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

Direction Access to and Reuse of Public Information

Unit EU Open Data and CORDIS

Sector EU Open Data

ISA2 Programme

What's ISA2?

ISA2 supports the development of **digital solutions** enabling public administrations, businesses and citizens in Europe to benefit from **interoperable cross-border** and **cross-sector public services.**

How OP is involved in ISA2?

OP is aiming at improving open services in the areas of:

- Data visualisation
- Linked open data
- Persistent identification

Upcoming training & workshop sessions

Topic	Type of session	Bxl.	Lux.
Making data viz like a pro – D3.js	Workshop	-	25/09
Telling your story through data visualisation	Training	2/10	22/10
Making great online visualisations without coding	Workshop	4/10	23/10
Applying data visualisation in use cases	Workshop	-	24/10

Upcoming webinars

Learn more details on webinar and registration on Joinup:

https://joinup.ec.europa.eu/collection/joinup/event/register-now-telling-your-story-through-data-visualisation

Learn more details on webinar and registration on Joinup:

https://joinup.ec.europa.eu/collection/joinup/event/register-now-practising-non-standard-data-visualisation

e-mail: op-odp-contact@publications.europa.eu

Conference EU DataViz in 2019

EU DataViz 2019
European Convention Center, Luxembourg
Tuesday, 12 November 2019

EU DATA VIZ

Serving citizens through better data visualisation
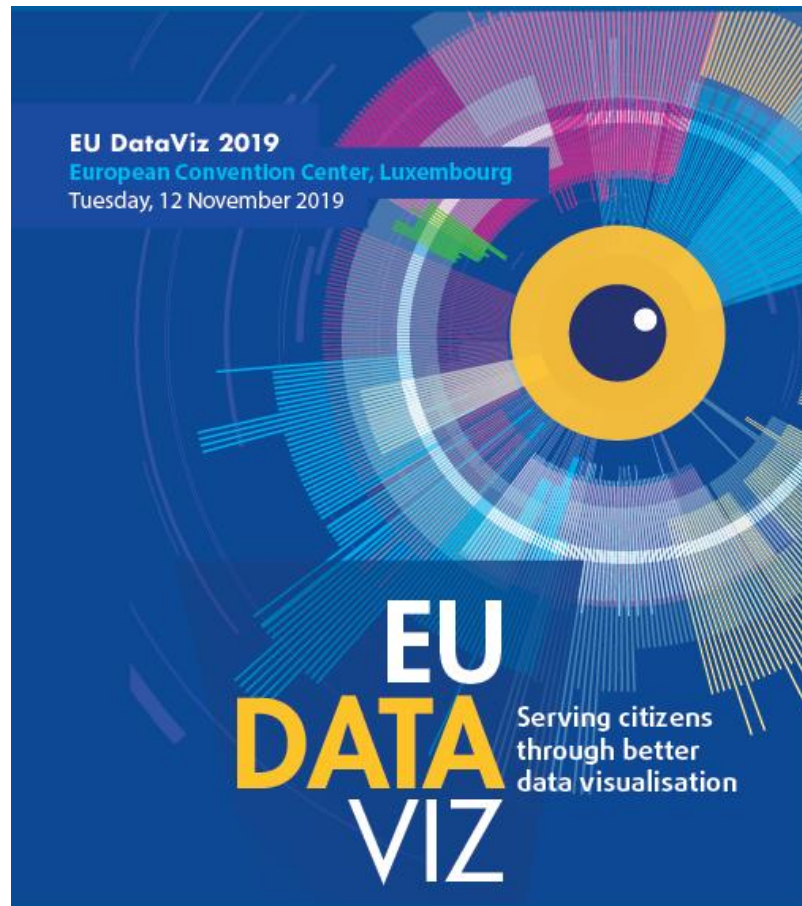
e-mail: op-eu-dataviz@publications.europa.eu

Agenda

09:00	Introduction
	Creative with dots, tool: RAWGraphs
10:30	Coffee break
	Creative with bars, tool: Charticulator
12:00 – 13:00	Lunch
	Time and hierarchy
	Multidimensional data, tool: Data Illustrator
14:30	Coffeebreak
	Networks and uncertainty
	Introducing new charts to readers
16:30	Q&A

1.
INTRODUCTION

Participants

Institution/DG and role?

What data do you work with?

Experience in data visualisation?

Expectations for today?

Introduction
Xenographics

Why are some charts weirder than others?

We are only familiar with what the tools we use are offering
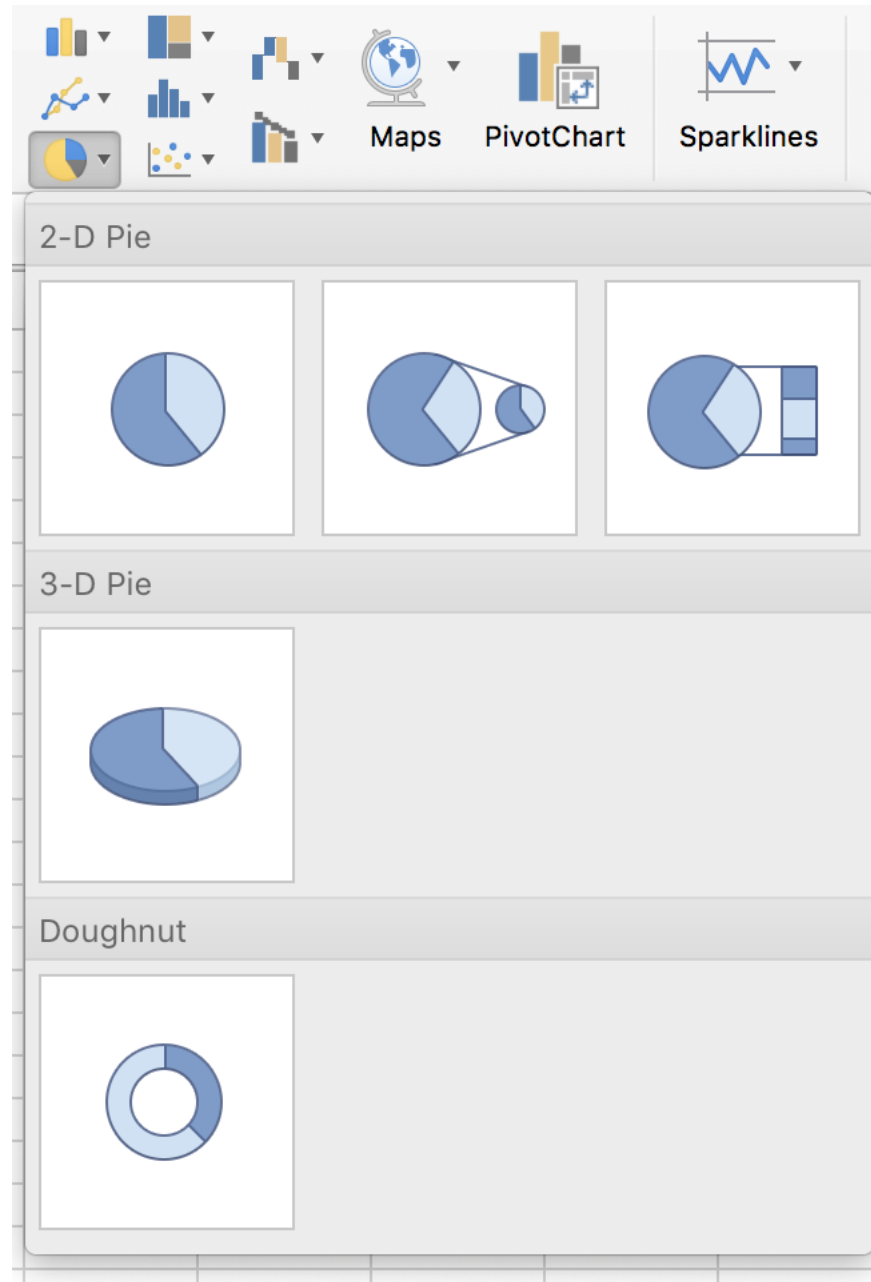
Introduction
Xenographics

William Playfair

"As knowledge increases amongst mankind, and transactions multiply, it becomes more and more desirable to abbreviate and facilitate the modes of conveying information from one person to another, and from one individual to the many."

Introduction
Xenographics

William Playfair

Exports and Imports to and from DENMARK & NORWAY from 1700 to 1780.
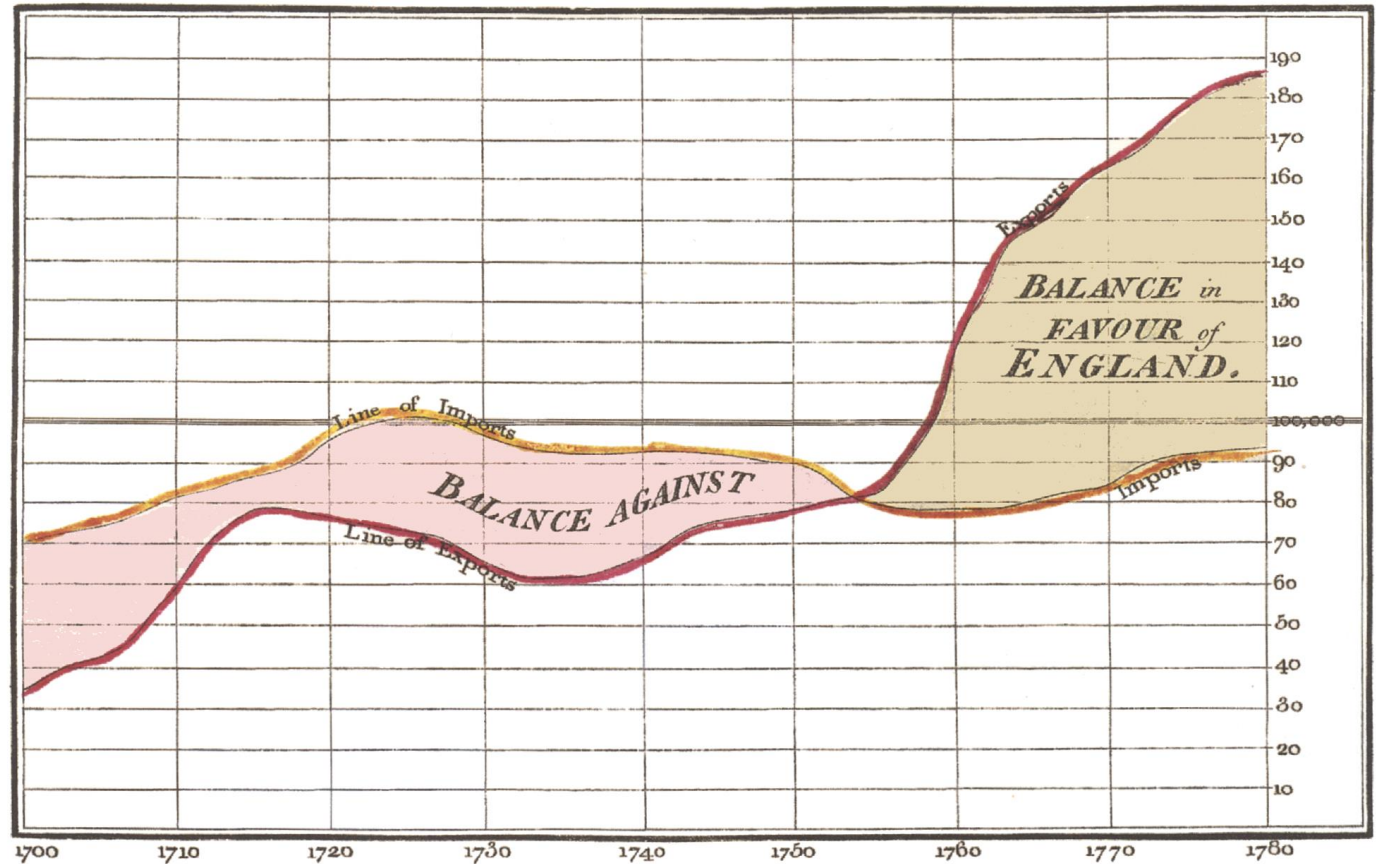
Introduction
Xenographics

William Playfair

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

Introduction
Xenographics

Alberto Cairo

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

Introduction
Dataviz catalogues

[Dataviz Project](#)

Introduction
Dataviz catalogues

[Visual vocabulary](#)

Introduction
Dataviz catalogues

[Data Visualisation Catalogue](https://datavizcatalogue.com)
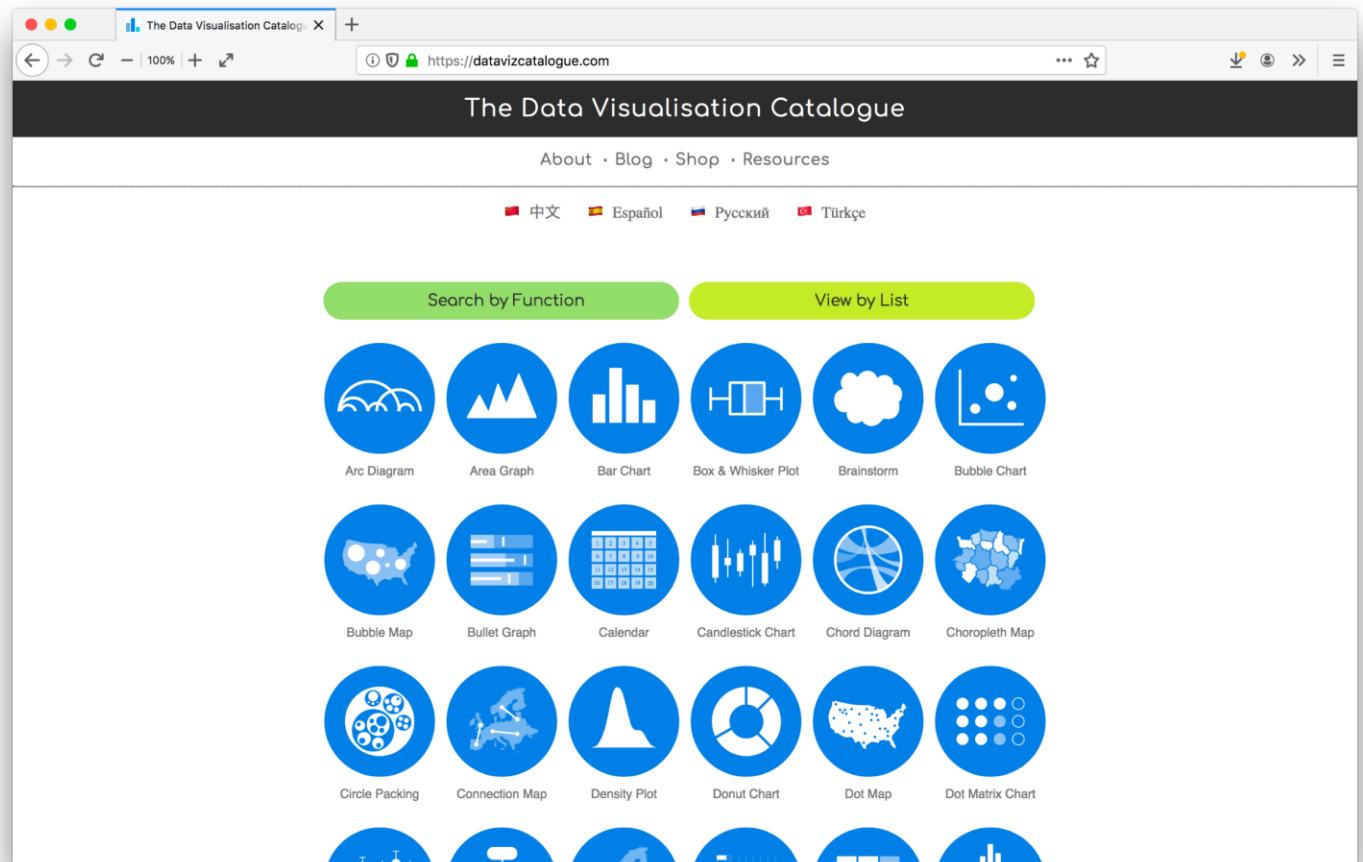
Introduction
Tool catalogue

[Chartmaker Directory](chartmaker.visualisingdata.com)

2.
CREATIVE WITH DOTS

Creative with dots
Dot plot

Unidimensional scatter plot

Example: EU regional GDP

Alternative to grouped bar chart

Creative with dots
Dot plot

Handling overlap:
transparency
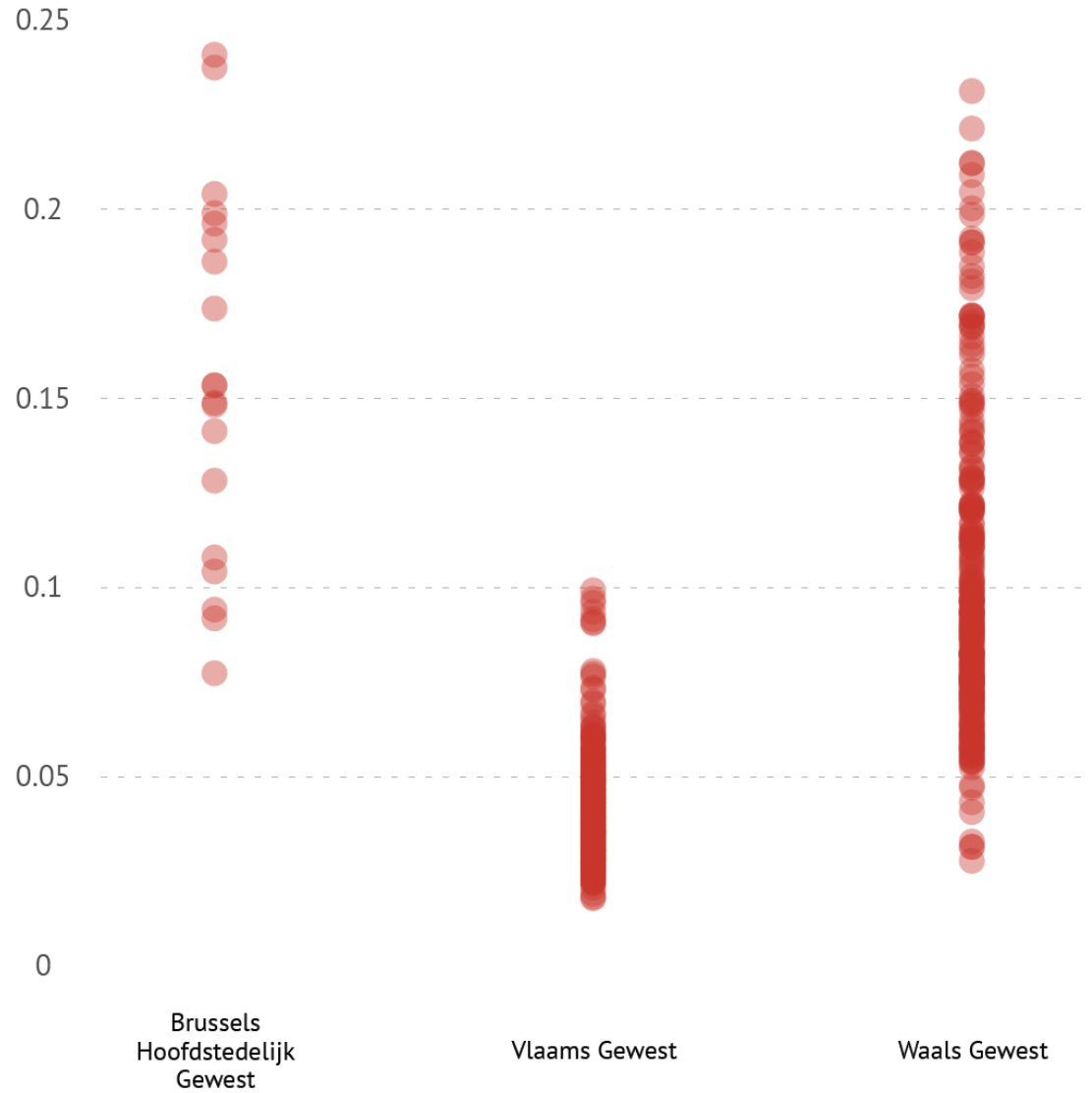
Creative with dots
Dot plot

Handling overlap:
jittering
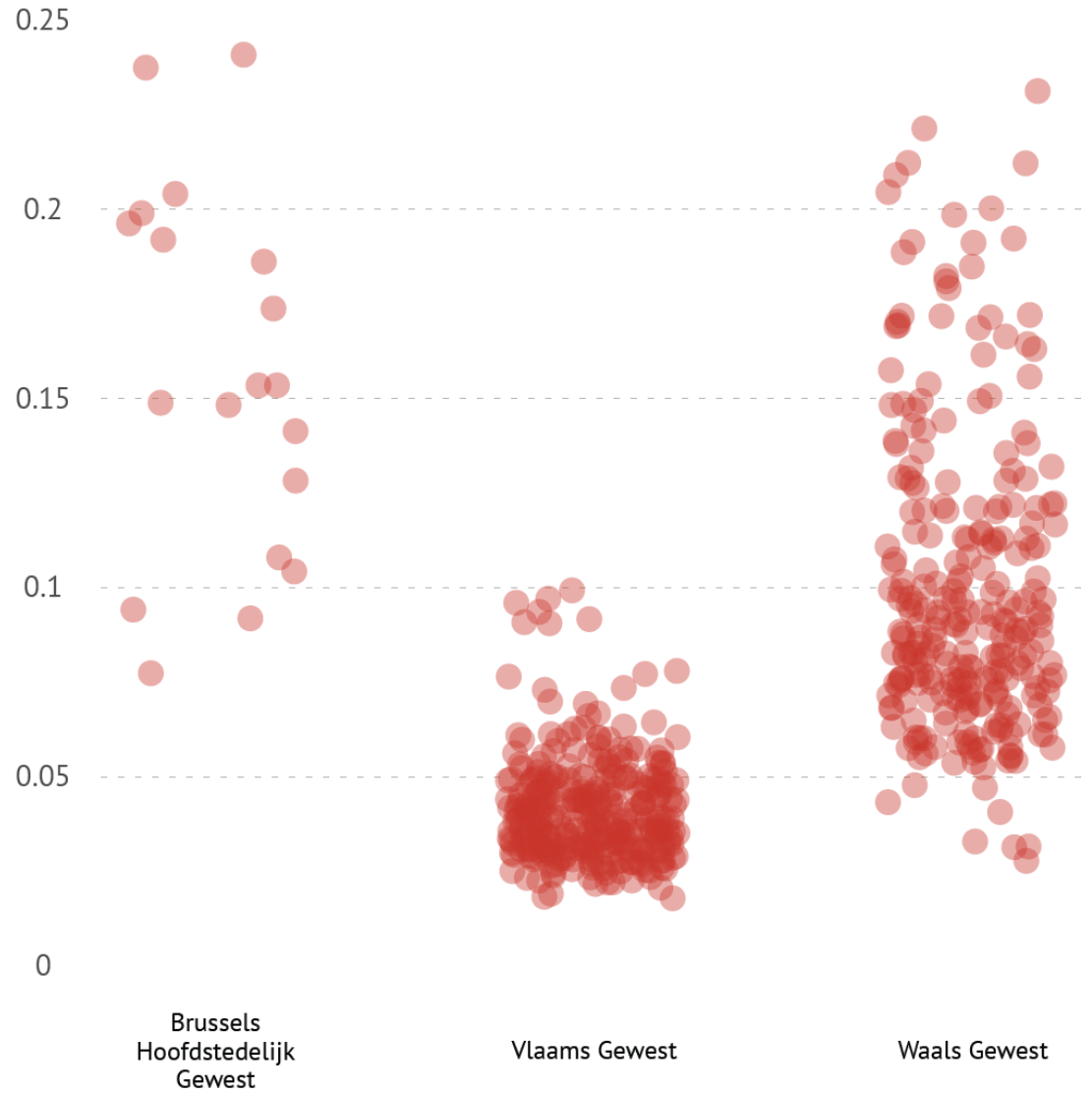
Creative with dots
Dot plot

Handling overlap: strips

Aka barcode plot

Example: [FT US election poll tracker](#)
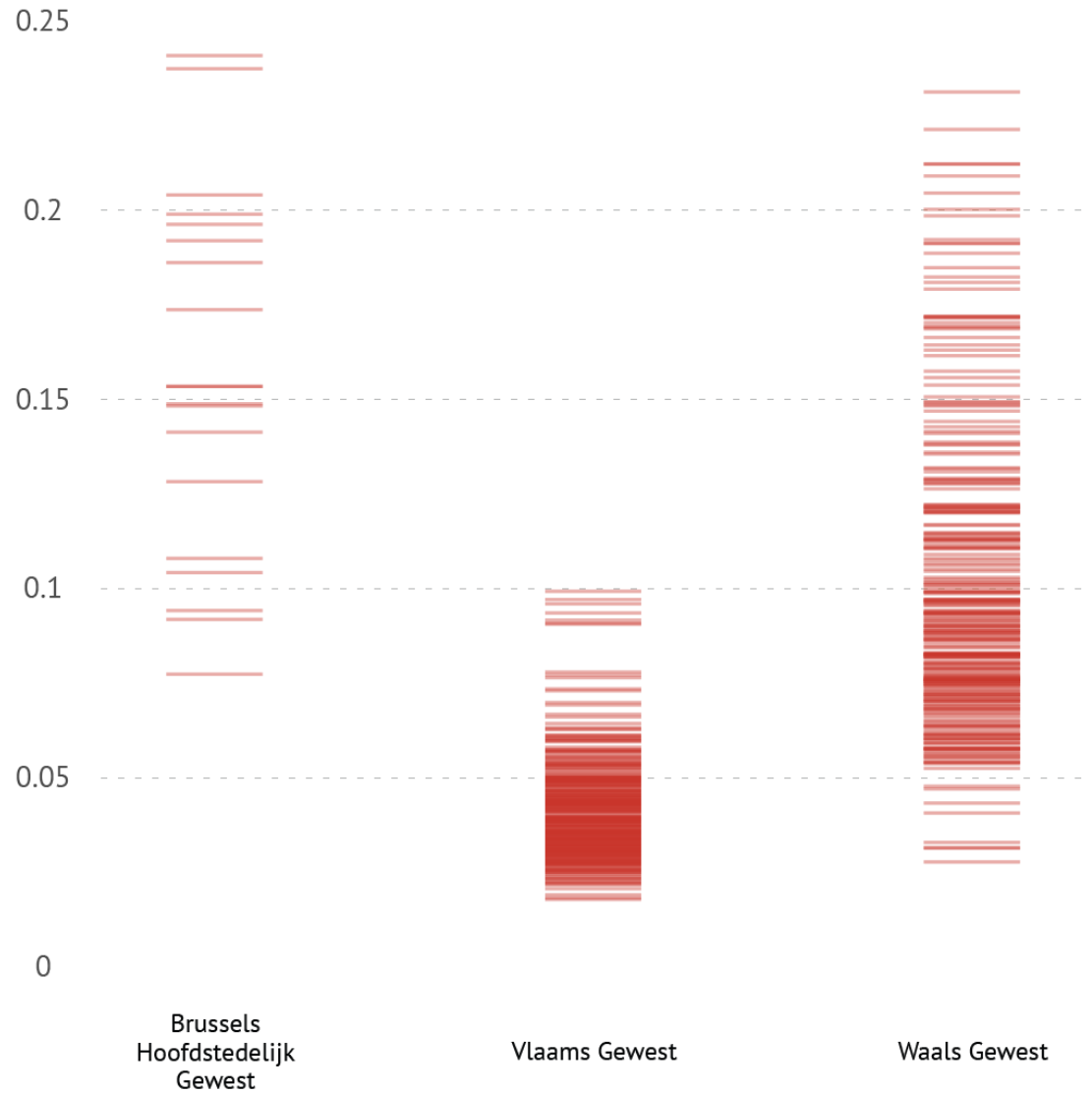
Creative with dots
Beeswarm plot

Dots are "stacked"

Better visualisation of distributions

Example: Summer Olympics medal tally
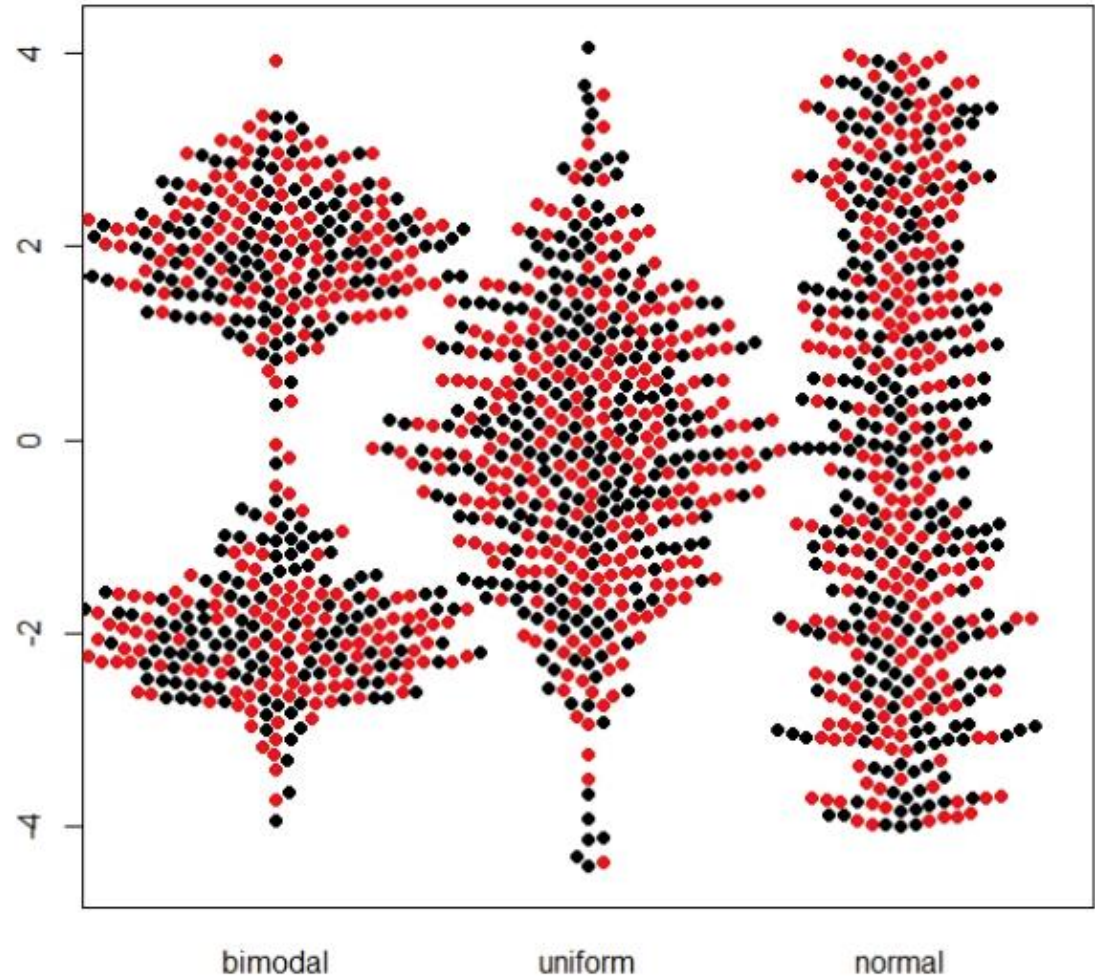
Creative with dots
Beeswarm plot

Variation: map value
to radius of dots
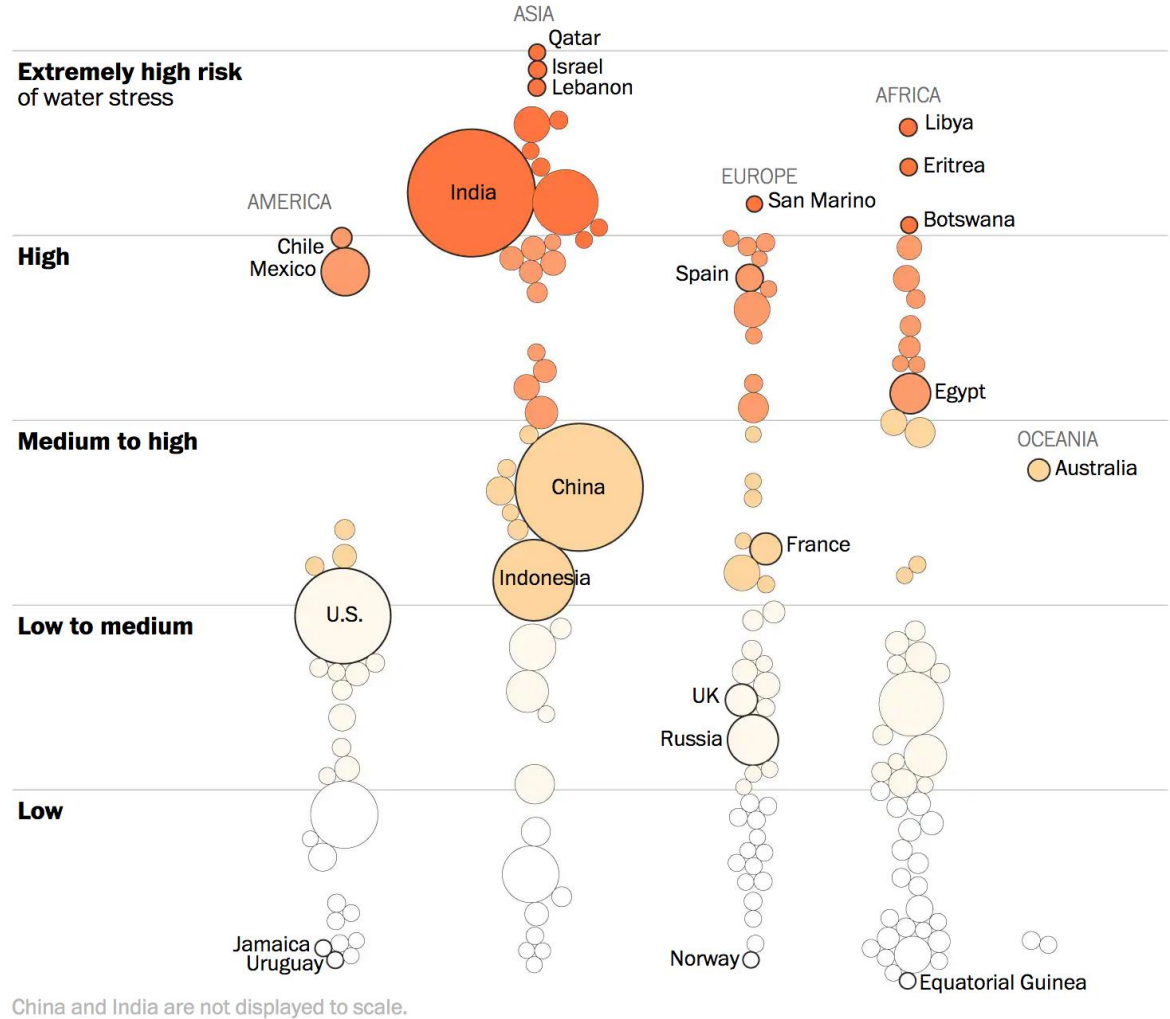
Tool
RAWGraphs

rawgraphs.io

"The missing link between spreadsheets and data visualisation"

Demo

Exercise
RAWGraphs

Make a beeswarm plot, following the RAWGraphs tutorial
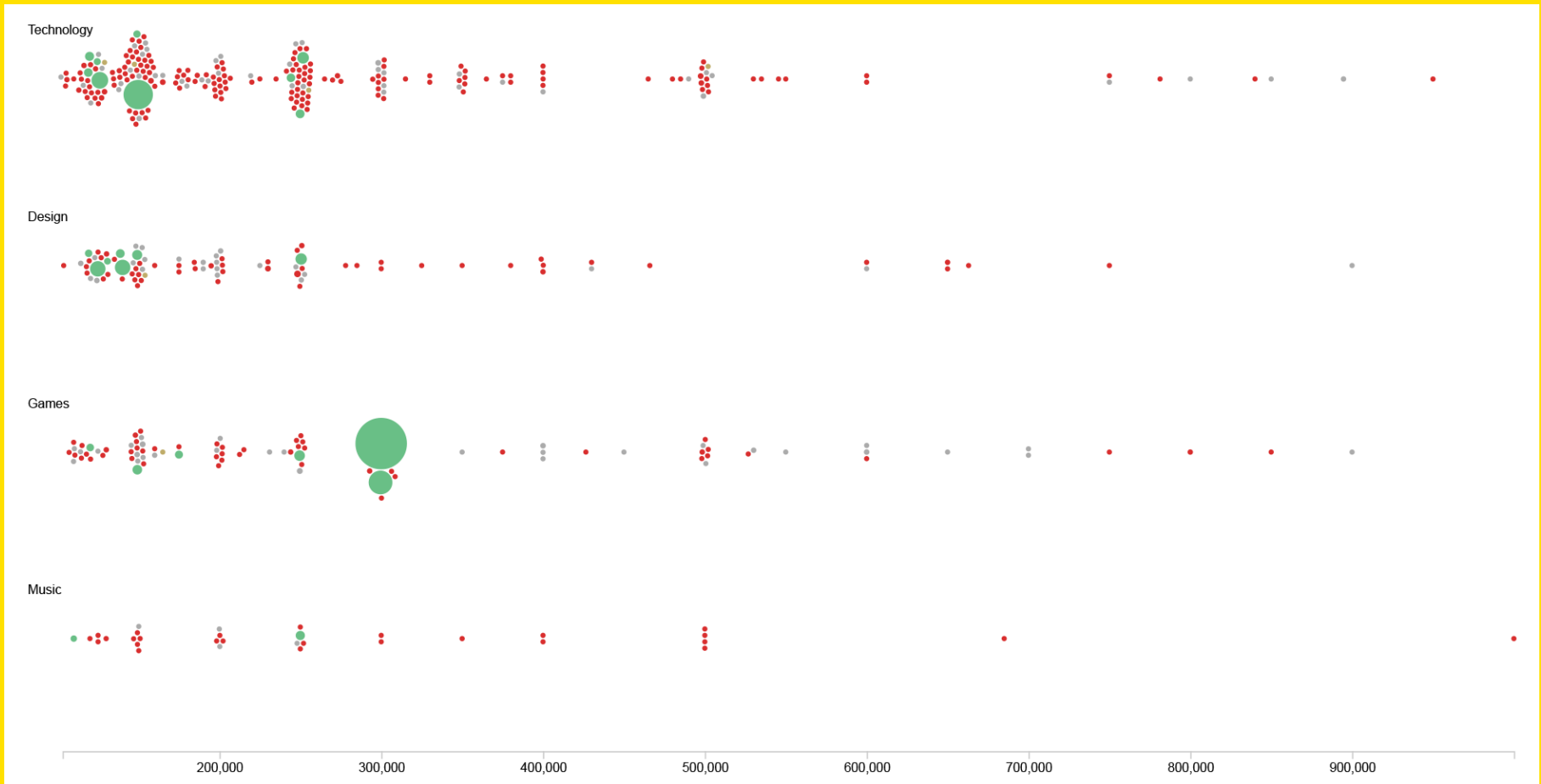
Creative with dots
Dumbbell chart

Good for showing gaps and ranges

Can be horizontal

Also known as connected dot plot

Example: Gender Pay Gap
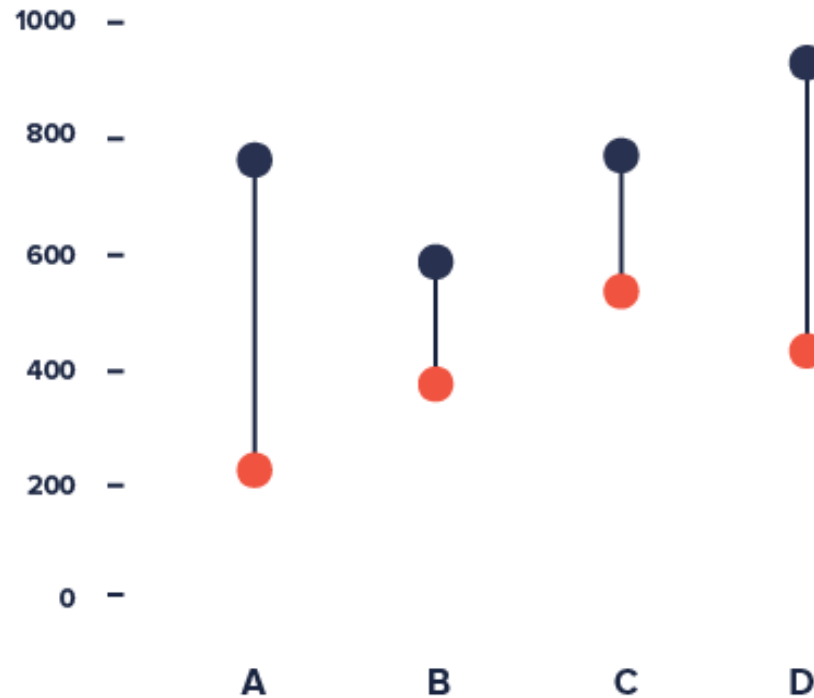
Creative with dots
Dumbbell chart

Also good for changes over time
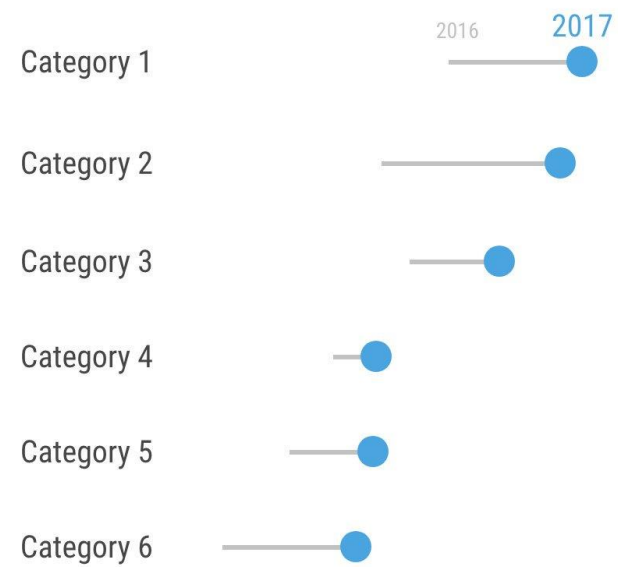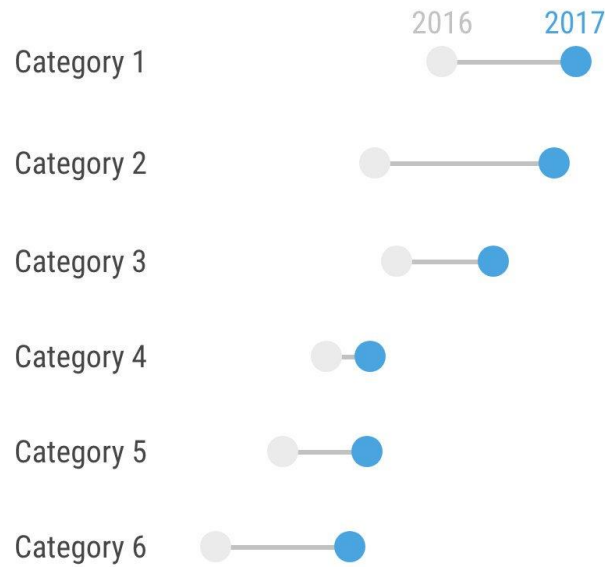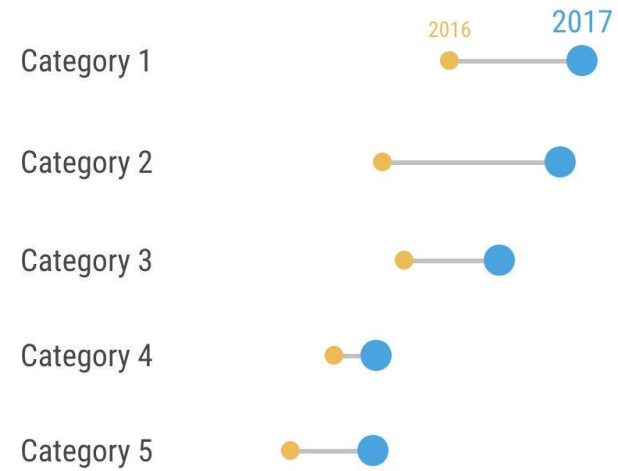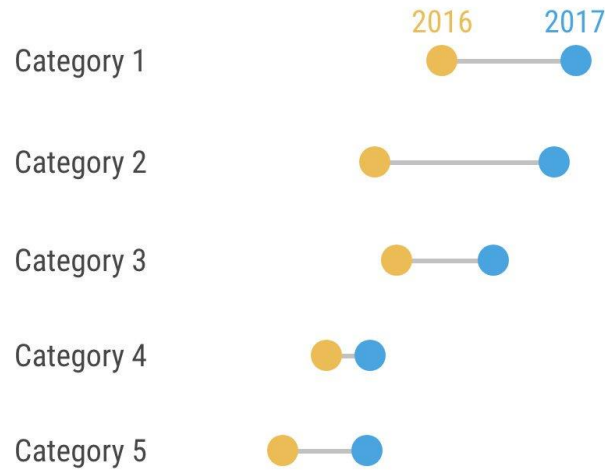
Creative with dots
Dumbbell chart

Variation: arrow chart

Examples:

[Where the one percent have gained the most](#)

[EU passport ranking](#)
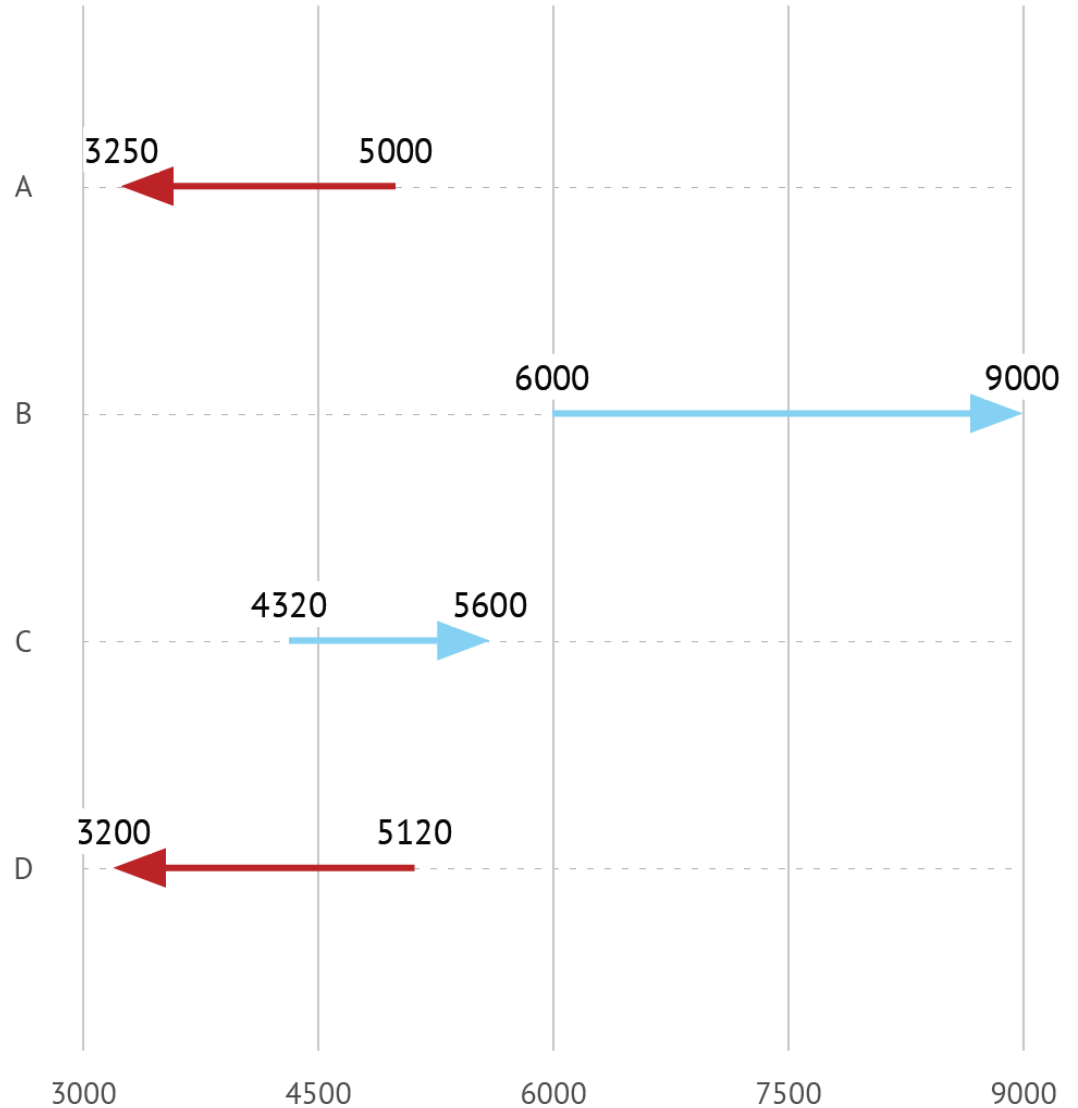
Creative with dots
Bubble chart

Can show 5 dimensions

Example: [Gapminder](#)
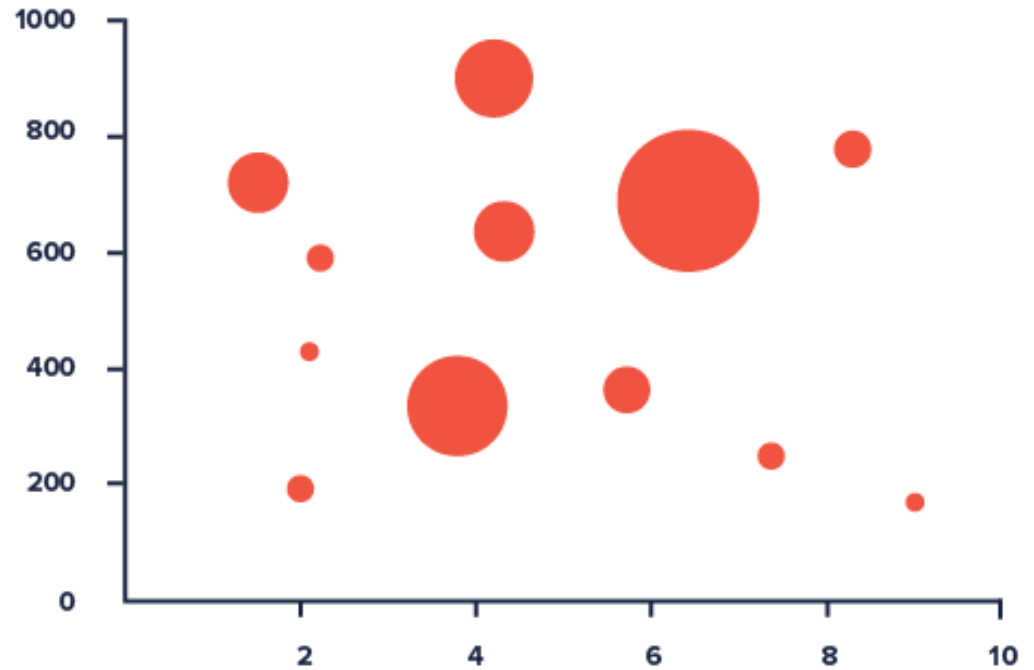
"Enrich your stories with charts, maps and tables"

Demo

How to create a dot plot

How to create a range plot

How to create an arrow plot

How to create a scatter plot

3.
CREATIVE WITH BARS

Bars
Bullet chart

For showing progress
and status

Bars
Bullet chart

For showing progress
and status

Background fill colors that encode qualitative ranges such as bad, satisfactory, and good

Revenue 2005 YTD

(U.S. $ in thousands)

0   50   100   150   200   250   300

Quantitative Scale

Symbol marker that encodes the comparitive measure

Text Label

Bar that encodes the performance measure
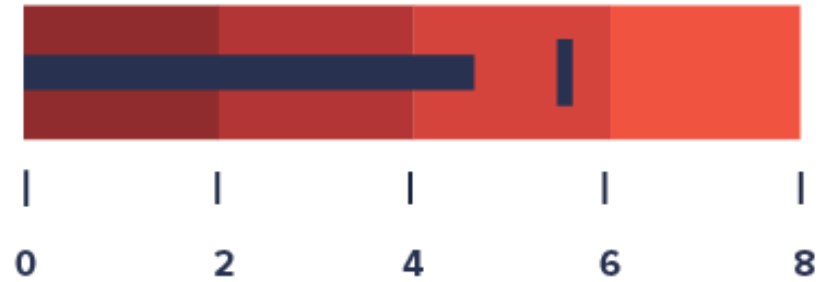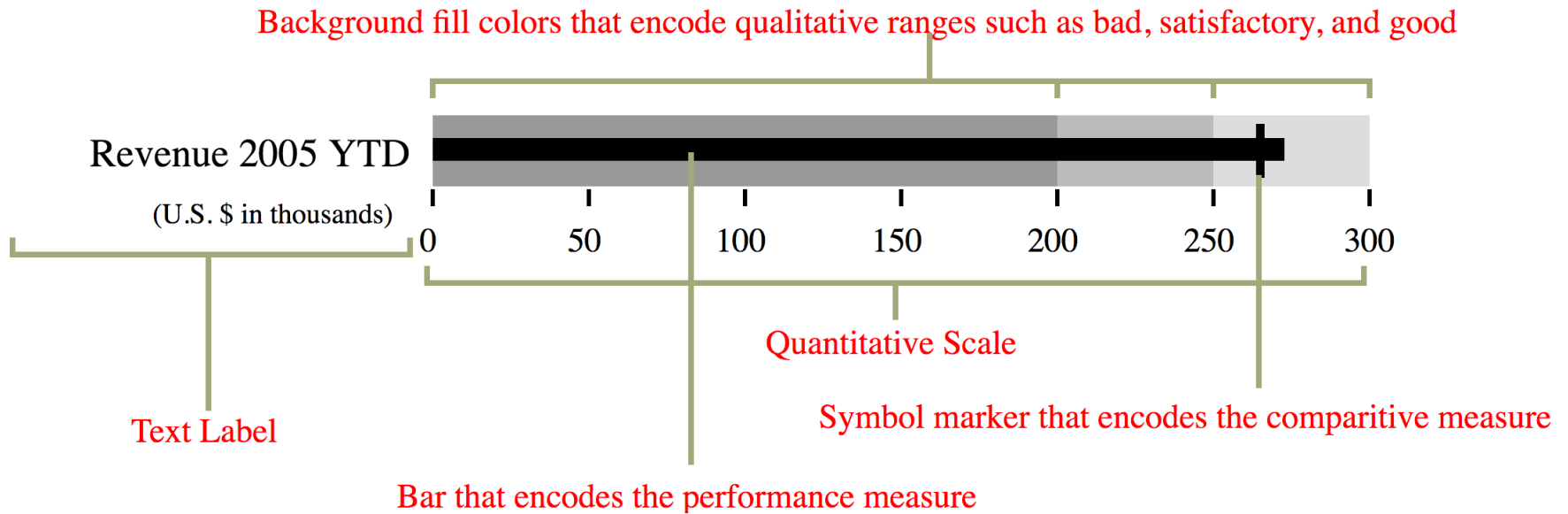
Bars
Marimekko

Aka Mekko chart, Mosaic plot

Examples:

[Low skill jobs account for the largest proportion of immigrants](#)

Worldbank: [Population in poverty](#)
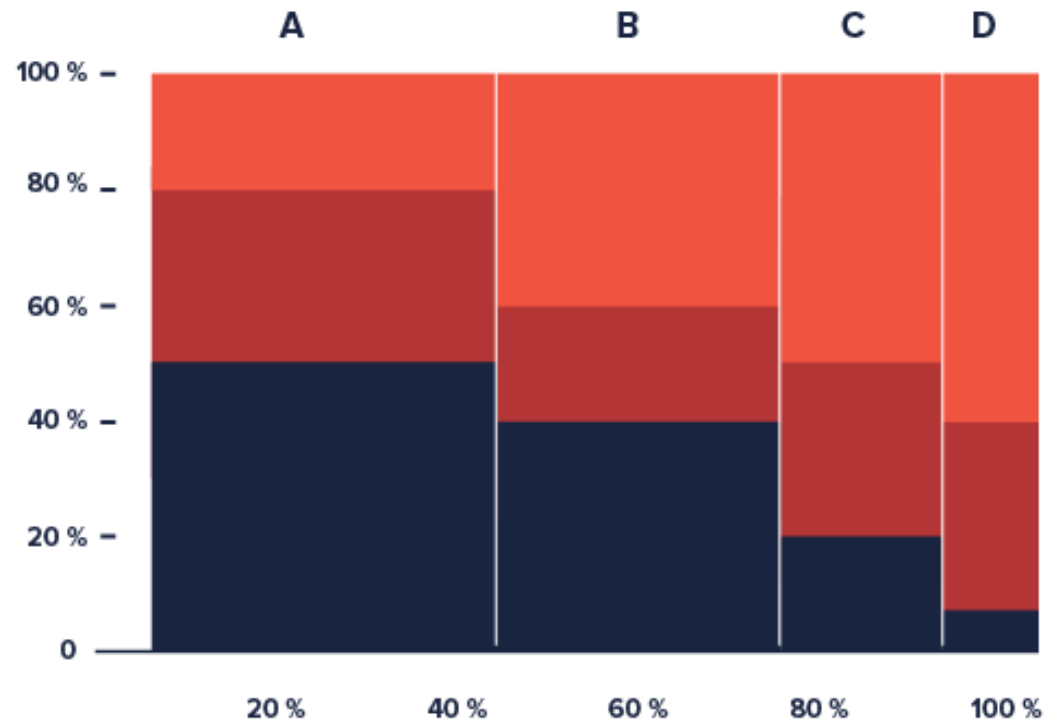
Tool
Charticulator

"Create bespoke chart designs without programming"

Demo

Exercise
Charticulator

Make a marimekko chart of municipal waste treatment by country

Data: tinyurl.com/y3rkp3z5

Video tutorial: charticulator.com/gallery/food_supply_per_capita.html

waste-treatment-EU-percentages
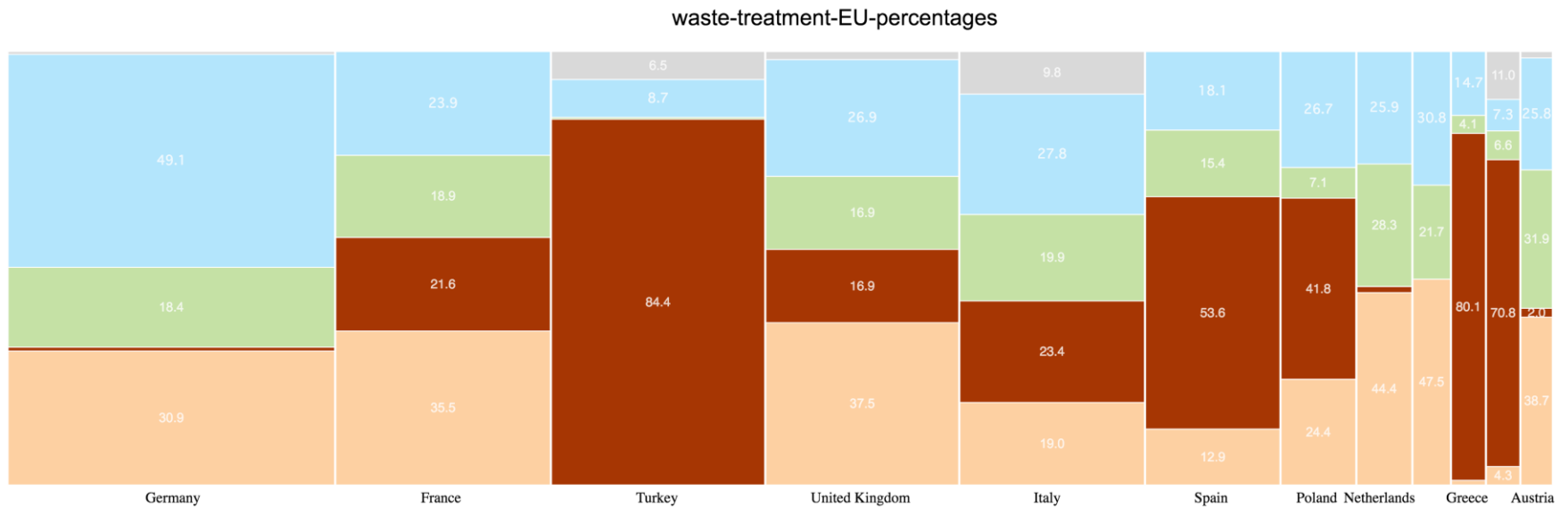
4.
CREATIVE WITH TIME

Time
Slopechart

Compare 2 moments in time
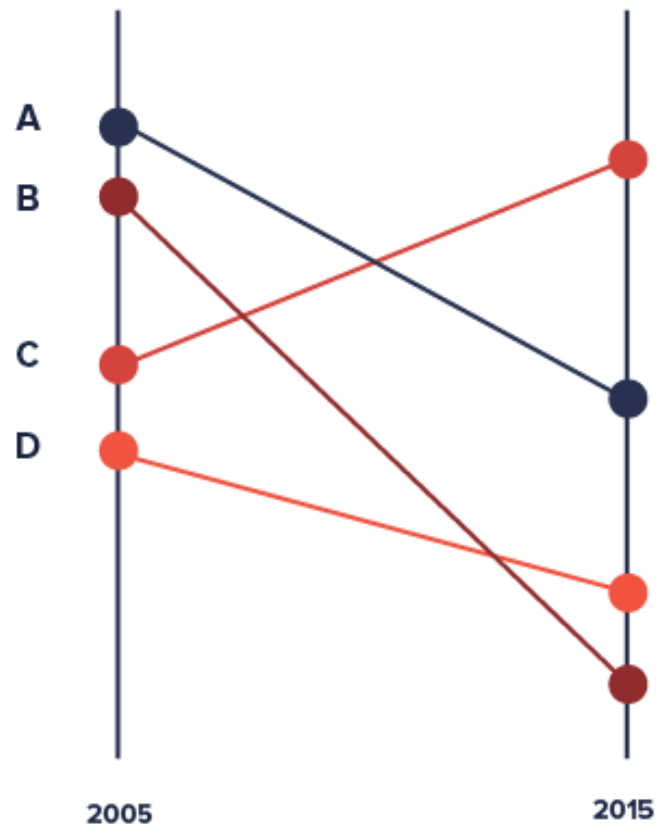
Alternative to paired bars

Time
Slopechart

Compare 2 moments in time
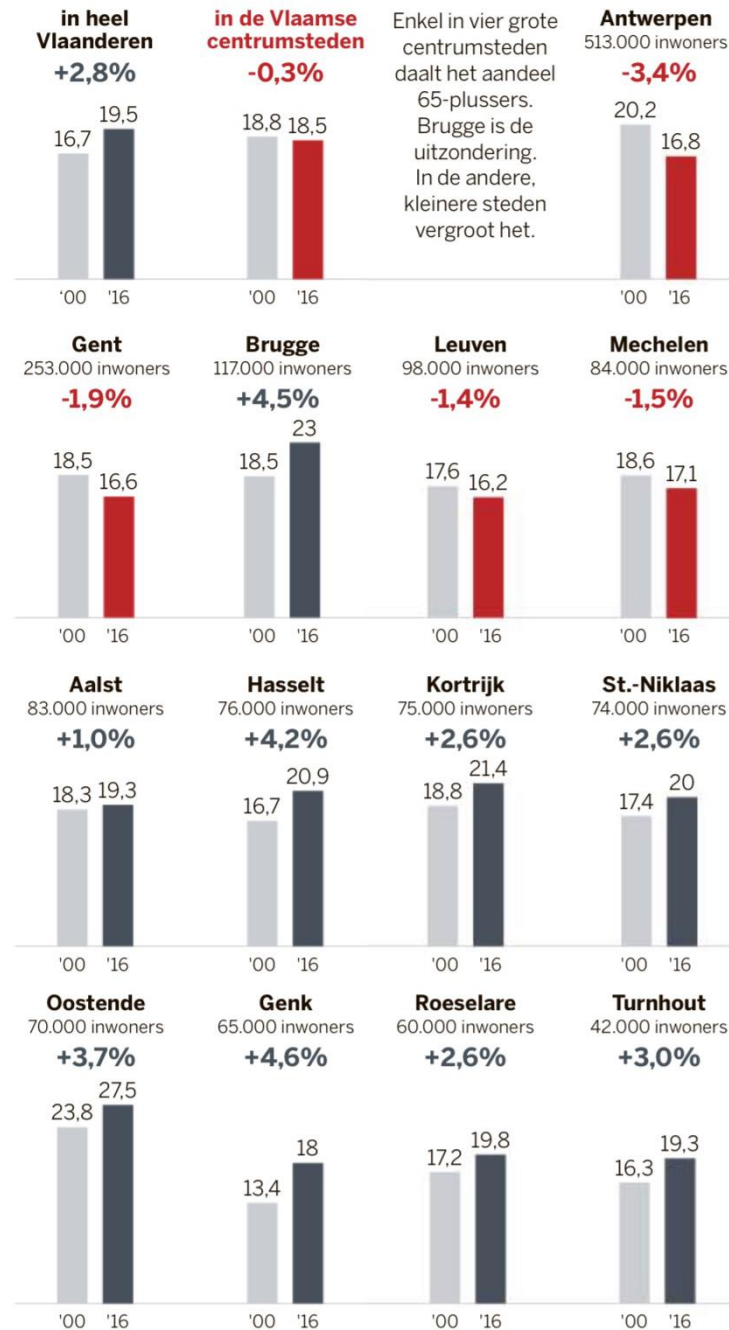
Alternative to paired bars

Aandeel 65-plussers

in heel Vlaanderen	in de Vlaamse centrumsteden	Enkel in vier grote centrumsteden daalt het aandeel 65-plussers. Brugge is de uitzondering. In de andere, kleinere steden vergroot het.	Antwerpen 513.000 inwoners
+2,8%	**-0,3%**		**-3,4%**
16,7 / 19,5	18,8 / 18,5		20,2 / 16,8
'00 '16	'00 '16		'00 '16

Gent 253.000 inwoners	Brugge 117.000 inwoners	Leuven 98.000 inwoners	Mechelen 84.000 inwoners
-1,9%	**+4,5%**	**-1,4%**	**-1,5%**
18,5 / 16,6	18,5 / 23	17,6 / 16,2	18,6 / 17,1
'00 '16	'00 '16	'00 '16	'00 '16

Aalst 83.000 inwoners	Hasselt 76.000 inwoners	Kortrijk 75.000 inwoners	St.-Niklaas 74.000 inwoners
+1,0%	**+4,2%**	**+2,6%**	**+2,6%**
18,3 / 19,3	16,7 / 20,9	18,8 / 21,4	17,4 / 20
'00 '16	'00 '16	'00 '16	'00 '16

Oostende 70.000 inwoners	Genk 65.000 inwoners	Roeselare 60.000 inwoners	Turnhout 42.000 inwoners
+3,7%	**+4,6%**	**+2,6%**	**+3,0%**
23,8 / 27,5	13,4 / 18	17,2 / 19,8	16,3 / 19,3
'00 '16	'00 '16	'00 '16	'00 '16

Time
Slopechart

Compare 2 moments in time

Alternative to paired bars

Aandeel 65-plussers

Oostende 27,5%

Brugge 23

Kortrijk 21,4

Hasselt 20,9

Sint-Niklaas 20
Roeselare 19,8
Vlaanderen 19,5
Turnhout & Aalst 19,3

Centrumsteden 18,5

Genk 18

Mechelen 17,1
Antwerpen 16,8
Gent 16,6

Leuven 16,2

25

20

15

2000   2016
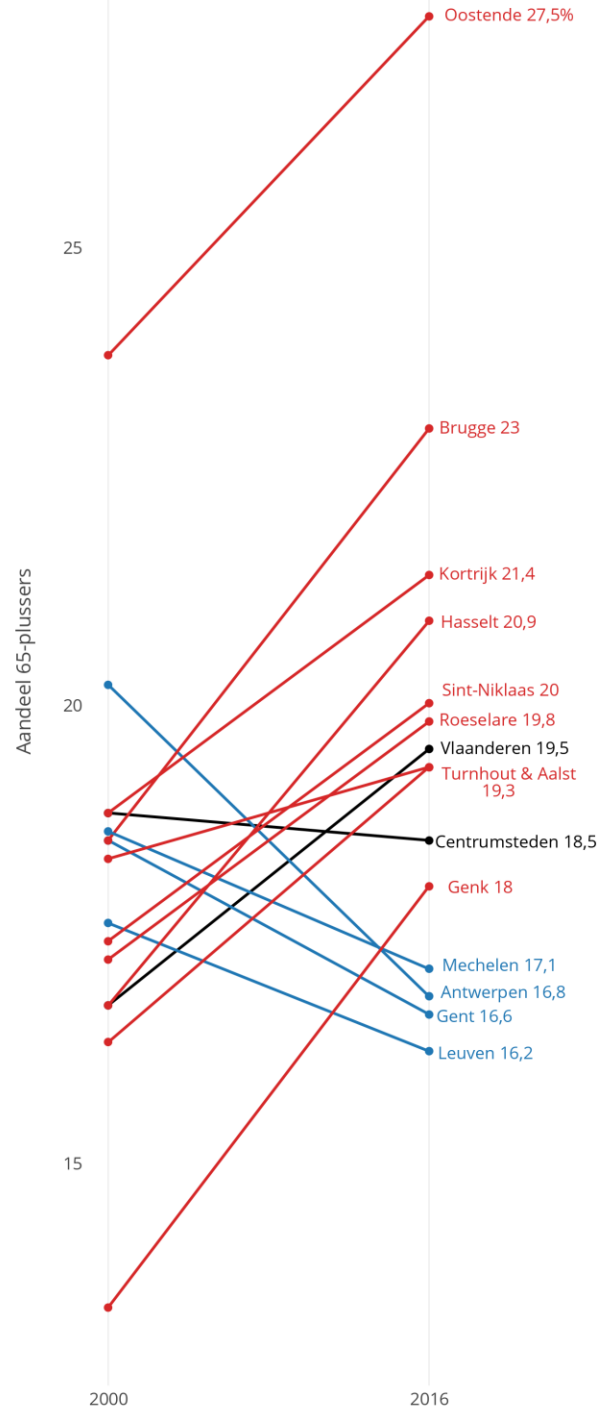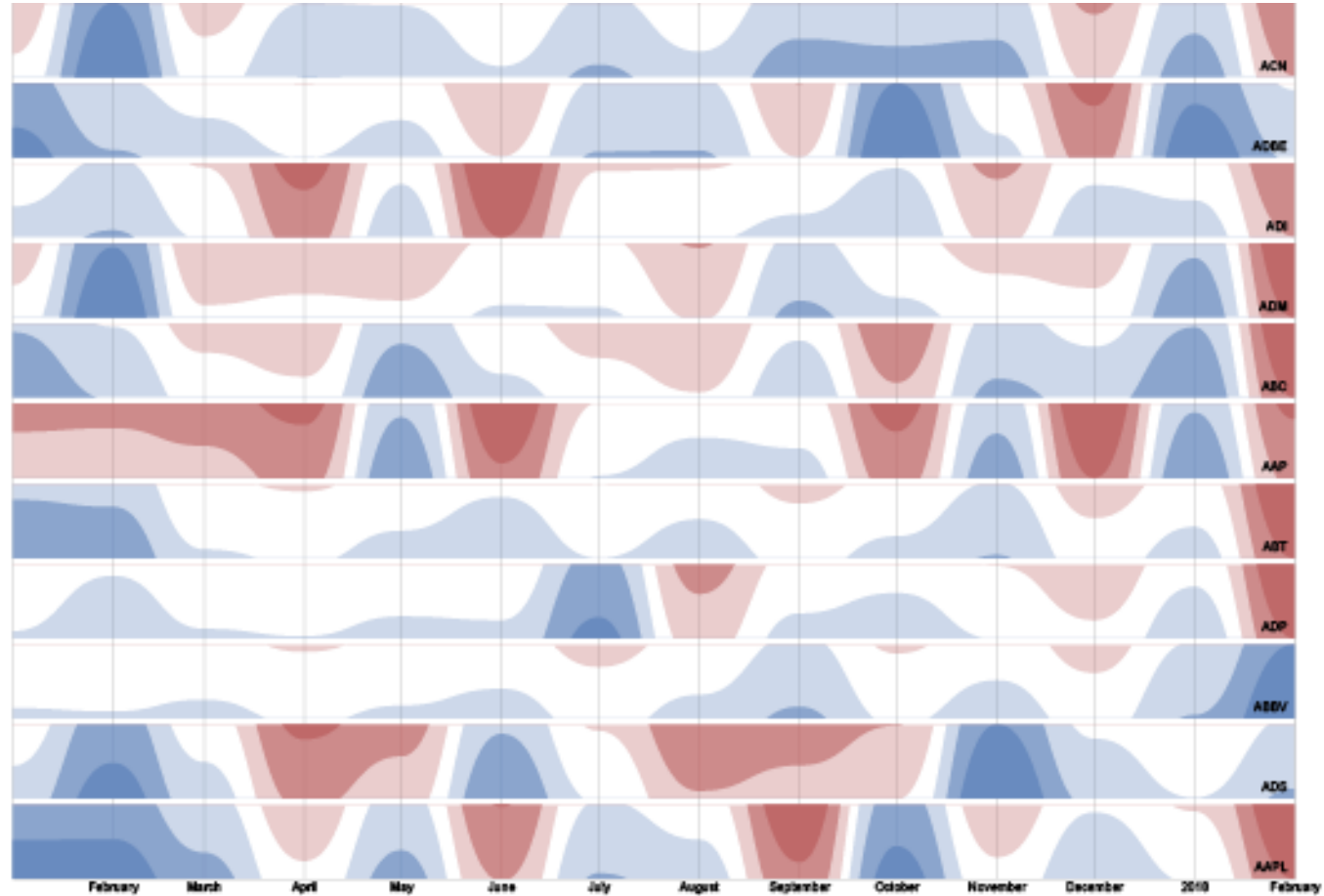
Time
Horizon chart

Area charts with high
data density

Time
Horizon chart

Area charts with high
data density
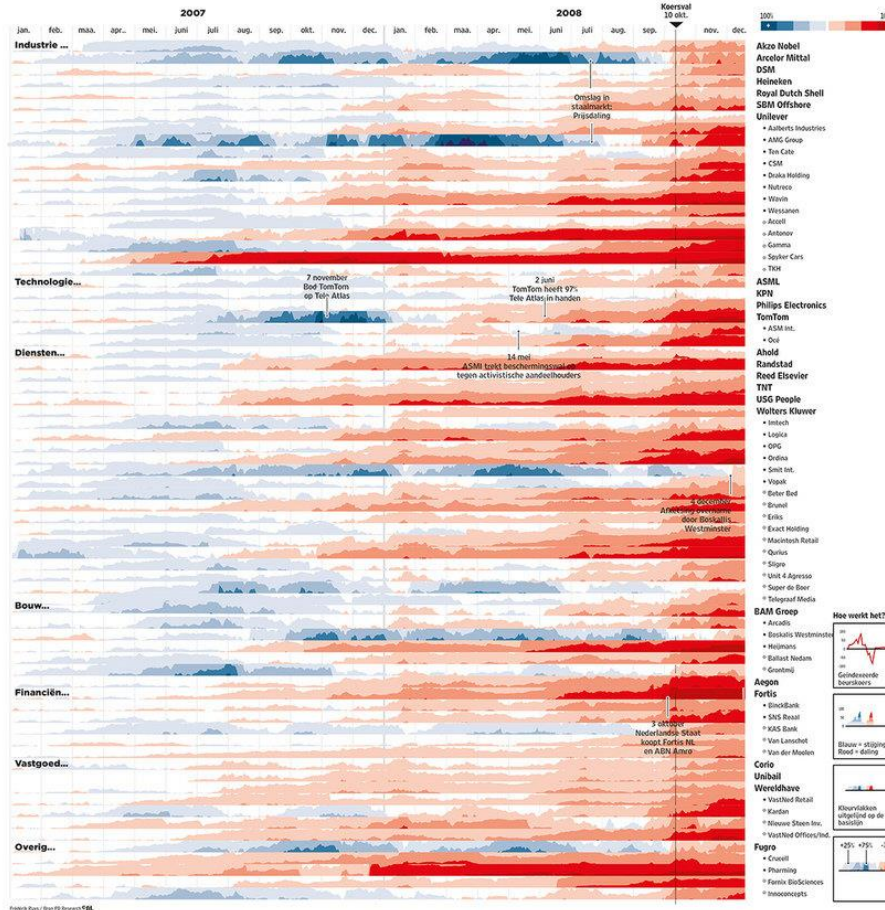
Time
Horizon chart

Area charts with high data density

Available in RAWGraphs

Time
Connected scatterplot

Evolution of 2 numerical values over time

Examples:

[The direction of your country](#)

[How education, joblessness and earnings intersect](#)

[Research](#)

Time
Connected scatterplot

Case: Uncovering tomorrow's innovation hotspots

Time
Connected
scatterplot

Case: Uncovering
tomorrow's innovation
hotspots

Time
Connected scatterplot

Case: Uncovering tomorrow's innovation hotspots

Time

Connected scatterplot

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

● origin (2012-2014) ▶ arrow head (2015-2017)

Value of deals (US$ m)

Beijing

Los Angeles
Tel Aviv
Toronto
Paris

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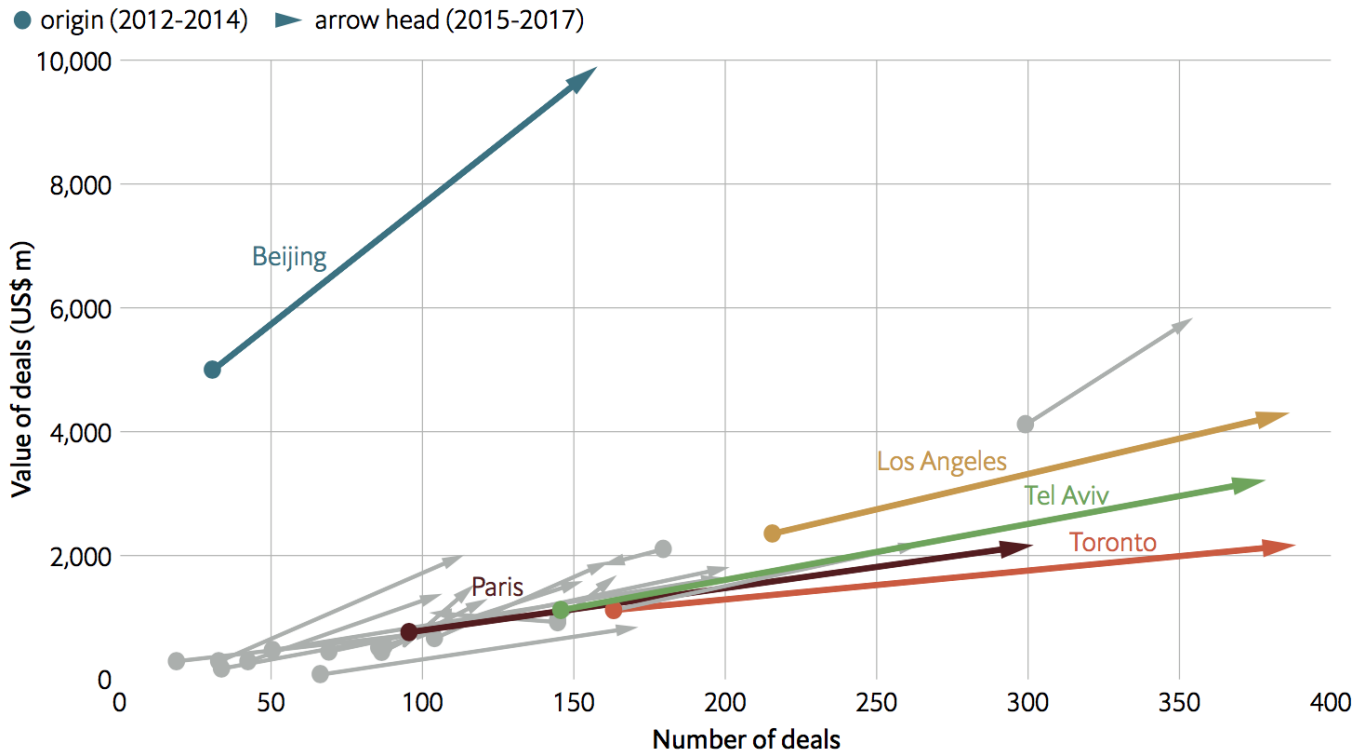
The chart indicates the pronounced trajectory in deal activity of the top cities. Grey arrows indicate deal activity for the remaining 19 cities.

Source: Crunchbase, The Economist Intelligence Unit

5.
HIERARCHY

Components
Waterfall chart

Show net result

Examples:

Change in US federal budget

Evolution de la masse des glaciers
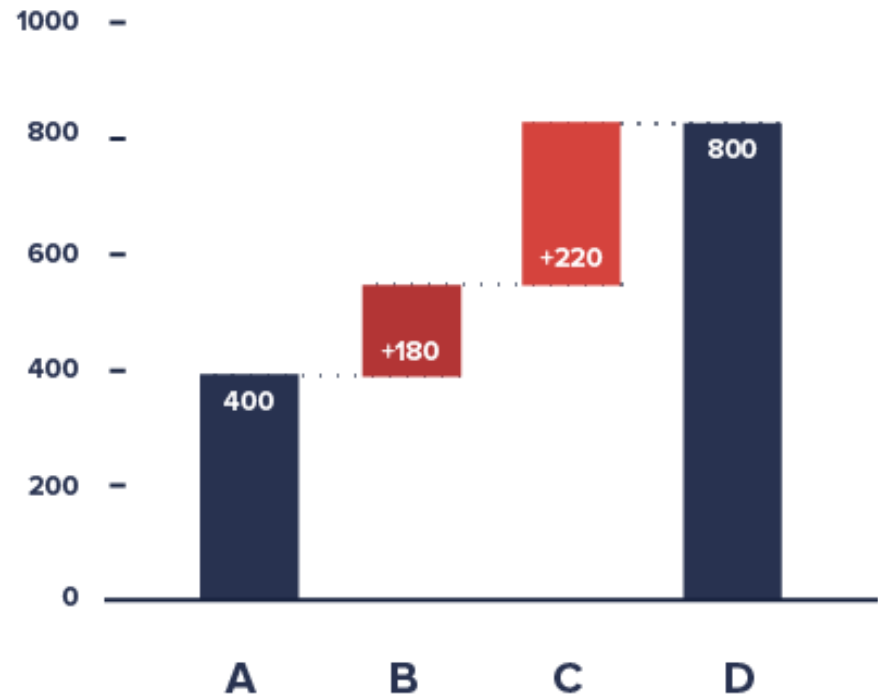
Hierarchy
Dendrogram

Available in RAWGraphs

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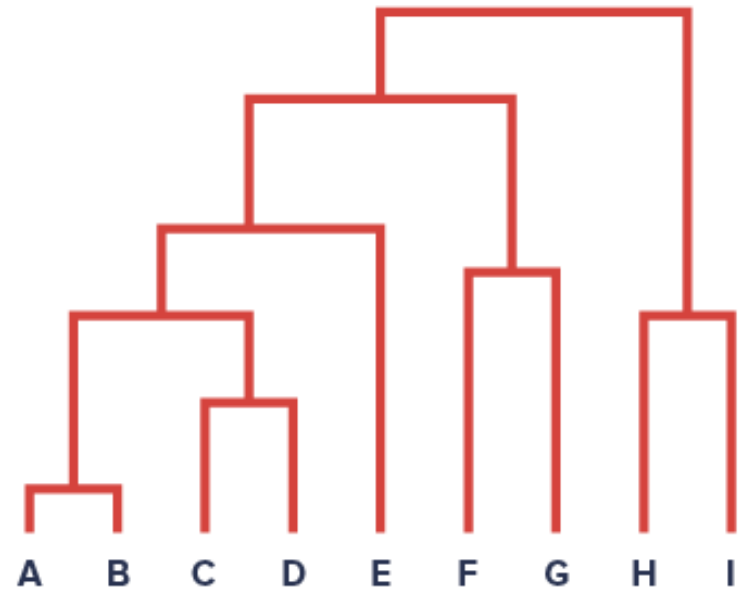
Hierarchy
Treemap

Hierarchy (multi) + numbers

Available in RAWGraphs

Examples:

Every job in America

Inventur der Tiere
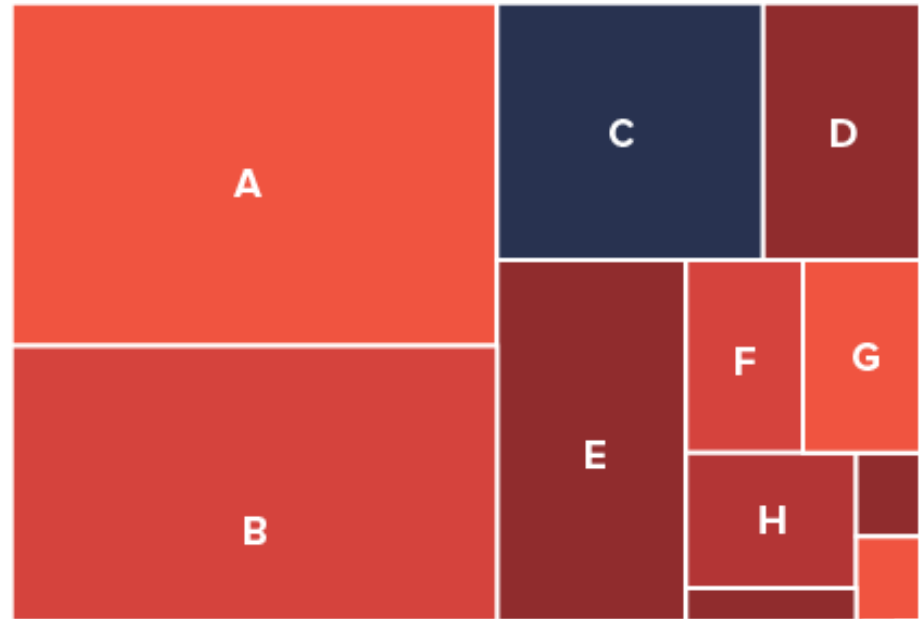
6.
MULTIDIMENSIONAL DATA

Multidimensional Heatmap

Examples:

[Frequency of soccer results](#)

[The impact of vaccines](#)

[When fatal crashes happened](#)
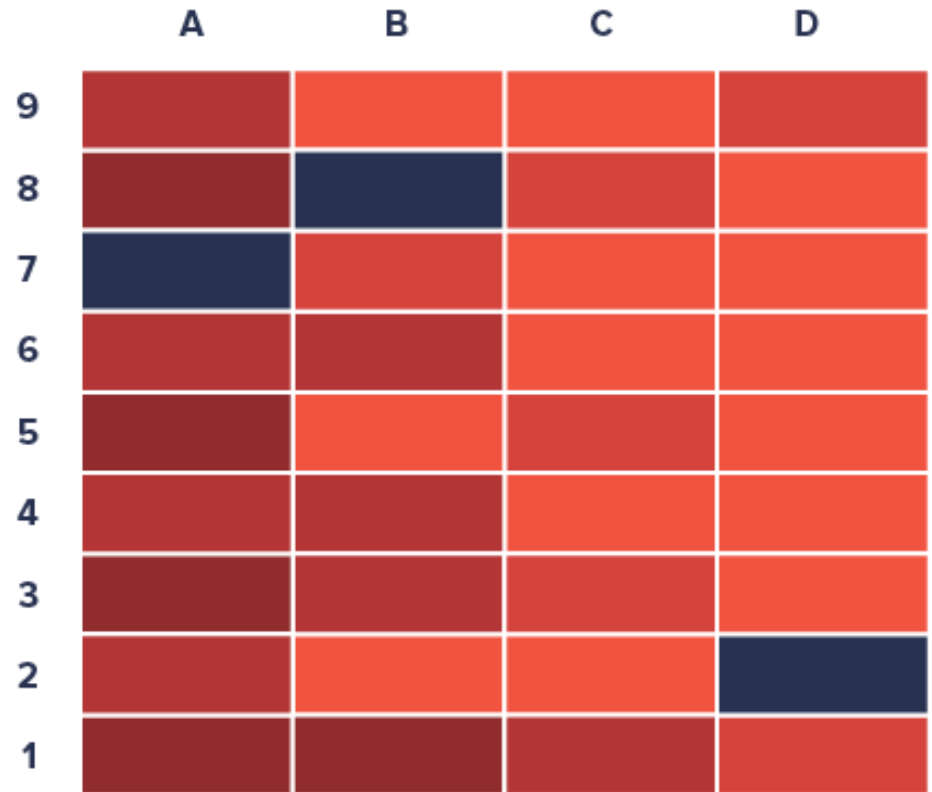
Multidimensional Matrix diagram

Scaled symbols, or categories

Sorting determines aspect

Can be one way or two way

(city distance, number of passengers between cities)

Multidimensional
Parallel coordinates

Example: [Marathon trainings](#)
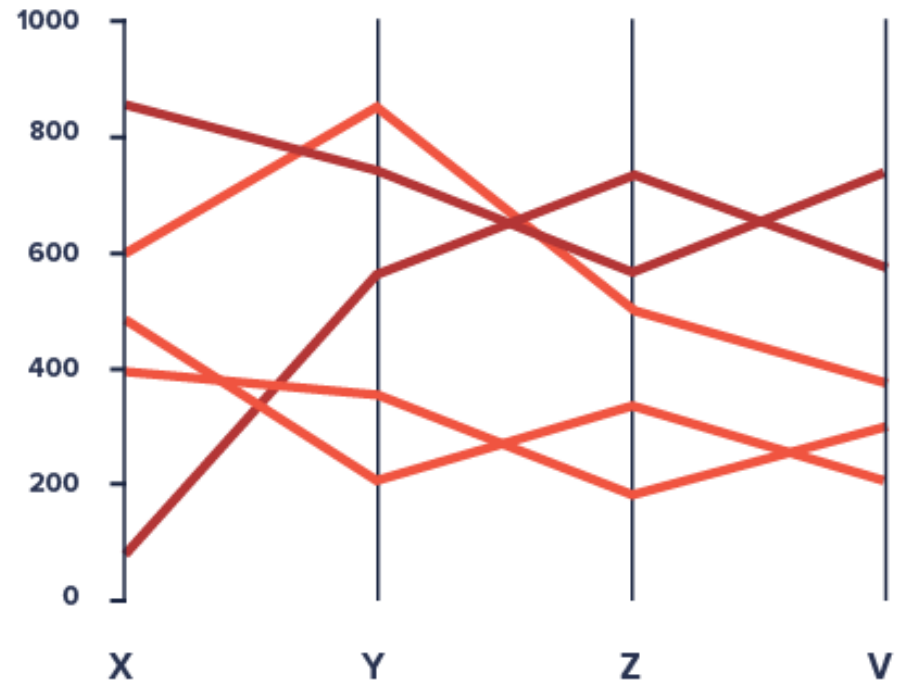
Tool
Data Illustrator

data-illustrator.com

"Create infographics and data visualisations without programming"

Demo

Exercise
Data Illustrator

Make a heatmap of EU unemployment rates

Data by age and sex: tinyurl.com/y4qmvjm9

Data by country: tinyurl.com/y24xoe9g

Video tutorial: vimeo.com/235782472

Make a slopechart of education levels vs obesity rate

Data: tinyurl.com/y2xeuezn

Video tutorial: vimeo.com/234522226

Multidimensional
Alluvial plot

Aka Sankey diagram
and parallel sets

Available in
RAWGraphs

Camouflage spelling

Looking for an
appartment in Paris,
2019

A   B   C
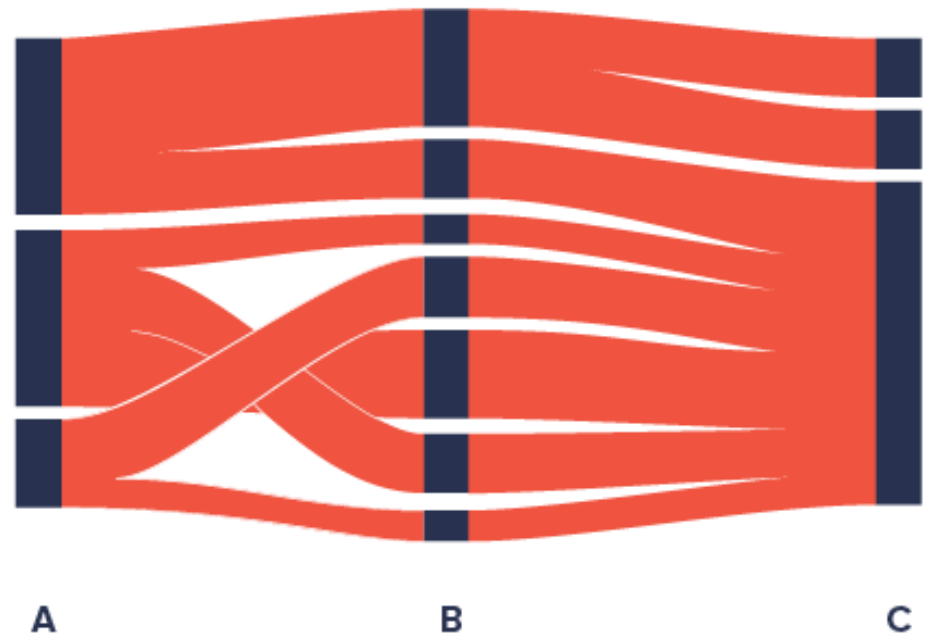
7.
NETWORKS

Networks
Node-link

Nodes connected with edges

Example: Belgian listed companies and their directors

Networks
Node-link

Example: Electricity generation and connections in Europe

Networks
Node-link

Special case:
adjacency matrix

8.
UNCERTAINTY

Uncertainty
Fan chart

Communicate
uncertainty

Uncertainty
Fan chart

Communicate
uncertainty

Chart 1 Macroeconomic projections[1]

(quarterly data)

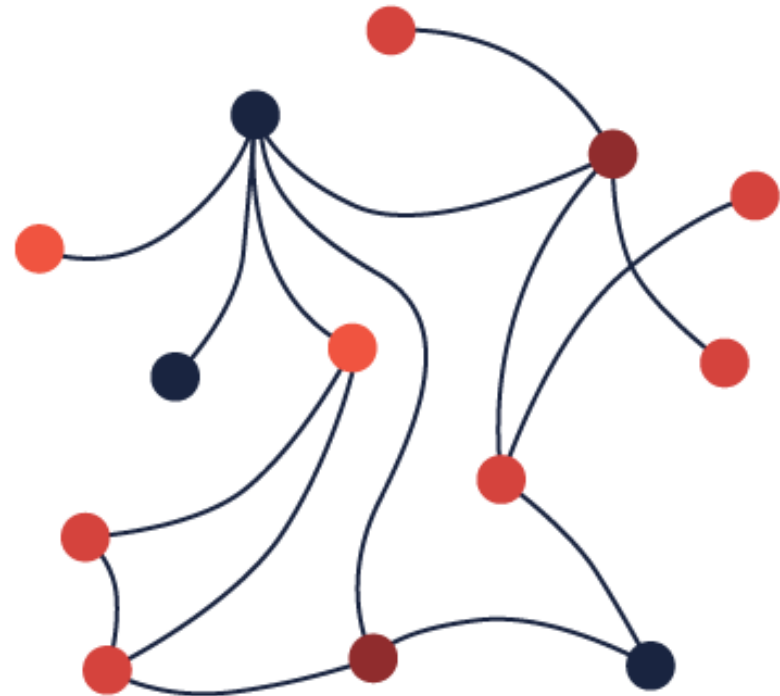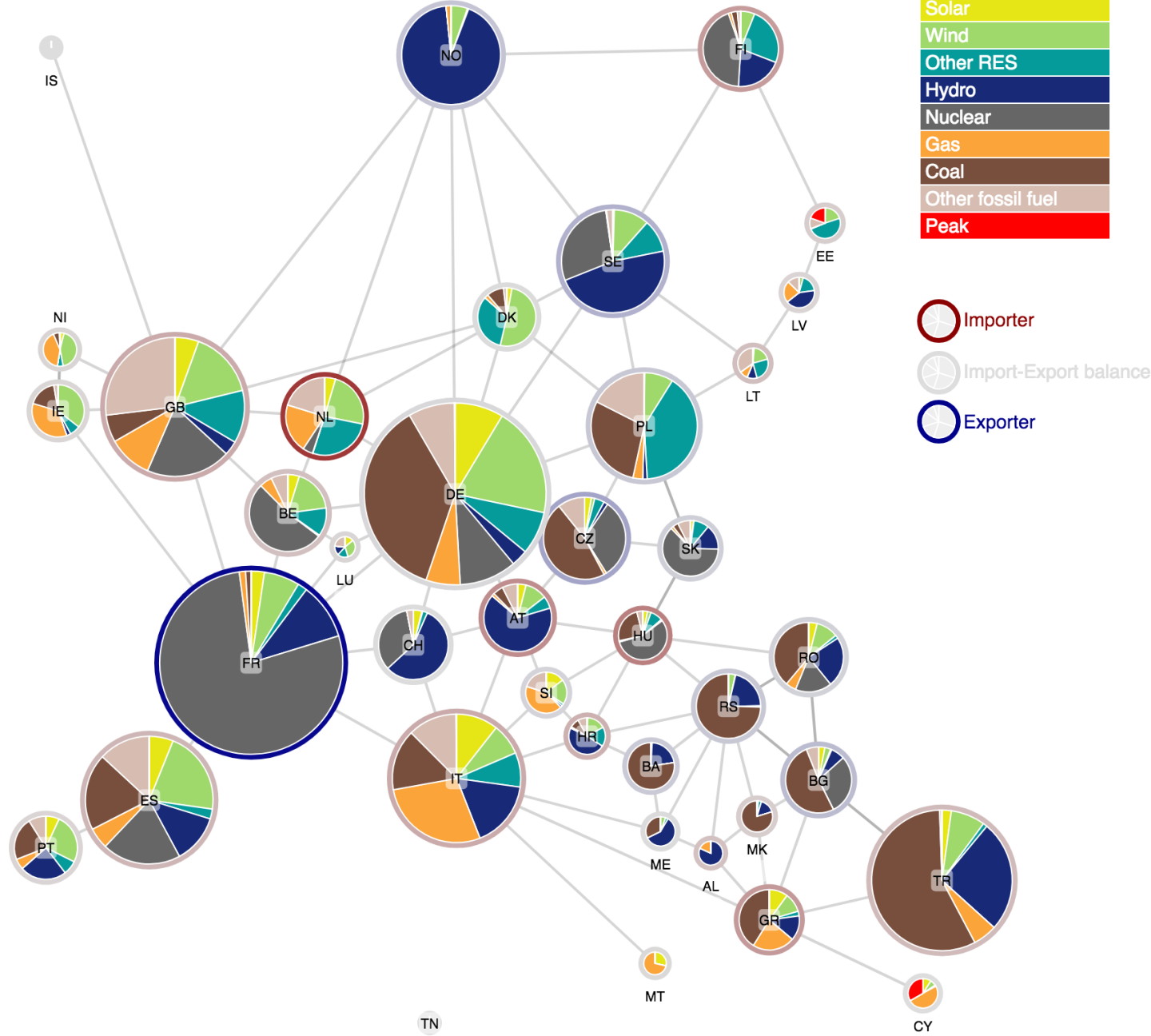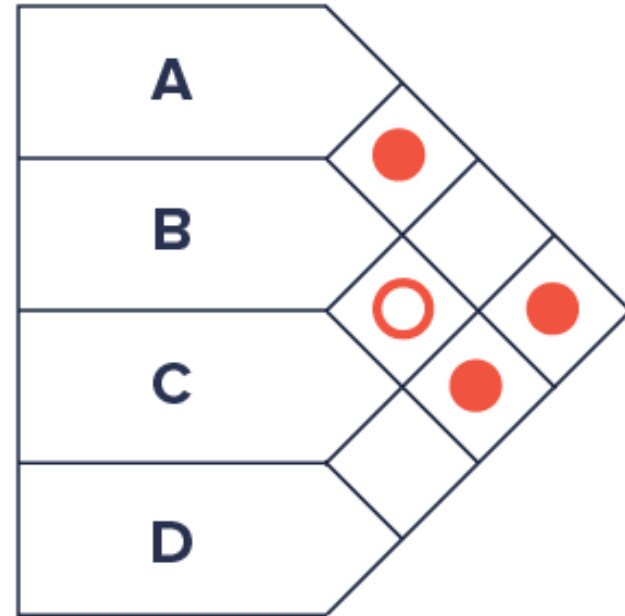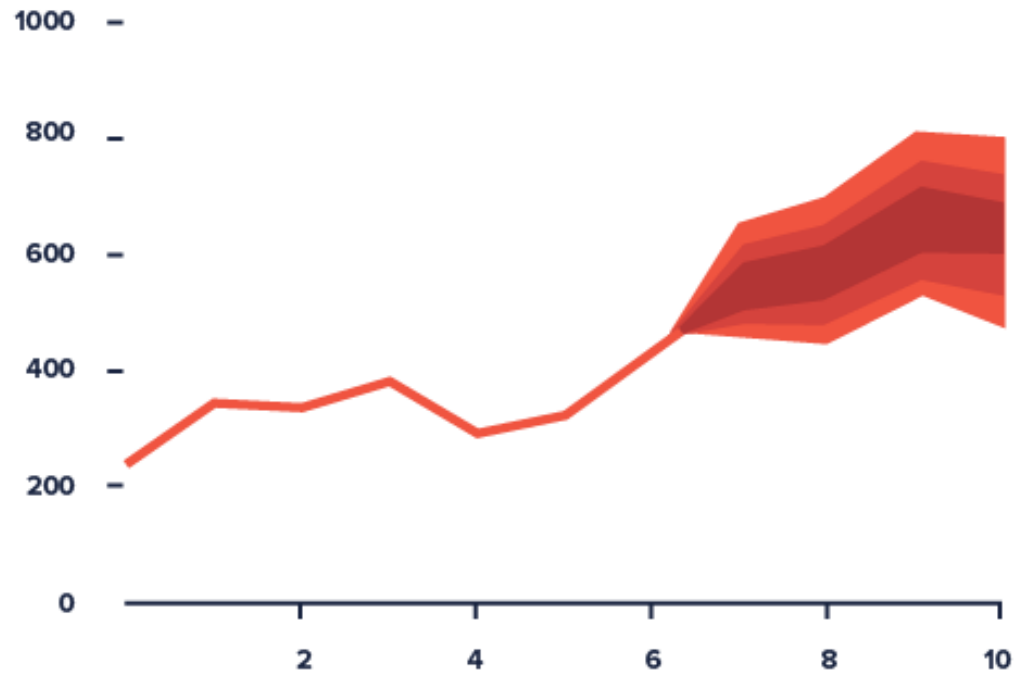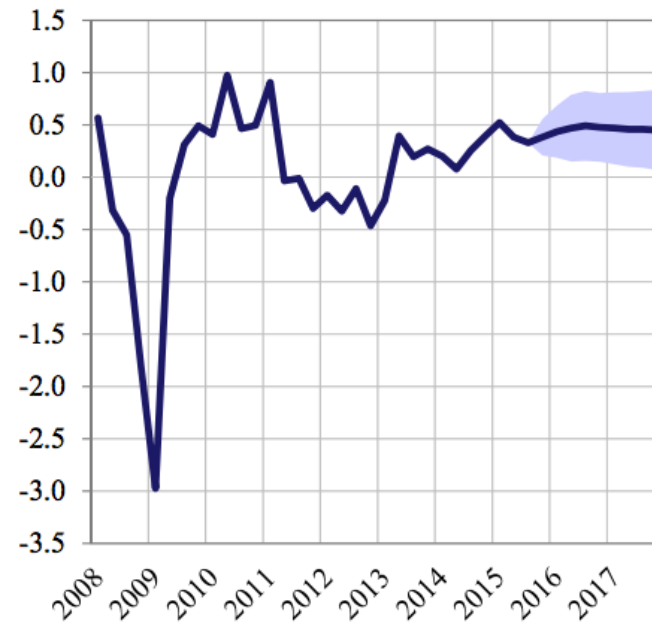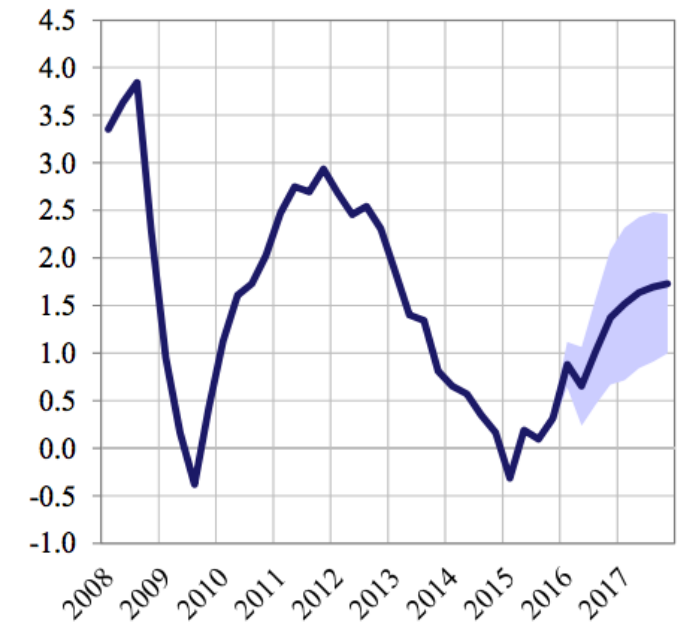**Euro area real GDP[2]**

(quarter-on-quarter percentage changes)

Euro area HICP

(year-on-year percentage changes)

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

Uncertainty
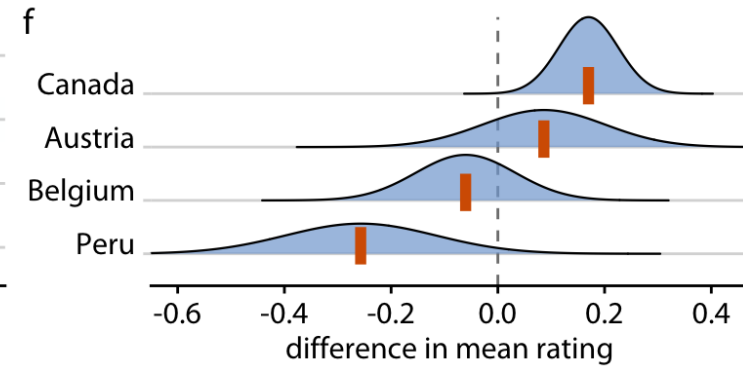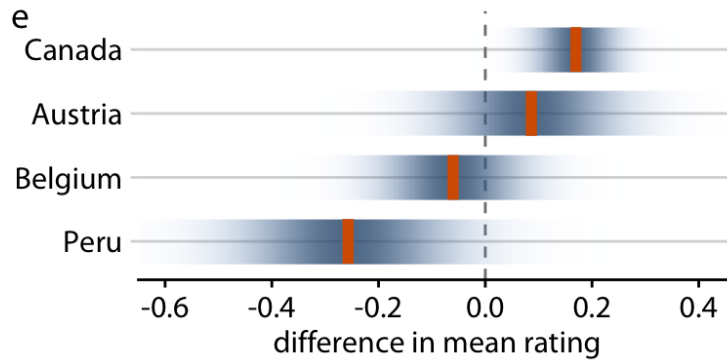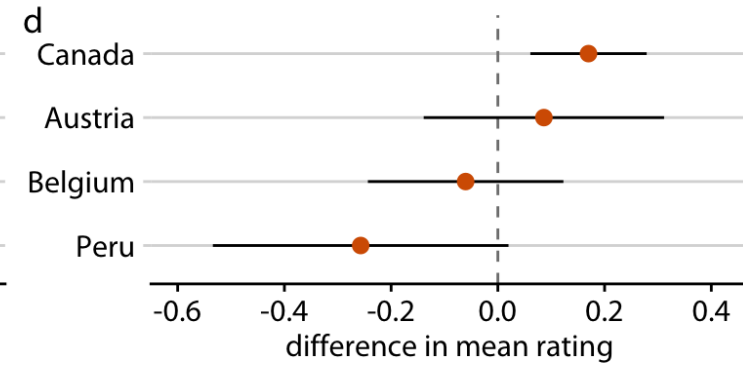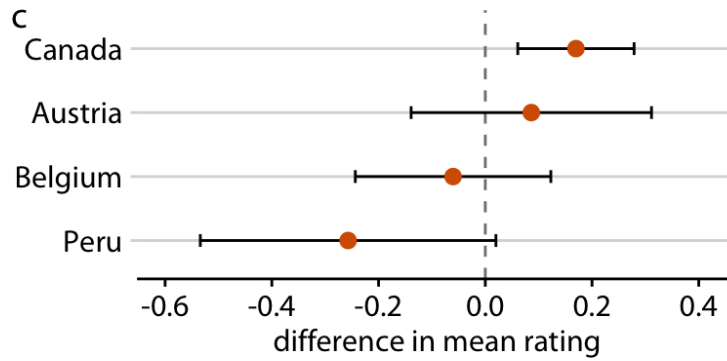## Confidence bands
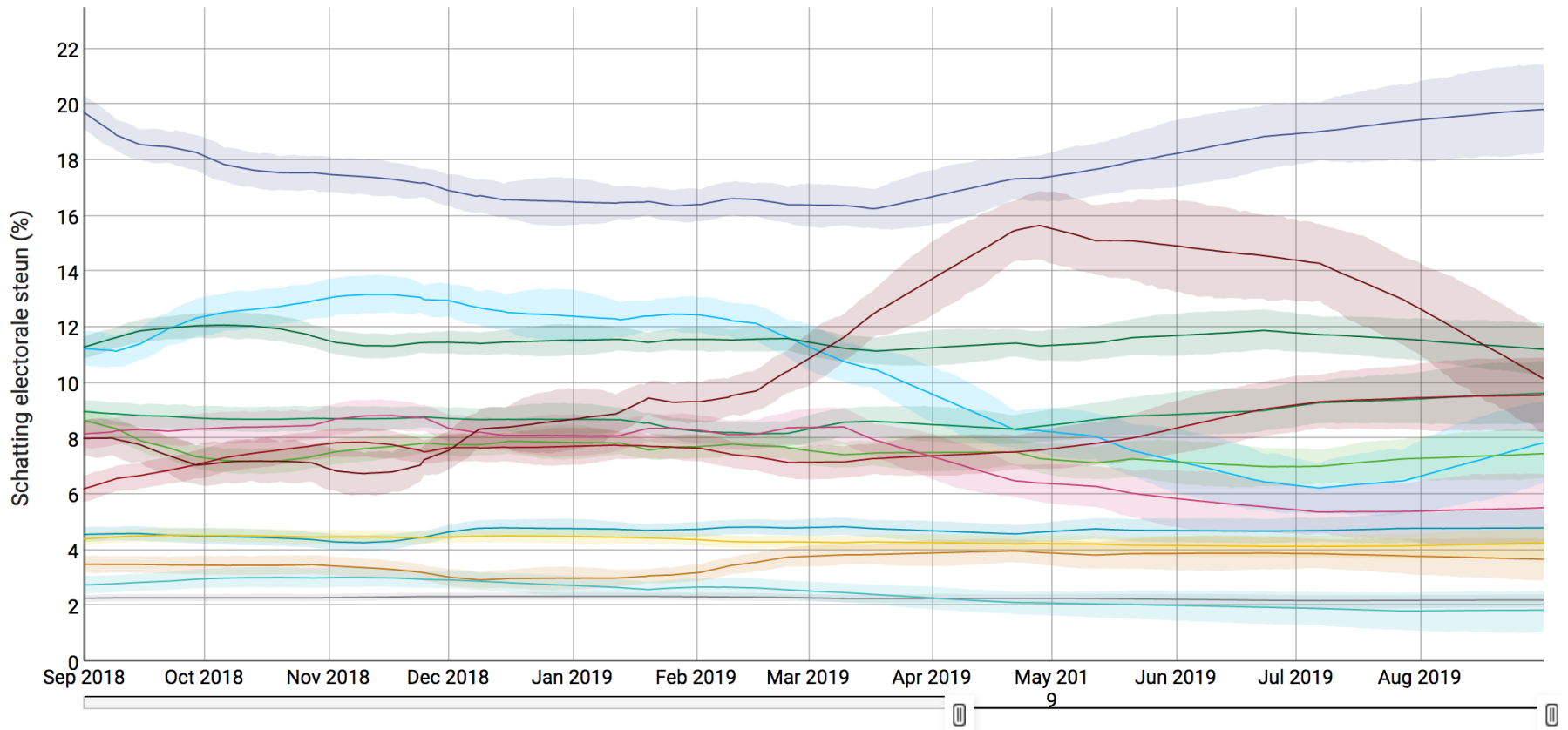
Uncertainty Confidence intervals
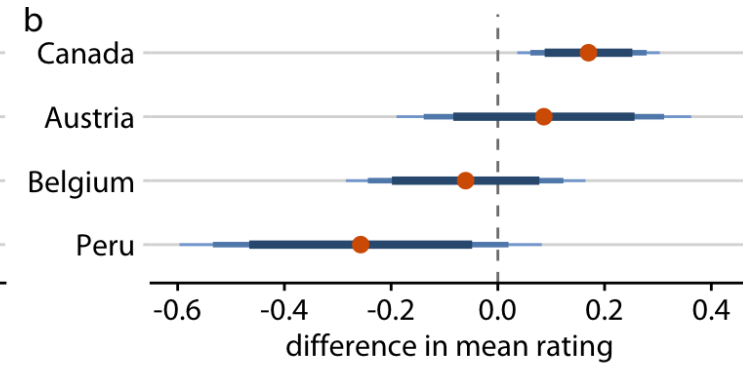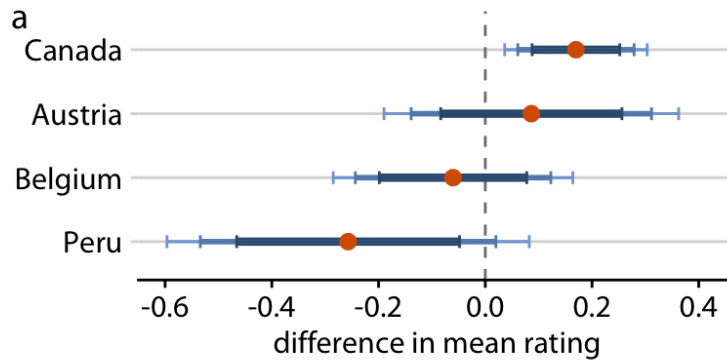
8.

INTRODUCING CHART TYPES TO READERS

Introducing charts

Add a 'How to read this chart' description

Add human readable axis labels

Add explanatory annotations
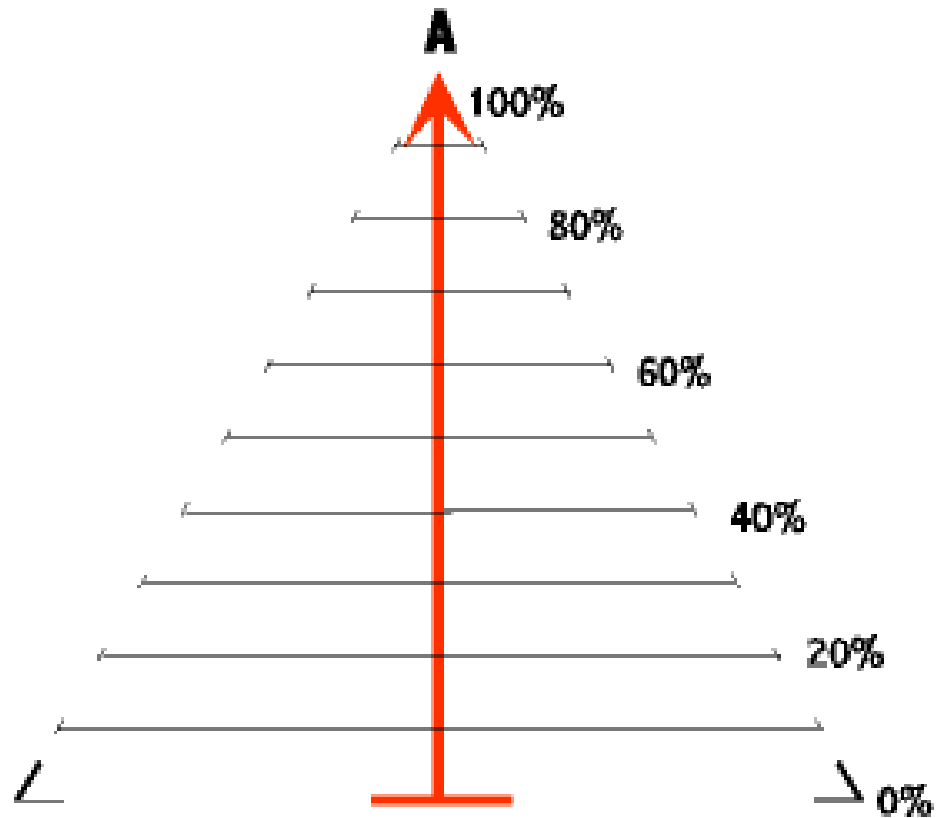
↑ How much **the slowest trips** changed

**SLOWER,
MORE RELIABLE**
6% of commutes

**FASTER,
MORE RELIABLE**
61% of commutes

5 min. faster

N.Y.C. average

5 min. slower

**SLOWER,
LESS RELIABLE**
18% of commutes

**FASTER,
LESS RELIABLE**
14% of commutes

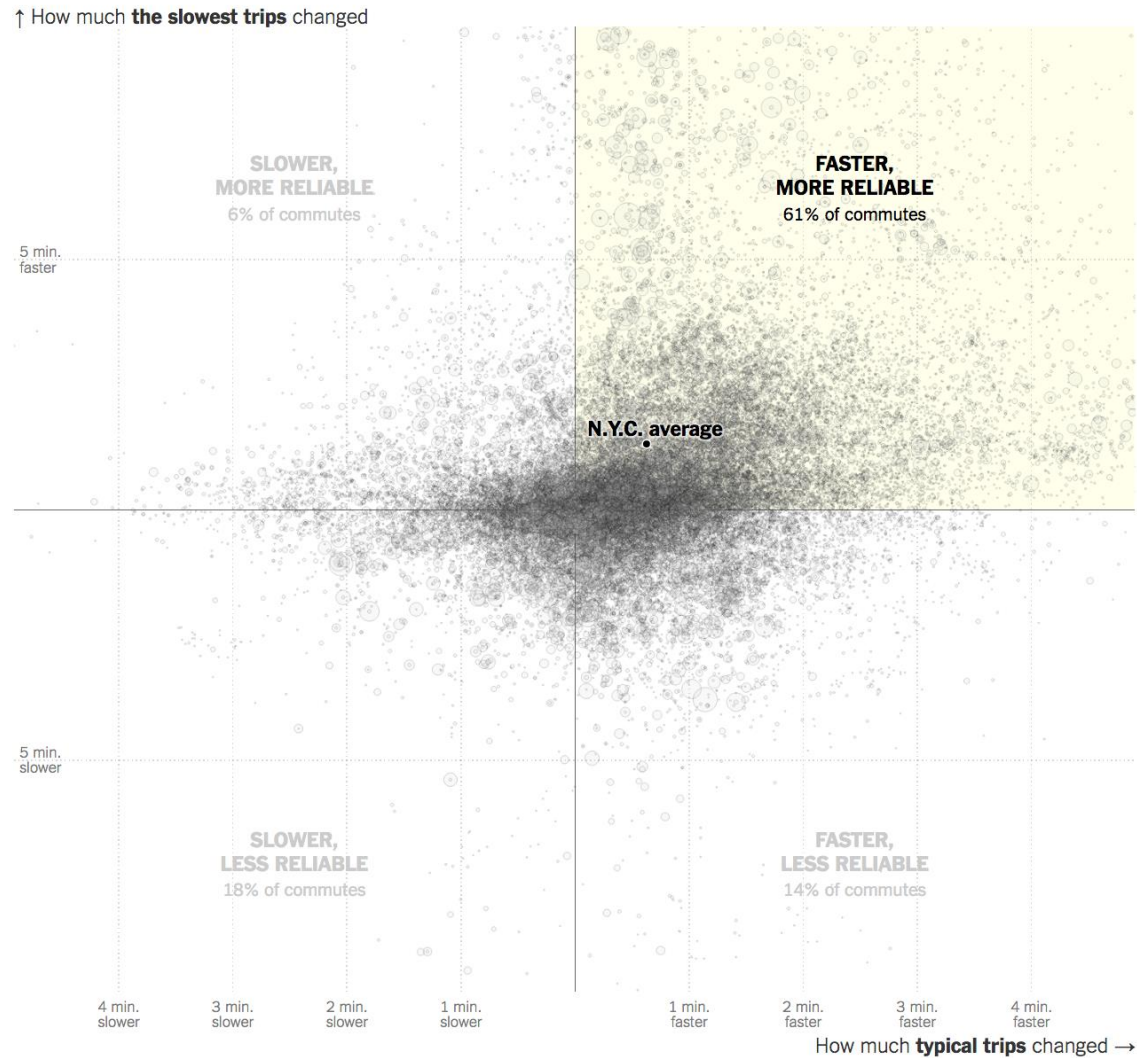4 min. slower   3 min. slower   2 min. slower   1 min. slower   1 min. faster   2 min. faster   3 min. faster   4 min. faster

How much **typical trips** changed →

Introducing charts
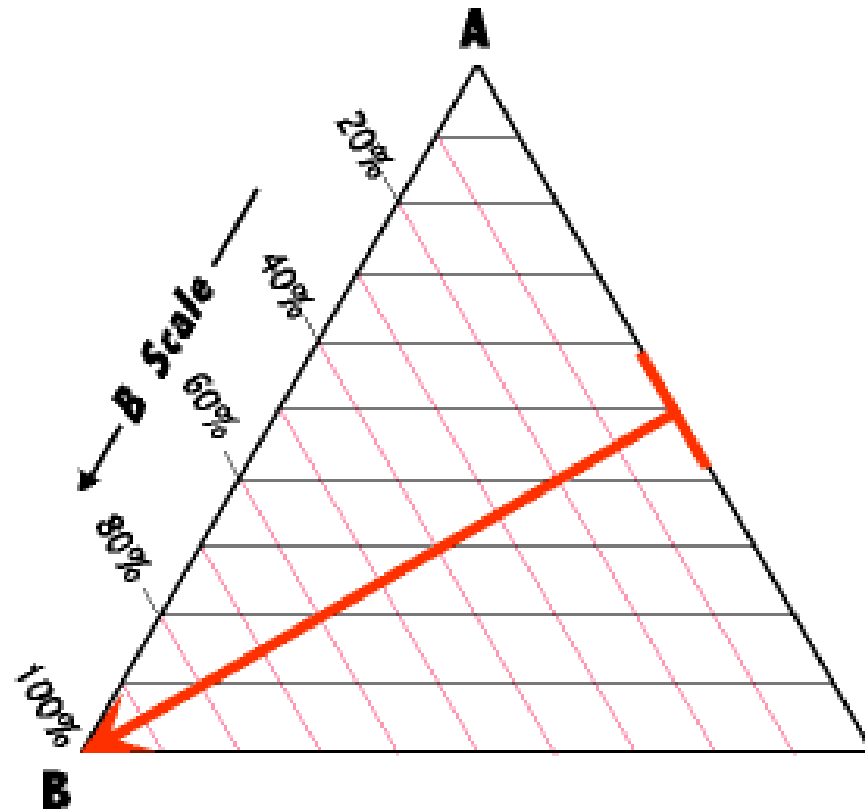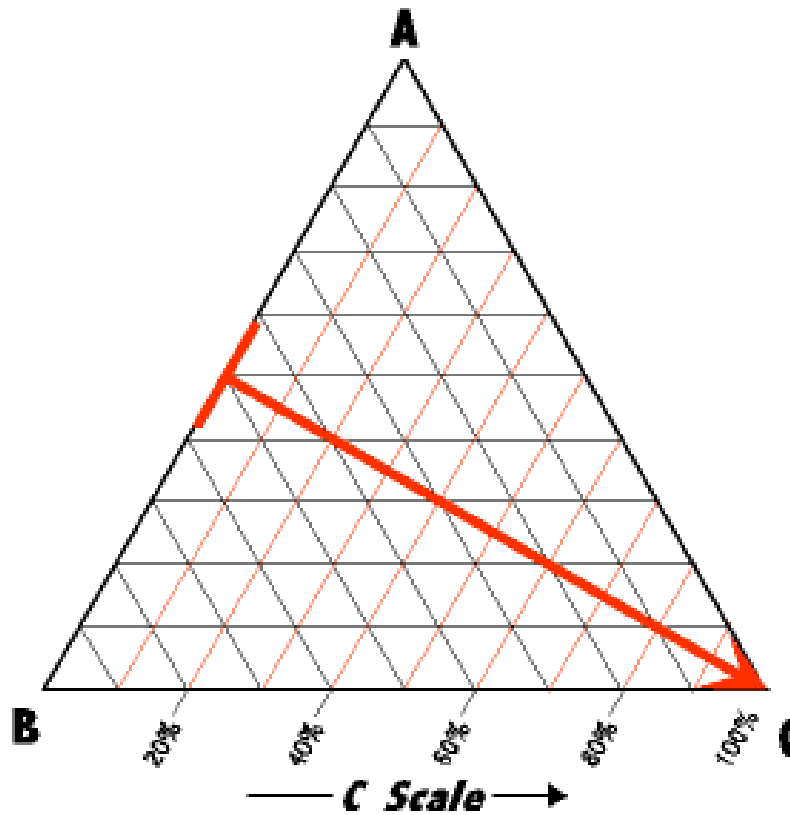
Add chart elements
sequentially

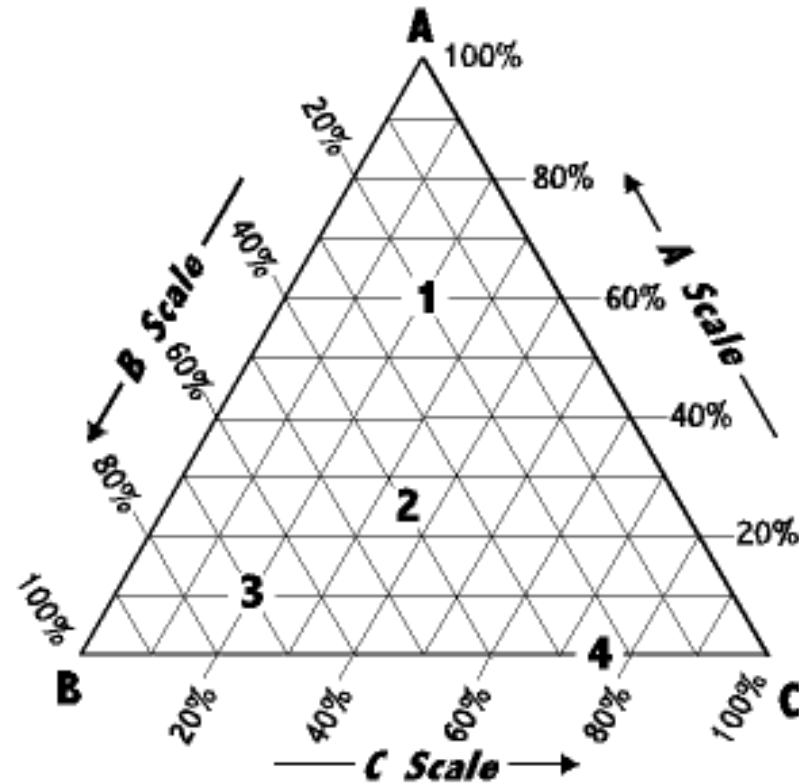# Introducing charts

Add chart elements
sequentially

Introducing charts

Add chart elements sequentially
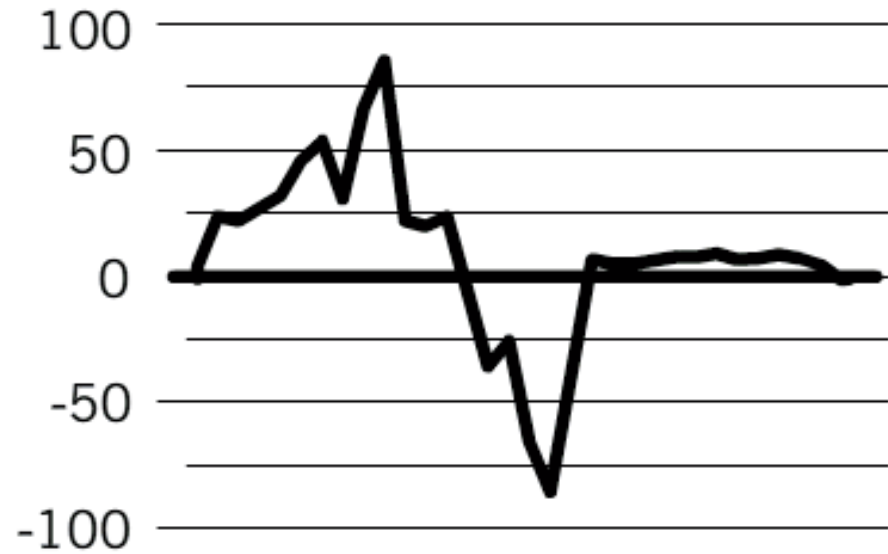
Introducing charts

Add chart elements
sequentially

Introducing charts

Make a gif or video

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

Q&A

Resources

Catalogues

[Dataviz Project](#)

[Visual Vocabulary](#)

[Data Visualisation Catalogue](#)

[Chartmaker Directory](#)

[Xenographics](#)

Tools

[RAWGraphs](#)

[Charticulator](#)

[Data Illustrator](#)