

Data Visualization Workshop

HKS Communications Workshop

Hong Qu

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Agenda

- I. Design Principles
- II. Data modeling
- III. Chart Types



Hong Qu

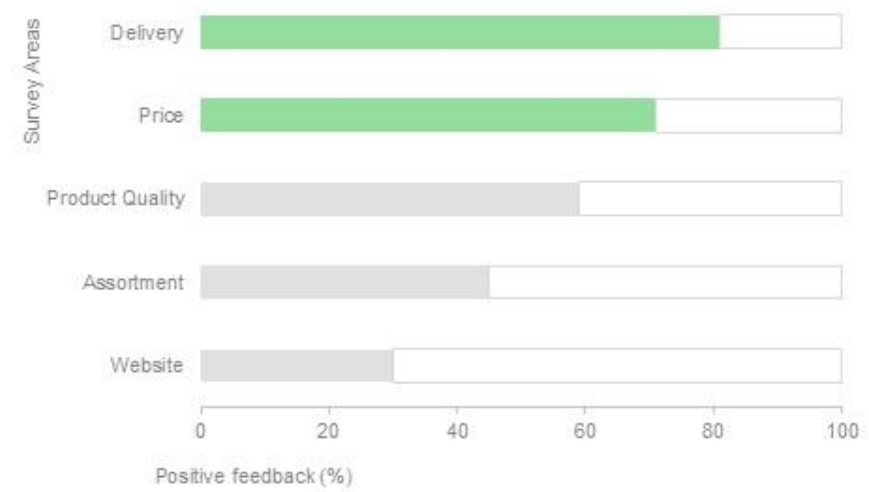
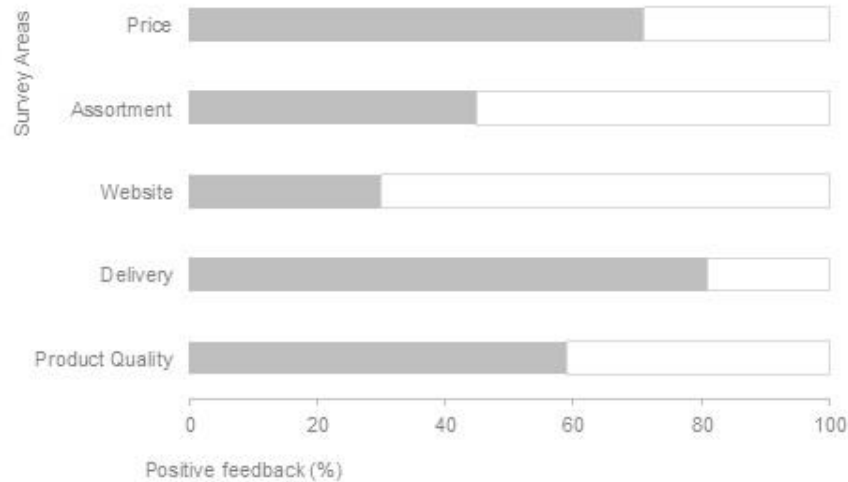
[@hqu](#)

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- Adjunct lecturer at HKS
- Race and Technology Fellow at Stanford
- PhD student Northeastern University in Network Science
- Founder of AI Blindspot, incubated at Berkman Klein
- Visiting Nieman fellow in 2013
- MS from UC Berkeley's School of Information
- BA from Wesleyan University



Pre-attentive Perception



Pre-attentive processing is the subconscious accumulation of information... All available information is pre-attentively processed. Then, the brain filters and processes what is important. Information that has the highest salience (a stimulus that stands out the most) or relevance to what a person is thinking about is selected for further and more complete analysis by conscious (attentive) processing.

“The goal of visualization is to aid our understanding of data by leveraging the human visual system’s **highly tuned** ability to **see patterns**, **spot trends**, and **identify outliers**.”

–Jeffrey Heer, Michael Bostock, Vadim Ogievetsky

Computer
Science

Software tools

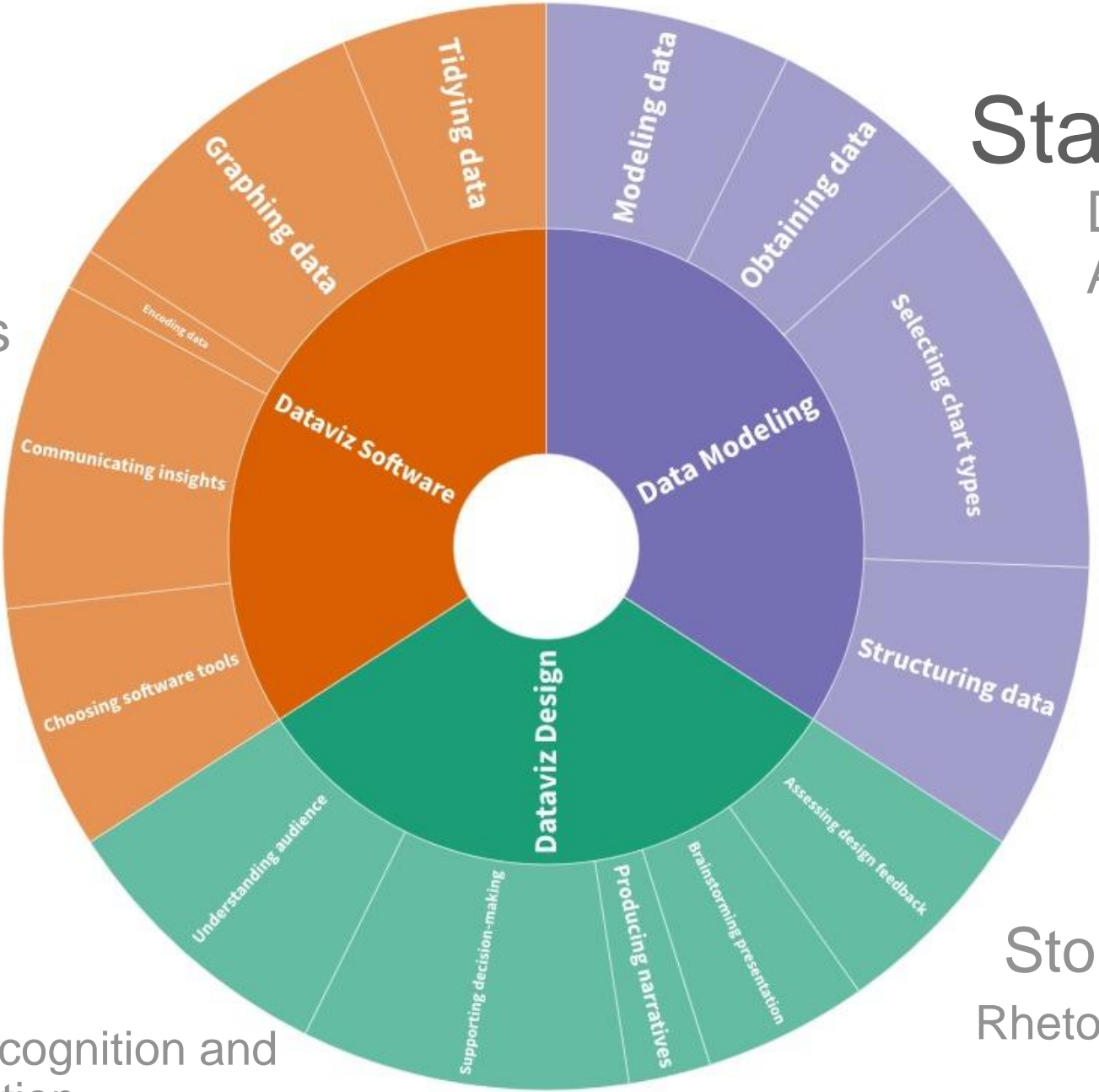
Interaction
design

Art
Visual cognition and
perception

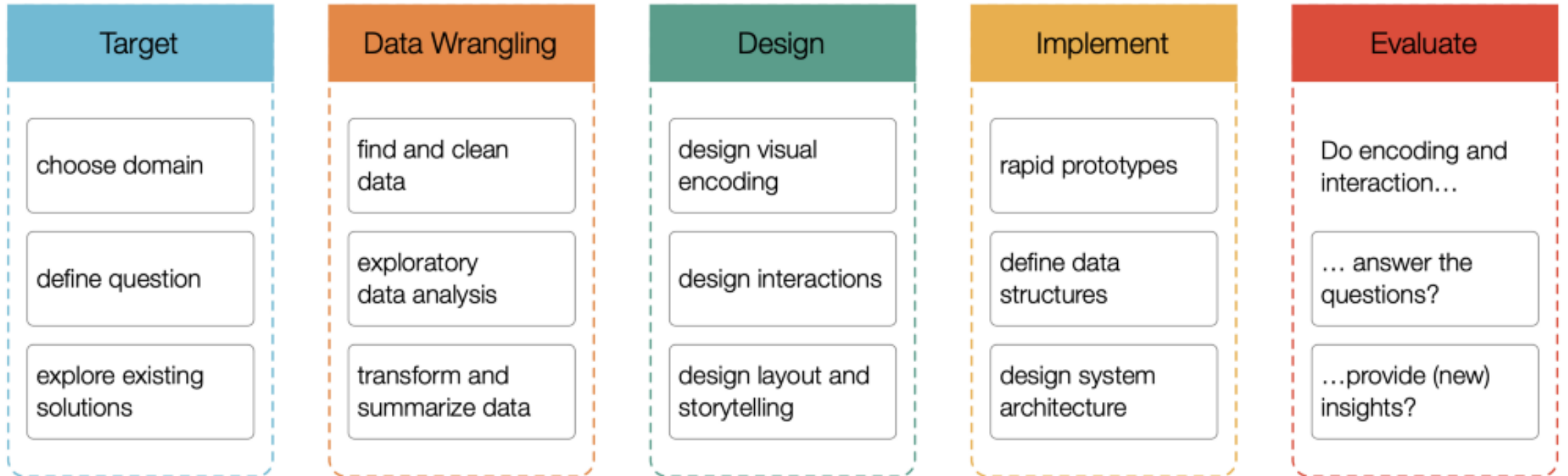
Design

Statistics
Data
Analytics

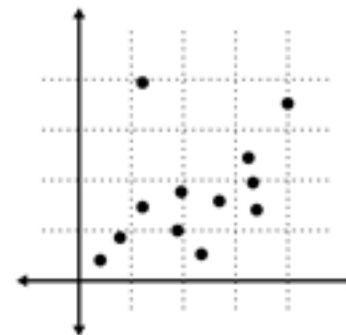
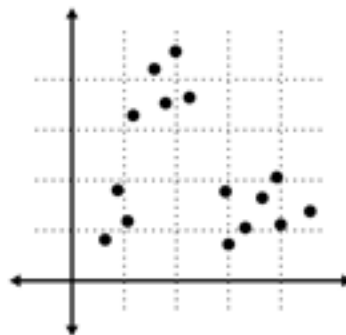
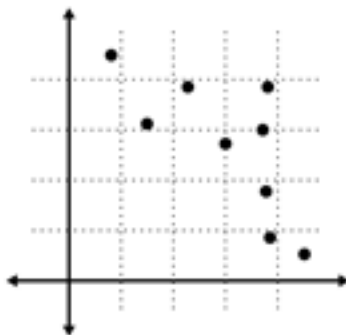
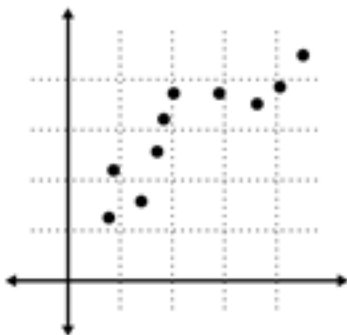
Storytelling
Rhetoric



The Five-Step Process



[The Power of Visualization in Data Science](#)





DATA

[What is the difference between data and information?](#)



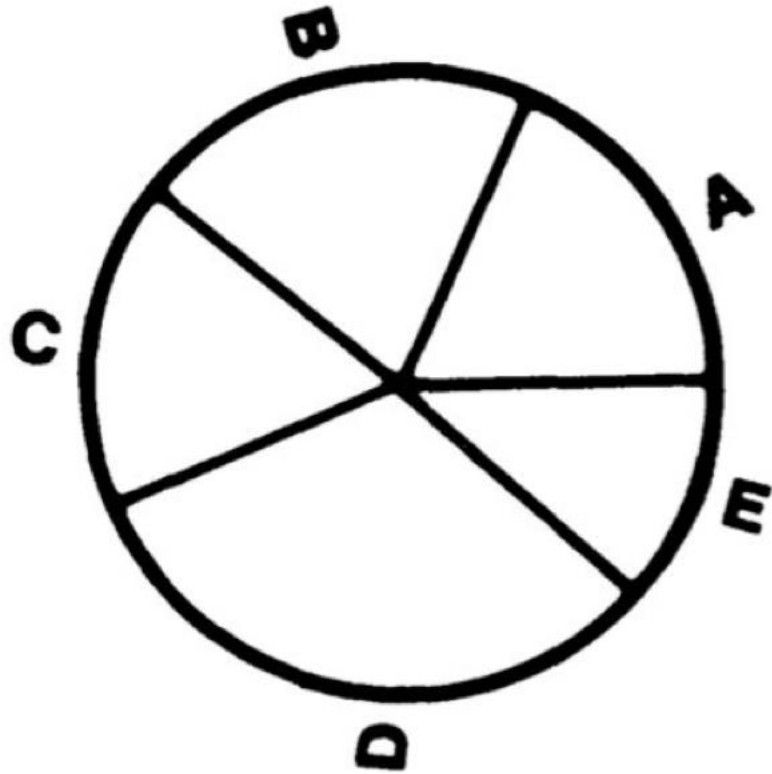
INFORMATION

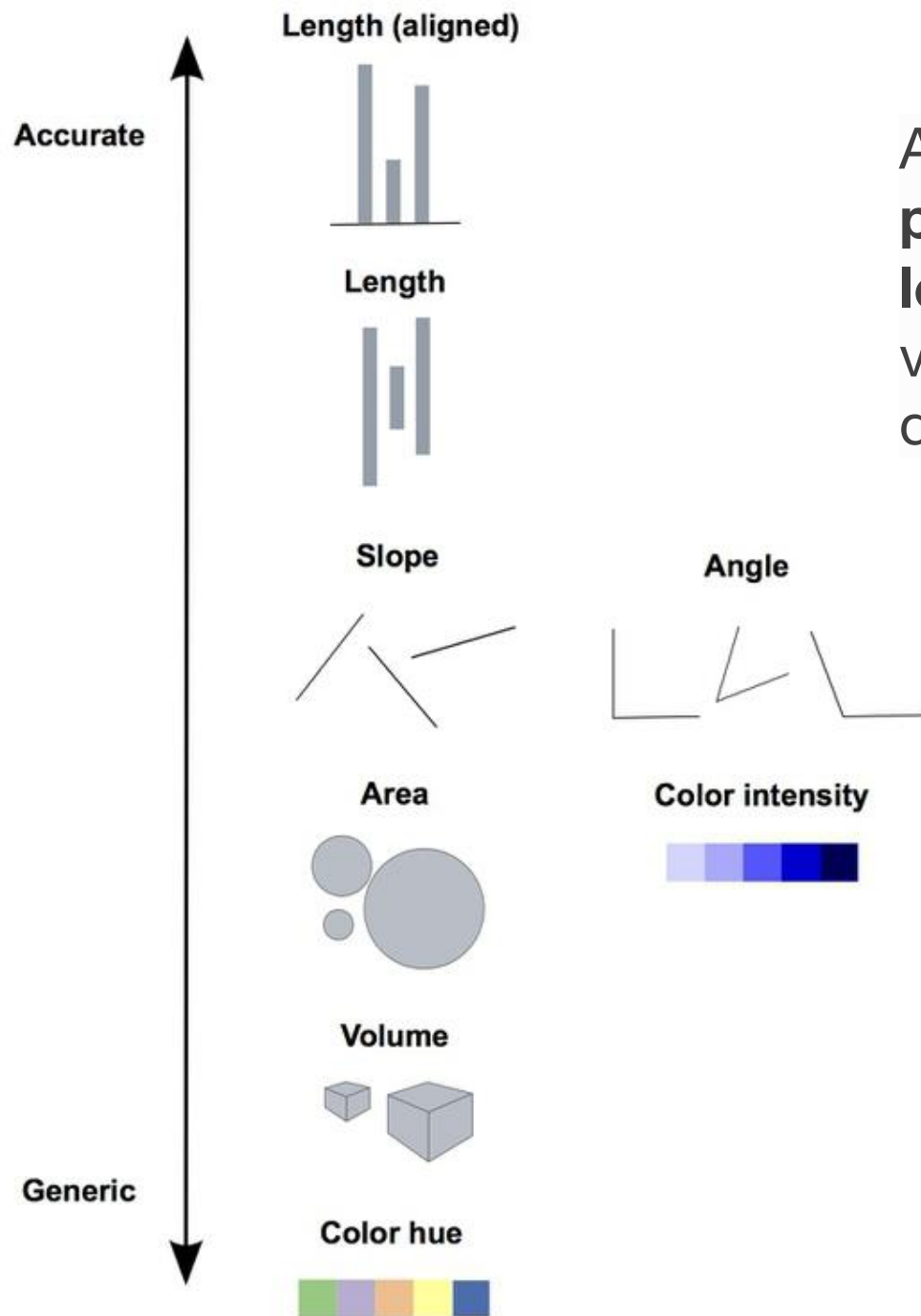


STORY

<https://www.eurobricks.com/forum/index.php?/forums/topic/71984-moc-small-train-station/>

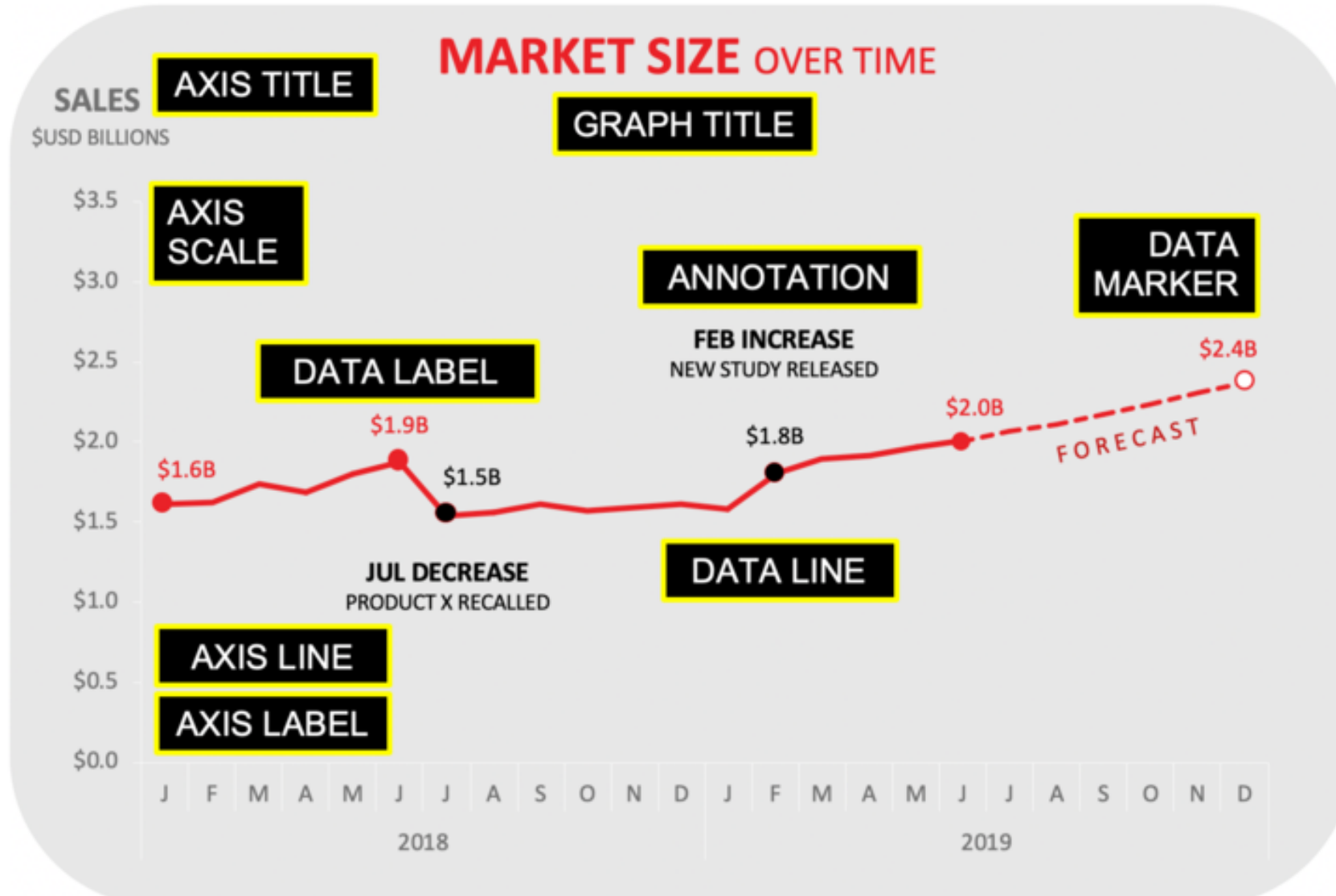
Pie vs Column





A study done showed that **position** is the best, followed by **length**, **angle** and **slope**, area, volume, and lastly, color and density.

Elements of a Chart



Color

THE USE OF COLOR IN DATA VISUALIZATION

SEQUENTIAL

color is ordered from low to high



Continuous

DIVERGING

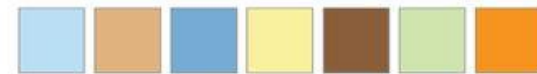
two sequential colors with a neutral midpoint



Opposites

CATEGORICAL

contrasting colors for individual comparison



Discrete

HIGHLIGHT

color used to highlight something



Contrast

ALERT

color used to get reader's attention



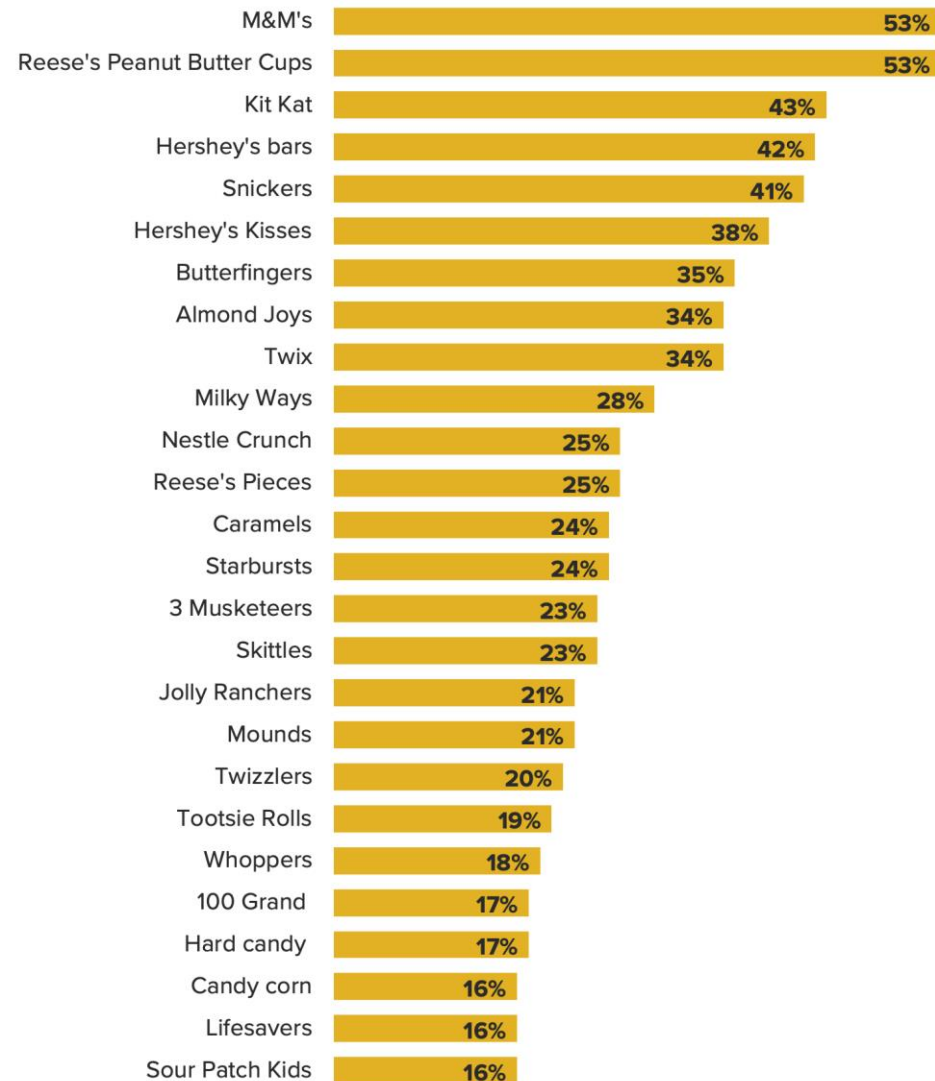
Key point

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

M&M's, Reese's Are the Kings of Halloween Candy

Bar Chart

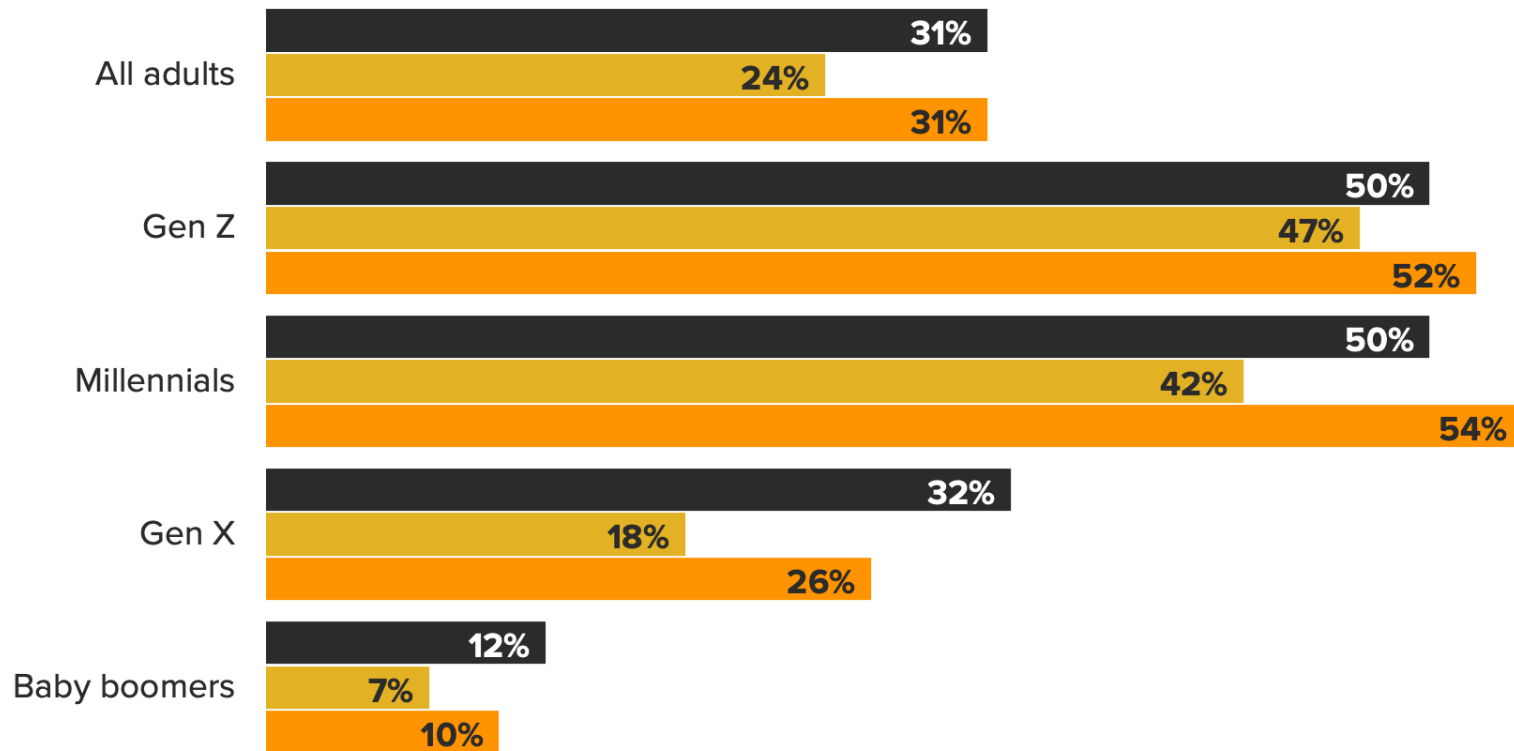
Shares of U.S. adults who selected each of the following candies as one of their favorites:



Roughly 1 in 3 Americans Plan to Dress Up This Halloween — the Same Share Who Did in 2019

Shares of U.S. adults who said they wore a costume for Halloween in 2019 and 2020, and plan to in 2021

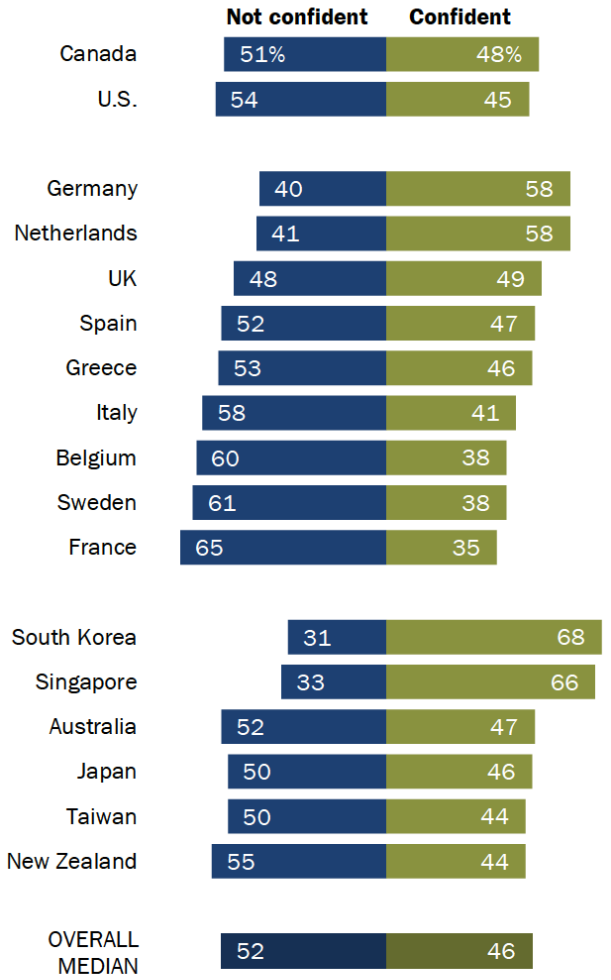
■ 2019 ■ 2020 ■ 2021



Divergent Bar Chart

Doubts that international community can reduce effects of climate change are common but not ubiquitous

% who are ___ that actions taken by the international community will significantly reduce the effects of global climate change



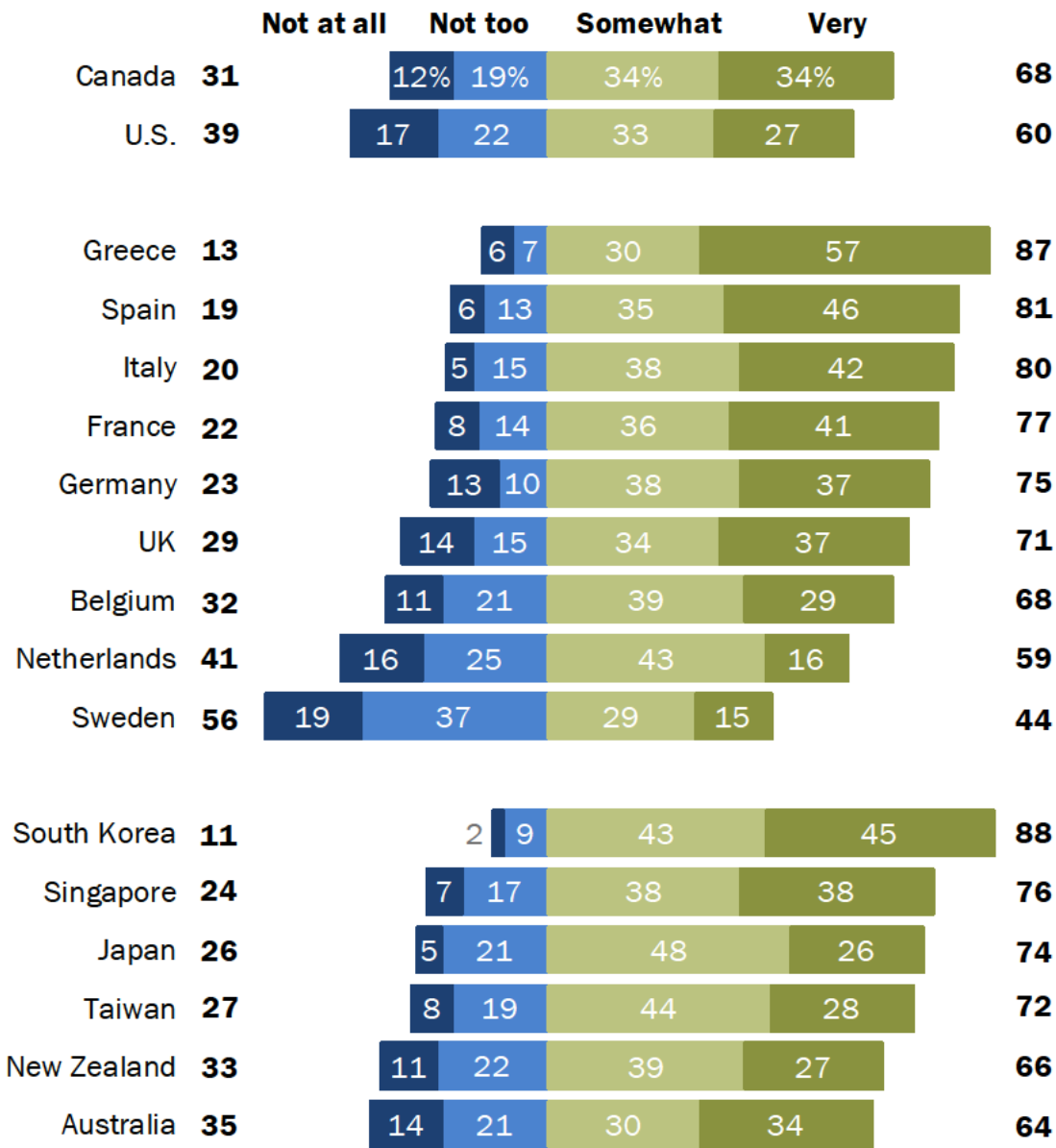
Note: Those who did not answer not shown.
Source: Spring 2021 Global Attitudes Survey. Q35.
"In Response to Climate Change, Citizens in Advanced Economies Are Willing To Alter How They Live and Work"

PEW RESEARCH CENTER

[In Response to Climate Change, Citizens in Advanced Economies Are Willing To Alter How They Live and Work](#)

Many are concerned climate change will personally harm them during their lifetimes

% who are ___ concerned that global climate change will harm them personally at some point in their lifetime

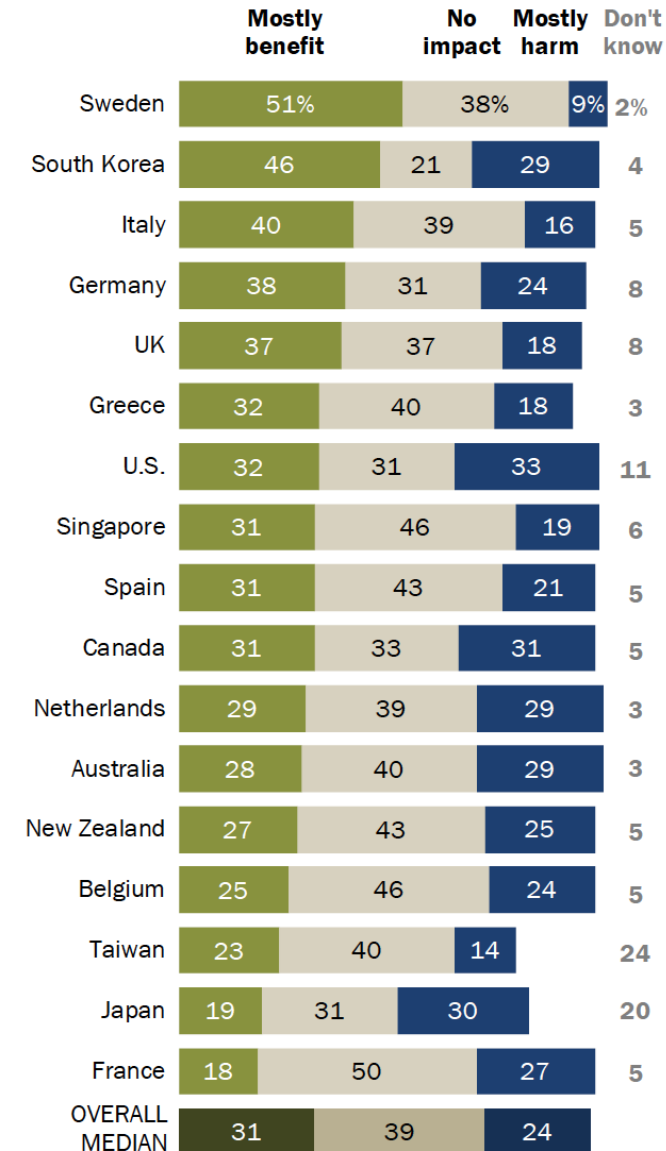


Divergent Bar Chart

Stacked Bar Chart

Publics are divided over the economic impact of international actions to address global climate change

% who think actions taken by the international community to address global climate change, such as the Paris climate agreement, will ___ (survey public's economy)

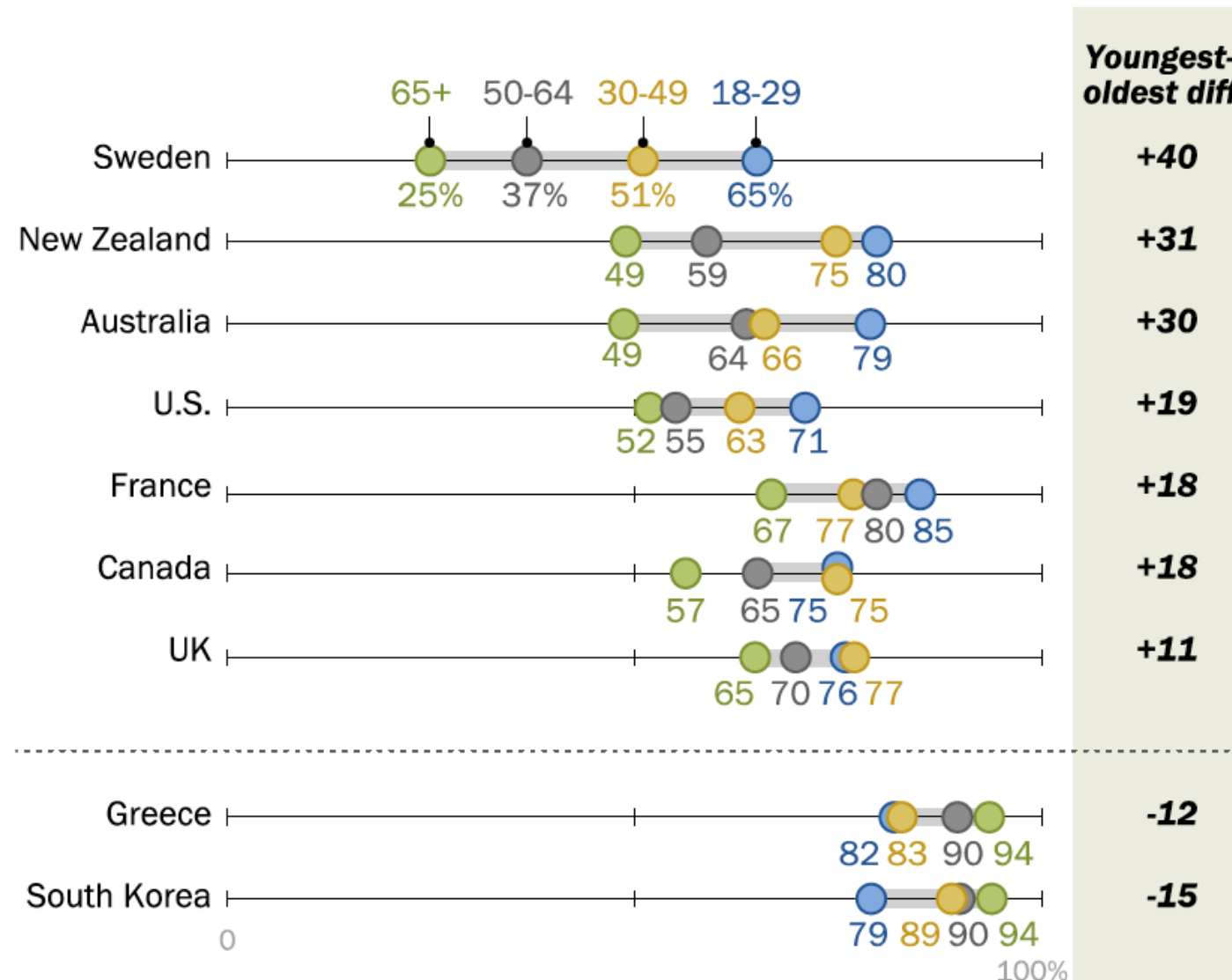


[In Response to Climate Change, Citizens in Advanced Economies Are Willing To Alter How They Live and Work](#)

Younger adults tend to be more concerned than older counterparts that climate change will harm them

Dot plot

% who are very/somewhat concerned that global climate change will harm them personally at some point in their lifetime, among those ages ...



Intense concern about the personal effects of climate change has increased sharply in several major economies since 2015

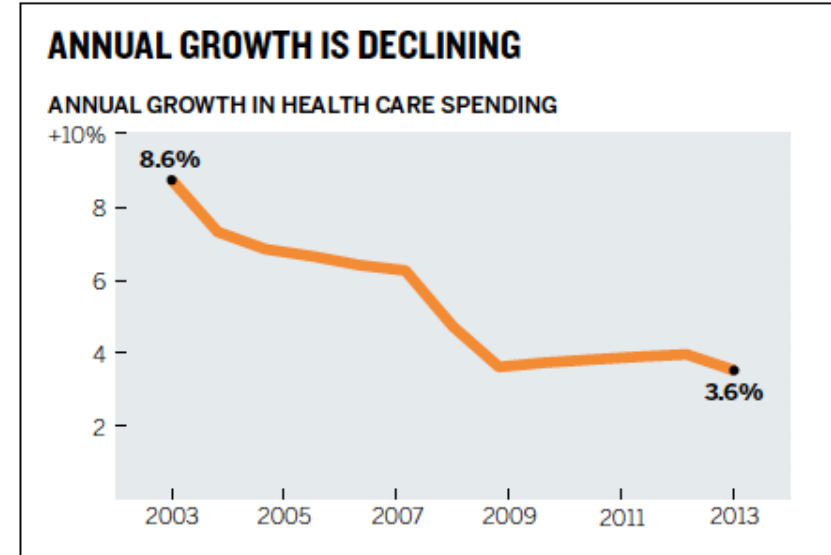
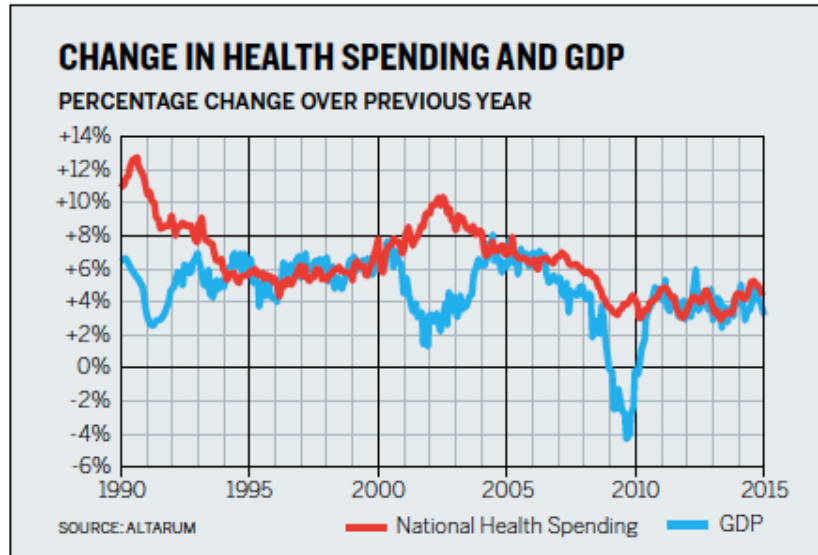
% who are **very concerned** that global climate change will harm them personally at some point in their lifetime



Slope graph

Small multiples

Simplicity takes discipline and courage



“I have only made this letter longer because I have not had the time to make it shorter.”
— Blaise Pascal

Storytelling with Data



understand the
context



choose an
effective visual



eliminate
clutter



focus
attention



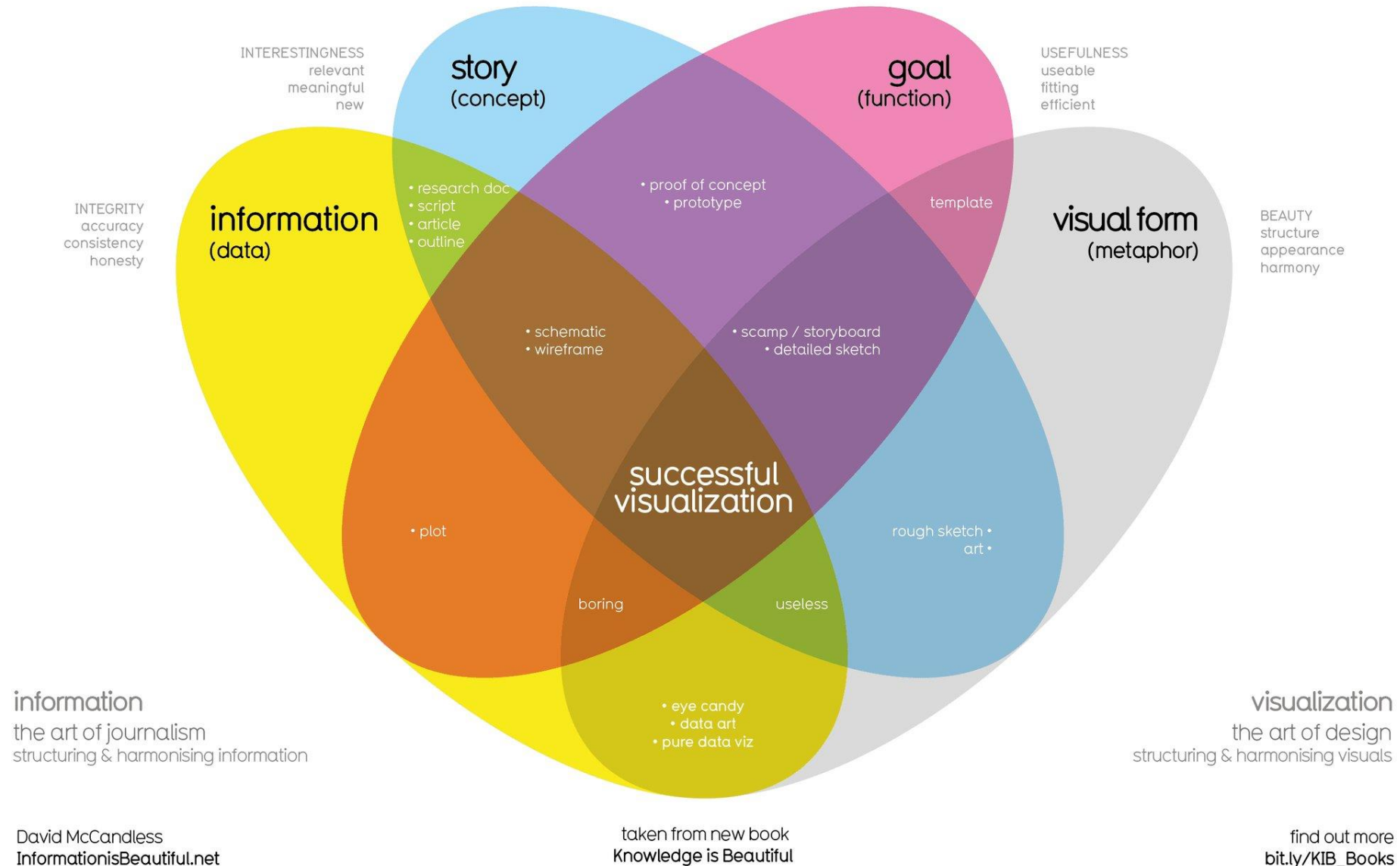
tell a
story

Recap

- Your mission is to enrich:
 1. Data
 2. Information
 3. Story
- Declutter and highlight to focus the viewer's attention
- Make use of the annotation layer
- What makes a good visualization?
 - ✓ Information
 - ✓ Story
 - ✓ Goal
 - ✓ Visual

What Makes a Good Visualization?

explicit (implicit)



What Makes a Good Data Visualization?

Questions and Discussion

Software tools

Datawrapper

<https://www.datawrapper.de>

Flourish^{*}

<https://flourish.studio>



+tableau

<https://www.tableau.com>



RESOURCES

- Software
 - [Tableau](#) for exploratory data analysis and interactive dashboards
 - Tutorial [videos on LinkedIn Learning](#)
 - Book [Practical Tableau: 100 Tips, Tutorials, and Strategies from a Tableau Zen Master](#)
 - [Flourish Studio](#) for animations
 - Tutorial [videos by Alberto Cairo](#)
 - [Datawrapper](#) for charts and maps
 - [Tutorials](#)
 - [Canva](#) for [infographics](#)
- Design Books
 - [Storytelling with Data: A Data Visualization Guide for Business Professionals](#)
 - [Now You See It: Simple Visualization Techniques for Quantitative Analysis](#)
 - [Information Is Beautiful](#)
 - [Good Charts: The HBR Guide to Making Smarter, More Persuasive Data Visualizations](#)
 - [Functional Art, The: An introduction to information graphics and visualization](#)
- [Data Visualization Society](#)
 - [Nightingale](#) Medium Journal