

FIN4104/4911

Quantitative Analysis for Financial Decisions

Chapter 11: Data Visualization and Presentation



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Course Outline

- CH 11: Data Visualization and Presentation

Source: Brent Dykes, Effective Data Storytelling



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Data Storytelling

What is Data Storytelling?

Data storytelling is a structured approach for communicating data insights using narrative elements and explanatory visuals.



Why do we need data storytelling skills?

"The ability to take data—to be able to understand it, to process it, to extract value from it, to visualize it, to communicate it—that's going to be a **hugely important skill in the next decades**."



Hal Varian, Google Chief Economist

- Find Insights
- Explain Insights



Observations vs. Insights



Small Insights Can Be Acted on by Individuals



Bigger Insights Require Communication



Bigger Insights Require Communication



4 Key Communication Objectives



Every insight
invites change



But very few **drive**
change without **good**
communication.



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Stories Beat Statistics

1 More Memorable



5%
statistics

VS

63%
stories

2 More Persuasive



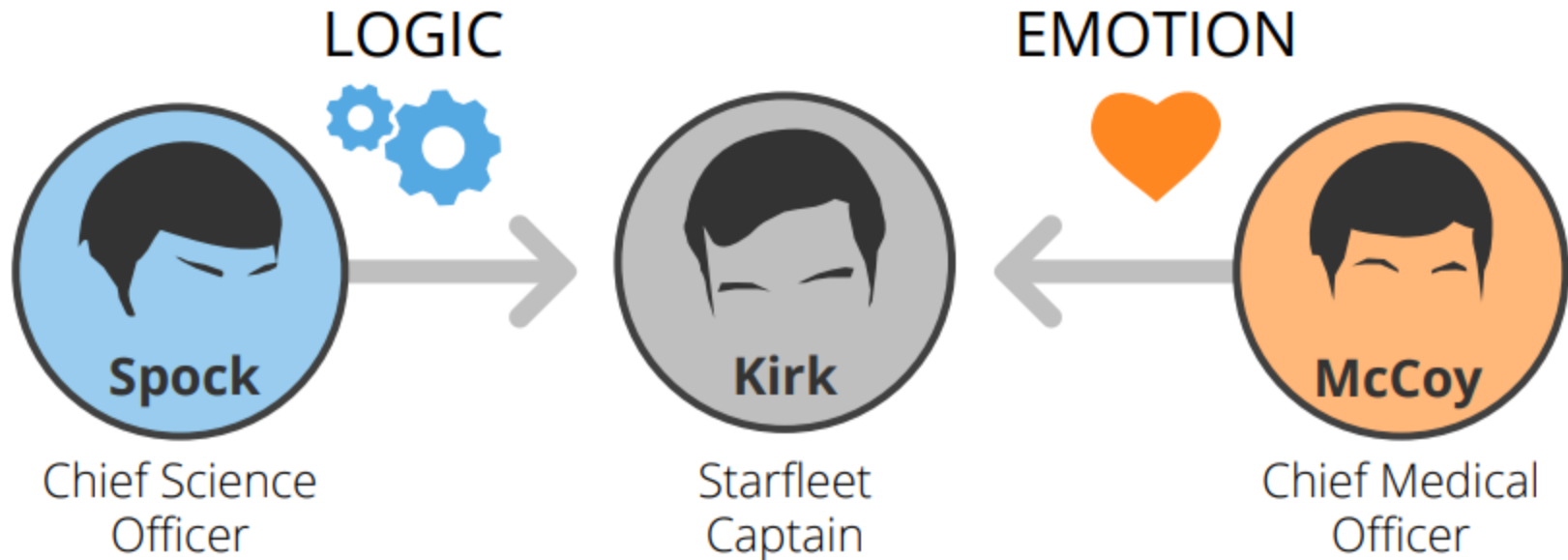
\$1.14
statistics

VS

\$2.38
story



Decision Making: Logic vs. Emotion





We **hear** statistics,
but we **feel** stories



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Message and Audience Alignment

"If the statistics are boring, you've got the **wrong numbers.**"

Edward Tufte
Data viz expert



...or maybe the **wrong audience!**



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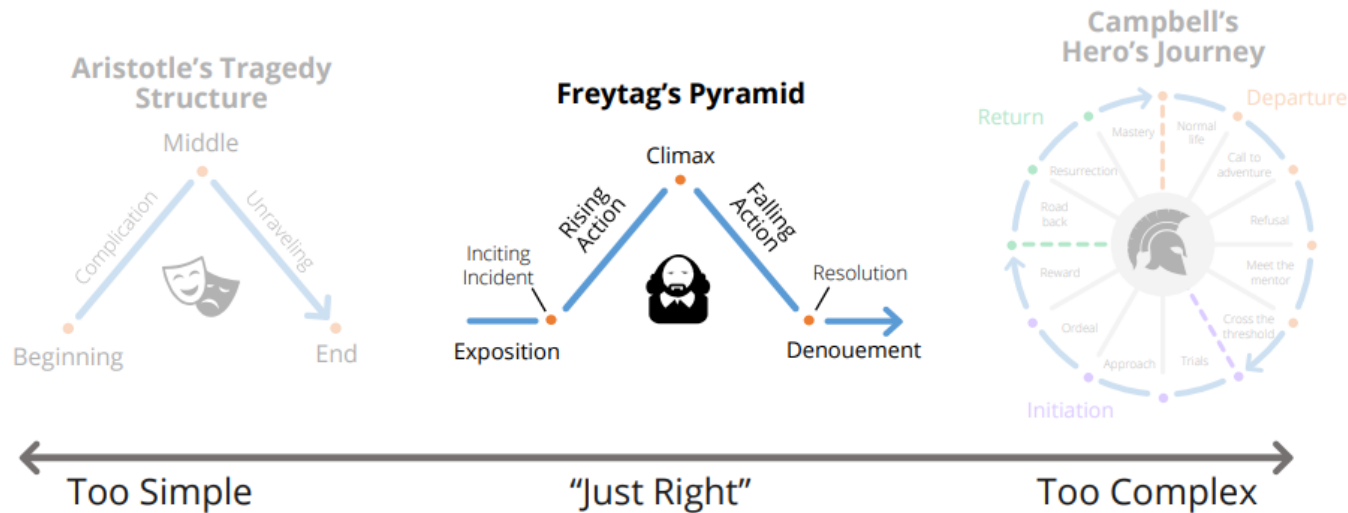


What is your storyline?

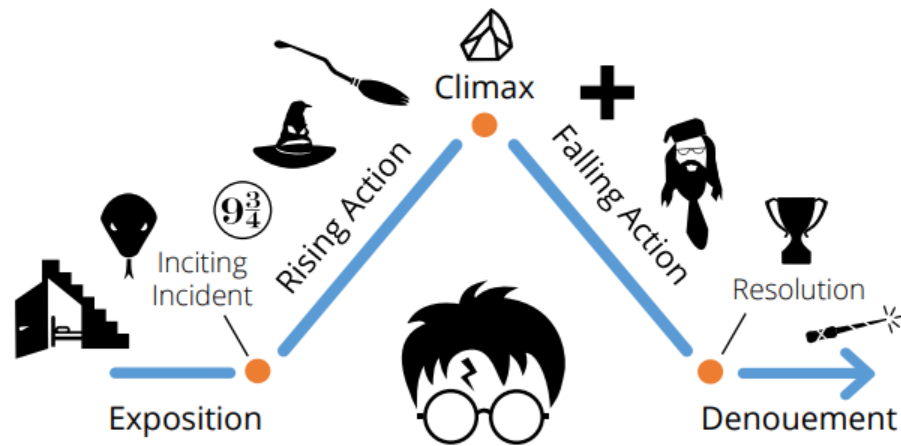


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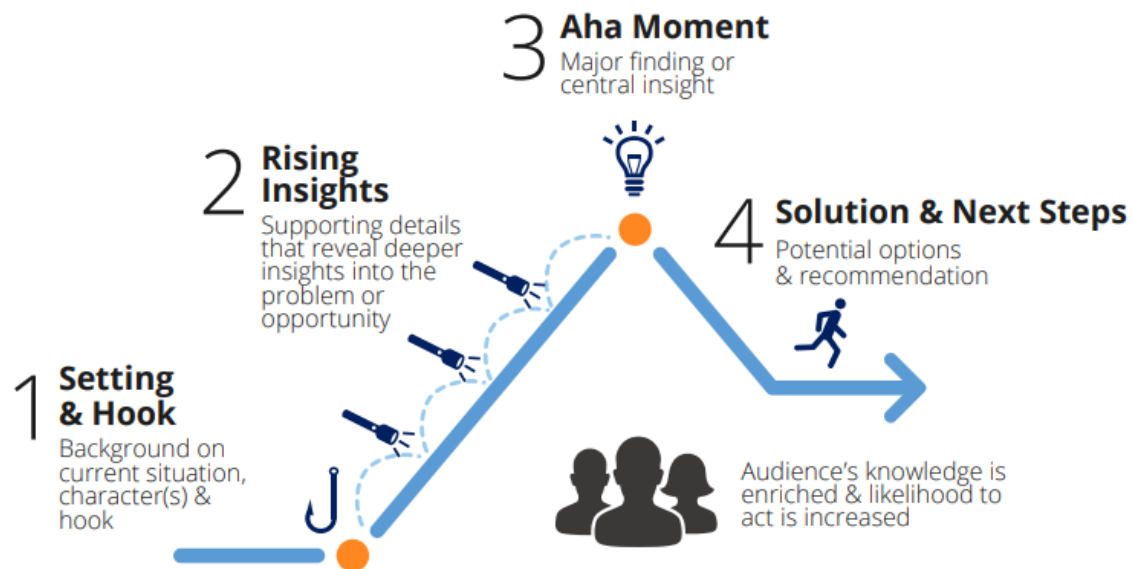
Different Narrative Models



Harry Potter and Freytag's Pyramid



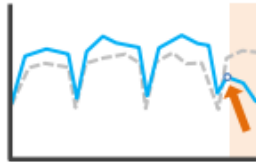
Data Storytelling Arc



Data Storytelling Arc in Action



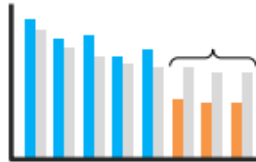
Setting
& Hook



What is status quo? What unexpectedly changed?



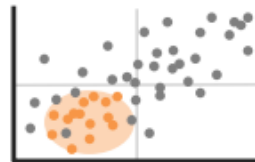
Rising
Insight #1



What influenced or contributed to the change?



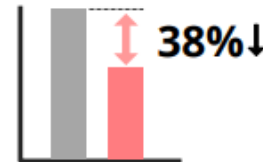
Rising
Insight #2



What other supporting evidence is needed or helpful?



Aha
Moment



What is the impact if nothing changes?



Solution &
Next Steps



What are the options? What is the best course of action?



Anscombes Quartet In Action

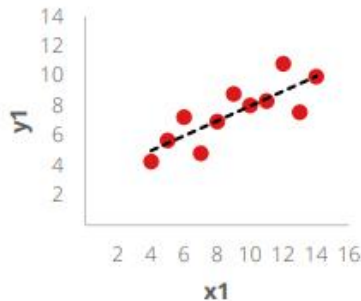
Francis Anscombe
Statistician
(1918-2001)



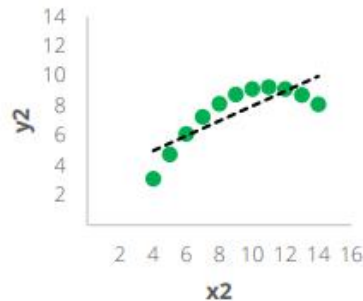
"Numerical calculations are exact, but graphs are rough."



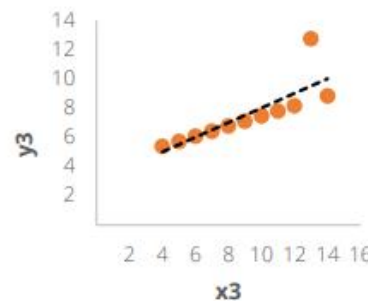
1



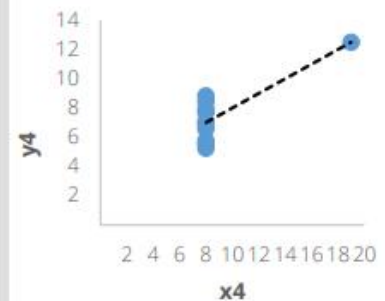
2



3



4



Gestalt Principles > Grouping

Proximity



Similarity



Enclosure

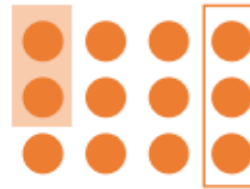


Figure-Ground



Continuity



Closure



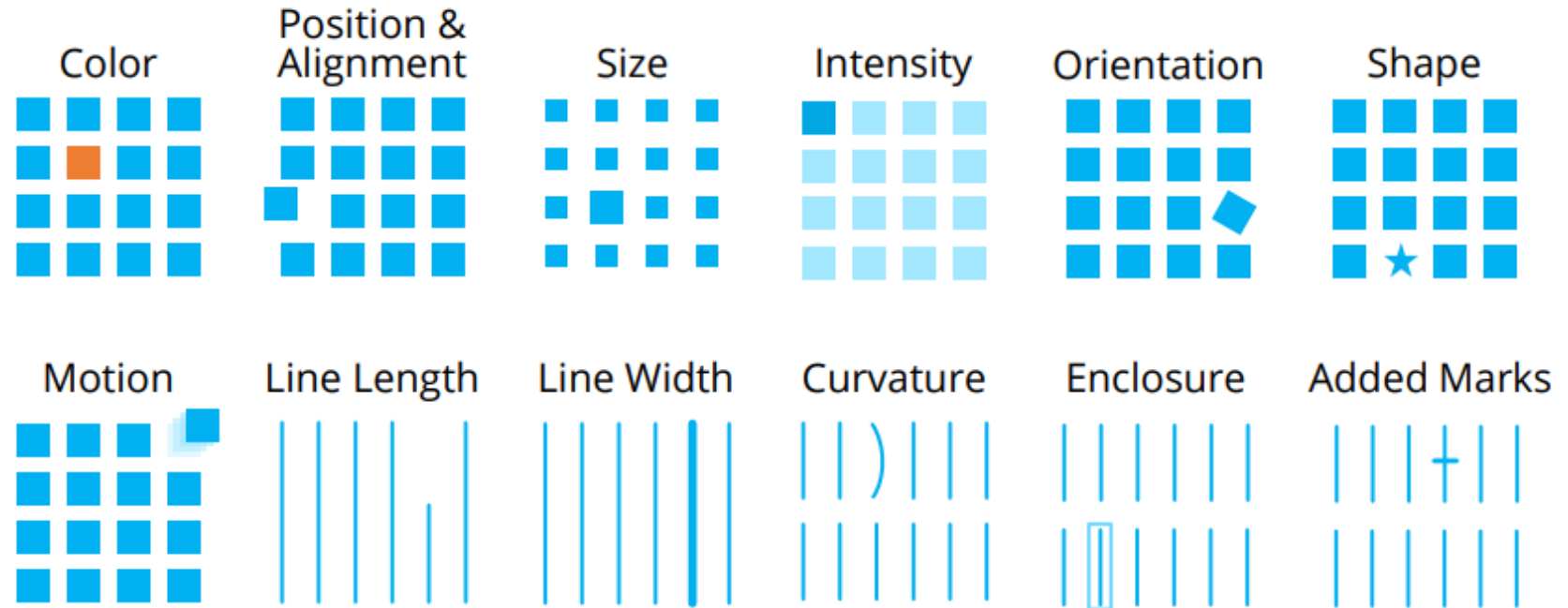
Connection



Simplicity (Prägnanz)



Preattentive Attributes > Importance



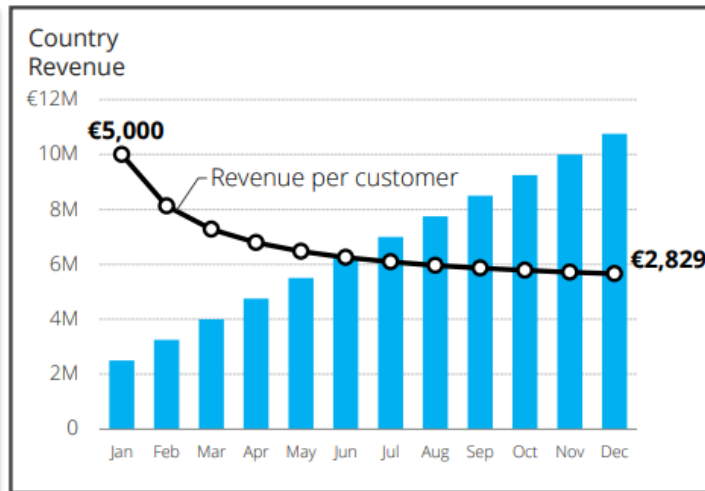
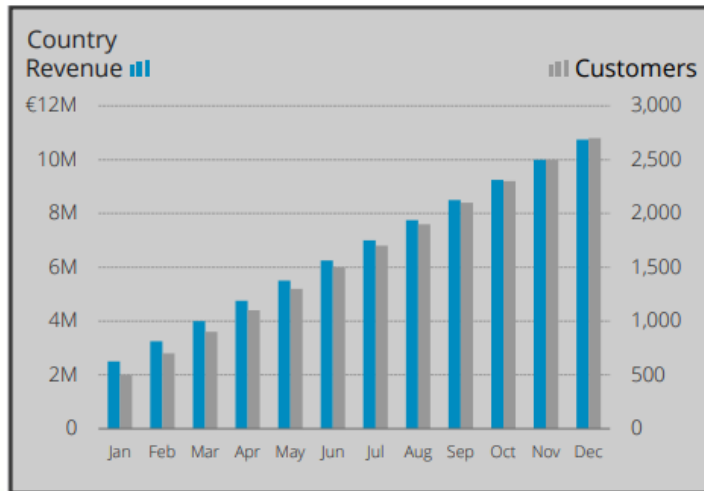
5 Steps for Better Visual Storytelling

1 Identify the right data



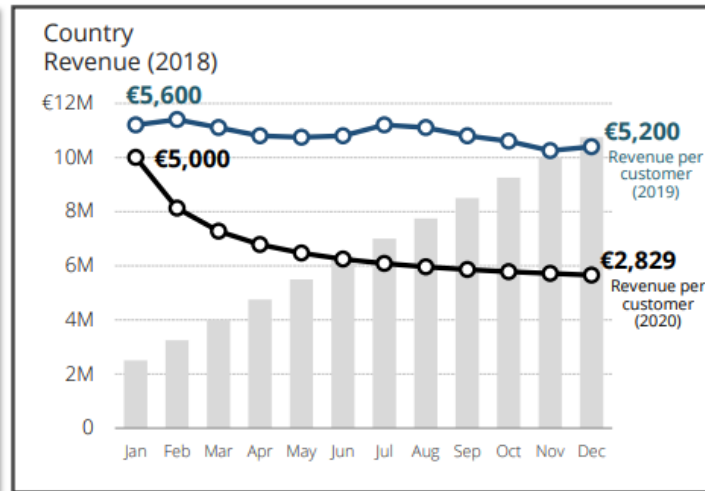
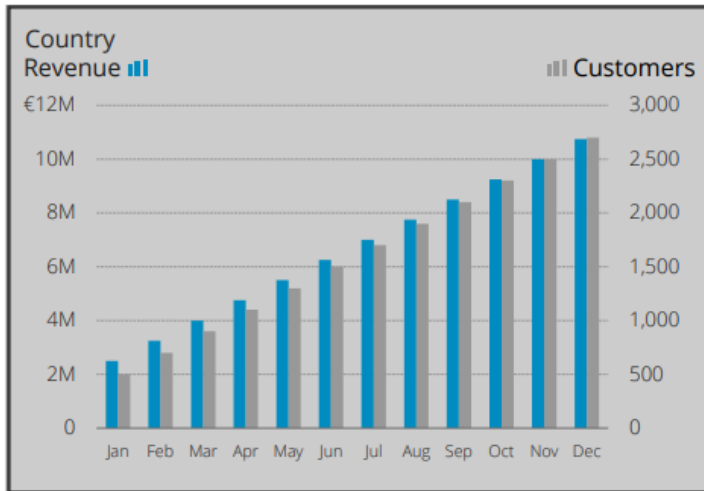
Identify Right Data for Your Data Story

Calculated metrics may be more insightful than total values.



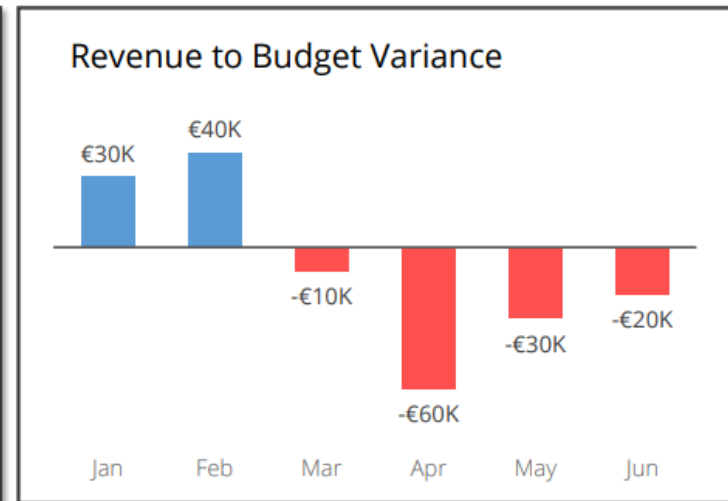
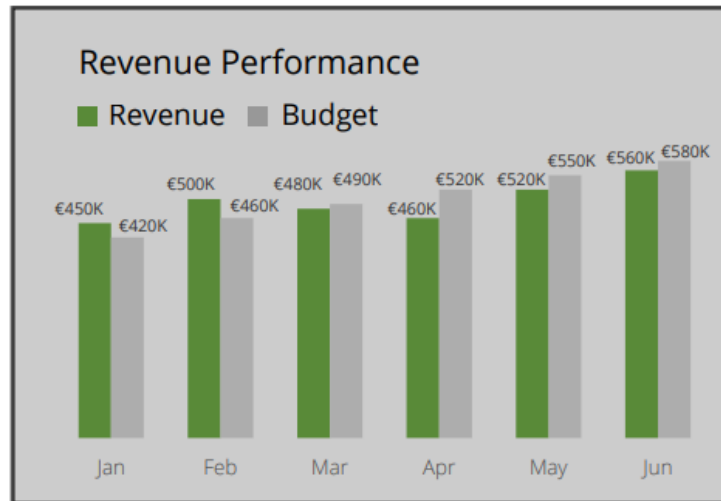
Identify Right Data for Your Data Story

Contextual data may make your visual more insightful.



Identify Right Data for Your Data Story

Variance may better highlight key differences that you're trying to expose.

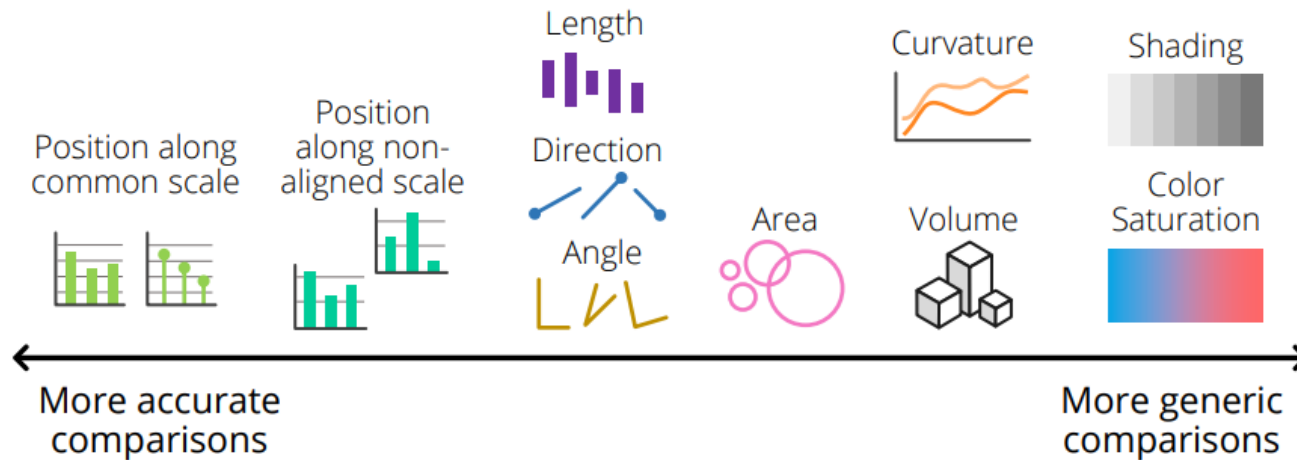


5 Steps for Better Visual Storytelling

- 1 Identify the right data
- 2 Choose the right visualisations



Graphical Methods Vary in Effectiveness

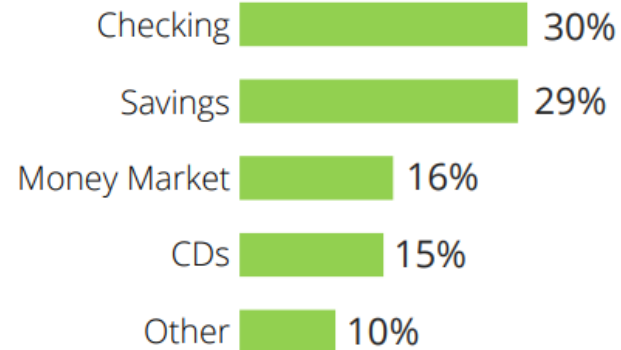
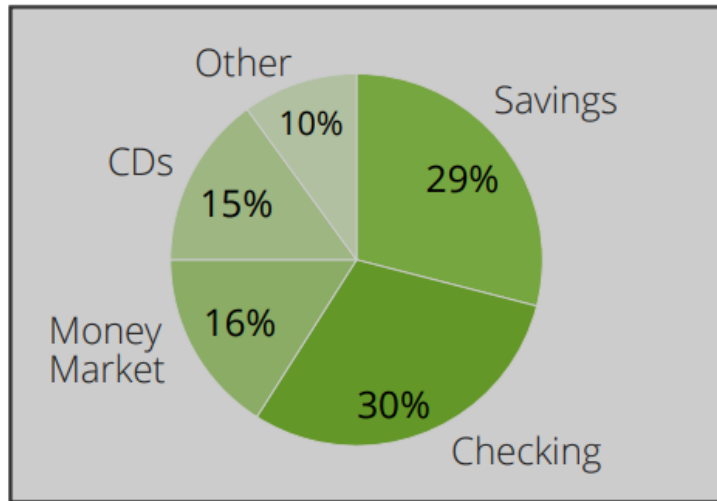


Cleveland & McGill (1984). Graphical perception: Theory, experimentation, and application to the development of graphical methods. *Journal of American Statistical Association*. 79(387): 531-554.



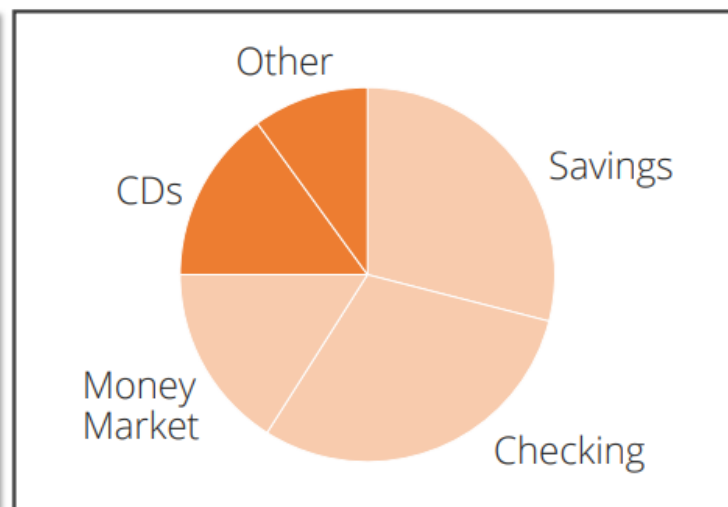
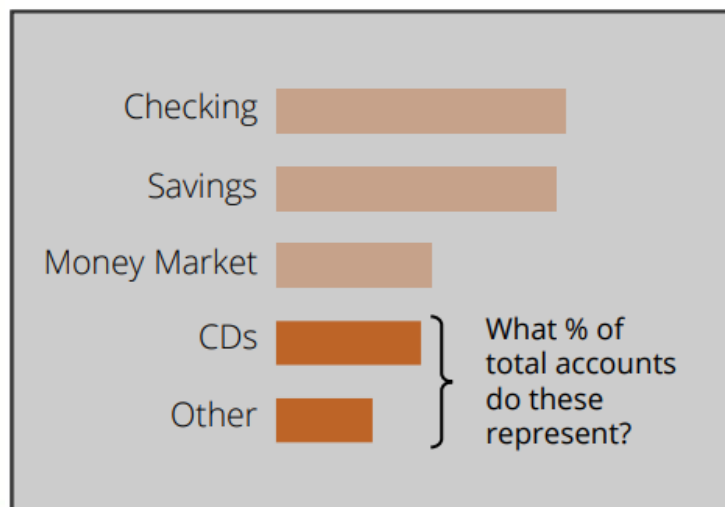
All Charts Are Not Created Equal

Bar charts don't necessarily need value labels to convey differences.



Charts Can Fit Different Purposes

Pie charts can be used to convey certain percentages very clearly.



5 Steps for Better Visual Storytelling

- 1 Identify the right data
- 2 Choose the right visualisations
- 3 Calibrate visuals to your message



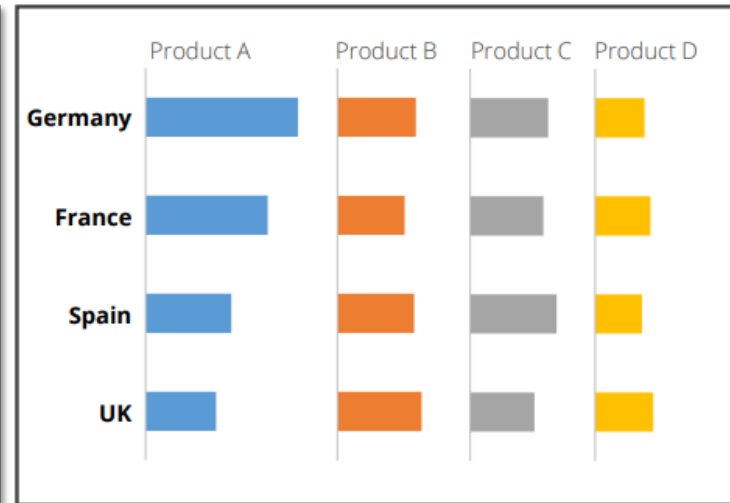
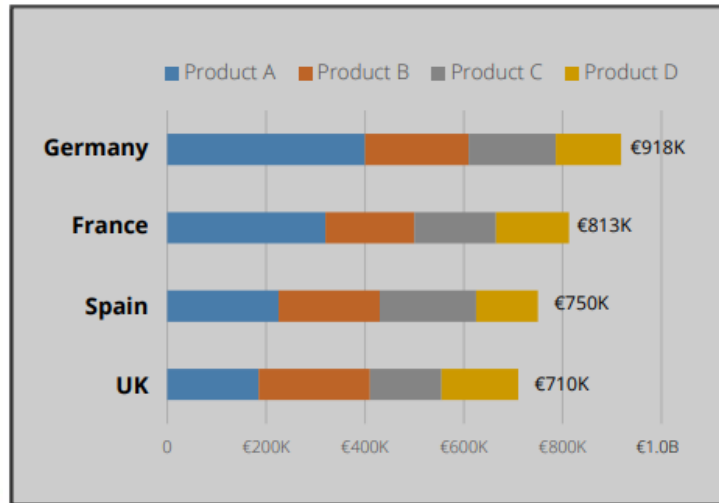
Anticipate Your Audience's Comparison Needs

Changing the orientation of a chart can make it easier to compare key values.



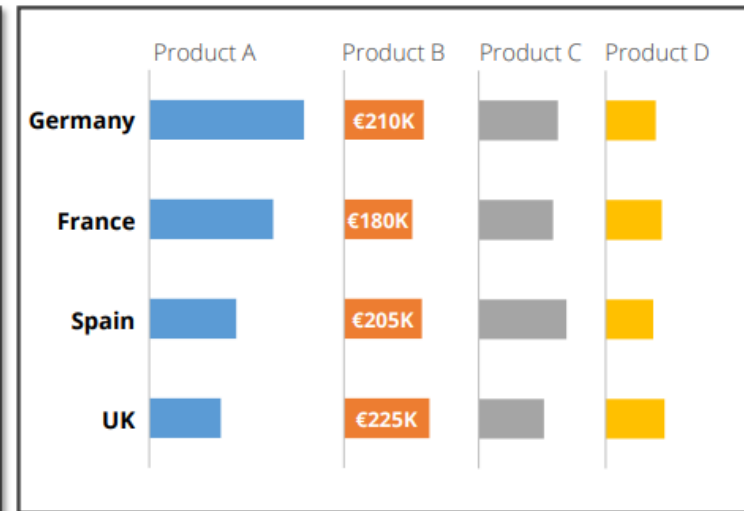
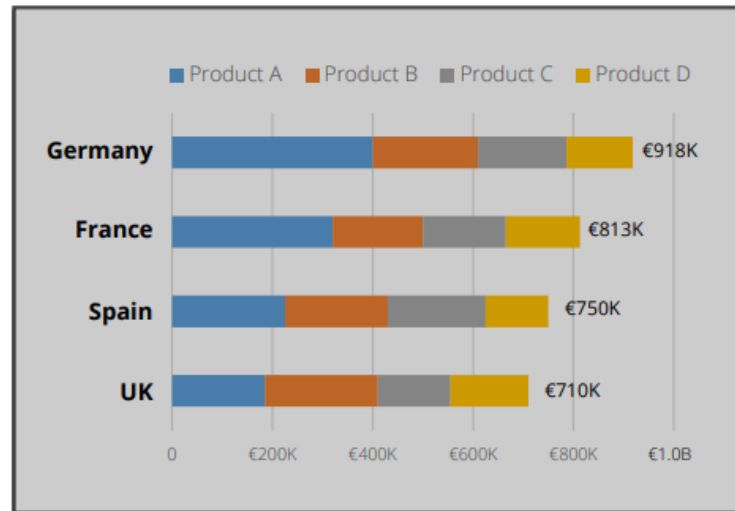
Anticipate Your Audience's Comparison Needs

Panel bar charts offer each category its own baseline for easier visual inspection.



Anticipate Your Audience's Comparison Needs

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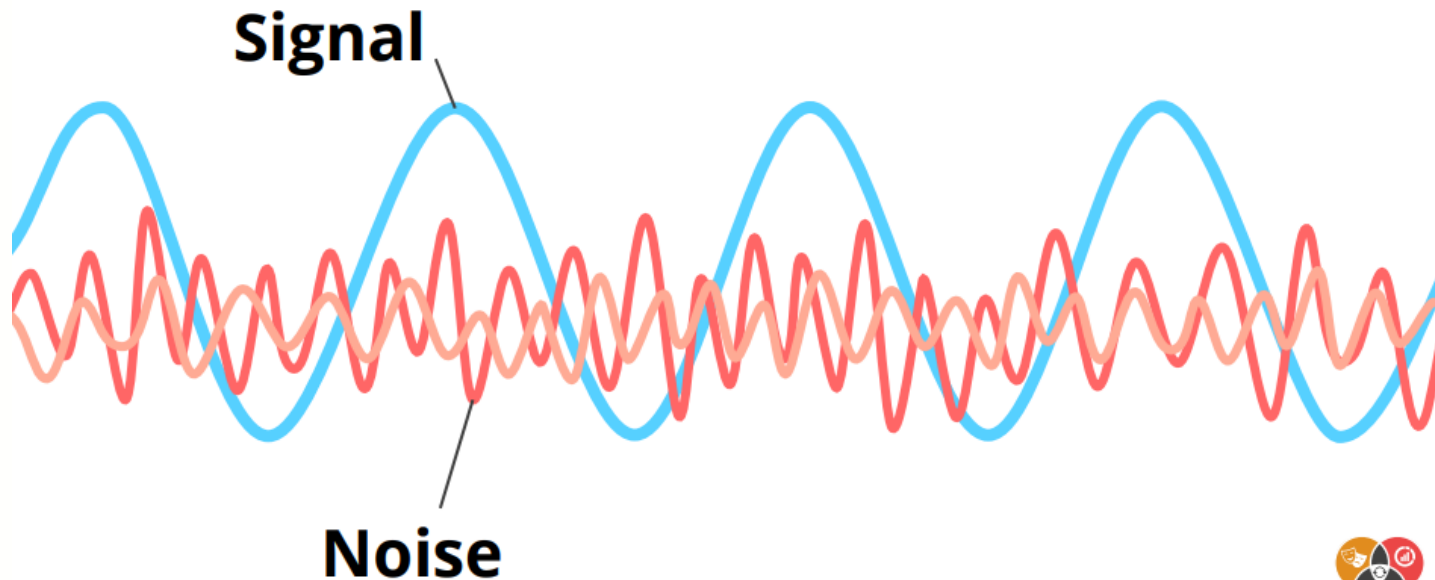


5 Steps for Better Visual Storytelling

- 1 Identify the right data
- 2 Choose the right visualisations
- 3 Calibrate visuals to your message
- 4 Remove unnecessary noise



Strengthen Signal by Removing Noise



4 Ways to Reduce the Noise in Your Visuals

1

Remove
Surplus Data



2

Aggregate Less
Important Data



3

Separate Data
Layers



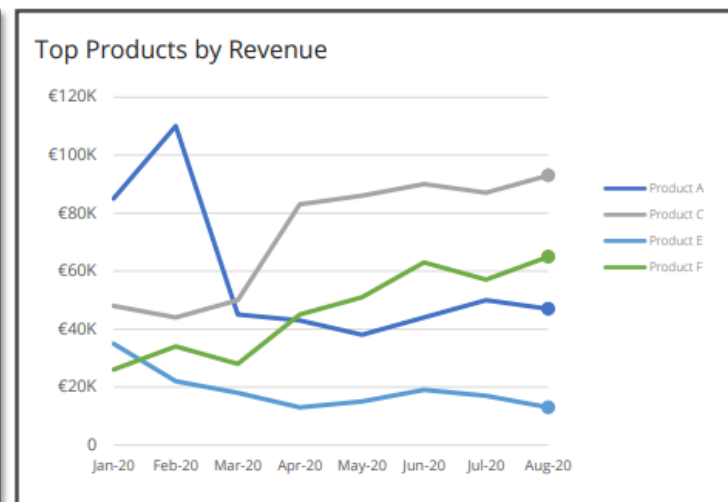
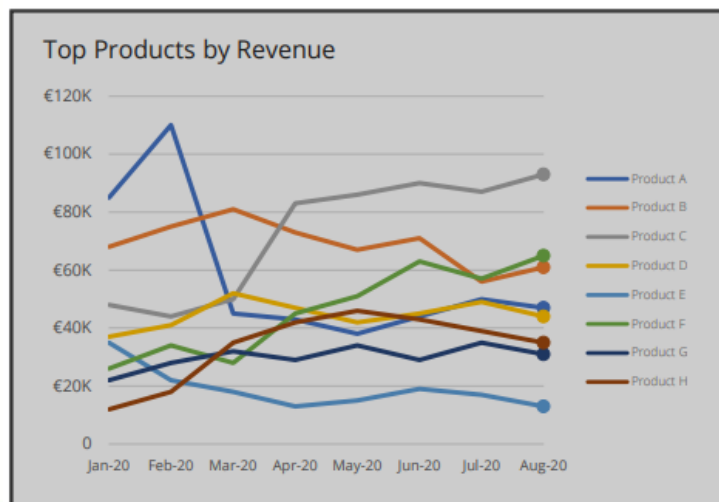
4

Remove
Chartjunk



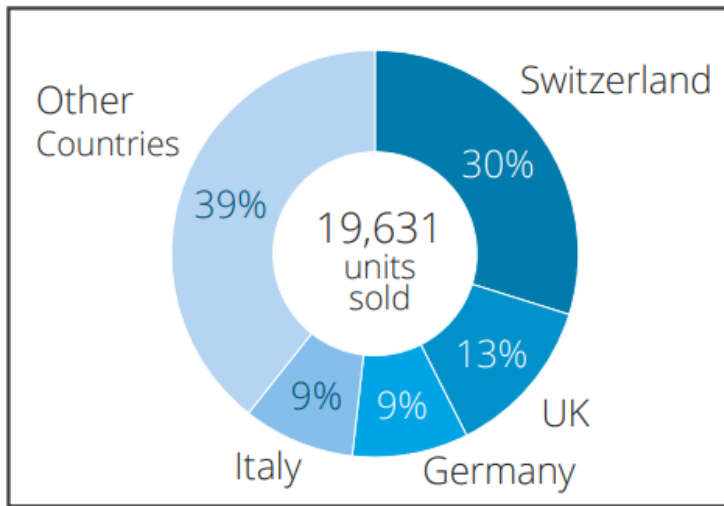
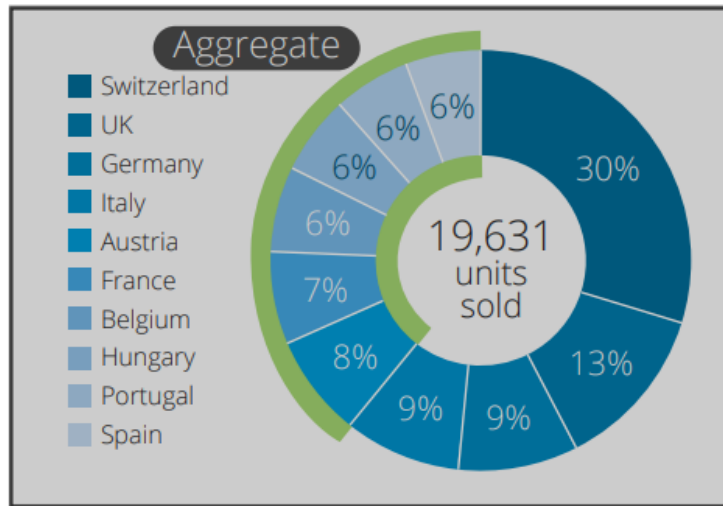
Remove Surplus Data that Isn't Needed

Ask yourself **what is essential** to making your point. Remove what's unnecessary.



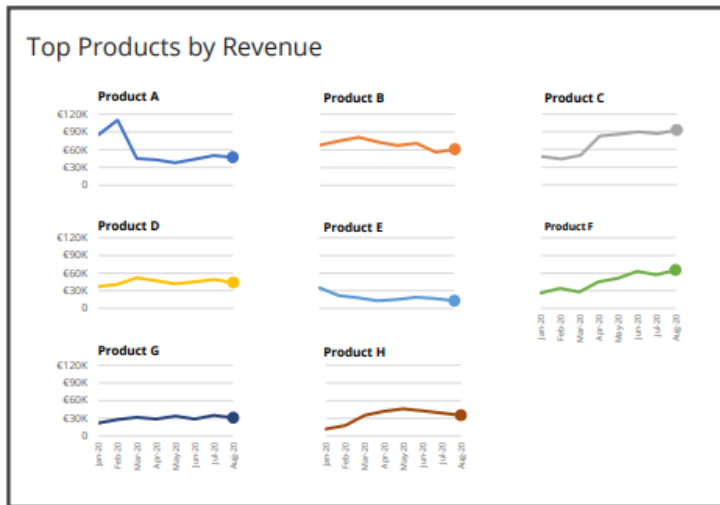
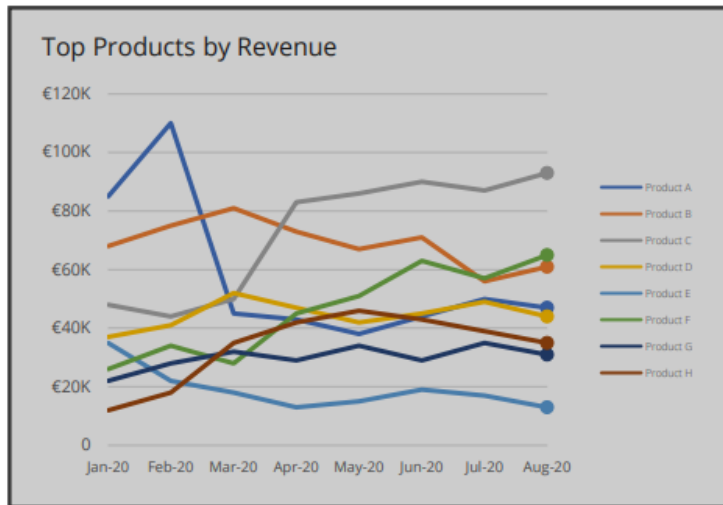
Aggregate Less Important Information

To simplify charts, you can **aggregate less critical data** to reduce the cognitive load.



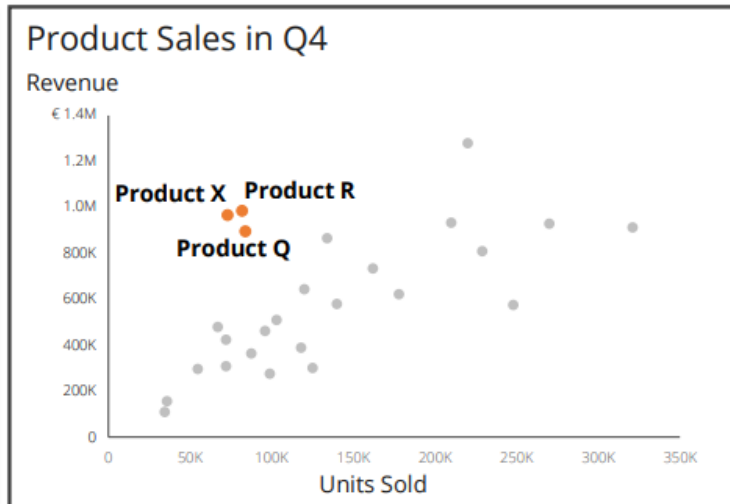
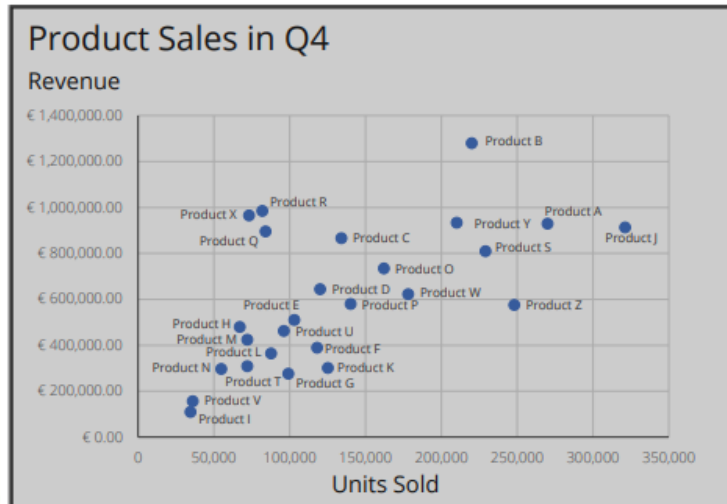
Separate Data Layers

To reduce noise, you can **break apart data series** into separate charts.



Remove the Chartjunk

Remove non-essential chart elements to help the data communicate more clearly.



5 Steps for Better Visual Storytelling

- 1 Identify the right data
- 2 Choose the right visualisations
- 3 Calibrate visuals to your message
- 4 Remove unnecessary noise
- 5 Focus attention on what's important



Why Visual Design Matters

109483792478394836374
893043171628302365430
239485120495239076746
112820205646844036979
938228201654547163812
620156514173783920198
295826012386431242993



Why Visual Design Matters

109483792478394836374
893043171628302365430
239485120495239076746
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938228201654547163812
620156514173783920198
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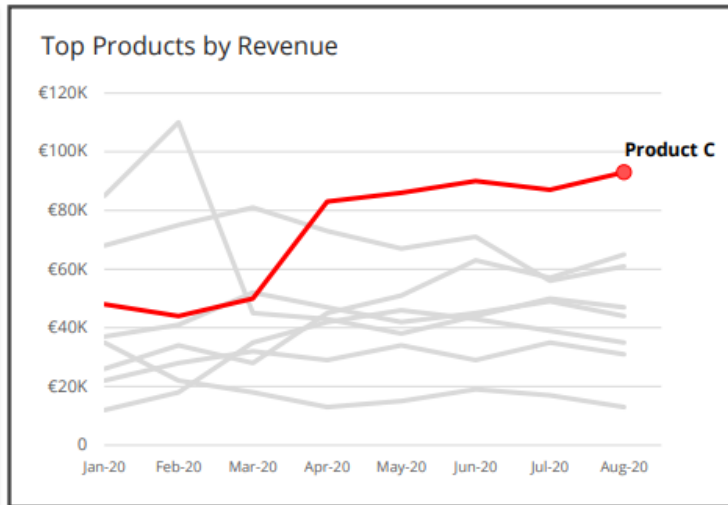
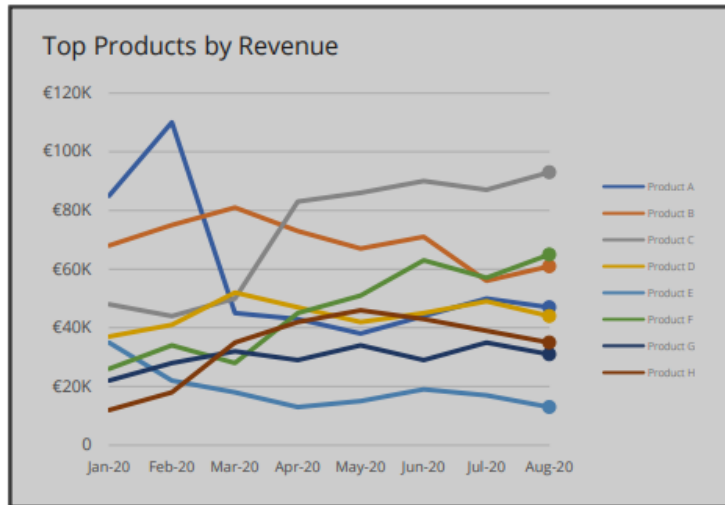
Why Visual Design Matters

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893043171628302365430
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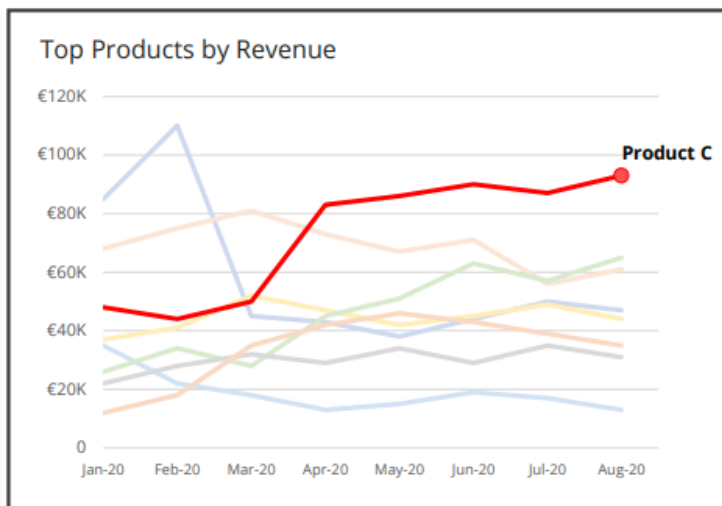
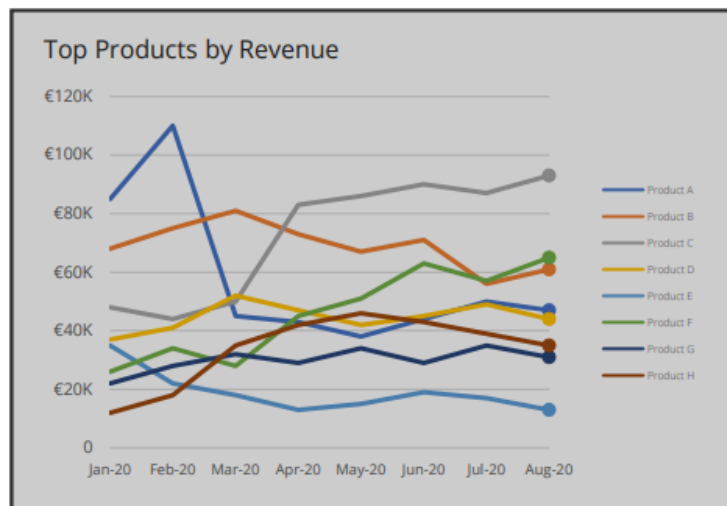
Highlight What Matters with Color

Use **color and grayscale** to draw attention while still providing context.



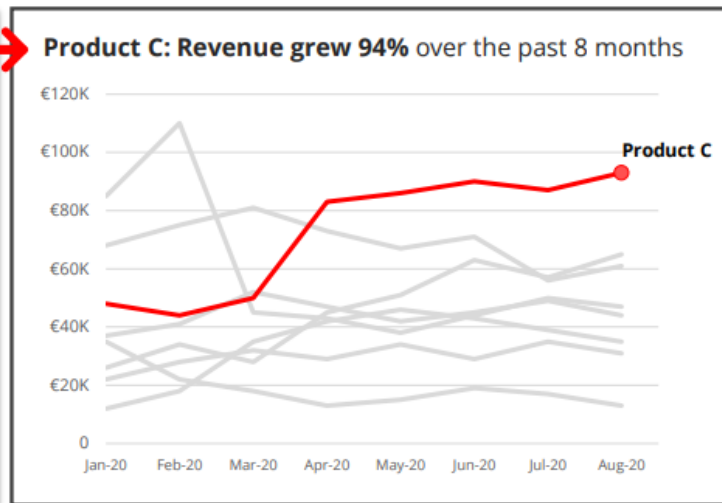
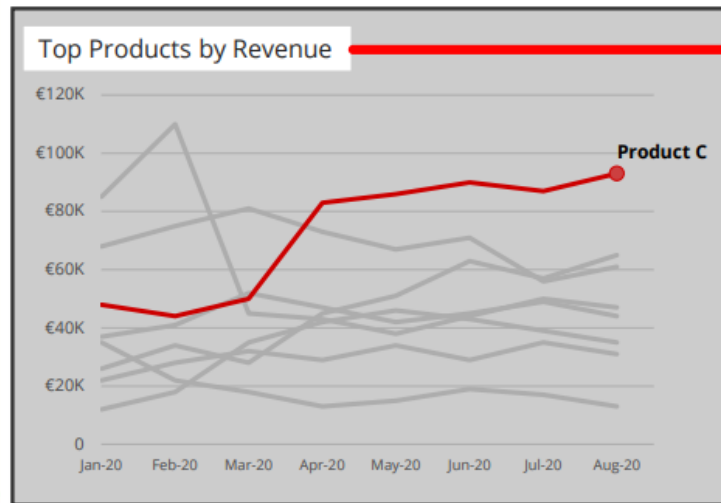
Highlight What Matters with Color

Use a **bold color with light colors** to draw attention while still providing context.



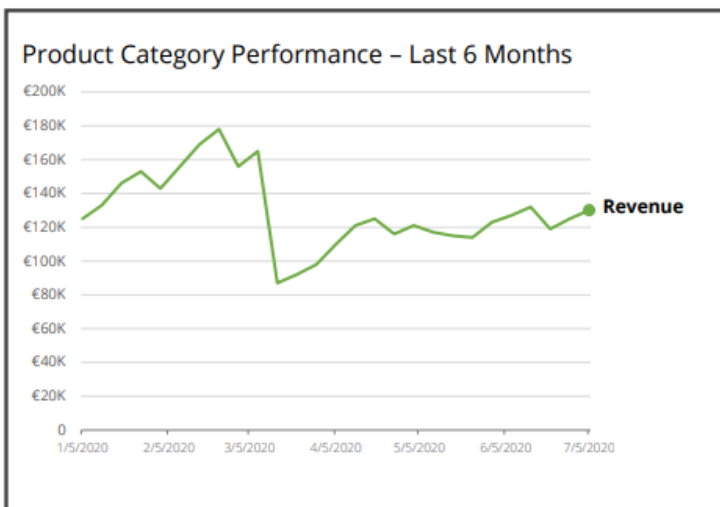
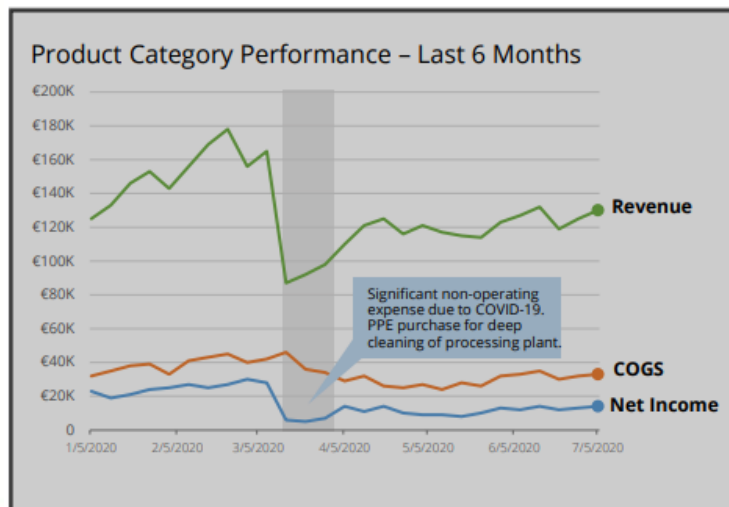
Highlight What Matters with Text

Text can be used to **steer attention** to what's most important in a chart.



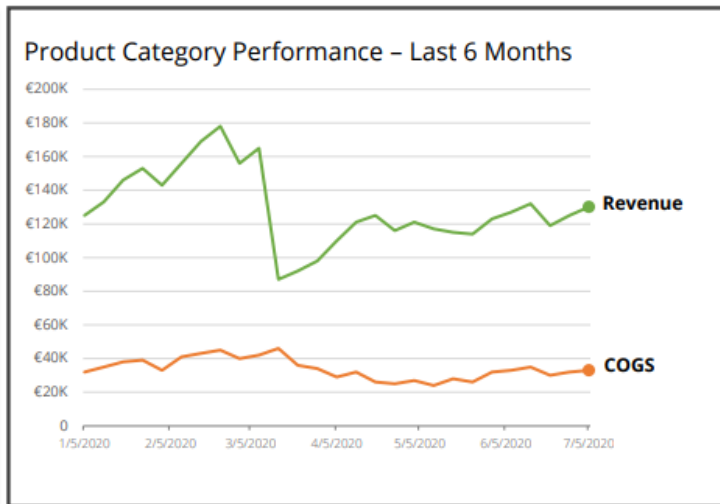
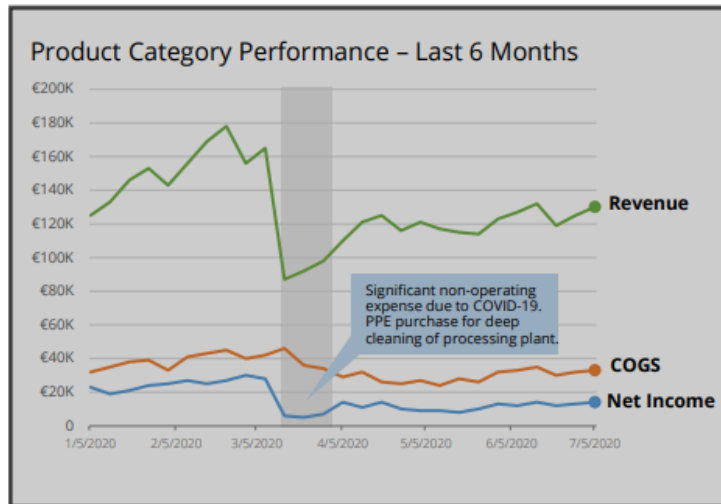
Use Content Staging to Reveal Insights

Use **animations** to break up the **content** into manageable portions.



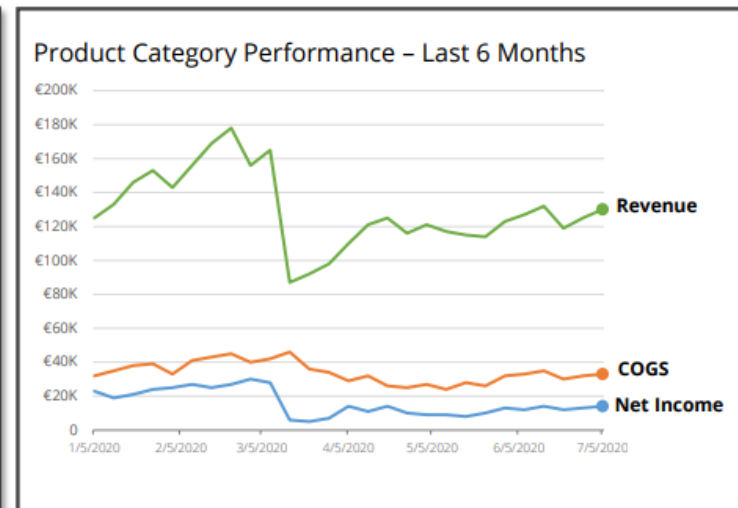
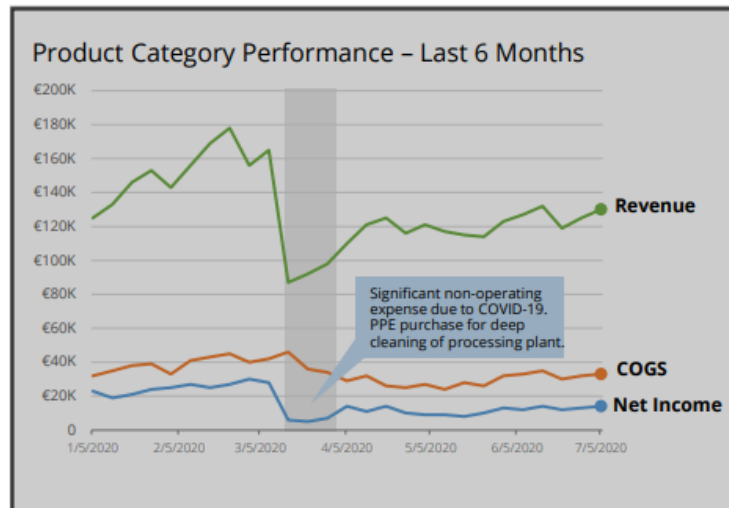
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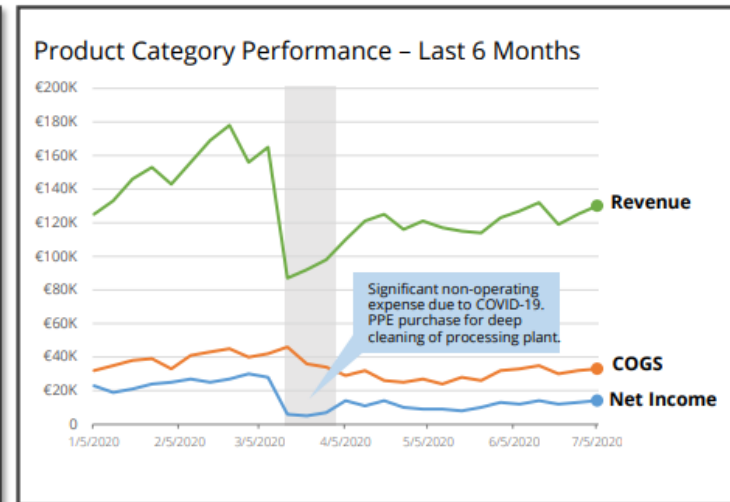
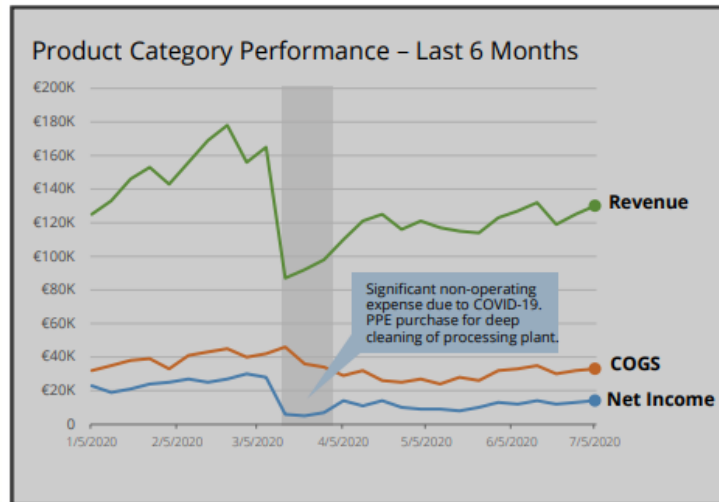
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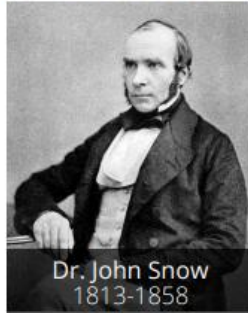


Use Content Staging to Reveal Insights

Use **animations** to break up the **content** into manageable portions.



Snow: Cholera As Waterborne Disease



Dr. John Snow
1813-1858







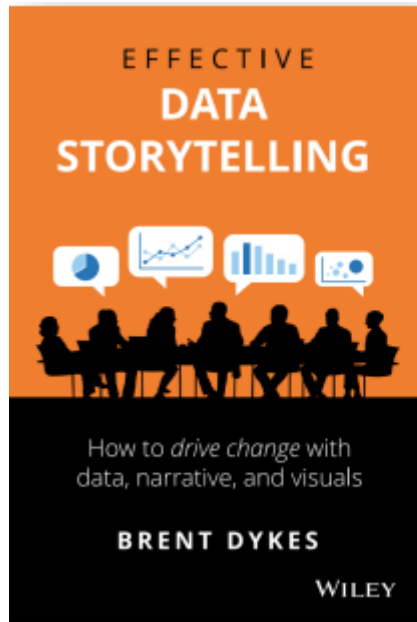
Companies need more data storytellers

“Numbers have an **important story** to tell. They rely on you to give them a **clear and convincing voice.**”

Stephen Few
Data Viz Expert



LEARN MORE ...

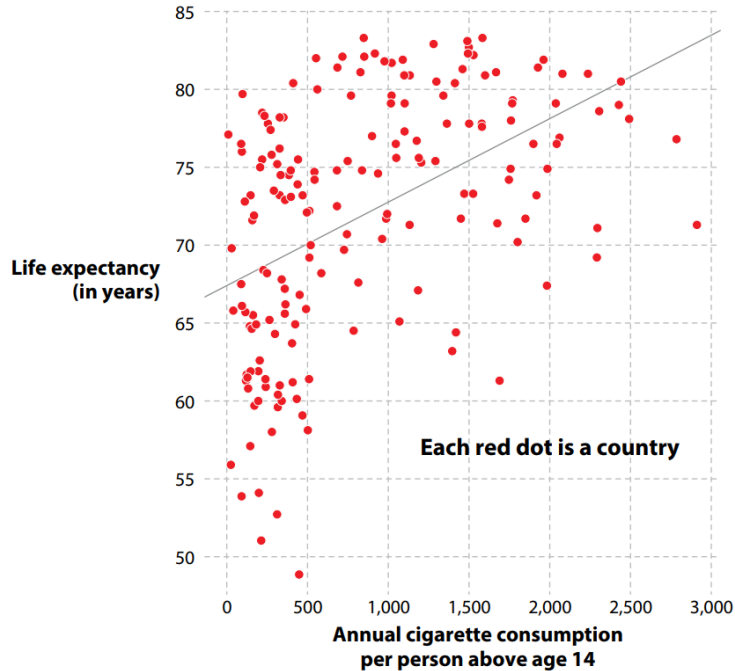


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Example



Smoking
cigarettes
can help you
live longer!!!

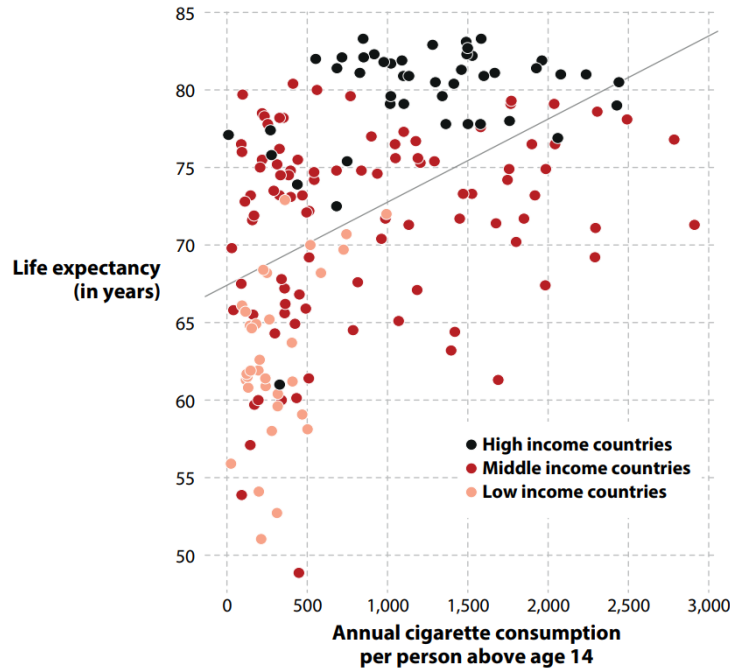
Example provided by
Heather Krause
<https://idatassist.com>

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Example



Remember:
A chart shows only what
it shows *and nothing else*

Smoking
cigarettes
can help you
live longer??

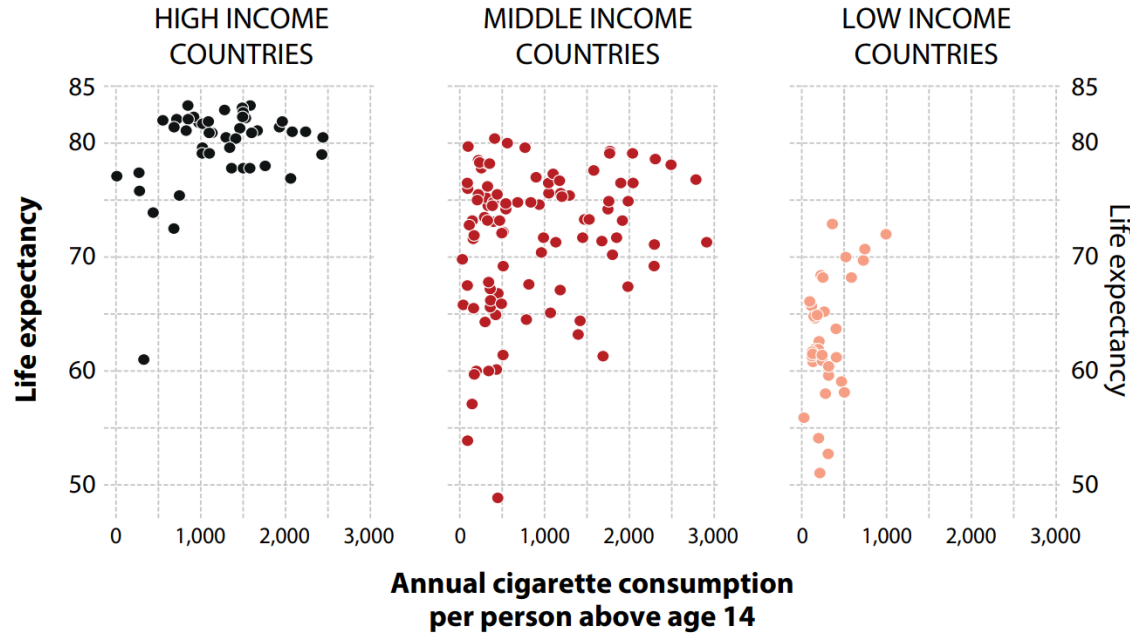
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Example



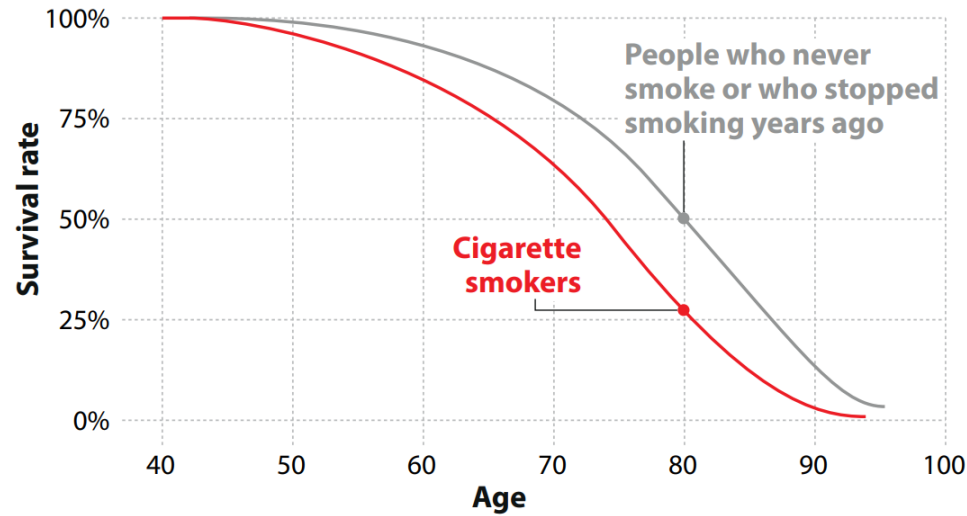
Be careful with amalgamation paradoxes and with the ecological fallacy

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Example



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