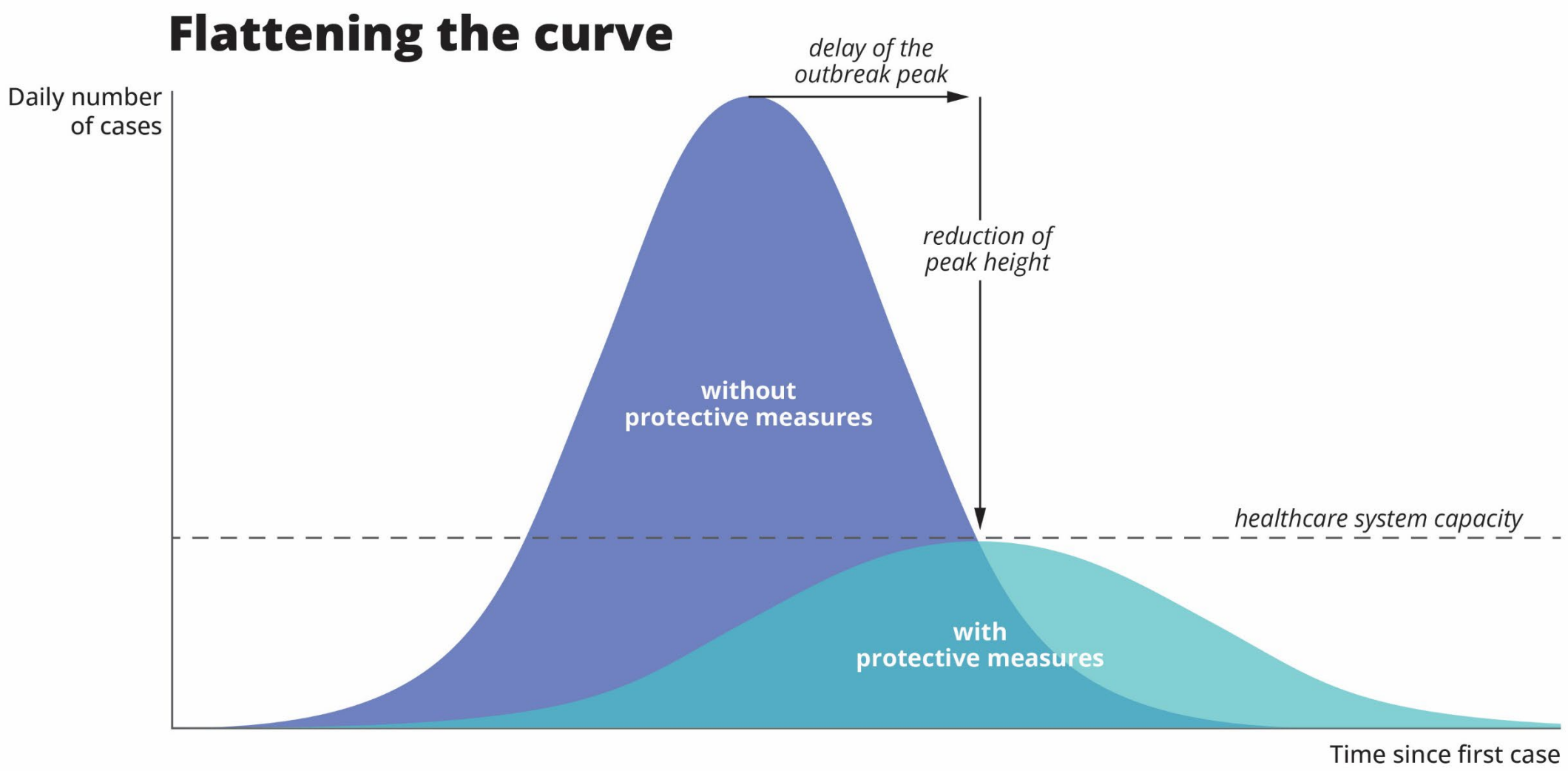


Dual-coding theory

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

Sketchnoting

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


Flattening the curve
delay of the outbreak peak
Daily number of cases
reduction of peak height
without protective measures
healthcare system capacity
with protective measures
Time since first case

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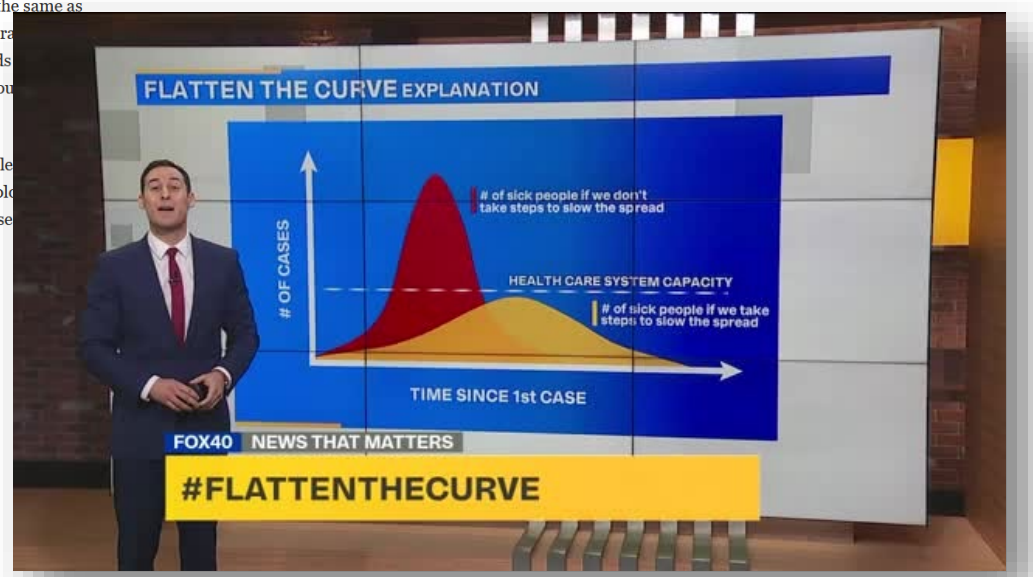
How should I protect myself?

There are some basic precautions you can take, which are the same as what you should be doing every day to stave off other respira 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 le seconds after using the bathroom, before eating and after blo nose or sneezing. It also advises not to touch your eyes, nose and to clean objects and surfaces you touch often.

Read more about preparing for coronavirus here.

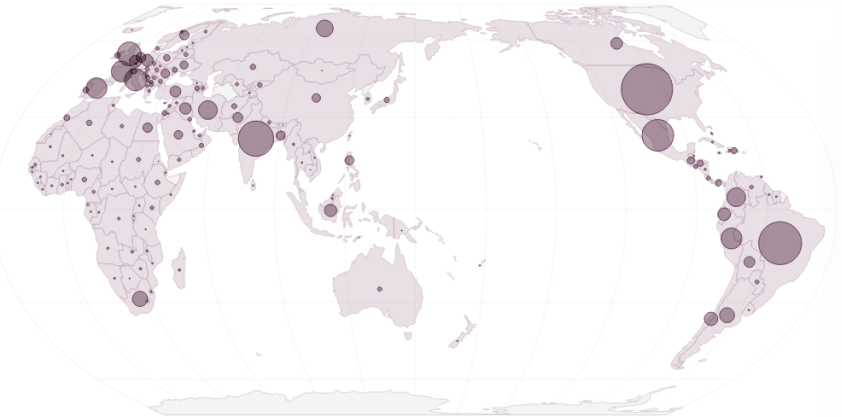
Return to top



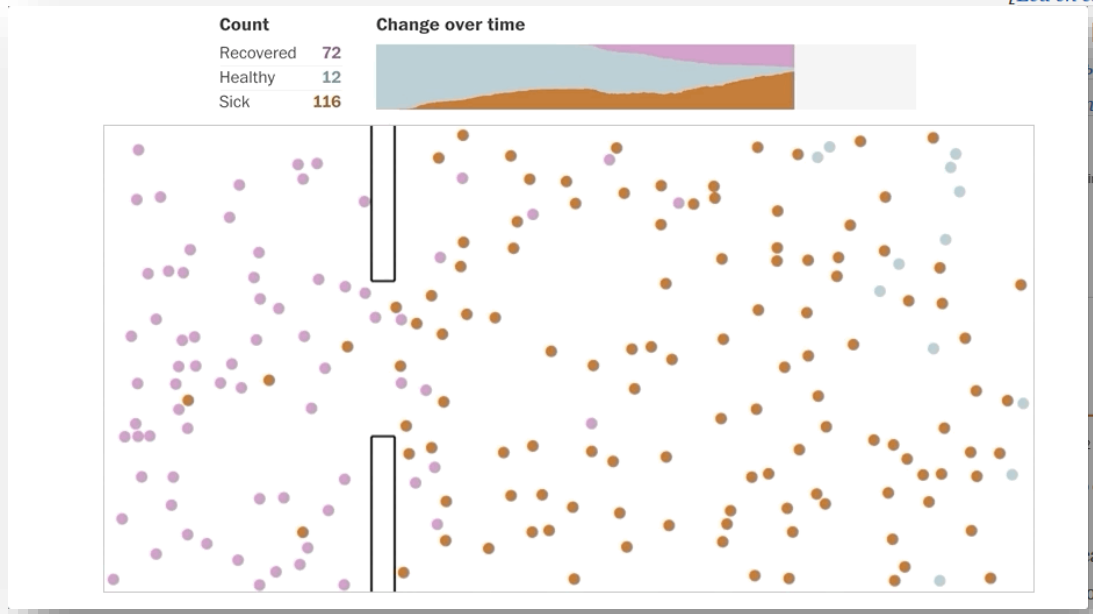
Where has it spread in the world?

Reported deaths	Reported cases
997,000	33,087,000

Deaths | Cases | Adjusted for population | Raw numbers



Country	Reported cases ▼	Change from Sept. 21 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



Health

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

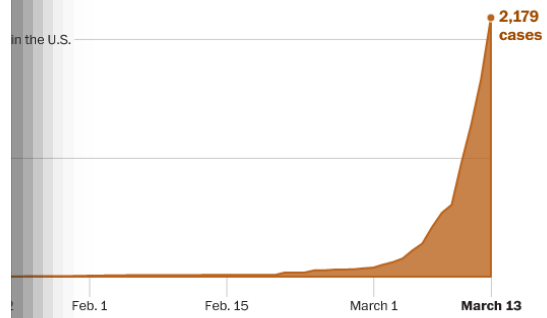
By Harry Stevens March 14, 2020

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* | *日本語で読む* | *به فارسی بخوانید* | *Leia em português* | *no русски* | *Lesen Sie auf Deutsch* | *Lees in het* *nds* | *Prečítajte si po Slovensky* | *বাংলায় পড়ুন* | *हिंदी में पढ़ें*]



explore the number of cases over time.

alled **exponential curve** has experts worried. If the 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

2

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

ns of explaining com
or readers," said Mar
raphics editors and d
s, strengthening our
that is driven by ra

The Economist
@TheEconomist

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

DE TIJD

NIEUWS > DOSSIERS

Het jaar in datajournalistiek

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28 december 2020 12:02

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

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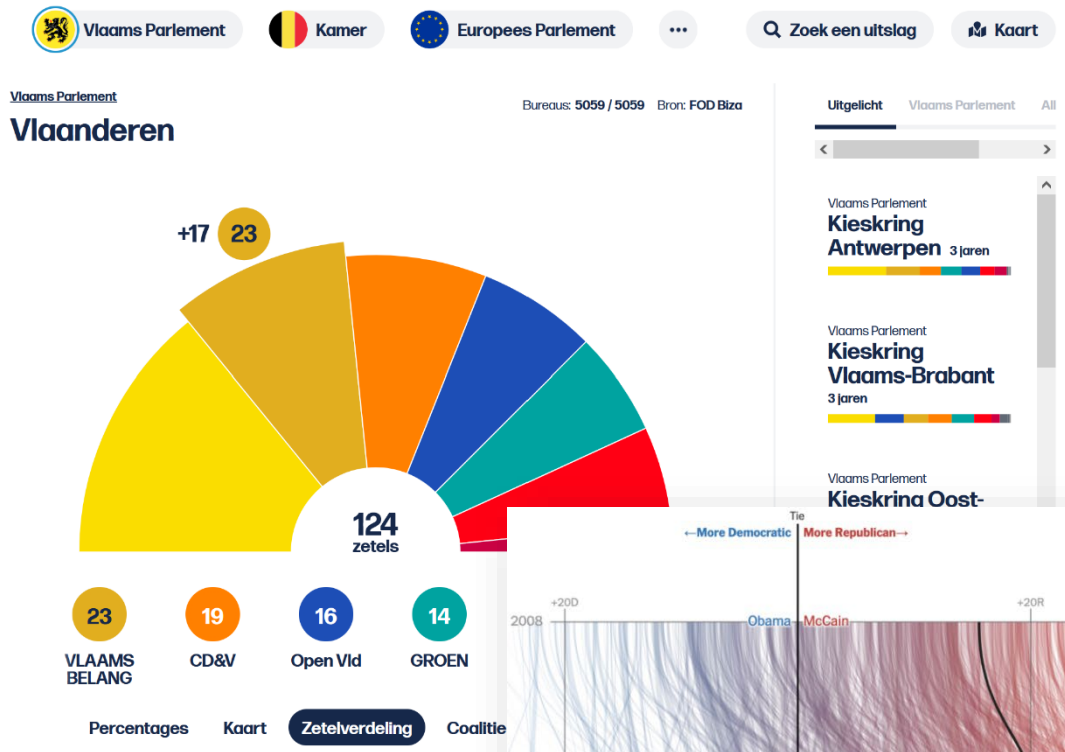
Data visualisation: A six-week visual storytelling programme

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)


Vlaams Parlement
Kamer
Europees Parlement
Zoek een uitslag
Kaart
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Vlaanderen
Bureaus: 5059 / 5059 Bron: FOD Biza
+17 23
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16
Open Vld
14
GROEN
Percentages
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Zetelverdeling
Coalitie
Uitgelicht
Vlaams Parlement
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Kieskring Vlaams-Brabant
3 jaren
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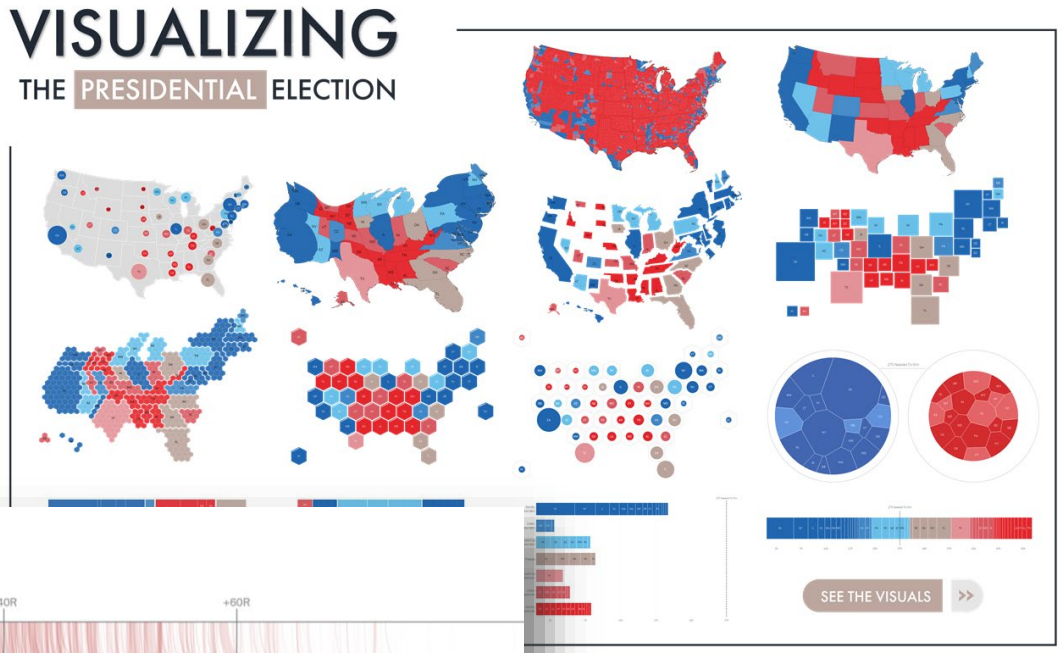
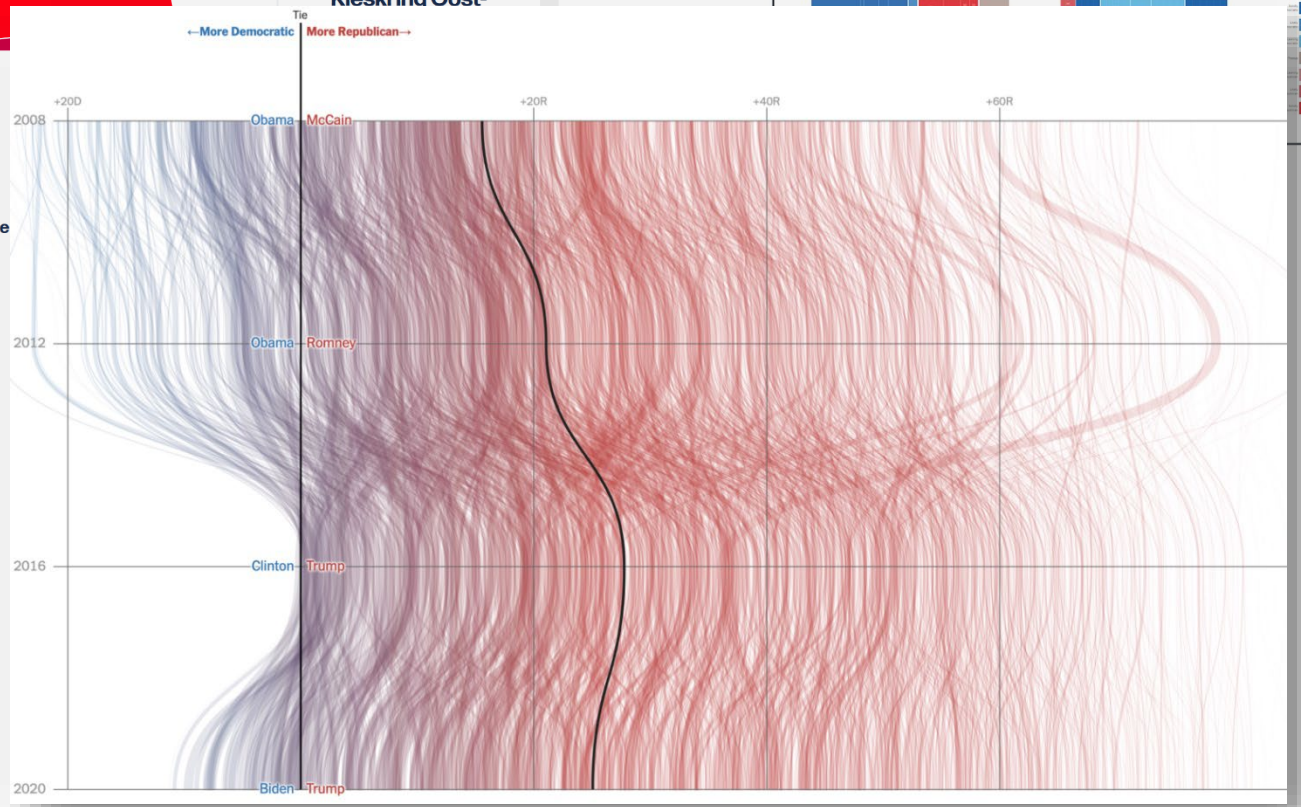
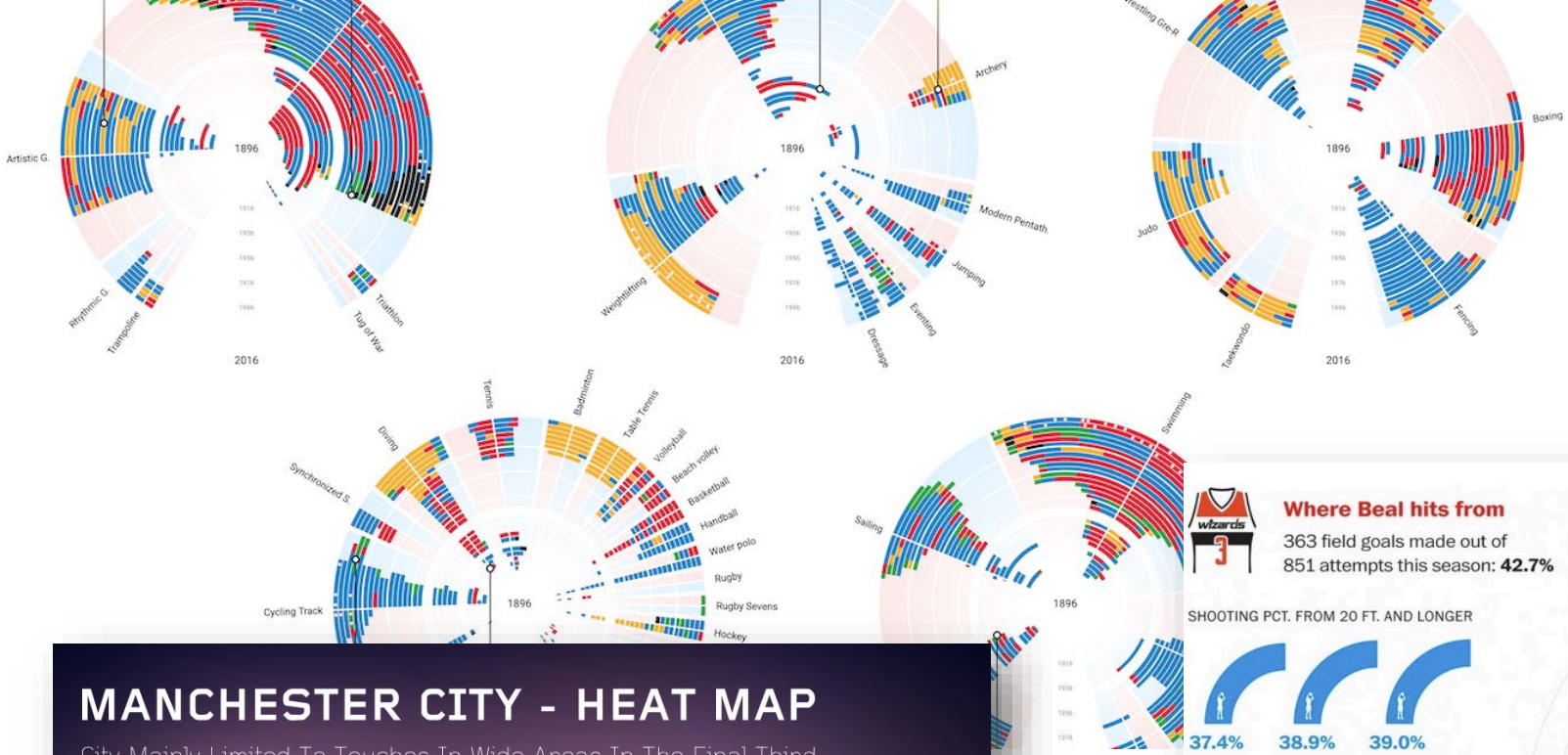
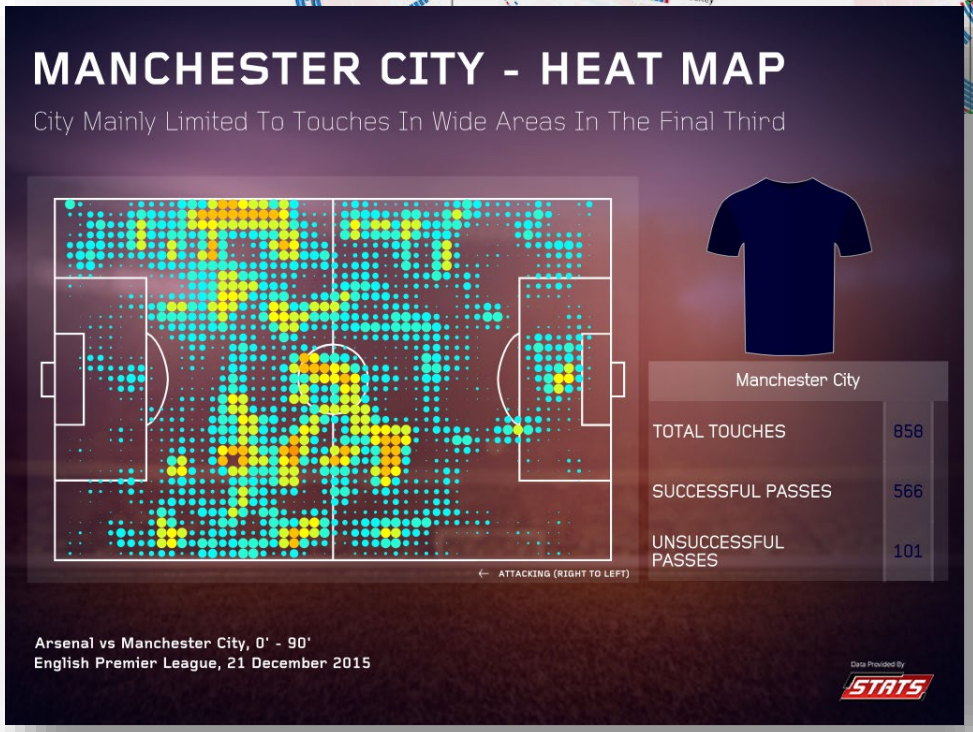
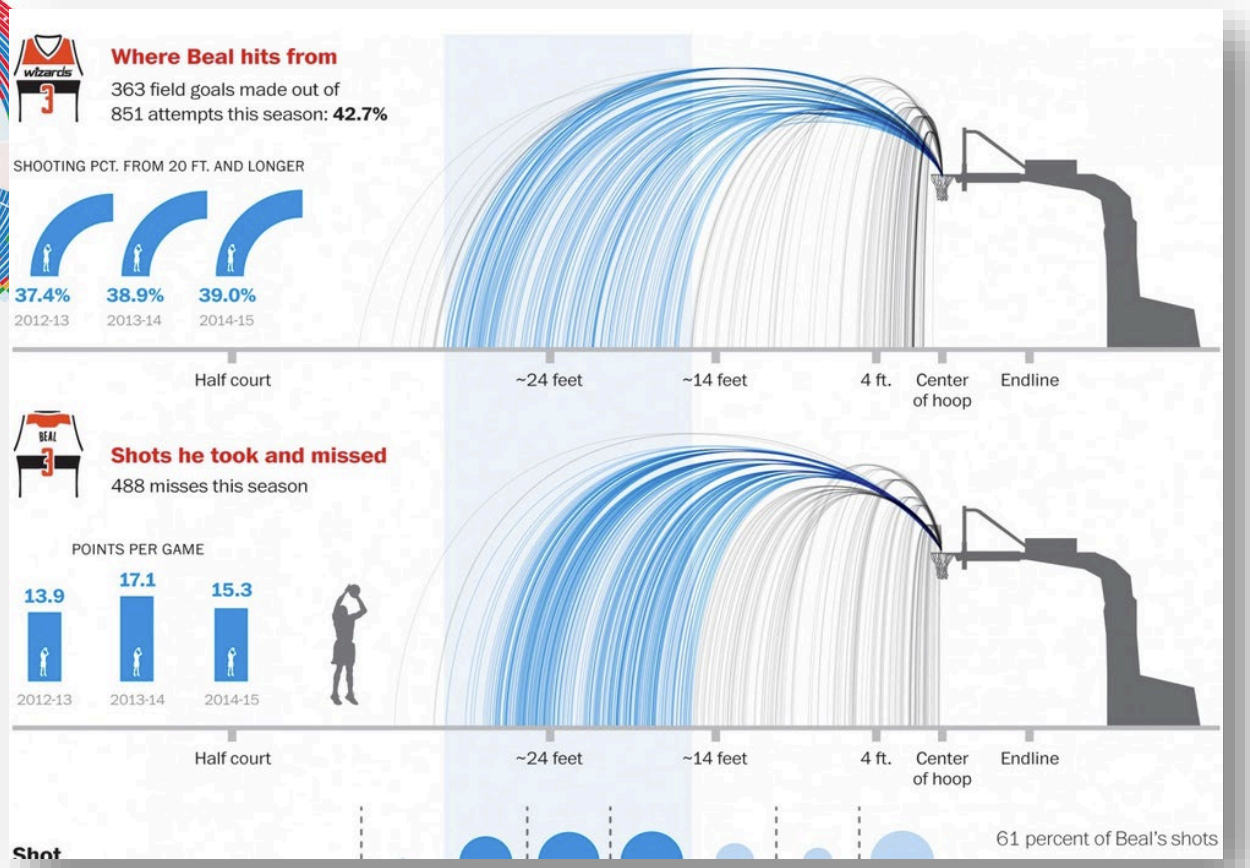
Kieskring Oost-


VISUALIZING
THE PRESIDENTIAL ELECTION
SEE THE VISUALS


Tie
←More Democratic
More Republican→
+20D
+20R
+40R
+60R
2008
Obama
McCain
2012
Obama
Romney
2016
Clinton
Trump
2020
Biden
Trump


1896
2016
Artistic G.
Rhythmic G.
Trampoline
Triathlon
Tug of War
Archery
Weightlifting
Modern Pentath.
Jumping
Eventing
Dressage
Judo
Taekwondo
Boxing
Fencing
Tennis
Badminton
Table Tennis
Volleyball
Beach volley
Basketball
Handball
Water polo
Rugby
Rugby Sevens
Hockey
Diving
Synchronized S.
Cycling Track
Swimming
Sailing


MANCHESTER CITY - HEAT MAP
City Mainly Limited To Touches In Wide Areas In The Final Third
ATTACKING (RIGHT TO LEFT)
Manchester City
TOTAL TOUCHES 858
SUCCESSFUL PASSES 566
UNSUCCESSFUL PASSES 101
Arsenal vs Manchester City, 0' - 90'
English Premier League, 21 December 2015
Data Provided By
STATS


Where Beal hits from
363 field goals made out of
851 attempts this season: 42.7%
SHOOTING PCT. FROM 20 FT. AND LONGER
37.4%
2012-13
38.9%
2013-14
39.0%
2014-15
Half court
~24 feet
~14 feet
4 ft.
Center of hoop
Endline
Shots he took and missed
488 misses this season
POINTS PER GAME
13.9
2012-13
17.1
2013-14
15.3
2014-15
Half court
~24 feet
~14 feet
4 ft.
Center of hoop
Endline
Shot
61 percent of Beal's shots

journalists

financial institutions

researchers

marketing agencies

organisations

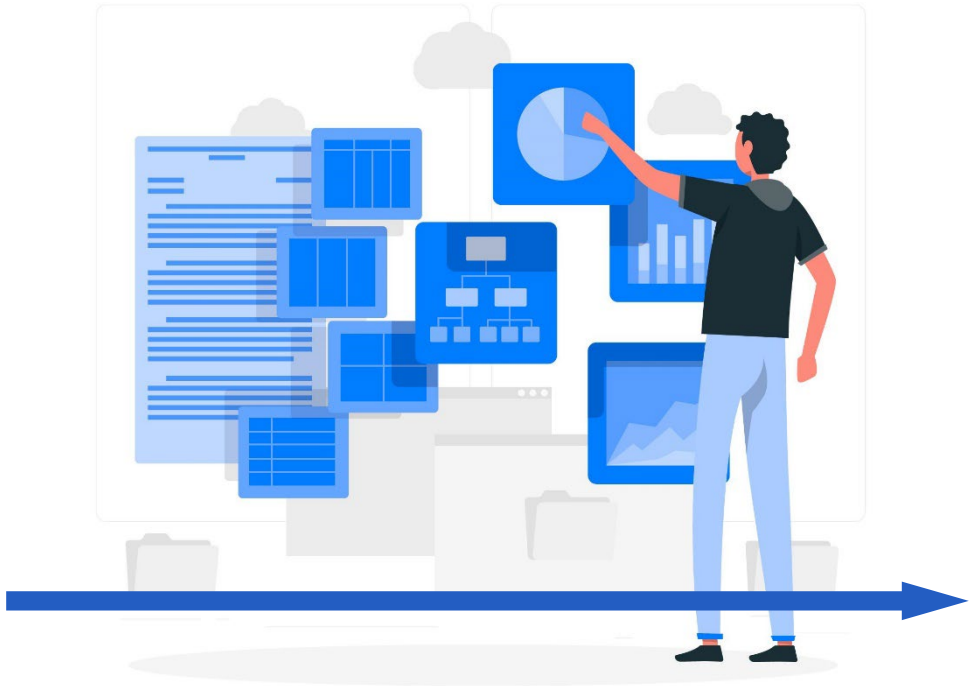
governments

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

...


Cramer classes of chemicals I, II and III
• Class I: Substances with simple chemical structures and for which efficient modes of metabolism exist, suggesting a low order of oral toxicity.
• Class II: Substances which possess structures that are less innocuous than class I substances, but do not contain structur features suggestive of toxicity like those substances in class I
• Class III: Substances with chemical structures that permit no strong initial presumption of safety or may even suggest significant toxicity or have reactive functional groups.
KWR
서울국제
컨퍼런스

K 14 01

K 14 02

K 14 03

Influence of rare-earth codoping on the afterglow behaviour in $Ca_2Si_5N_8:Eu^{2+}$

Koen Van den Eeckhout, Philippe F. Smet, Dirk Poelman
LumiLab, Department of Solid State Sciences, Ghent University

UNIVERSITEIT GENT

LumiLab

Background

Persistent phosphors are luminescent materials that continue emitting light for hours after ending the excitation ("afterglow").

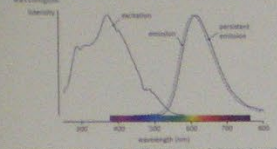
This has applications in various fields including

- safety and emergency signage
- dials and displays
- medical imaging

Many persistent phosphors have been developed over the past few years. However, efficient and stable persistent light emitting compounds in the orange to red part of the visible spectrum are scarce.

$Ca_2Si_5N_8:Eu^{2+},RE^{3+}$

We focused on the nitride-silicate $Ca_2Si_5N_8$ as host material with Eu^{2+} as the luminescent centers, codoped with various rare earth ions (RE^{3+}). This material has an orange emission peaking around 610 nm. During the afterglow, the emission is shifted approximately 10 nm towards longer wavelengths.



The excitation spectrum peaks at 370 nm but extends far into the visible region of the spectrum. This makes $Ca_2Si_5N_8:Eu^{2+},RE^{3+}$ suitable for indoor applications, where UV light is often absent.

Preparation

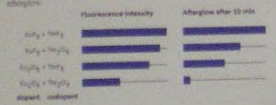
Samples were prepared starting from

- Ca_3N_2 and Si_3N_4 for the host crystal
- EuF_3 or Eu_2O_3 for the dopant
- $(RE)F_3$ or $(RE)_2O_3$ for the codopant

through a solid state reaction

- temperature: 1300-1400°C
- duration: 1-3 hours
- flowing atmosphere of 90% N_2 and 10% H_2

The rare earth dopants and codopants are preferably added in their fluoride form, not in their oxide form. This enhances both the fluorescence and the afterglow.



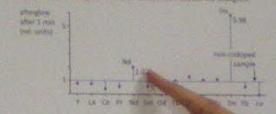
Acknowledgement

Many thanks to Pieter Dorenbos, Adrie Bos and Erik van der Kolk from Delft University of Technology for assistance in TL measurements.

Influence of rare earth codoping

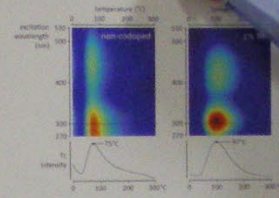
Codoping with rare earth ions is believed to influence or even introduce new long-lived charge traps inside a material, thus greatly enhancing the afterglow.

Of all rare earth codopants, we found that **thulium** yields the brightest afterglow. Neodymium also enhances the afterglow, compared to the non-codoped $Ca_2Si_5N_8:Eu^{2+}$. Introducing cerium or lutetium ions weakens the afterglow.



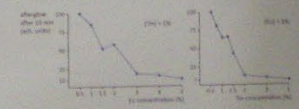
Thermoluminescence (TL) measurements at [illegible] that the material can be charged with visible light.

Upon codoping with Tm, the main TL peak shifts to lower temperatures, indicating a **deepening** of the charge carrier traps.



Dopant and codopant concentration

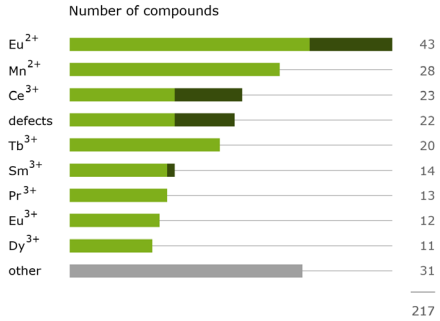
The brightness of the afterglow is strongly influenced by the dopant and codopant concentrations. In general, lower concentrations are preferable.

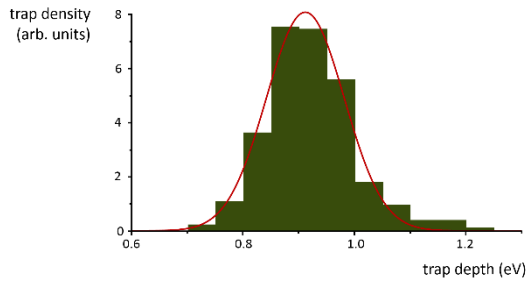


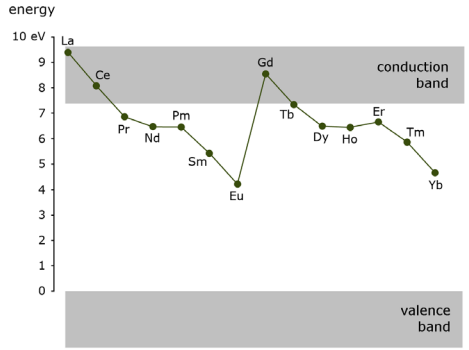
Conclusions

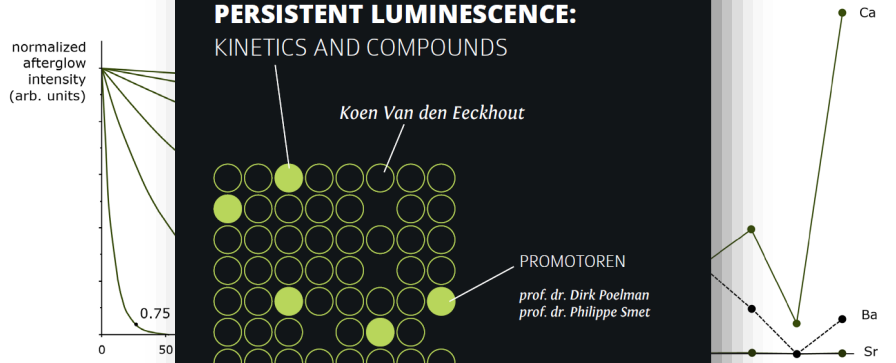
Rare earth codoped $Ca_2Si_5N_8:Eu^{2+}$ is an orange persistent phosphor that can be excited with both UV and visible light. Codoping with **thulium** greatly enhances the afterglow by shifting the main trap levels.

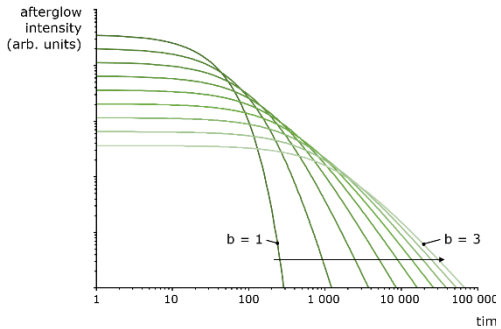
To obtain a bright afterglow, the dopant and codopant are preferably added to the starting mixture in their fluoride form, and in concentrations not higher than 1%.

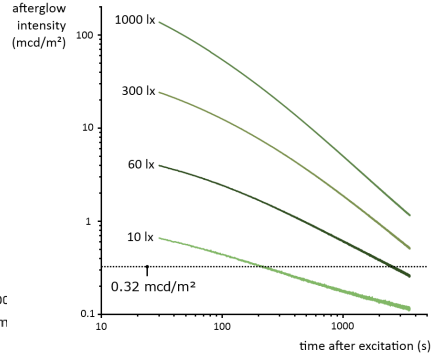

Number of compounds
Eu2+ 43
Mn2+ 28
Ce3+ 23
defects 22
Tb3+ 20
Sm3+ 14
Pr3+ 13
Eu3+ 12
Dy3+ 11
other 31
217

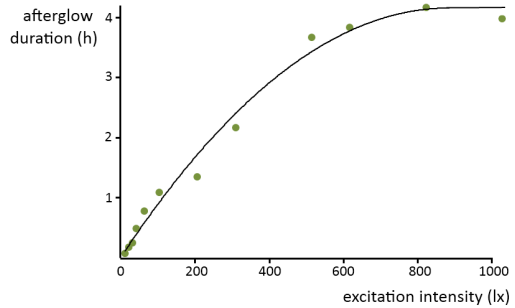

trap density
(arb. units)
trap depth (eV)

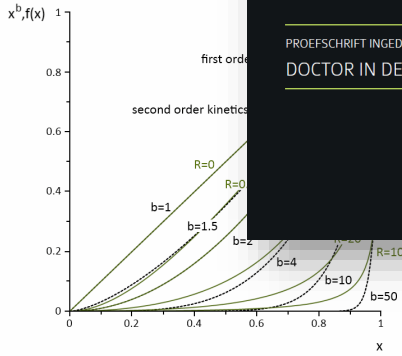

energy
10 eV
La
Ce
Pr
Nd
Pm
Sm
Eu
Gd
Tb
Dy
Ho
Er
Tm
Yb
conduction band
valence band

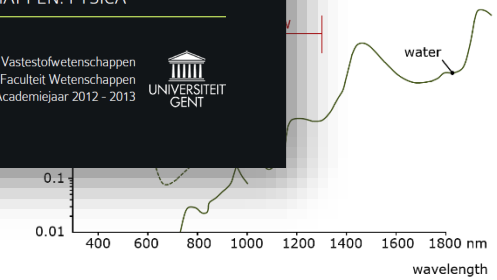

normalized
afterglow
intensity
(arb. units)
0.75
Ca
Ba
Sr
Nd
Sm
Tm

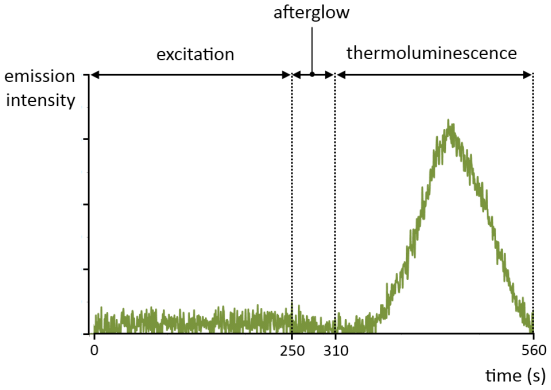

afterglow
intensity
(arb. units)
b = 1
b = 3
tim

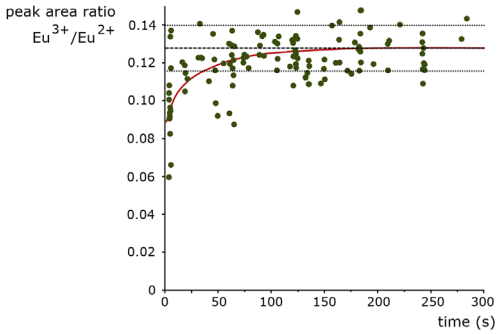

afterglow
intensity
(mcd/m²)
1000 lx
300 lx
60 lx
10 lx
0.32 mcd/m²
time after excitation (s)

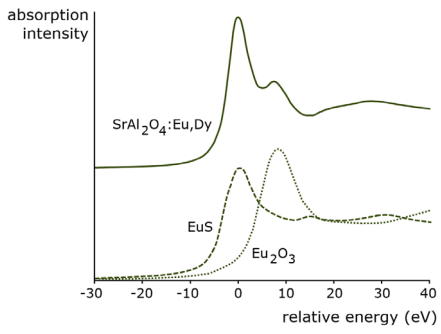

afterglow
duration (h)
excitation intensity (lx)

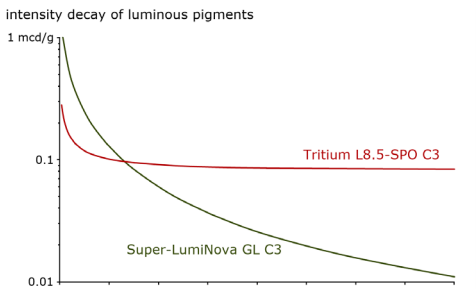

x^b,f(x)
first orde
second order kinetics
R=0
R=0
b=1
b=1.5
b=2
b=4
b=10
b=50
R=100
x

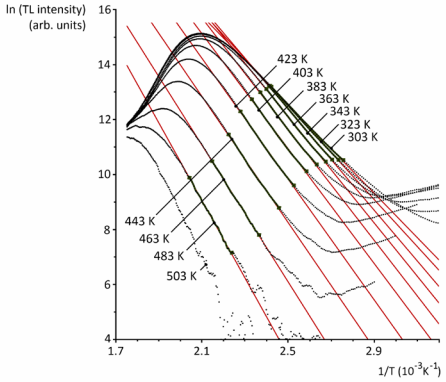

water
wavelength

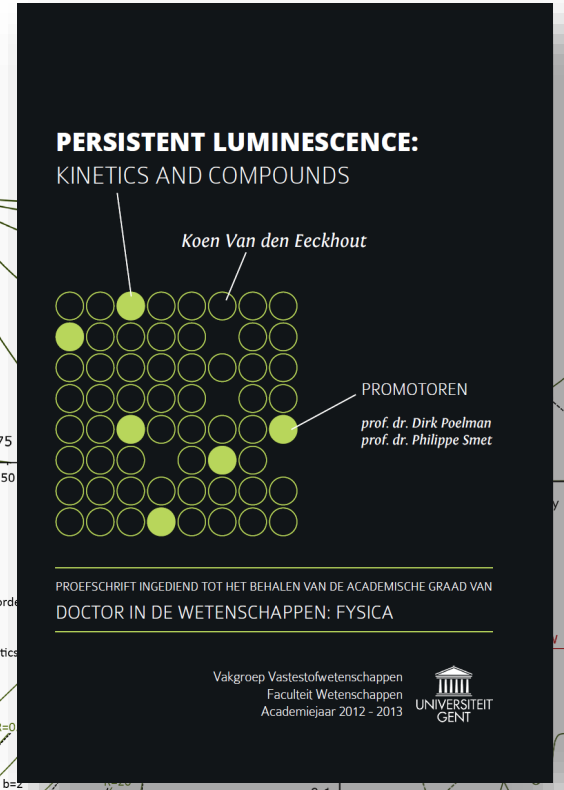

afterglow
excitation
thermoluminescence
emission
intensity
time (s)


peak area ratio
Eu3+/Eu2+
time (s)

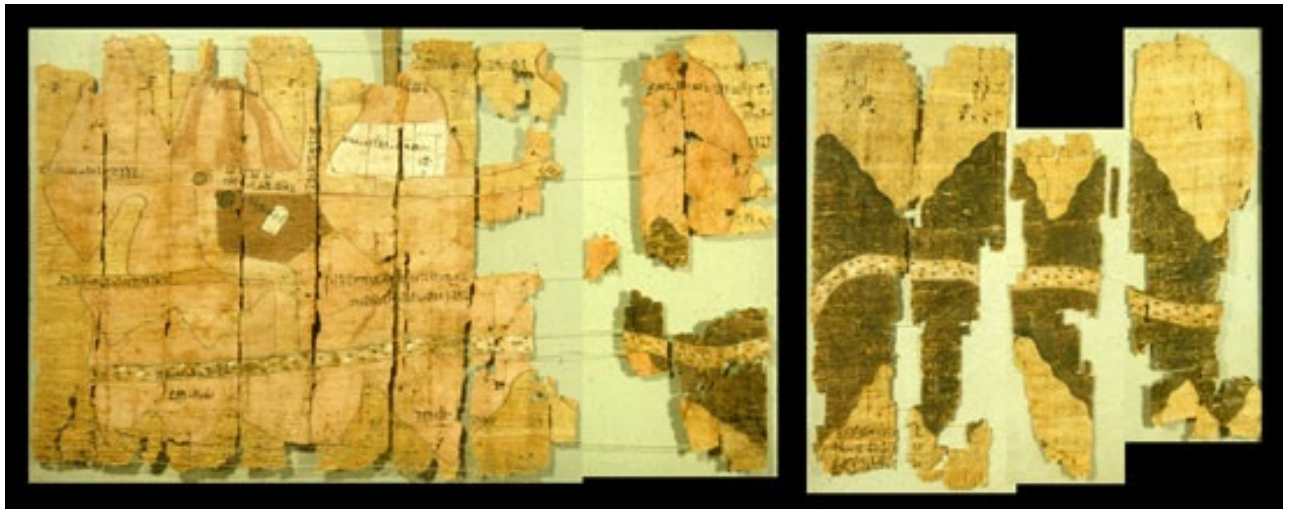

absorption
intensity
SrAl2O4:Eu,Dy
EuS
Eu2O3
relative energy (eV)


intensity decay of luminous pigments
1 mcd/g
Tritium L8.5-SPO C3
Super-LumiNova GL C3
8 hours

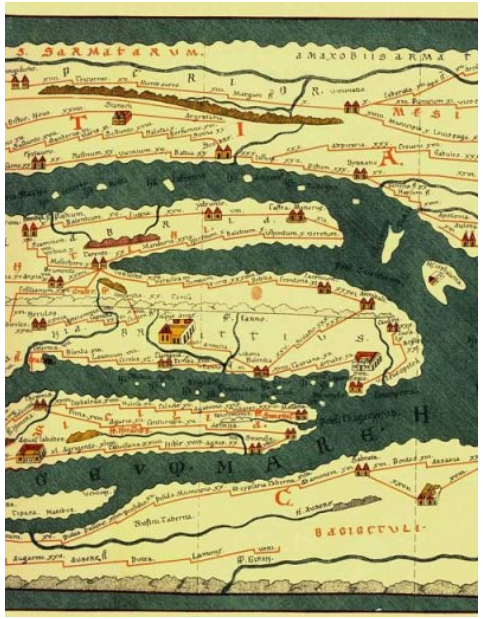

ln (TL intensity)
(arb. units)
423 K
403 K
383 K
363 K
343 K
323 K
303 K
443 K
463 K
483 K
503 K
1/T (10-3K-1)


PERSISTENT LUMINESCENCE:
KINETICS AND COMPOUNDS
Koen Van den Eeckhout
PROMOTOREN
prof. dr. Dirk Poelman
prof. dr. Philippe Smet
PROEFSCHRIFT INGEDIEND TOT HET BEHALEN VAN DE ACADEMISCHE GRAAD VAN
DOCTOR IN DE WETENSCHAPPEN: FYSICA
Vakgroep Vastestofwetenschappen
Faculteit Wetenschappen
Academiejaar 2012 - 2013
UNIVERSITEIT GENT

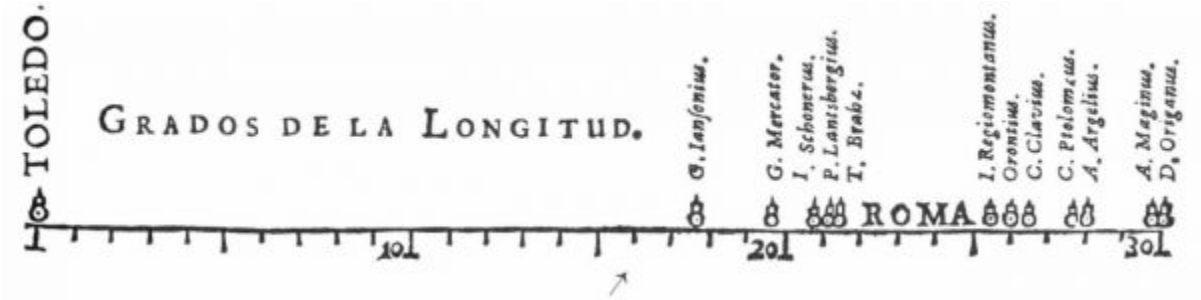
Babylonian world map
around 600 BC



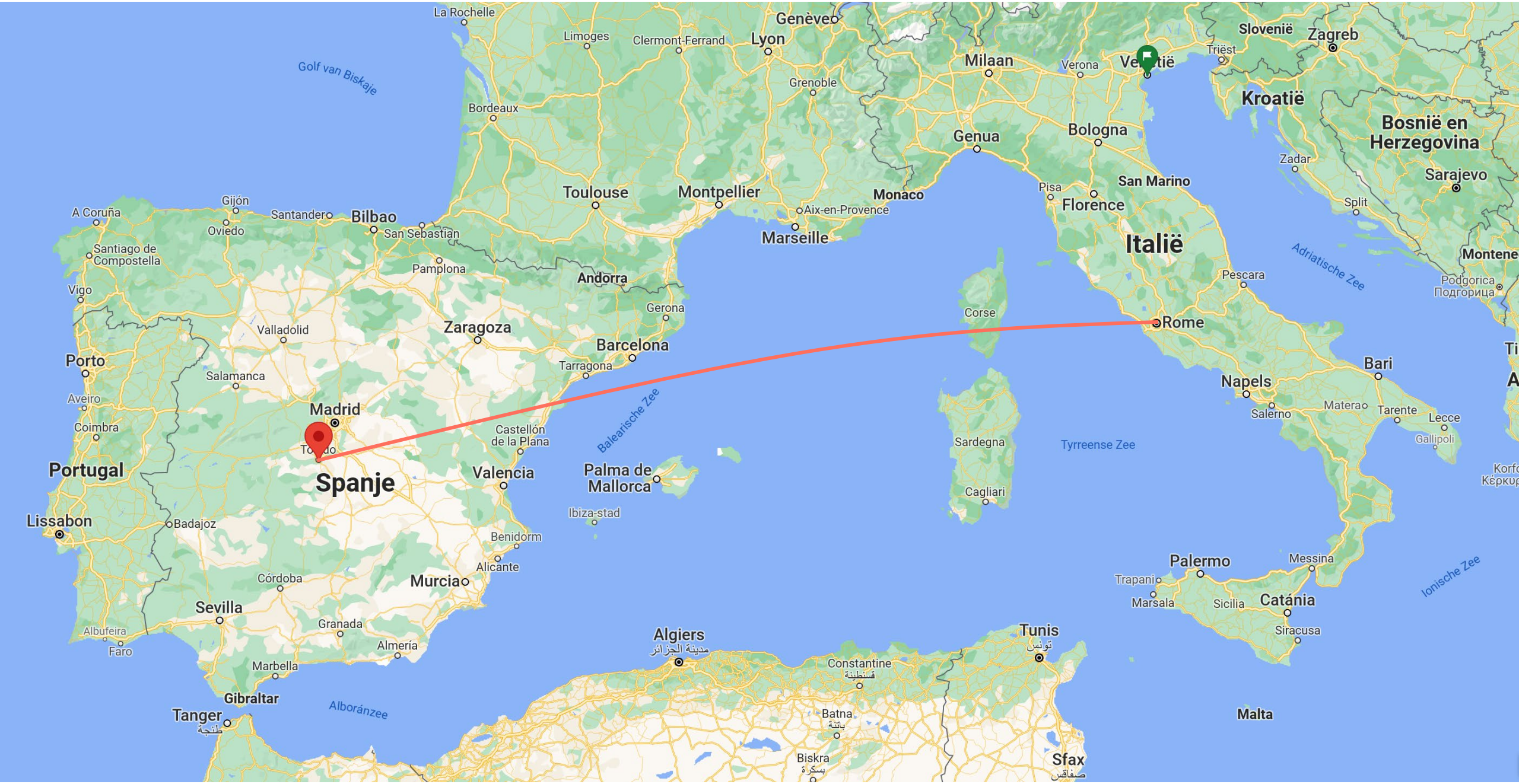
Egyptian map
around 1150 BC

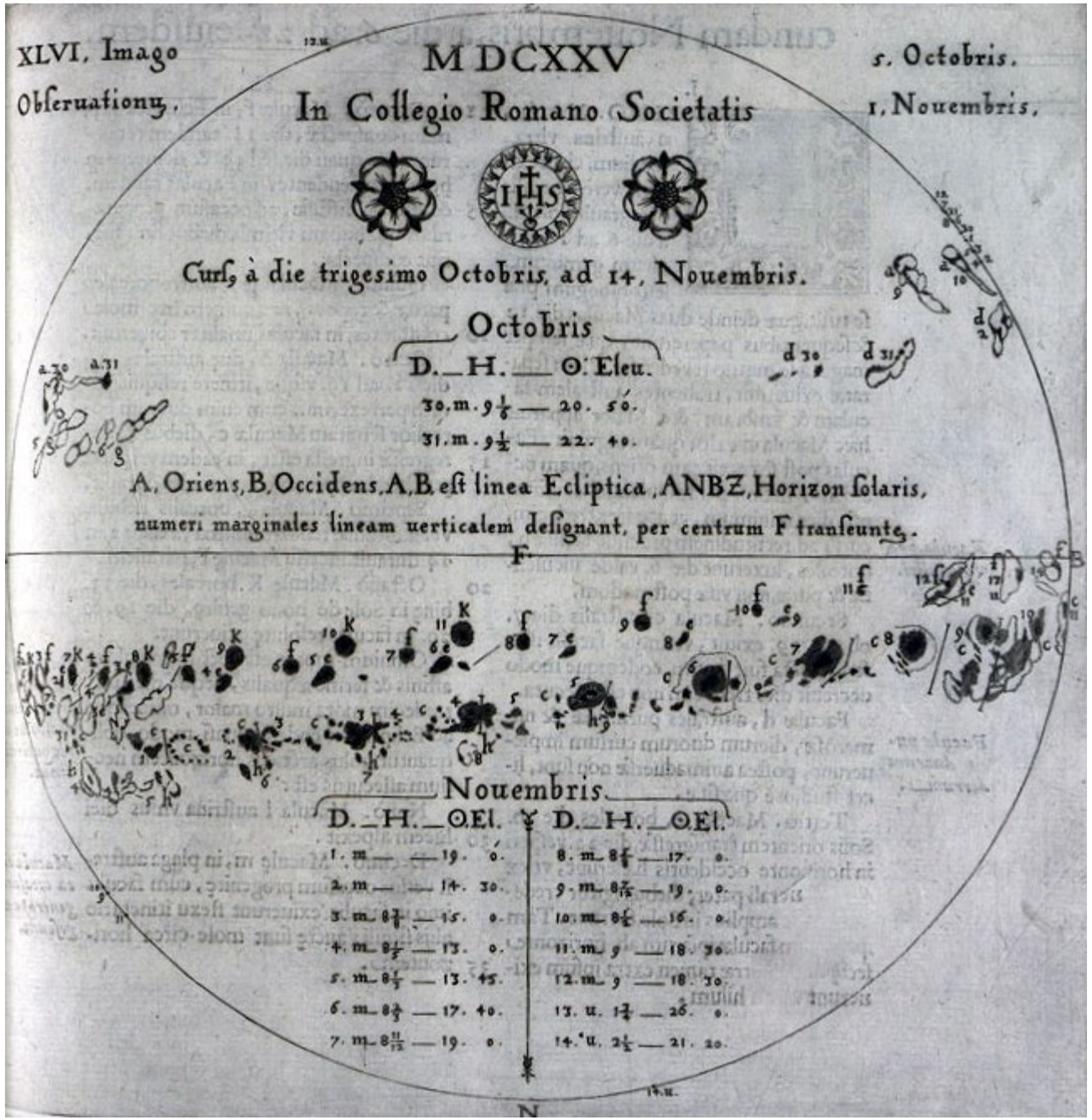


Roman map
around 350 BC

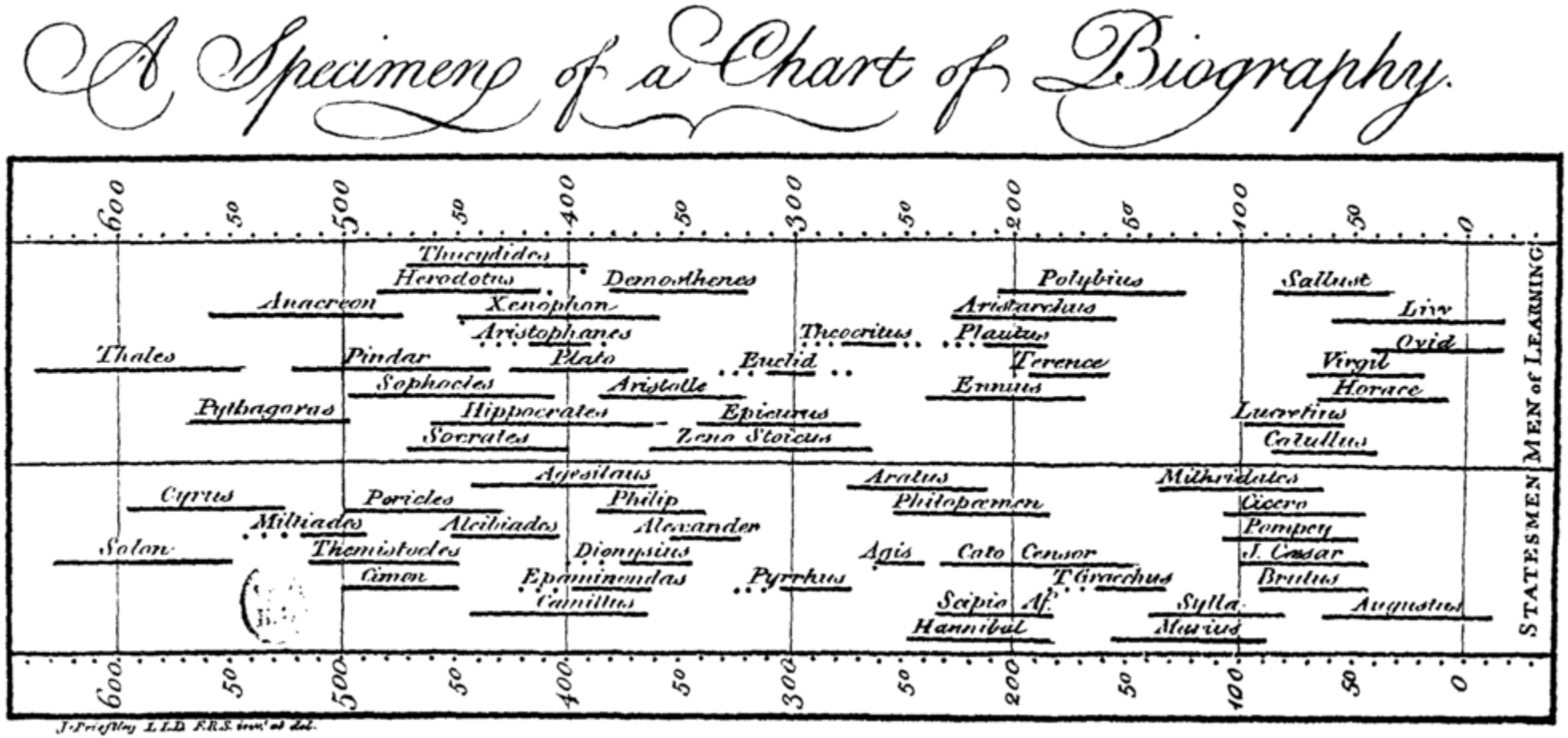


Michiel Florent van Langren
1644


Golf van Biskaje
La Rochelle
Limoges
Clermont-Ferrand
Genève
Lyon
Milaan
Verona
Slovenië
Zagreb
Triëst
Grenoble
Bordeaux
Kroatië
Bosnië en Herzegovina
Genua
Bologna
Zadar
Sarajevo
Toulouse
Montpellier
Monaco
Pisa
San Marino
Florence
Split
A Coruña
Gijón
Santander
Bilbao
Oviedo
Aix-en-Provence
Marseille
Italië
Santiago de Compostella
San Sebastian
Pamplona
Adriatische Zee
Pescara
Vigo
Andorra
Gerona
Podgorica
Подгорица
Corse
Zaragoza
Rome
Valladolid
Barcelona
Porto
Tarragona
Bari
Salamanca
Napels
Aveiro
Madrid
Salerno
Matera
Tarente
Coimbra
Castellón de la Plana
Lecce
Gallipoli
Balearische Zee
Sardegna
Tyrreense Zee
Portugal
Spanje
Valencia
Palma de Mallorca
Cagliari
Ibiza-stad
Lissabon
Badajoz
Benidorm
Alicante
Palermo
Messina
Trapani
Córdoba
Murcia
Marsala
Sicilia
Catánia
Ionische Zee
Sevilla
Granada
Siracusa
Albufeira
Faro
Almería
Algiers
مدينة الجزائر
Tunis
تونس
Marbella
Constantine
قسنطينة
Gibraltar
Alboránzee
Batna
باتنة
Malta
Tanger
طنجة
Biskra
بسكرة
Sfax
صفاقس

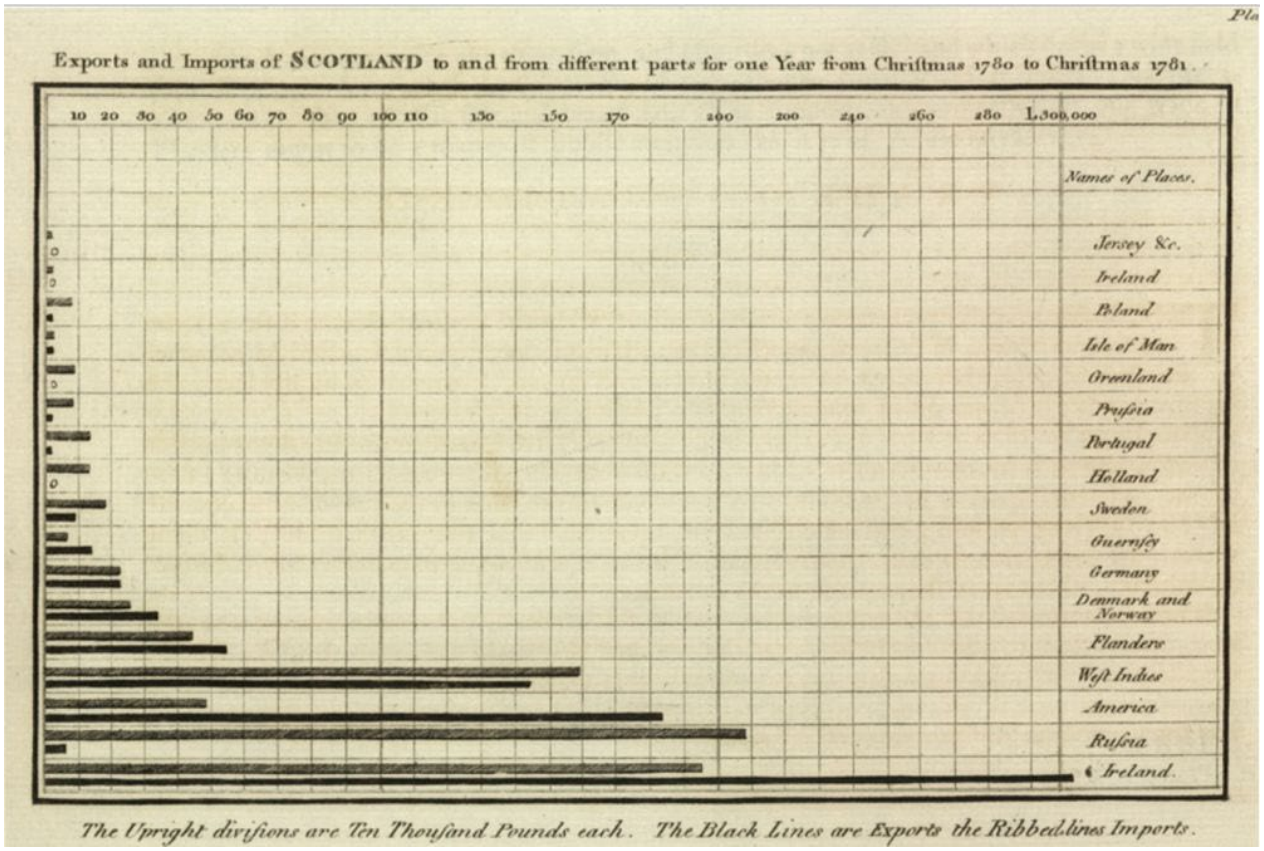


Christoph Scheiner
1626

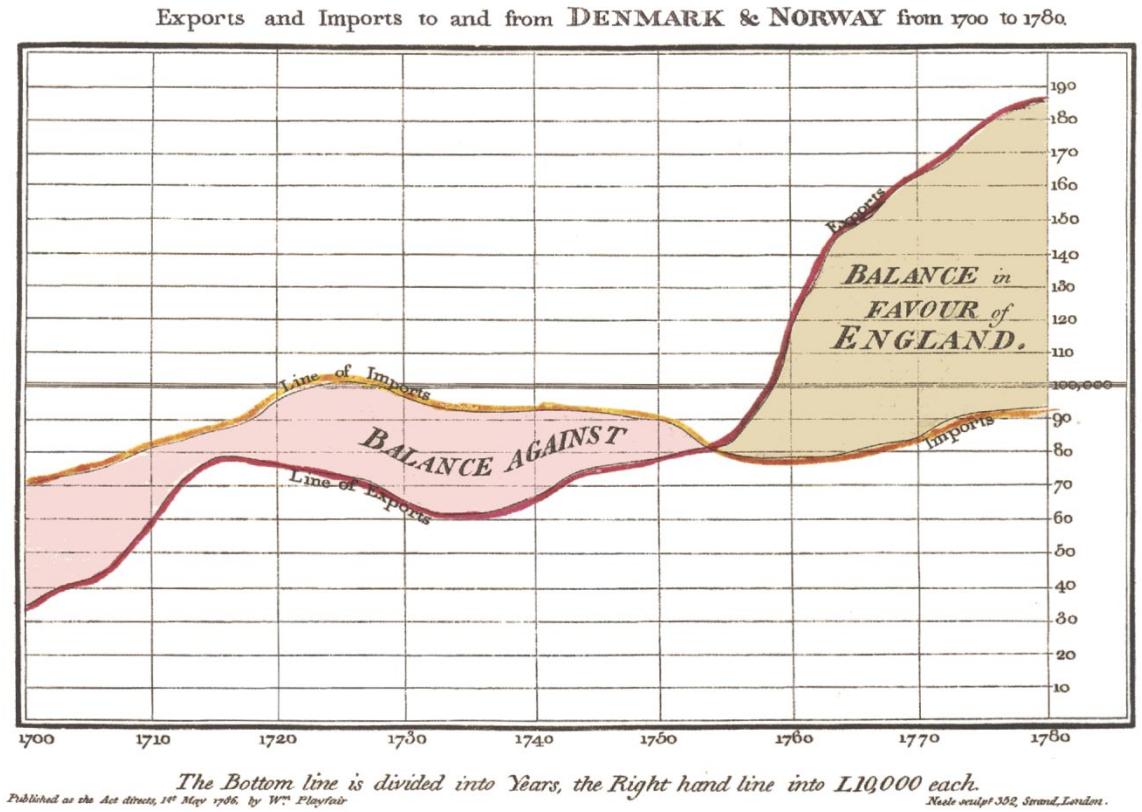


Joseph Priestley
1765

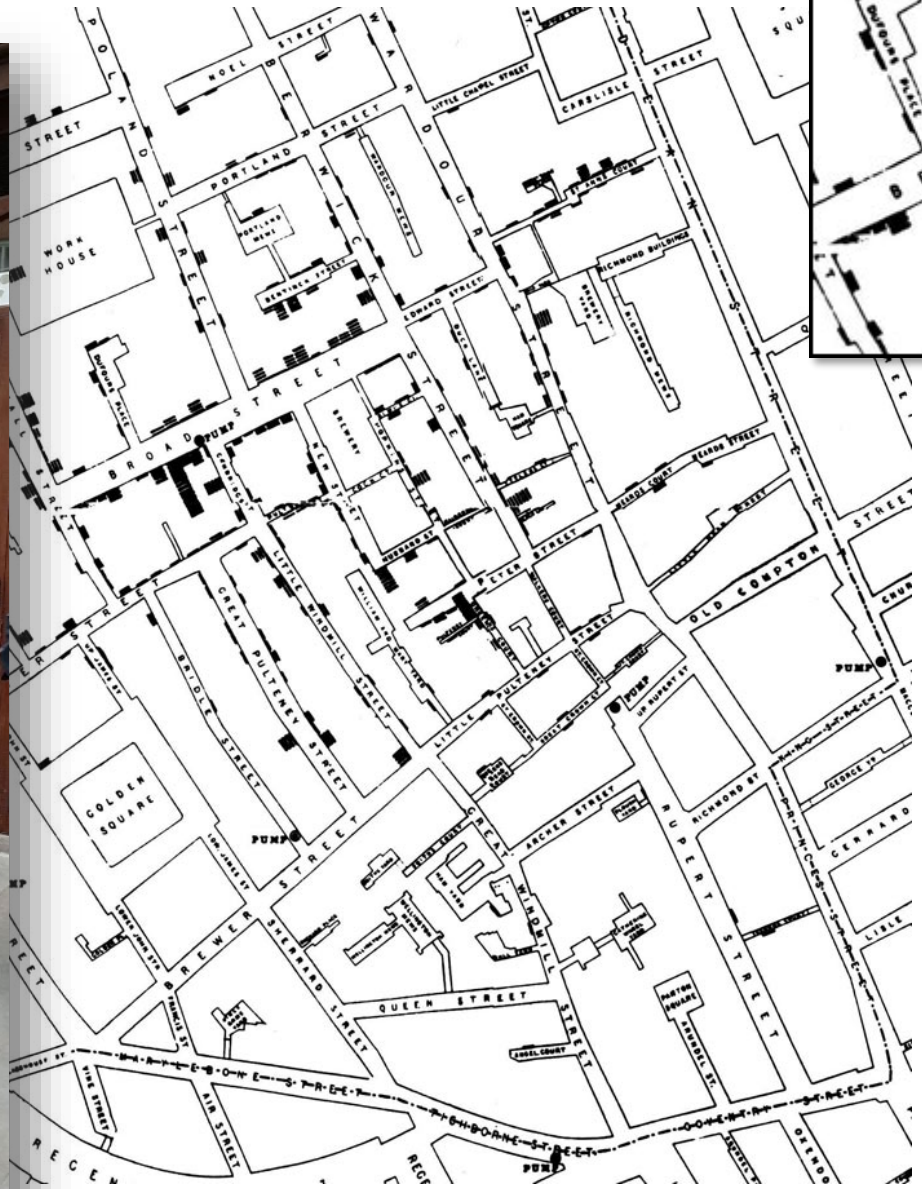
The inventor of the bar, line and pie chart



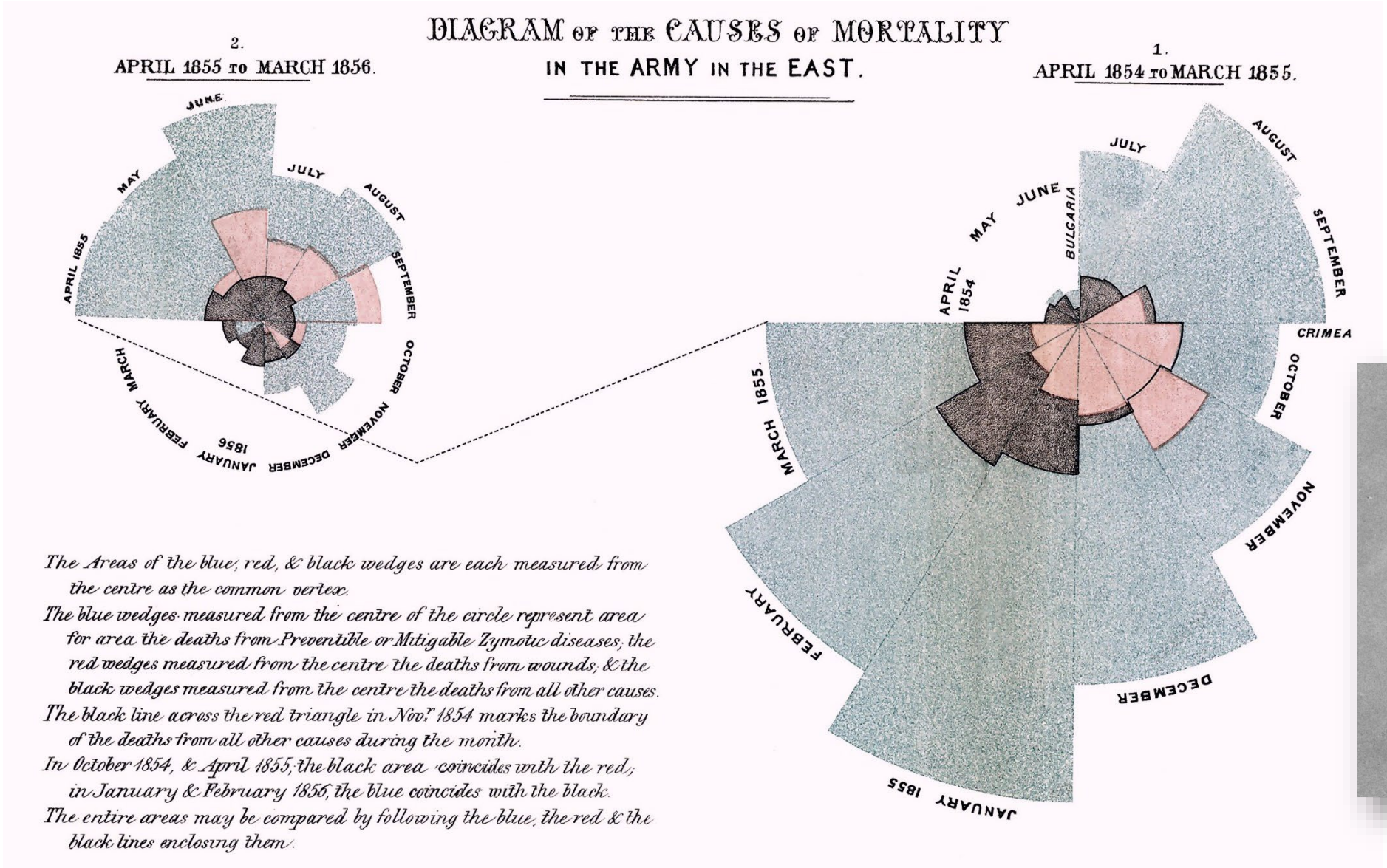
William Playfair
1781



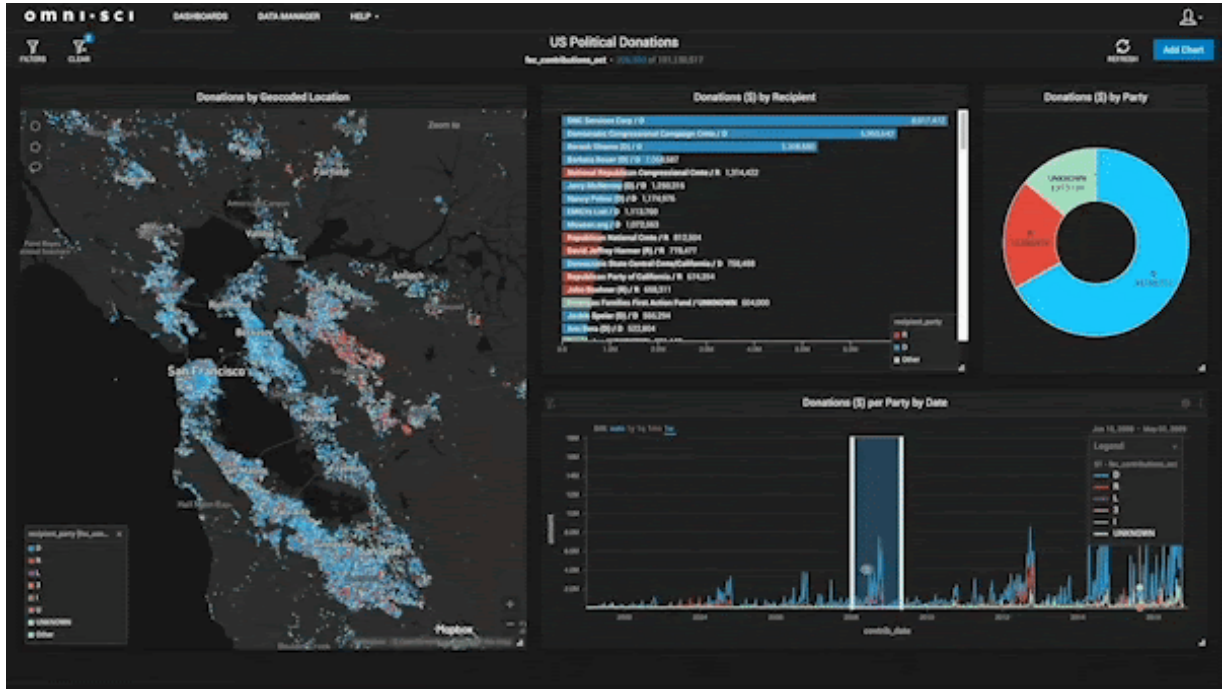
William Playfair
1786



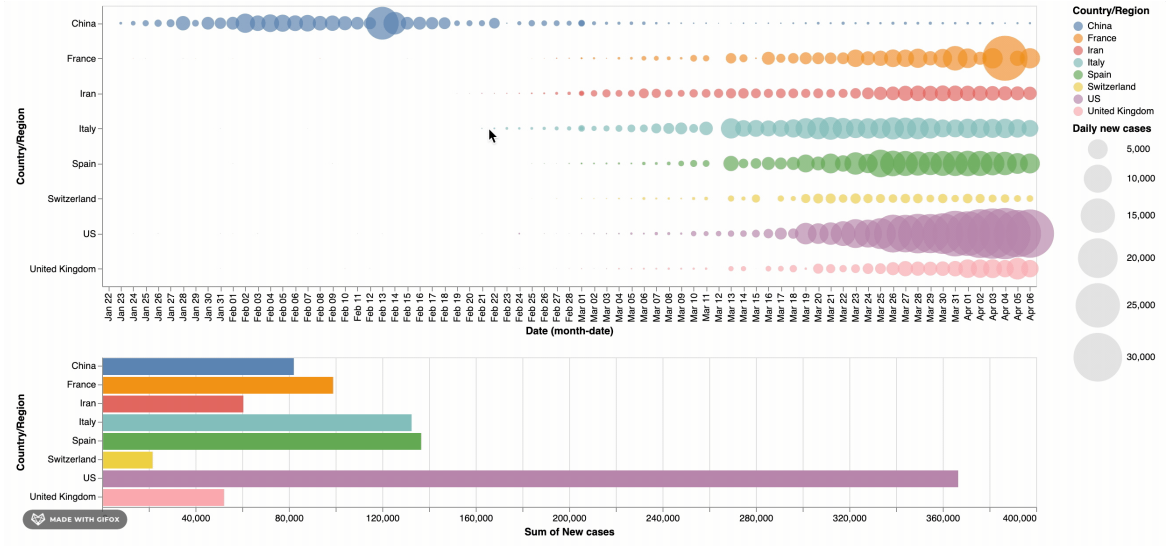
John Snow
1854

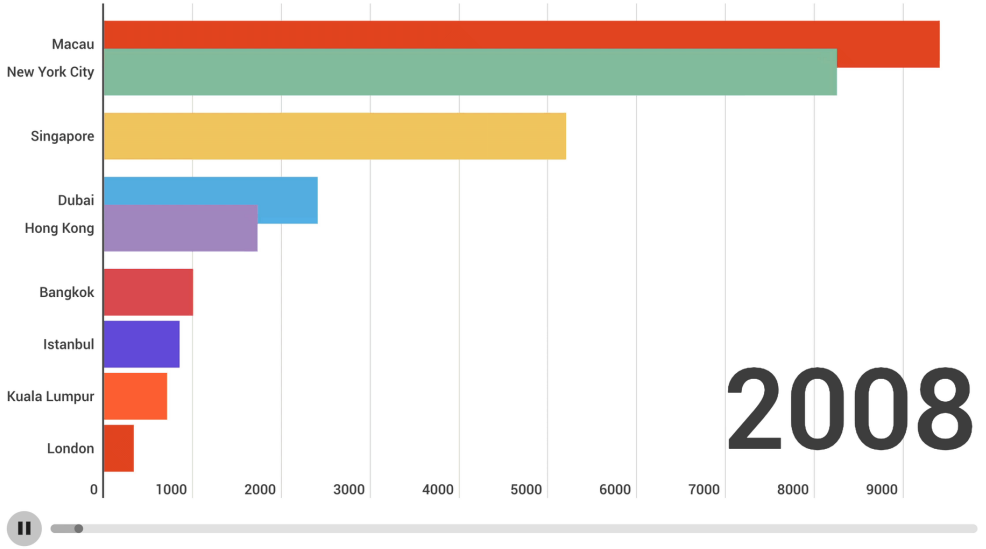


Florence Nightingale
1858


omni·sci
DASHBOARDS
DATA MANAGER
HELP
US Political Donations
Add Chart
Donations by Geocoded Location
Donations ($) by Recipient
Donations ($) by Party
Donations ($) per Party by Date


Best Score
6.37 miles
Jardson
Elson
Max
SUN MON TUE WED THU FRI SAT
Total of Steps
53,047 steps
2,265 6,412 8,972 7,773 12,355 10,287 4,983
Running Level
Week 2 of May
SUN MON TUE WED THU FRI SAT
Daily Summary
Tuesday, Sat 14, 2016
Move
Exercise
Stand


Country/Region
China
France
Iran
Italy
Spain
Switzerland
US
United Kingdom
Date (month-date)
Daily new cases
5,000
10,000
15,000
20,000
25,000
30,000
Sum of New cases
MADE WITH GIFOX


Macau
New York City
Singapore
Dubai
Hong Kong
Bangkok
Istanbul
Kuala Lumpur
London
0 1000 2000 3000 4000 5000 6000 7000 8000 9000
2008

What is a good data visualization?

Group exercise

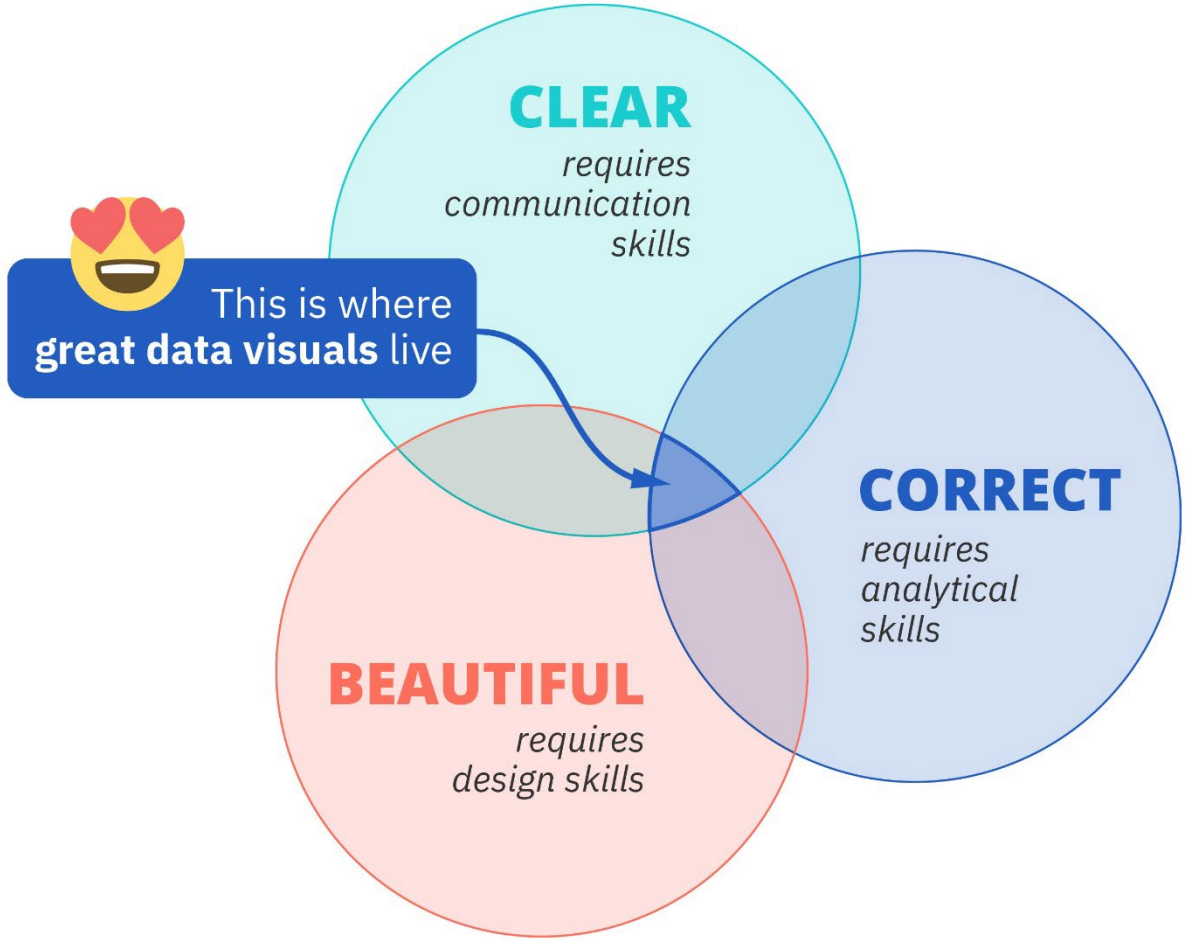
Each group receives **a set of data visuals to discuss**.

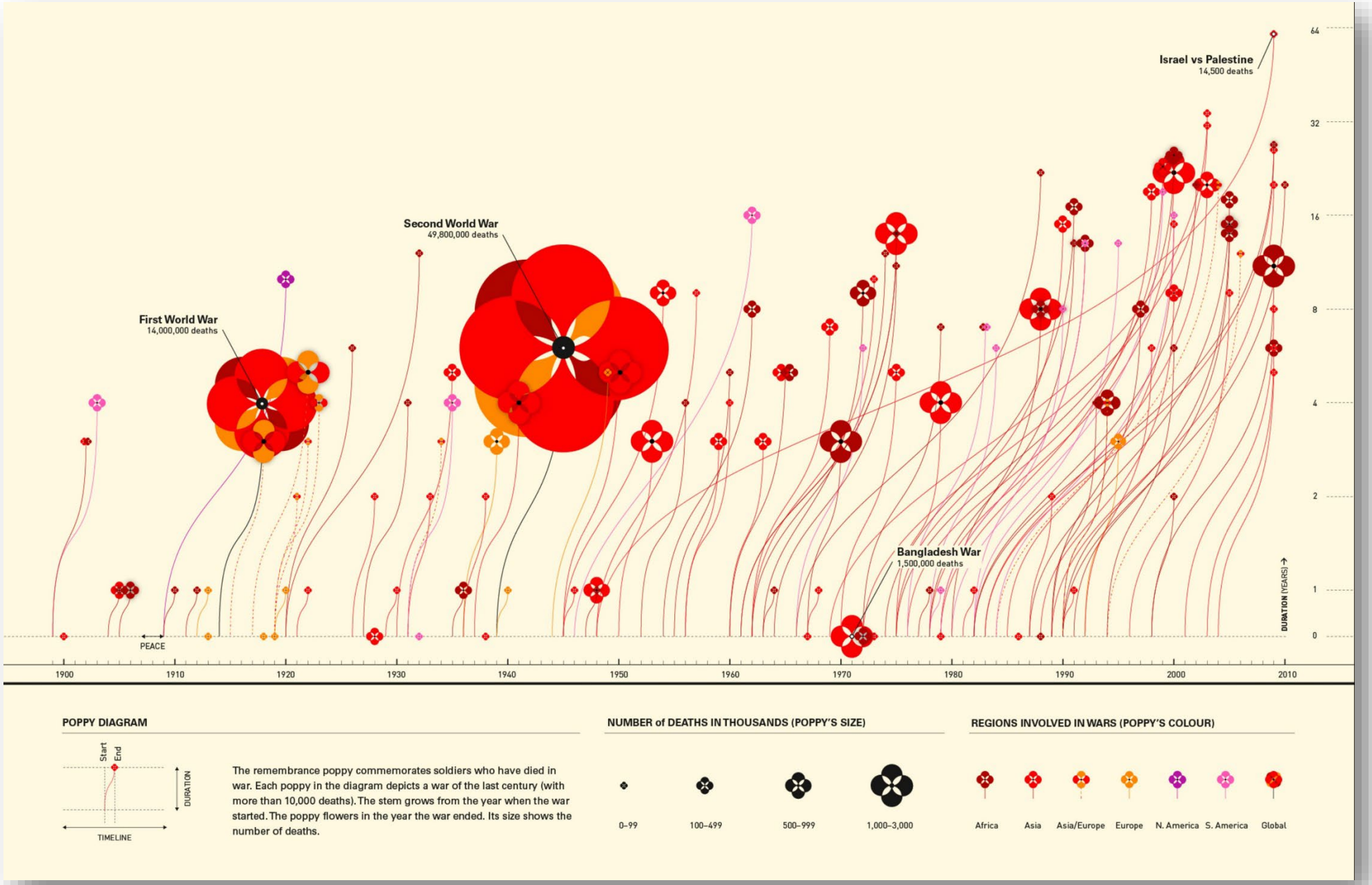
As a group, choose your **most favorite**
and **least favorite data visual**
and explain why.

Break

All the slides and all the links:

baryon.be/dataviz-resources


CLEAR
requires communication skills
This is where great data visuals live
CORRECT
requires analytical skills
BEAUTIFUL
requires design skills



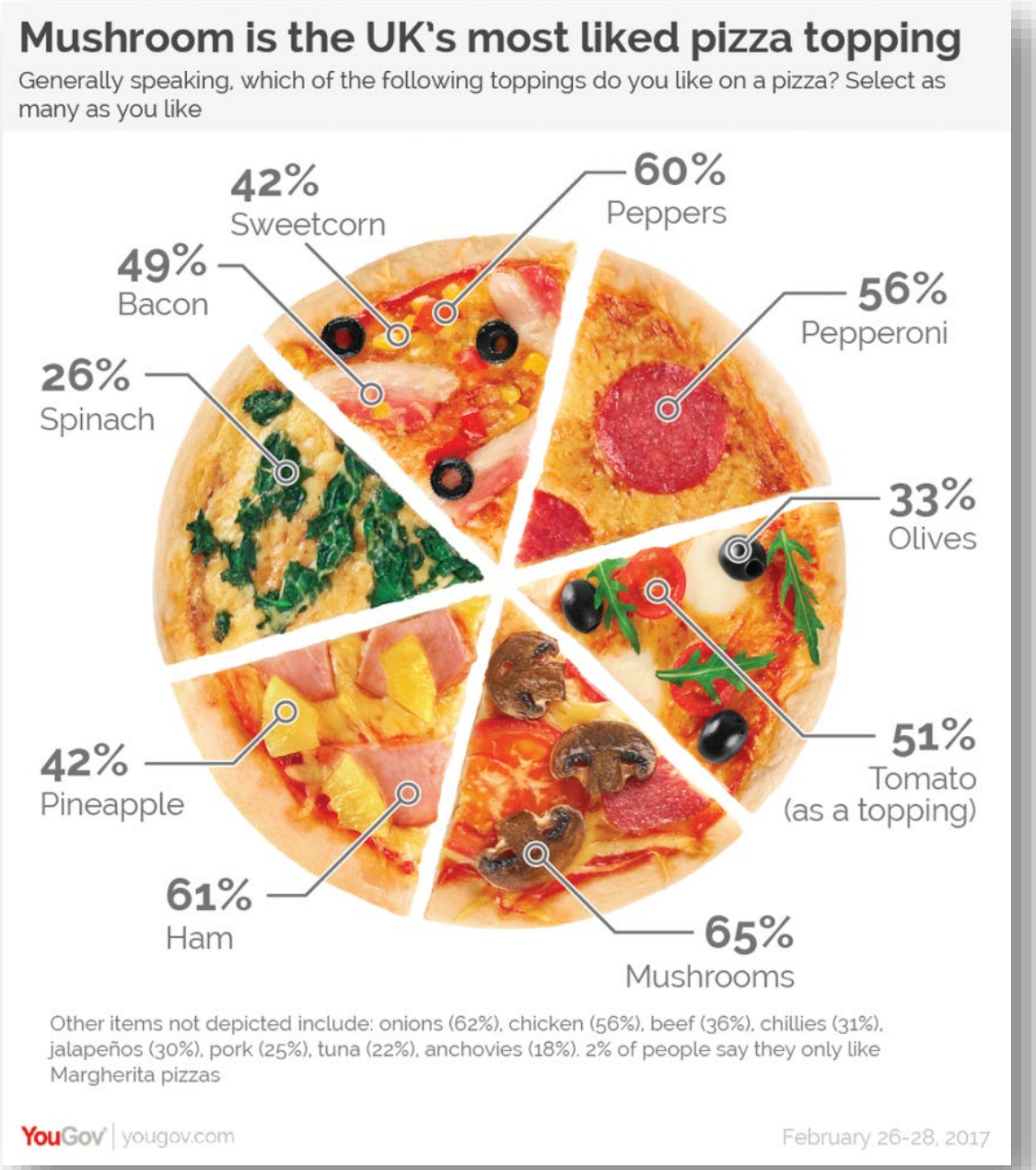
complicated data art

~~clear~~

correct

beautiful

misleading charts



clear

~~correct~~

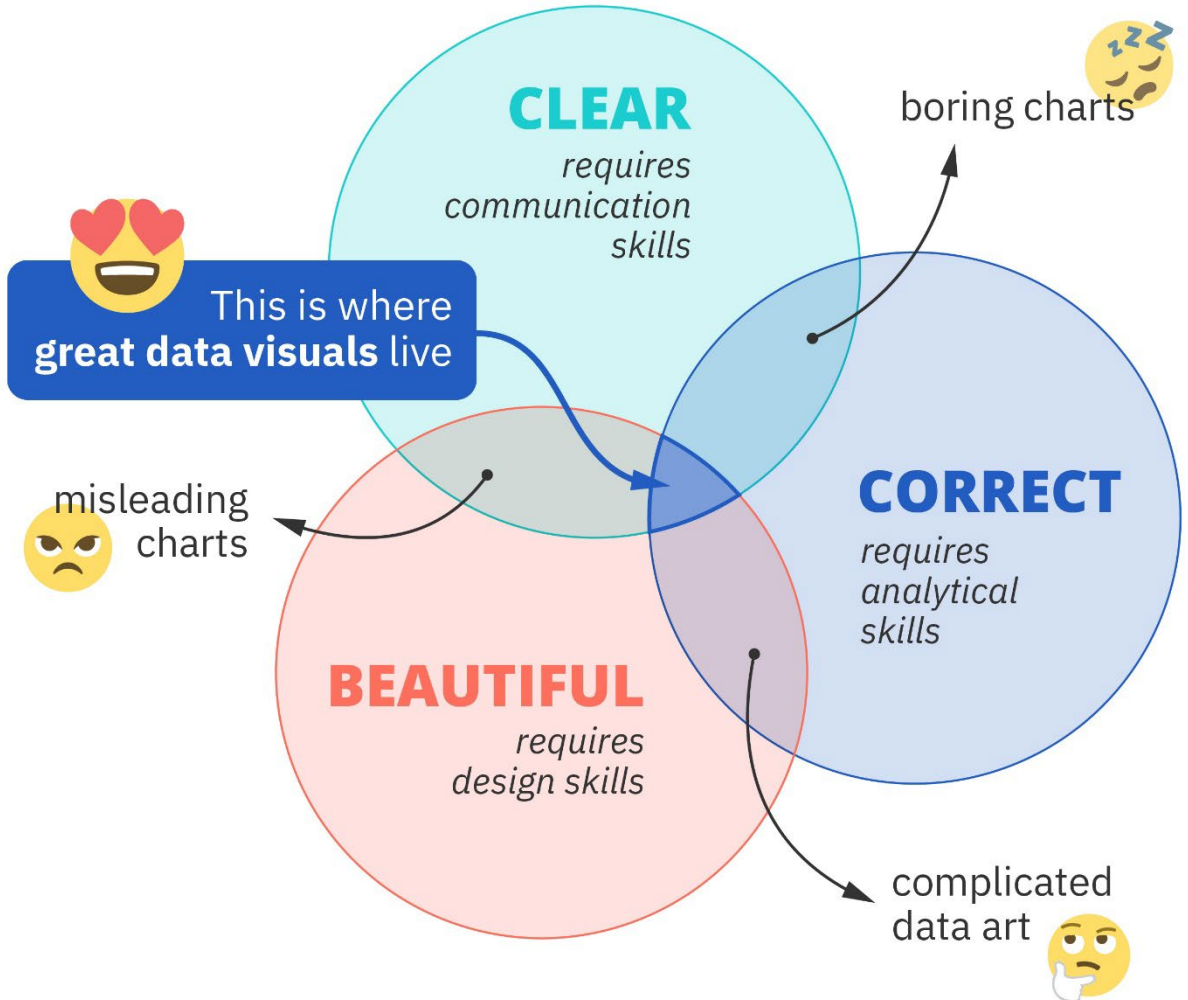
beautiful

boring charts

clear

correct

~~beautiful~~


CLEAR
requires communication skills
boring charts
This is where great data visuals live
CORRECT
requires analytical skills
misleading charts
BEAUTIFUL
requires design skills
complicated data art

Introduction

The importance of data visualization

Historic data visuals

What is a good data visualization?

15’ break

Communication principles

Identifying your message

Adapting to the audience

Signal-to-noise ratio

Communication principles

Communication principles

1. Identify your _ _ _ _ _ _ _ _
2. Adapt to your _ _ _ _ _ _ _ _ _
3. Improve the _ _ _ _ _ _ - _ _ - _ _ _ _ _ ratio

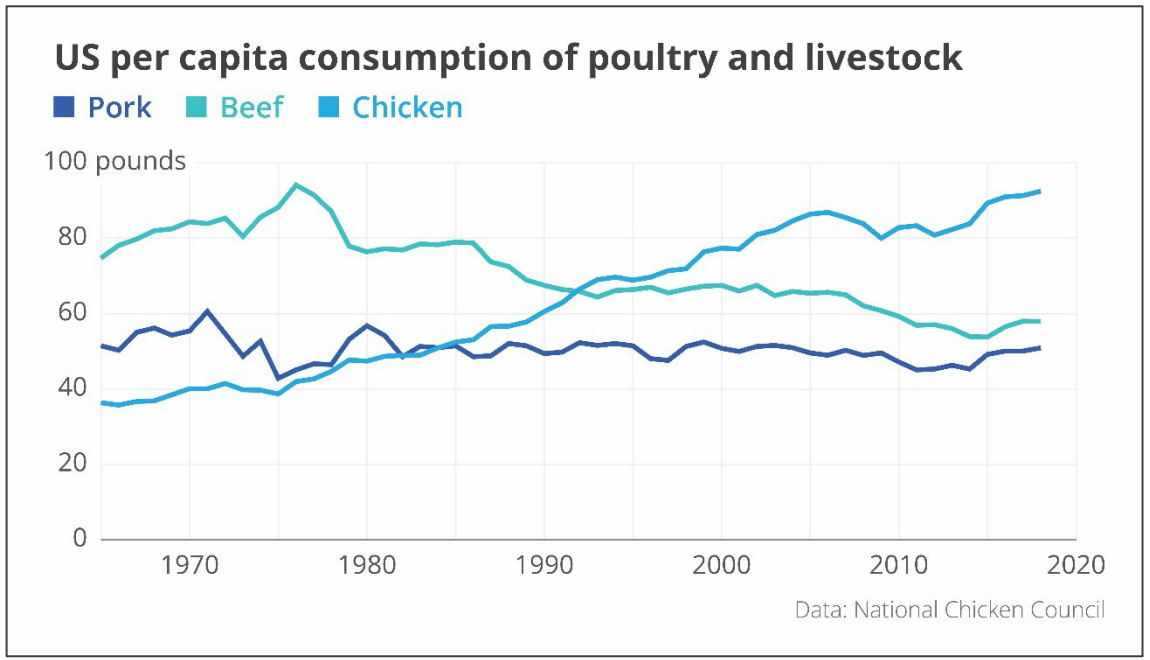
The basic model of communication

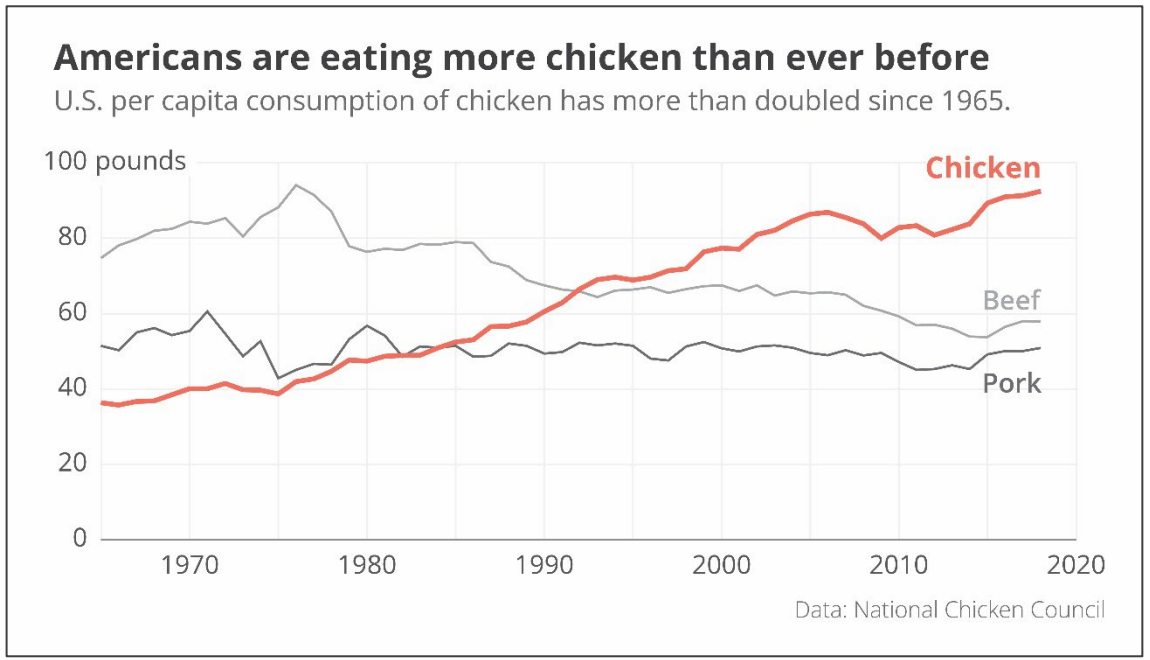
Communication principles

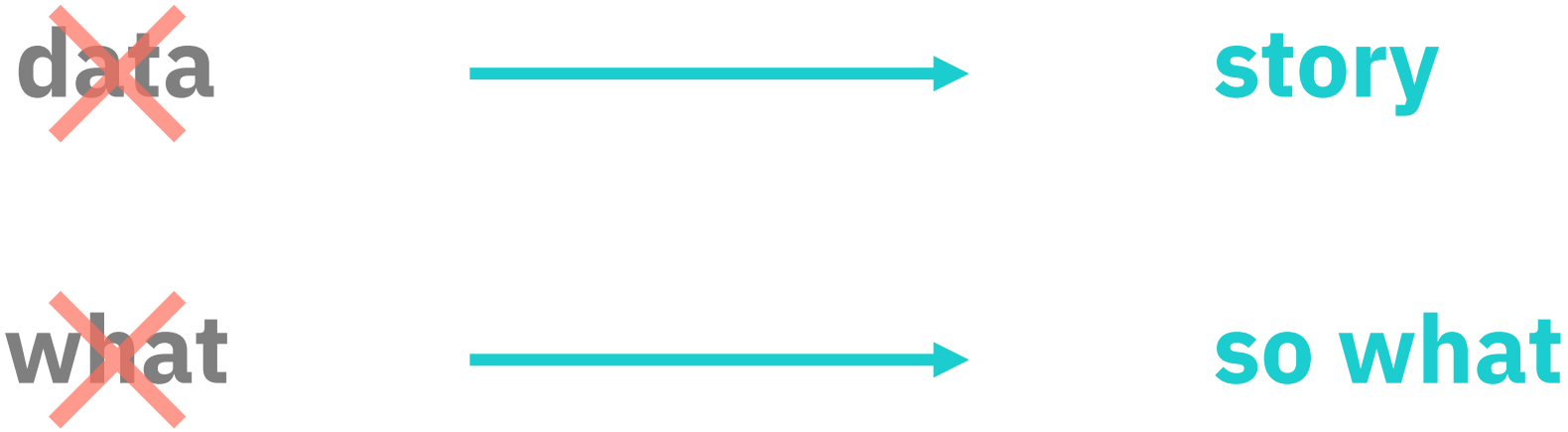
1. Identify your **message**
2. Adapt to your _ _ _ _ _ _ _ _ _
3. Improve the _ _ _ _ _ _ - _ _ - _ _ _ _ _ ratio

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
100 pounds
80
60
40
20
0
1970
1980
1990
2000
2010
2020
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.
100 pounds
80
60
40
20
0
Chicken
Beef
Pork
1970
1980
1990
2000
2010
2020
Data: National Chicken Council


data
story
what
so what

Identify your message

list available data and illustrations

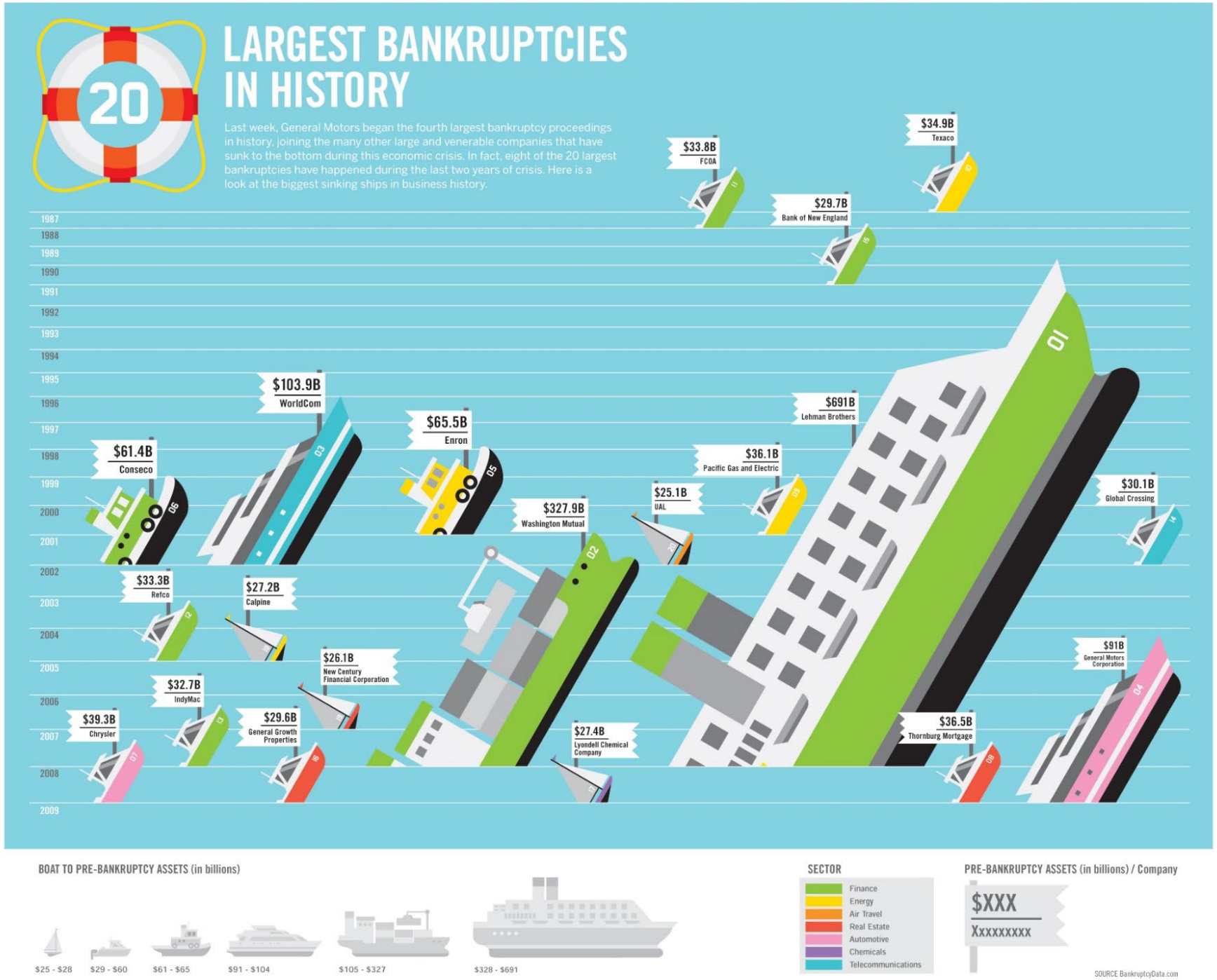
explore, refine, combine, complete

look for outliers & surprises

separate main and side issues

define key message(s)

limit yourself



Identify your message

list the available data and illustrations

explore, refine, combine, complete

look for outliers & surprises

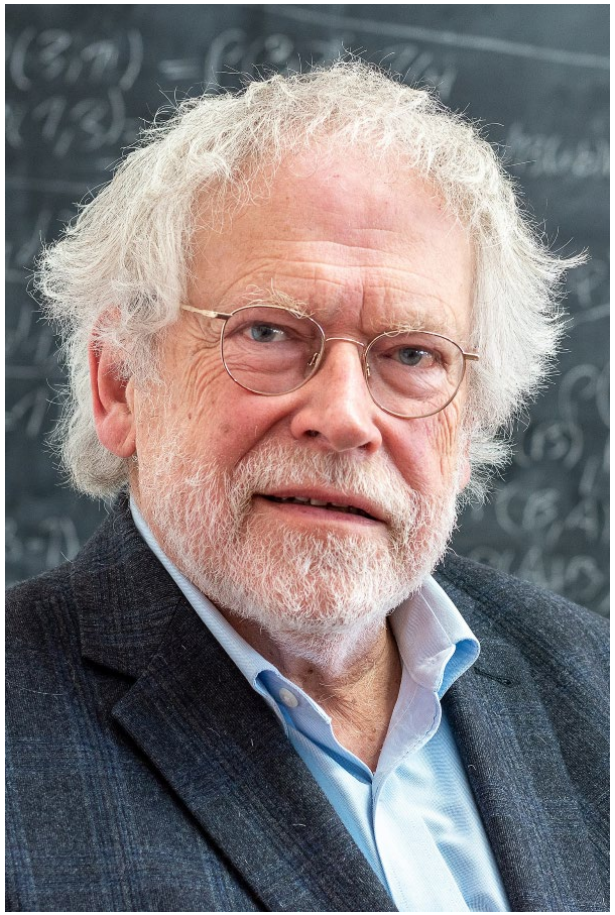
separate main and side issues

define key message(s)

limit yourself

Alain Aspect

John F. Clauser



Anton Zeilinger

Cecil Powell
Facts

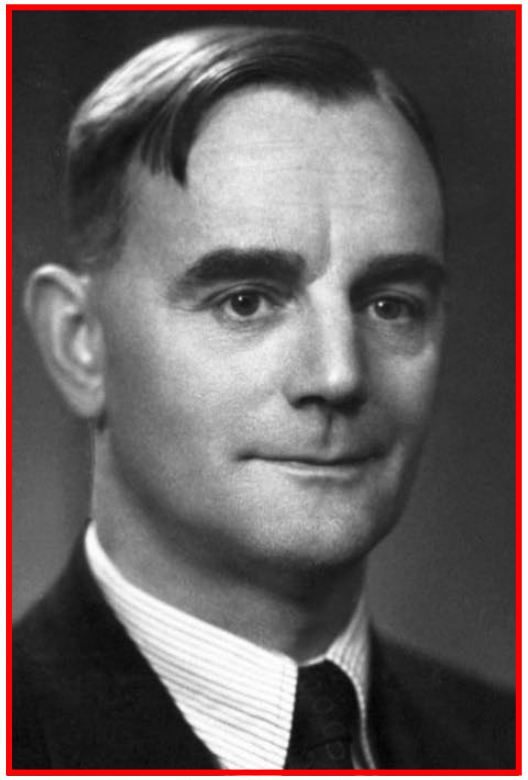


Photo from the Nobel Foundation archive.

Cecil Frank Powell
The Nobel Prize in Physics 1950

Born: 5 December 1903, Tonbridge, United Kingdom

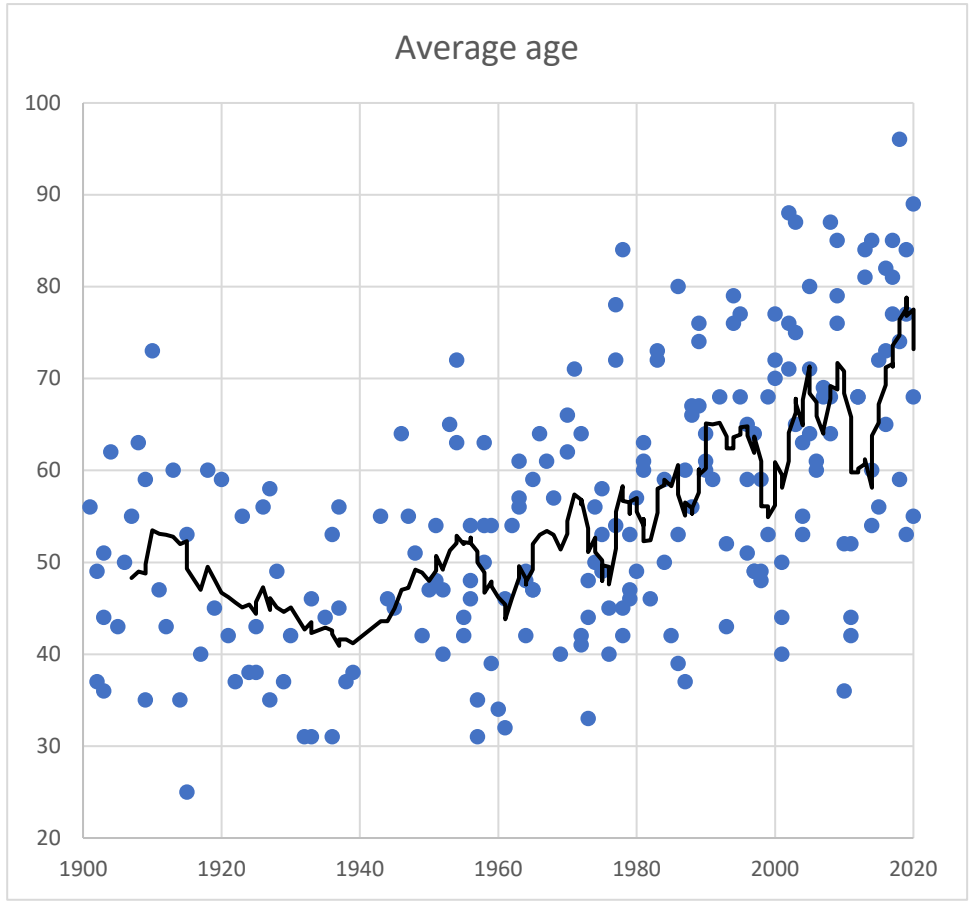
Died: 9 August 1969, Italy

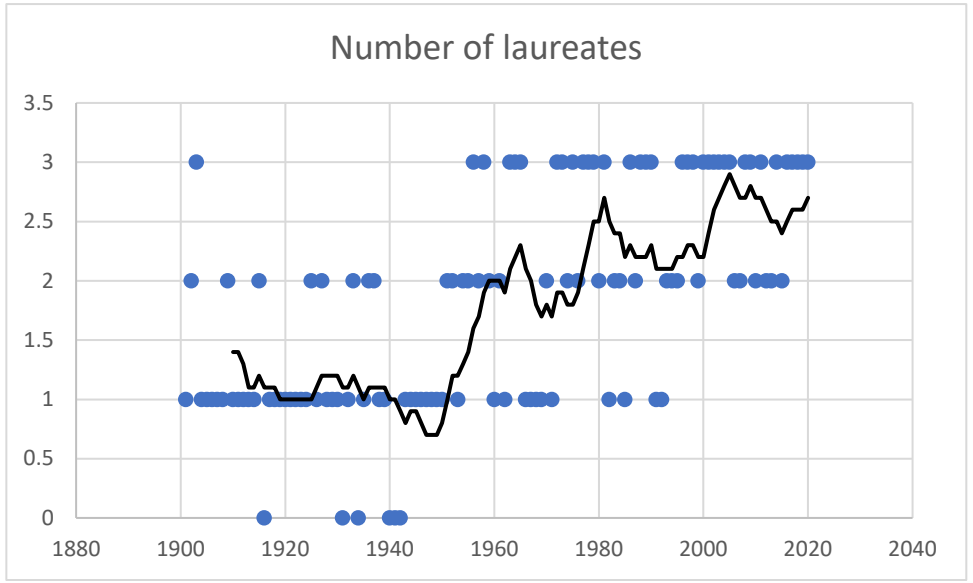
Affiliation at the time of the award: Bristol University, Bristol, United Kingdom

Prize motivation: "for his development of the photographic method of studying nuclear processes and his discoveries regarding mesons made with this method."

Prize share: 1/1

full name
year of award
date of birth
place of birth
date of death
prize share
picture
--
gender

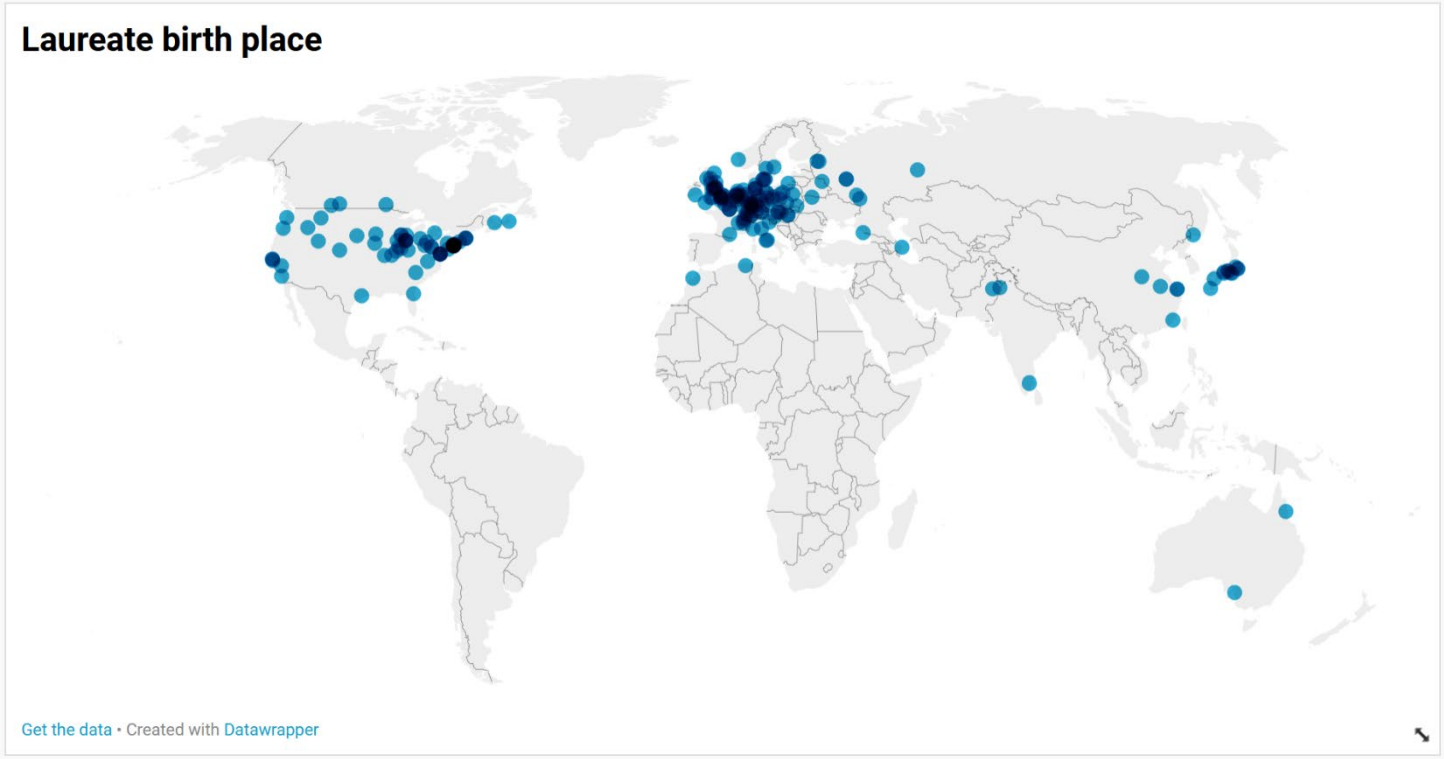




gender balance

Men: 218

Women: 4



The Nobel Prize in Physics

114 years, 108 prizes, 198 laureates

25 YOUNGEST LAUREATE

William Lawrence Bragg
1915

88 OLDEST LAUREATE

Raymond Davis Jr.
2002

2 HIGHEST NUMBER OF PRIZES WON

John Bardeen
1956, 1972

Laureates' gender

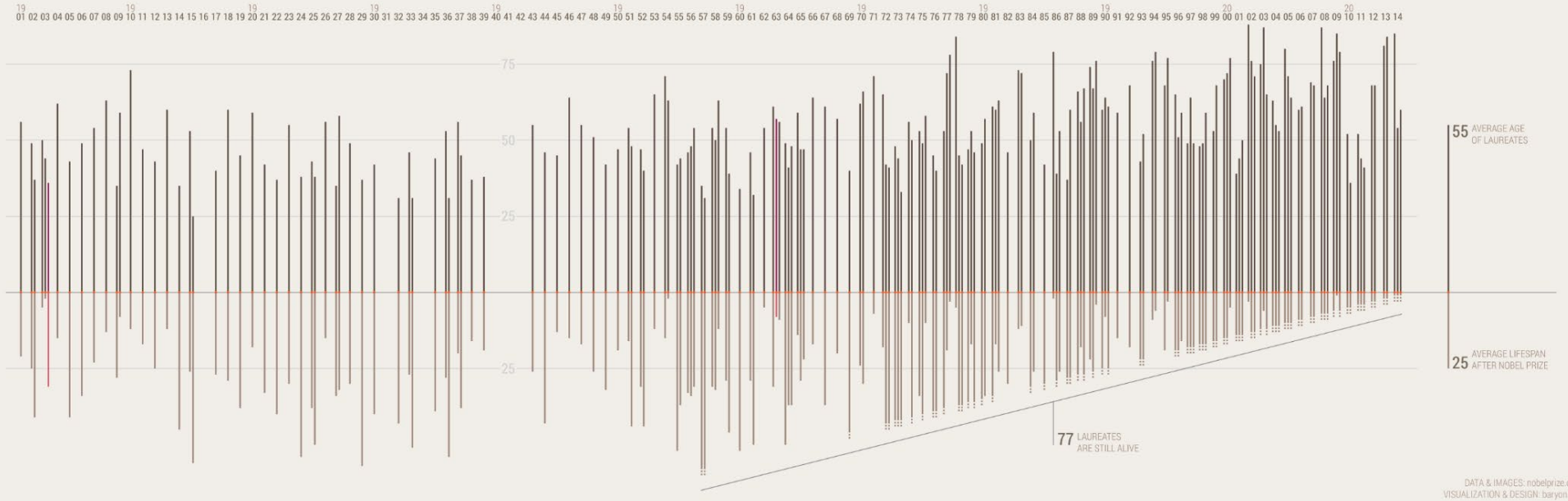
MALE 196
FEMALE 2

Marie Skłodowska-Curie
1903

Maria Goeppert-Mayer
1963

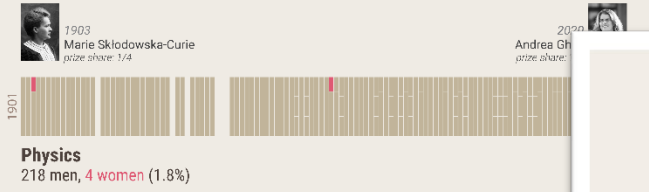
Most successful research domains

PARTICLE PHYSICS	34
ATOMIC PHYSICS	28
CONDENSED MATTER	28
INSTRUMENTATION	20
NUCLEAR PHYSICS	17
ELECTROMAGNETISM	14
ASTROPHYSICS	13
QUANTUM MECHANICS	11
OPTICAL PHYSICS	10
SUPERCONDUCTIVITY	9
SUPERFLUIDITY	8
ELECTRODYNAMICS	8
SEMICONDUCTORS	8

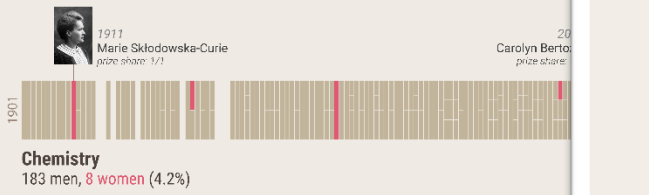


DATA & IMAGES: nobelprize.org
VISUALIZATION & DESIGN: baryon.be

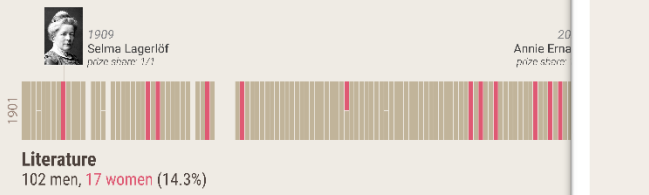
Medicine
213 men, 12 women (5.3%)



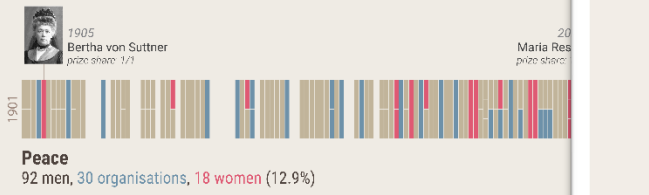
Physics
218 men, 4 women (1.8%)



Chemistry
183 men, 8 women (4.2%)



Literature
102 men, 17 women (14.3%)

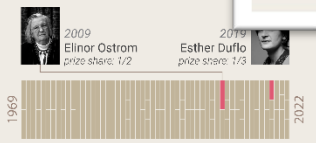


Peace
92 men, 30 organisations, 18 women (12.9%)

Women of the Nobel Prize

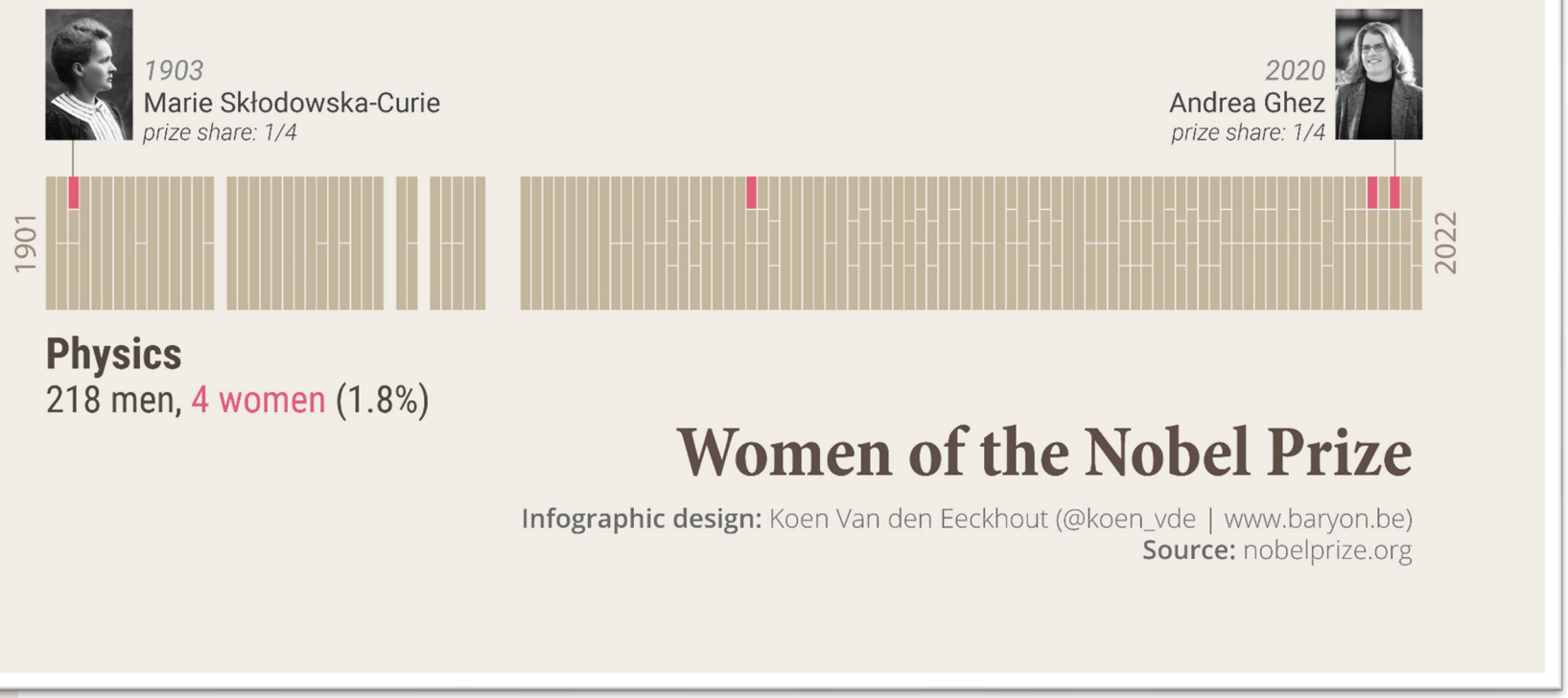
The Nobel Prize exists since 1901. In those 122 years, the Prize was awarded 898 times to a man, but only 61 times to a woman. 2009 was a record year, with 5 women winning a Prize.

In 2022, only 2 women received the Prize: Annie Ernaux won the Literature Prize, and Carolyn Bertozzi won the Chemistry Prize together with Morten Meldal and K. Barry Sharpless, for their groundbreaking work on click chemistry and bioorthogonal chemistry - chemical reactions that can occur inside of living systems.



Economics
90 men, 2 women (2.2%)

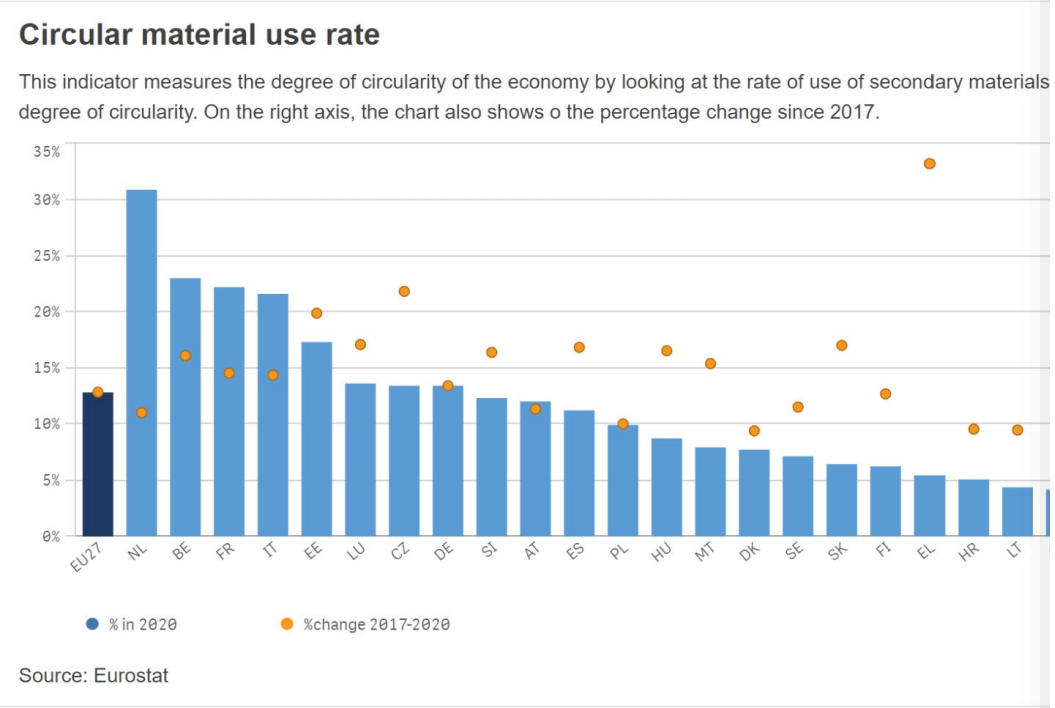
Source: nobelprize.org
Infographic design: Koen Van den Eeckhout (@koen_vde | www.baryon.be)

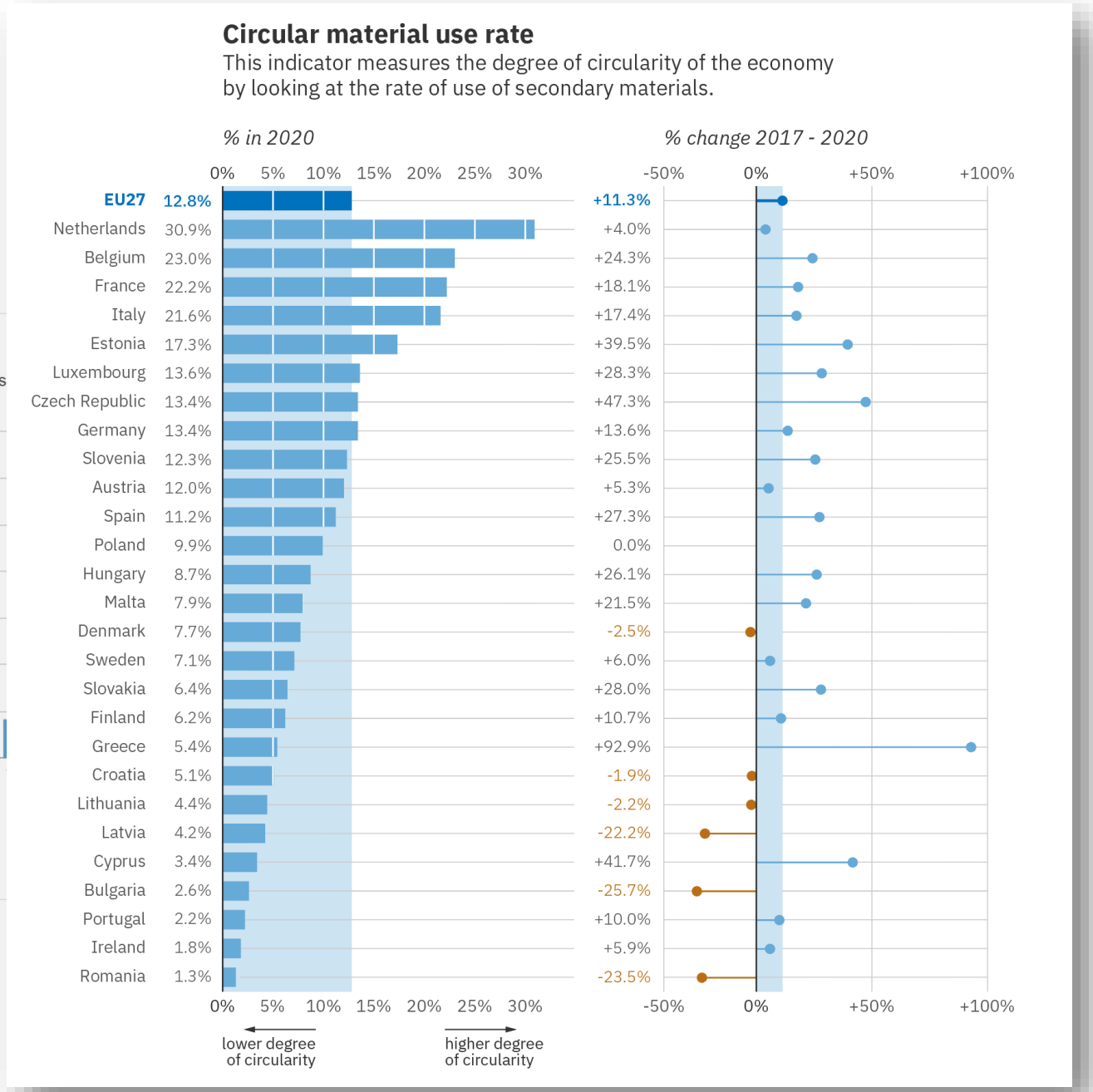


baryon.be/nobelprize

Dual axes

Telling too many stories at once?





Communication principles

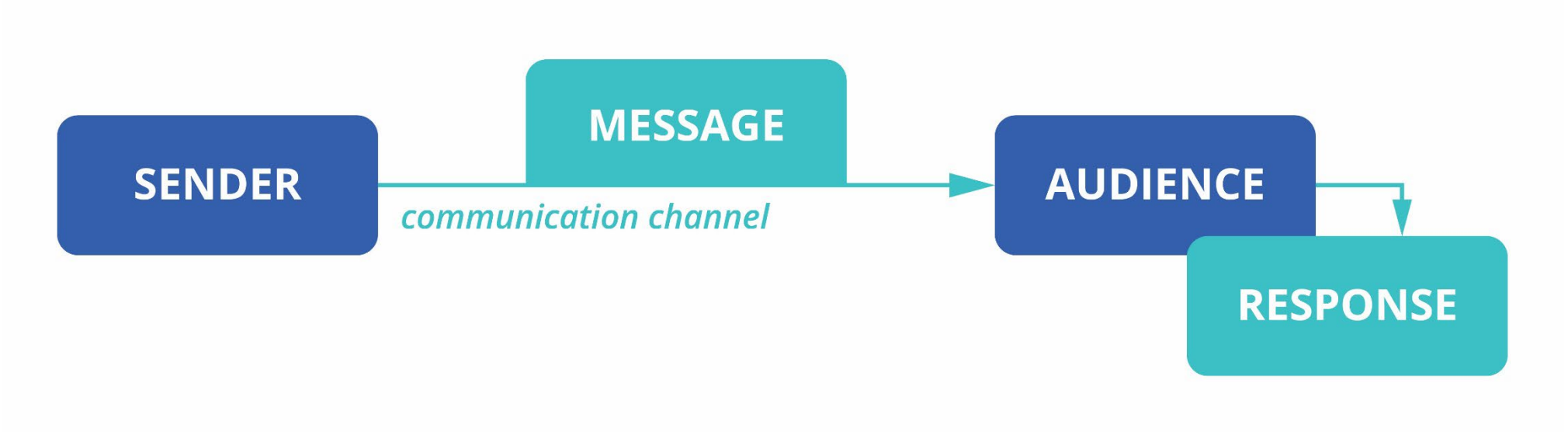
1. Identify your **message**
2. Adapt to your _ _ _ _ _ _ _ _ _
3. Improve the _ _ _ _ _ _ - _ _ - _ _ _ _ _ ratio


© hung.be photography

Communication principles

1. Identify your **message**
2. Adapt to your **audience**
3. Improve the _ _ _ _ _ _ - _ _ - _ _ _ _ _ ratio

The basic model of communication



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?

when you don't adapt to your audience...

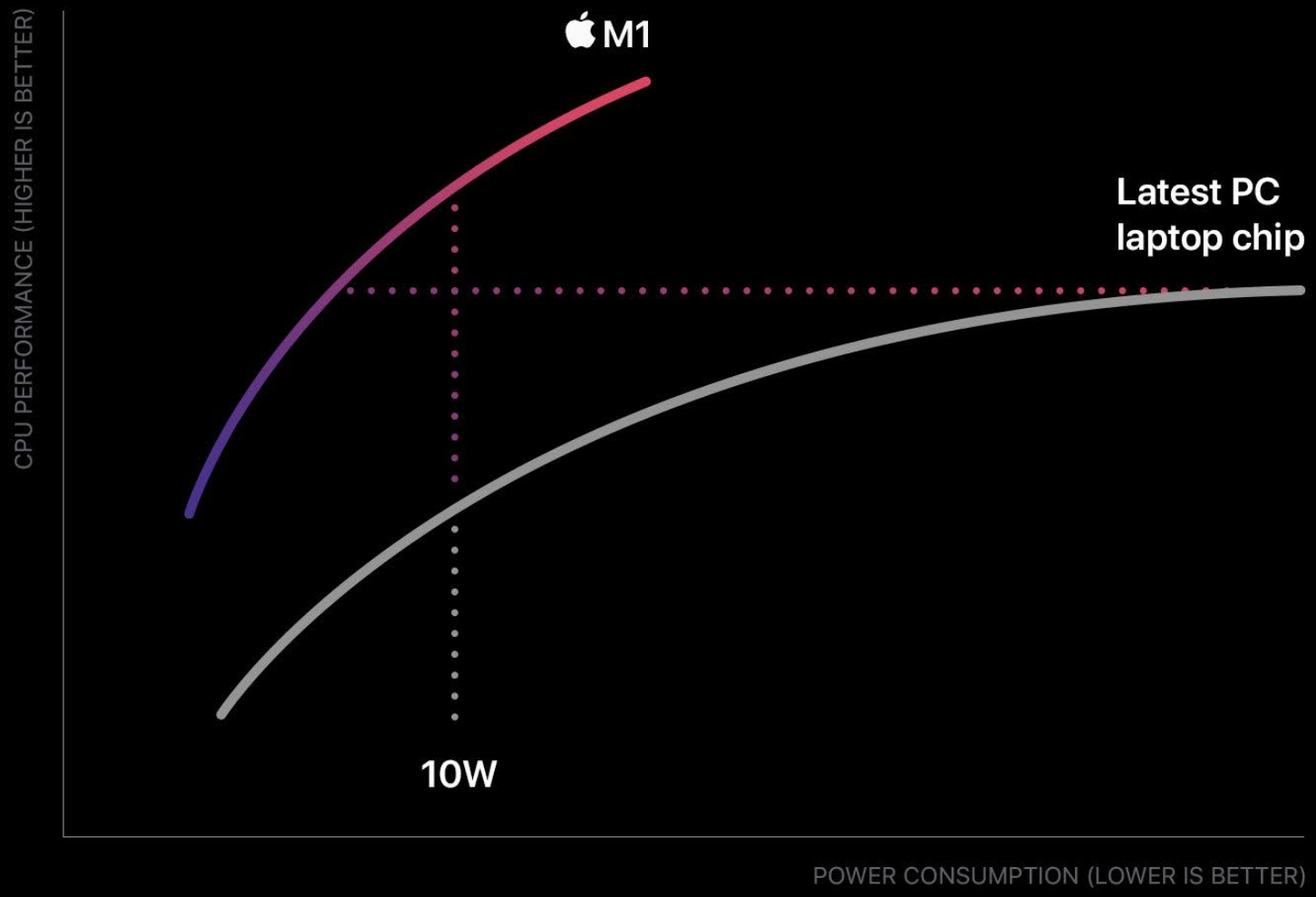
Communication principles

1. Identify your **message**
2. Adapt to your **audience**
3. Improve the _ _ _ _ _ _ - _ _ - _ _ _ _ _ ratio

The basic model of communication


GPS

CPU performance vs. power



Up to

2x

faster CPU performance[4]

Matches peak PC performance using

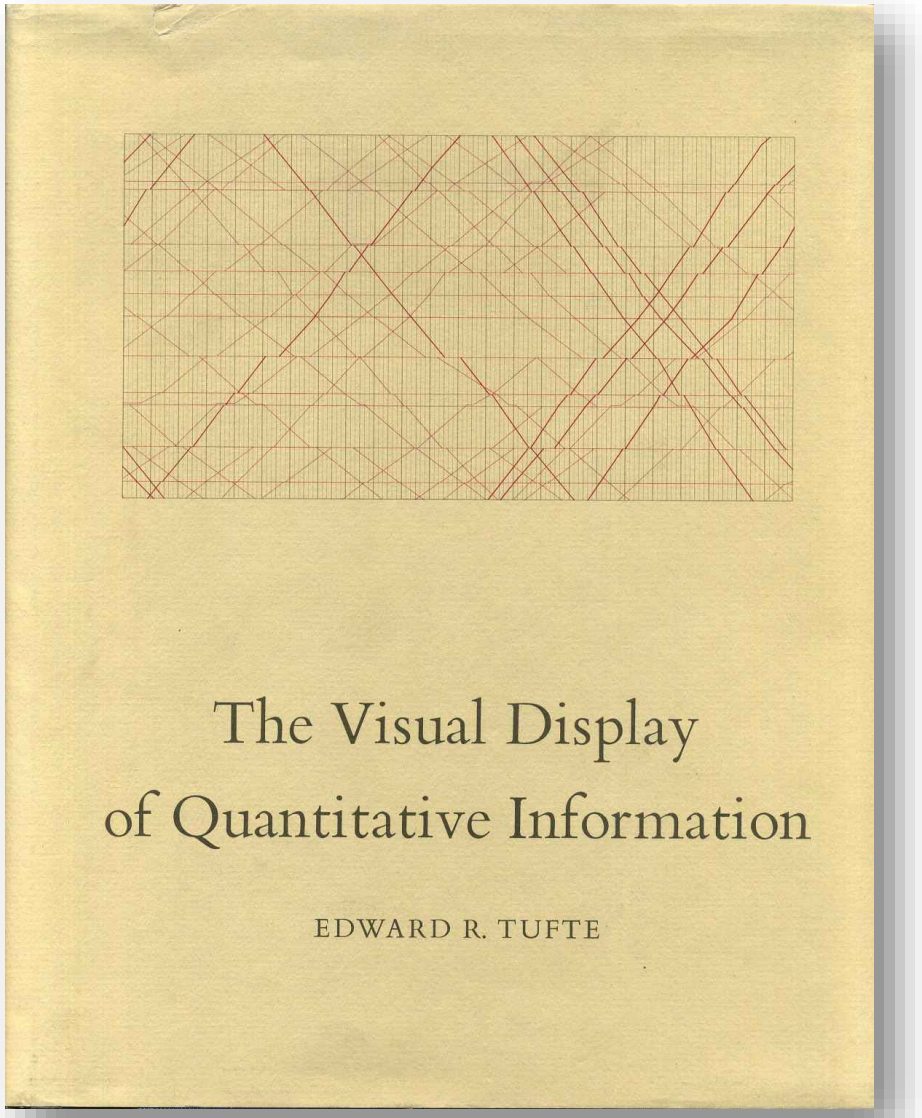
25%

of the power[4]

CPU performance

Communication principles

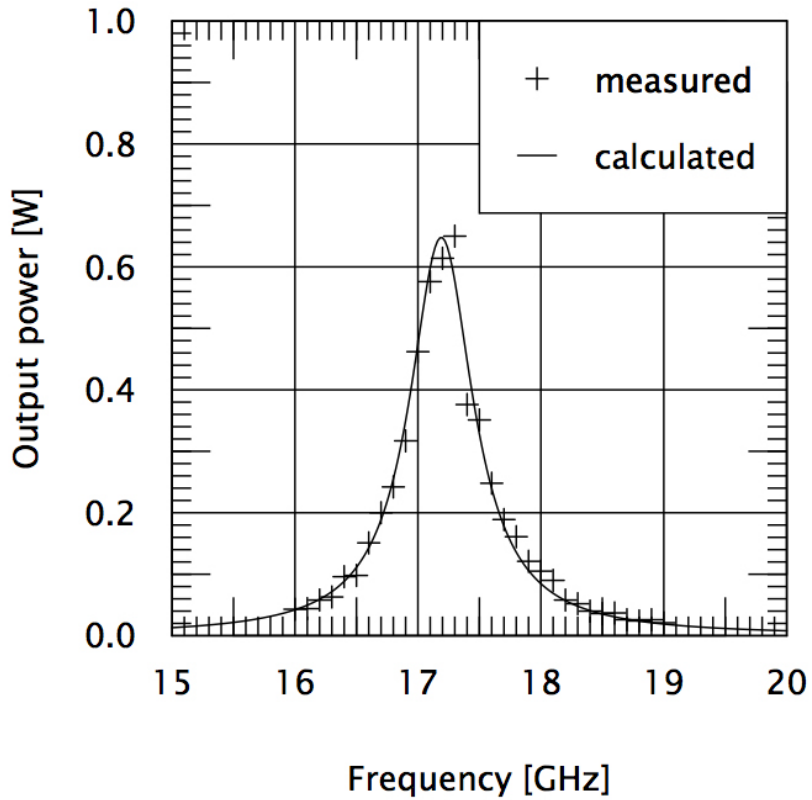
1. Identify your **message**
2. Adapt to your **audience**
3. Improve the **signal-to-noise** ratio

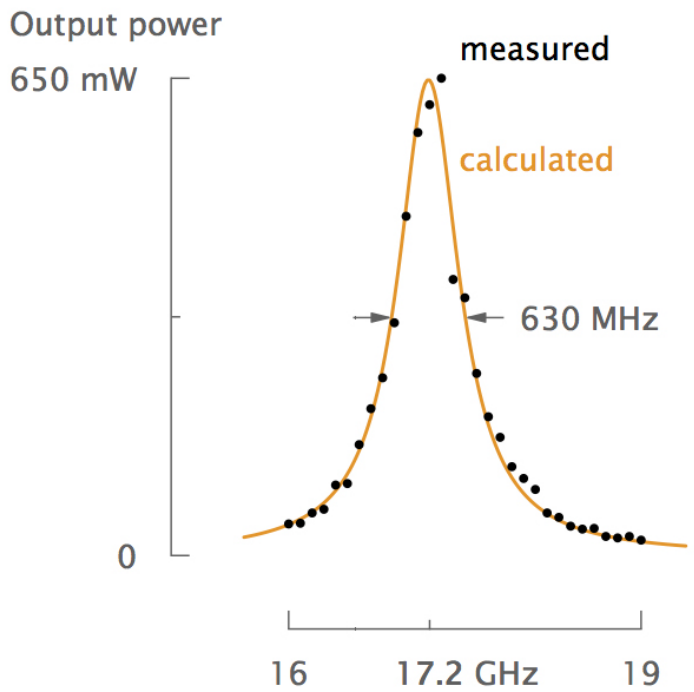


“Maximize the **data-ink ratio**”

Low **data-ink ratio**

High **data-ink ratio**





Jean-Luc Doumont, Optics & Photonics Focus 2010

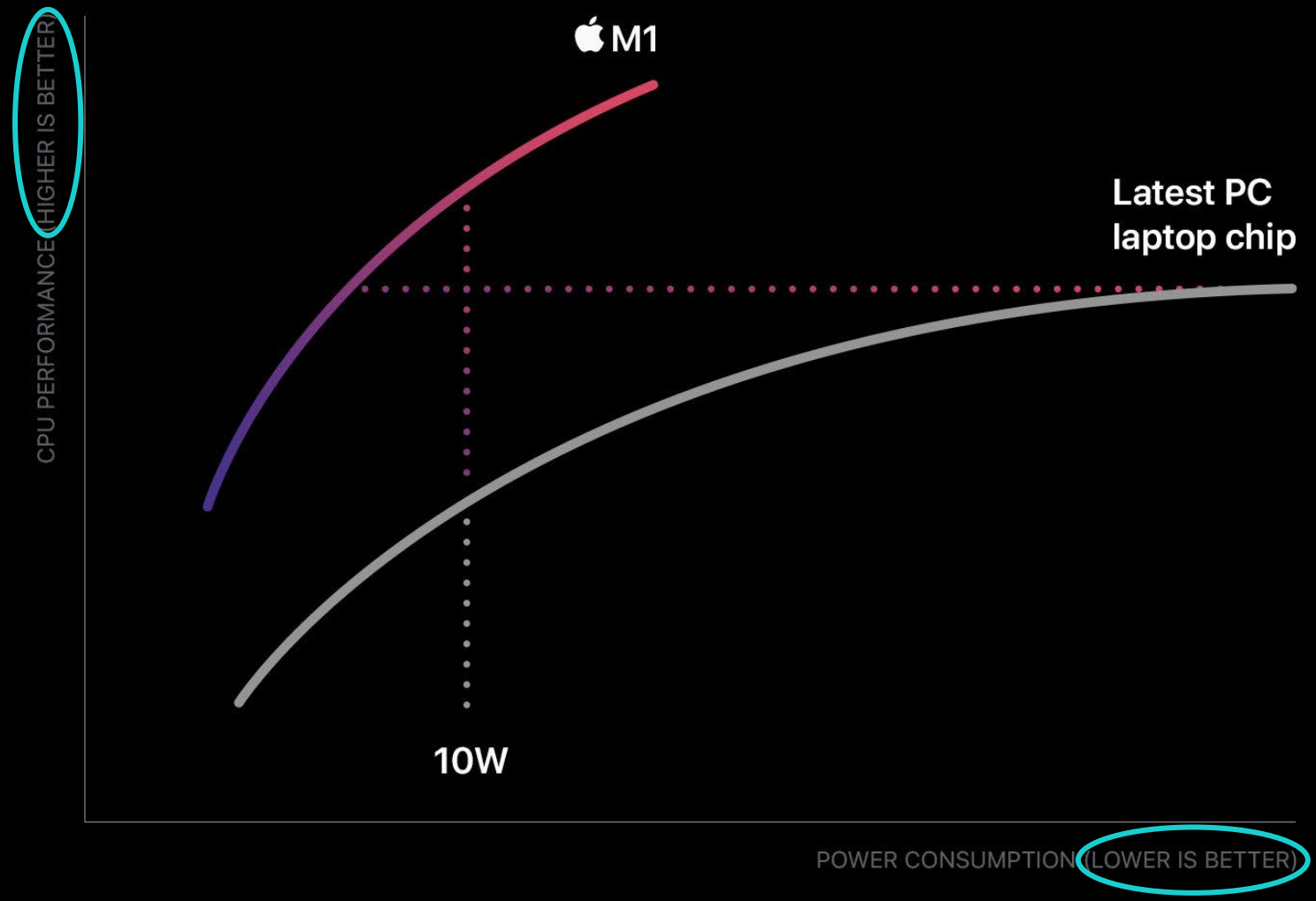
Noise = physical noise

elements which are on the visual
but are not helpful

+ mental noise

thinking work required
from your audience

CPU performance vs. power



Up to
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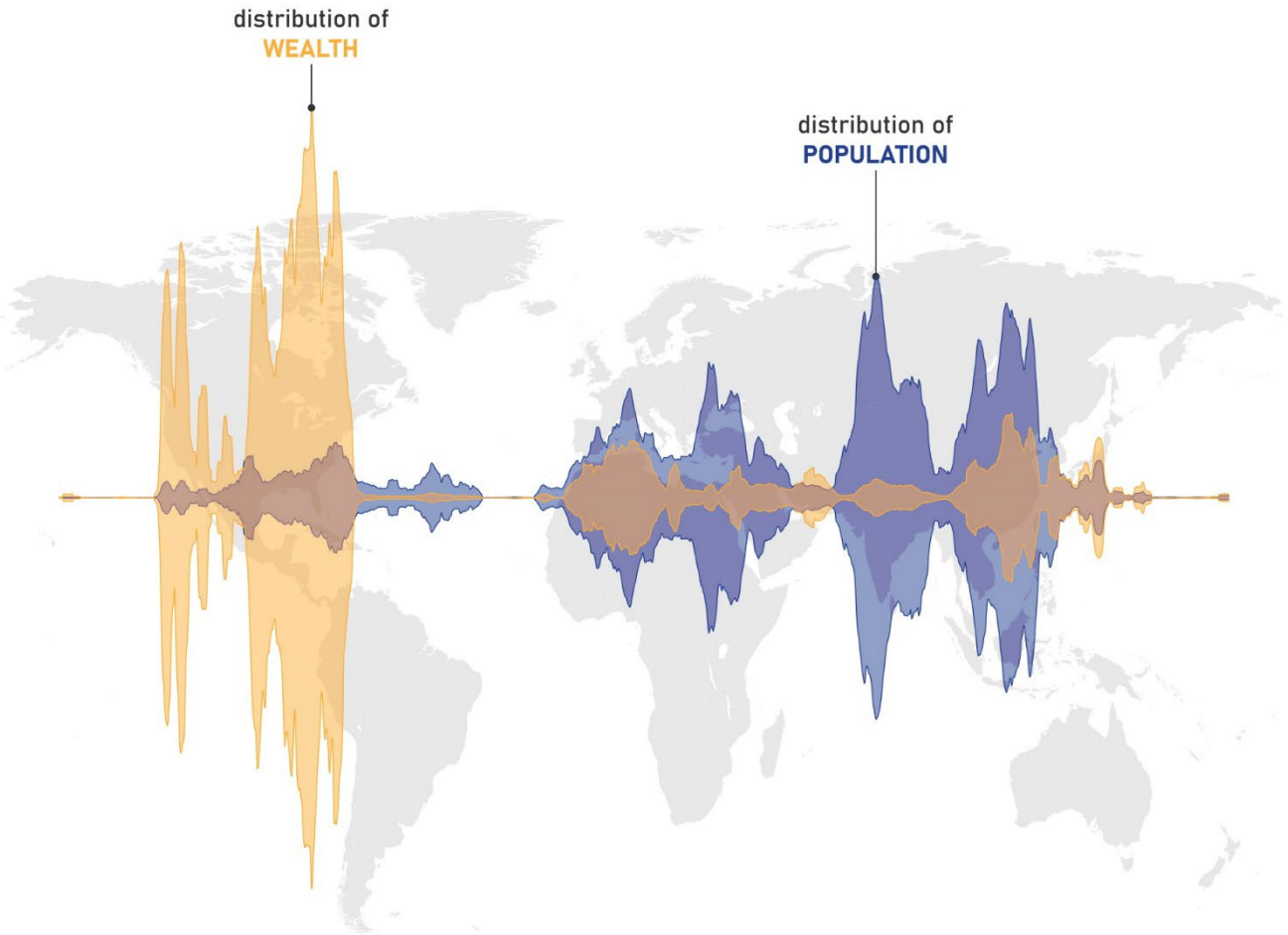
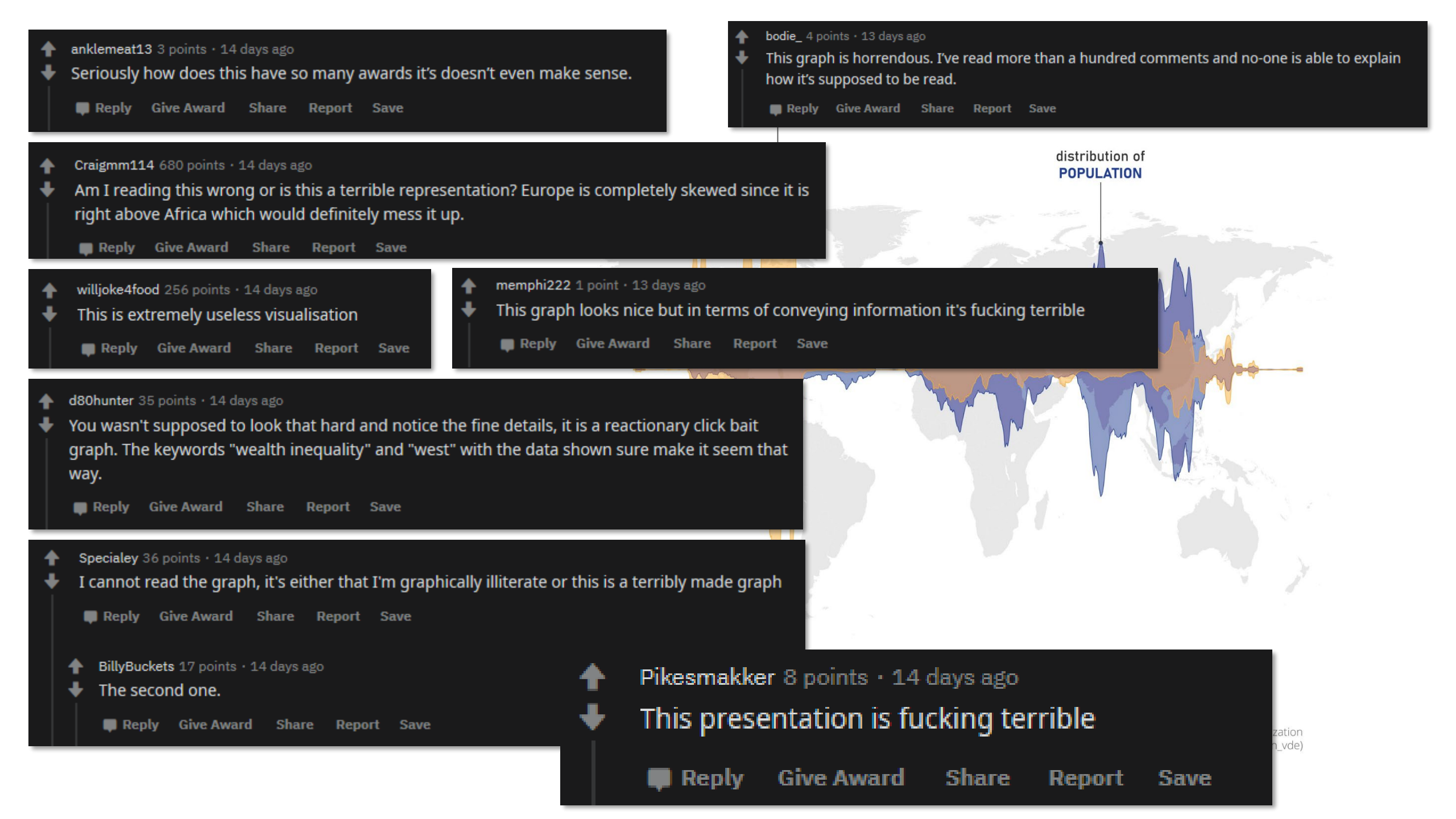


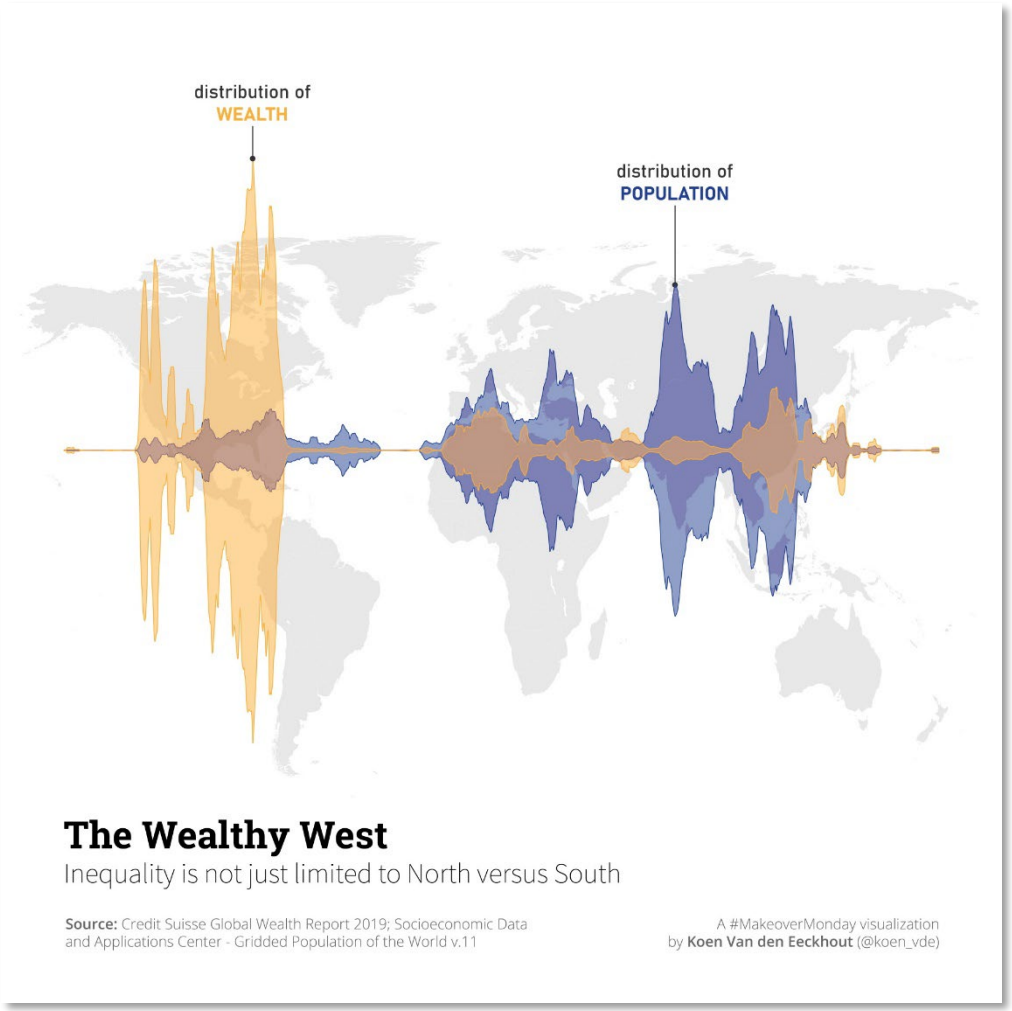
The Wealthy West

Inequality is not just limited to North versus South

Source: Credit Suisse Global Wealth Report 2019; Socioeconomic Data and Applications Center - Gridded Population of the World v.11

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


anklemeat13 3 points · 14 days ago
Seriously how does this have so many awards it's doesn't even make sense.
Reply Give Award Share Report Save
bodie_ 4 points · 13 days ago
This graph is horrendous. I've read more than a hundred comments and no-one is able to explain how it's supposed to be read.
Reply Give Award Share Report Save
Craigmm114 680 points · 14 days ago
Am I reading this wrong or is this a terrible representation? Europe is completely skewed since it is right above Africa which would definitely mess it up.
Reply Give Award Share Report Save
distribution of
POPULATION
willjoke4food 256 points · 14 days ago
This is extremely useless visualisation
Reply Give Award Share Report Save
memphi222 1 point · 13 days ago
This graph looks nice but in terms of conveying information it's fucking terrible
Reply Give Award Share Report Save
d80hunter 35 points · 14 days ago
You wasn't supposed to look that hard and notice the fine details, it is a reactionary click bait graph. The keywords "wealth inequality" and "west" with the data shown sure make it seem that way.
Reply Give Award Share Report Save
Specialey 36 points · 14 days ago
I cannot read the graph, it's either that I'm graphically illiterate or this is a terribly made graph
Reply Give Award Share Report Save
BillyBuckets 17 points · 14 days ago
The second one.
Reply Give Award Share Report Save
Pikesmakker 8 points · 14 days ago
This presentation is fucking terrible
Reply Give Award Share Report Save



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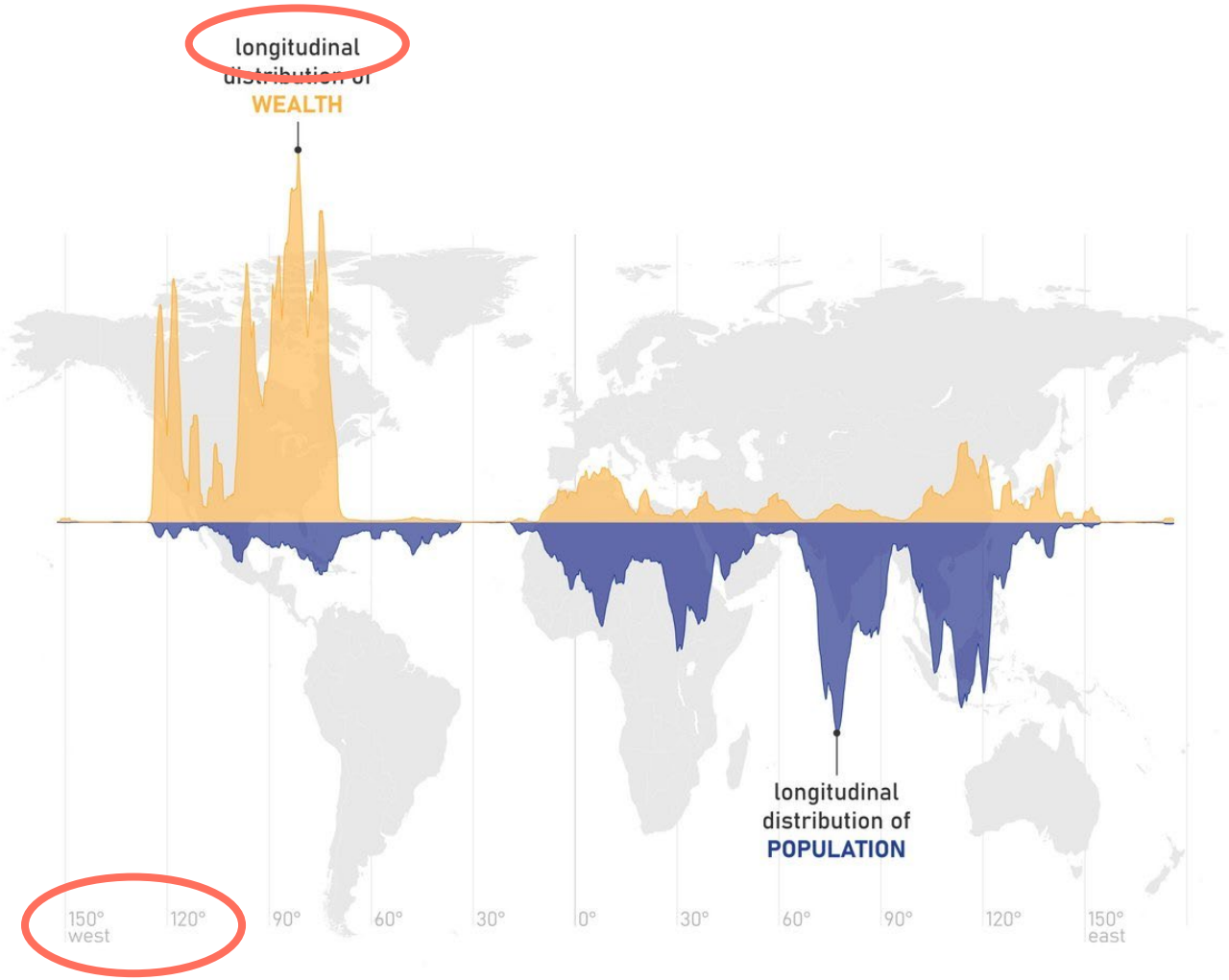

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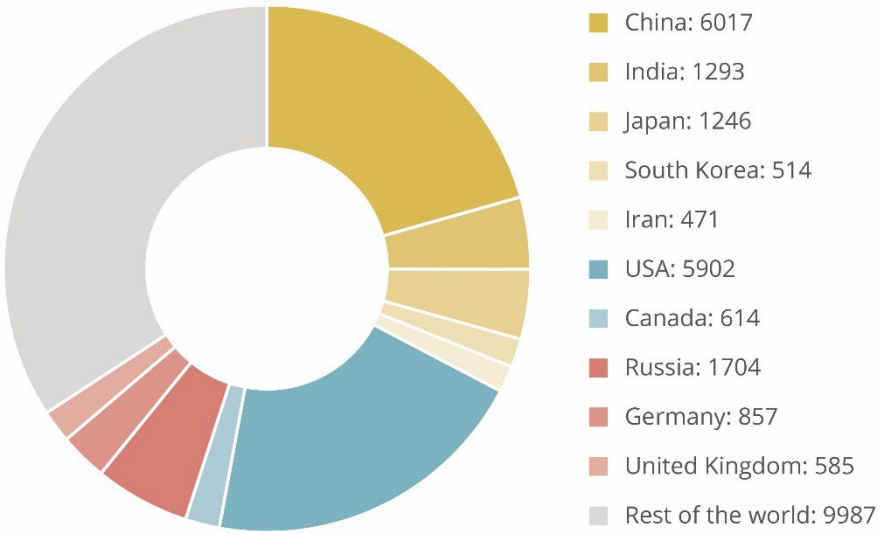
A #MakeoverMonday visualization by **Koen Van den Eeckhout** (@koen_vde)

Quick tip

Direct labeling

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

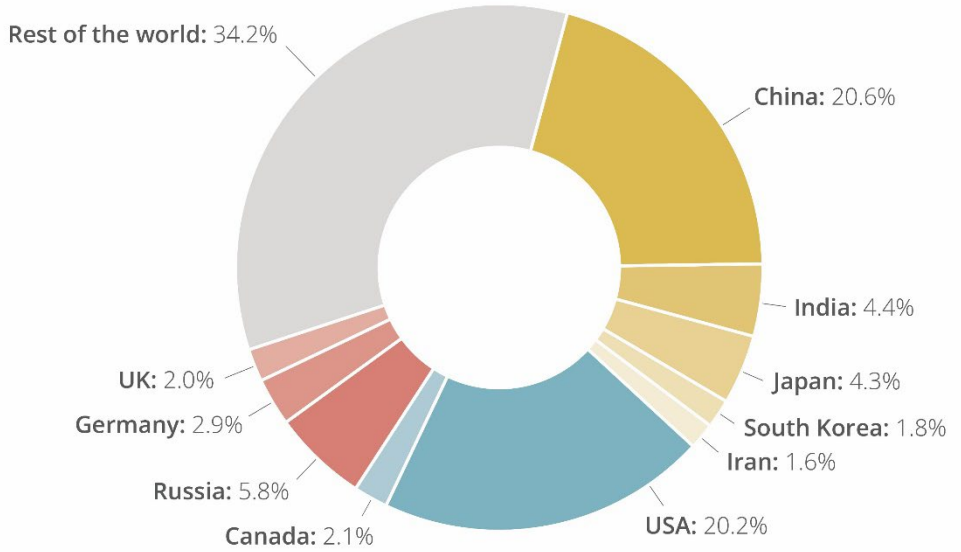
Million metric tons of carbon dioxide, in 2006



Source: Energy Emission Administration

Global share of CO_2 emissions (2006)

Carbon dioxide emissions are dominated by China and the USA



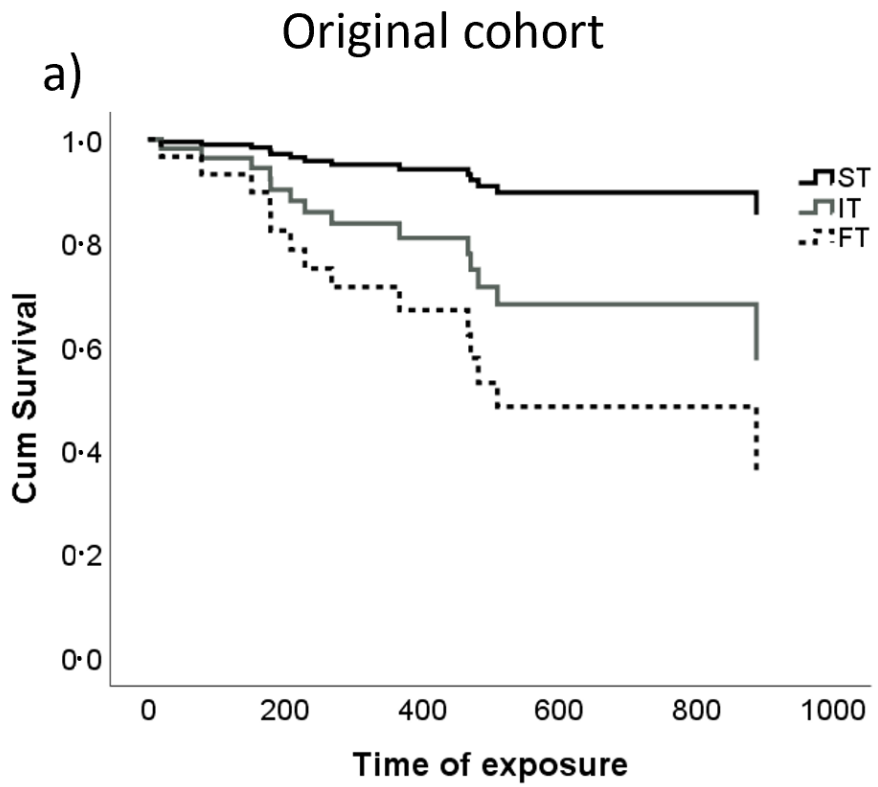
Source: Energy Emission Administration

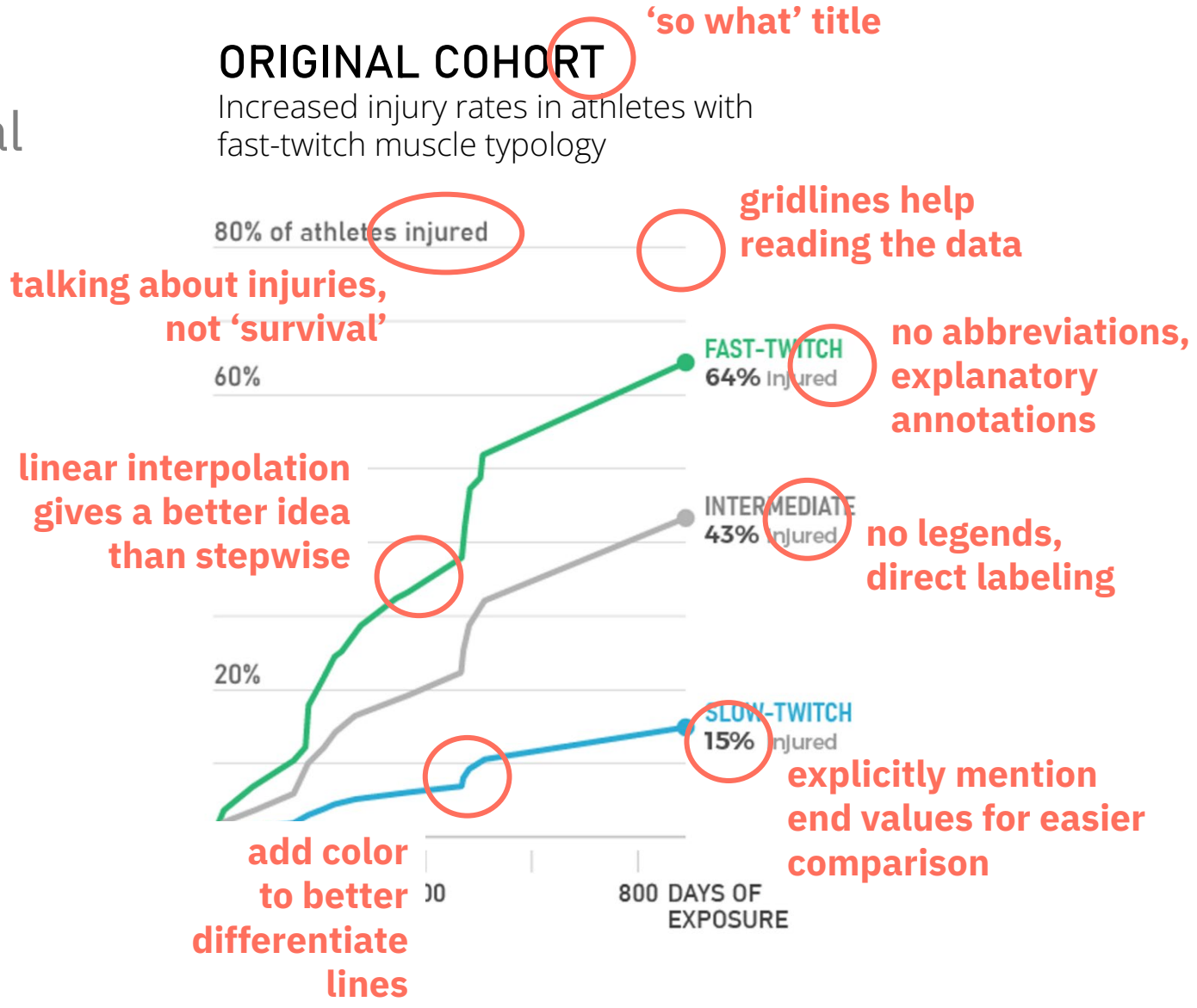
Communication principles

1. Identify your **message**
2. Adapt to your **audience**
3. Improve the **signal-to-noise** ratio

How would you do it?

Write down at least 5 things you would change to improve this visual

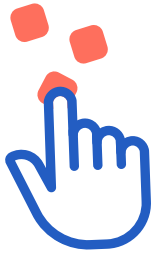




Lunch break

All the slides and all the links:

baryon.be/dataviz-resources



All the slides and all the links:

baryon.be/dataviz-resources

Session 1 — **Graphical representation of data**

homework assignment part 1

Session 2 — **Producing and designing data visuals**

homework assignment part 2

Session 3 — **Visualizing scientific research**

Encoding

Graphical representation categories

Visual variables

Chart types

Common chart types

15’ break

Less common chart types

Maps and tables

Maps

Table design

Inspiration – online and offline

Encoding

graphical representation categories

What do we want to do with our data?

visual variables

How can we turn raw numbers into shapes?

Graphical representation categories

comparison

part-to-whole comparison

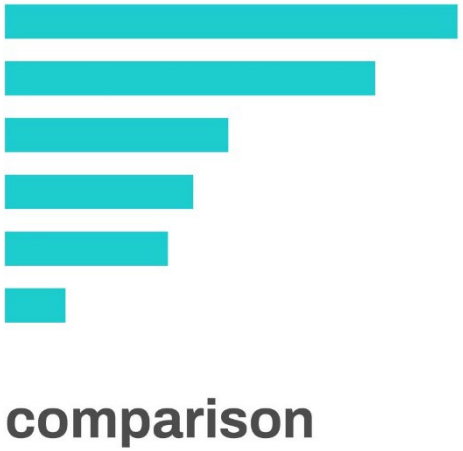
distribution

spatial distribution

correlation

evolution

hierarchy



Graphical representation categories

comparison

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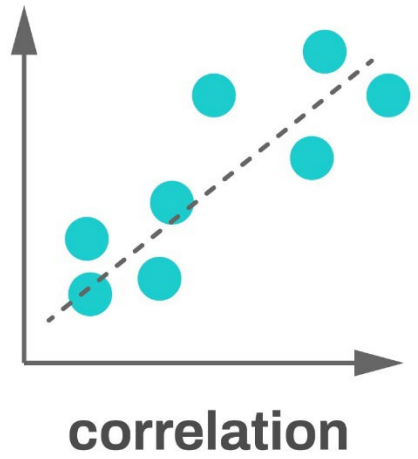

Graphical representation categories

comparison

part-to-whole comparison

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correlation

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hierarchy

Graphical representation categories

comparison

part-to-whole comparison

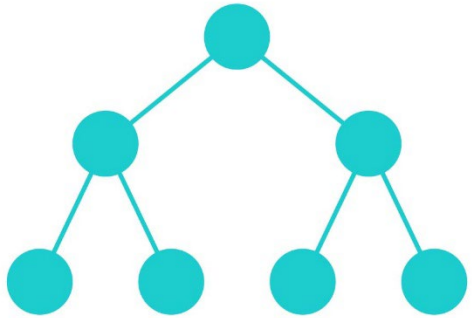
distribution

spatial distribution

correlation

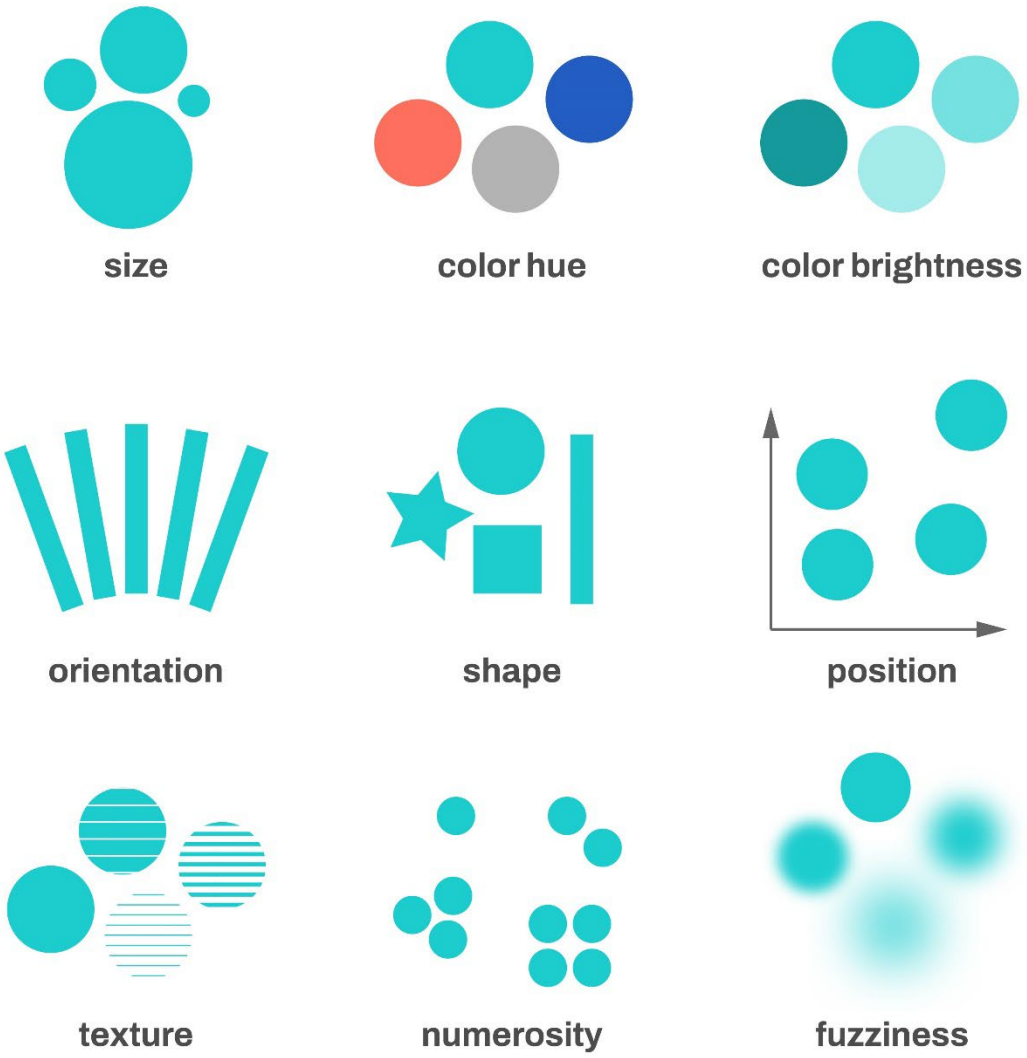
evolution

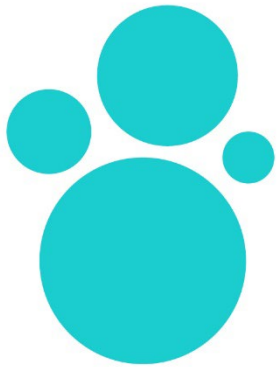
hierarchy



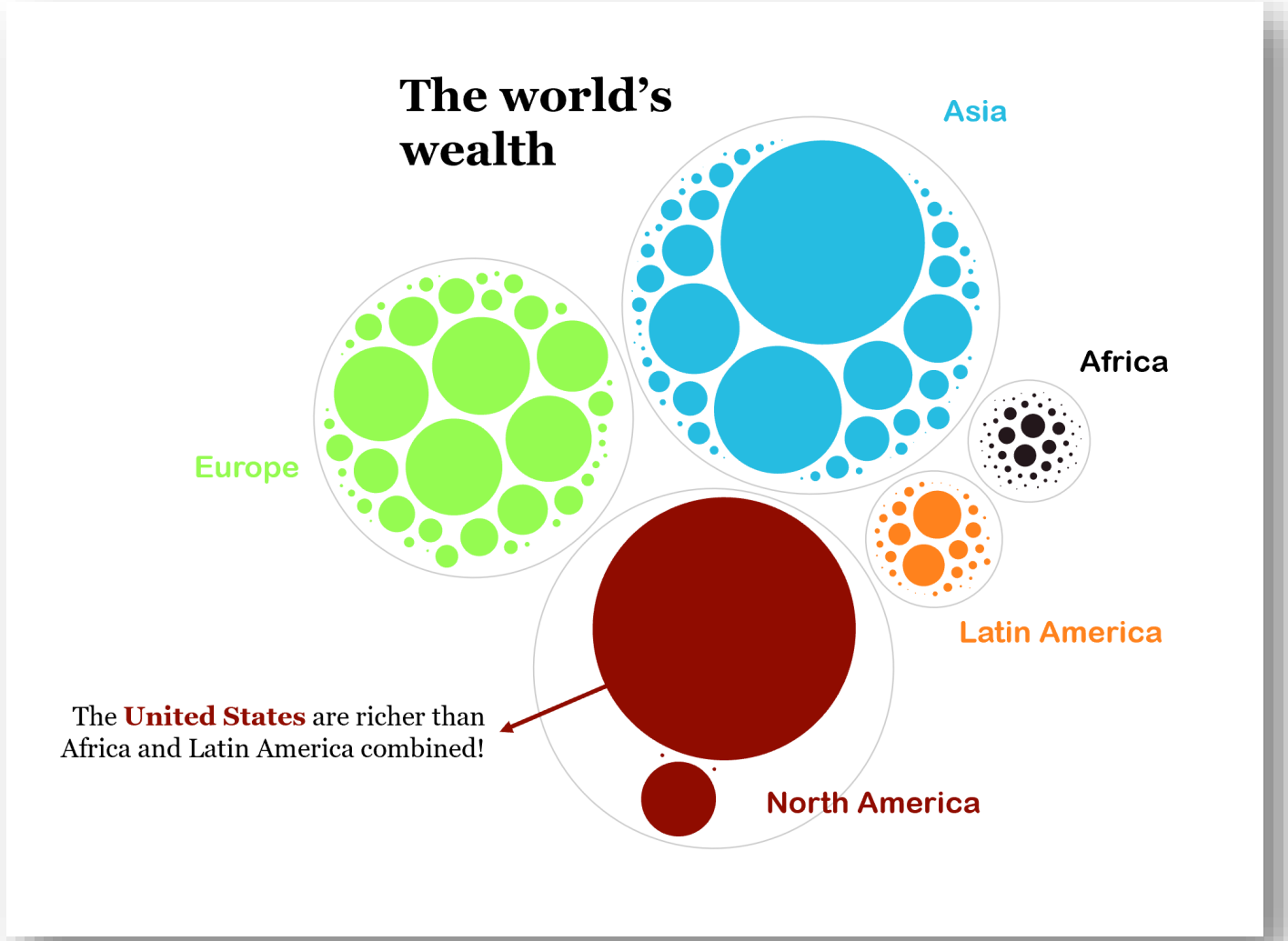
hierarchy

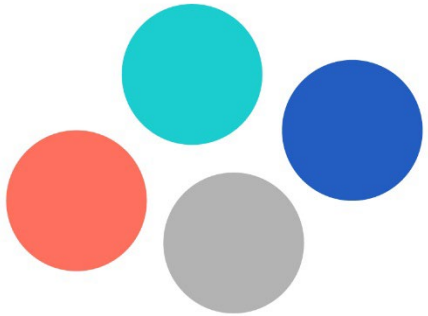
Visual variables



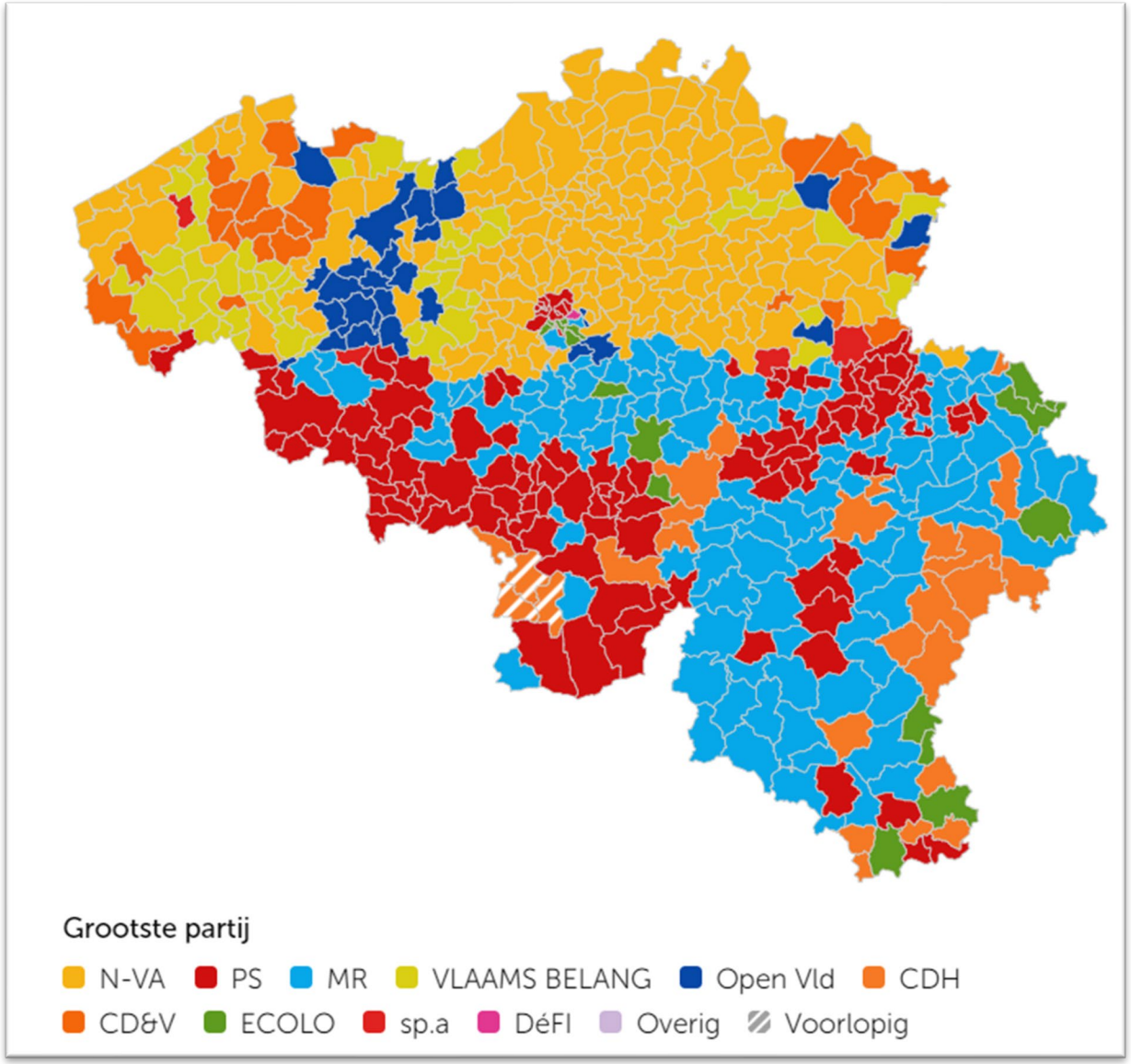


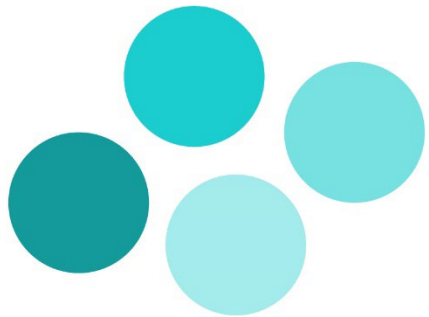
size


The world's wealth
Asia
Africa
Europe
Latin America
North America
The United States are richer than Africa and Latin America combined!

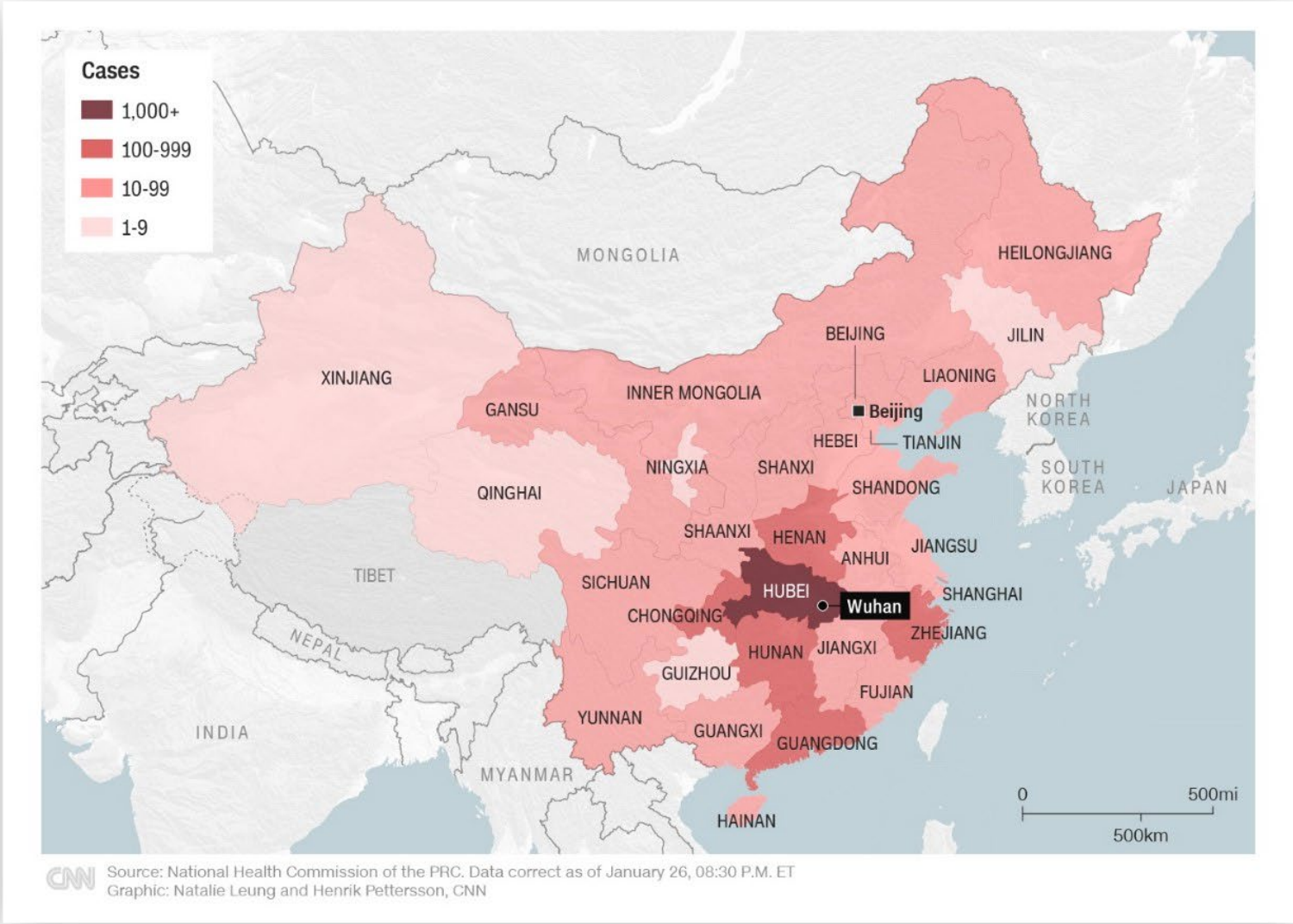


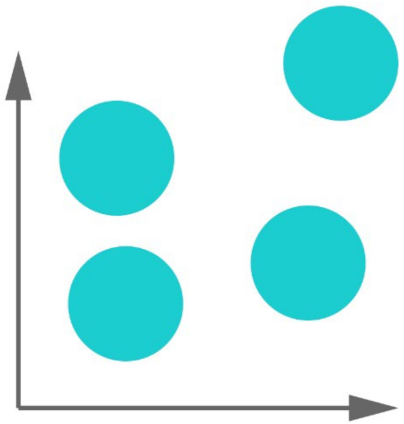
color hue


Grootste partij
N-VA
PS
MR
VLAAMS BELANG
Open Vld
CDH
CD&V
ECOLO
sp.a
DéFI
Overig
Voorlopig

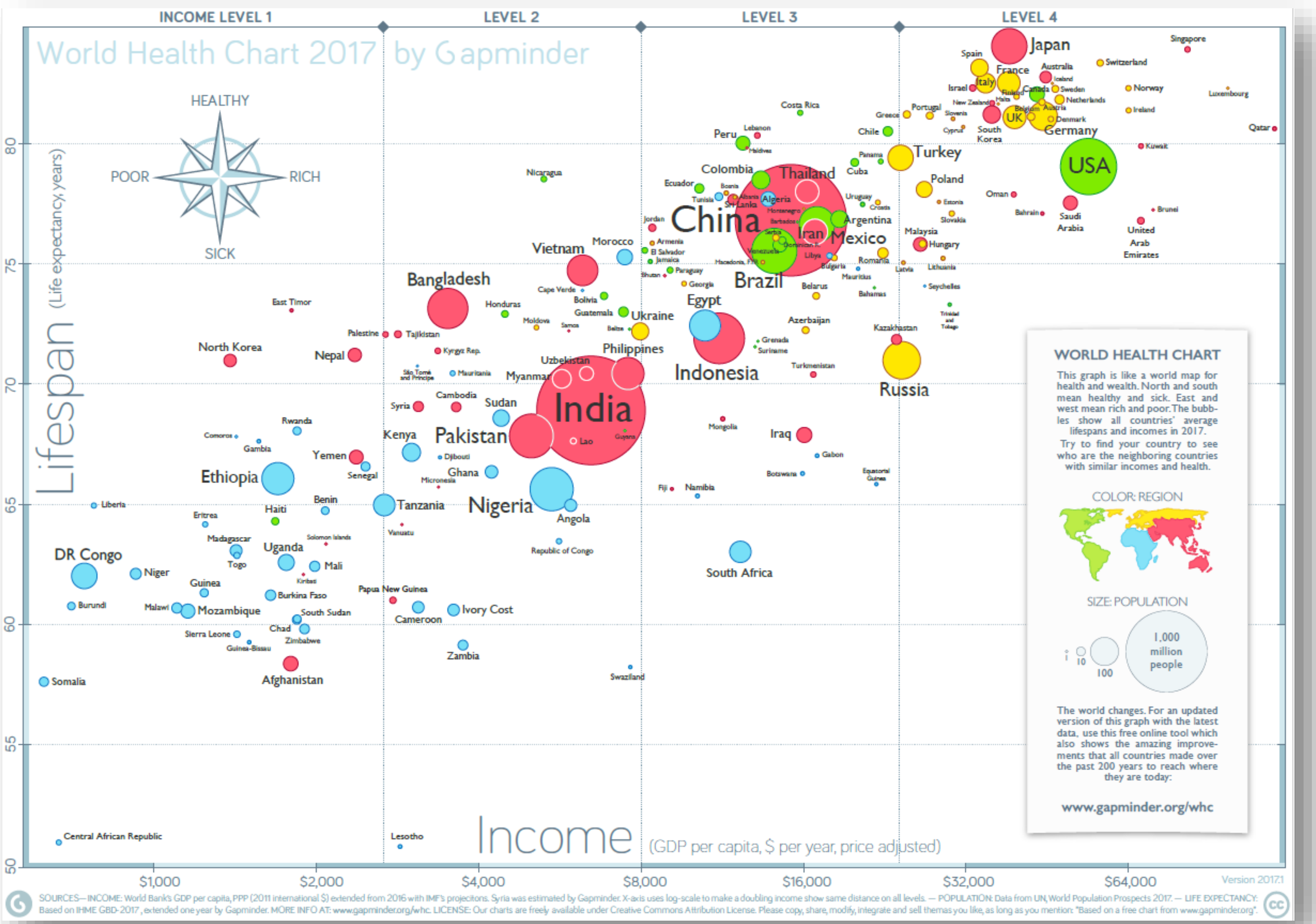


color brightness

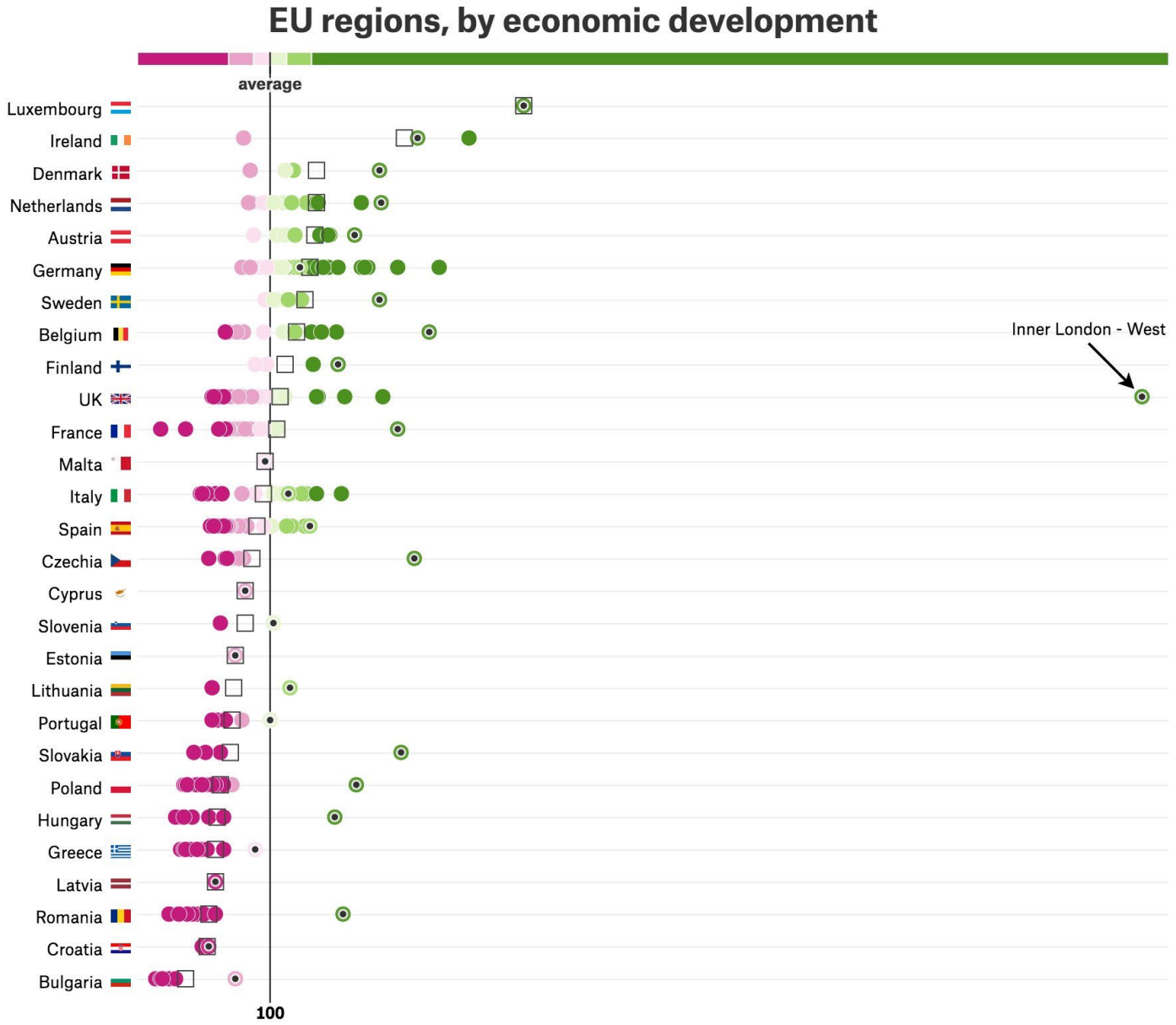




position

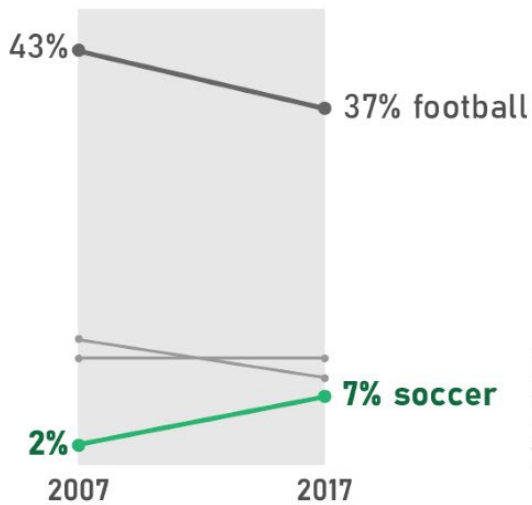


INCOME LEVEL 1
LEVEL 2
LEVEL 3
LEVEL 4
World Health Chart 2017 by Gapminder
HEALTHY
POOR
RICH
SICK
Lifespan (Life expectancy, years)
80
75
70
65
60
55
50
Income (GDP per capita, $ per year, price adjusted)
$1,000
$2,000
$4,000
$8,000
$16,000
$32,000
$64,000
Japan
USA
China
India
Indonesia
Brazil
Russia
Mexico
Turkey
Thailand
Germany
UK
France
Italy
Spain
Iran
Egypt
Vietnam
Bangladesh
Pakistan
Nigeria
Ethiopia
Philippines
DR Congo
Kenya
Tanzania
Uganda
Mozambique
Afghanistan
South Africa
Somalia
Central African Republic
Lesotho
Ukraine
Poland
Argentina
Colombia
Peru
Morocco
Myanmar
Sudan
Yemen
North Korea
Nepal
Iraq
Angola
Ghana
Zambia
Cameroon
Ivory Cost
Niger
Haiti
WORLD HEALTH CHART
This graph is like a world map for health and wealth. North and south mean healthy and sick. East and west mean rich and poor. The bubbles show all countries' average lifespans and incomes in 2017.
Try to find your country to see who are the neighboring countries with similar incomes and health.
COLOR: REGION
SIZE: POPULATION
1,000 million people
100
10
The world changes. For an updated version of this graph with the latest data, use this free online tool which also shows the amazing improvements that all countries made over the past 200 years to reach where they are today:
www.gapminder.org/whc
Version 2017.1

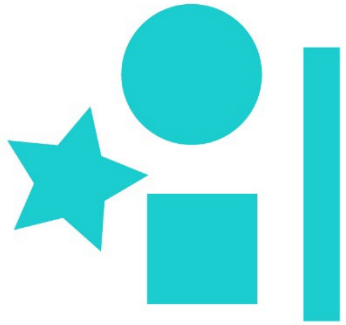


The region of Inner London-West is an outlier: its GDP is more than 600% of the EU average and, consequently, receives little in EU catch-up funds. Let's zoom in so we can see more details for the other regions.

orientation



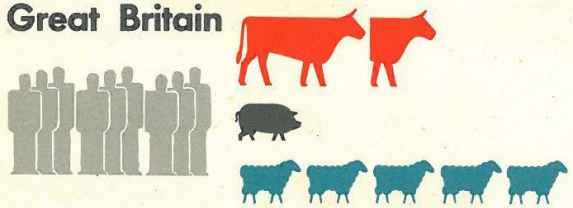
Soccer is rapidly growing in popularity and is now the **fourth favorite sport** to watch



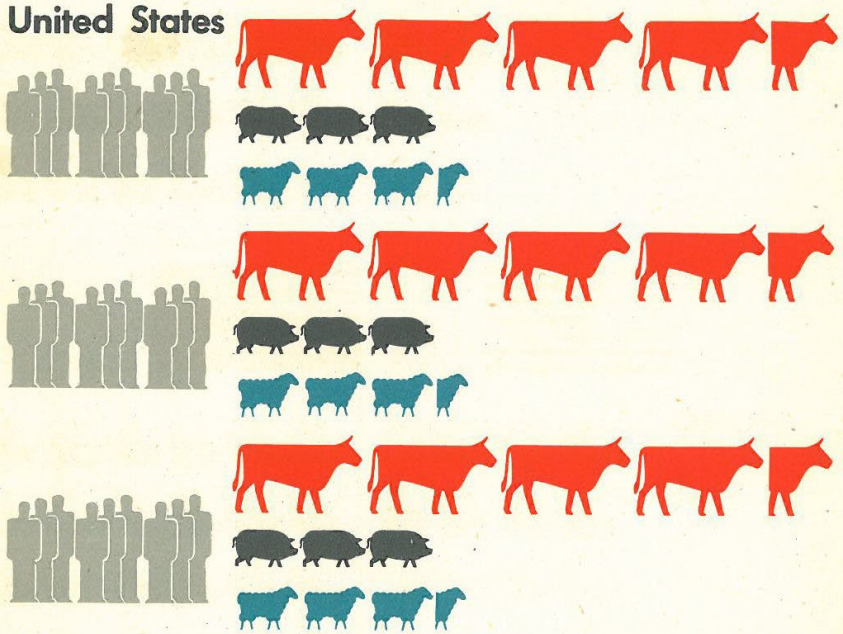
shape

Population and Live Stock

Great Britain



United States

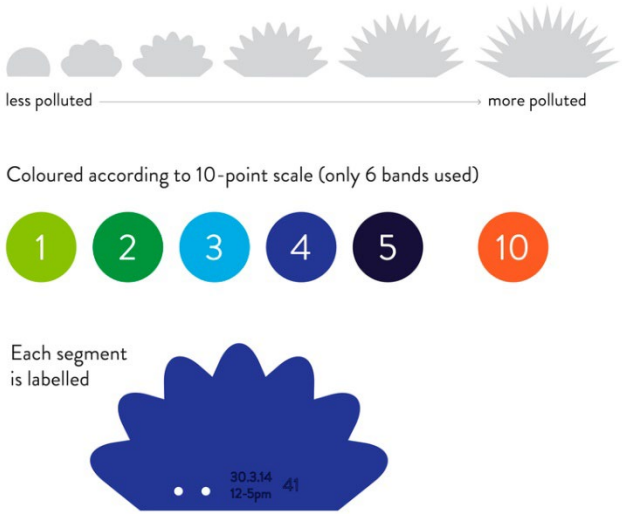


Each grey figure represents 5 million population
Each complete red symbol represents 5 million cattle
Each complete black symbol represents 5 million pigs
Each complete blue symbol represents 5 million sheep

Average for 1935 - 1939

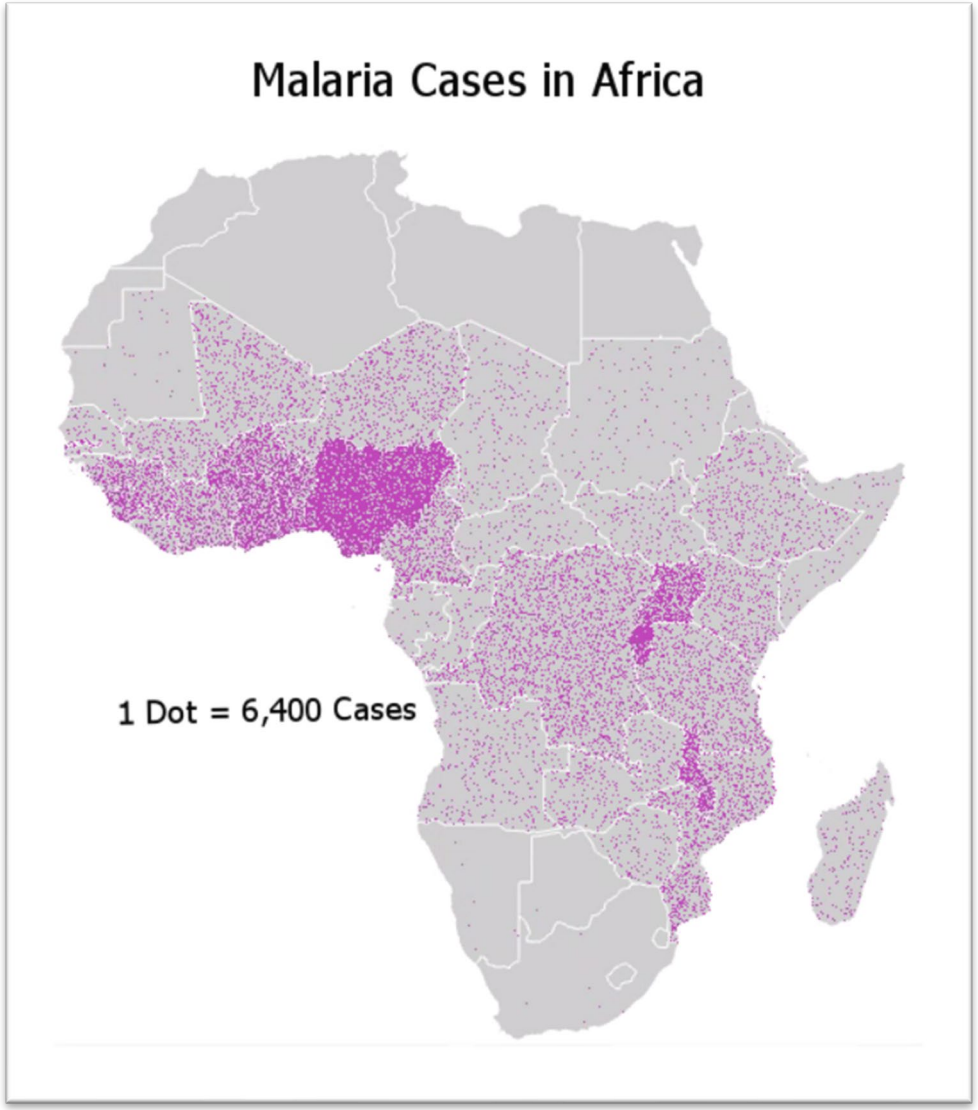
ISOTYPE

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.

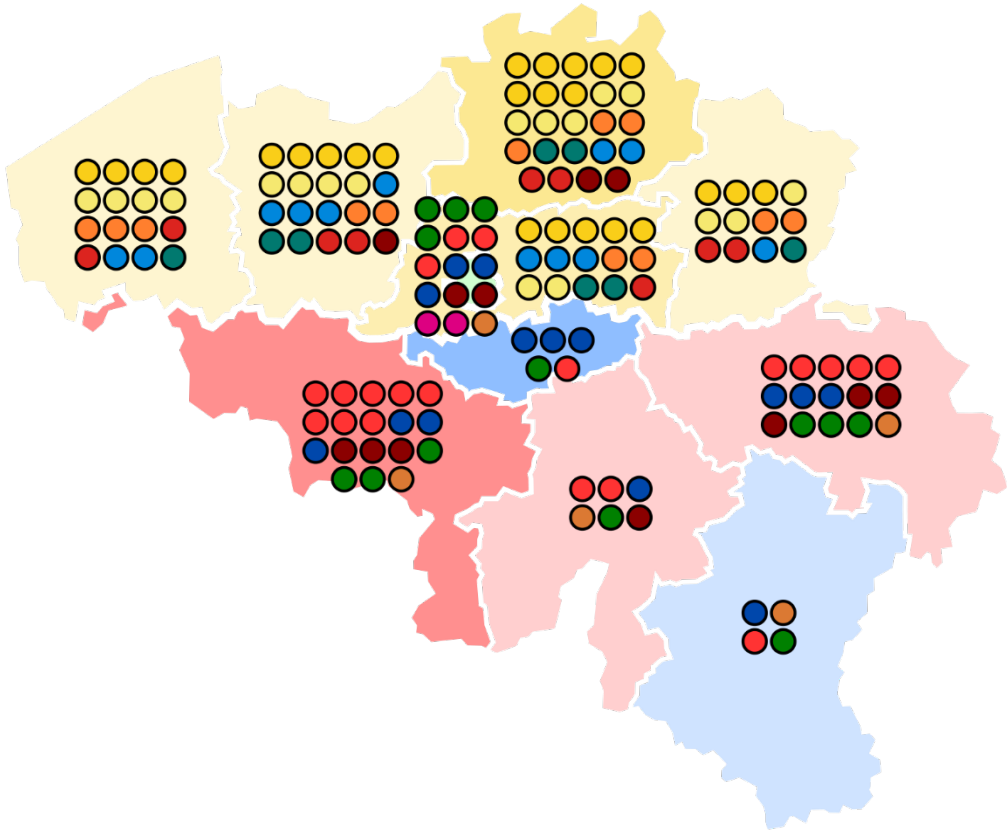


stefanieposavec.com/airtransformed

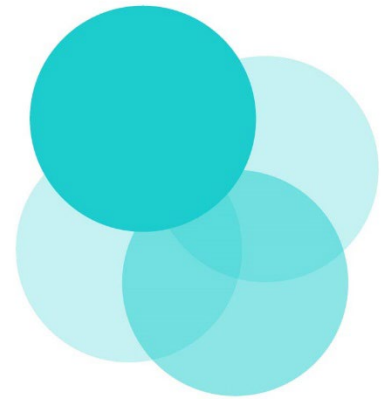
texture



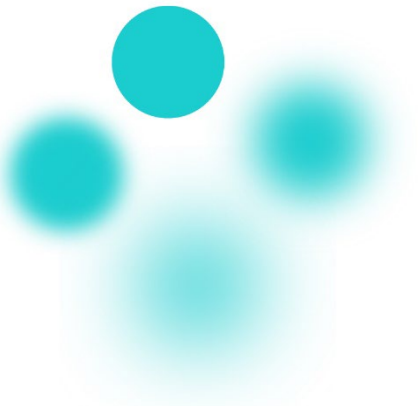
numerosity



N-VA Leader: Bart de Wever	16.03%	25 seats	(▼8)
VB Leader: Tom Van Grieken	11.95%	18 seats	(▲15)
PS Leader: Elio Di Rupo	9.46%	20 seats	(▼3)
CD&V Leader: Wouter Beke	8.89%	12 seats	(▼6)
Open Vld Leader: Gwendolyn Rutten	8.54%	12 seats	(▼2)
PTB-PVDA Leader: Peter Mertens	8.62%	12 seats	(▲10)
MR Leader: Charles Michel	7.56%	14 seats	(▼6)
sp.a Leader: John Crombez	6.71%	9 seats	(▼4)
Ecolo Leaders: Nollet & Khattabi	6.14%	13 seats	(▲7)
Groen Leader: Meyrem Almaci	6.10%	8 seats	(▲2)
cdH Leader: Maxime Prévot	3.70%	5 seats	(▼4)
DéFI Leader: Olivier Maingain	2.22%	2 seats	(▶0)



transparency



fuzziness

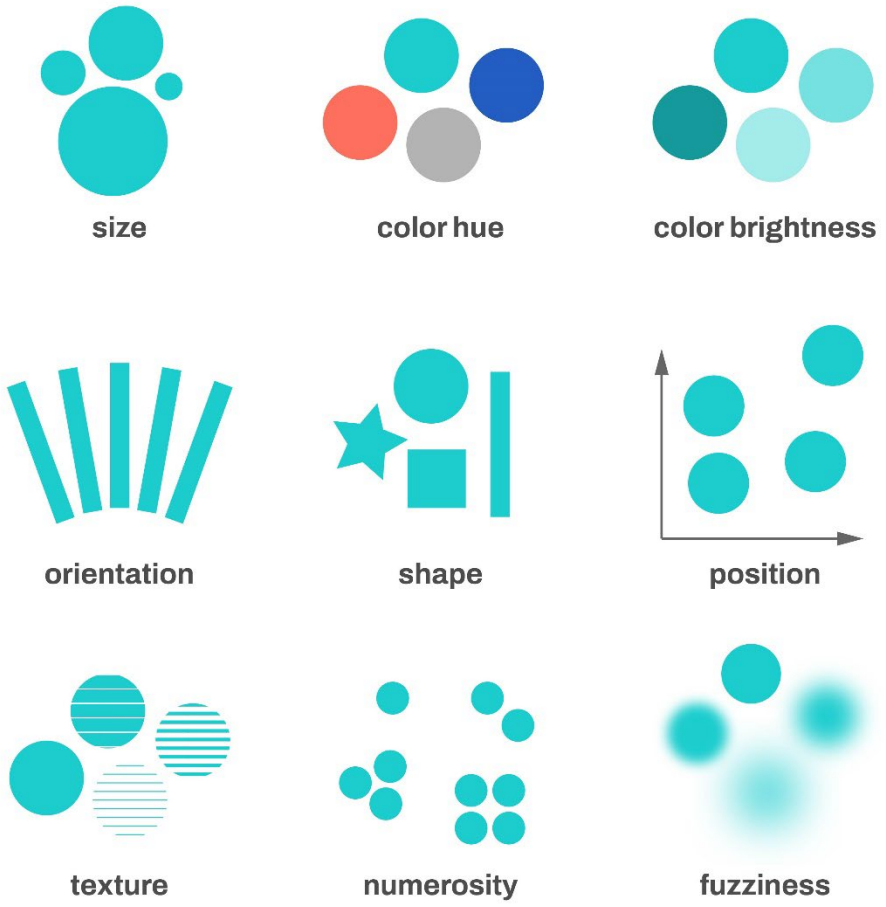
Visual variable brainstorming

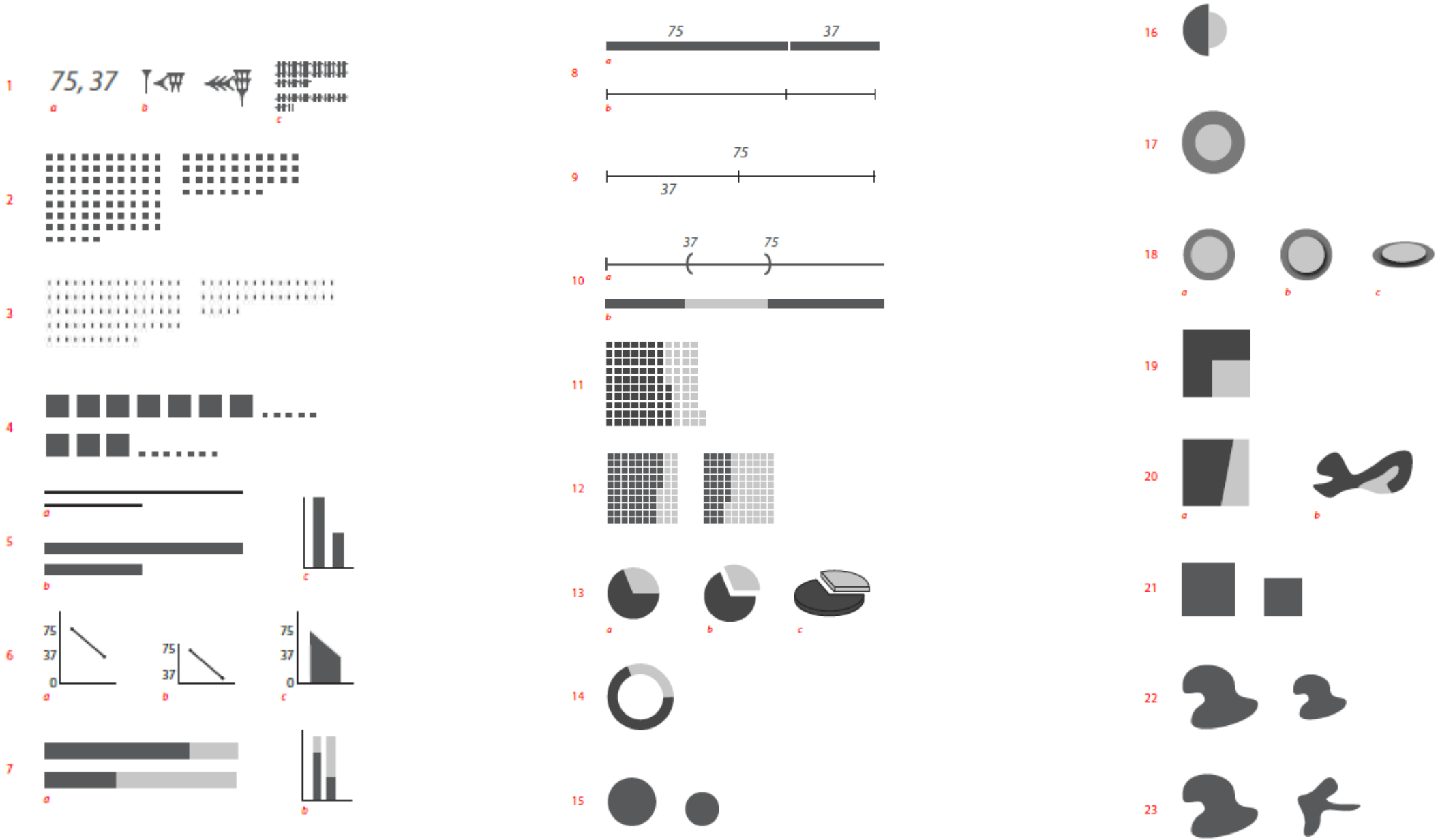
Individual exercise (10 minutes)

Using visual variables, think of **as many ways as possible** to visualize the following two-number dataset:

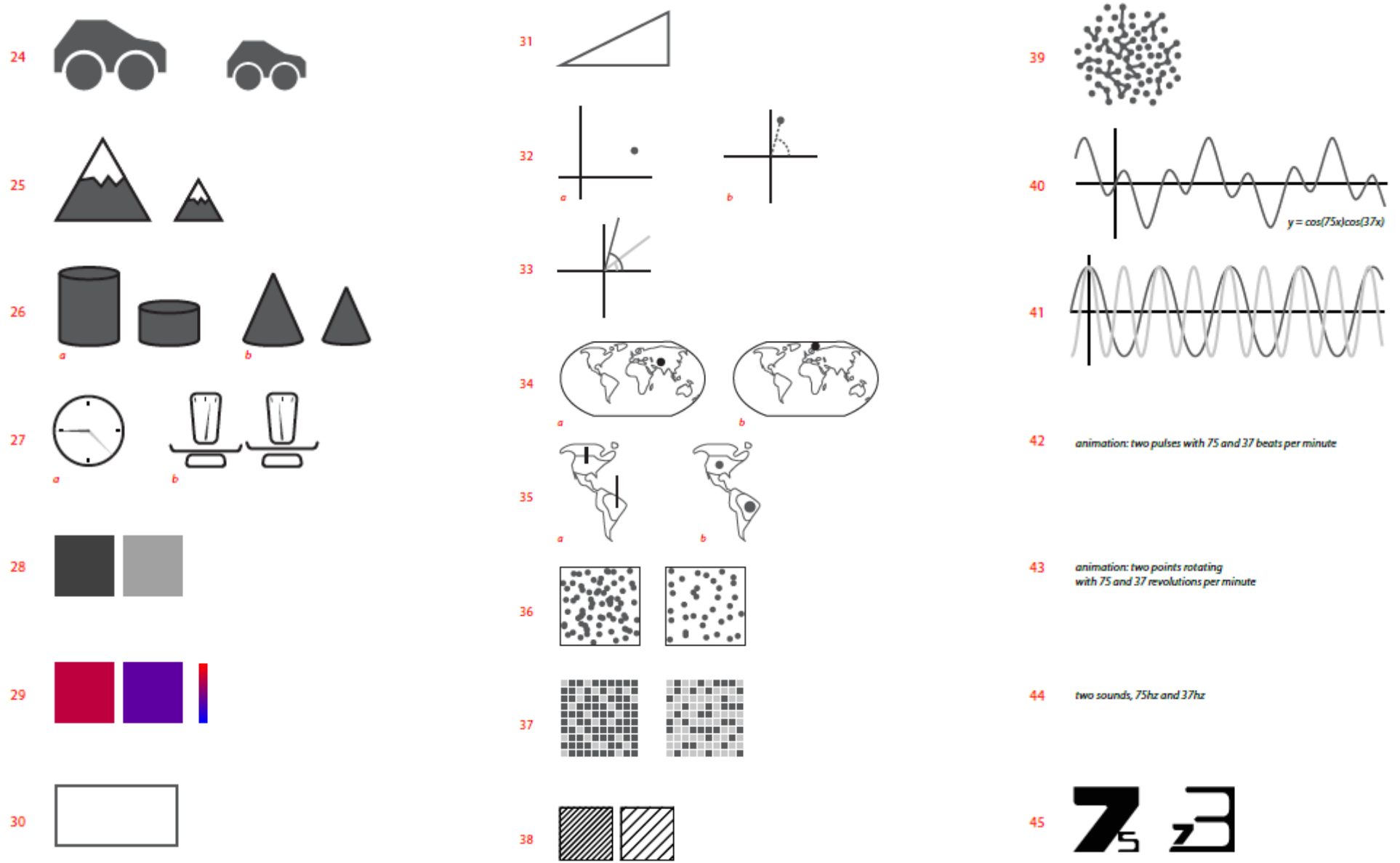
75 37

Examples, using **size**:

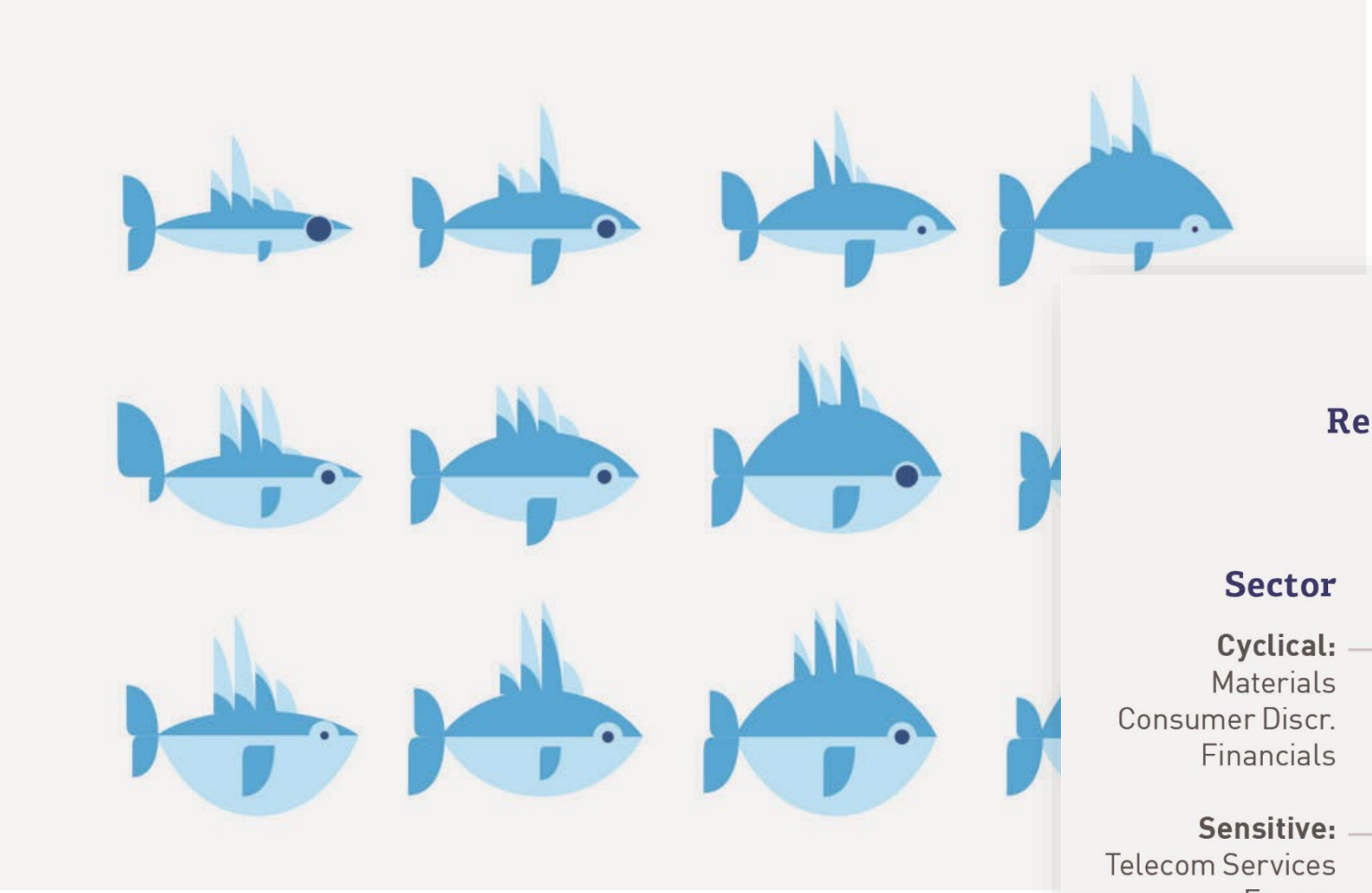




Santiago Ortiz 2012, from the post: http://blog.visual.ly/45-ways-to-communicate-two-quantities



Santiago Ortiz 2012, from the post: http://blog.visual.ly/45-ways-to-communicate-two-quantities



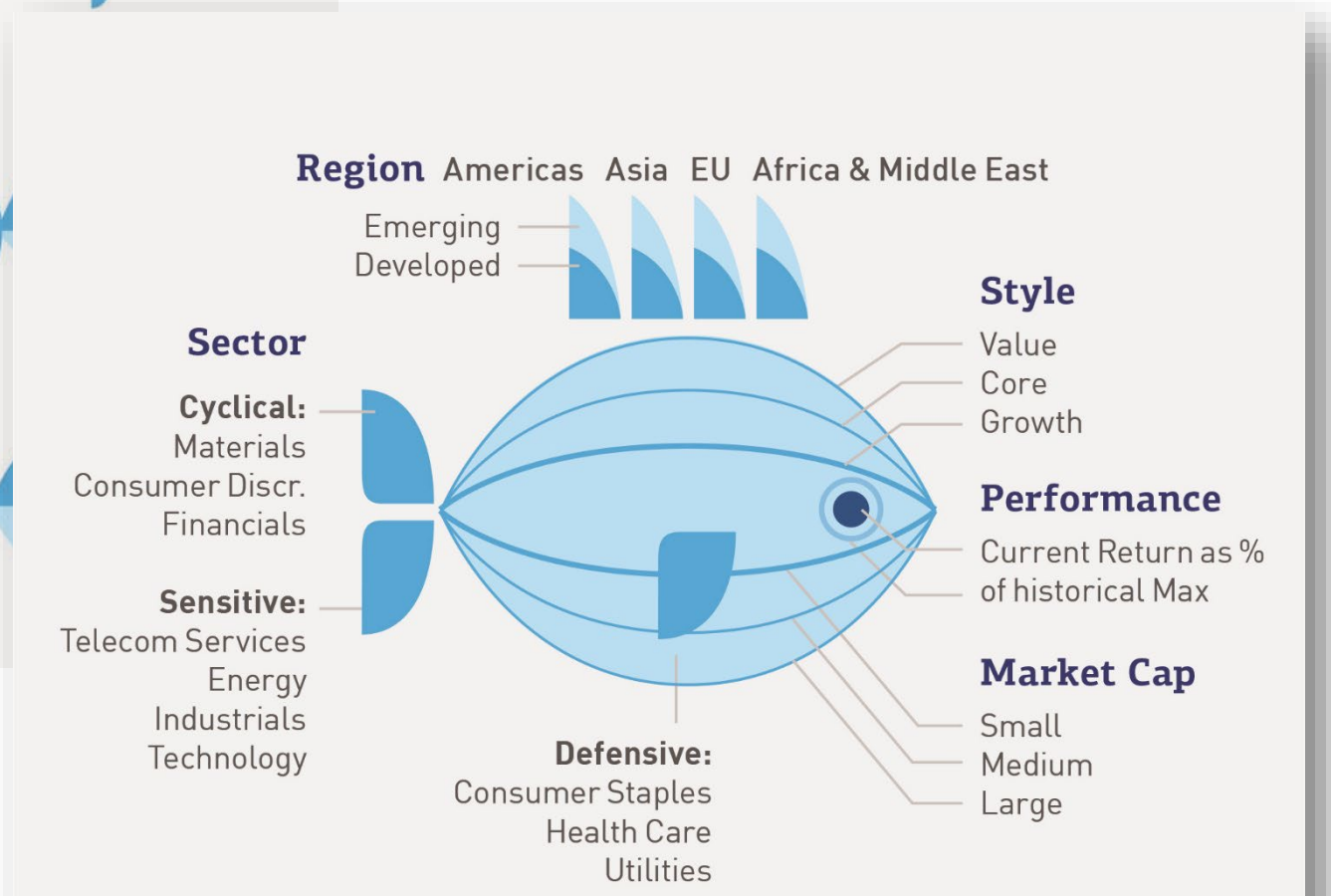

Region
Americas
Asia
EU
Africa & Middle East
Emerging
Developed
Style
Value
Core
Growth
Sector
Cyclical:
Materials
Consumer Discr.
Financials
Performance
Current Return as %
of historical Max
Sensitive:
Telecom Services
Energy
Industrials
Technology
Market Cap
Small
Medium
Large
Defensive:
Consumer Staples
Health Care
Utilities

Chart types

graphical representation categories

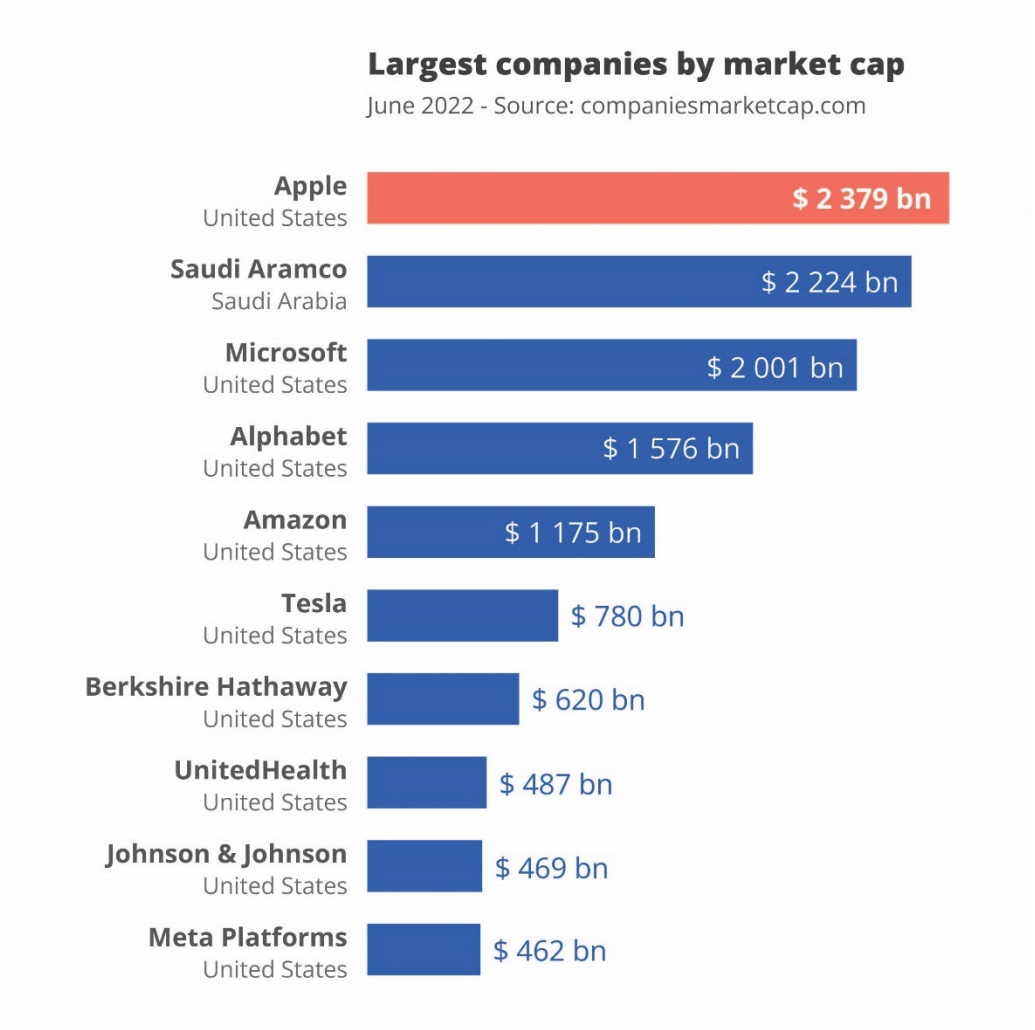
What do we want to do with our data?

visual variables

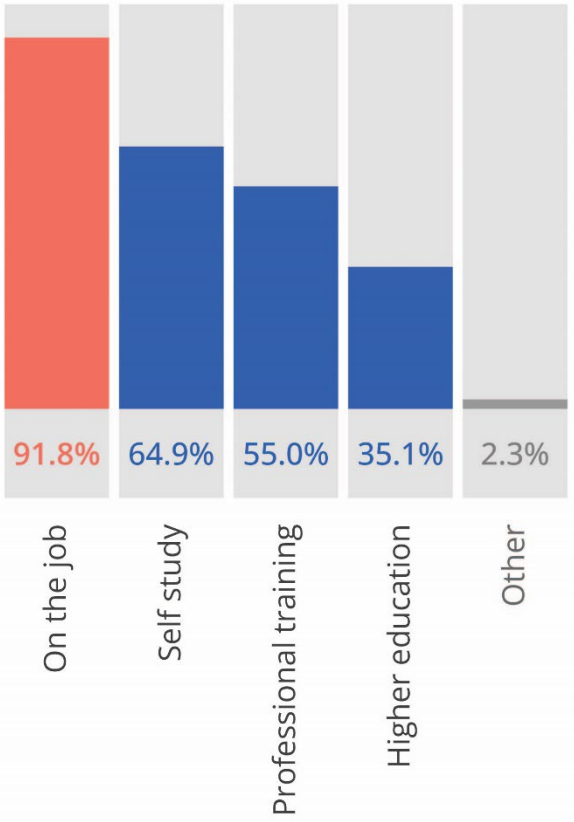
How can we turn raw numbers into shapes?

Common chart types

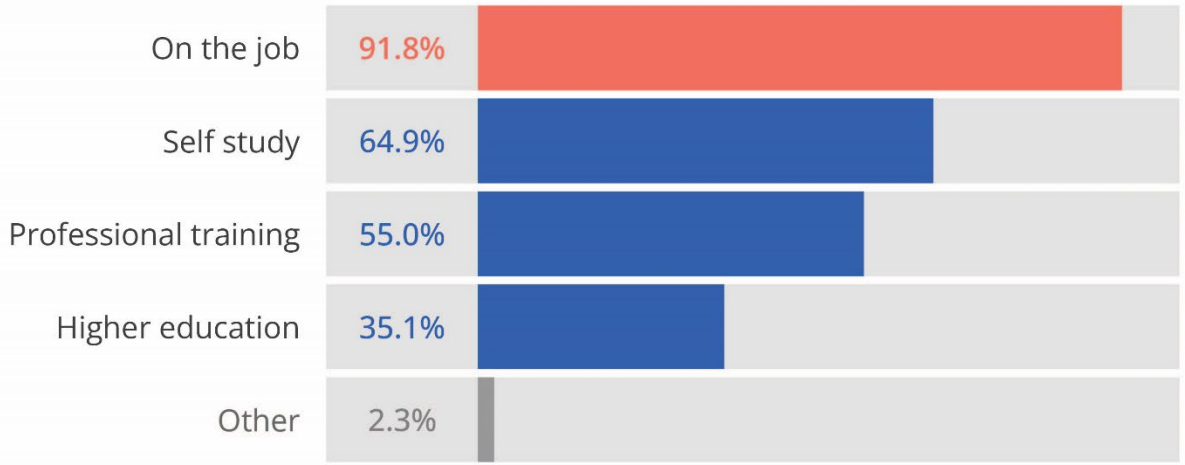
Bar charts: **comparison** using **size** (length)



Where did you learn your skills?

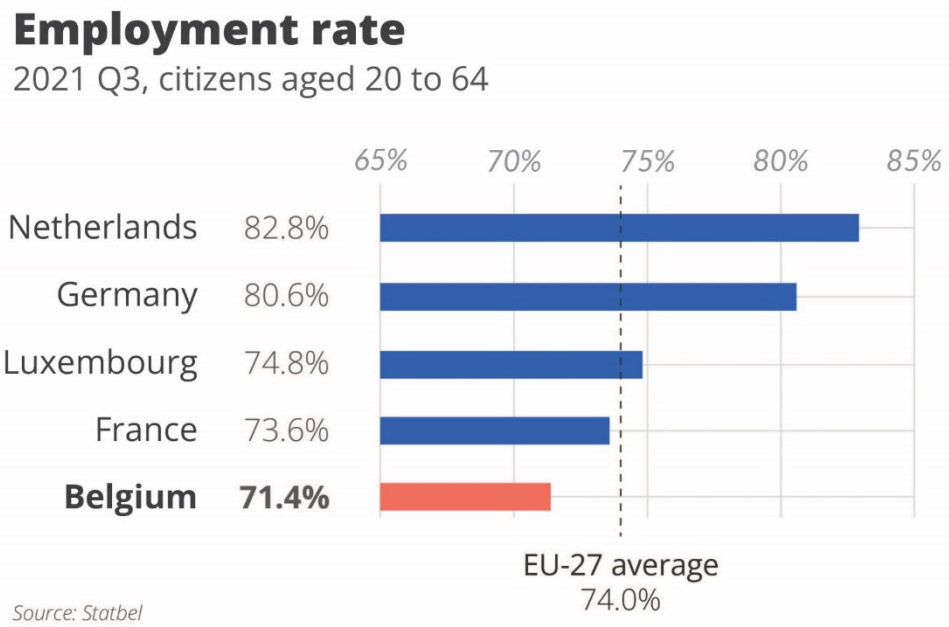


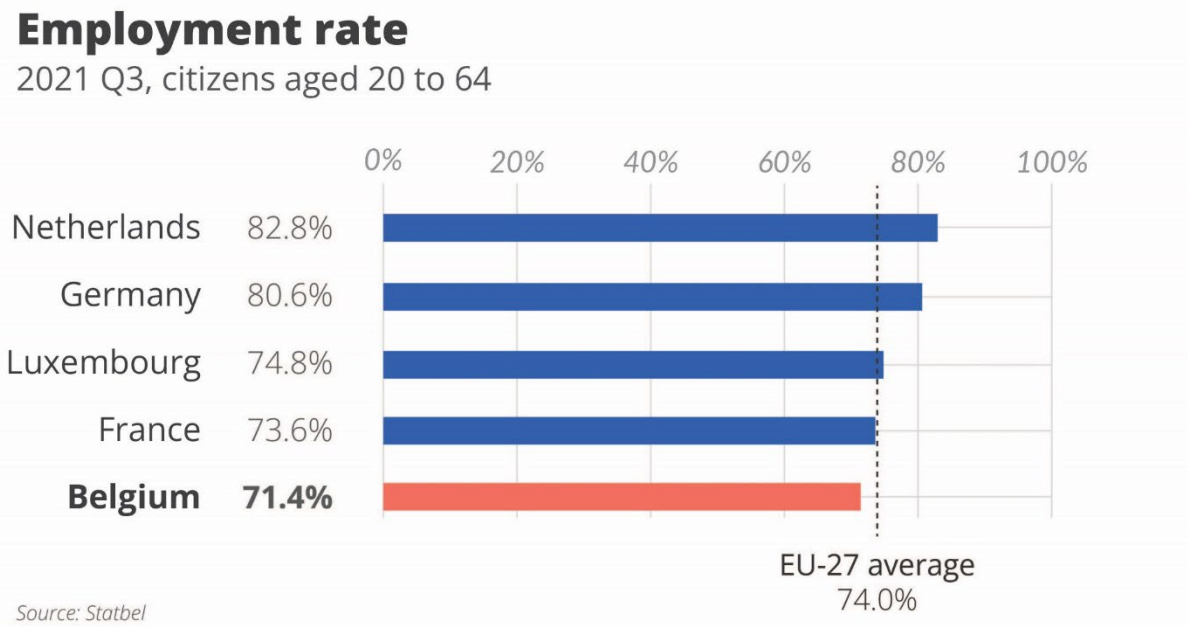
Where did you learn your skills?



Pitfall

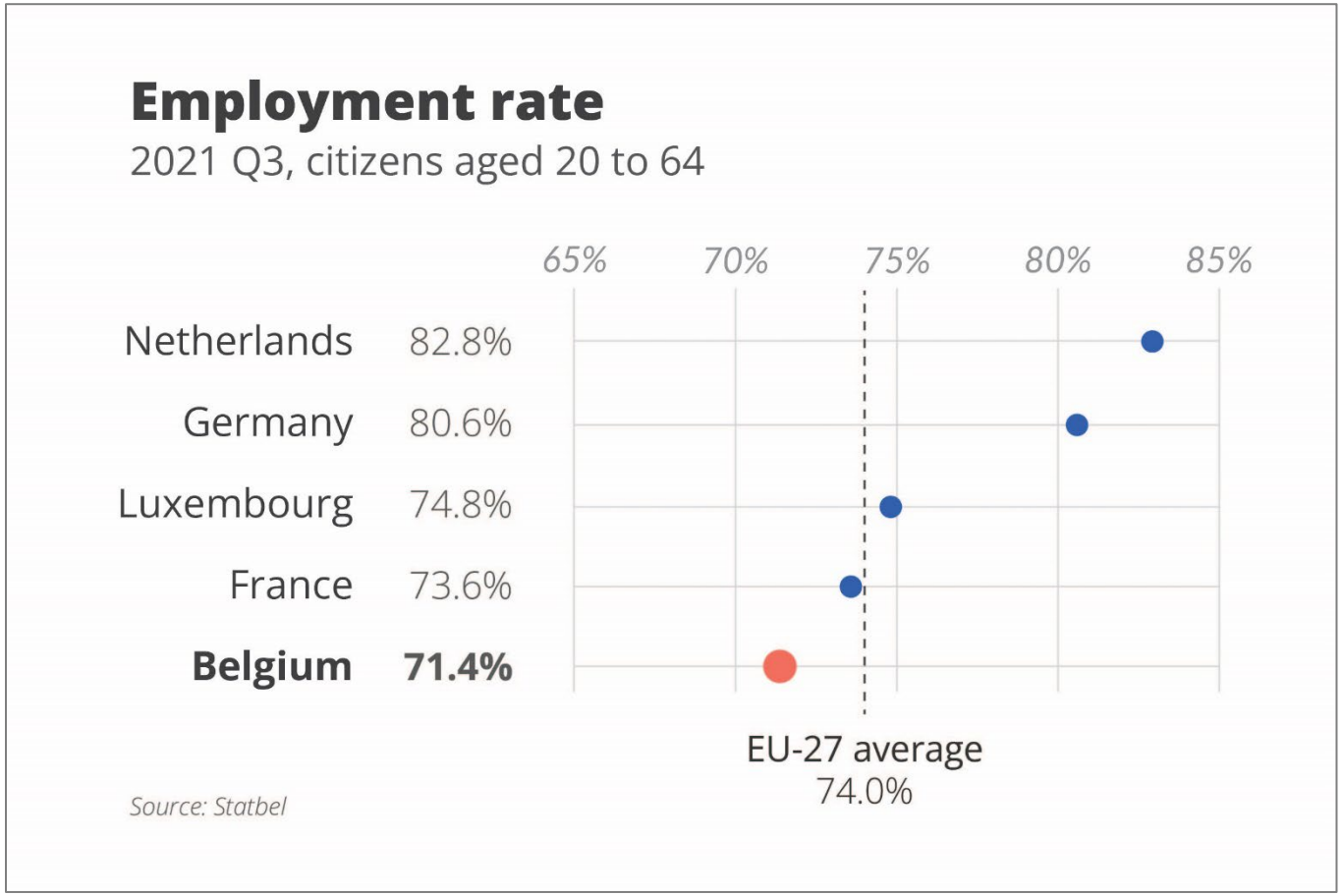
Bar charts not starting from zero





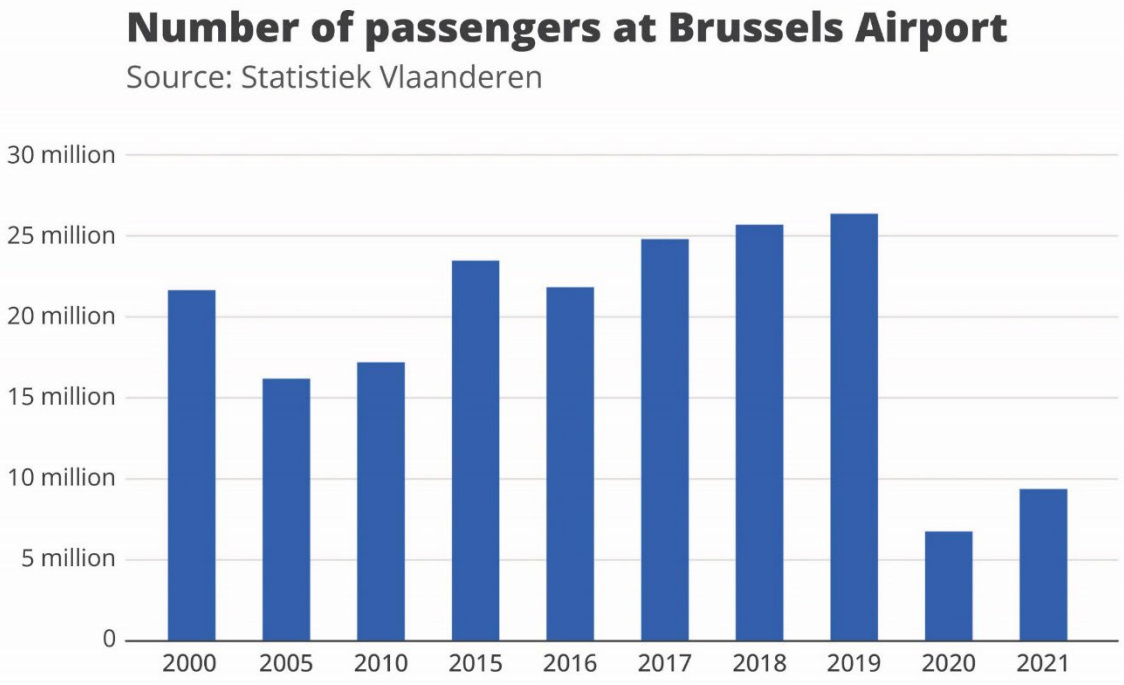
Alternative solution

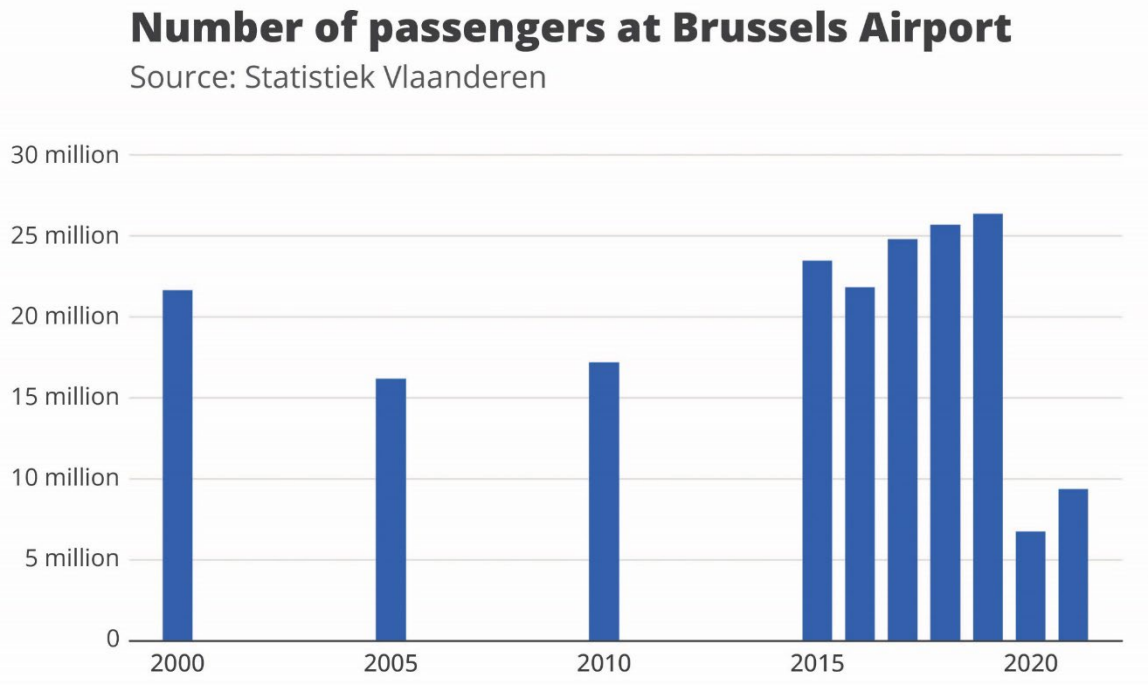
Use a dot plot



Pitfall

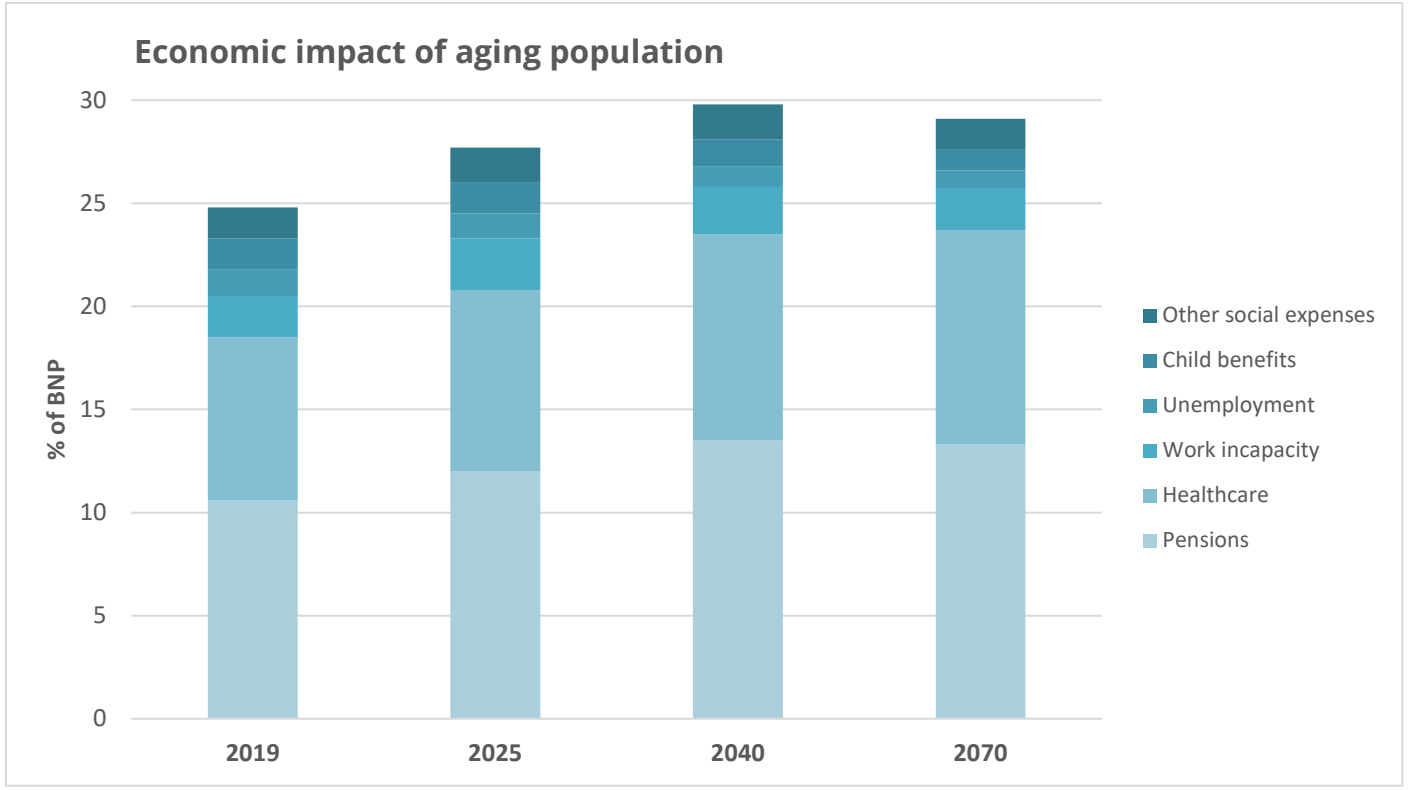
Equidistant labels for non-equidistant data





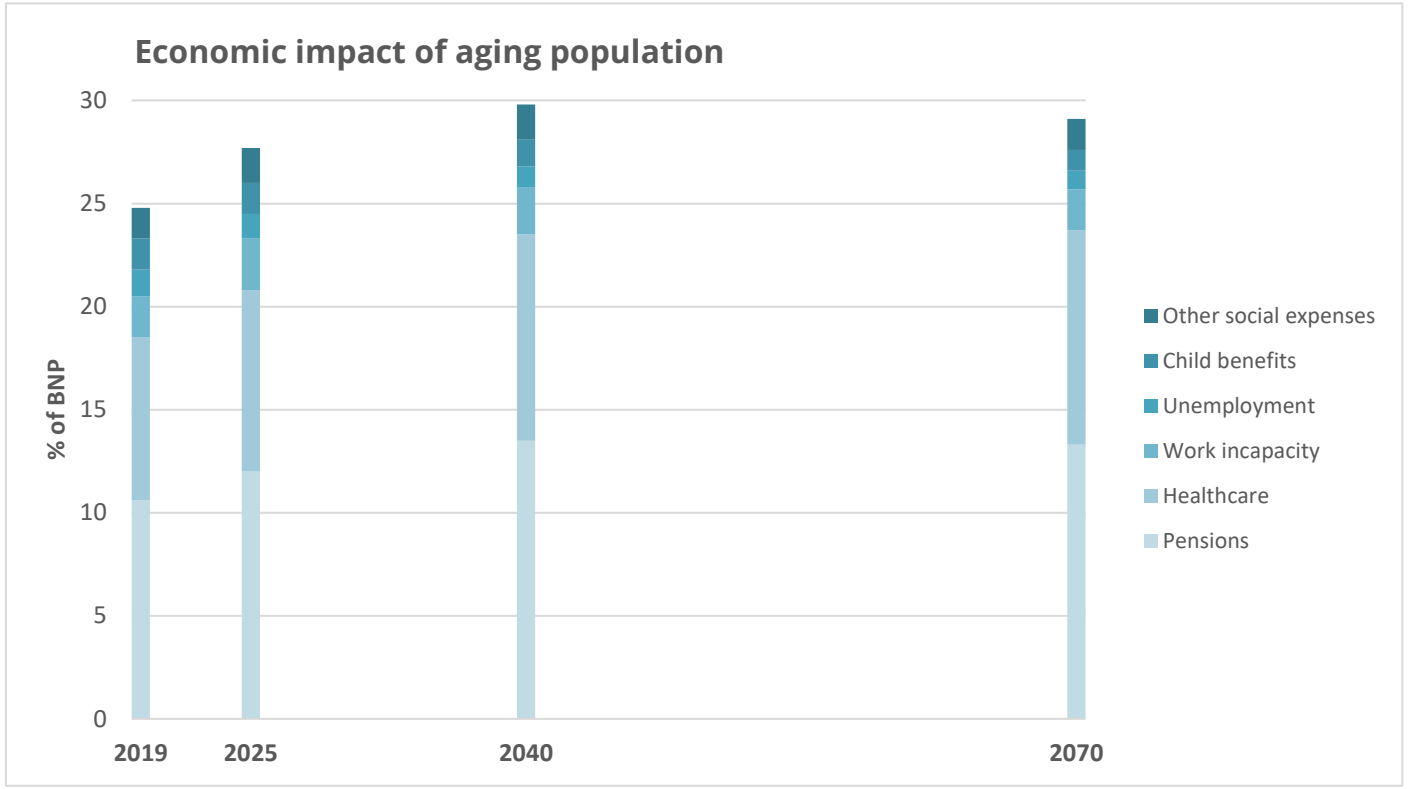
Pitfall

Equidistant labels for non-equidistant data



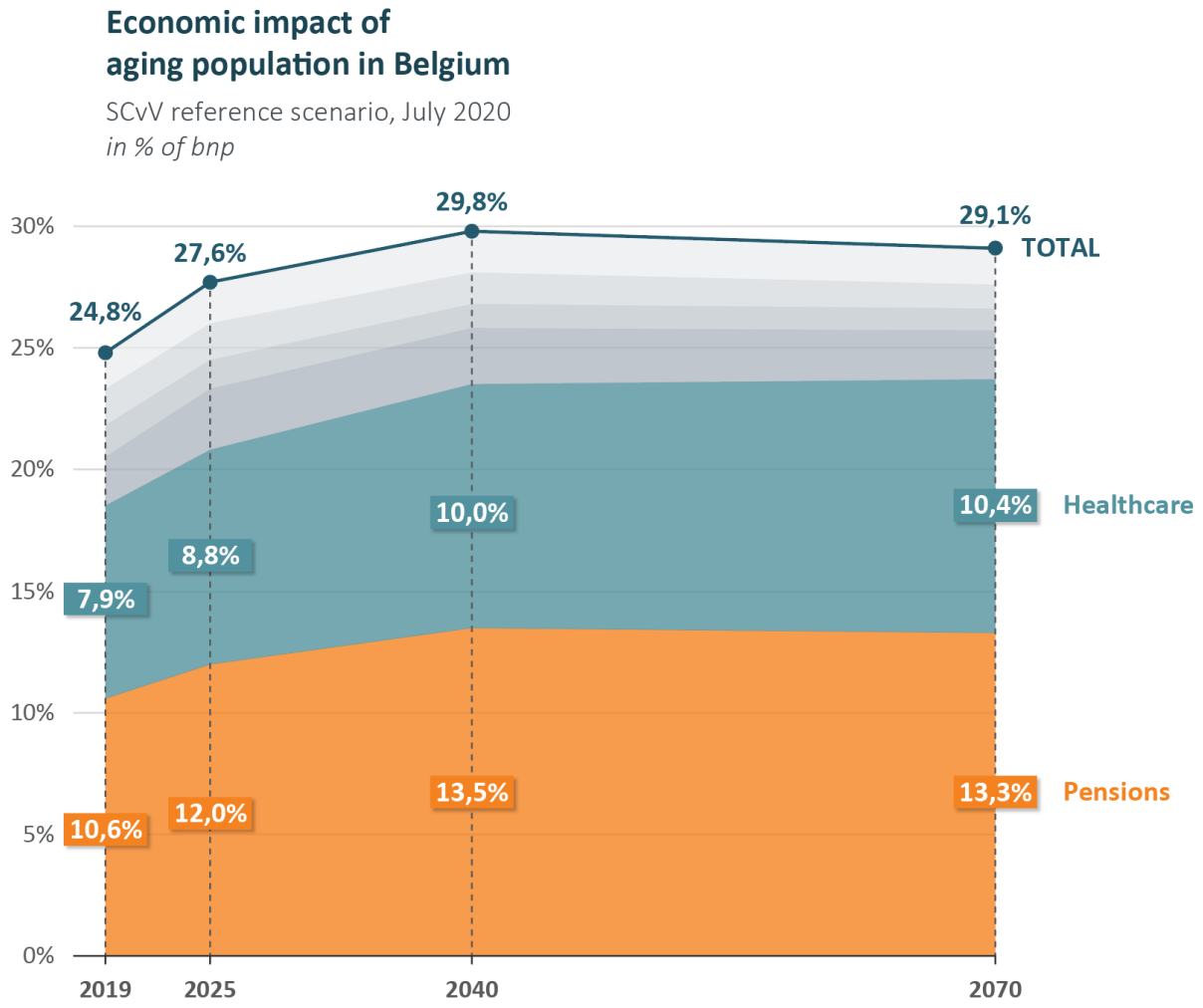
Pitfall

Equidistant labels for non-equidistant data



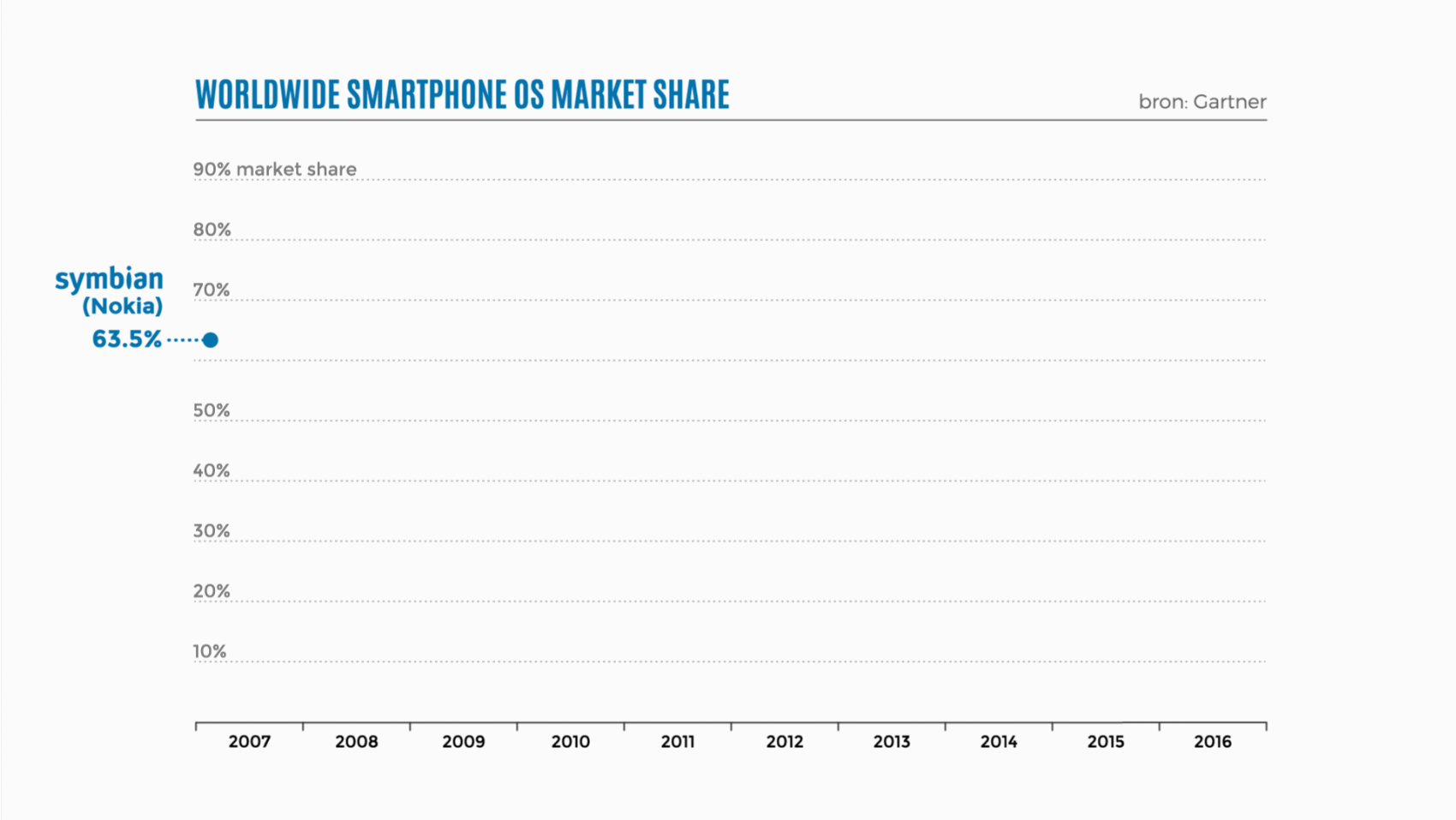
Alternative solution

Use a line or area chart



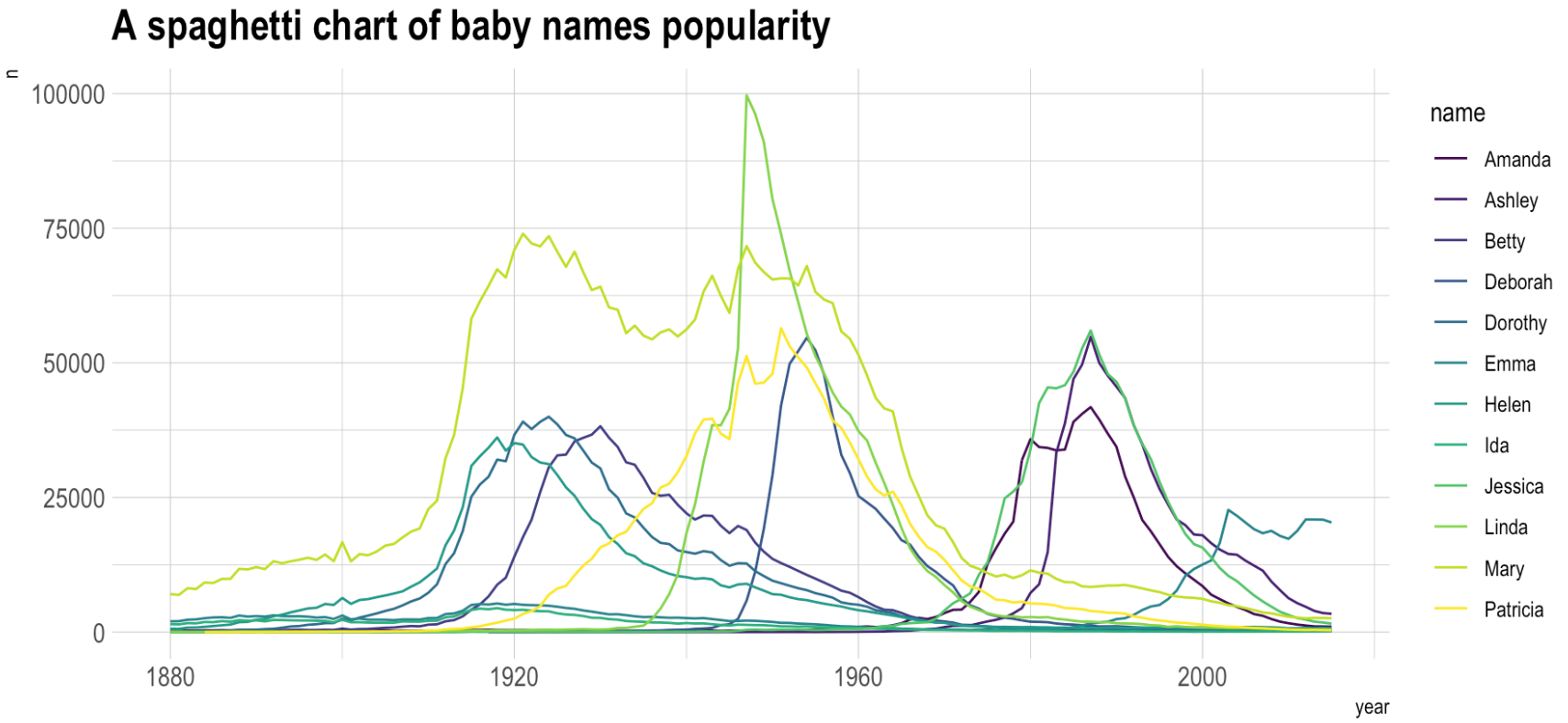
Common chart types

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



Pitfall

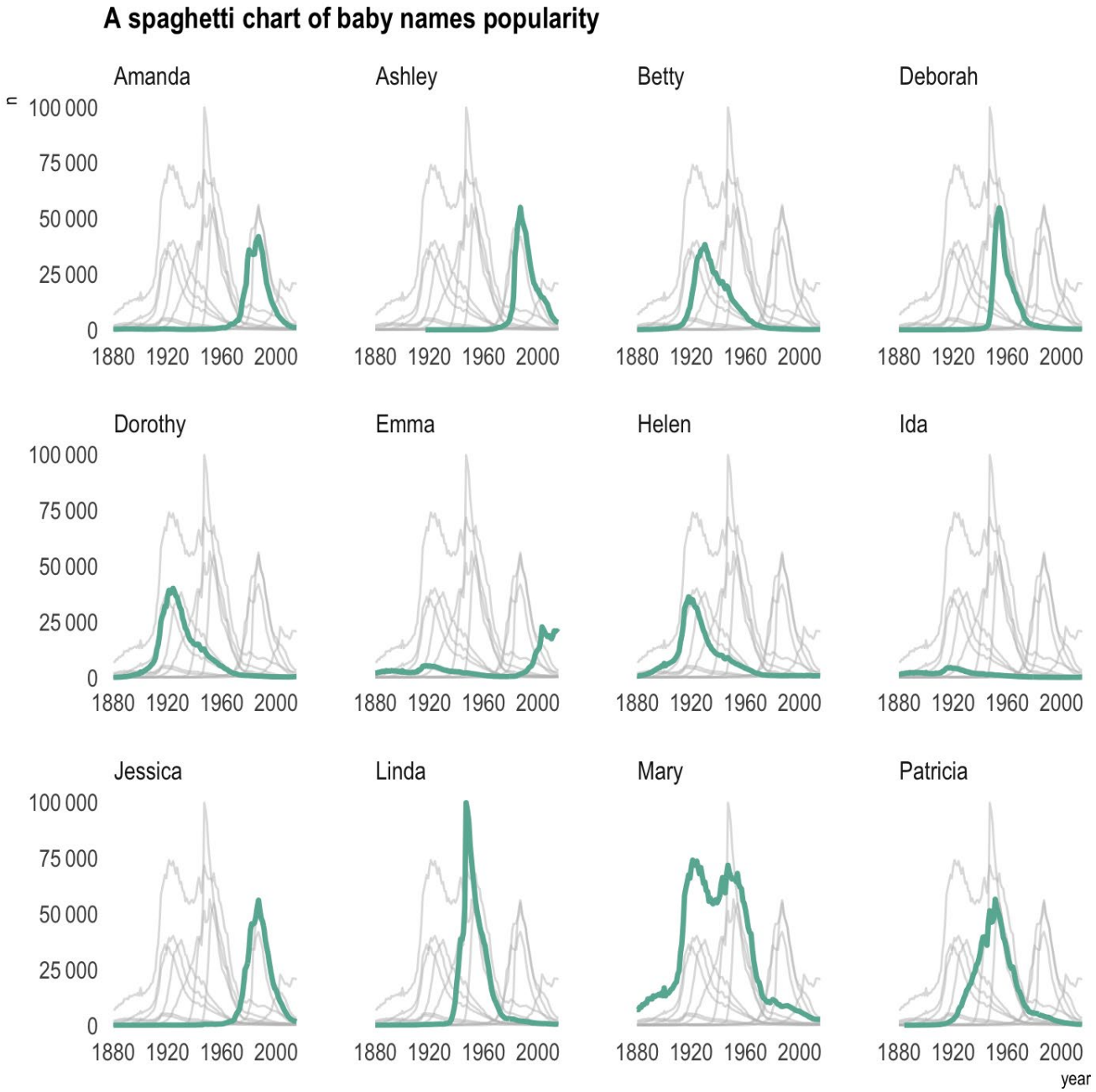
Line chart spaghetti



https://itsmecevi.github.io/dataviz/caveat/spaghetti.html

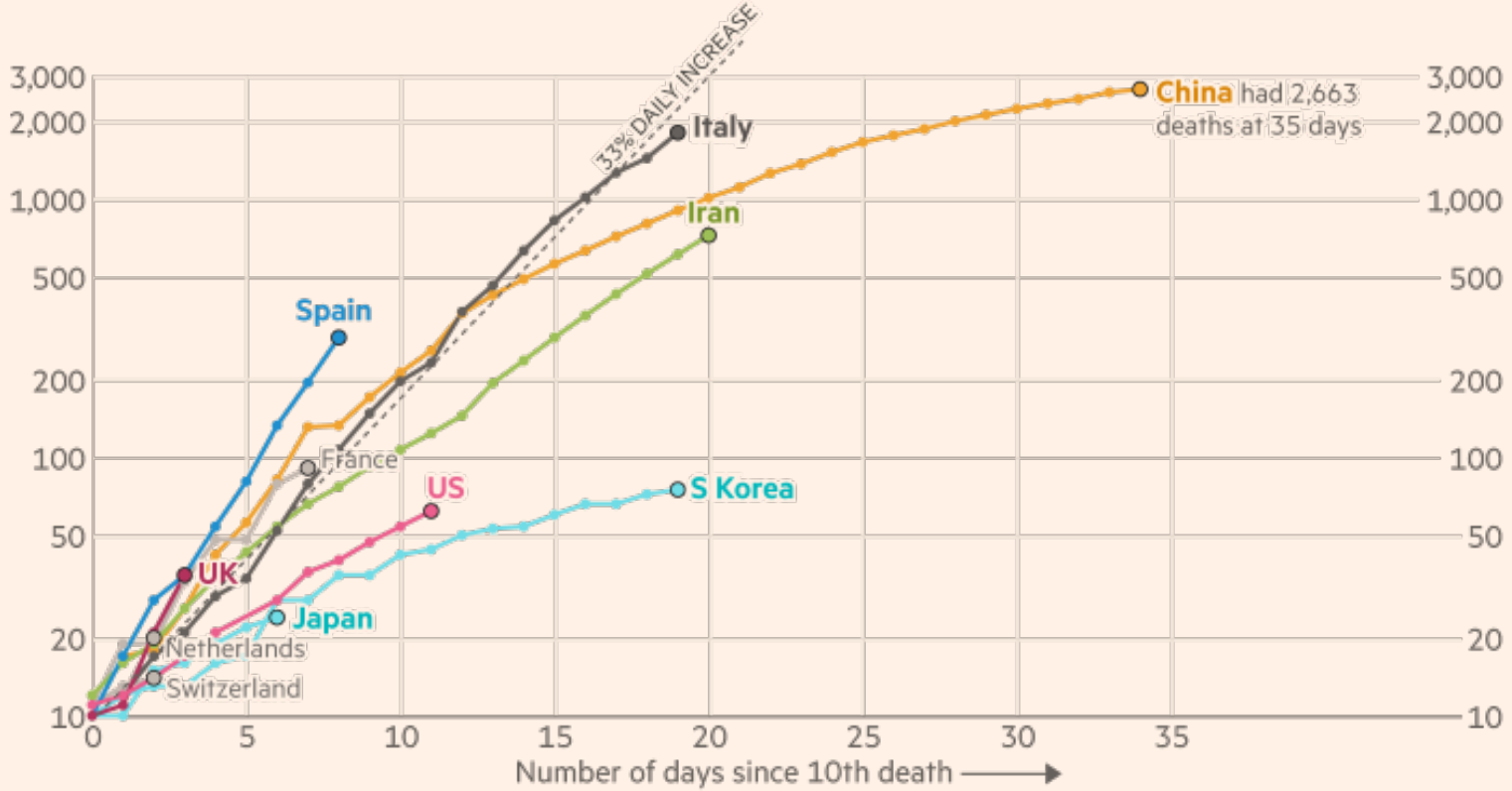
Alternative solution

Make one line stand out



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

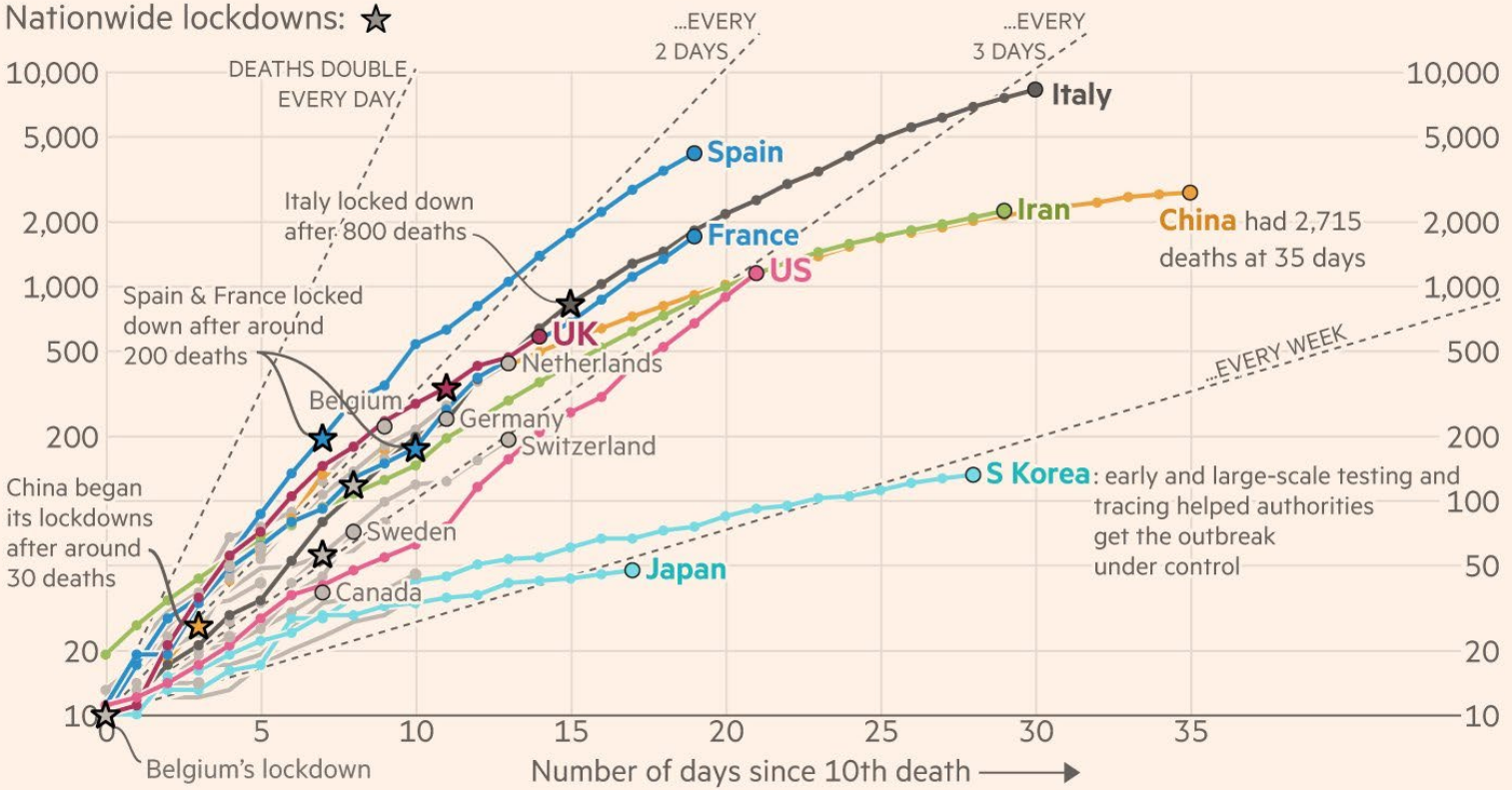


FT graphic: John Burn-Murdoch / @jburnmurdoch
Source: FT analysis of Johns Hopkins University, CSSE. Data updated March 15, 17:00 GMT

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

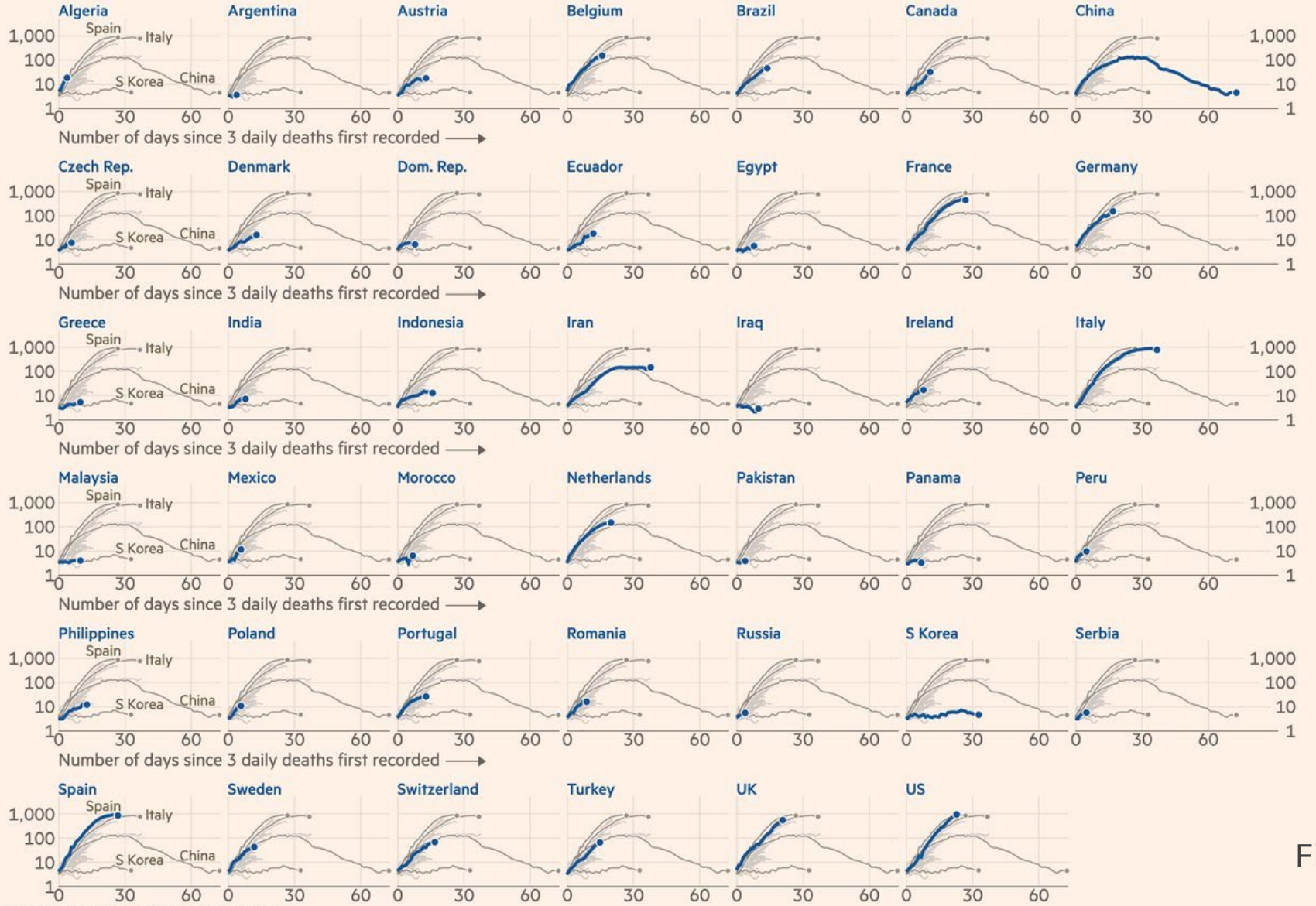


FT graphic: John Burn-Murdoch / @jburnmurdoch
Source: FT analysis of Johns Hopkins University, CSSE; Worldometers; FT research. Data updated March 26, 19:00 GMT

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

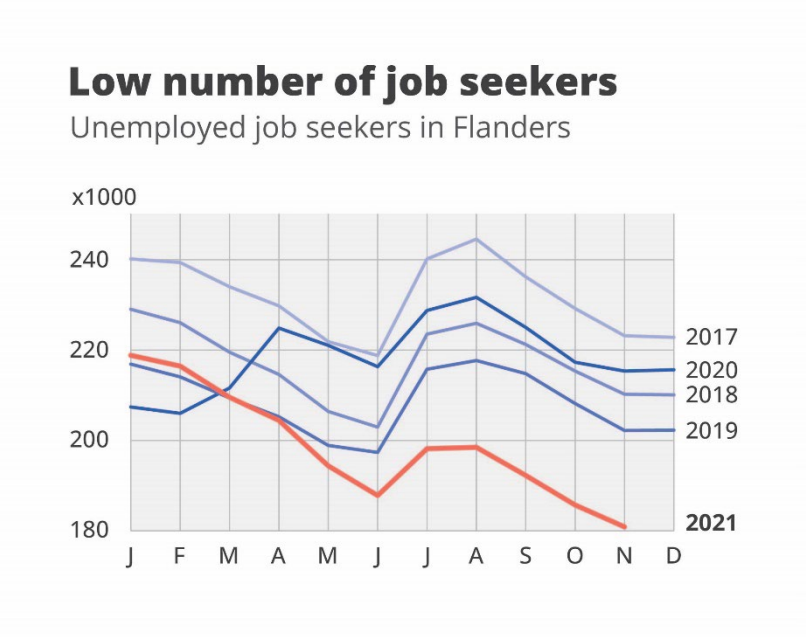


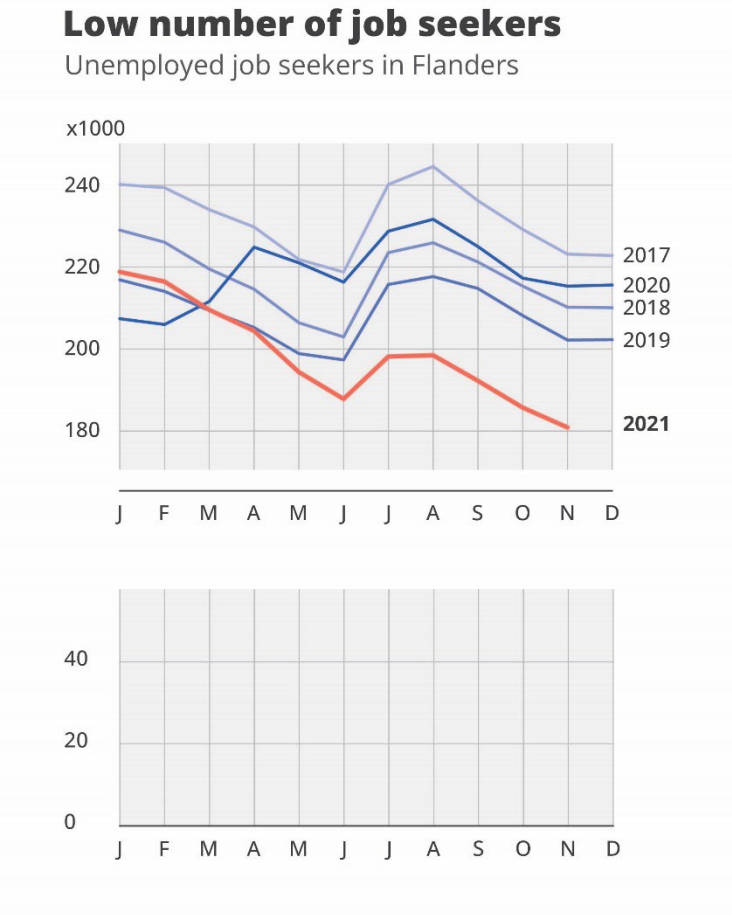
FT graphic: John Burn-Murdoch / @jburnmurdoch
Source: FT analysis of European Centre for Disease Prevention and Control; Worldometers; FT research. Data updated April 05, 19:00 GMT

Financial Times,
April 5, 2020

Pitfall

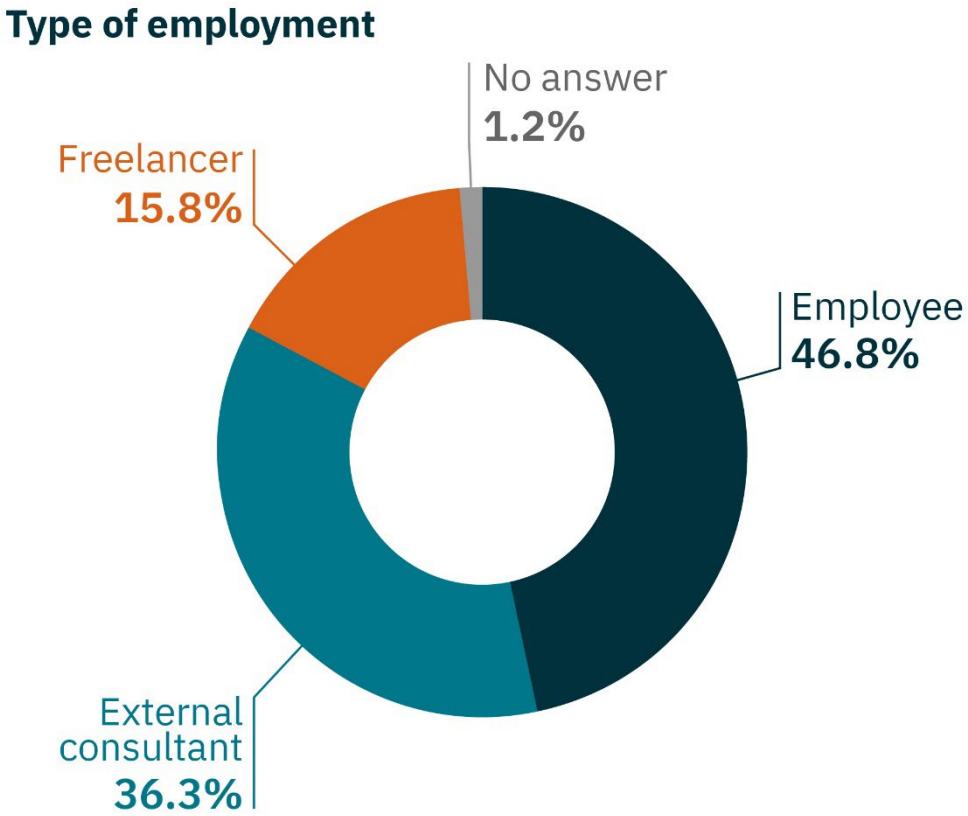
Line charts not starting from zero





Common chart types

Pie charts: **part-to-whole comparison** using **size**

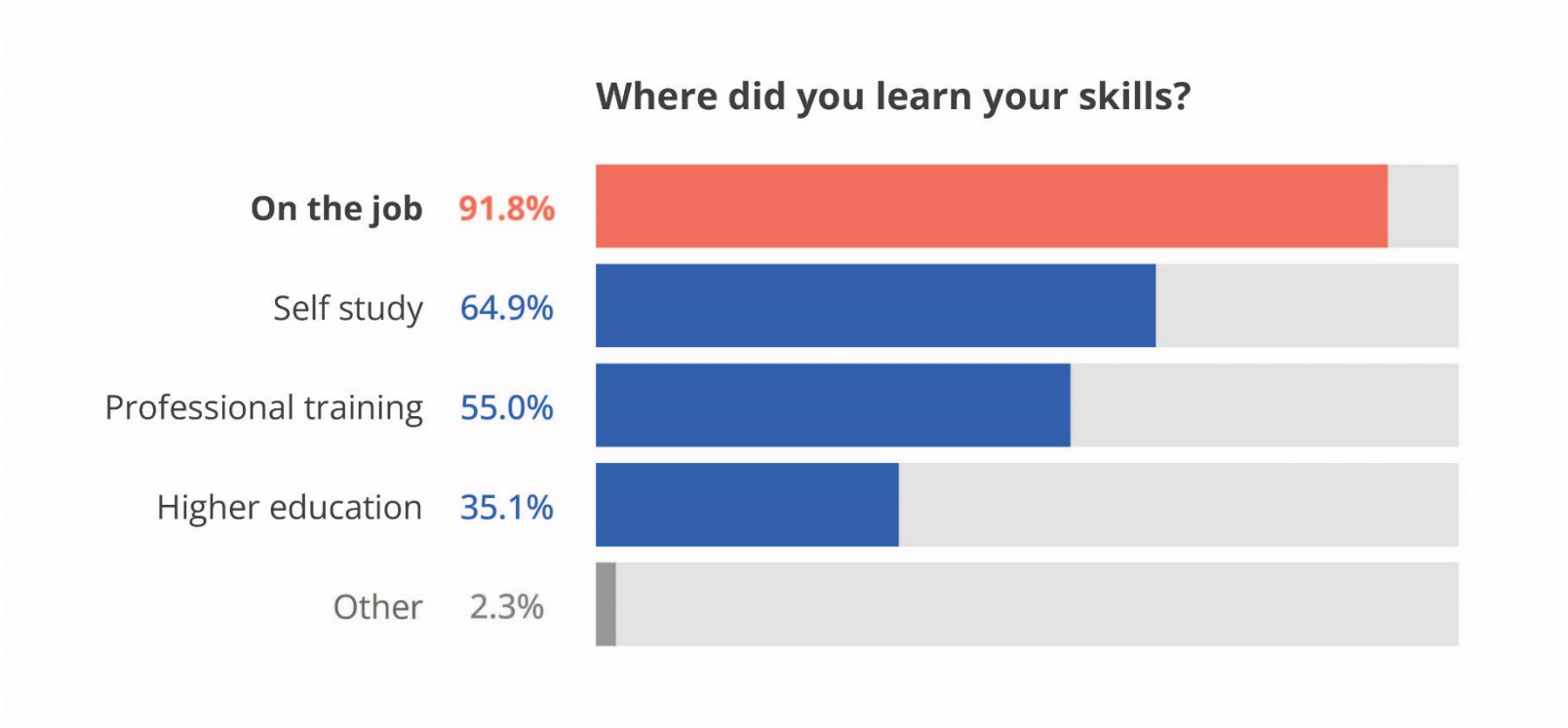


Pitfall

It doesn’t add up

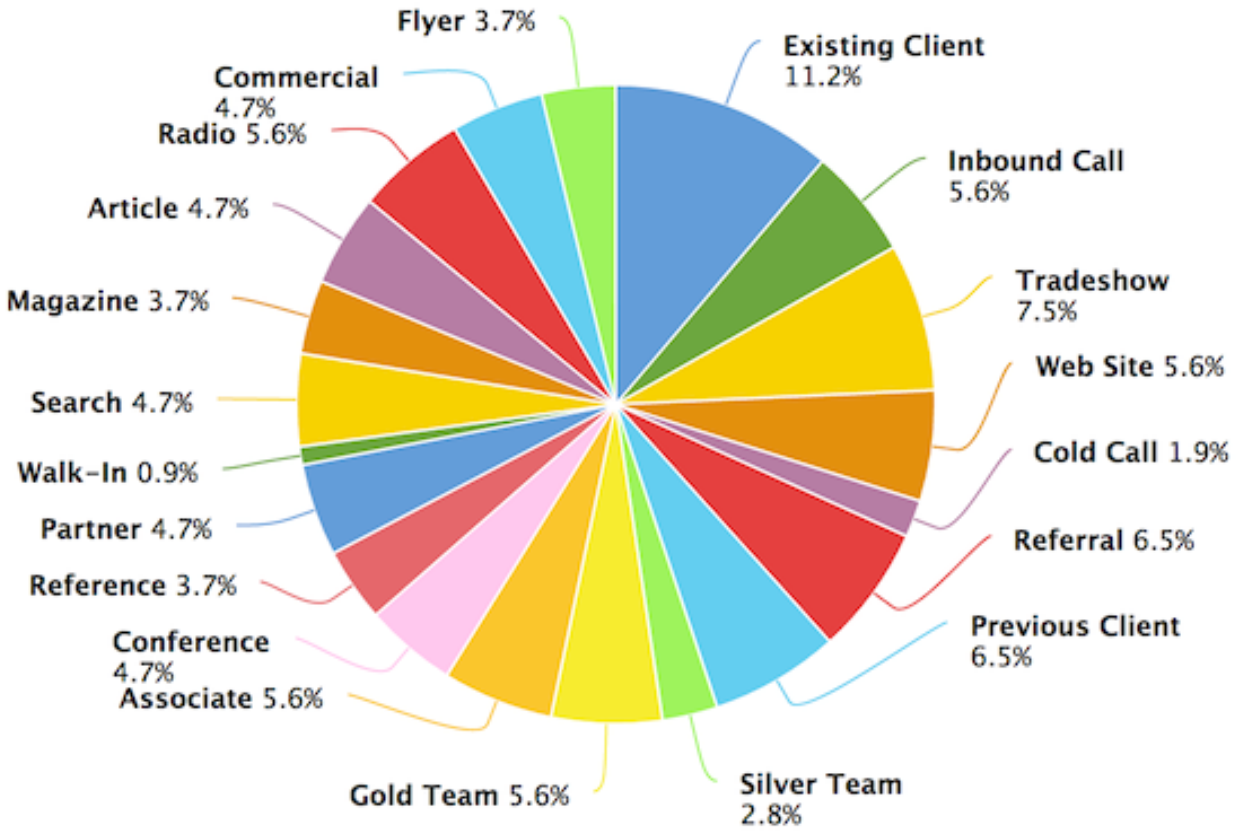
Alternative solution

Use a bar chart



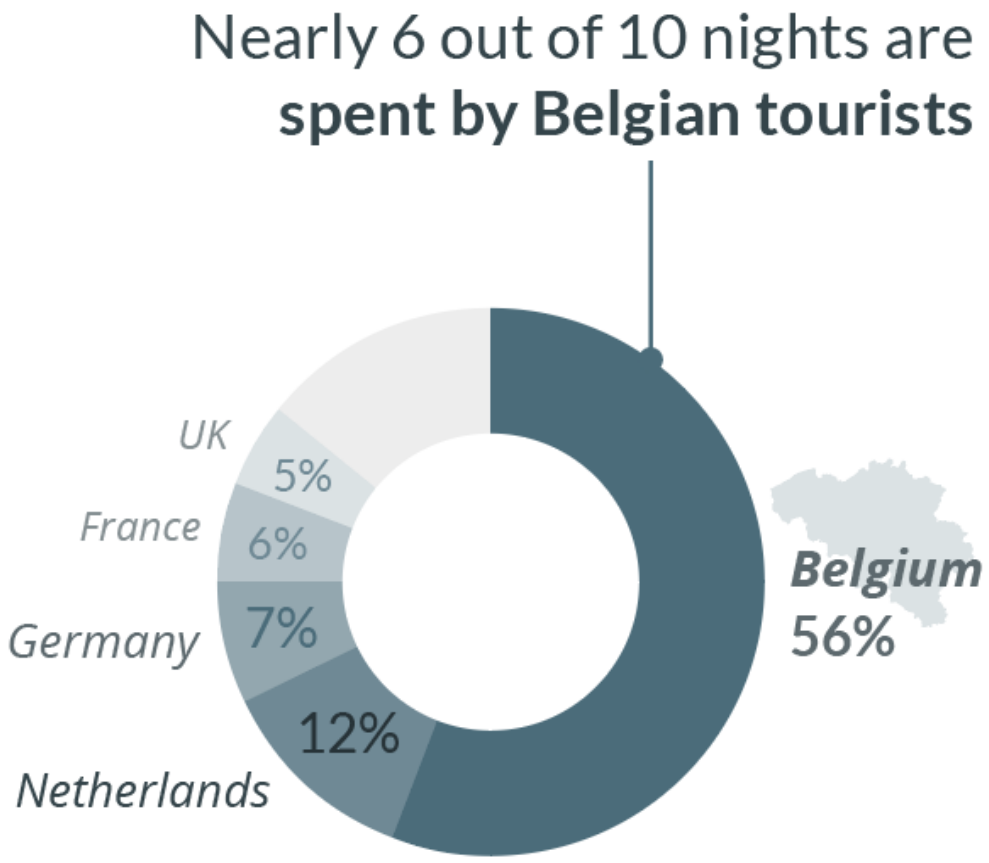
Pitfall

Too many categories



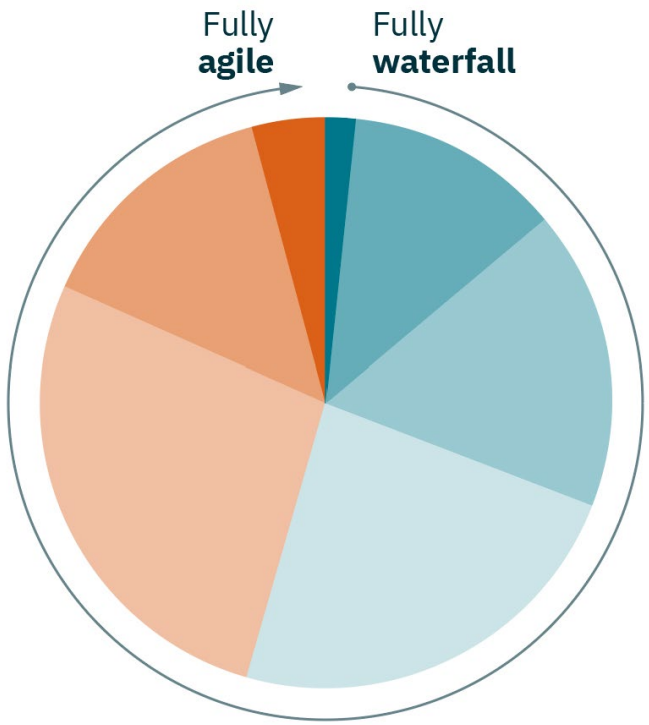
Alternative solution

Group categories together



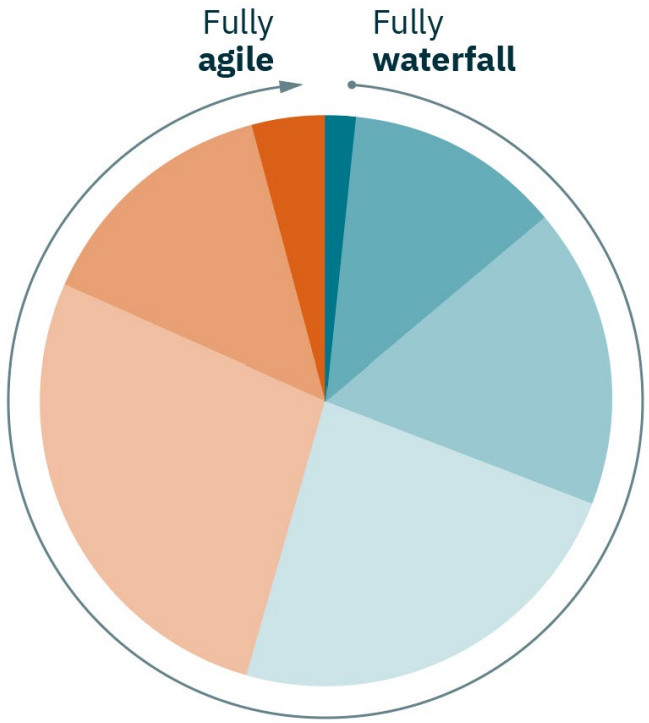
Pitfall

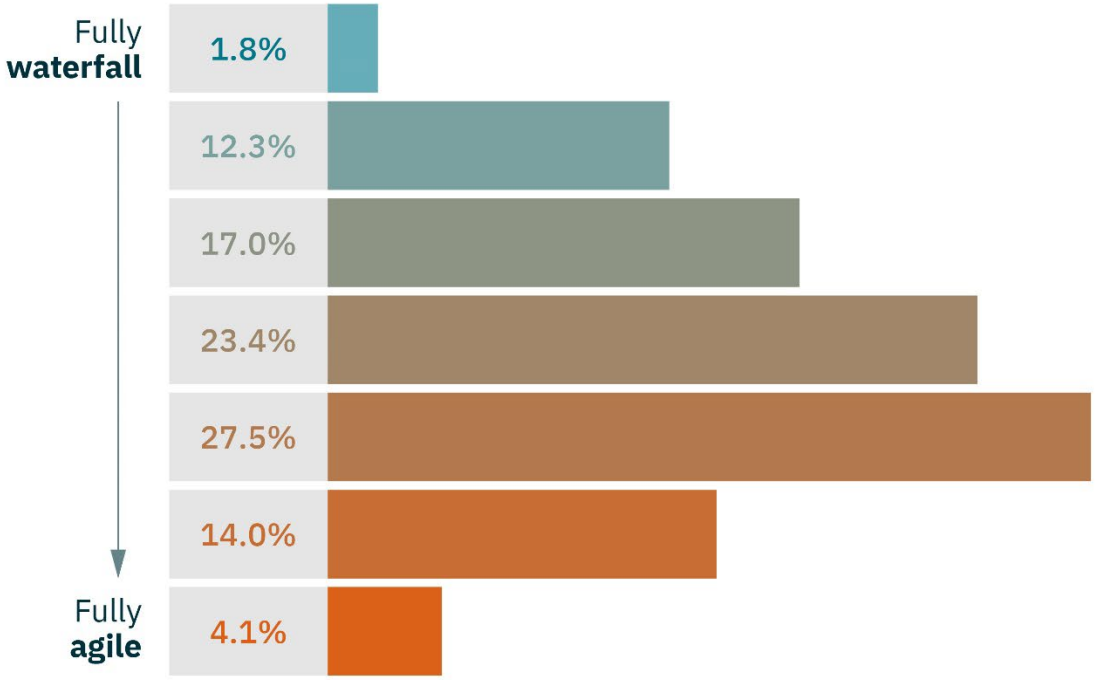
Difficult to compare



Alternative solution

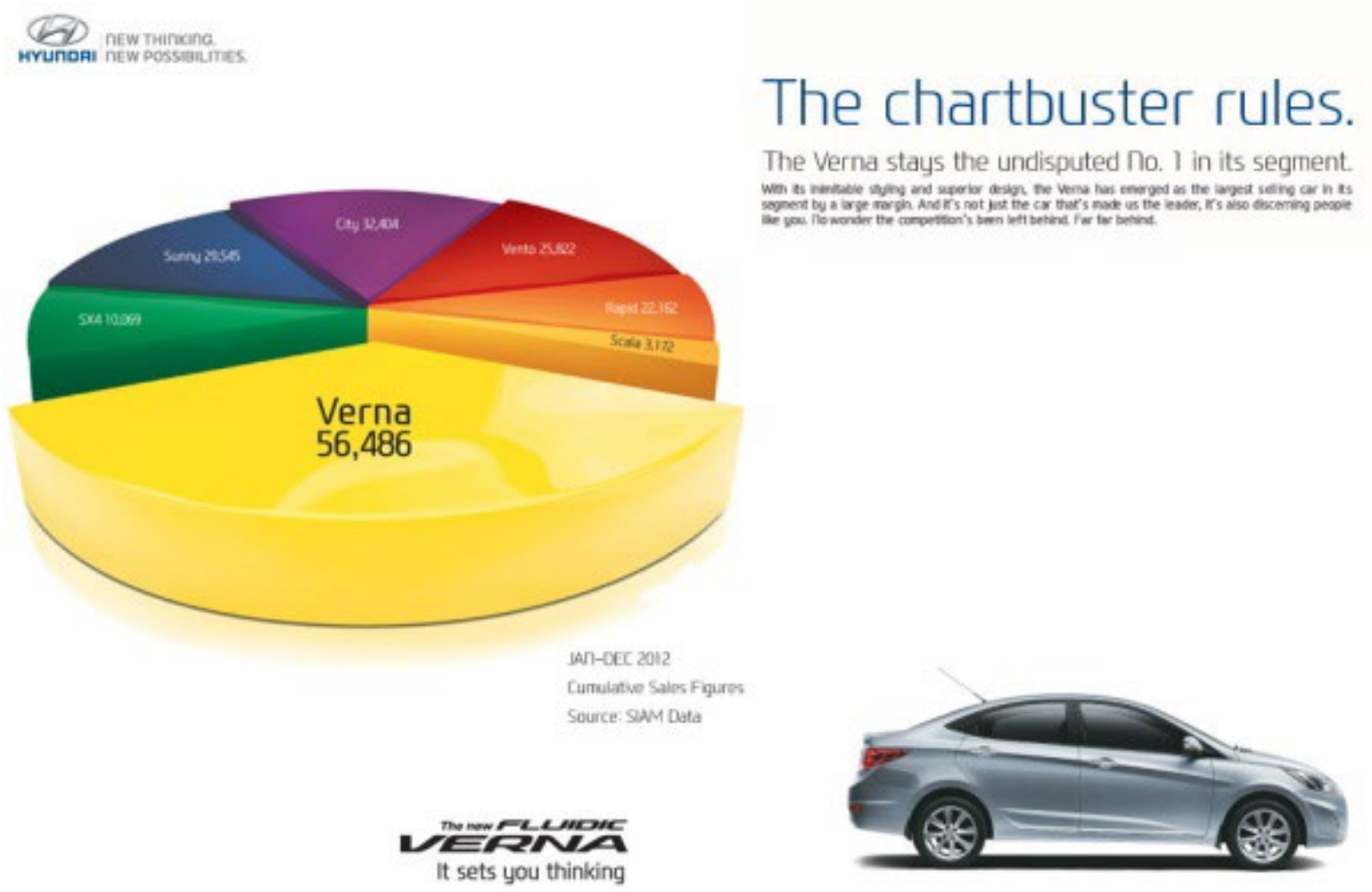
Use a bar chart





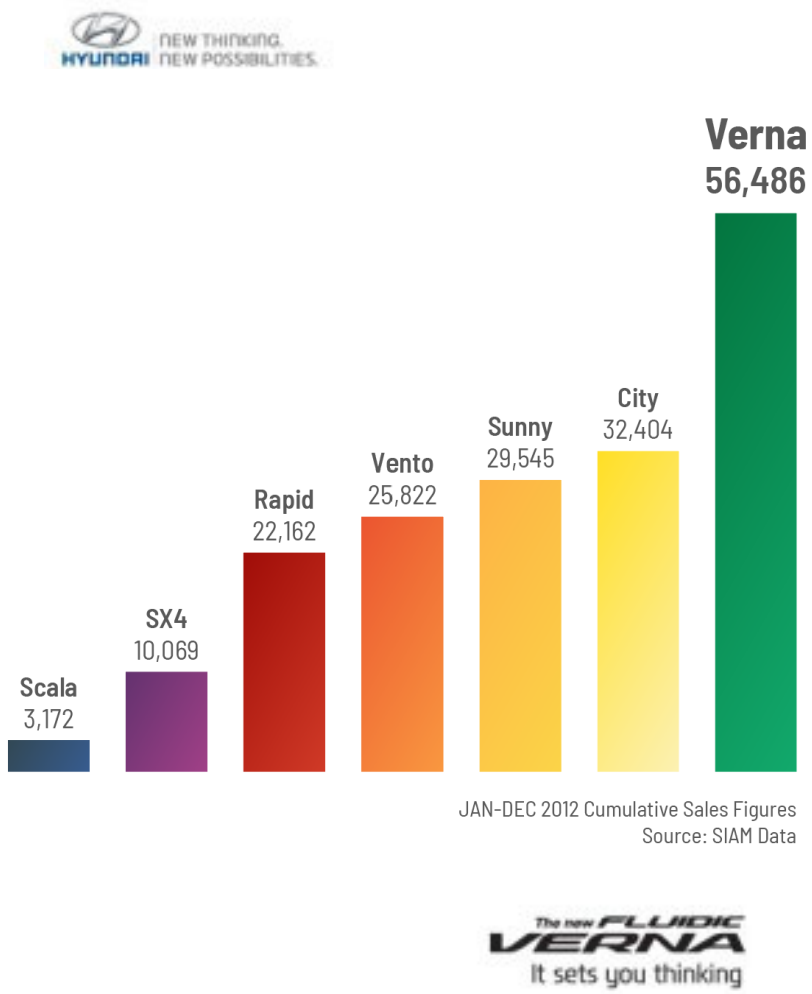
Pitfall

3D pie charts



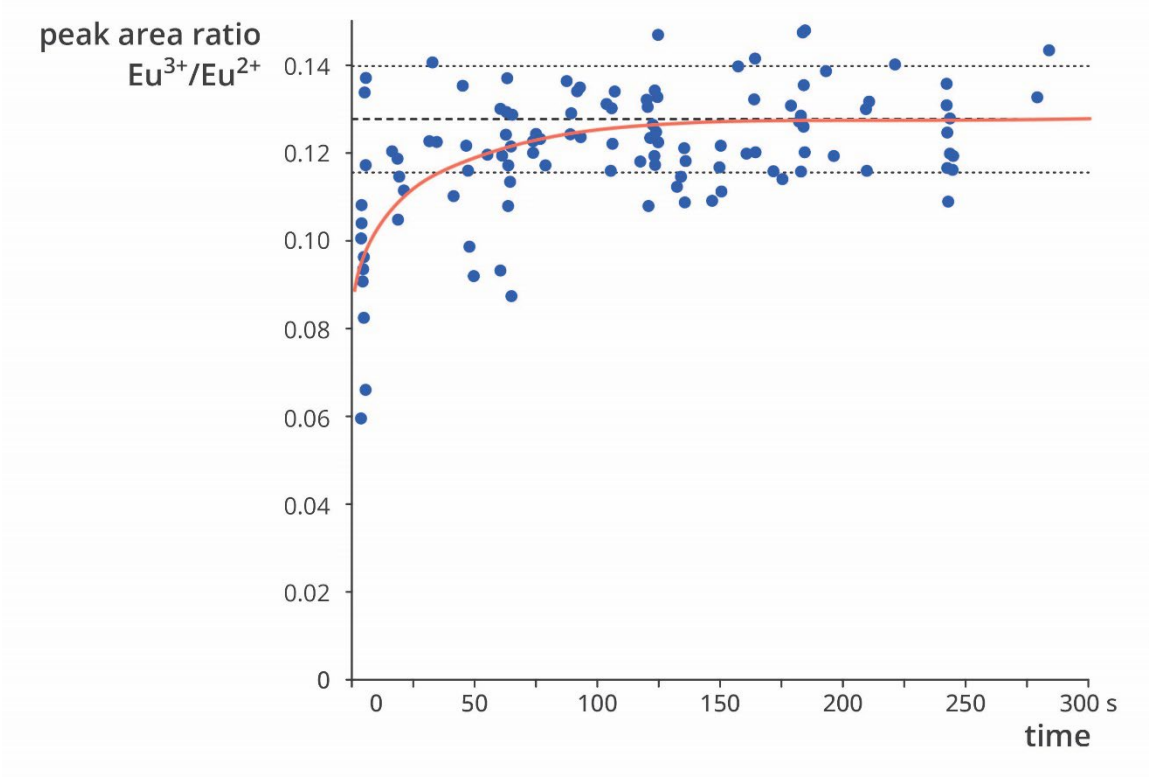
Alternative solution

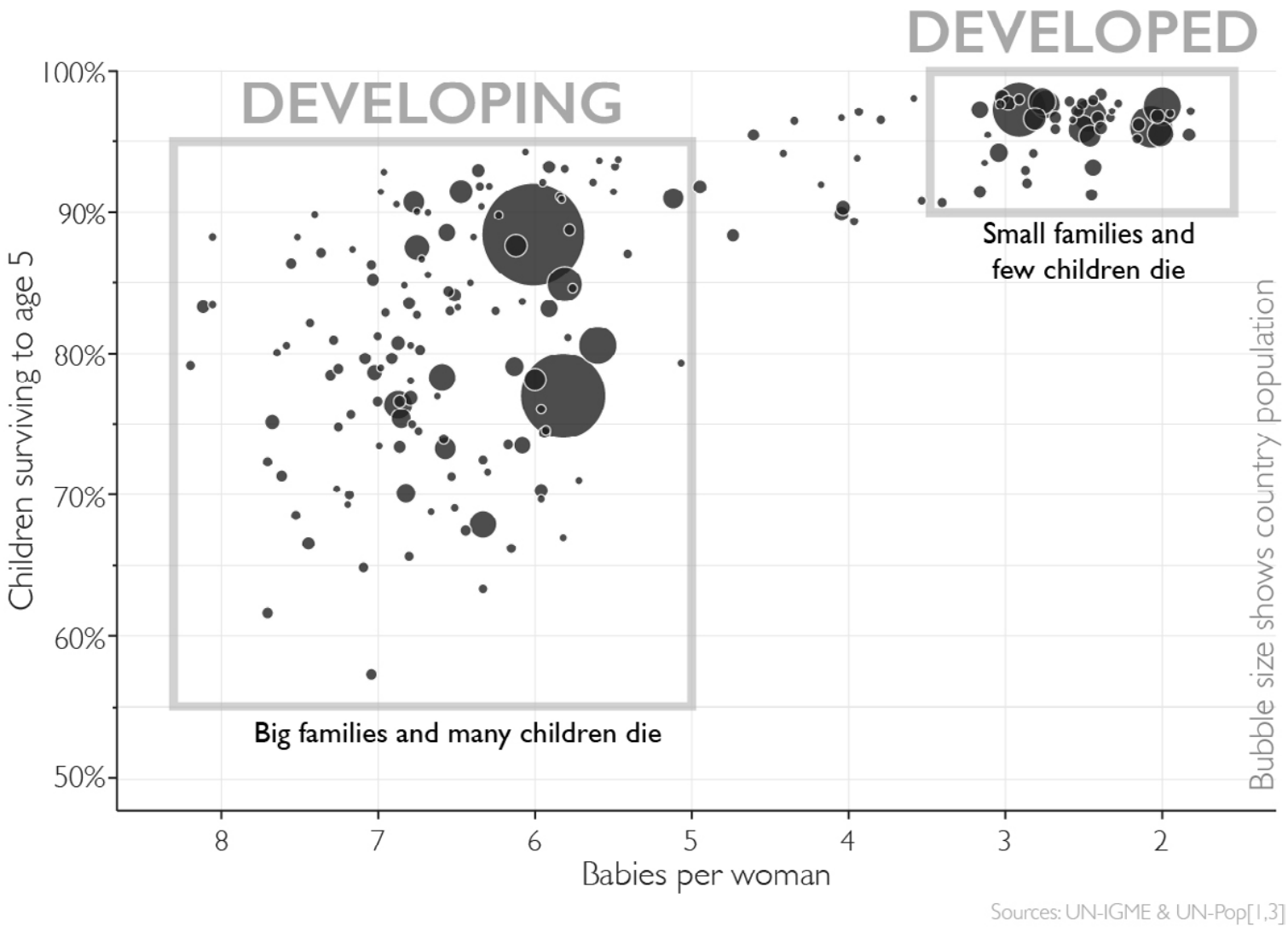
Use a bar chart



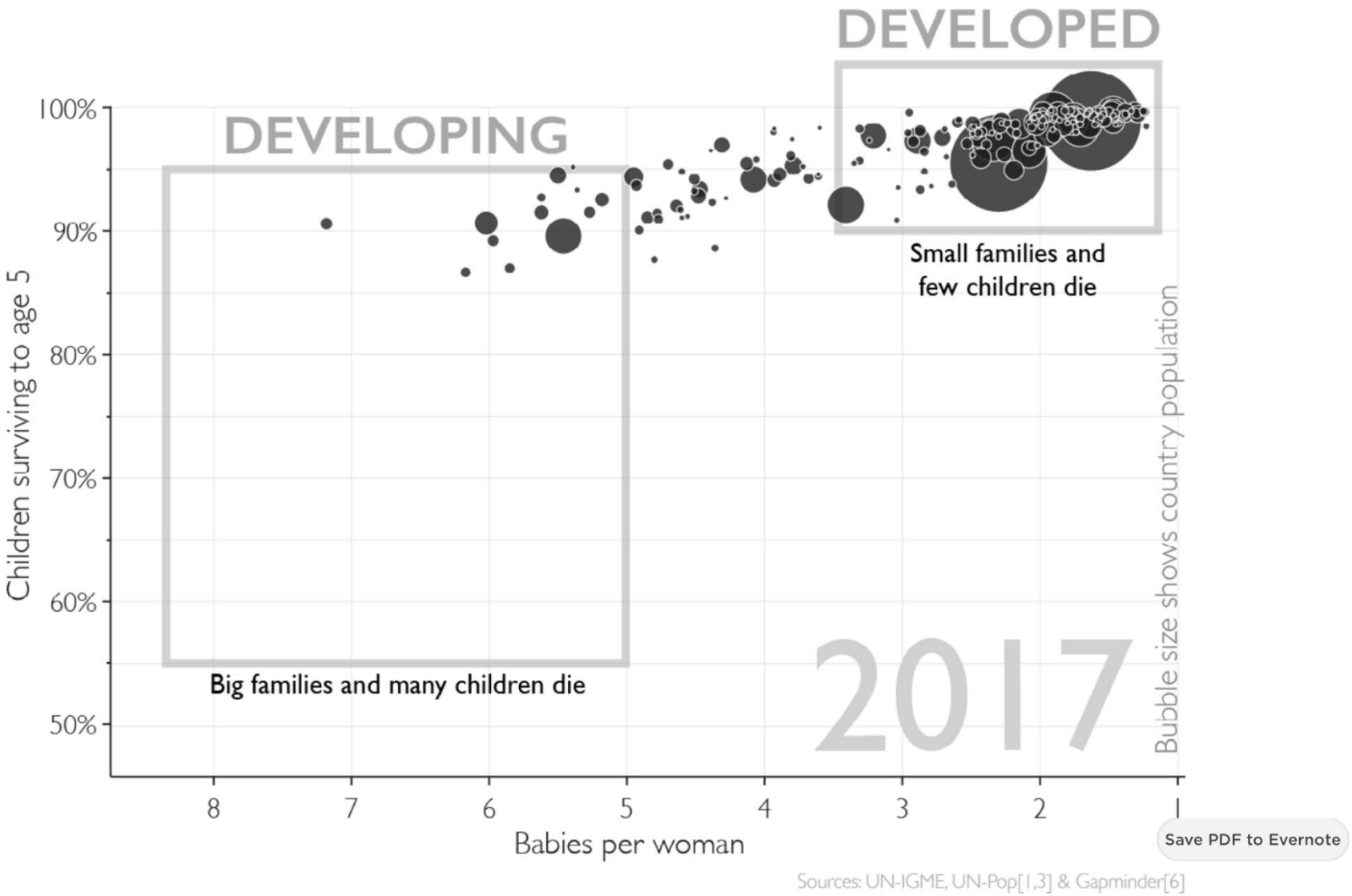
Common chart types

Scatter plots: **correlation** or **distribution** using **position**





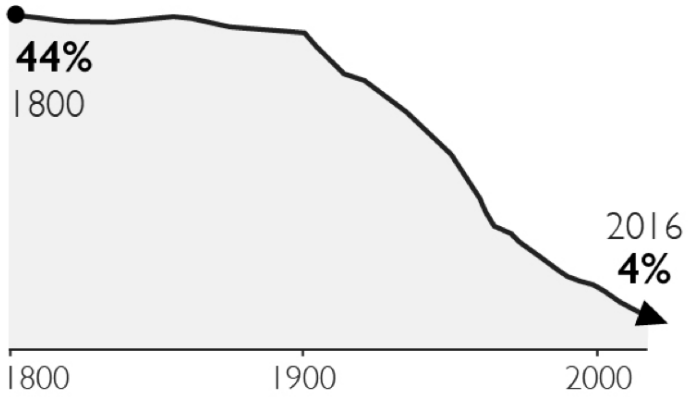
Hans Rosling, Factfulness



Hans Rosling, Factfulness

CHILDREN DYING

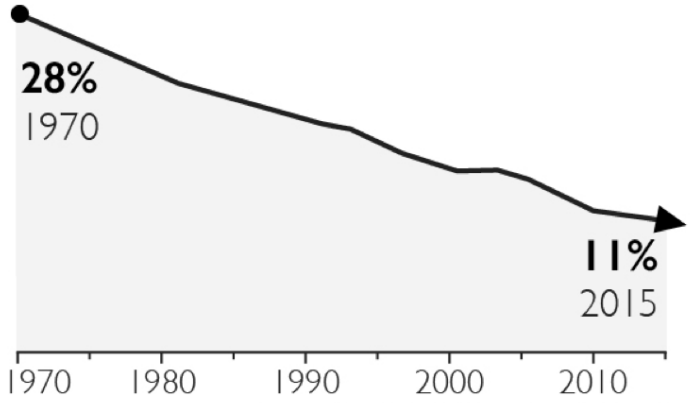
Percent dying before their fifth birthday



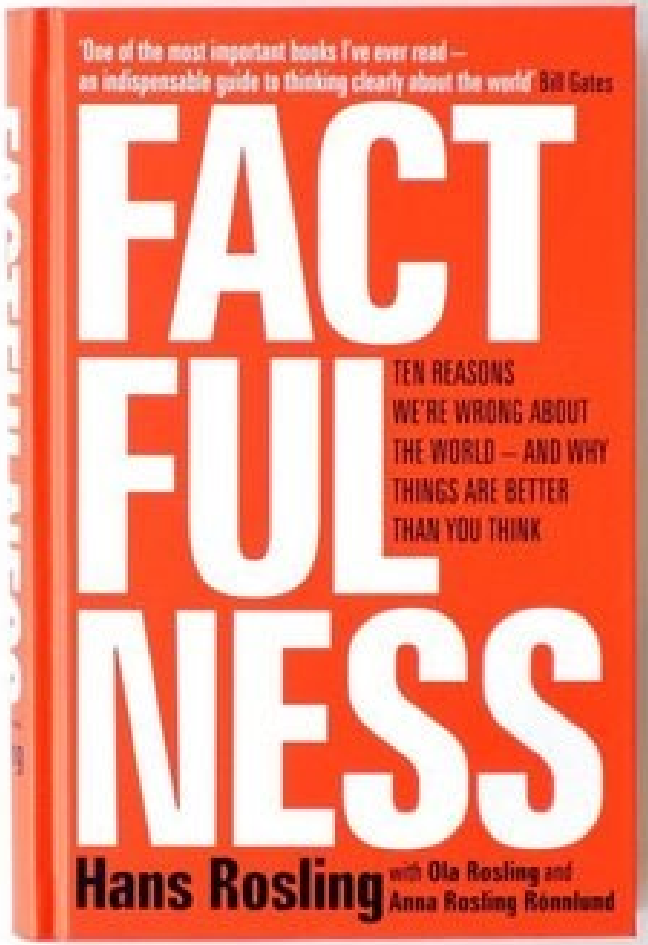
Source: Gapminder[6] based on UN-IGME & HMD

HUNGER

Share of people undernourished



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



Break

All the slides and all the links:

baryon.be/dataviz-resources

Encoding

Graphical representation categories

Visual variables

Chart types

Common chart types

15’ break

Less common chart types

Maps and tables

Maps

Table design

Inspiration – online and offline

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.

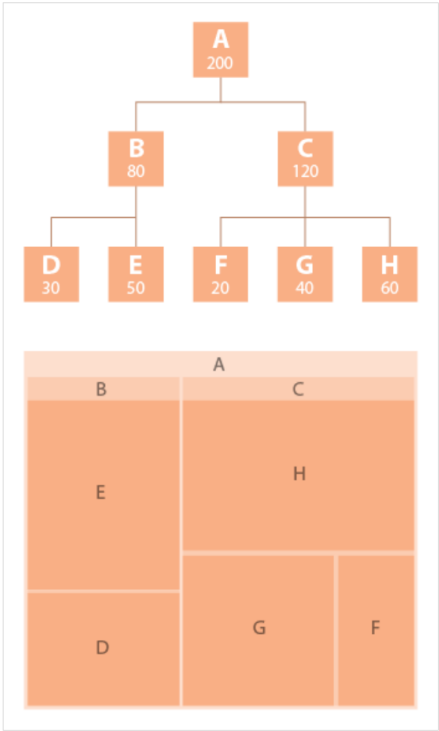
When a quantity is assigned to a category, its area size is displayed in proportion to that quantity and to the other quantities within the same parent category in a part-to-whole relationship. Also, the area size of the parent category is the total of its subcategories. If no quantity is assigned to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


Circle Packing


Marimekko Chart


Sunburst Diagram

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)

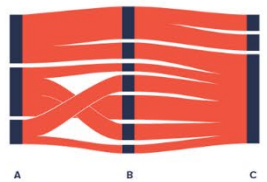
Examples

Region-wise Literacy Rates in 2015, World Population - FusionCharts

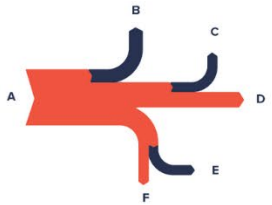
Top 10 Chinese Exports to the World - AnyChart

Treemap - Datamatic

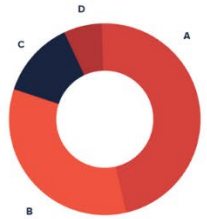
Alluvial Diagram



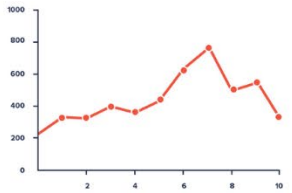
Sankey Diagram



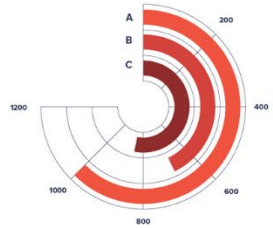
Donut Chart



Line Graph

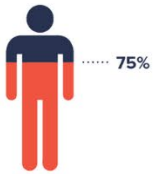


Radial Bar Chart



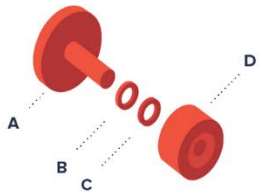
Polar Area Chart

Pictorial Fraction Chart

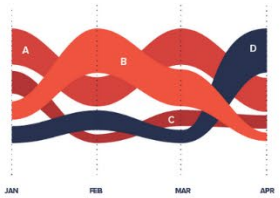


Radial Histogram

Exploded View Drawing



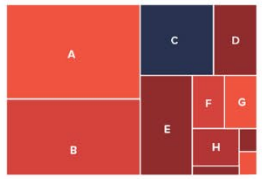
Sorted Stream Graph



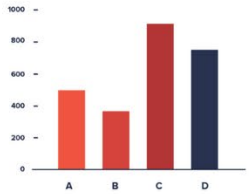
Flow Map

Sunburst Diagram

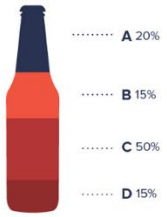
Treemap

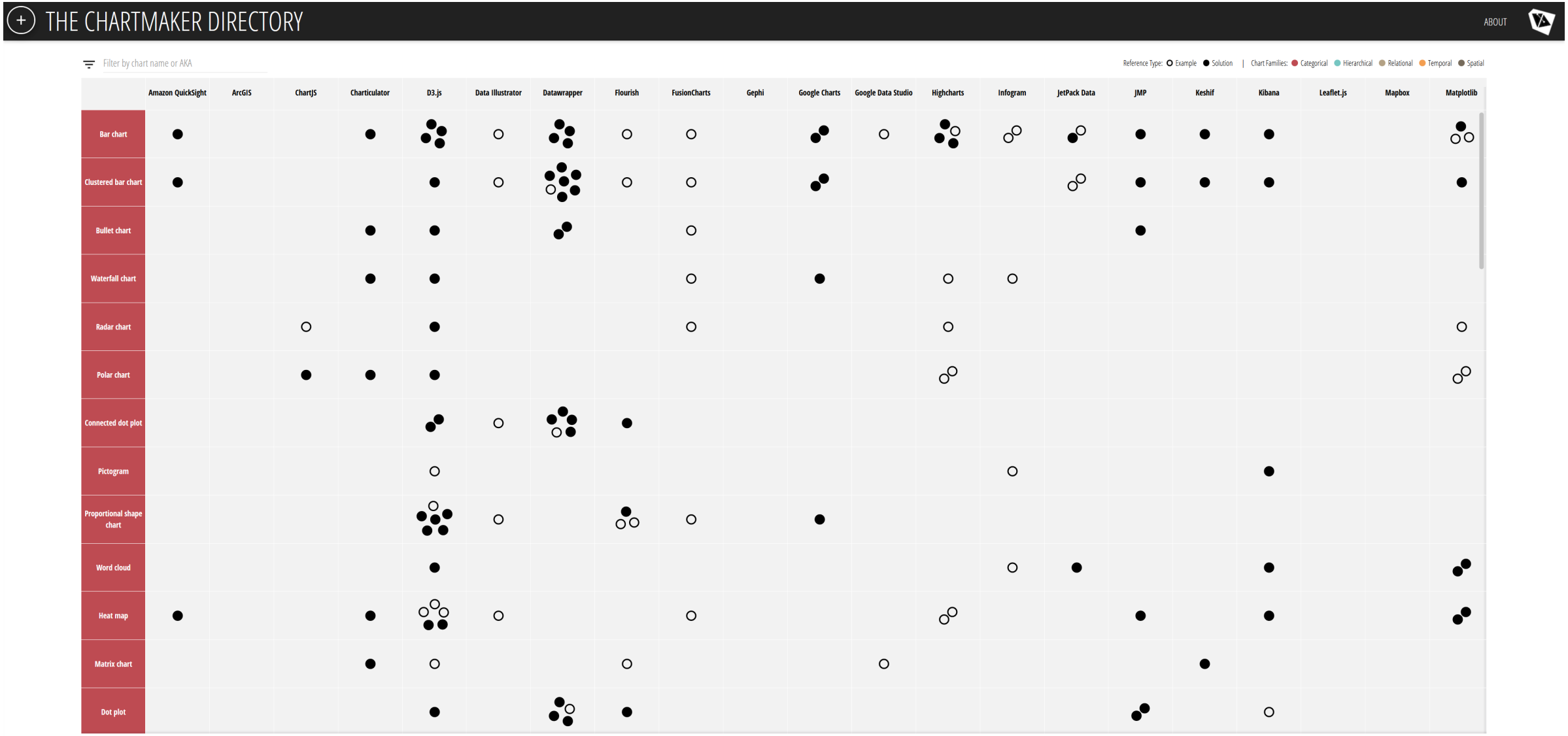


Bar Chart (Vertical)



Pictorial Stacked Chart



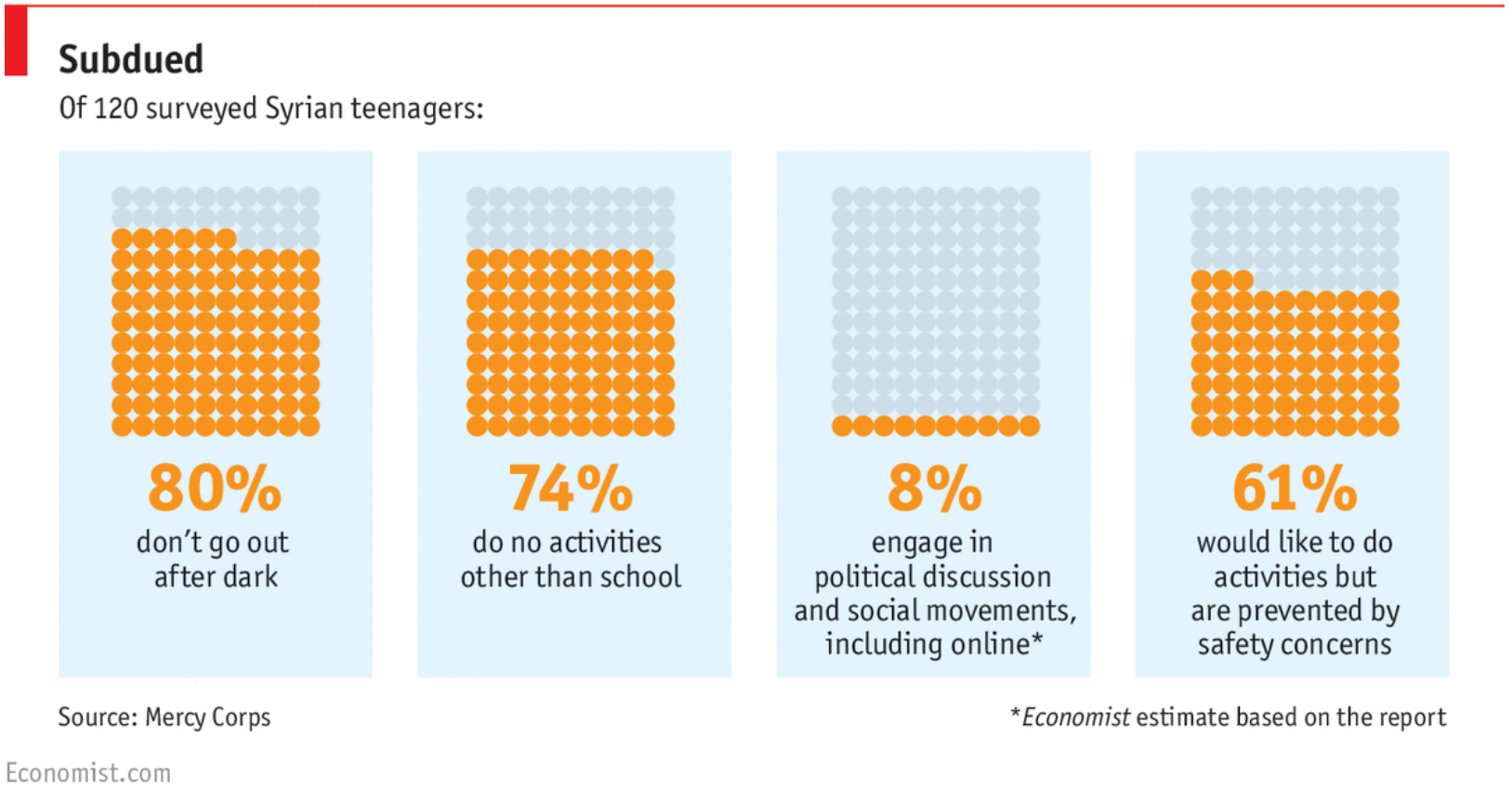


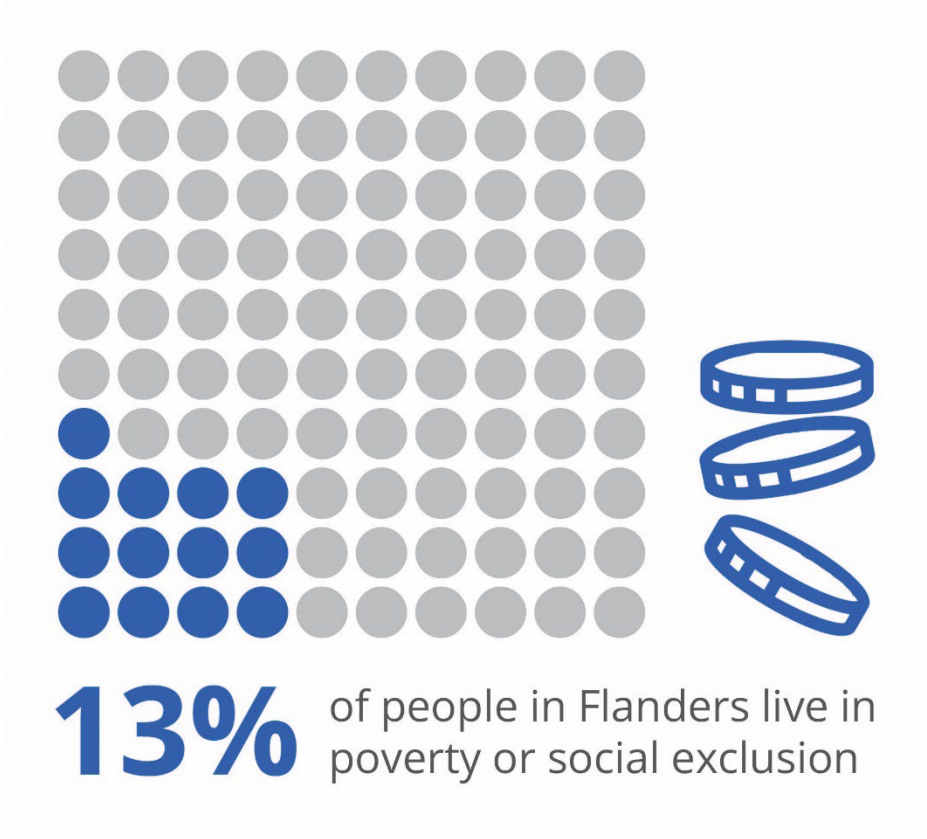
chartmaker.visualisingdata.com

https://chart.guide/

Less common chart types

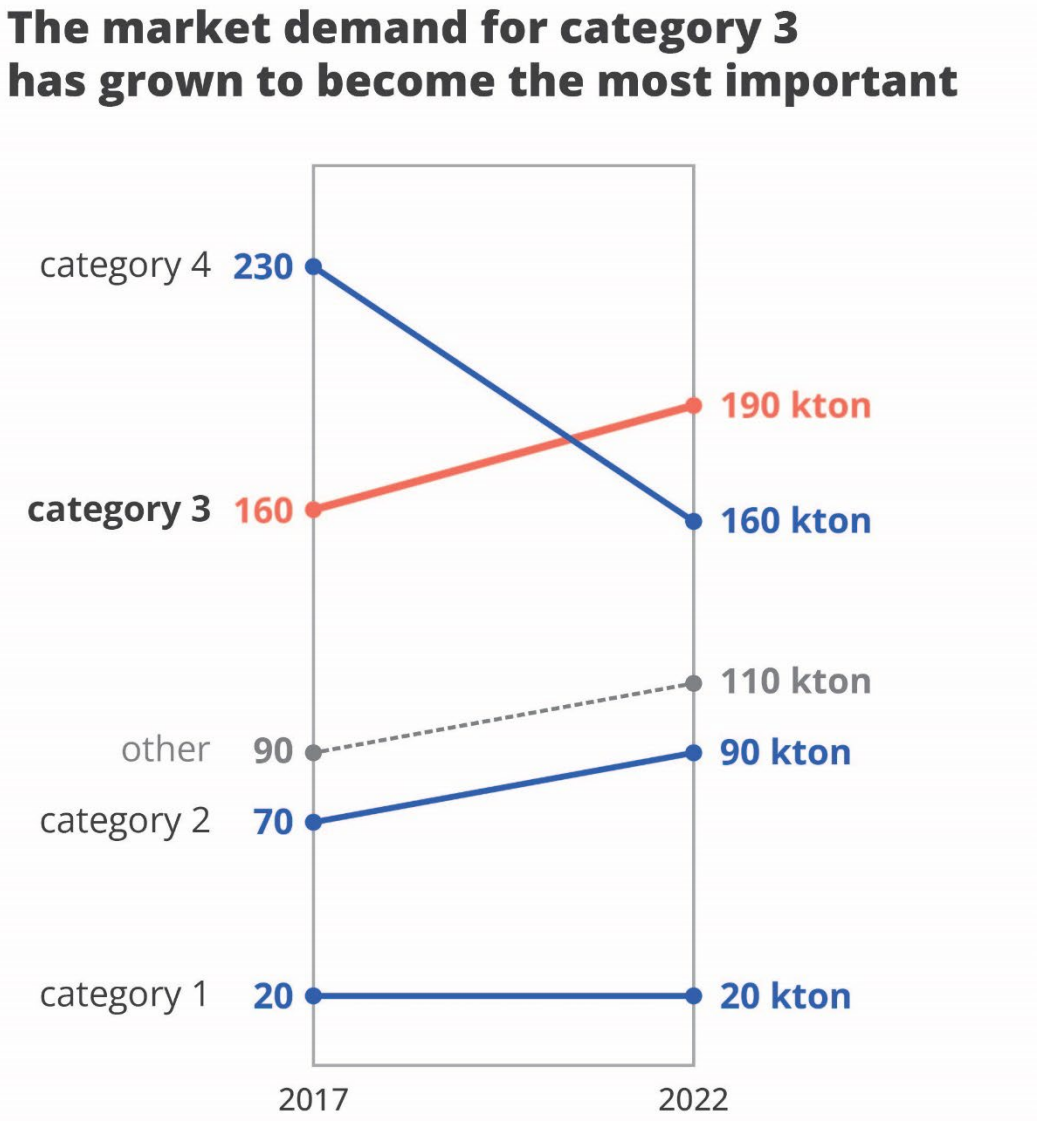
Waffle charts




13%
of people in Flanders live in
poverty or social exclusion

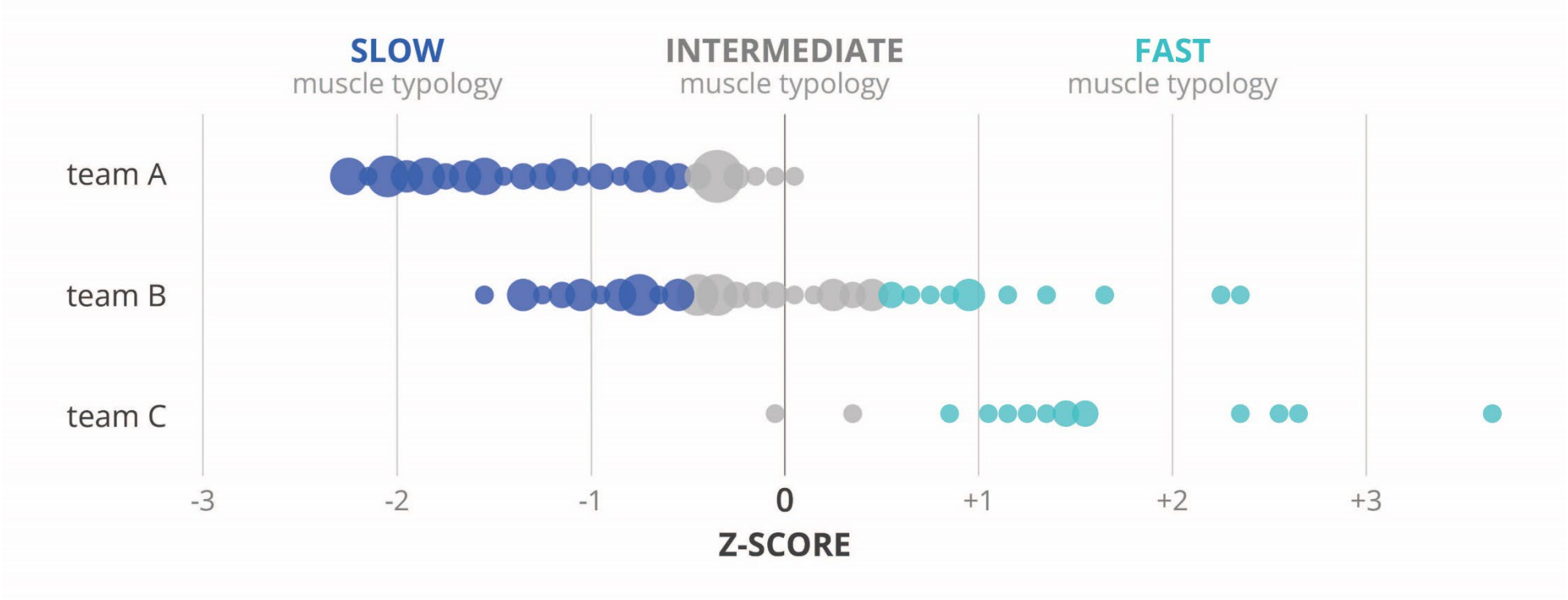
Less common chart types

Slopegraphs



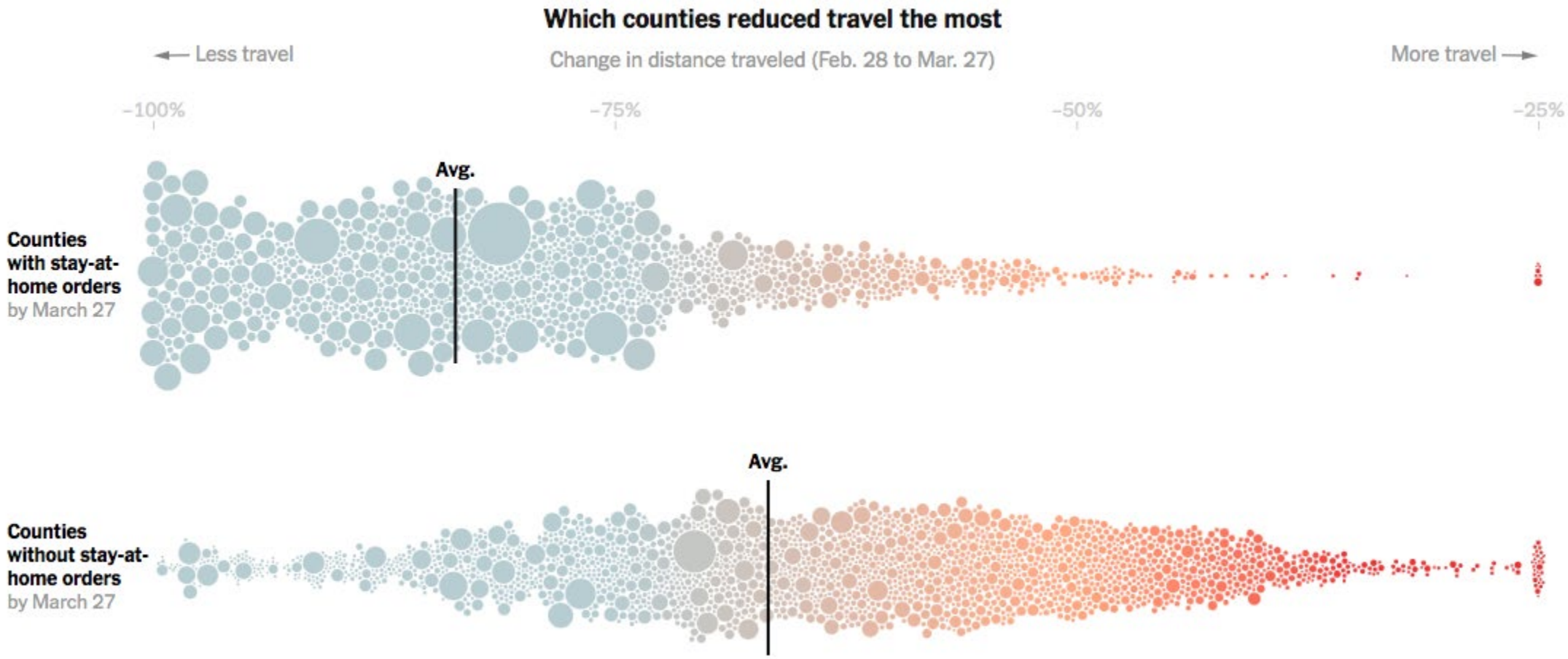
Less common chart types

Strip charts



Less common chart types

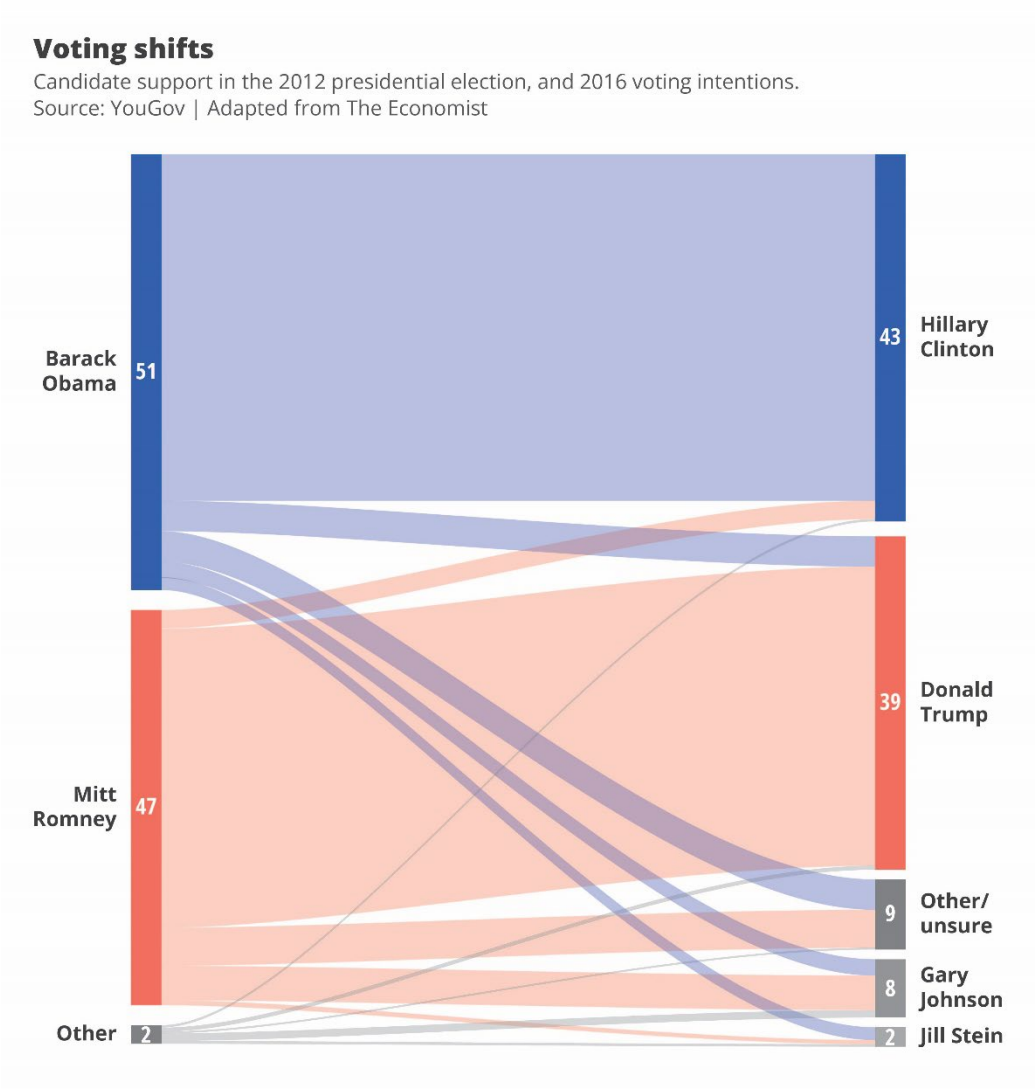
Beeswarm plots



nytimes.com/interactive/2020/04/02/us/coronavirus-social-distancing.html

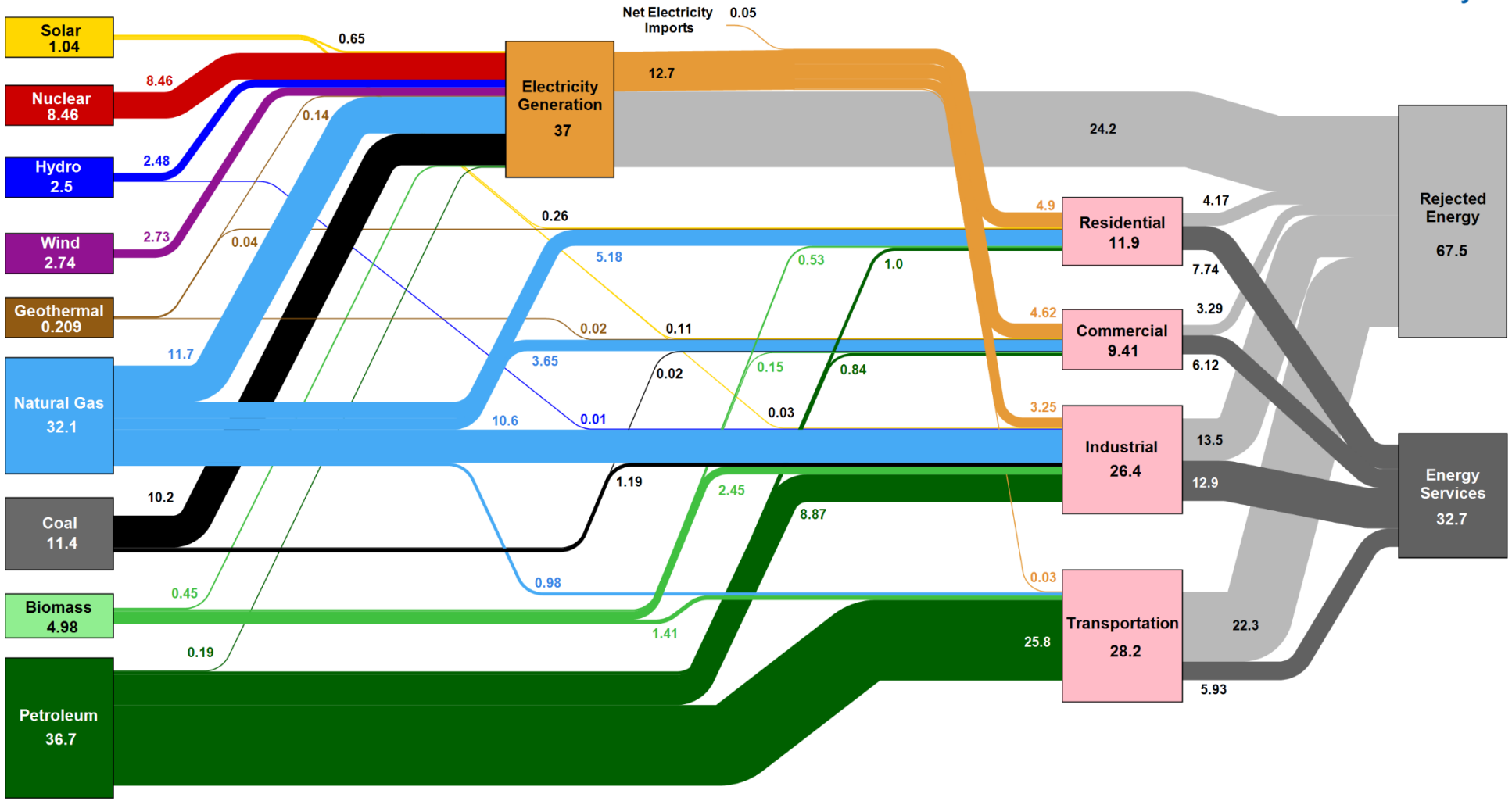
Less common chart types

Sankey diagrams



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

Lawrence Livermore National Laboratory



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

Carte Figurative des pertes successives en hommes de l'Armée Française dans la campagne de Russie 1812-1813.

Dressée par M. Minard, Inspecteur Général des Ponts et Chaussées en retraite.

Paris, le 20 Novembre 1869.

Les nombres d'hommes présents sont représentés par les largeurs des zônes colorées à raison d'un millimètre pour dix mille hommes; ils sont de plus écrits en travers des zônes. Le rouge désigne les hommes qui entrent en Russie, le noir ceux qui en sortent. — Les renseignements qui ont servi à dresser la carte ont été puisés dans les ouvrages de MM. Thiers, de Ségur, de Fezensac, de Chambray et le journal inédit de Jacob, pharmacien de l'Armée depuis le 28 Octobre.

Pour mieux faire juger à l'œil la diminution de l'armée, j'ai supposé que les corps du Prince Jérôme et du Maréchal Davoust qui avaient été détachés sur Minsk et Mobilow et ont rejoint vers Orscha et Witebsk, avaient toujours marché avec l'armée.

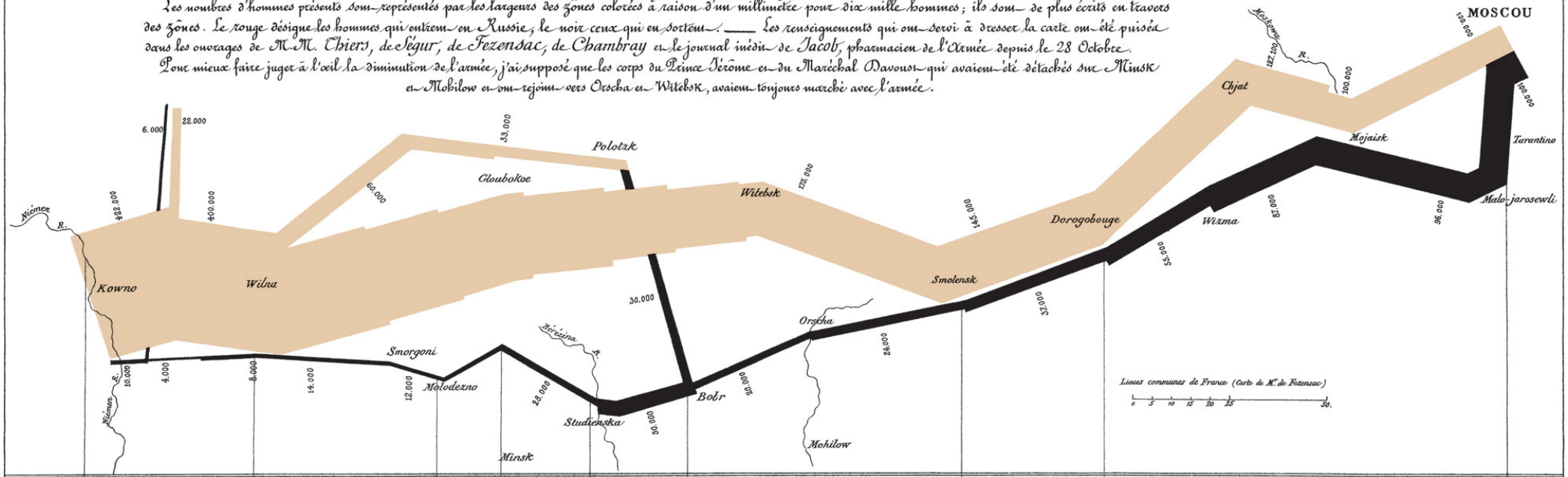
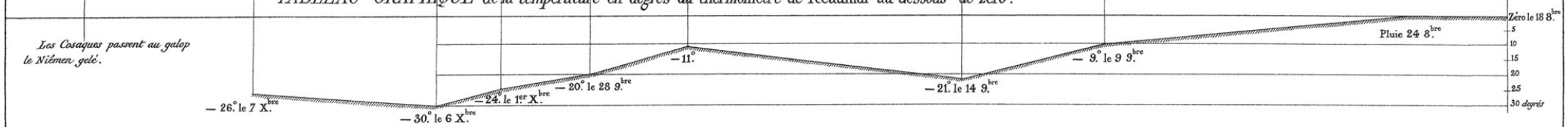


TABLEAU GRAPHIQUE de la température en degrés du thermomètre de Réaumur au dessous de zéro.



Autog. par Regnier, 8. Pas. Ste Marie St Gain à Paris.

Imp. Lith. Regnier et Dourdet.

Chart type exploration

Group exercise

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

datavizcatalogue.com

chartmaker.visualisingdata.com

chart.guide

Browse around, get familiar, explore examples

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

Graphical representation of data

Individual exercise

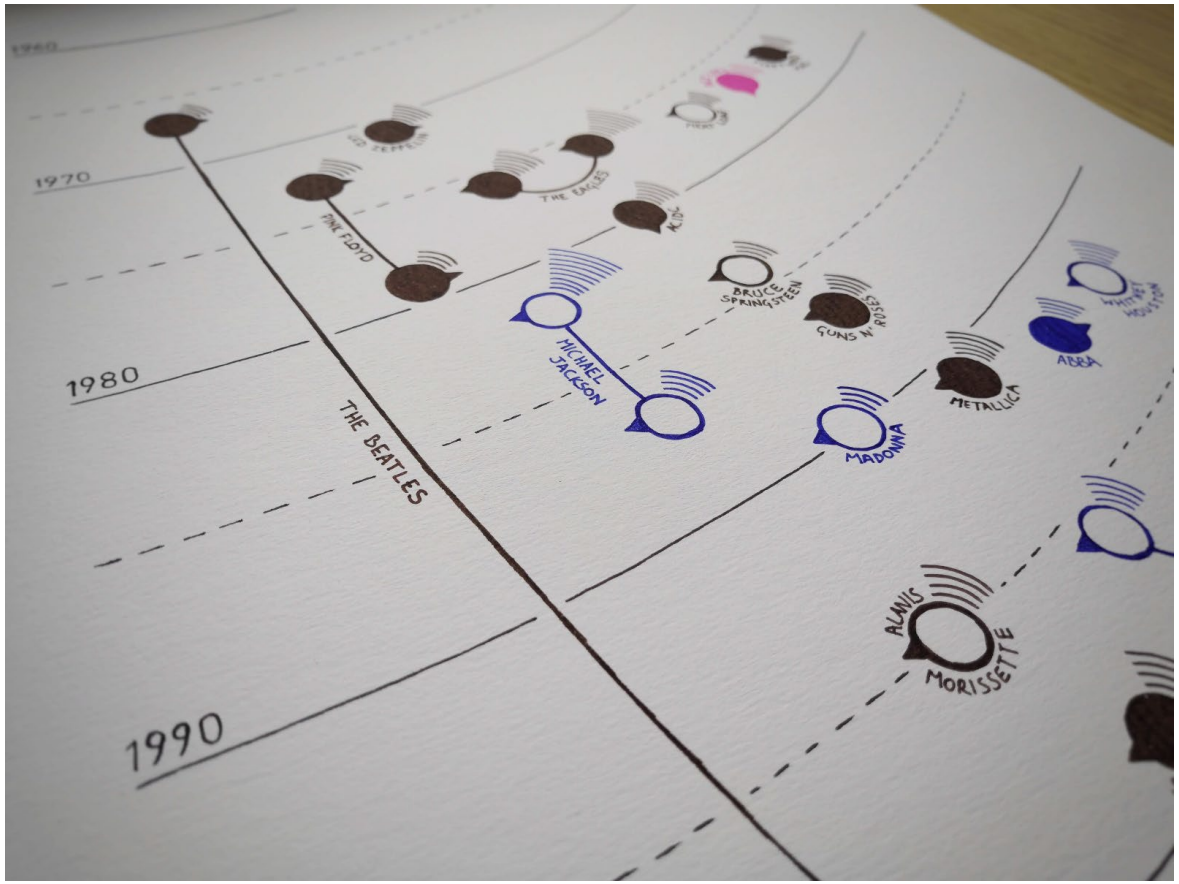
Observe the following **data set**:

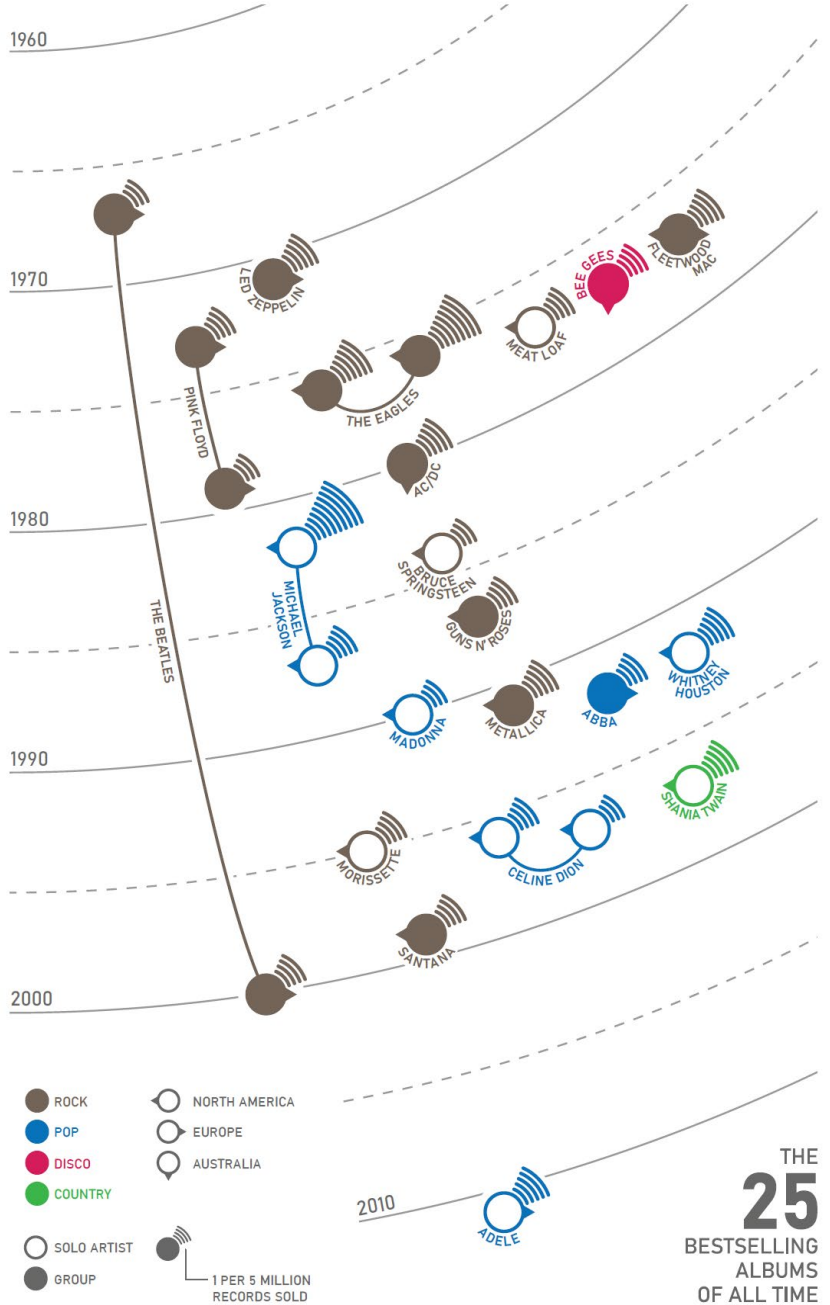
baryon.be/files/workshop/music.xlsx

Which **dimension** would you map to which **visual variable**?

Sketch how such a visual would look like.

Artist	Album	Year	Genre	Copies sold (r	Type	Country
The Beatles	Sgt. Pepper's Lonely Hearts Club Band	1967	Rock	18.2	Group	UK
Led Zeppelin	Led Zeppelin IV	1971	Rock	29	Group	UK
Pink Floyd	The Dark Side of the Moon	1973	Rock	24.2	Group	UK
Eagles	Their Greatest Hits (1971-1975)	1976	Rock	41.2	Group	USA
Eagles	Hotel California	1976	Rock	31.5	Group	USA
Fleetwood Mac	Rumours	1977	Rock	27.9	Group	UK & USA
Meat Loaf	Bat Out of Hell	1977	Rock	21.7	Solo	USA
Bee Gees	Saturday Night Fever	1977	Disco	21.6	Group	Australia
Pink Floyd	The Wall	1979	Rock	18.7	Group	UK
AC/DC	Back in Black	1980	Rock	29.4	Group	Australia
Michael Jackson	Thriller	1982	Pop	47.3	Solo	USA
Bruce Springsteen	Born in the U.S.A.	1984	Rock	19.6	Solo	USA
Michael Jackson	Bad	1987	Pop	22.2	Solo	USA
Guns N' Roses	Appetite for Destruction	1987	Rock	21.9	Group	USA
Madonna	The Immaculate Collection	1990	Pop	19.4	Solo	USA
Metallica	Metallica	1991	Rock	25.2	Group	USA
Whitney Houston	The Bodyguard	1992	Pop	28.4	Solo	USA
ABBA	Gold: Greatest Hits	1992	Pop	23	Group	Sweden
Alanis Morissette	Jagged Little Pill	1995	Rock	24.4	Solo	Canada
Celine Dion	Falling into You	1996	Pop	20.2	Solo	Canada
Shania Twain	Come On Over	1997	Country	29.6	Solo	Canada
Celine Dion	Let's Talk About Love	1997	Pop	19.3	Solo	Canada
Santana	Supernatural	1999	Rock	20.5	Group	USA
The Beatles	1	2000	Rock	23.4	Group	UK
Adele	21	2011	Pop	25.3	Solo	UK



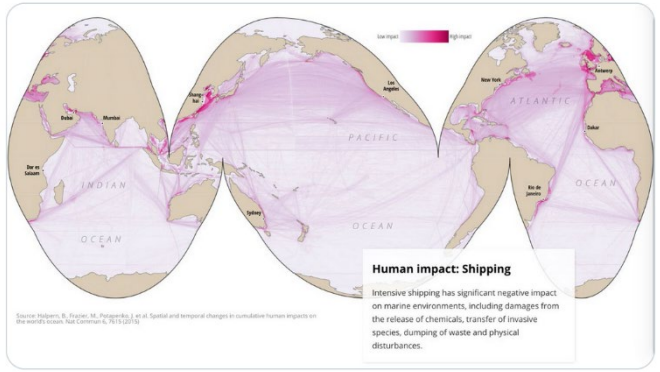


THE
25
BESTSELLING
ALBUMS
OF ALL TIME

Inspiration

Twitter

Maarten Lambrechts @maartenzam · 23 mei
Als antwoord op @pickover
From a work in progress



5

Nadieh Bremer @NadiehBremer · 15 u
New!! 🎉 I've created a streamgraph-meets-bump-chart #dataviz to show the rise & sudden surge in the no. of satellites orbiting Earth for @sciam 🛰️

Huge thanks to @ChristiansenJen for the feedback + layout + sending me 2 issues when my store in NL didn't get them due to covid-19

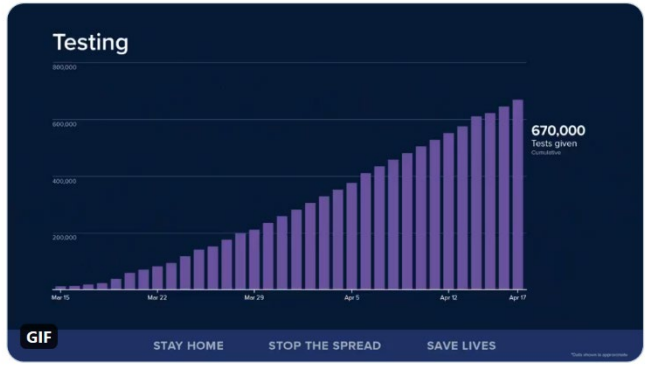
7 40 368

Vastgemaakte Tweet

Giorgia Lupi @giorgialupi · 30 apr.
We ❤️@NYGovCuomo 's daily briefings. That's why at @pentagram we humbly tried to make his charts even more effective and human.

We talked to @FastCompany about it: fastcompany.com/90498405/andre...

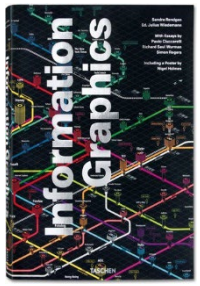
But also check out the full project here: drive.google.com/file/d/1tS-BDR...



13 160 441

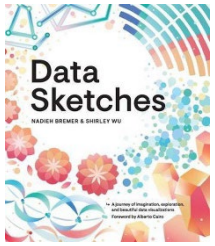
Full **Dataviz World Leaders** list at: twitter.com/Koen_VdE/lists

Books



Information graphics

Taschen



Data Sketches

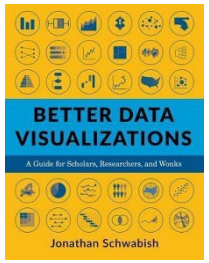
Nadieh Bremer & Shirley Wu

RECOMMENDED

Visual journalism

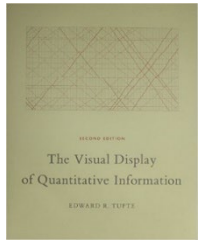
Gestalten

RECOMMENDED



Better data visualizations

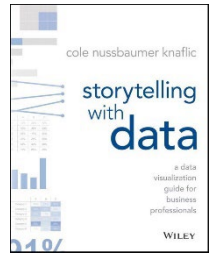
Jonathan Schwabish



The visual display of quantitative information

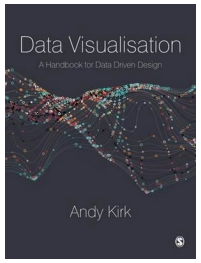
Edward R. Tufte

RECOMMENDED



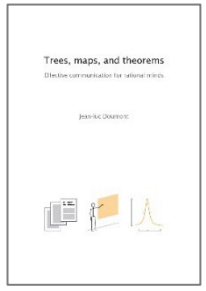
Storytelling with data

Cole Nussbaumer Knaflic



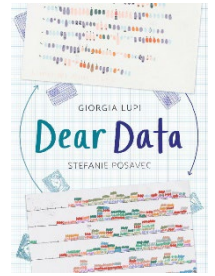
Data visualisation

Andy Kirk



Trees, maps and theorems

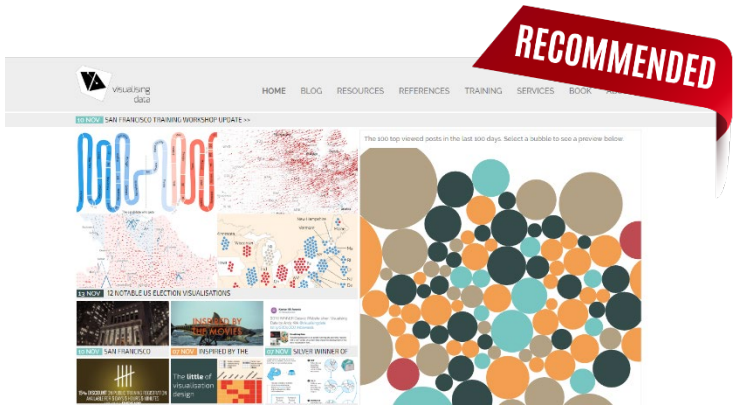
Jean-Luc Doumont



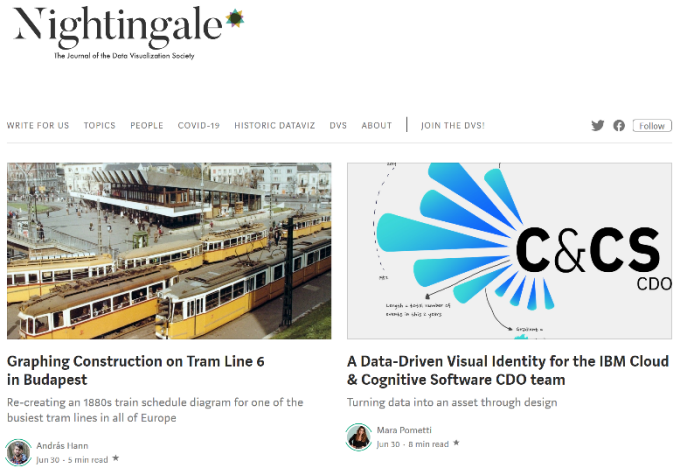
Dear data

Stefanie Posavec, Giorgia Lupi

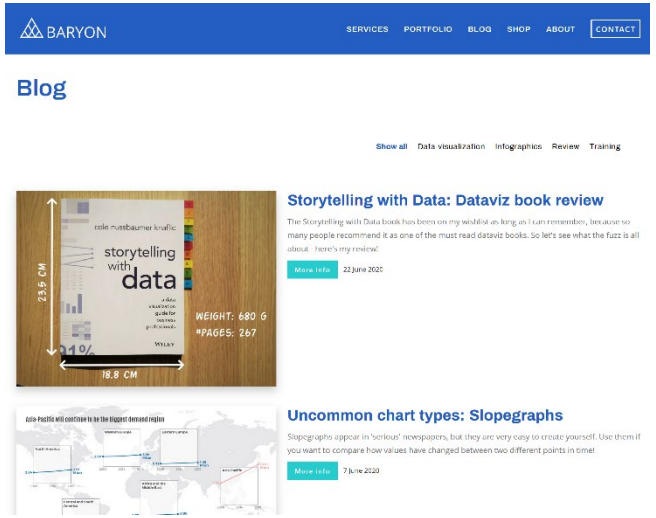
Blogs



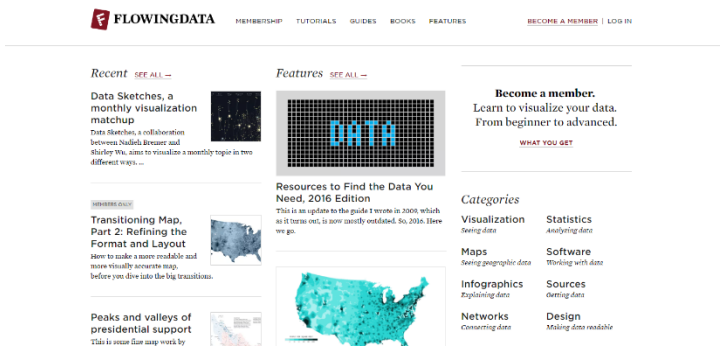
[Visualising Data]



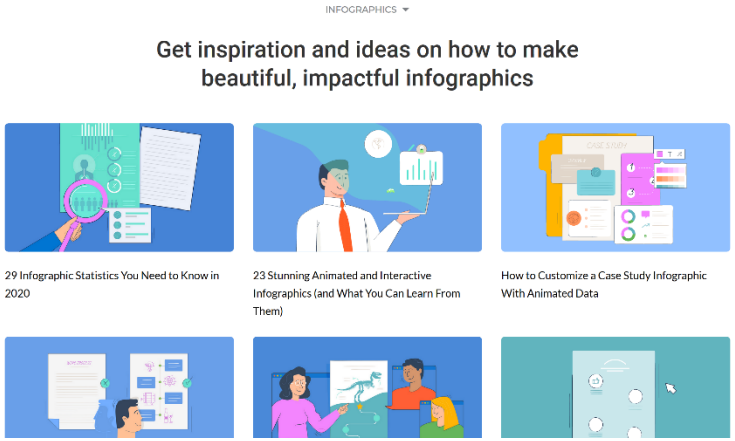
[Nightingale]



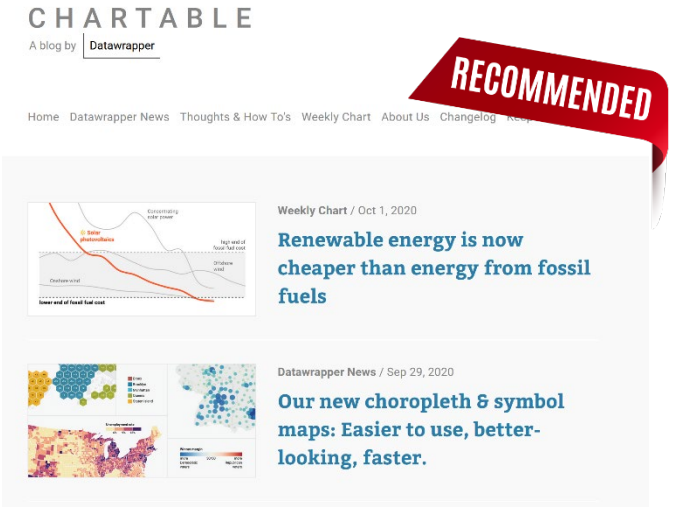
[Baryon blog]



[Flowing Data]

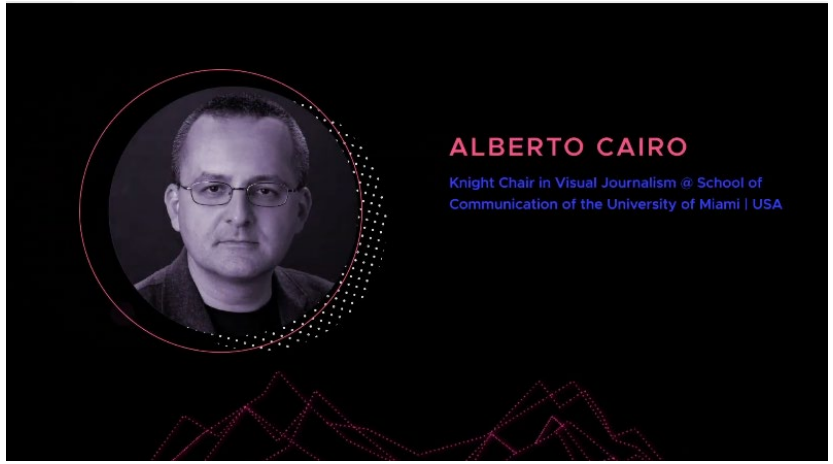


[Visme blog]



[Chartable]

Videos



Datafest online 2020
23 different talks

Youtube playlist

Outlier Conference 2022
71 different talks

Youtube playlist

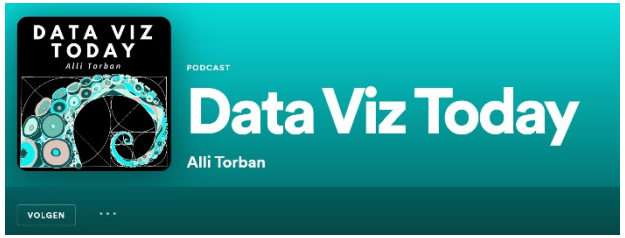
Podcasts

[Data Journalism Conversations]

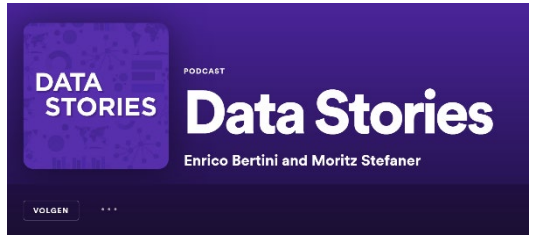
[The Data Journalism Podcast]

[Explore Explain]

[Storytelling with data]



[Data Viz Today]

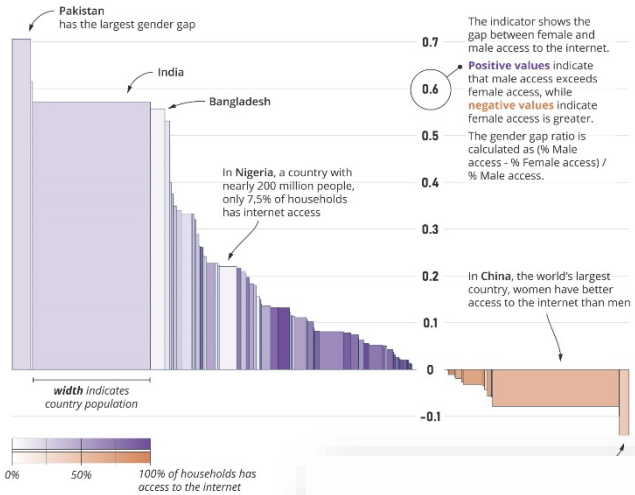


[Data Stories]

Homework assignment

The digital divide

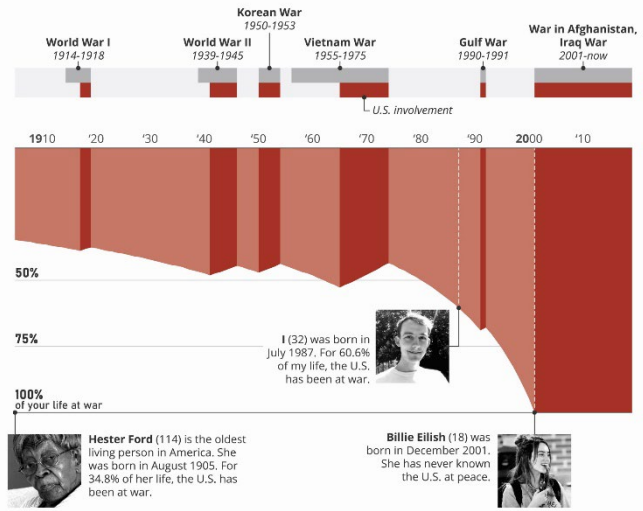
In most countries, **men** have better access to the internet than **women**



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

A lifetime at war

No Americans born since 2001 have known their country at peace

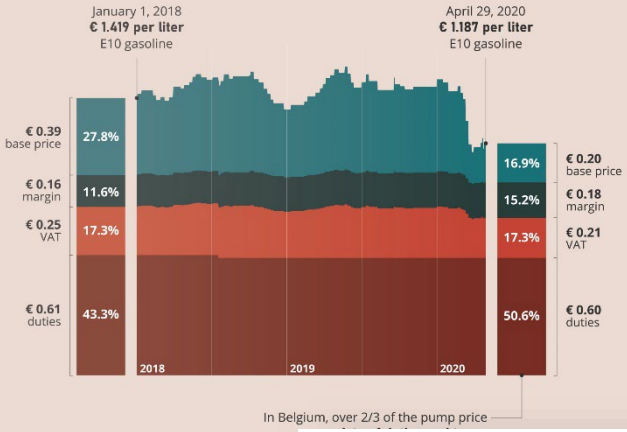


Source: Philip Bump for the Washington Post, "Nearly a quarter of Americans have never experienced the U.S. in a time of peace"

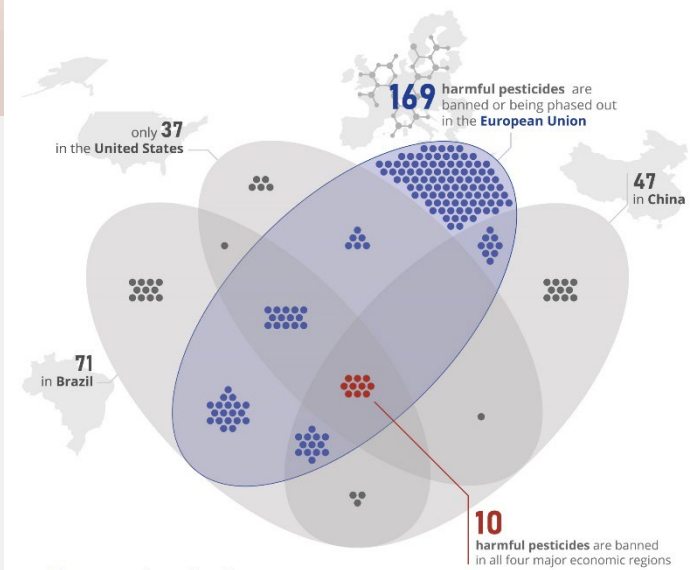
A #MakeoverMonday visualization by **Koen Van den Eeckhout** (@koen_vde)

Oil Time Low

Crude oil prices are at their lowest point since 1998, dropping over 85% in the past few months. But at the pump, we pay for more than just the oil.



Source: Belgian Petroleum Federation, FOD Economie, Statbel



Europe leads the way

in banning harmful pesticides

Source: Donley, N. The USA lags behind other agricultural nations in banning harmful pesticides. Environ Health 18, 44 (2019) doi:10.1186/s12940-019-0488-0

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

Inspired by David McCandless' ***Reasons for Being*** visualization: informationisbeautiful.net

What is your message?

Homework assignment

Download and explore a dataset of your choice at ourworldindata.org

Alternatively, you can use one of the following datasets:

- Titanic disaster dataset
- Stack Overflow Developer Survey
- Nobel Prize winners

Yes, you can choose your own dataset

apart from these 3. However, make sure:

- your data has sufficient 'depth' to find an interesting story
- your key message can be understood by your audience (your audience = PhD students from all levels, and different fields)

Take enough time to familiarize yourself with the dataset

Identify one or more **key messages** you can derive from it

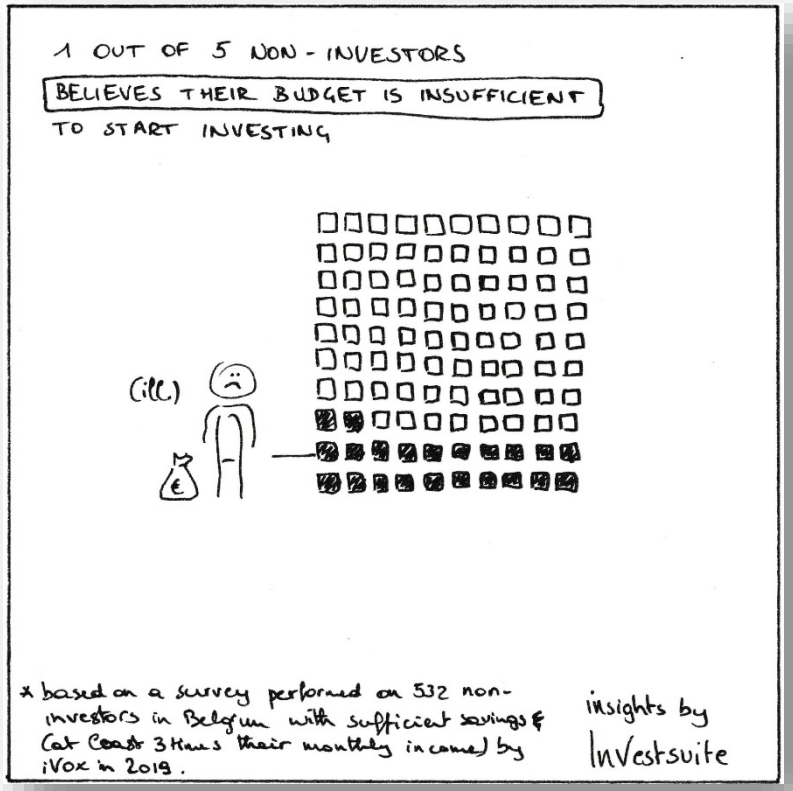
What is your concept?

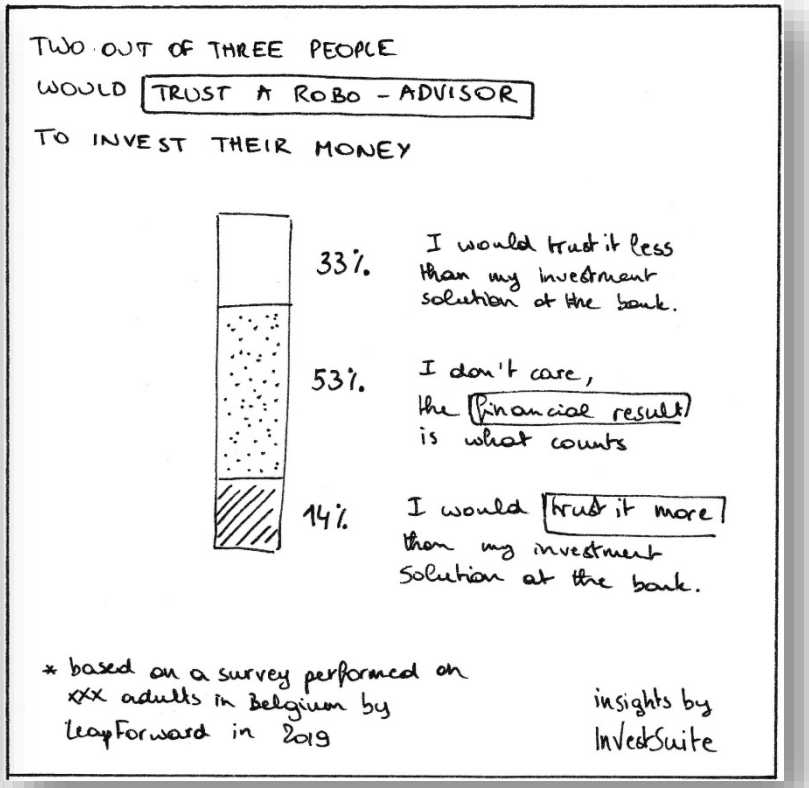
Homework assignment (continued)

Select one of the key messages you identified previously

Explore different concepts to turn this message into a data visual

Choose 2 or 3 concepts
and turn them into sketches





Submission

Homework assignment (continued)

Send **one of your concept sketches** (scan or photograph - jpg, png, or pdf)

to **koen@baryon.be**

Session 1 — **Graphical representation of data**

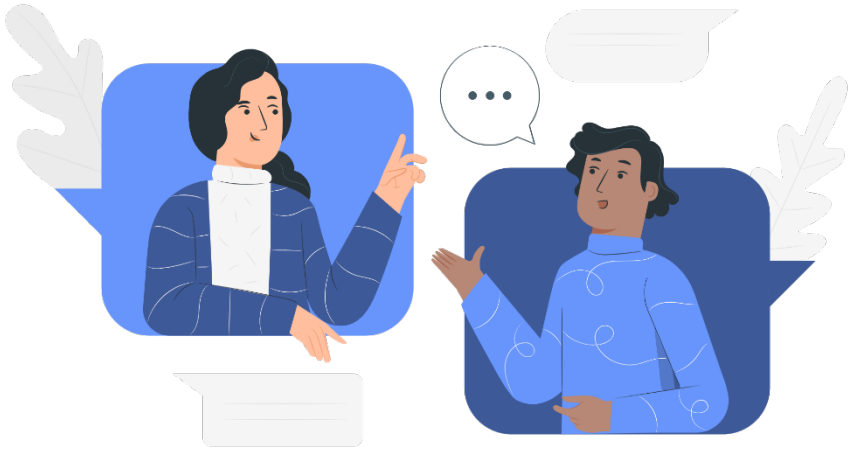
homework assignment part 1

Session 2 — **Producing and designing data visuals**

homework assignment part 2

Session 3 — **Visualizing scientific research**

Q & A



All the slides and all the links:

https://baryon.be/dataviz-resources

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