

Data Visualization & Storytelling

—
Using Tableau for data-driven decision making

MIS Guest Lecture



Aalto University
School of Business

Philipp Back
4th April 2024

My background

Current role:

Postdoctoral researcher in Management Science (Business Analytics) at Aalto University School of Business

Education:

2018 – 2022 D.Sc. Business, Economics and Finance, Aalto BIZ

2015 – 2017 M.Sc. Business Analytics, Aalto BIZ

2011 – 2014 B.Sc. International Management (Germany – China)

Work experience:

Data engineer, M&A and IPO consulting, research commercialization

Research:

Financial news analytics, AI-driven forest management, people analytics.



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- **Tableau Demo on storytelling**
- Visual perception
- Preattentive attributes
- Design
- Storytelling

Our Inspiration / Aspiration

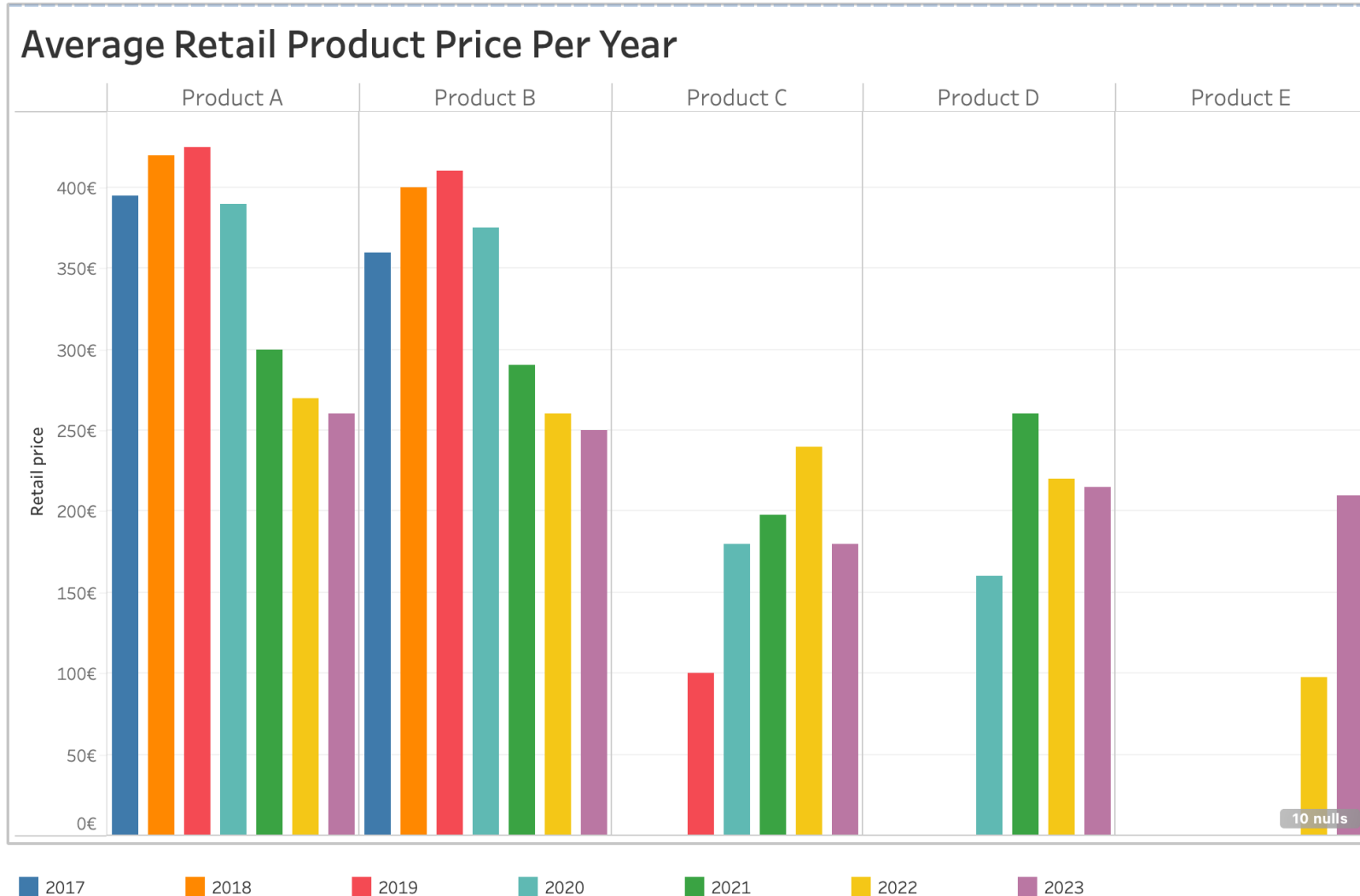


Tableau Demo – Product costs

Adopted from: Knaflic, C. N. (2015). *Storytelling with data: A data visualization guide for business professionals*. John Wiley & Sons.

What's the key message (10 sec. or less)?

Price has declined for all products on the market since the launch of Product C in 2019



For our entire lives we're surrounded by stories. As you watch the video take note of the reasons why.



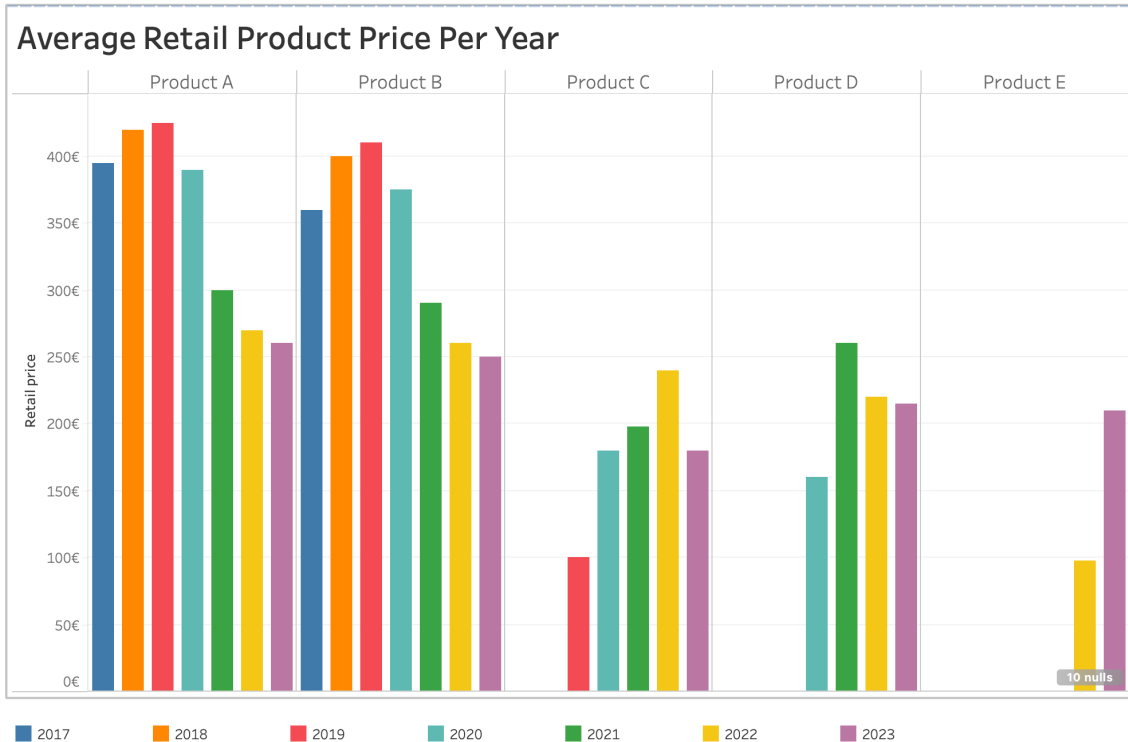
The Power of Storytelling, with Sir Ian McKellen
<https://vimeo.com/125383660>

Back to Tableau...

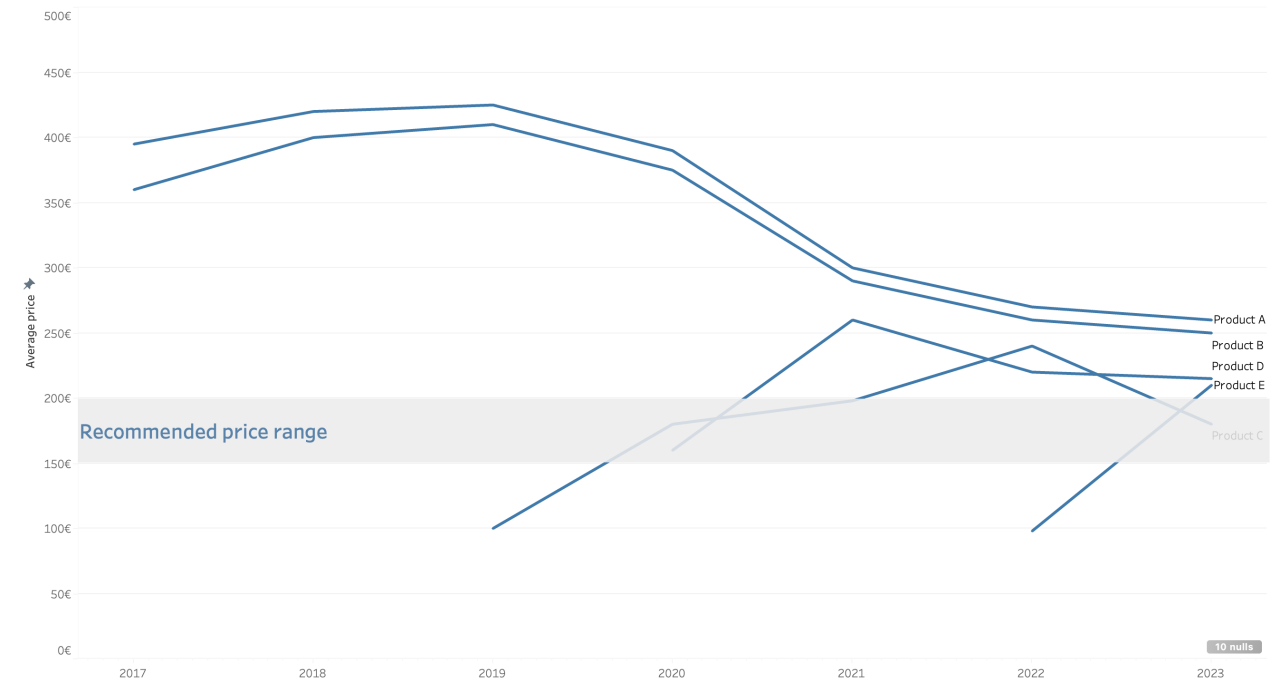
Adopted from: Knaflic, C. N. (2015). *Storytelling with data: A data visualization guide for business professionals*. John Wiley & Sons.

The power of data visualization & storytelling

Price has declined for all products on the market since the launch of Product C in 2019



Retail price over time



Visualization Inspiration



<https://youtu.be/5Zg-C8AAIGg?t=15>

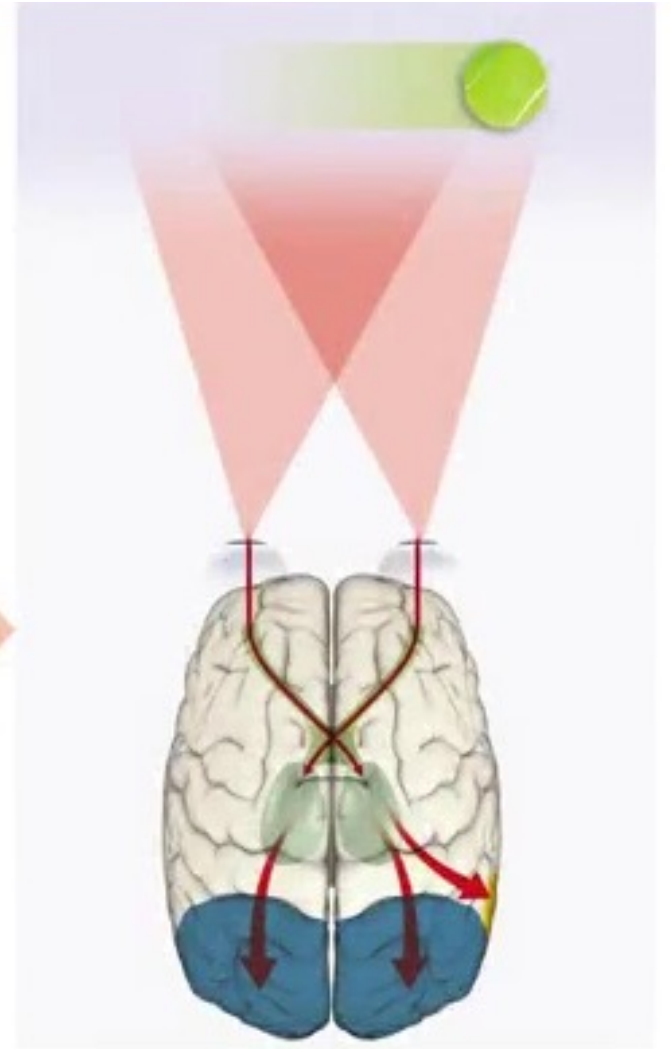
Agenda

- Tableau Demo on storytelling
- **Visual percetion**
- Prettentive attributes
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Most of the human brain is devoted to fast visual processing



10 Million Bits
Per Second



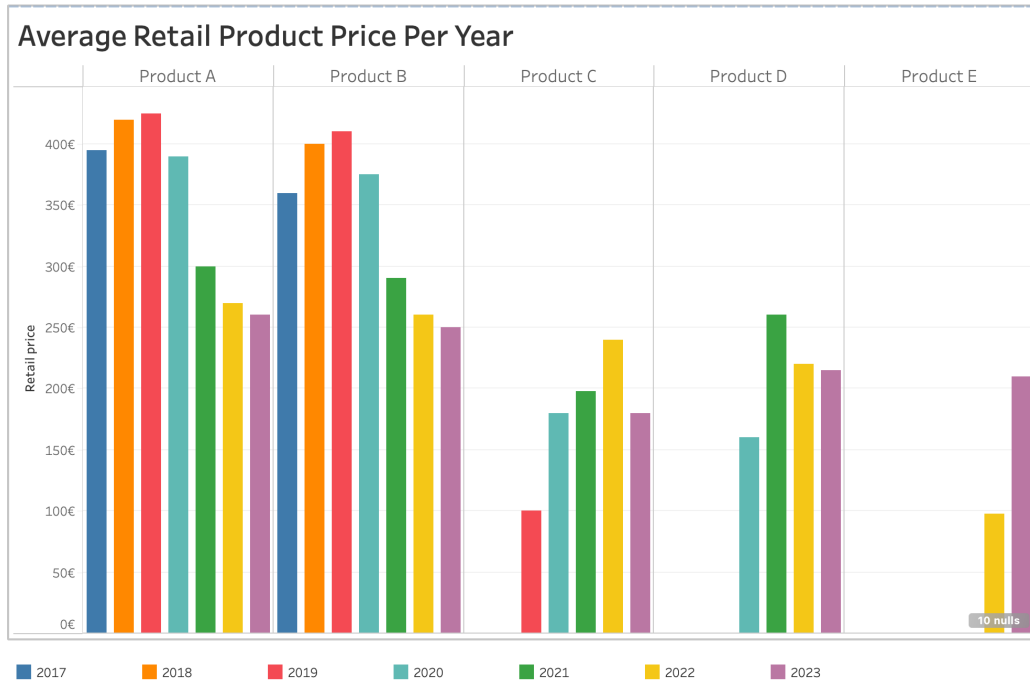
Visual processing speed could mean the difference between life and death



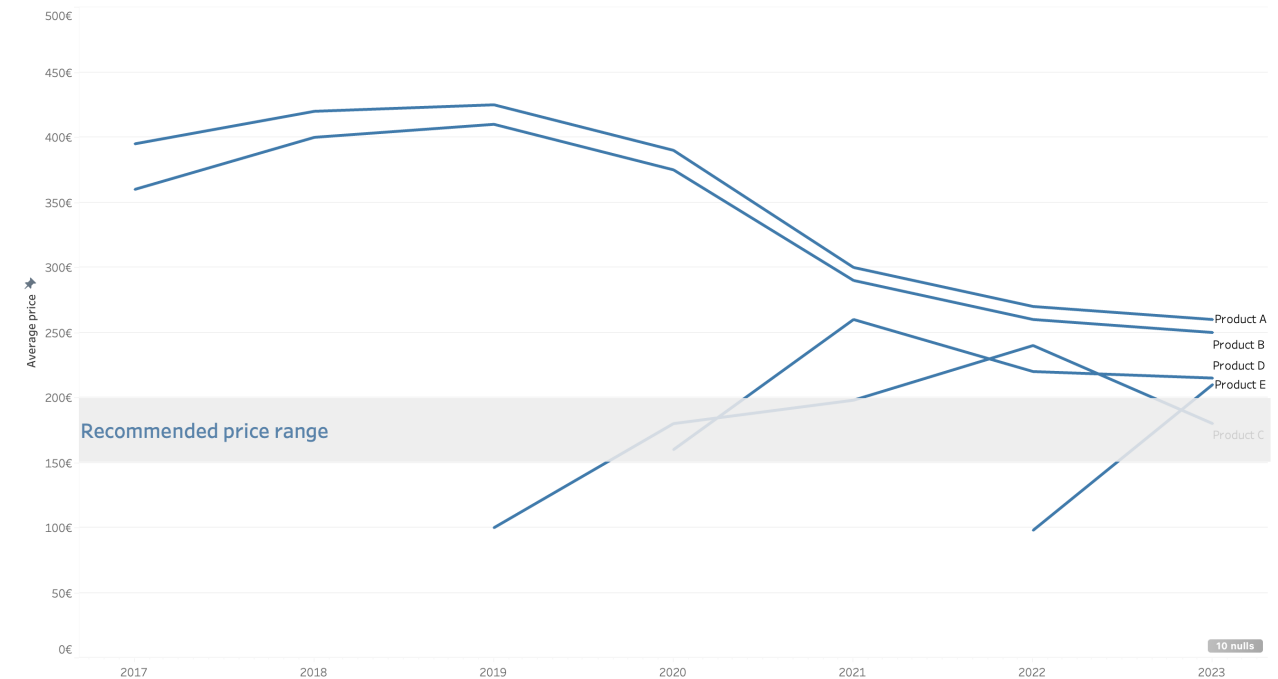
Your design choices can help – or prevent – people to...

- ...make clear and accurate interpretations of data and
- gain useful insights.

Price has declined for all products on the market since the launch of Product C in 2019



Retail price over time



Where's the toothbrush?



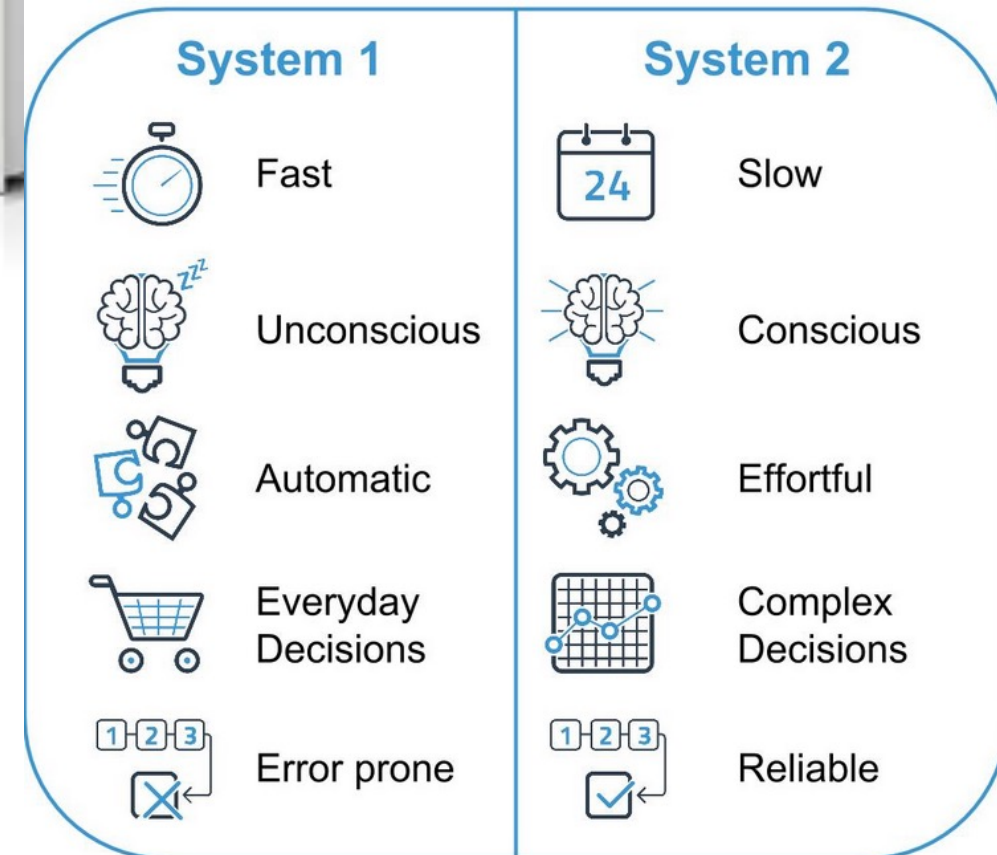
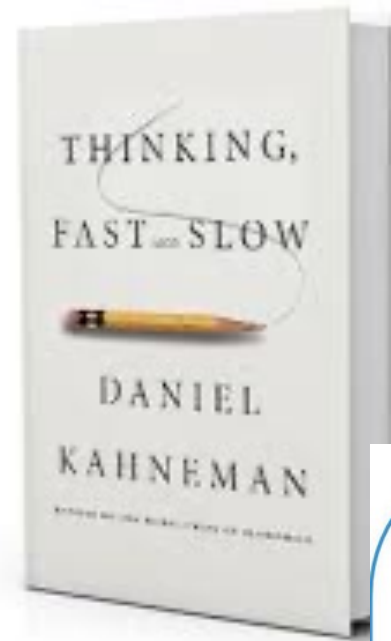
Driving how we think
and make judgments

First:

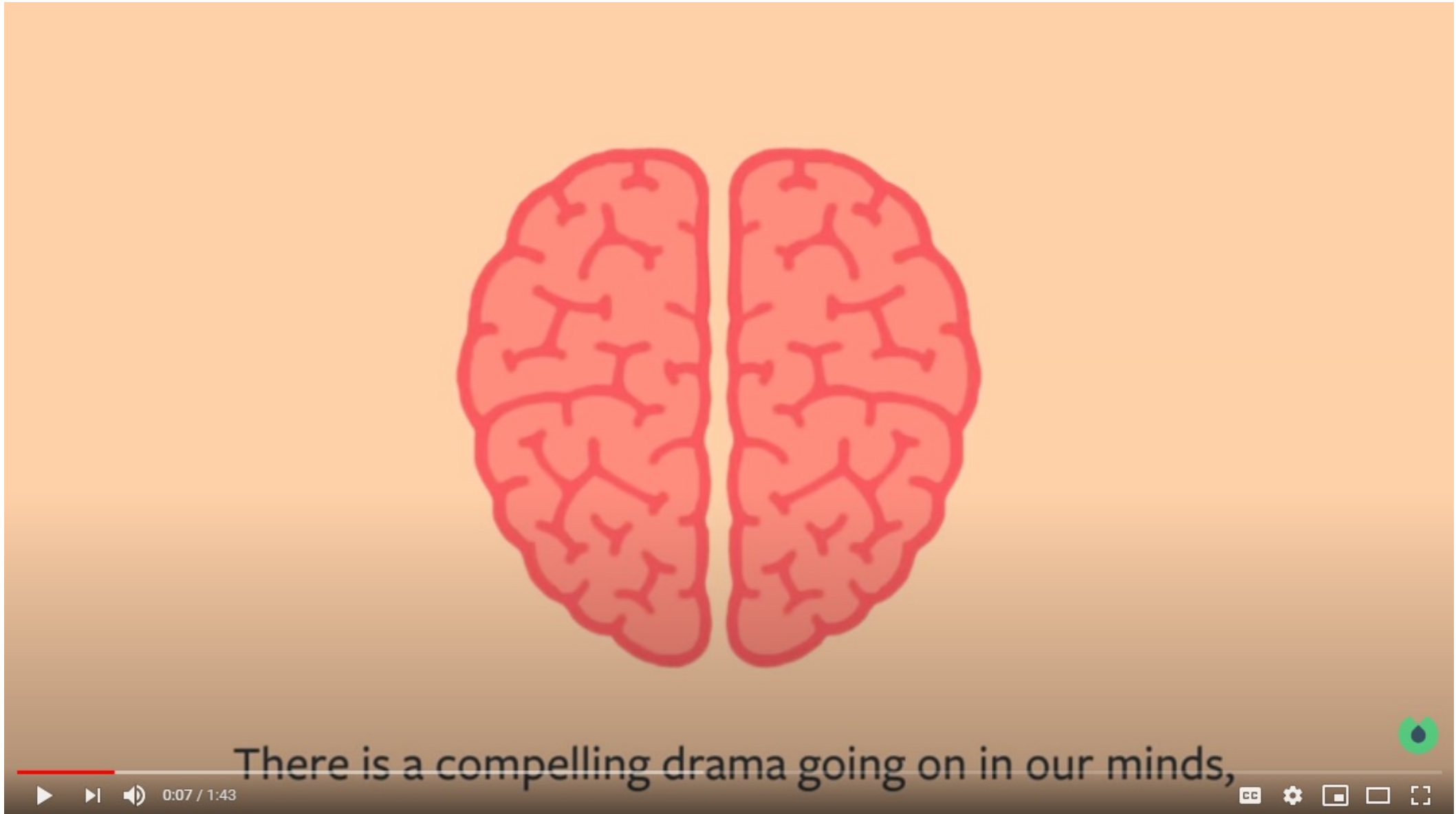
Automatic and
immediate perception

Second:

Slower and more
deliberate cognition



System 1 vs. System 2



<https://youtu.be/D8gpV-xjECM>

Back

4.4.2024

Leverage the perceptual & cognitive systems of your audience!



Agenda

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- **Prettentive attributes**
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Count the 3s! Shout the answer!

3 4 1 6 5 4 3 7 5 1 3 9

5 9 3 4 5 8 9 1 9 9 8 7

2 3 5 6 4 2 7 2 1 8 5 5

9 9 9 3 7 9 4 7

Let's make a tiny change...

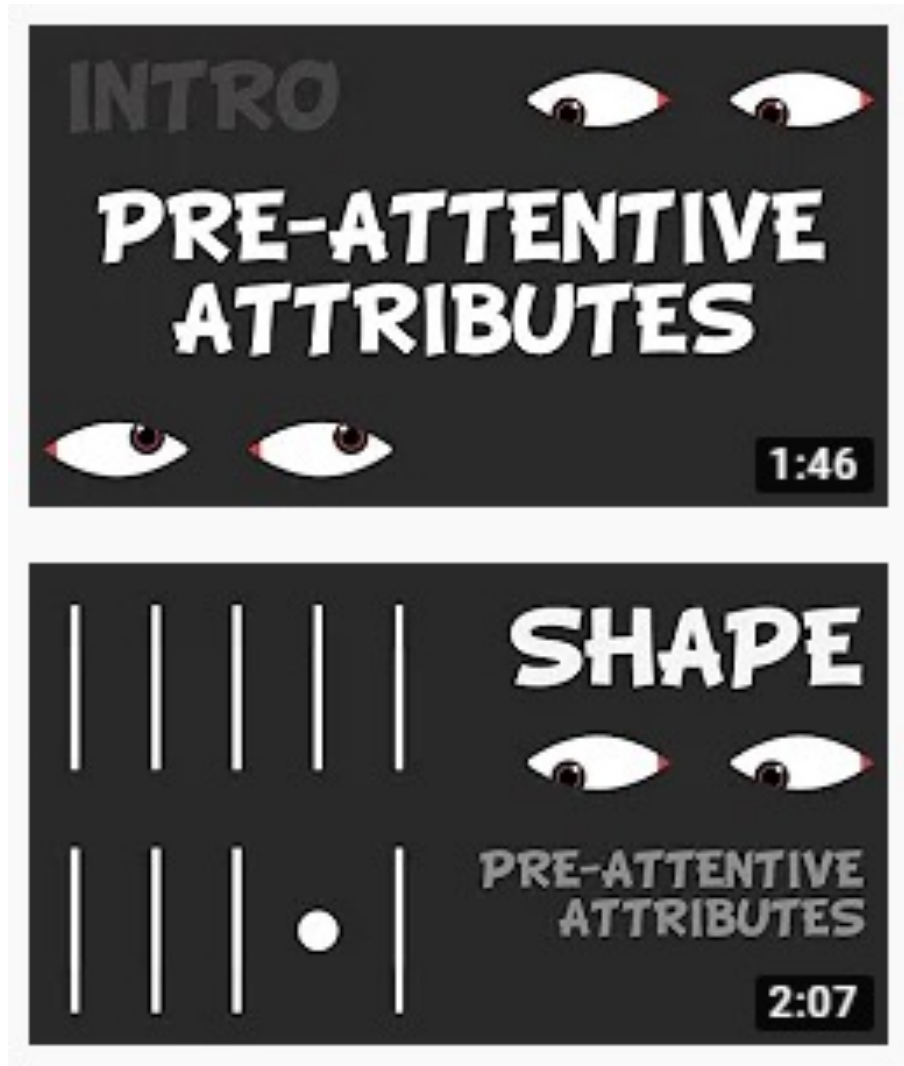
3 4 1 6 5 4 **3** 7 5 1 **3** 9

5 9 **3** 4 5 8 9 1 9 9 8 7

2 **3** 5 6 4 2 7 2 1 8 5 5

9 9 9 **3** 7 9 4 7

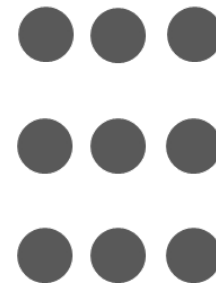
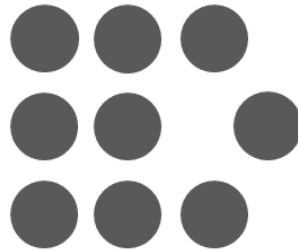
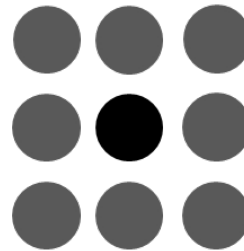
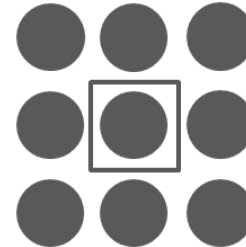
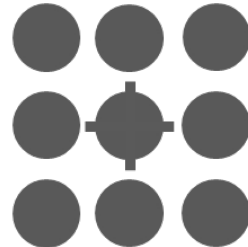
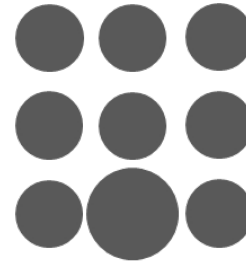
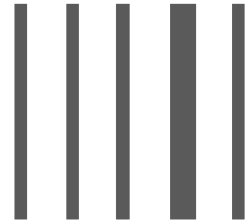
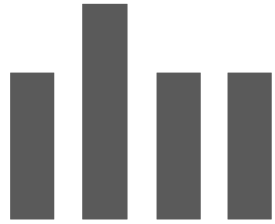
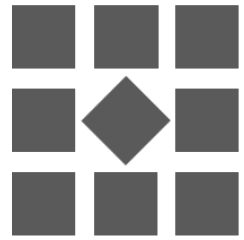
Preattentive Attributes



<https://youtu.be/l1Ym-F7gqQw>

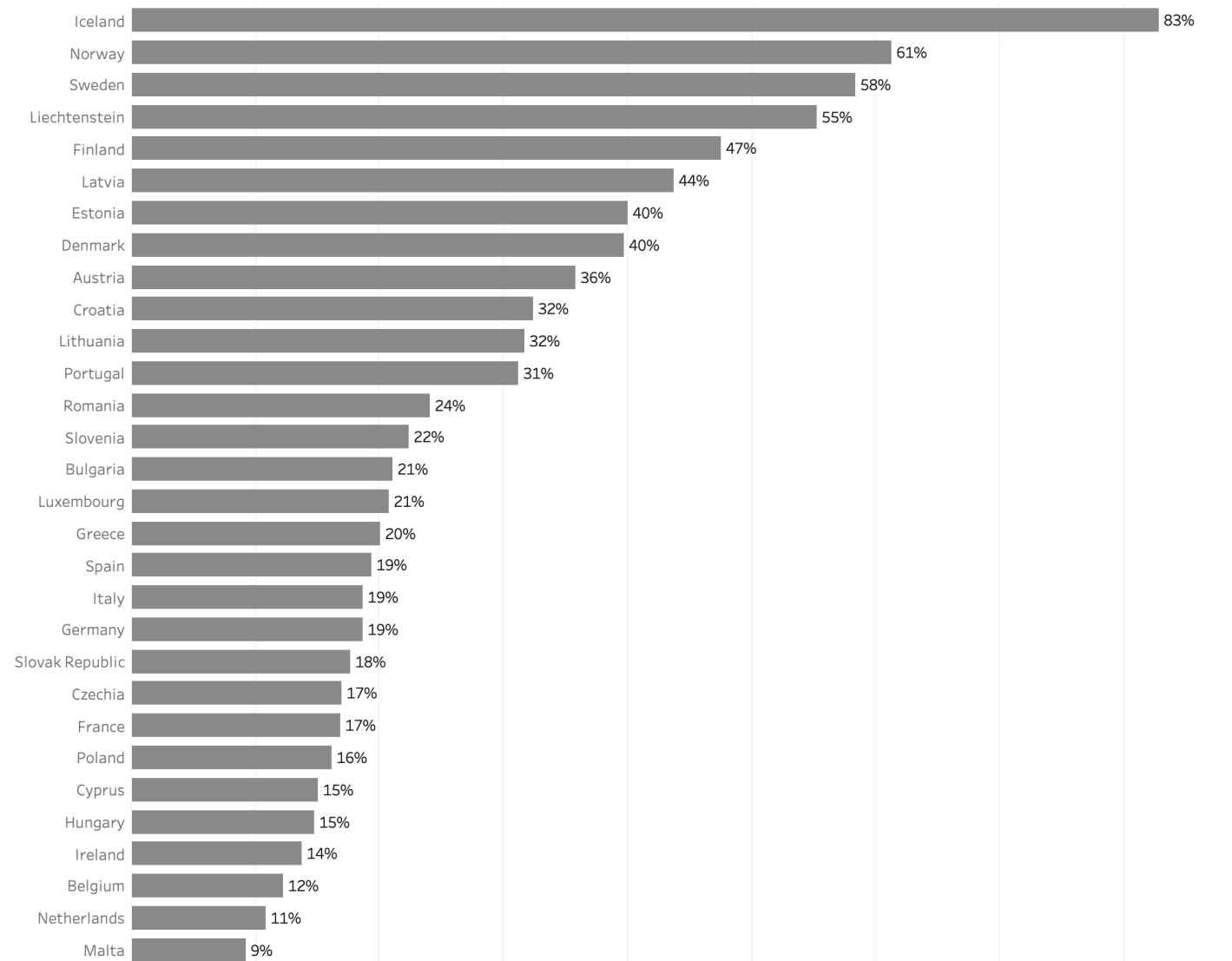
<https://youtu.be/Z5wTs9QBgrM>


Preattentive Attributes: be strategic!



A preattentive attribute example (Tableau)

Share of renewable energy consumption



Renewable energy consumption (% of total final energy consumption) 

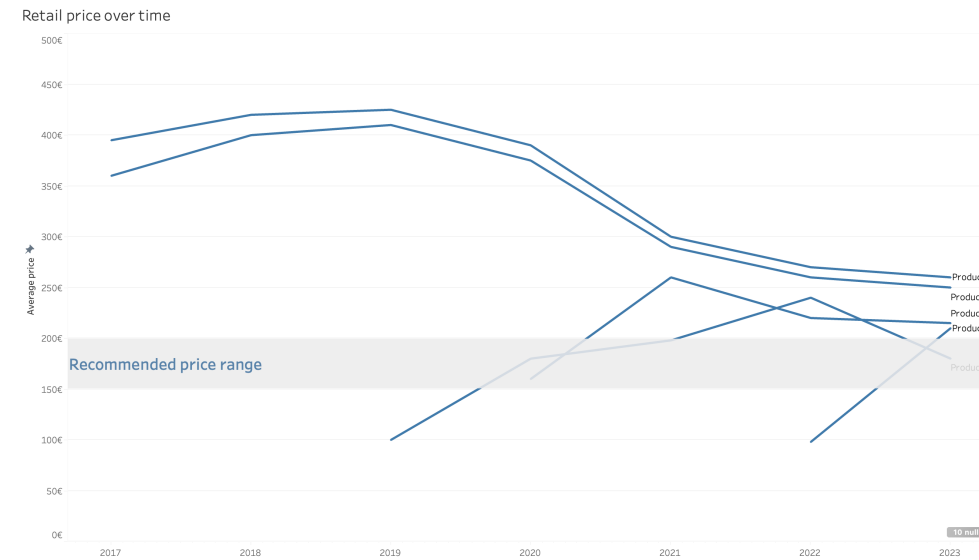
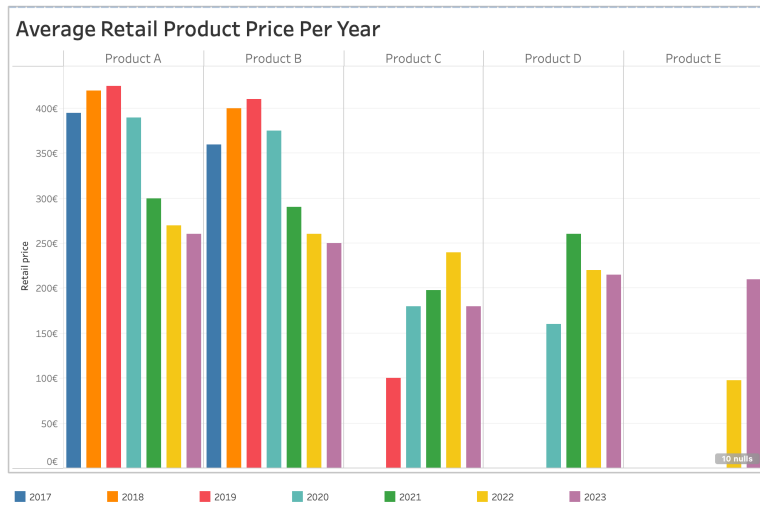
[BACK](#)

4.4.2024

A test: is your audience seeing what you want them to see?

- Close your eyes for 10 seconds
- Look at your Viz and note where your eyes land first
- This is where your audience will look first!

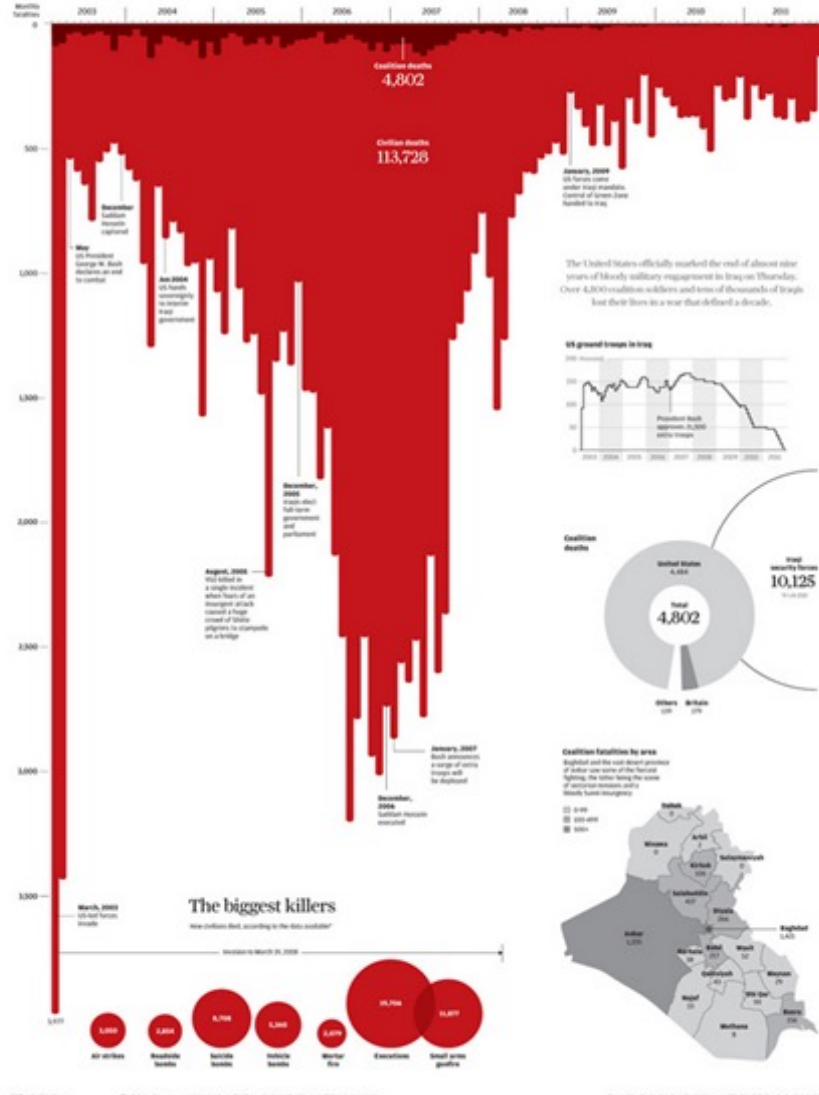
Price has declined for all products on the market since the launch of Product C in 2019



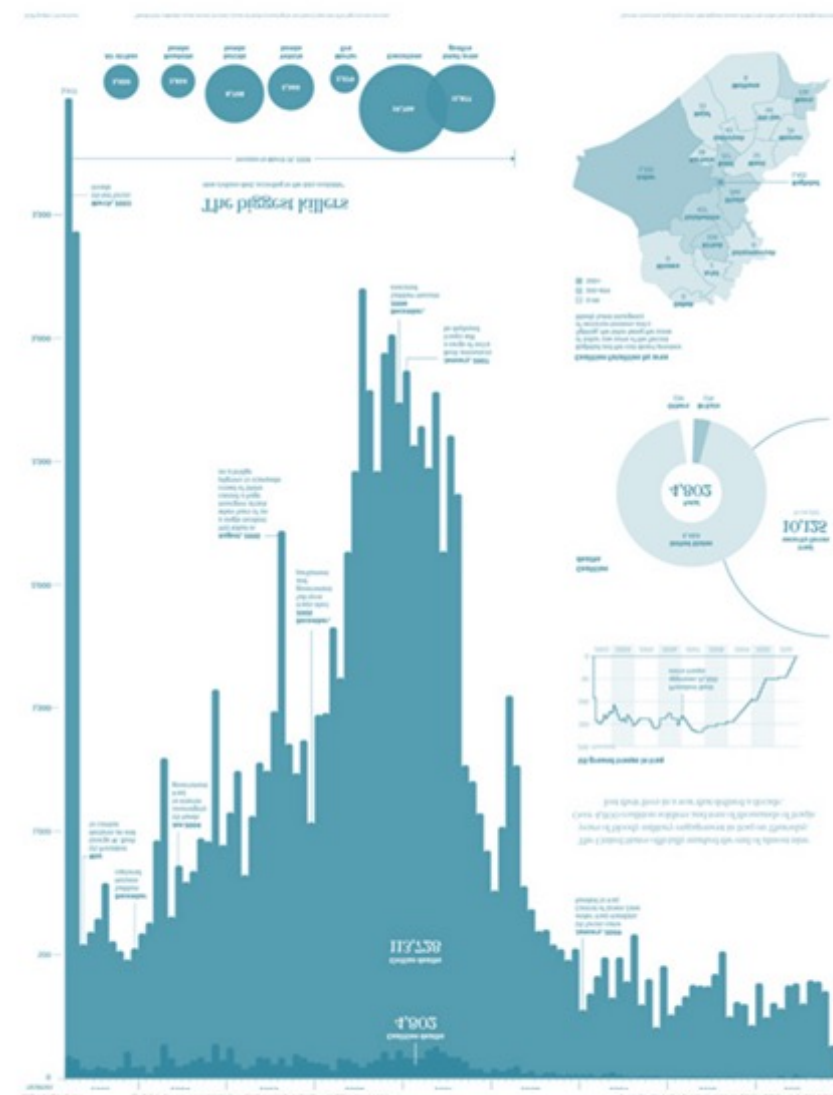
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- **Storytelling**

Iraq's bloody toll



Iraq: Deaths on the Decline



<https://youtu.be/Ybwh4lejYO4>

What meaning does color bring to the visualization?

Earhtones

Gentle browns, blues. Calming, sinks into the page



Cool

Soothing, restful, calm



Unnatural colors

Alarming, unnerving. draws attention.



Warm

Optimistic, active, vivid



Increasing color intensity

Increasing saturation and brightness draws the eye and means the point is more important



Source: *Juice Analytics Whitepaper (part 3)*

Best practices for the use of color in data visualization

THE USE OF COLOR IN DATA VISUALIZATION

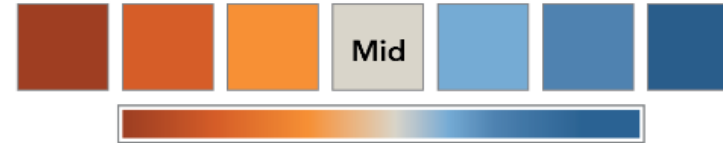
SEQUENTIAL

color is ordered from low to high



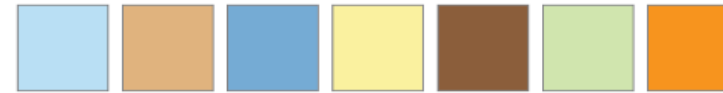
DIVERGING

two sequential colors with a neutral midpoint



CATEGORICAL

contrasting colors for individual comparison



HIGHLIGHT

color used to highlight something



ALERT

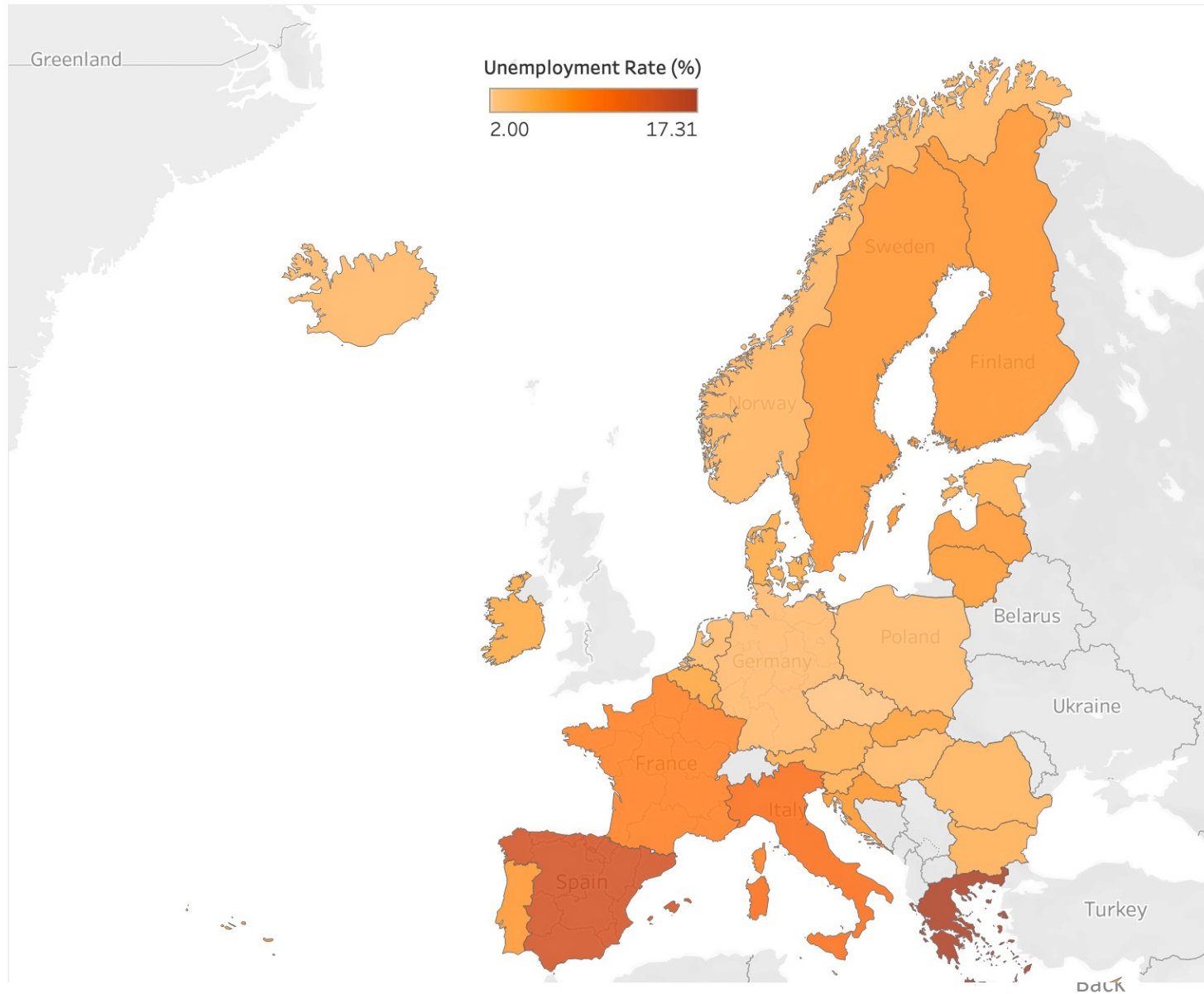
color used to get reader's attention



Source: *The Big Book of Dashboards* (Figure 1.16)

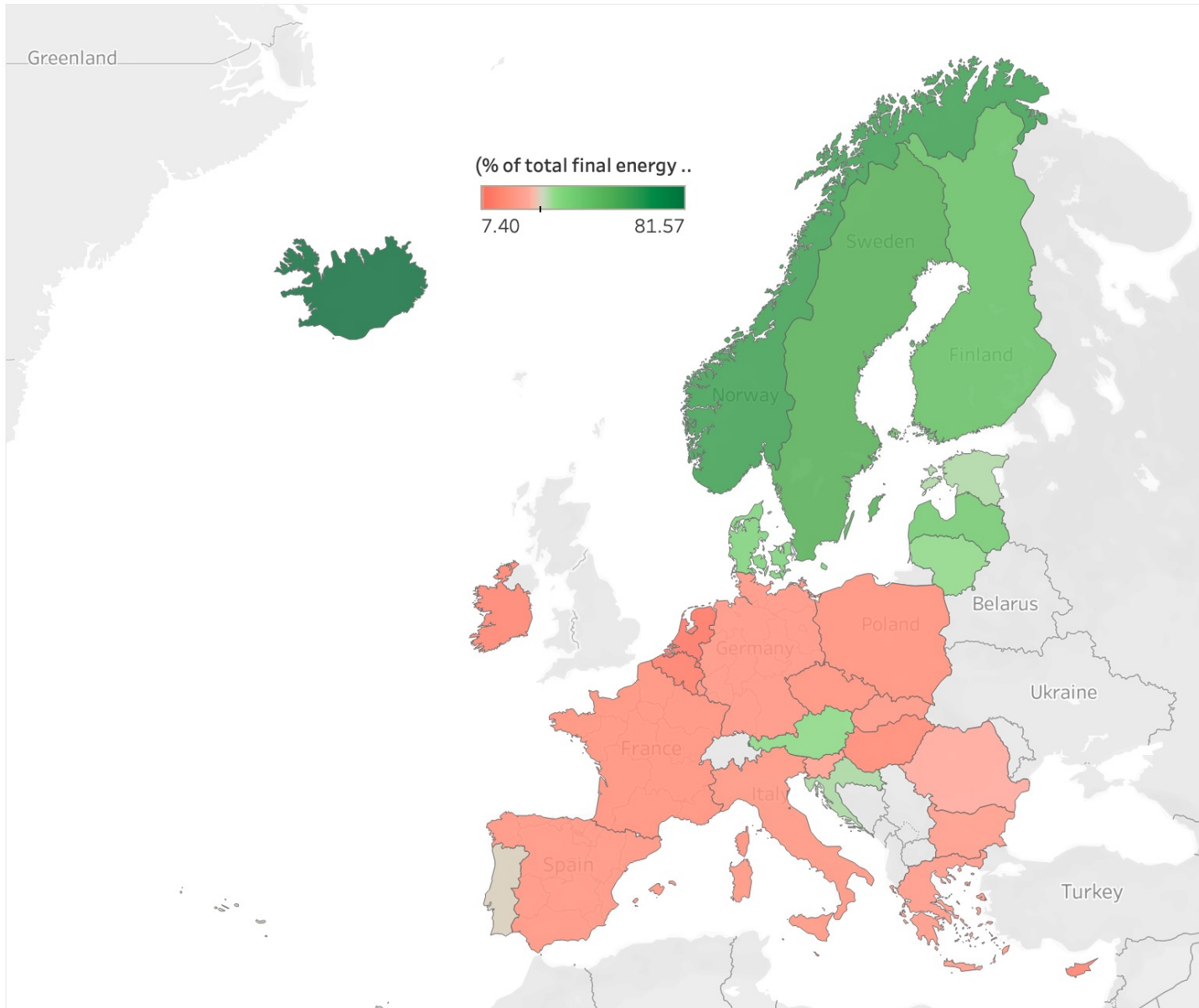
Sequential Color

Unemployment Rate by EEA Country



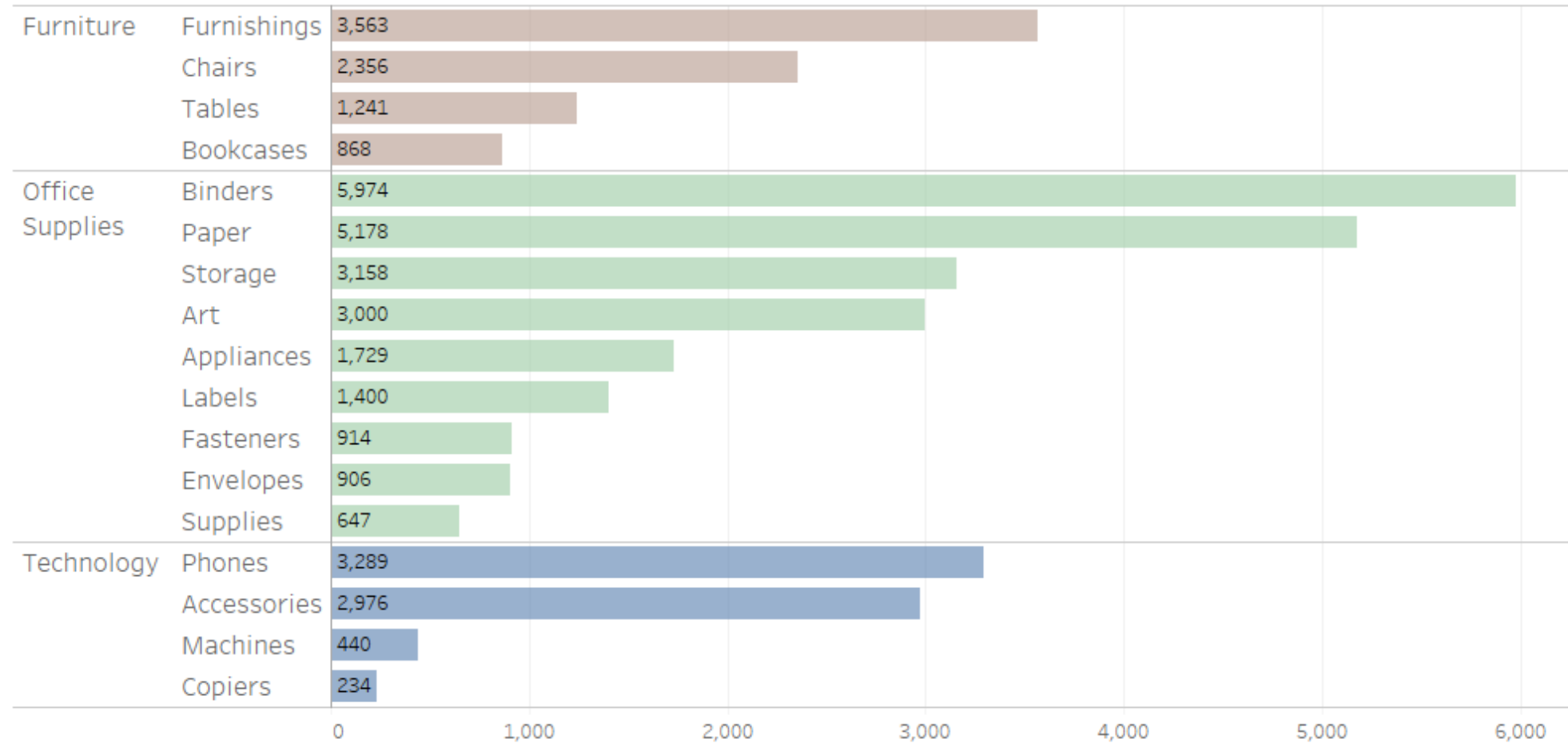
Diverging Color (Tableau)

Renewable energy consumption in the EEA



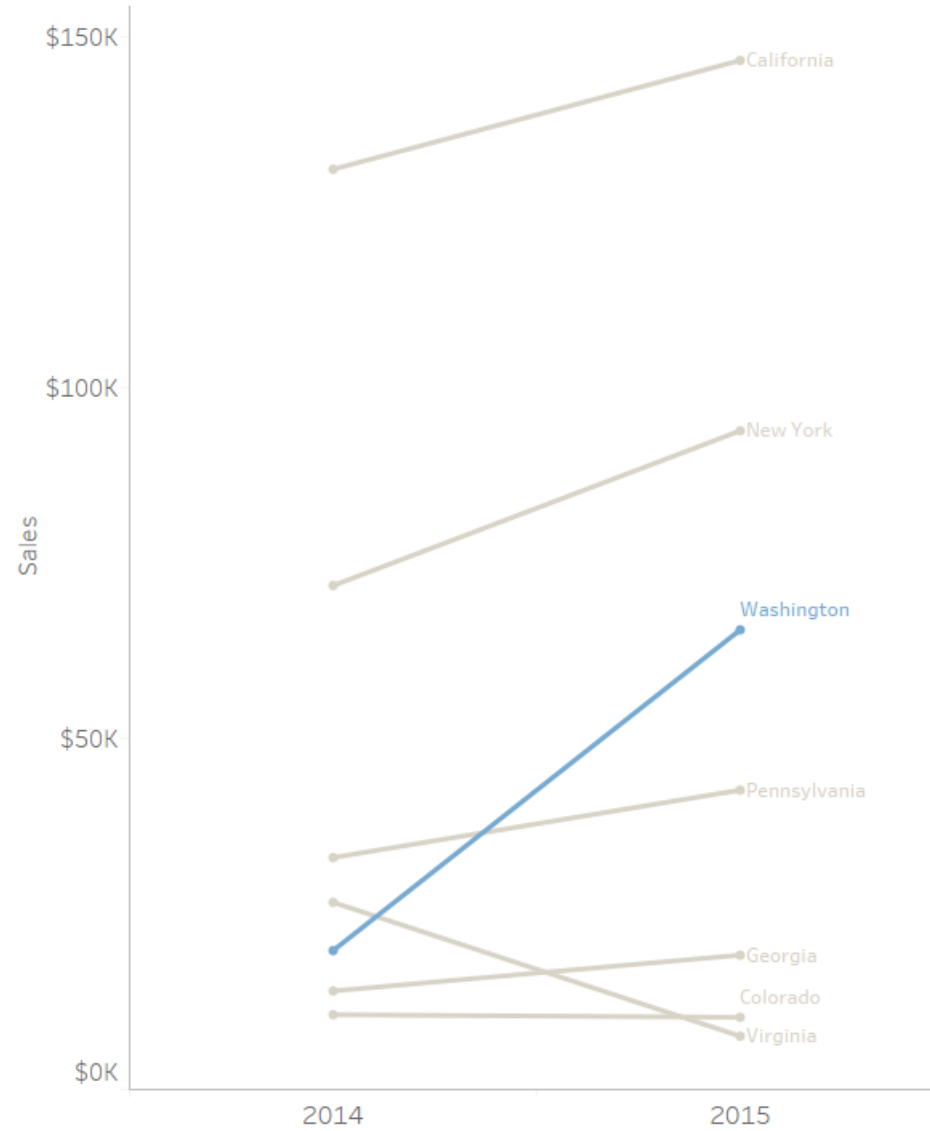
Categorical Color

Quantity by Category and Subcategory

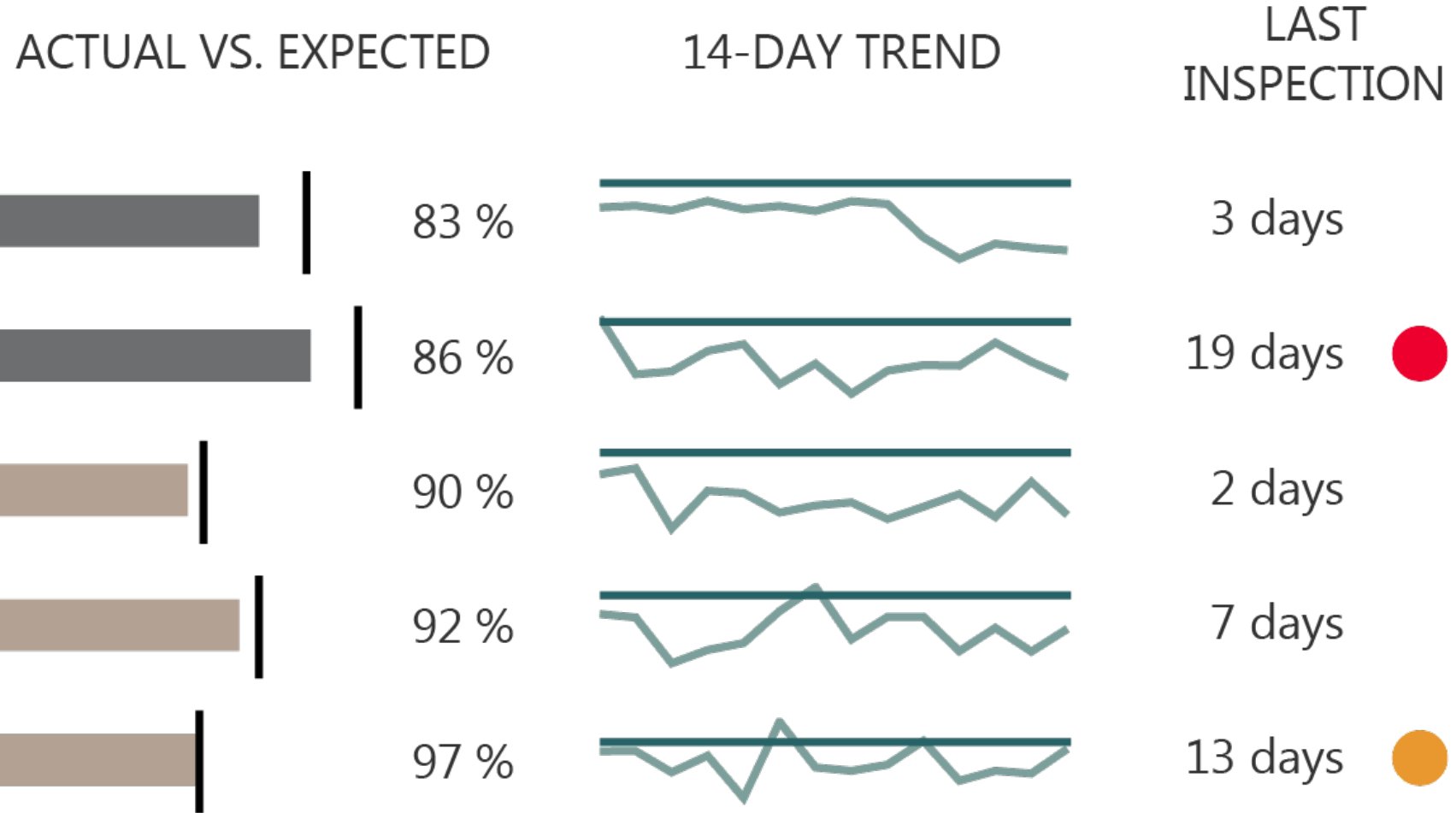


Highlight Color

Sales by State, 2014-2015



Alert Color



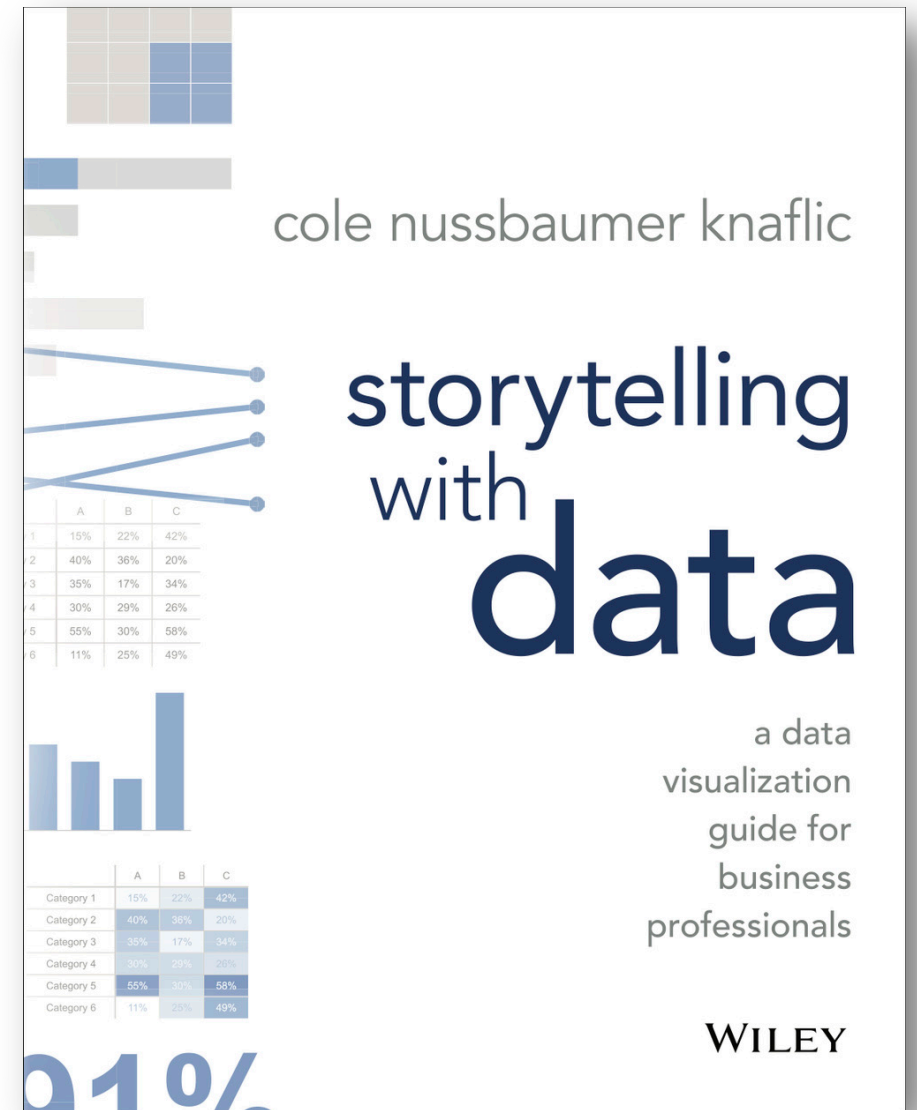
Should the y-axis ALWAYS start at 0?



<https://youtu.be/14VYnFhBKcY>



<https://youtu.be/X79o46W5plI>



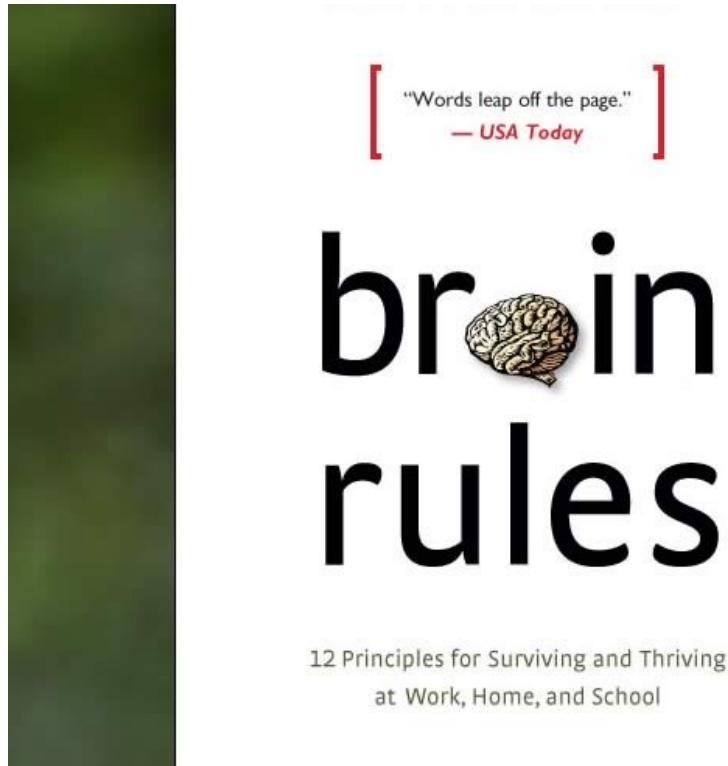
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90% of what you said is gone within 30 seconds!

"If companies would have as little respect for business as they have for presentations the majority would go bankrupt"

- Dr. John Medina (one of the world's leading neurologists)



So why should we tell stories with data?

Storytelling is a powerful way to connect with stakeholders (users / audience).

- *We are wired to respond emotionally to stories. Stories bring people together.*

Storytelling is a powerful way to communicate information and ideas.

- *Stories enable us to share information and insights in a way that is naturally engaging (fun).*
- *And stories are typically more memorable than basic facts and figures.*

Storytelling is a way to solidify abstract concepts & simplify complex messages.

- *Stories make us care, and when we care, we pay more attention.*

Stories have a structure: the Narrative Arc

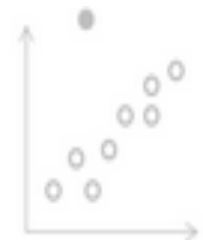
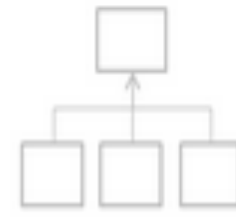
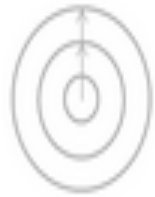
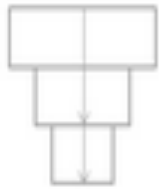


There are a number of different types of narrative (story) and they all follow a **basic story arc** with a **beginning, middle, and end**.

Here is a story framework with only 3 elements:

- Context (**beginning**)
- Challenge (**middle**)
- Conclusion (**end**)

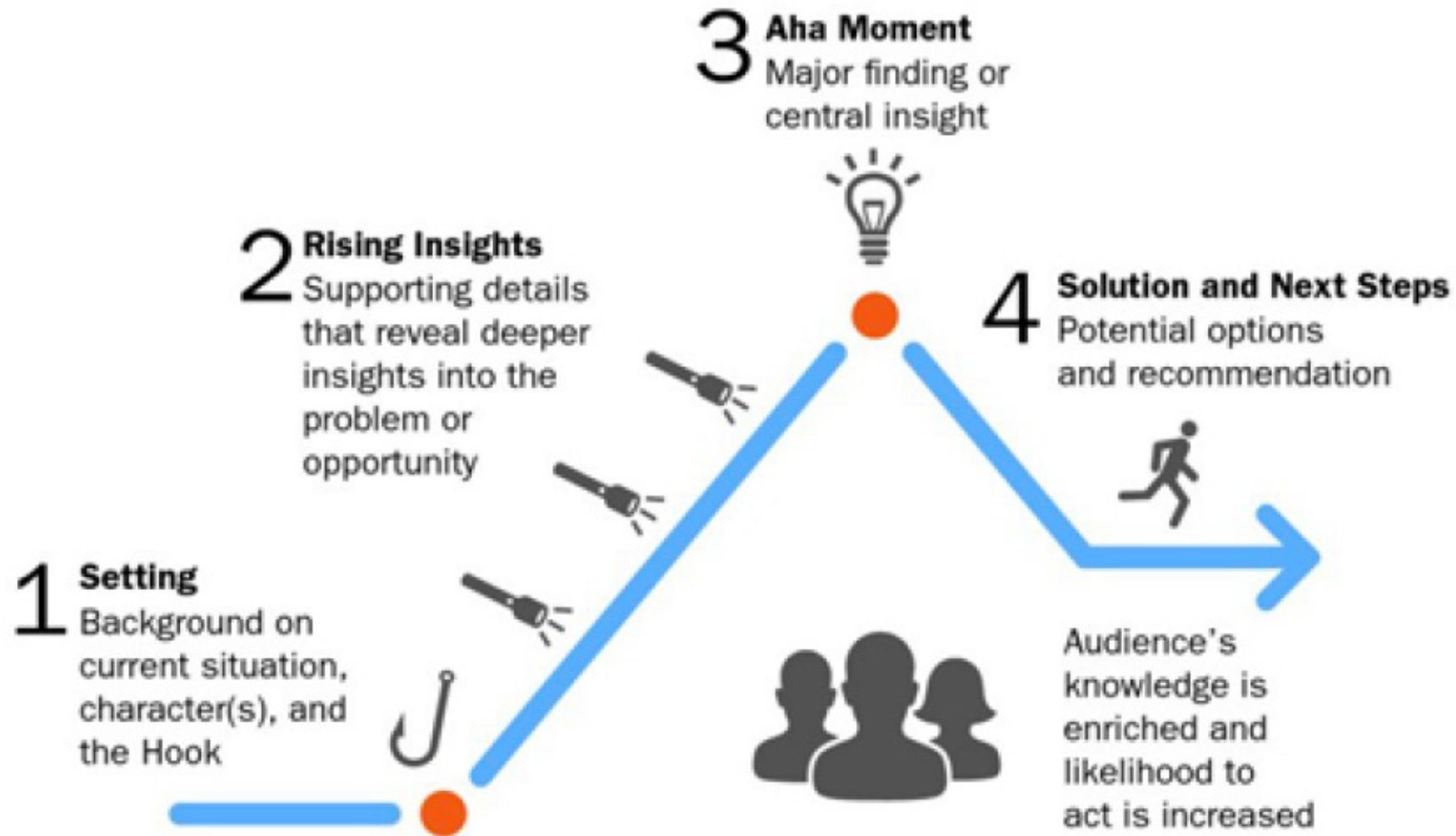
7 Types of Data Stories



1. Narrate **change over time** (how has x changed over the last decade?)
2. Start big and **drill down** (how much x is there in the world? How much in my zip code?)
3. Start small and **zoom out** (there is this much x in your zip code. See how much there is in the world.)
4. Highlight **contrasts** (see how far apart the highs and lows of x are)
5. Explore the **interaction of trends** (what does it mean when x grows to be greater than y?)
6. **Dissect the factors** (see how much of x's growth is caused by y and z)
7. **Profile the outliers** (see how x is not at all like z)

<http://mediashift.org/2015/06/exploring-the-7-different-types-of-data-stories/>

Dykes' Data Storytelling Arc



From Dykes, B. (2020) Effective Data Storytelling

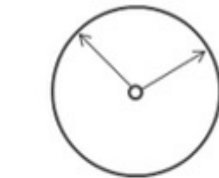
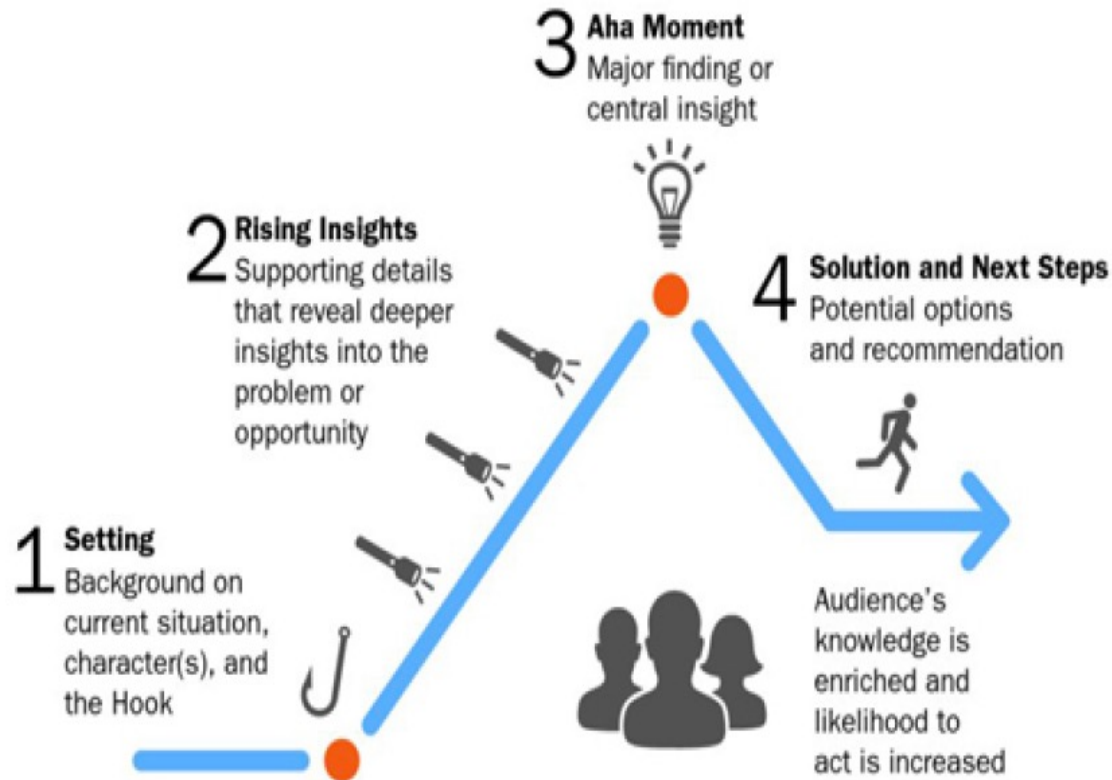
What's the Aha Moment of your data story?



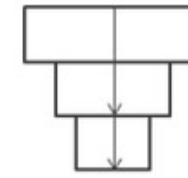
From Dykes, B. (2020) Effective Data Storytelling

The storytelling arc is applicable to any type of story!

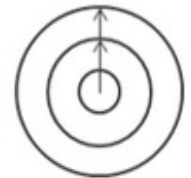
Your Aha Moment will align with one of the story types



Change Over Time



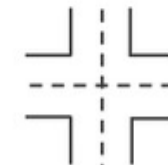
Drill Down



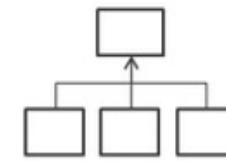
Zoom Out



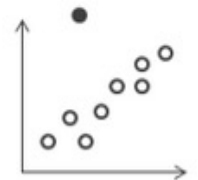
Contrast



Intersections

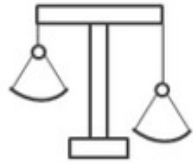
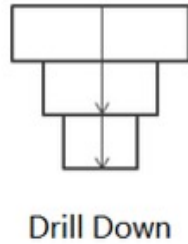


Factors

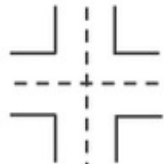


Outliers

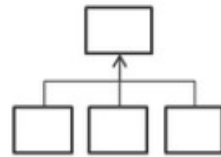
Data Story Type: change over time



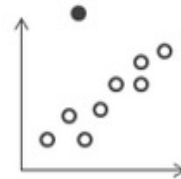
Contrast



Intersections



Factors



Outliers



What it does: Uses a chronology to illustrate a trend.

Questions: What is happening, or what continues to happen?

Example: Arsenal's Injury Crisis

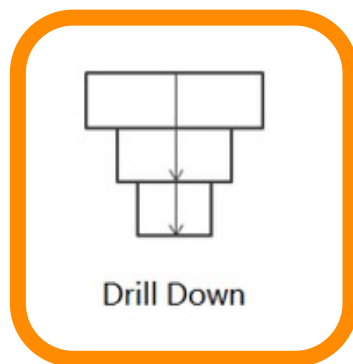
https://public.tableau.com/views/EPLInjuries/InjuryCrisis?:language=en-US&:display_count=n&:origin=viz_share_link

<https://www.tableau.com/solutions/workbook/day-of-week-analysis>

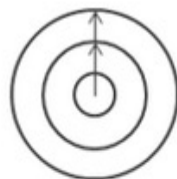
Data Story Type: drill down



Change Over Time



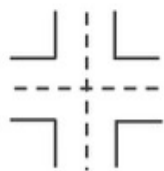
Drill Down



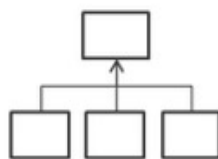
Zoom Out



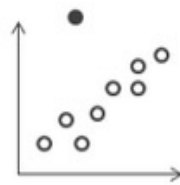
Contrast



Intersections



Factors



Outliers



What it does: Sets context so that your audience better understands what's going on in a particular category.

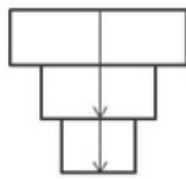
Questions: What is different about this person, place or thing? How does the behavior / performance of this person, place, or thing compare?

Example: Tell me about Will
<https://public.tableau.com/en-us/s/gallery/tell-me-about-will>

Data Story Type: zoom out



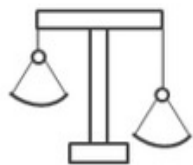
Change Over Time



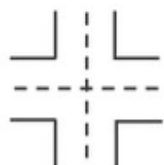
Drill Down



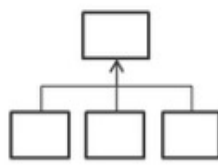
Zoom Out



Contrast



Intersections



Factors



Outliers

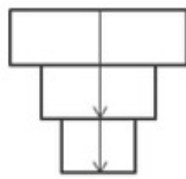


- **What it does:** Describes how something your audience cares about relates to the bigger picture.
- **Questions:** How does something you care about compare to the bigger picture? What effect does one area have on the bigger picture?
- **Example:** Vancouver Cyclists
<https://public.tableau.com/app/profile/peacockworks/viz/VancouverCyclists/VancouverCyclists>

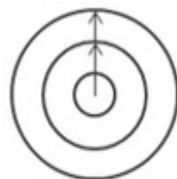
Data Story Type: contrast



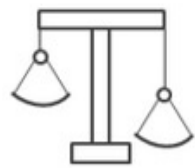
Change Over Time



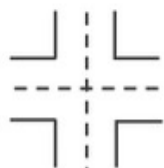
Drill Down



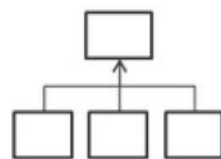
Zoom Out



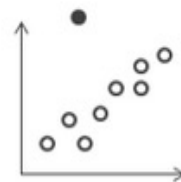
Contrast



Intersections



Factors



Outliers

What it does: Shows how two or more subjects differ.

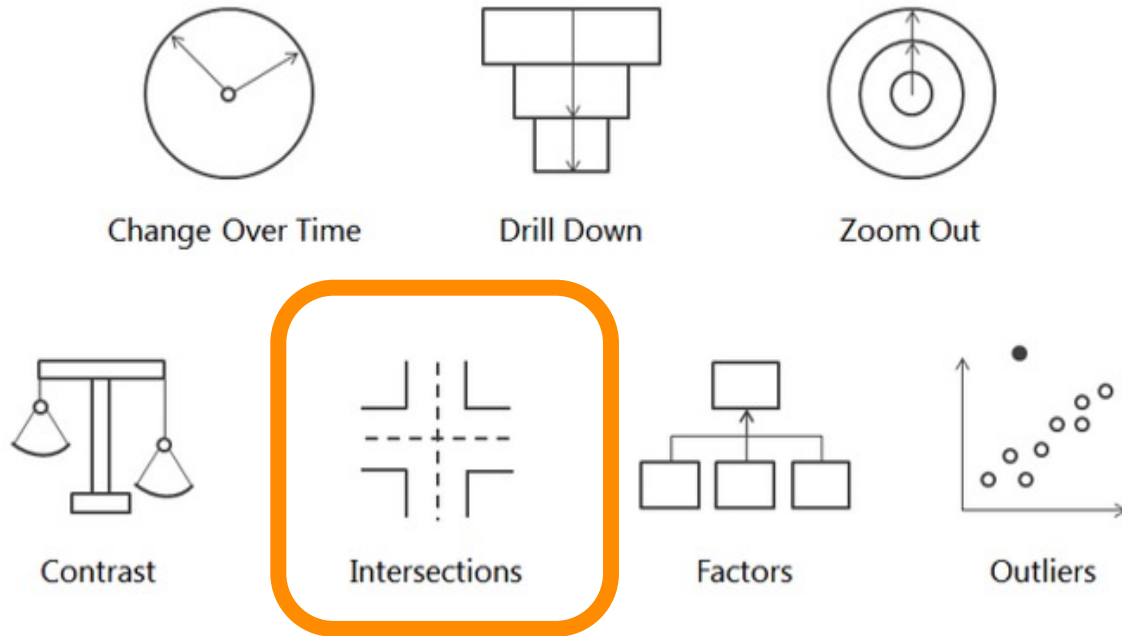
Questions: Why are these items different? How can we make A perform like B? Which area should we focus on and which area is doing fine?

Example: The Pyramids of Egypt

https://public.tableau.com/views/Pyramids_1/EgyptianPyramids?:language=en-US&:display_count=n&:origin=viz_share_link



Data Story Type: intersections



- **What it does:** Highlights important shifts when one category overtakes another.
- **Questions:** What causes these shifts? Are these shifts good or bad? How do these shifts affect other aspects of our plan?

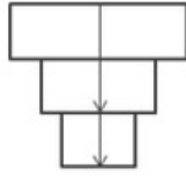
Example: US vs THEM

https://public.tableau.com/views/USvsTHEM/USvs_THEM?:embed=y&:display_count=n&:origin=viz_share_link

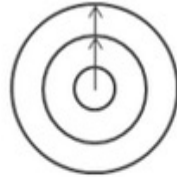
Data Story Type: factors



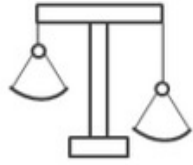
Change Over Time



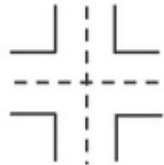
Drill Down



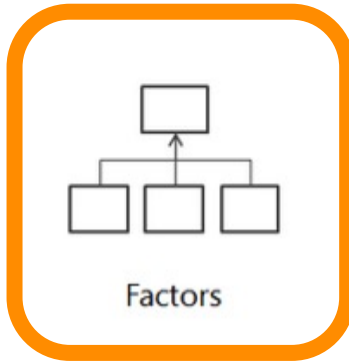
Zoom Out



Contrast



Intersections



Factors



Outliers



What it does: Explains a subject by dividing it into types or categories.

Questions: Is there a particular category we should focus on more? How much do these items affect the metric we care about?

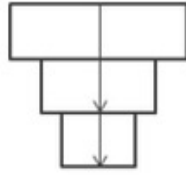
Example: How the sun controls the weather

https://public.tableau.com/app/profile/ugley_matt/viz/SunSpotsStory/SunspotsTheWeather

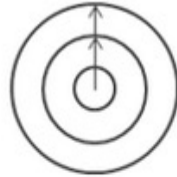
Data Story Type: outliers



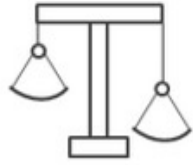
Change Over Time



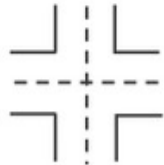
Drill Down



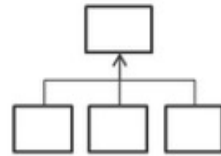
Zoom Out



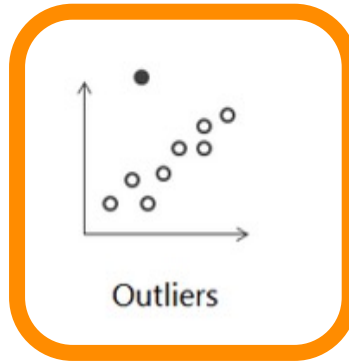
Contrast



Intersections



Factors



Outliers

What it does: Shows anomalies or where things are exceptionally different.

Questions: What is different?

Example: Earthquakes

https://public.tableau.com/views/EarthquakeTrendStory2/Finished-Earthquakestory?:language=en-US&:display_count=n&:origin=viz_share_link



The magic of storytelling



<https://www.youtube.com/watch?v=Nj-hdQMa3uA>

What do you want your audience to have in their blood?

Dopamine, Oxytocin, and Endorphins

- Focus
- Motivation
- Memory
- Generosity
- Trust
- Bonding
- Creativity
- Relaxation

Cortisol and Adrenaline

- Intolerant
- Irritable
- Uncreative
- Critical
- Memory impaired
- Bad decisions

100 000 years ago...

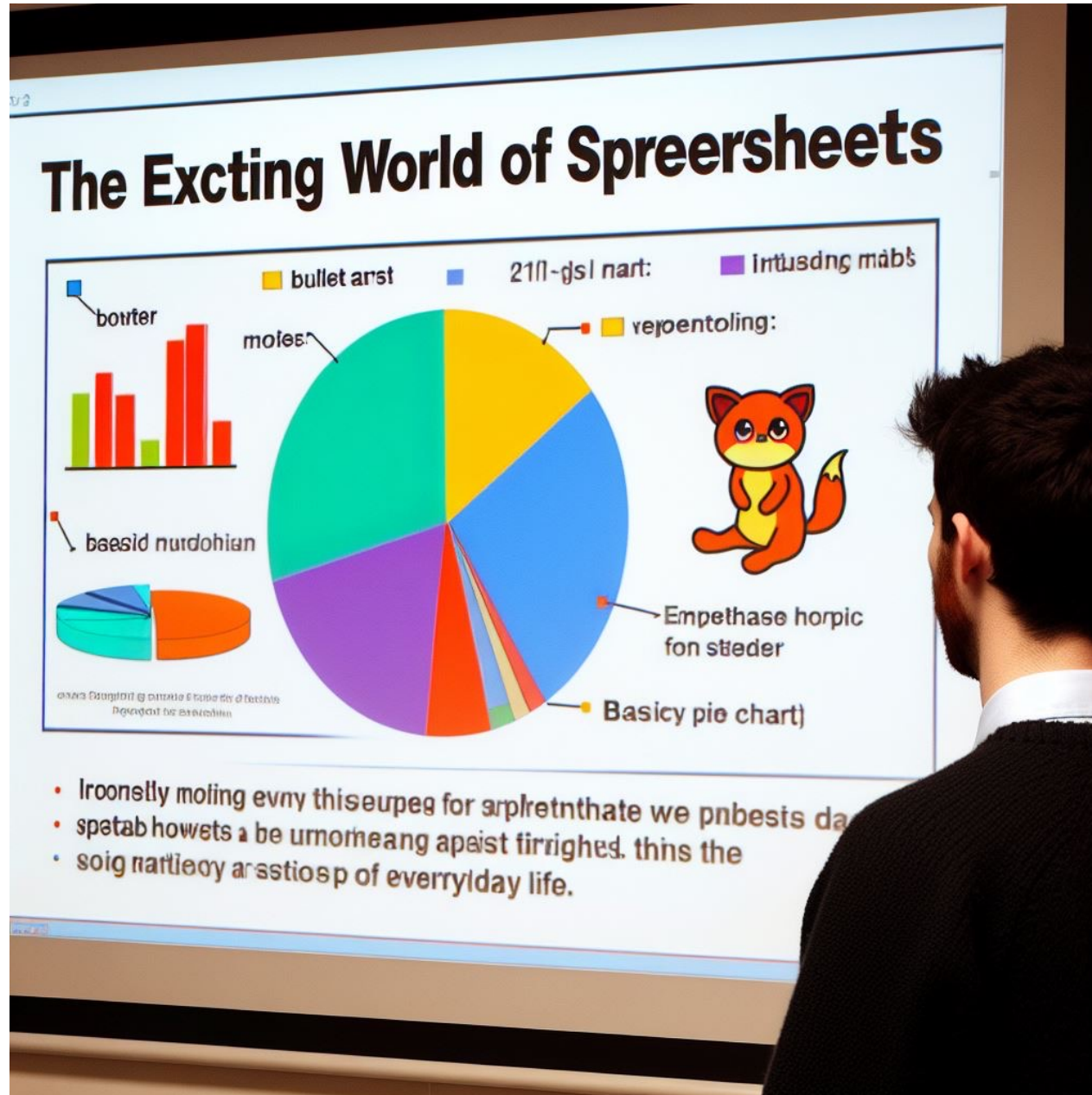


27 000 years ago...



3 500 years ago...





“You don’t need to be a bearded old man in an armchair to tell great stories!” - David JP Phillips

Q&A time