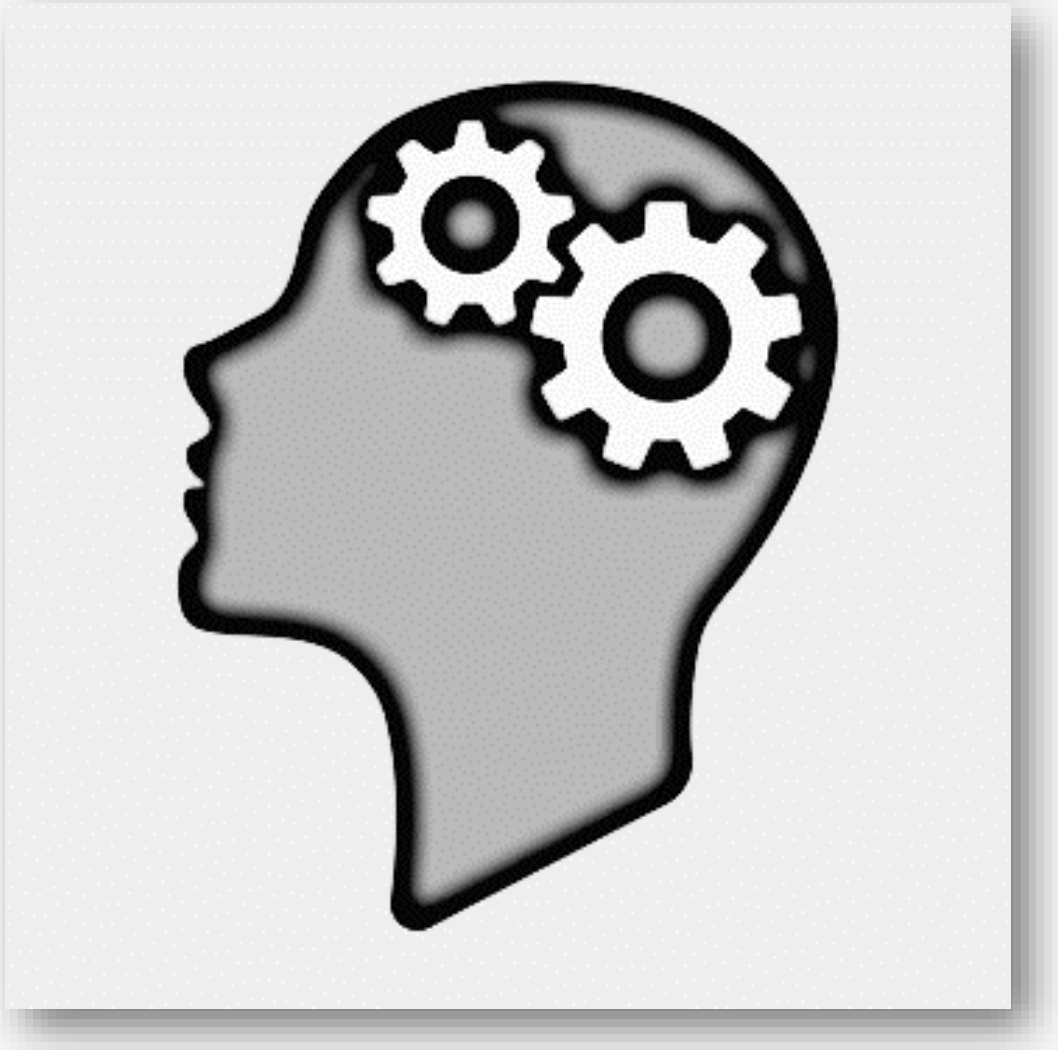
Psychology & Report Design

Jon Lunn



Version: SQL Bits 2023

About Me

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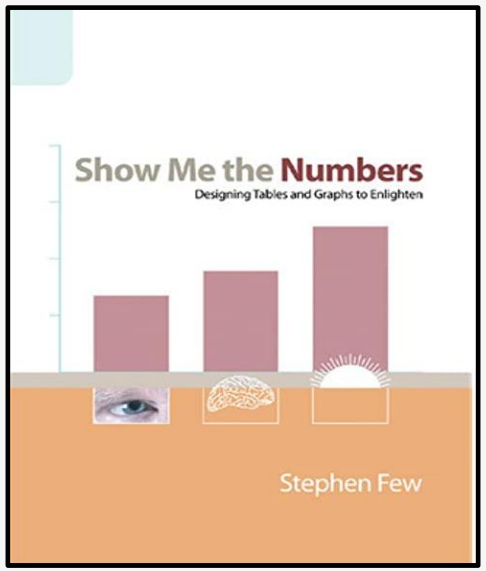
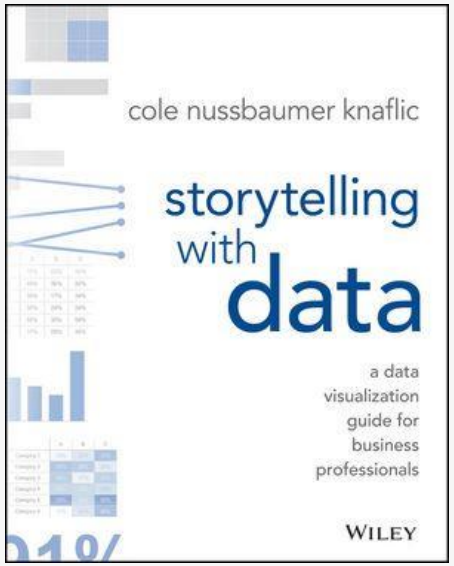
GitHub: https://github.com/mrjonlunn

Email: jon@mrjonlunn.com

DATA RELAY

Sources


Show Me the Numbers
Designing Tables and Graphs to Enlighten
Stephen Few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storytelling with data
a data visualization guide for business professionals
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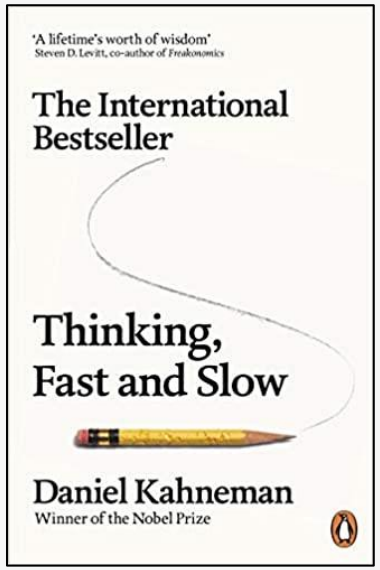
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Steven D. Levitt, co-author of Freakonomics
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Thinking, Fast and Slow
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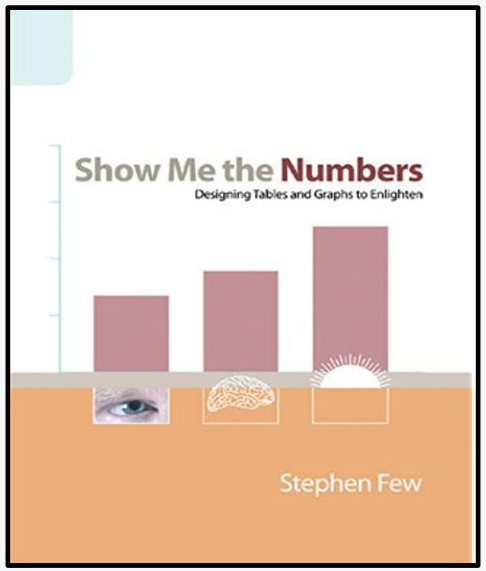
Sources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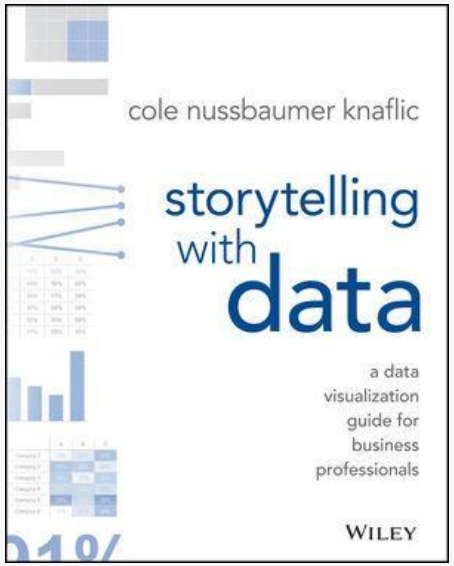
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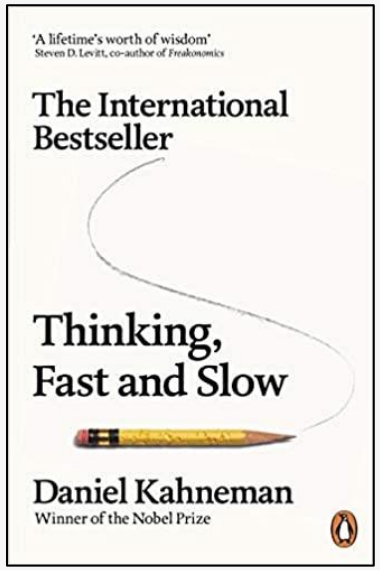
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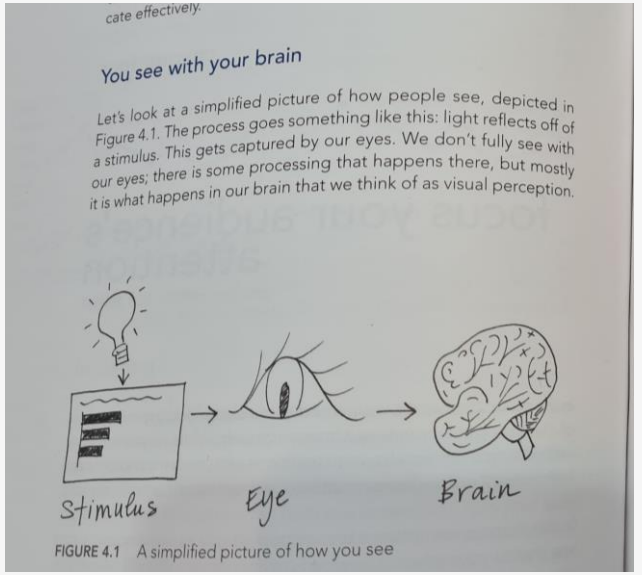
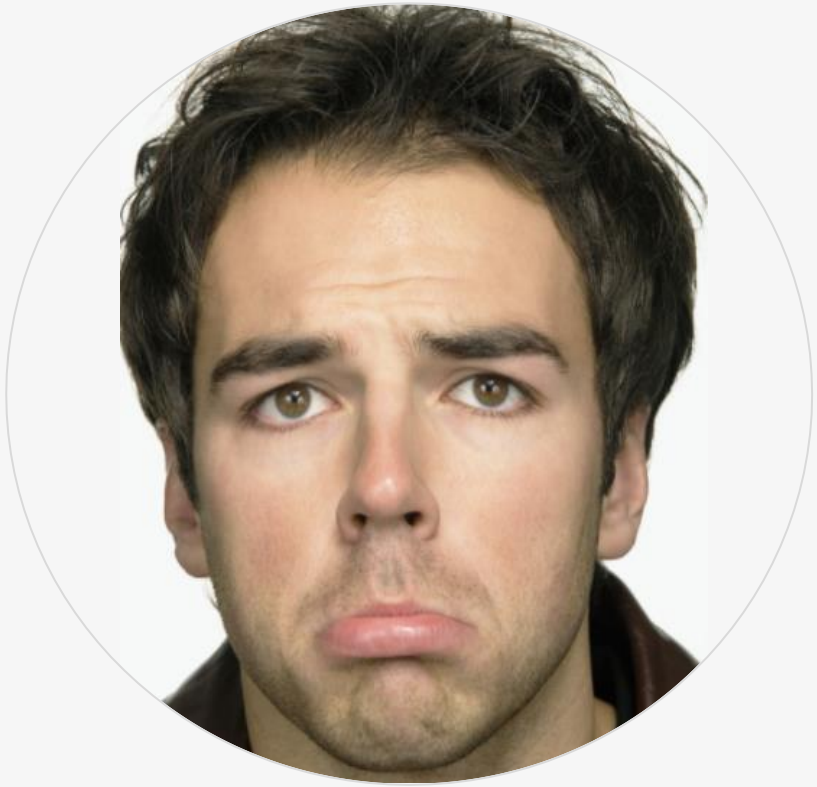

cate effectively.
You see with your brain
Let's look at a simplified picture of how people see, depicted in Figure 4.1. The process goes something like this: light reflects off of a stimulus. This gets captured by our eyes. We don't fully see with our eyes; there is some processing that happens there, but mostly it is what happens in our brain that we think of as visual perception.
Stimulus
Eye
Brain
FIGURE 4.1 A simplified picture of how you see

Interactive Bit

Happy

Interactive Bit



Sad

Interactive Bit

Happy

Interactive Bit

Angry

Interactive Bit

Sad

Interactive Bit

$$2 + 10 + 5 + 10 + 100 = ?$$

$$= 127$$

$$100 + 10 + 10 + 5 + 2 = 127$$

Dual Process Theory

- Intuitive (System 1)
  - Lower mental effort, automatic and effortless
  - System 1 will pass items to System 2, if they break the rules
- Attentive (System 2)
  - Higher mental effort
  - Physical responses – Pupil dilation, heart rate increase, glucose levels drop
  - Familiar tasks in System 2 may become System 1 tasks

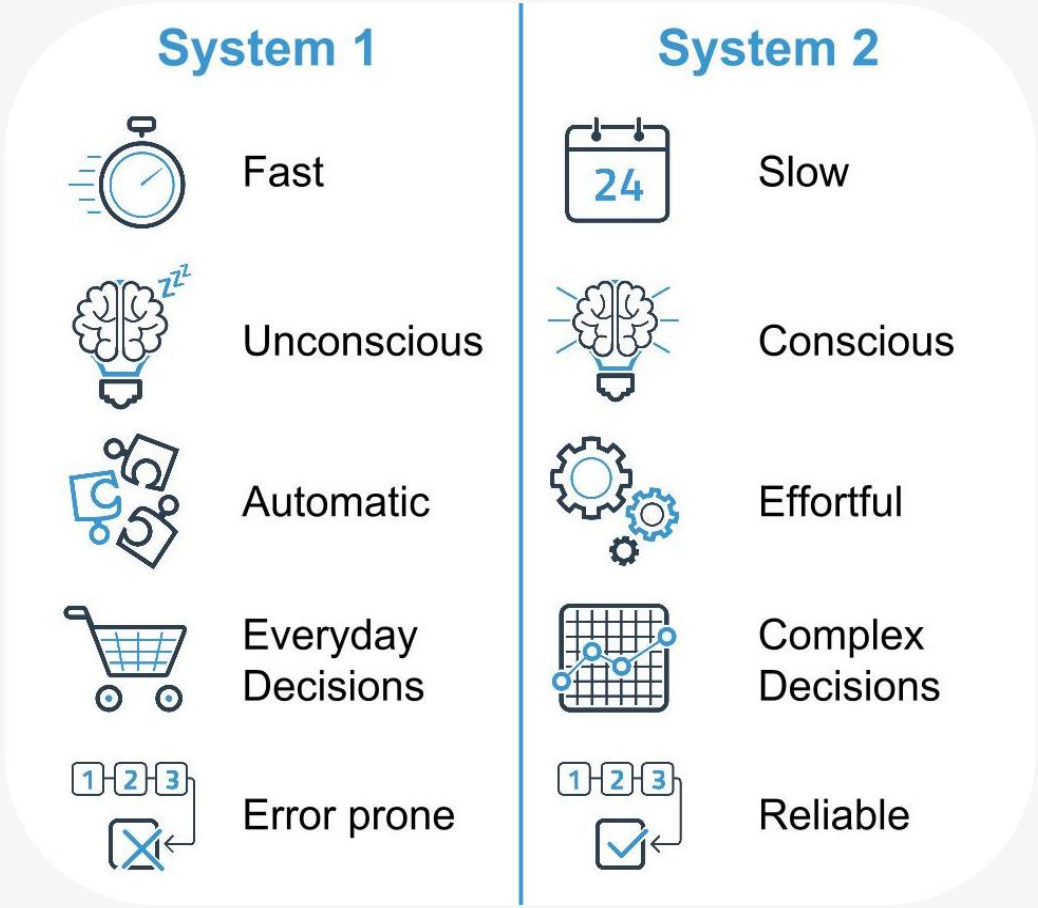


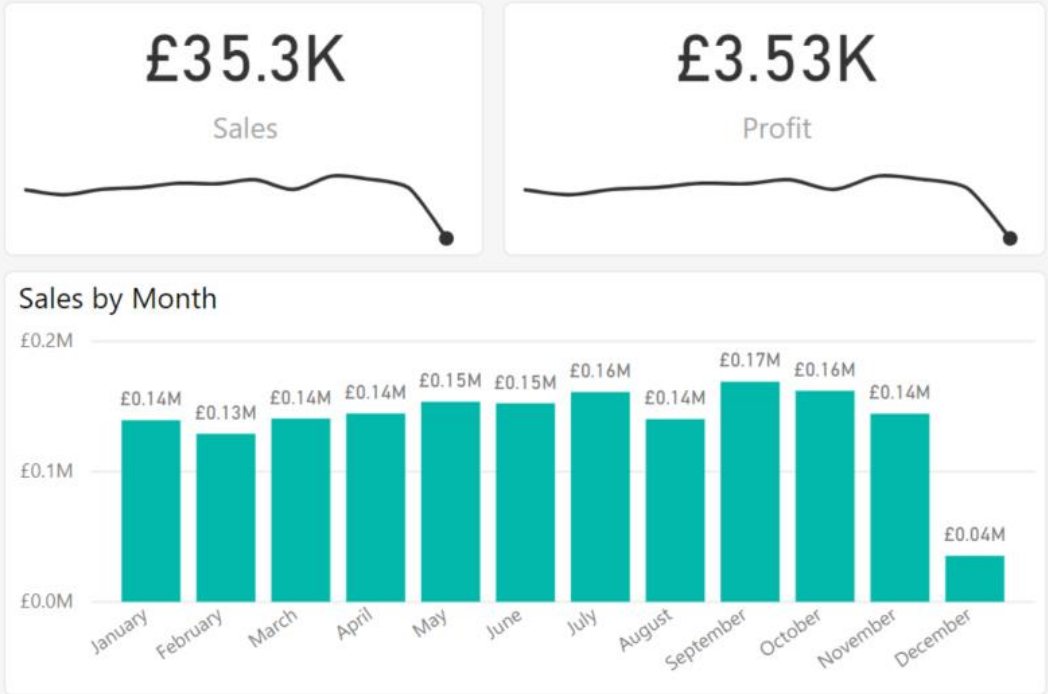
Image Source: System 1 vs System 2 Thinking (researchgate.net)

Layout

Initiative – Read from left to right, top to bottom
Note: Other languages may do it differently!

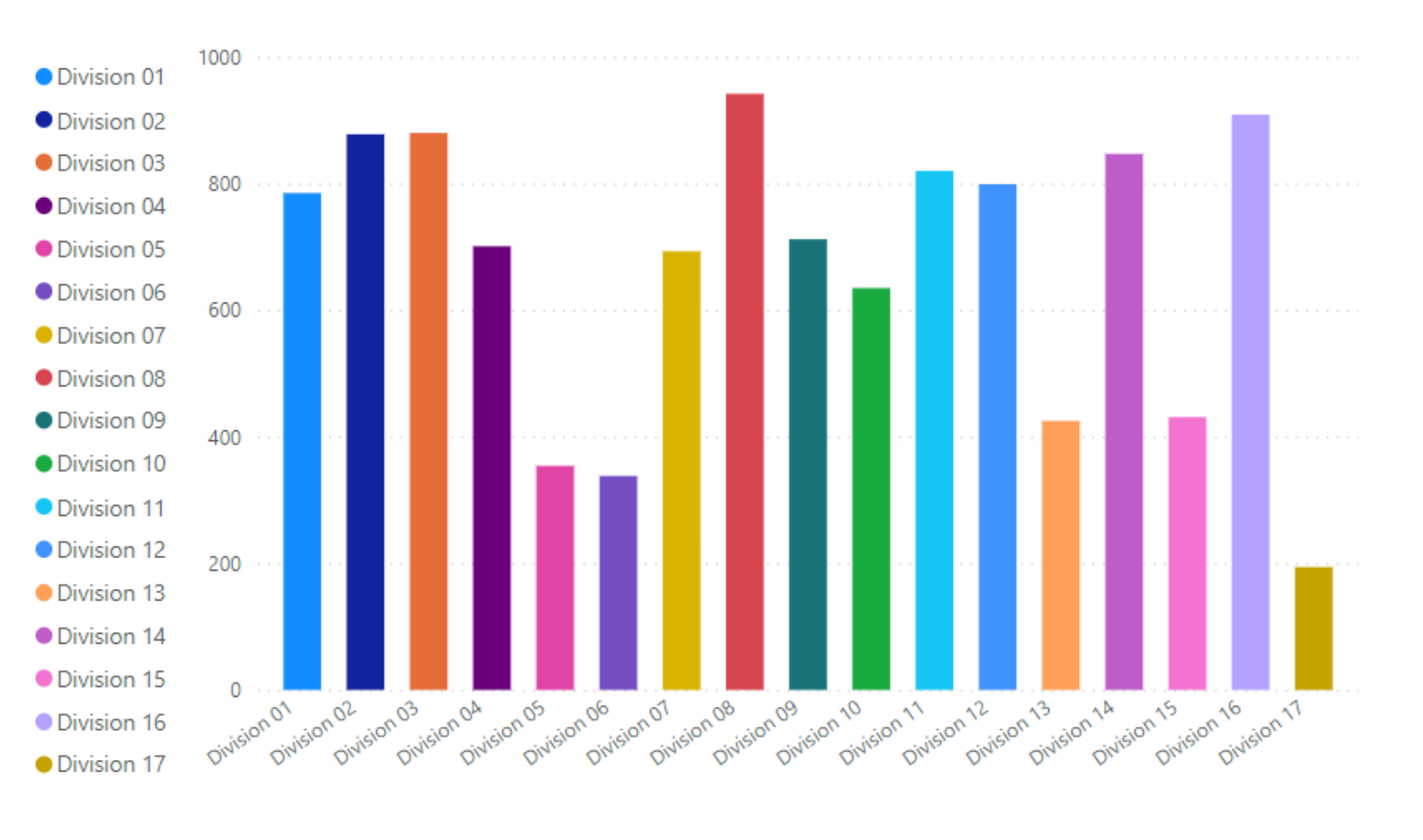
Layout

Order of Granularity

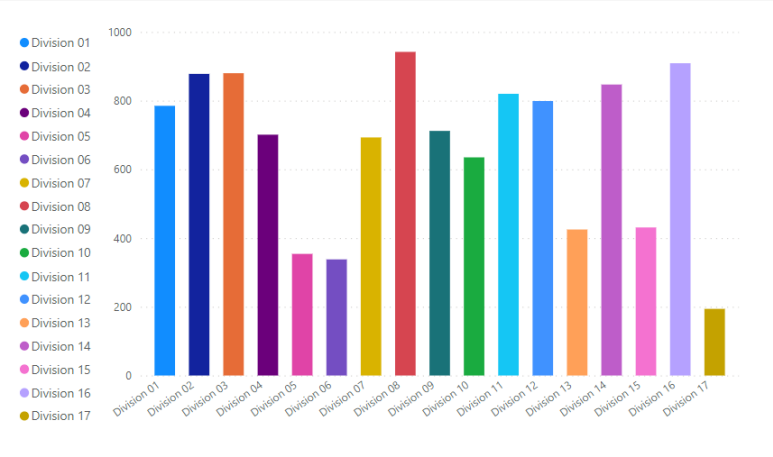


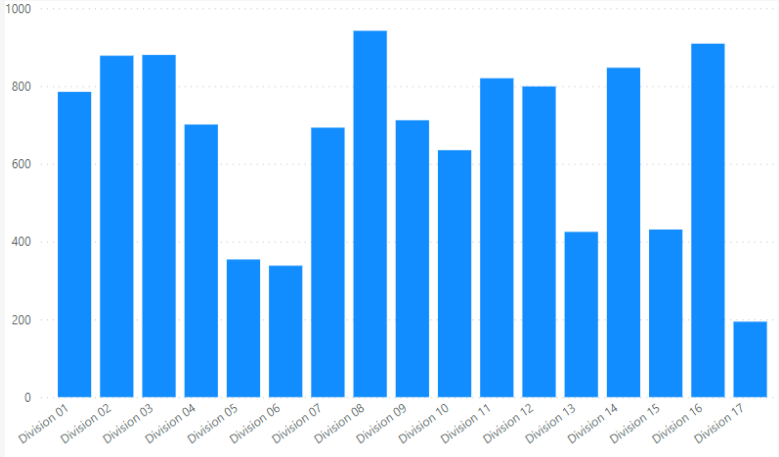
Sales Person	Revenue	New Customers	Leaving Customers	Leads
Mr Black	£15,000	50	15	55
Mr Orange	£5,000	14	9	18
Mr Red	£12,000	20	48	66
Mrs Green	£9,000	10	21	48
Ms Blue	£14,000	11	5	12
Ms Purple	£18,000	33	3	63

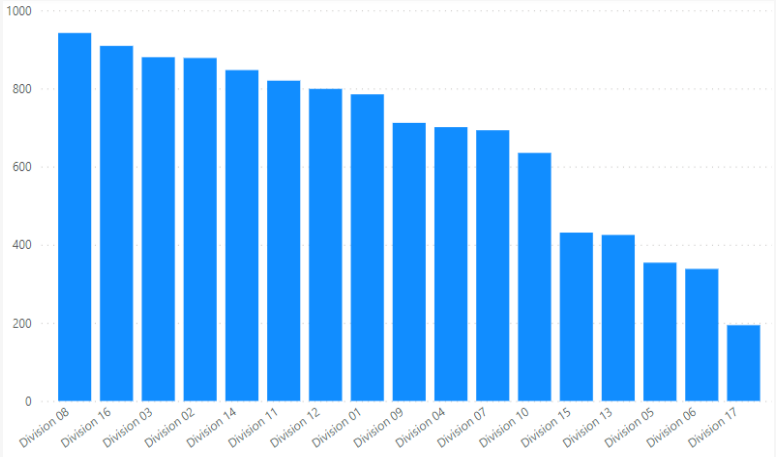
Order your data if you can

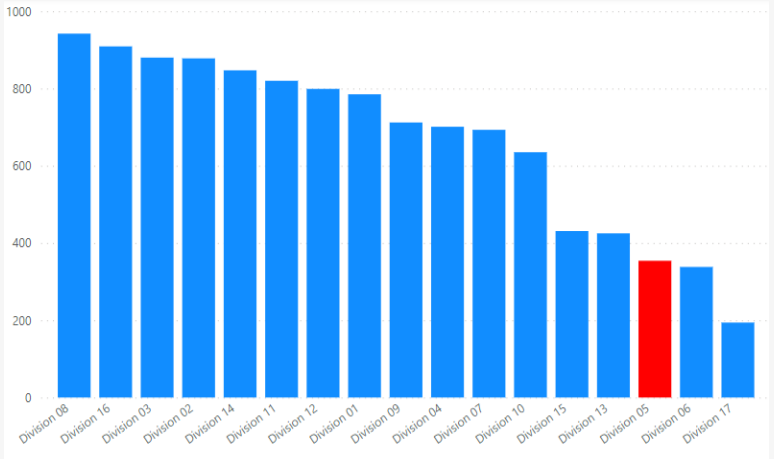


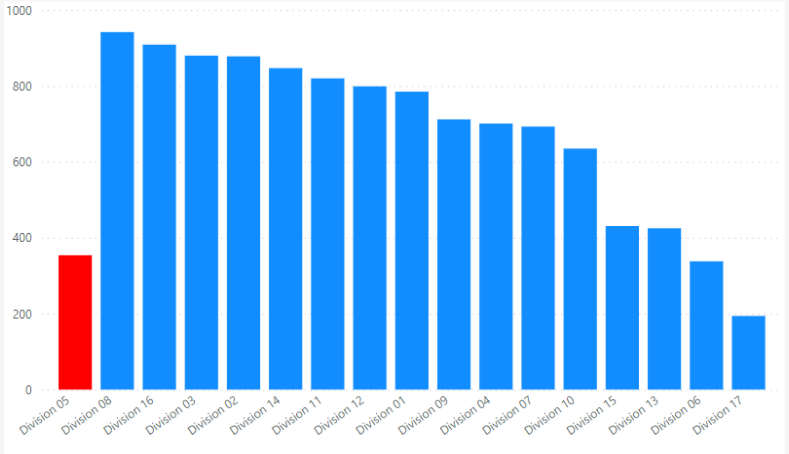
Order your data if you can – use colour to add focus











The impact of colour

		KPI	Jan	Feb	Mar	Apr	May	Jun
Financial	1	Supply Chain Cost	£1.70	£1.69	£1.68	£1.65	£1.57	£1.55
	2	Cash Debtor Days	16.2	17.1	18.3	16.5	14.6	16
Customer	3	Coverage	76%	74%	78%	81%	82%	85%
	4	Customer Service	91%	92%	89%	93%	96%	94%
Process	5	Stock Availability	97.60%	94.30%	96.50%	98.10%	98.70%	98.40%
	6	Total Stock	18.6	18.9	16.7	17.5	15.5	14.3
	7	Sales Forecasting	64%	59%	58%	65%	76%	81%
Learning & Growth	8	Performance Appraisal	25%	25%	25%	65%	65%	655%
	9	Competency Attainment	40%	40%	40%	50%	50%	50%

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Monochrome colour schemes, decrease cognitive burden, and reduces the impact of colour blindness.

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Red–green color blindness affects *up to* 1 in 12 males (8%) and 1 in 200 females (0.5%). The ability to see color also decreases in old age.
Color Blindness | National Eye Institute (nih.gov)

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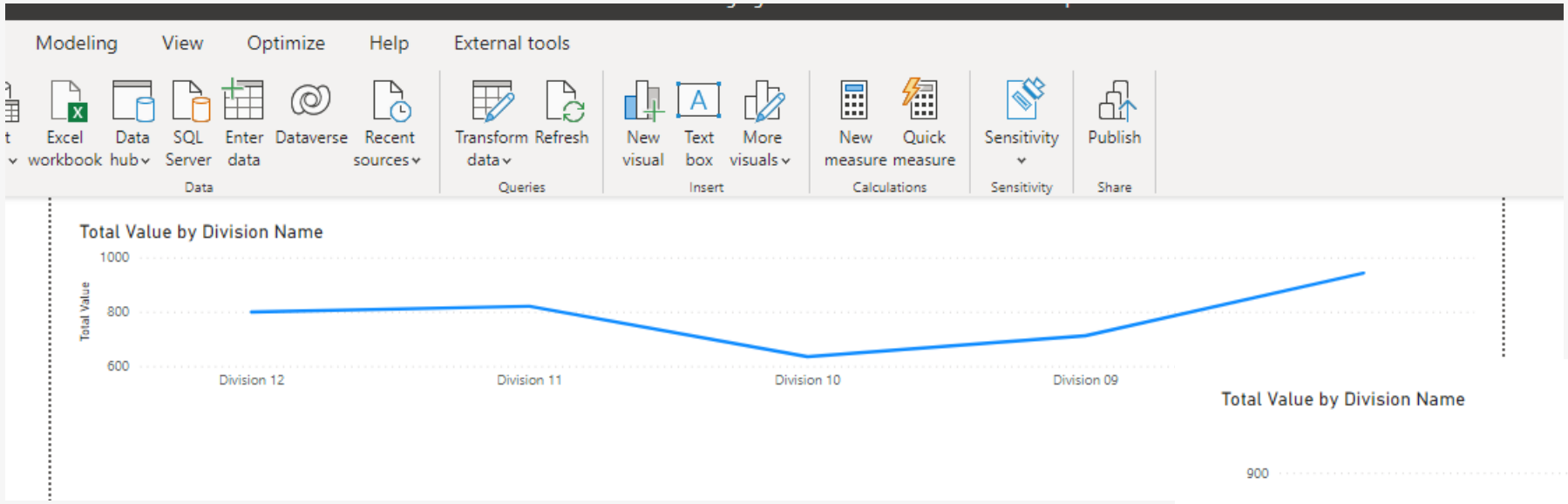
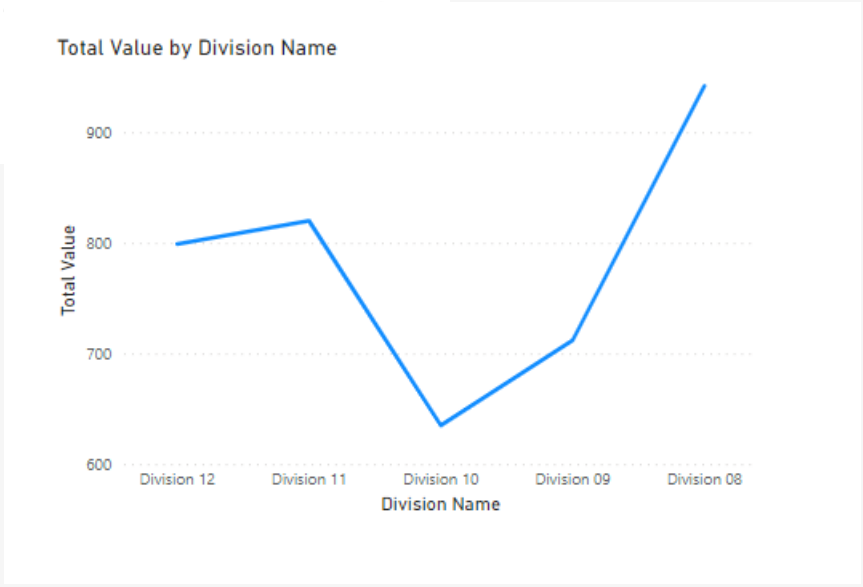
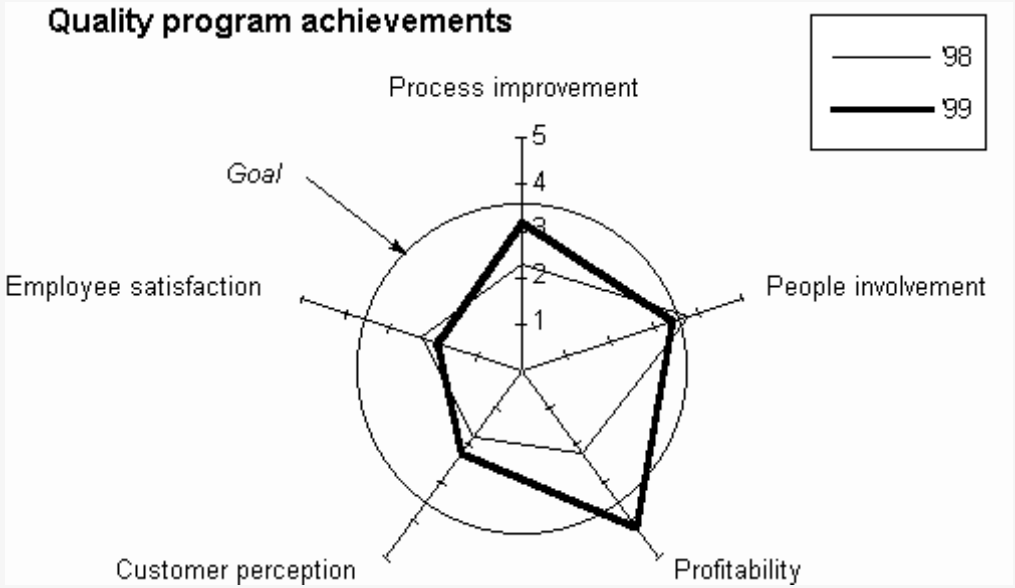
The impact of scale

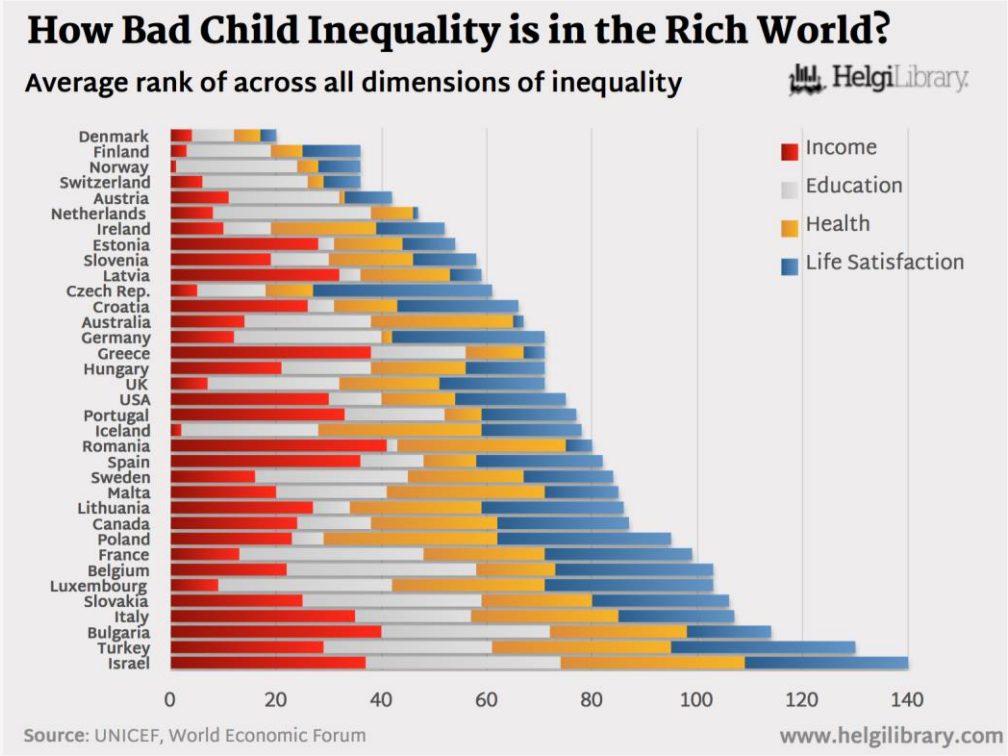




Visual Selection

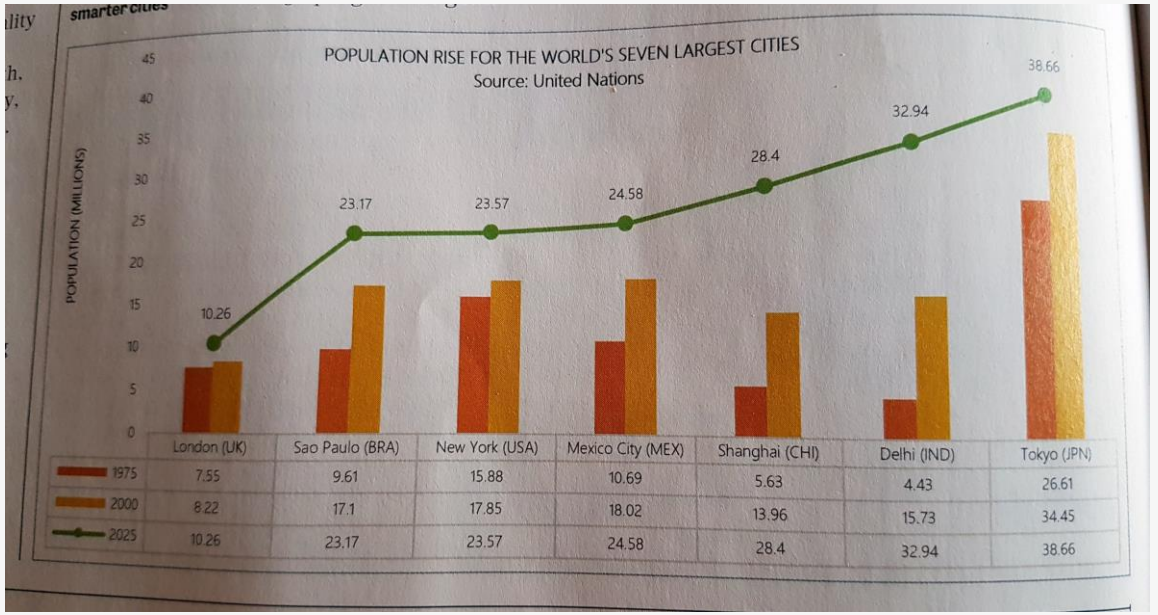


This is categorical information not continuous
It should be a column or bar chart for better comparison



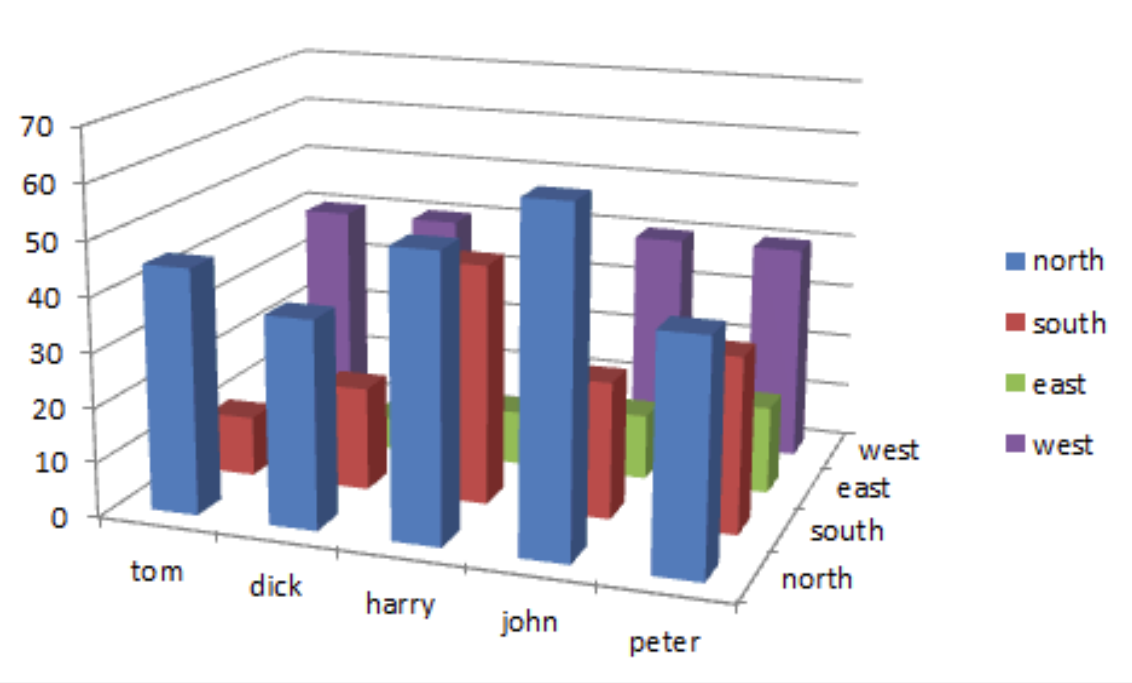
This should be split into 4 charts to better show the comparison of the types.

Visual Selection

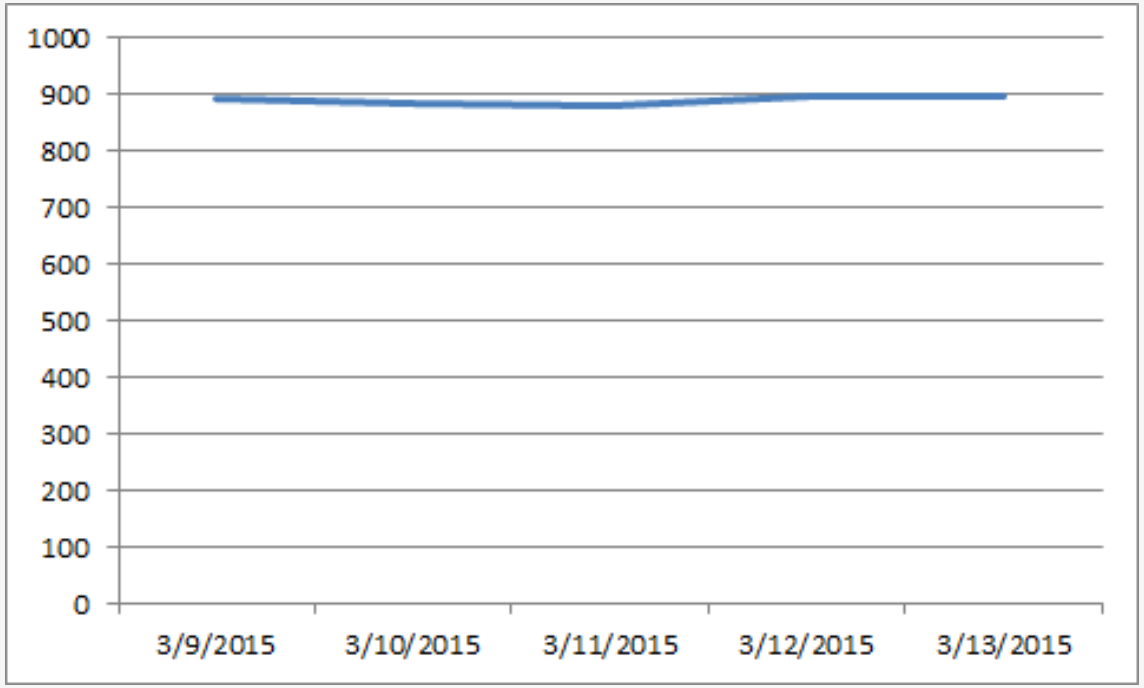


	London (UK)	Sao Paulo (BRA)	New York (USA)	Mexico City (MEX)	Shanghai (CHI)	Delhi (IND)	Tokyo (JPN)
1975	7.55	9.61	15.88	10.69	5.63	4.43	26.61
2000	8.22	17.1	17.85	18.02	13.96	15.73	34.45
2025	10.26	23.17	23.57	24.58	28.4	32.94	38.66

Visual Selection

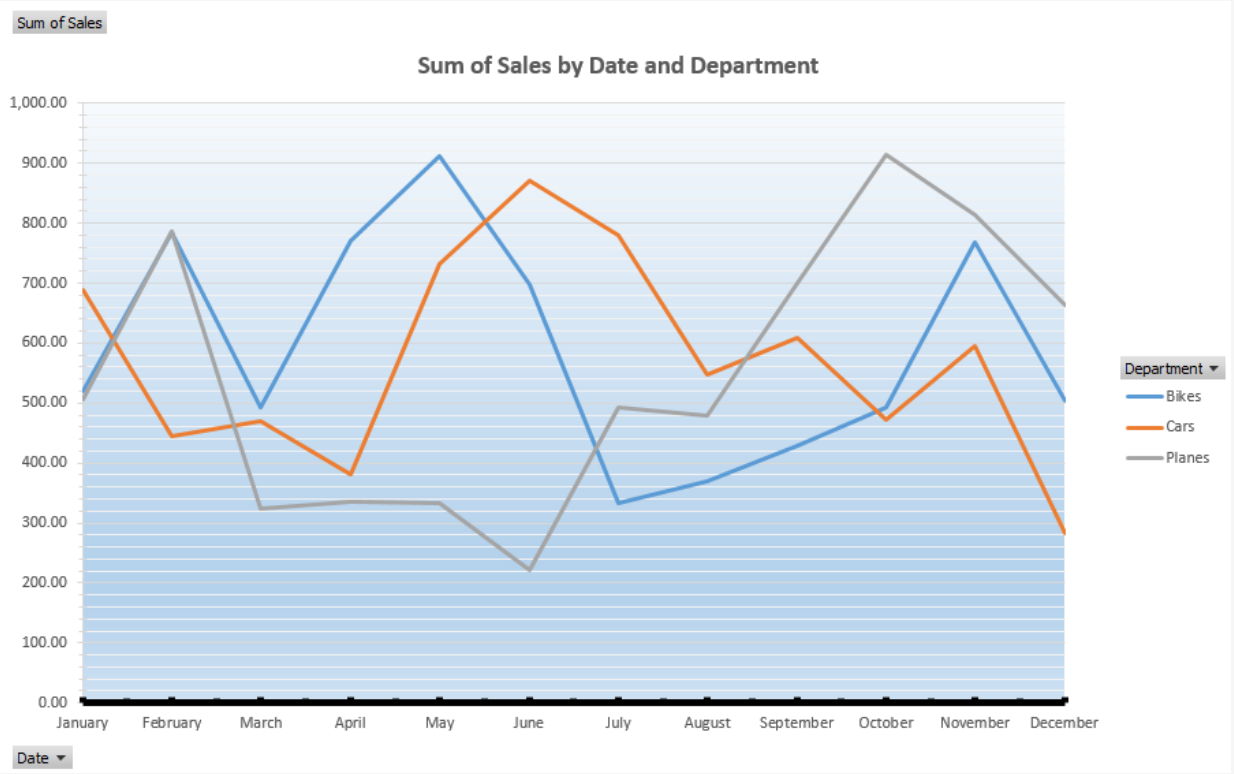


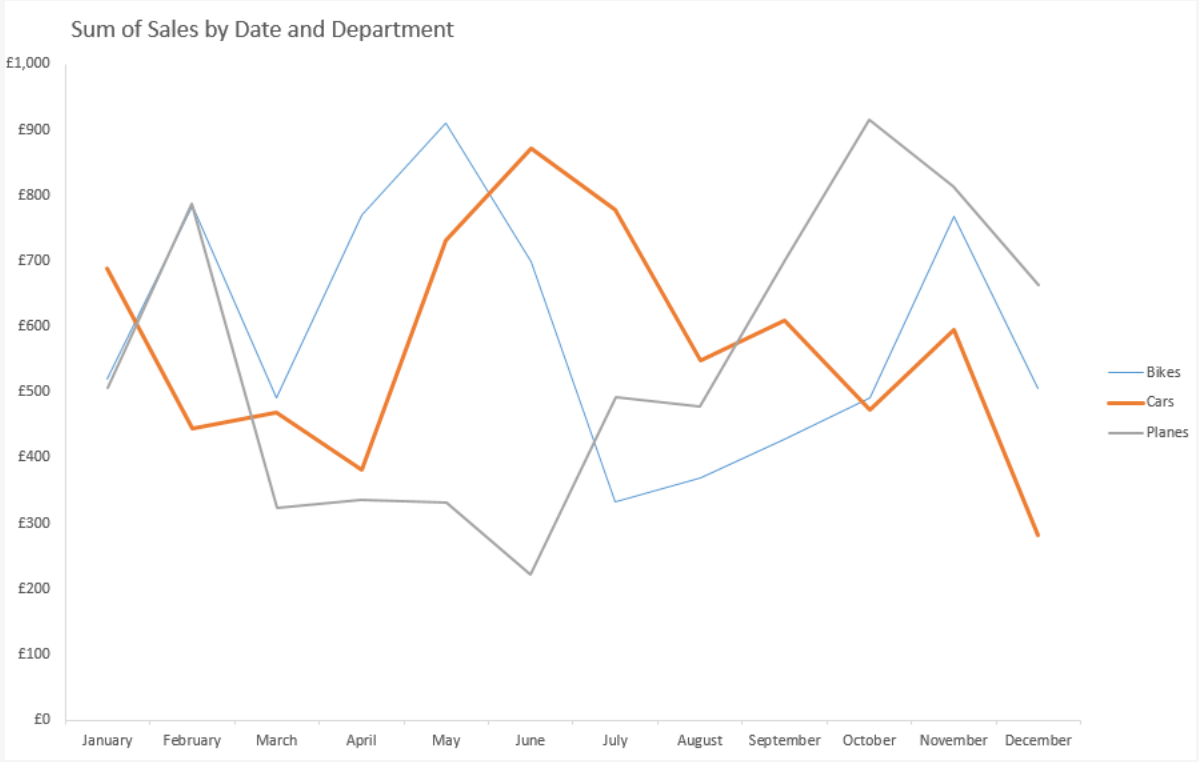
No 3D! It can hide detail and even for a basic chart adds an extra level of cognitive burden



Should a chart start or not start at zero?

Remove distractions





Abstract numbers

How can you visualize or relate to numbers?

Try to visualize 15 dots (Tip - use dice patterns)

Initiative vs Attentive - When do you stop counting the dice dots as a child, then start recognizing the pattern?

Frequency Format

- Ratios are relative frequencies (how many)
- Percentages are ’chances’, ‘risk’ or ‘probability’ (how likely)

You intuitively understand ‘how many’ more than ‘how likely’

5%	1 in 20
10%	1 in 10
25%	1 in 4
33%	1 in 3

Abstract numbers – Frequency Format

Intuitive (System 1) can be prone to errors and bias

Which is worse?

- A disease that kills 1,286 people out of every 10,000
- A disease that kills 24.14% of the population

- Defense Lawyer: DNA will falsely match in 1 in 1,000 cases of capital cases
- Prosecution Lawyer: DNA will only be wrong in 0.1% of cases

- Banking – 5% Cashback on purchases

Abstract numbers

Is there a best ratio to use?

Whiskas cat food 70/80's advertisement

- 8 out of 10 cats preferred it
- 4 out of 5 cats preferred it
- 80% of cats preferred it

Use the power of 10's
Round up or down, don't do '1.5 in 17'

Framing - Positive or negative context

Cat food

- 2 out of 10 cats refused it
- 1 out of 5 cats refused it
- 20% of cats refused it

Seeing the doctor

- 9 out 10 ten people will have no complications after surgery
- 1 in 10 ten people will have complications after surgery

Summary

- Start with what do you want to show
- How best to lay it out
- Focus your user’s attention
- K.I.S.S
  - Keep It Simple(S), less is more

References and Further Reading

Slide 1: Image Master Of Science Degree - Psychology Icon Png PNG Image | Transparent PNG Free Download on SeekPNG
Slides 18 -20: Thinking, Fast and Slow, Chapter ’Rare Events’

Further Reading

Storytelling with Data: A Data Visualization Guide for Business Professionals - Cole Knaflic

Show me the numbers – Stephen Few

Thinking, Fast and Slow – Daniel Kahneman Thinking, Fast and Slow, Chapter ’Rare Events’