Data Storytelling

DRIVING RESULT THROUGH DATA STORYTELLING

Secrets to Effective Visuals

LEARNING ROADMAP:

Navigating Your Path to Success

Course 1:
Driving Change and Action through Insight

Course 1:
Unearthing Stories in Data

Course 2:
3 C's of Building Your Data Story

Course 3:
The Value of Visuals

Course 3:
Visualizing the Story

Course 4:
Secrets to Effective Visuals

6

Secrets to Effective Visuals

A. Understand Visual Signals: Principles of Visual Grouping

2014 MIT Study

We have the ability to process an image in just

13 milliseconds.

(Trafton, 2014)

Perceptual Tasks

(McGill and Cleveland, 1984)

How efficiently graphics convey information based on certain **visual factors**.

Position

Length

Slope

Angle

Area

Intensity

Color

Shape

Gestalt Principles of Visual Grouping

(Wertheimer, Kohler, and Koffka, 1923)

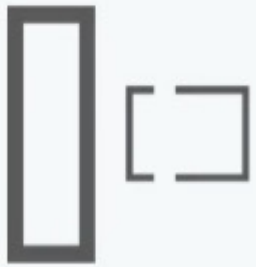
How our minds **naturally organize visual elements** into meaningful patterns.

Proximity

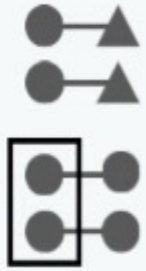
Similarity

Closure

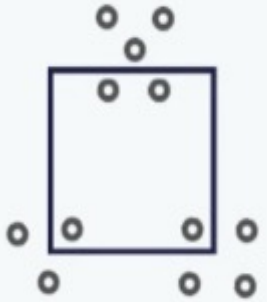
Continuity



Connection



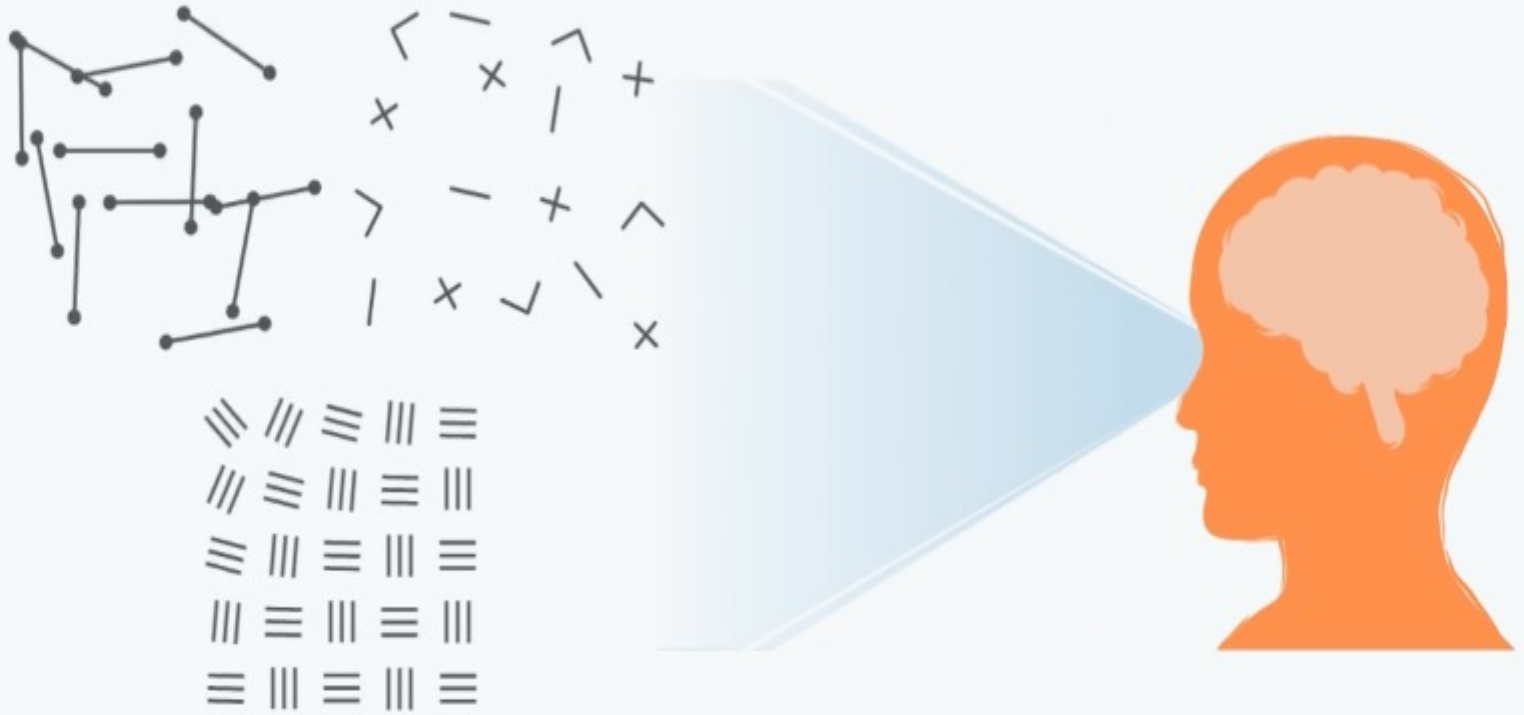
Enclosure



What is Visual Grouping?

VISUAL GROUPING

How our minds **naturally organize and group visual elements** that share similar characteristics or are located close to each other.



VISUAL GROUPING

- ✓ Understand complex visuals by recognizing **patterns** and **relationships**
- ✓ Identify which elements are **SIGNAL** or **NOISE**

SIX PRINCIPLES OF VISUAL GROUPING

1. Proximity
2. Similarity
3. Closure
4. Continuity
5. Connection
6. Enclosure

Objects that are **physically close together** are perceived as belonging to the same group.

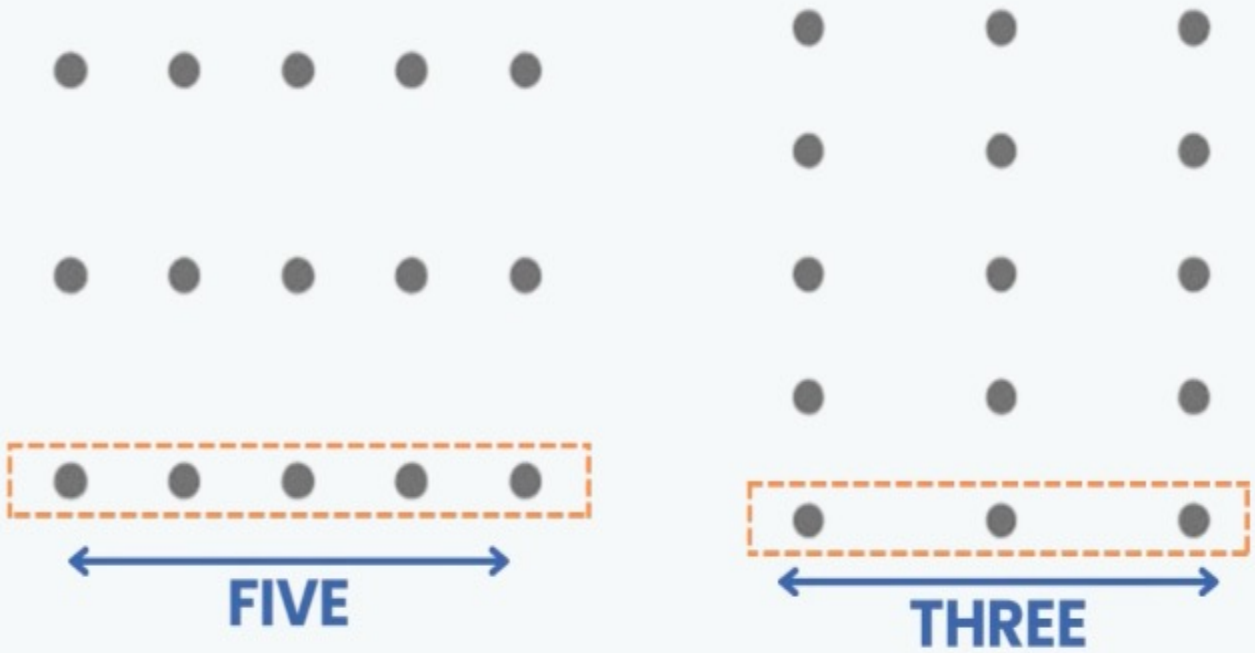
1

Proximity

Influence the visual orientation of a table simply by **changing the spacing** between some dots.

1

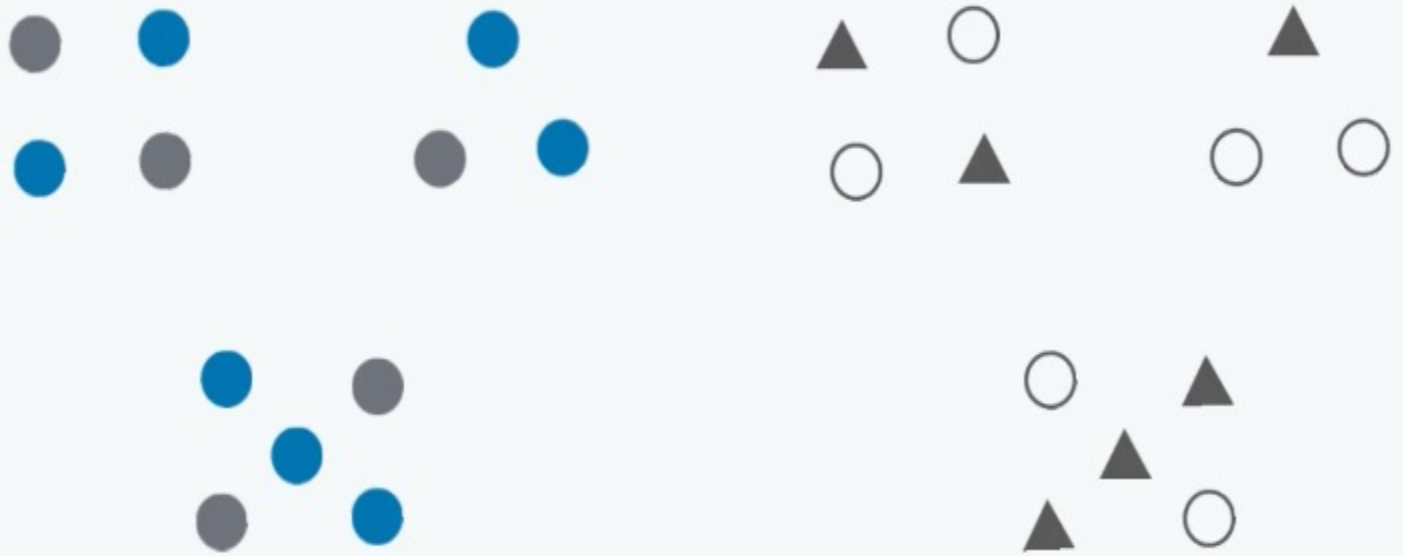
Proximity



Objects that are of **similar color, shape, size, or orientation** are perceived as related.

2

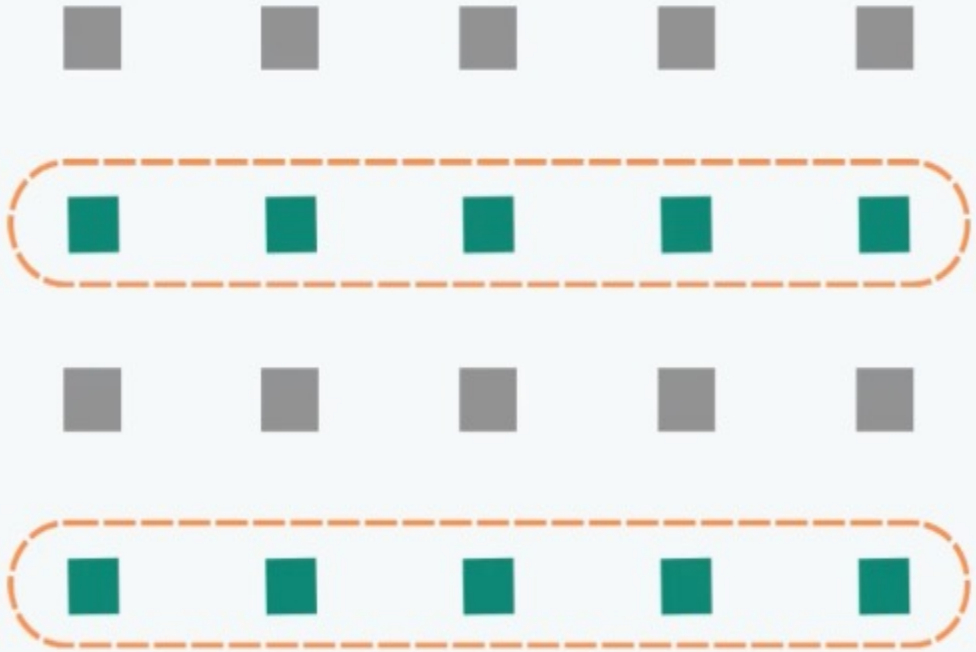
Similarity



Use **color** to guide a reader's eye while scanning a table.

2

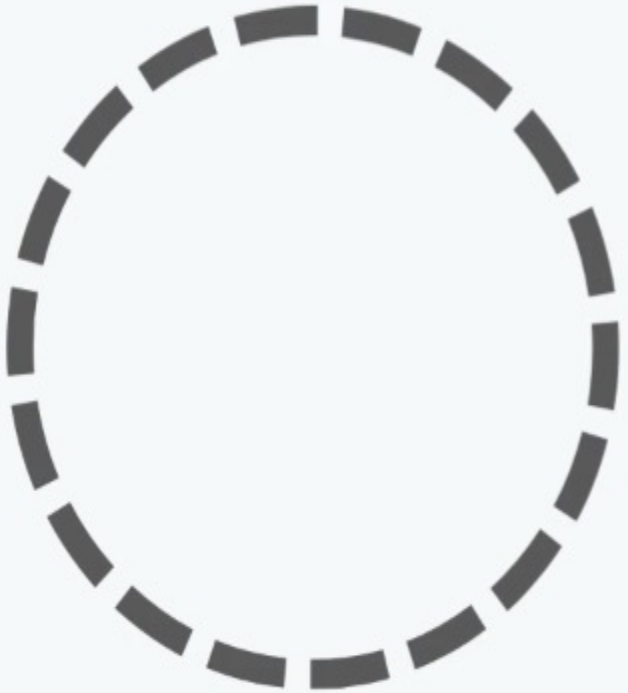
Similarity



3

Closure

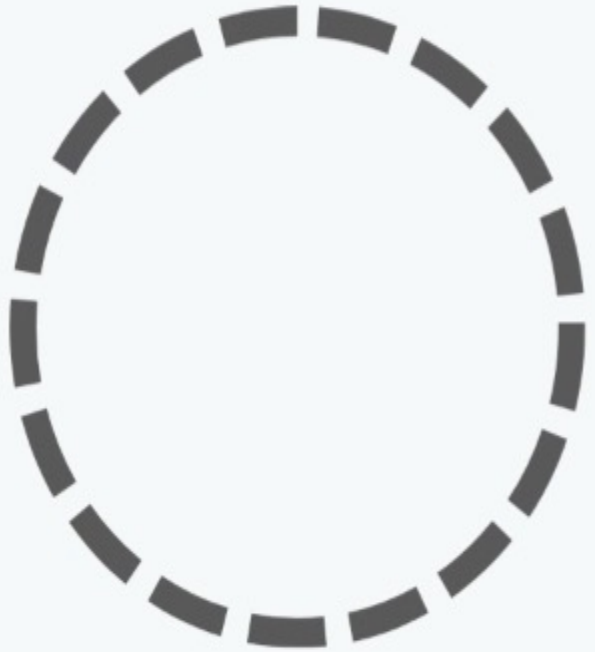
Our minds tend to complete **incomplete shapes or patterns**, filling in gaps to perceive **whole familiar objects**.

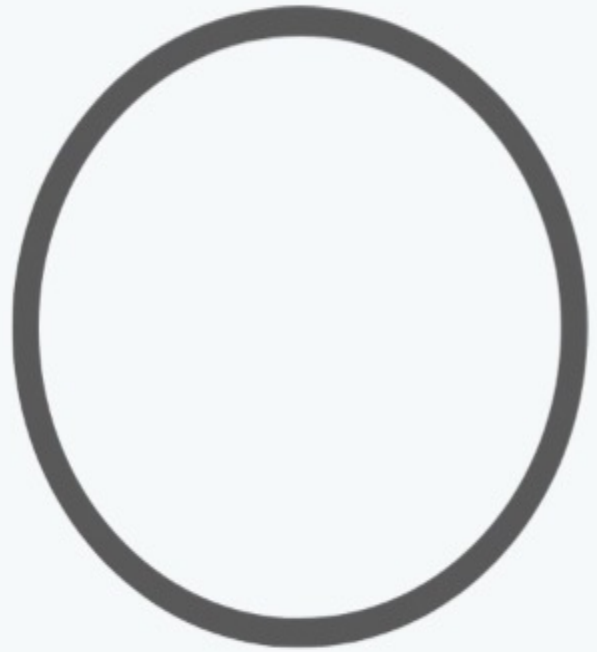


3

Closure

Even though this figure is segmented, we still interpret it as a circle.

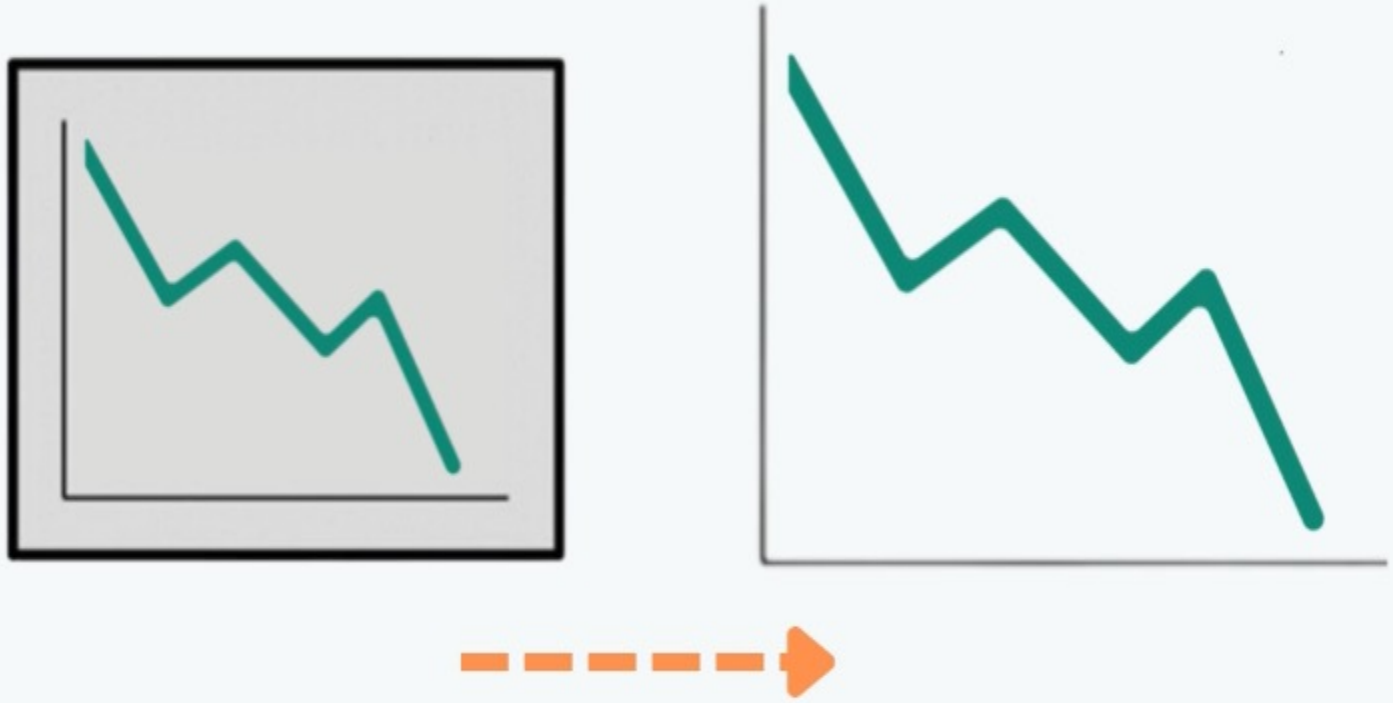




3

Closure

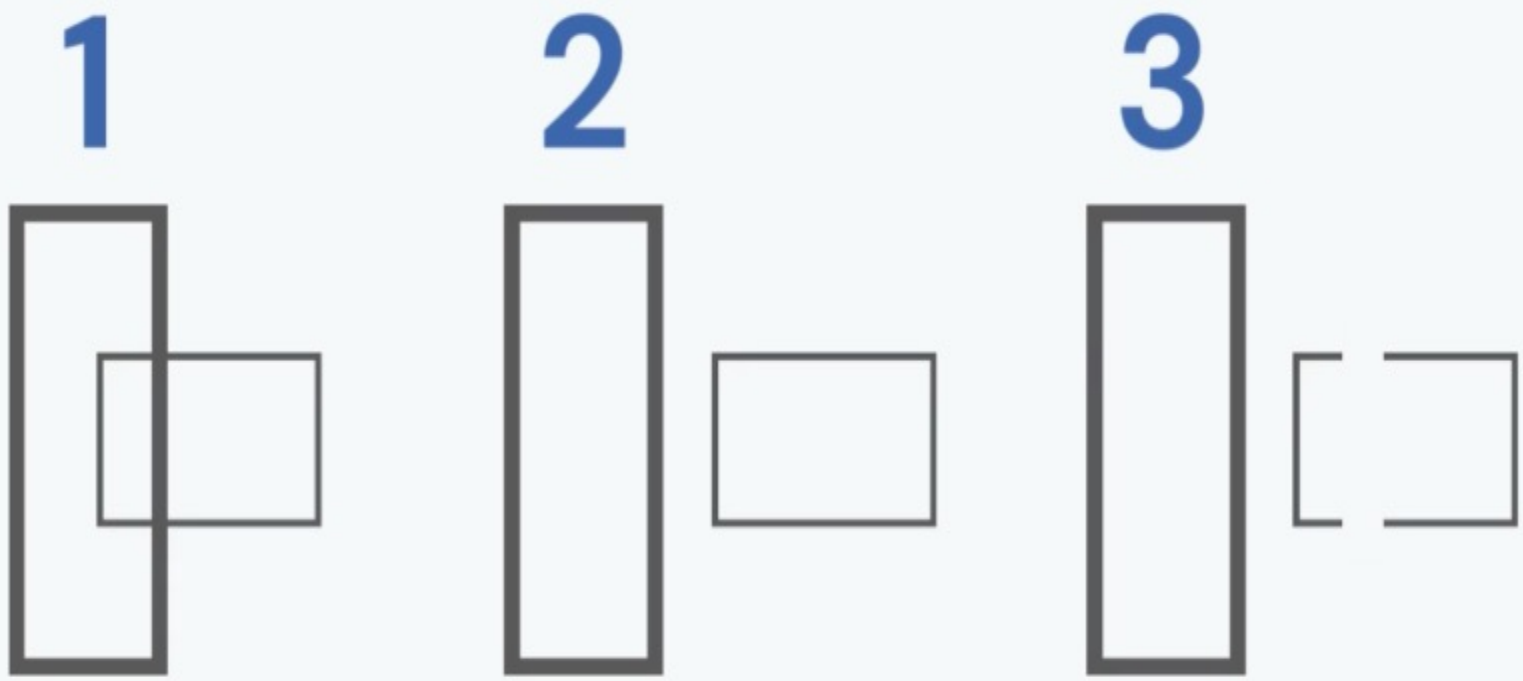
Remove chart borders and background shading, but graph will still appear as a **cohesive entity within a box**.



4

Continuity

When looking at objects, elements that form **smooth and continuous lines or curves** are seen as belonging together.

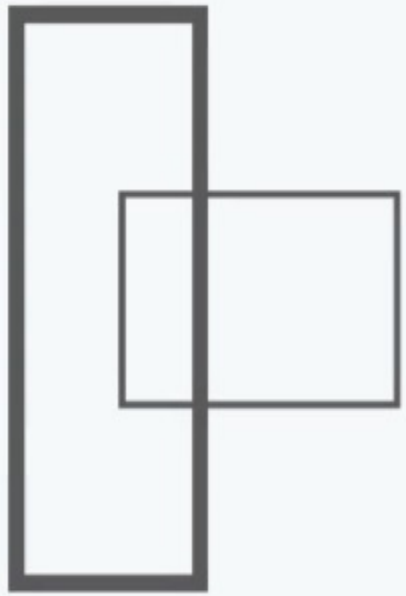


4

Continuity

Even when overlapped, we perceive them as **two distinct rectangles,** because the elements have **continuous lines.**

1

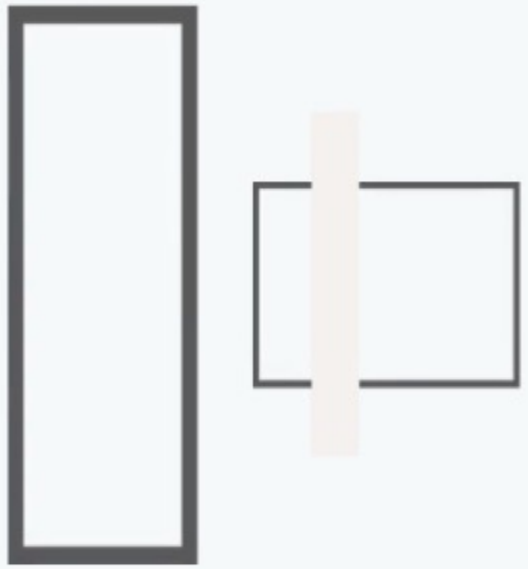


Even though there is a break in one of the rectangles, we can still assume that **the shape is continuous.**

4

Continuity

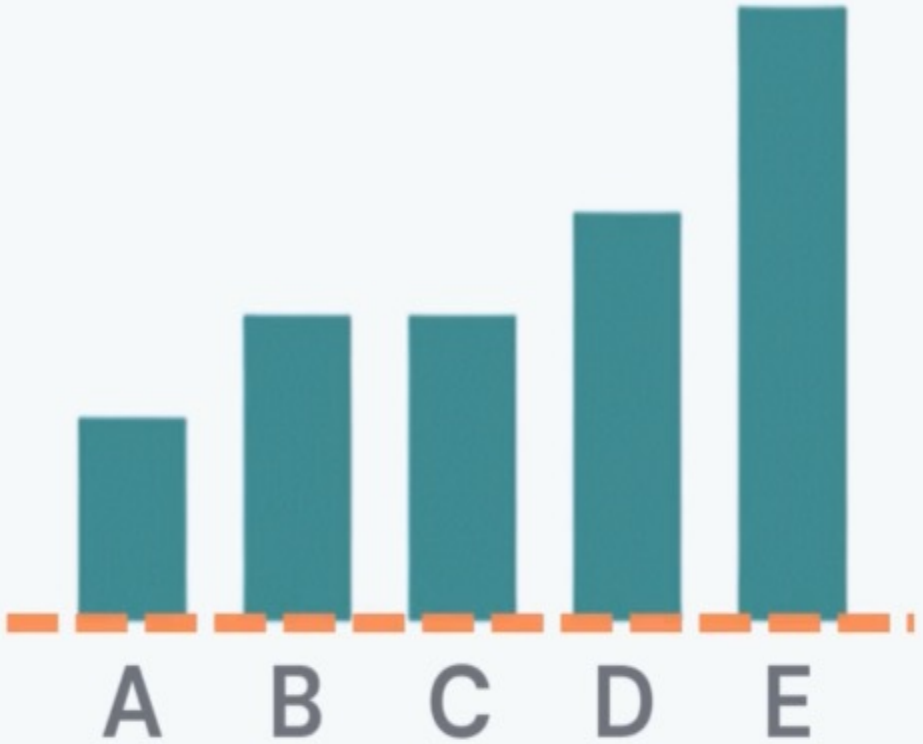
3



No x-axis, but we can still see the bars aligned because of **consistent white space between labels and data.**

4

Continuity



No x-axis, but we can still see the bars aligned because of **consistent white space between labels and data.**

4

Continuity

Because of the principle of continuity, there is **no need to put borders** around the chart to signify the axes.

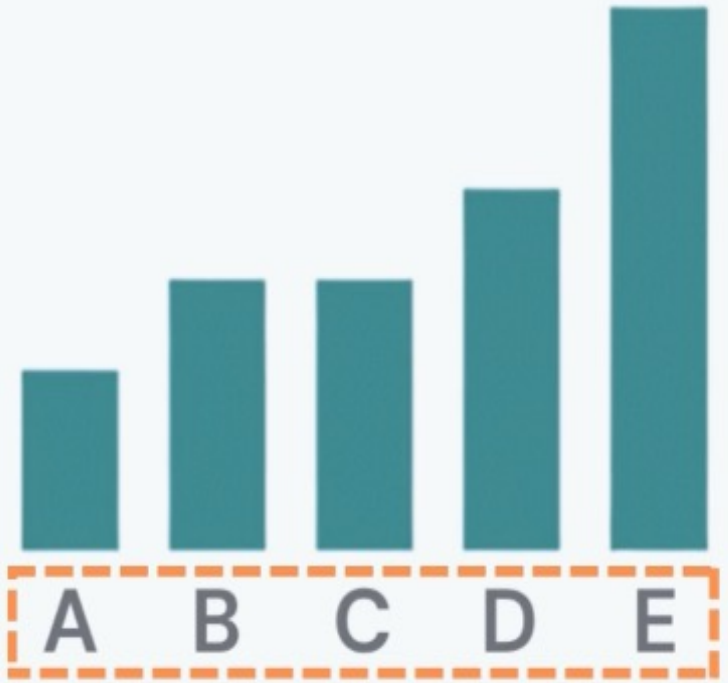
4

Continuity

Data labels can be used in place of axes or gridlines, making it easier to understand **without having to estimate values.**

4

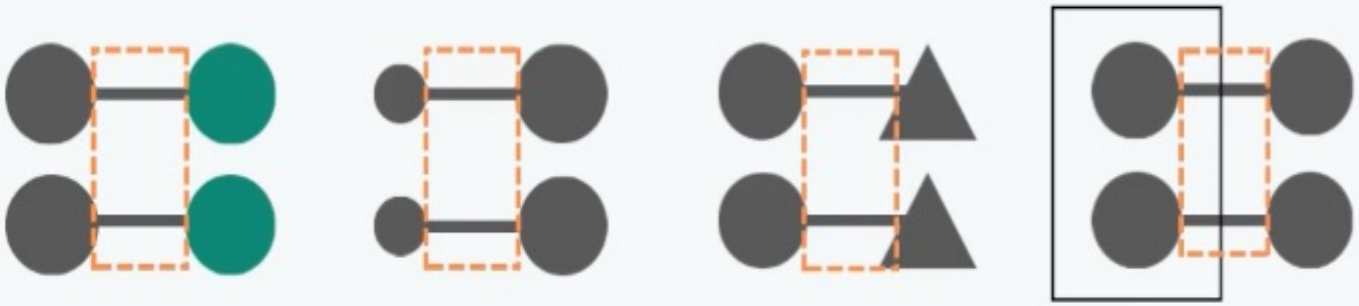
Continuity



5

Connection

Objects that are **physically connected** are part of a group.



Stronger association than similar color, size, or shape.

We use this principle in line graphs to show which data points belong to the same data series.

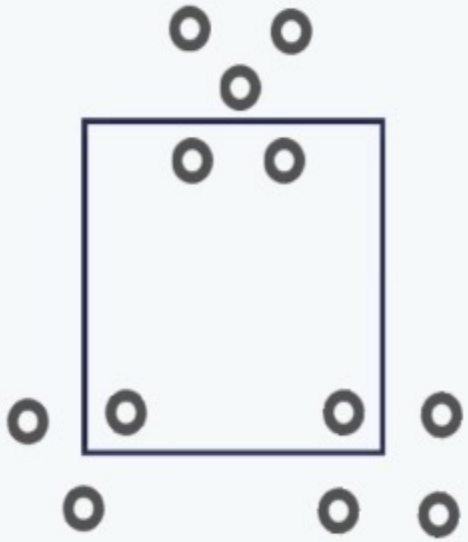
5

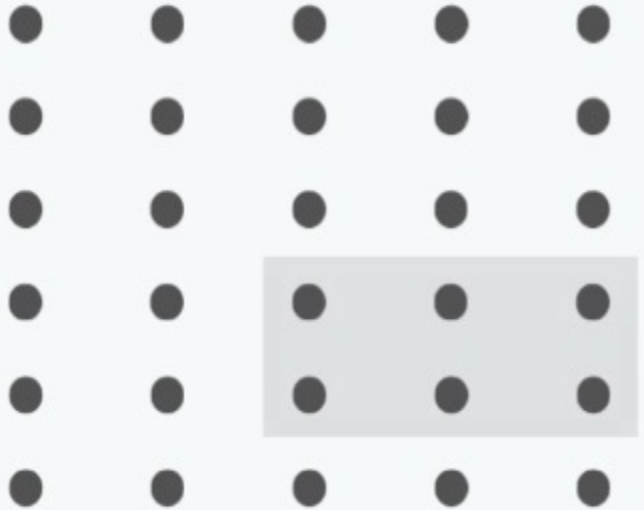
Connection

Objects that are **physically enclosed together** (by a shape or line) are part of the same group.

6

Enclosure

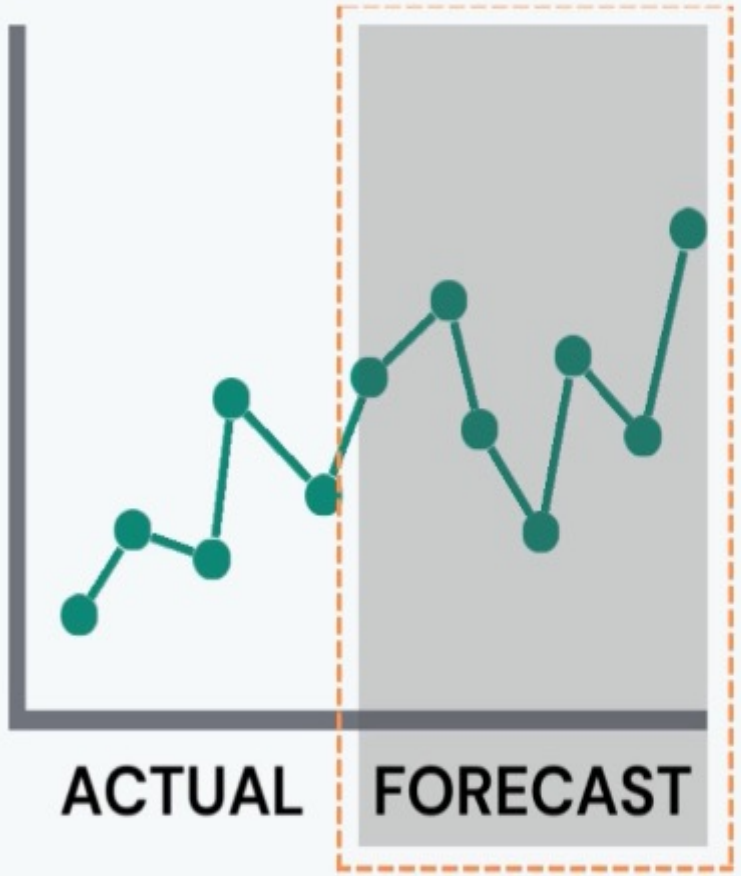




6

Enclosure

Enclosure is used to distinguish the area containing "**forecast**" from "**actual.**"



Gestalt Principles of Visual Grouping

(Wertheimer, Kohler, and Koffka, 1923)

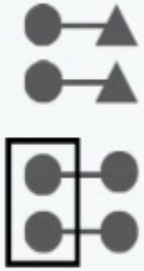
Proximity

Similarity

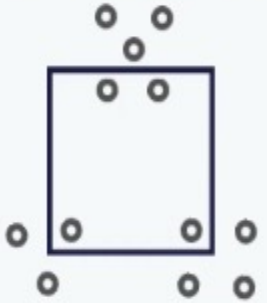
Closure

Continuity

Connection



Enclosure



Secrets to Effective Visuals

B. Direct Your Audience's Focus: Pre-Attentive Properties

"The greatest value of a picture is when it forces us to **notice what we never expected to see**."

John Tukey

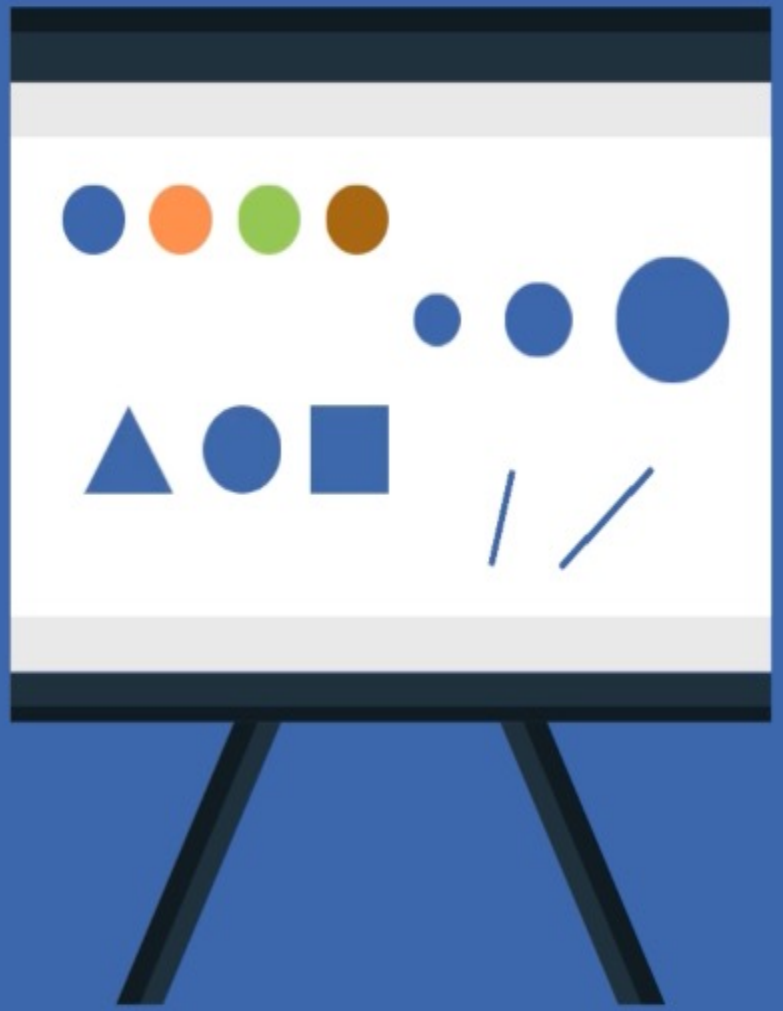
Father of Exploratory Data Analysis

Quick Visual Cues

Pre-Attentive Properties

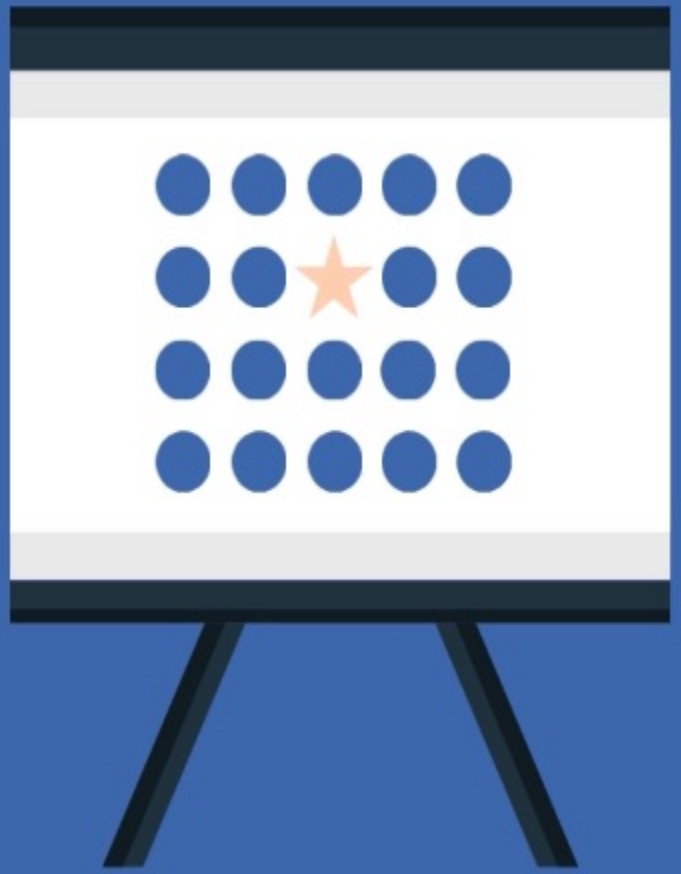
Visual characteristics that our brains can **quickly** and **automatically perceive** without conscious effort.

Pre-Attentive Properties



- Color
- Size
- Orientation
- Shape

Pre-Attentive Properties



- Stand out from surrounding information, attracting immediate attention
- We notice things even before we pay close attention
- Direct audience's focus; visualize and communicate information efficiently

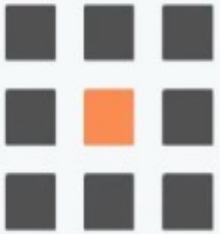
Bottomline:

Pre-attentive properties of visuals help users find what they **never expected to see.**

Common Pre-Attentive Properties

Effective Data Storytelling, Dykes (2019)

Color



Orientation

Size

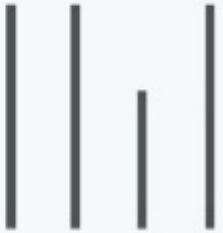
Intensity

Position and Alignment

Shape

Motion

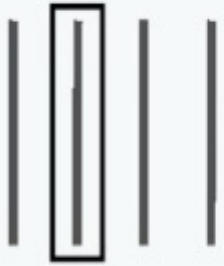
Length



Line Width

Curvature

Enclosure



Added Marks

Common Pre-Attentive Properties

Effective Data Storytelling, Dykes, (2019)

Color

highlight and categorize data

Common Pre-Attentive Properties

Effective Data Storytelling, Dykes, (2019)

Orientation

variations in element directions or angles

Common Pre-Attentive Properties

Effective Data Storytelling, Dykes, (2019)

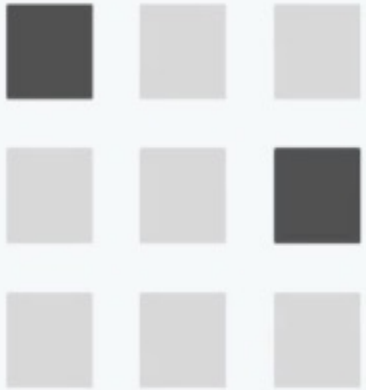
Size

differences in element dimensions
for importance or quantity

Common Pre-Attentive Properties

Effective Data Storytelling, Dykes, (2019)

Intensity



brightness or contrasts to highlight distinctions

Common Pre-Attentive Properties

Effective Data Storytelling, Dykes, (2019)

Position and Alignment

spatial arrangements to establish relationships

Common Pre-Attentive Properties

Effective Data Storytelling, Dykes, (2019)

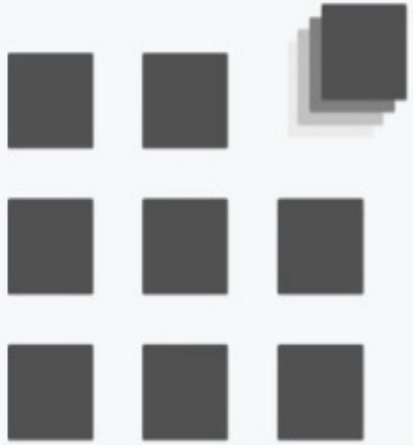
Shape

differentiates elements based on their forms

Common Pre-Attentive Properties

Effective Data Storytelling, Dykes, (2019)

Motion

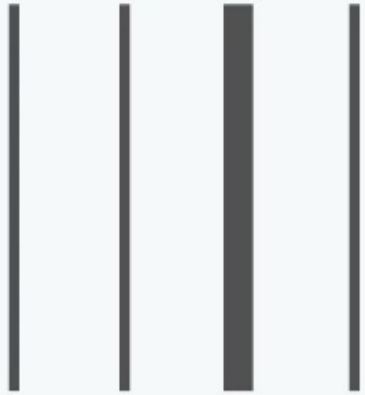


shows movement or change in the data

Common Pre-Attentive Properties

Effective Data Storytelling, Dykes, (2019)

Line Width

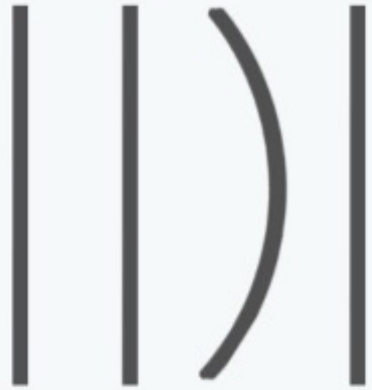


differences in line thickness for emphasis or grouping

Common Pre-Attentive Properties

Effective Data Storytelling, Dykes, (2019)

Curvature



variations in element curves

Common Pre-Attentive Properties

Effective Data Storytelling, Dykes, (2019)

Enclosure

elements enclosed by shapes for grouping

Common Pre-Attentive Properties

Effective Data Storytelling, Dykes, (2019)

Added Marks

extra visual elements that provide context

Common Pre-Attentive Properties

Effective Data Storytelling, Dykes, (2019)

Color

Orientation

Size

Intensity

Position and Alignment

Shape

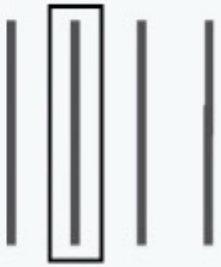
Motion

Length

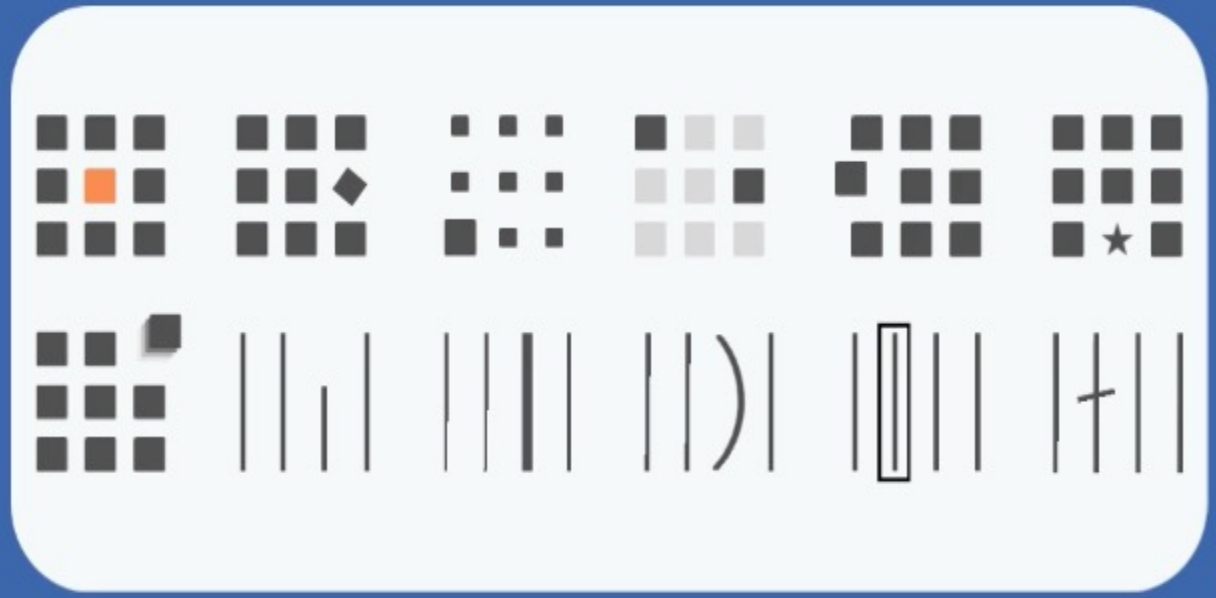
Line Width

Curvature

Enclosure



Added Marks



- Enhance effectiveness of your data story
- Direct audience’s attention to key visual elements
- Make the story's main points clear, engaging, and easy to digest

What are the pre-attentive properties in the charts I'm creating, and how can I use them to improve my data story?

VISUAL HIERARCHY

VISUAL HIERARCHY

The **arrangement and organization** of elements in a design or layout to create a **clear and organized visual structure**.

VISUAL HIERARCHY

Guide the viewer's eye

Effectively communicate information

Create a visually appealing design

Best Ways to Build
VISUAL HIERARCHIES

HOW TO BUILD VISUAL HIERARCHY

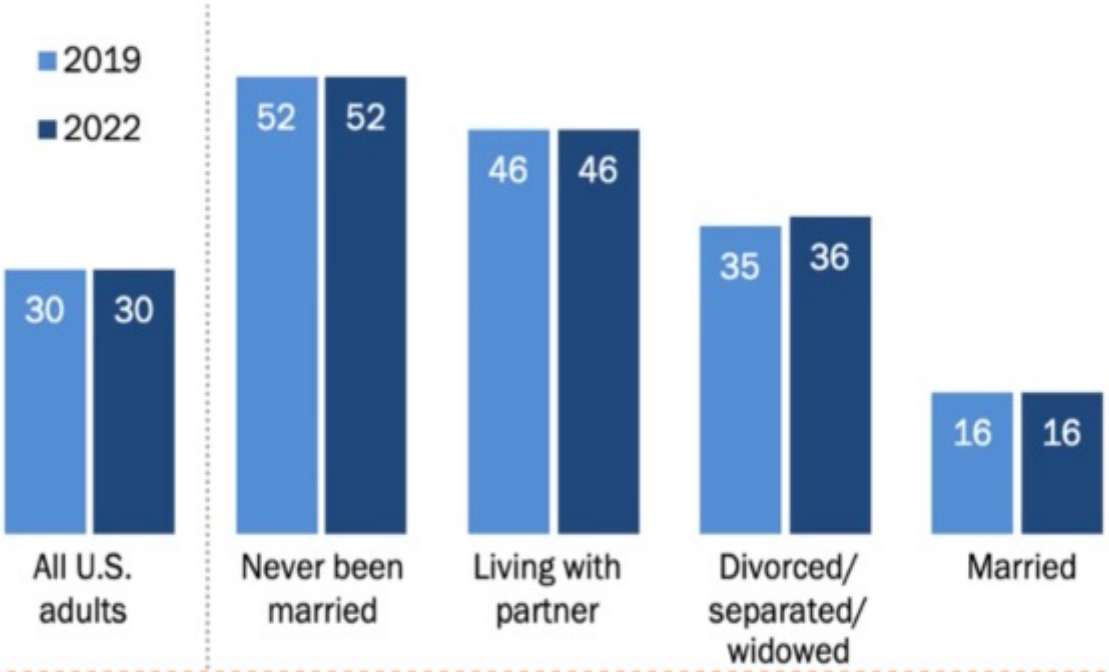
1. Placement of elements from **top to bottom**

1

The share of Americans who have ever used a dating site or app has held steady since 2019

2

% of U.S. adults, by marital status, who say they have ever used a dating site or app



3

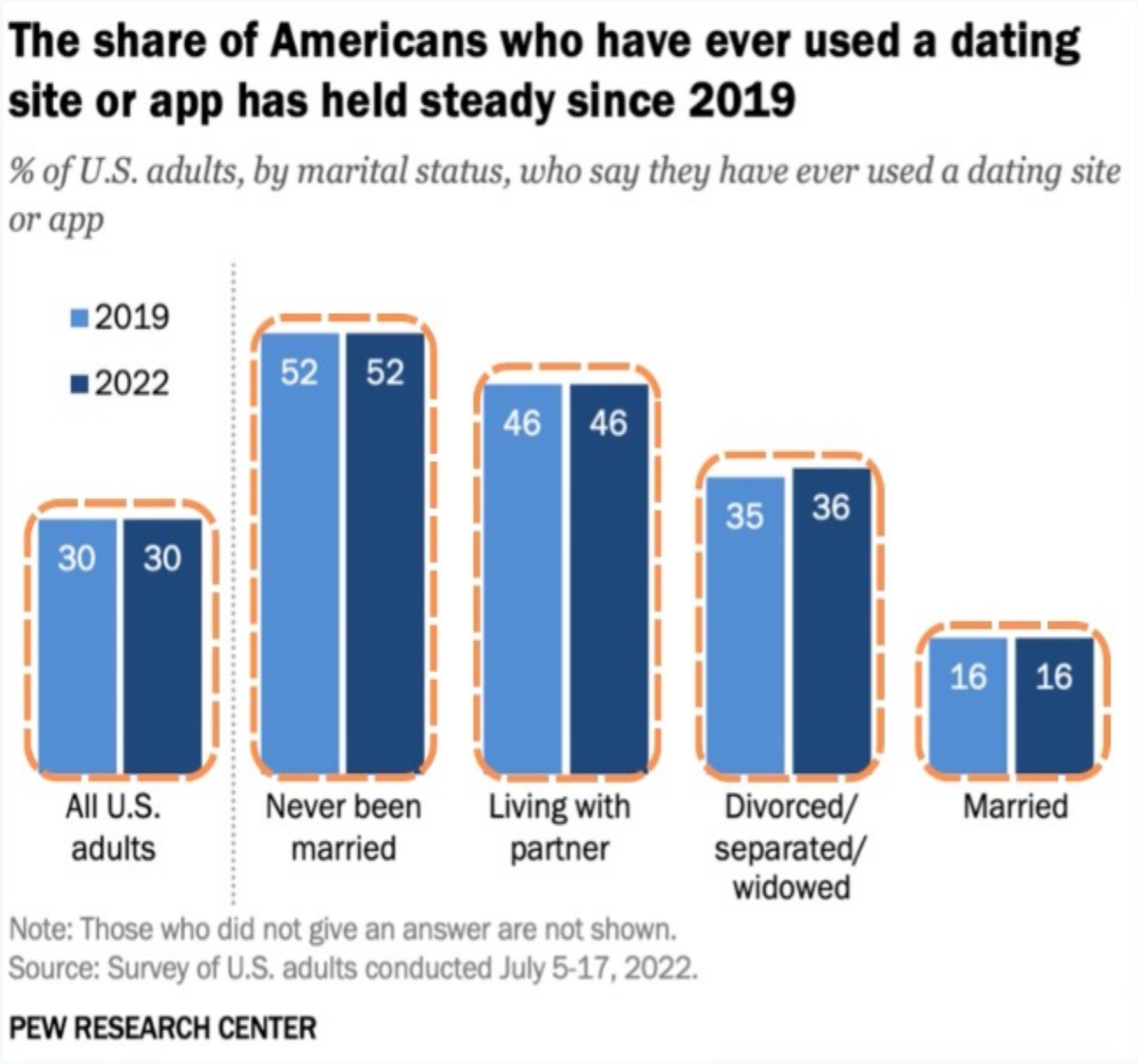
Note: Those who did not give an answer are not shown.
Source: Survey of U.S. adults conducted July 5-17, 2022.

PEW RESEARCH CENTER

4

HOW TO BUILD VISUAL HIERARCHY

1. Placement of elements from **top to bottom**
2. **Grouped** elements

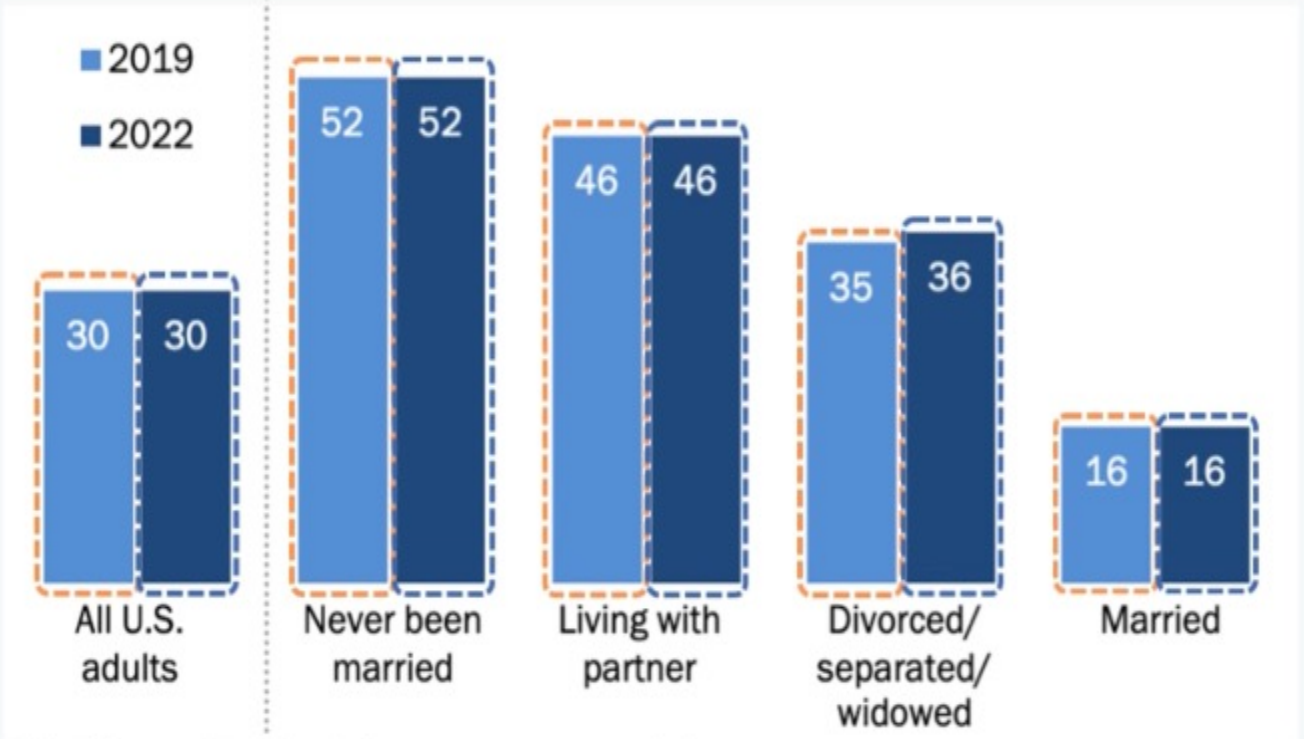


HOW TO BUILD VISUAL HIERARCHY

1. Placement of elements from **top to bottom**
2. **Grouped** elements
3. Distinct **use of colors**

The share of Americans who have ever used a dating site or app has held steady since 2019

% of U.S. adults, by marital status, who say they have ever used a dating site or app



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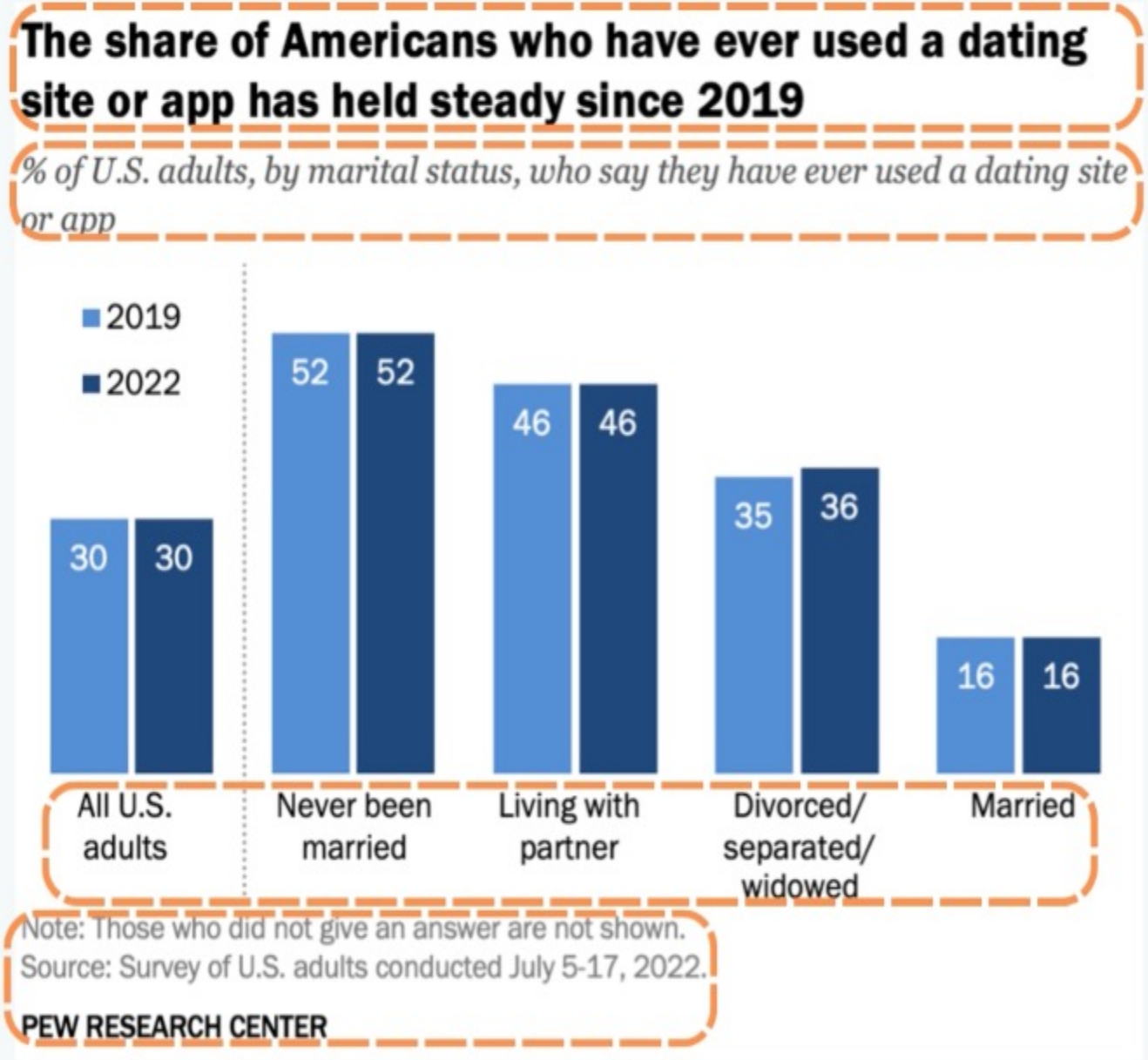
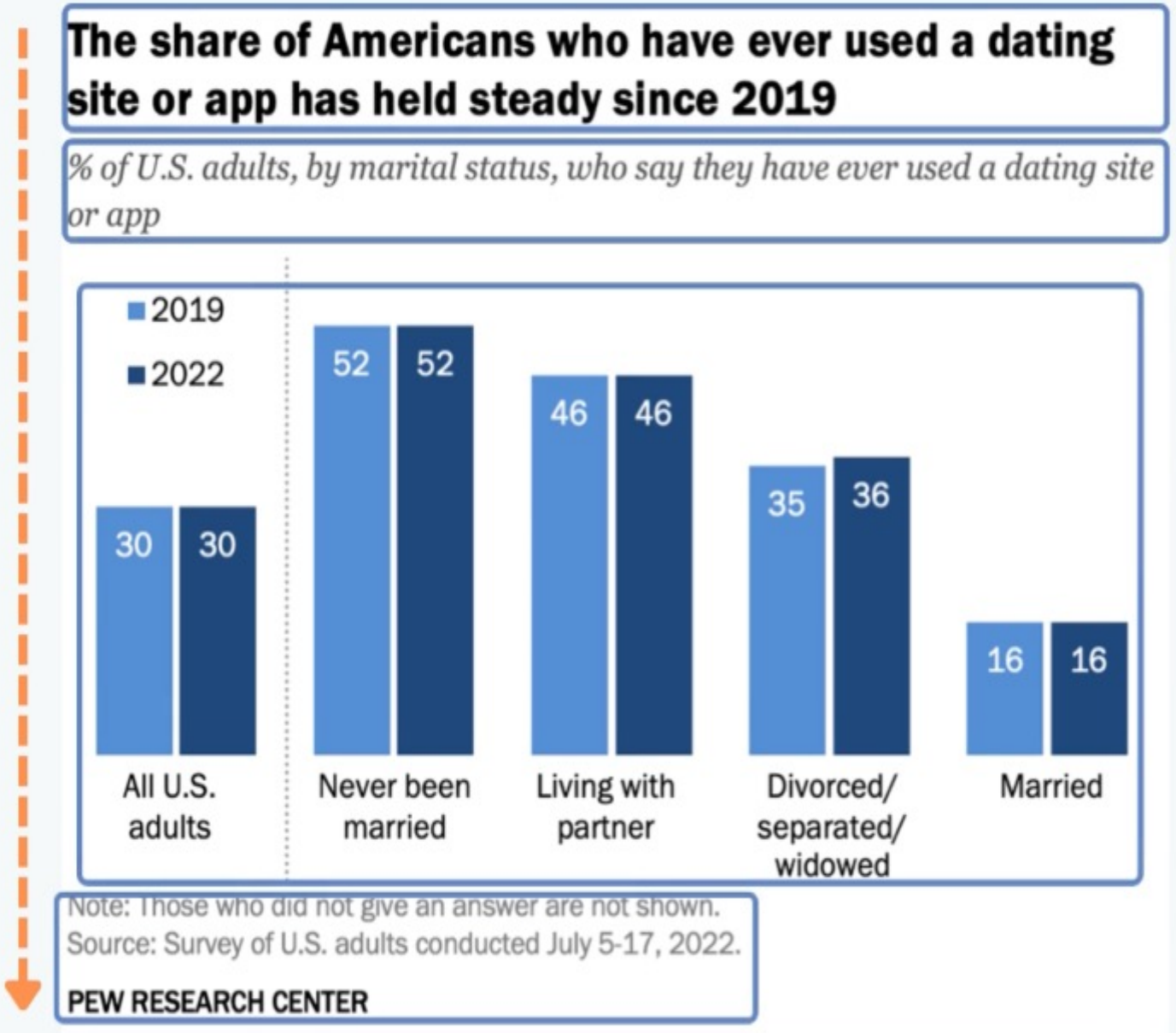
HOW TO BUILD VISUAL HIERARCHY

1. Placement of elements from **top to bottom**
2. **Grouped** elements
3. Distinct **use of colors**
4. Varied **font sizes** and **styles**



HOW TO BUILD VISUAL HIERARCHY

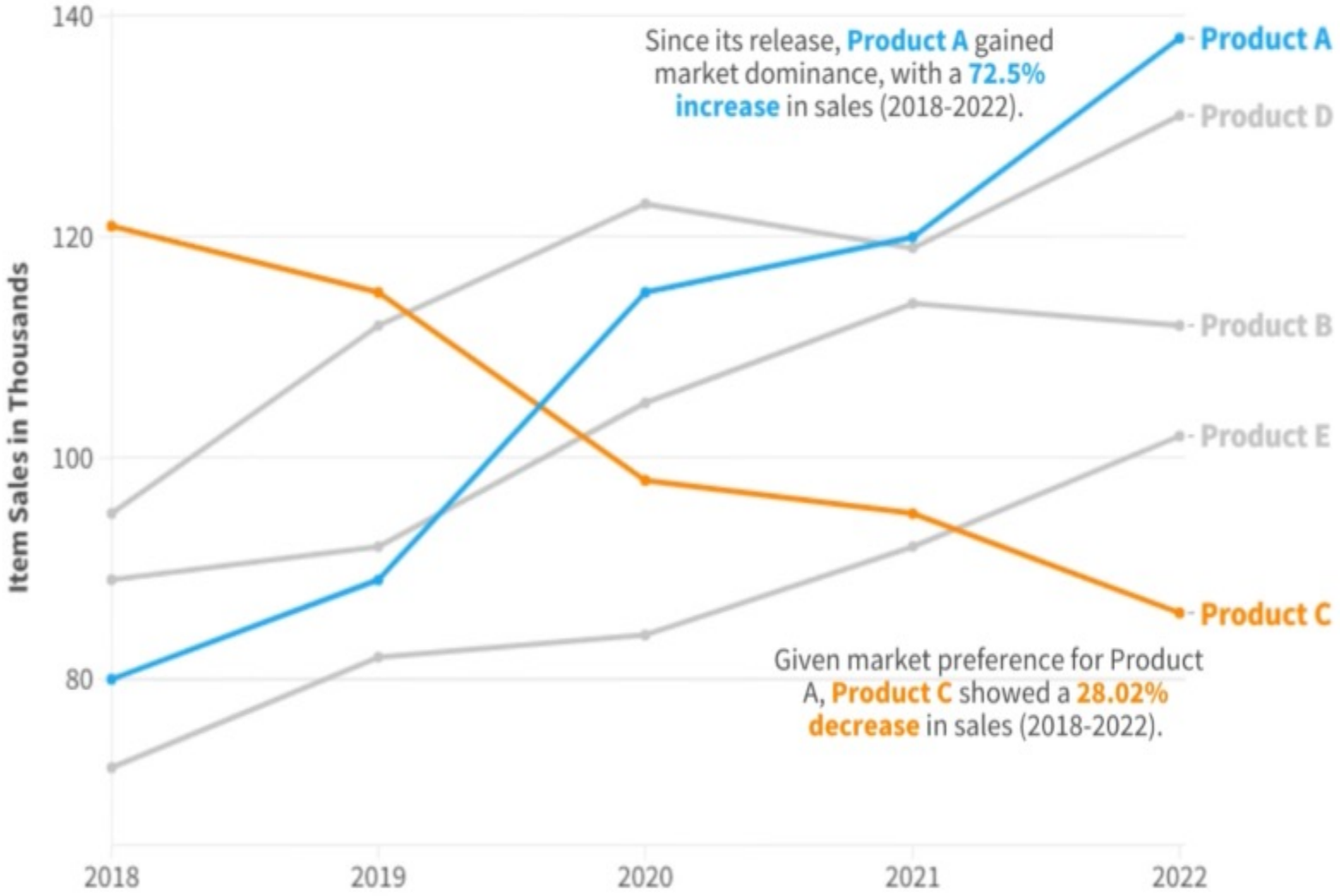
1. Placement of elements from **top to bottom**
2. **Grouped** elements
3. Distinct **use of colors**
4. Varied **font sizes** and **styles**
5. Diverse **visual techniques**



1 Bold title on top

Product A sales skyrocketed, ultimately surpassing all other products by 2022.

*The explosive growth of **Product A** triggered significant sales decline of previously best-selling **Product C**, making it the lowest-selling product by 2022.*



1. Bold title on top
2. Smaller font subtitle

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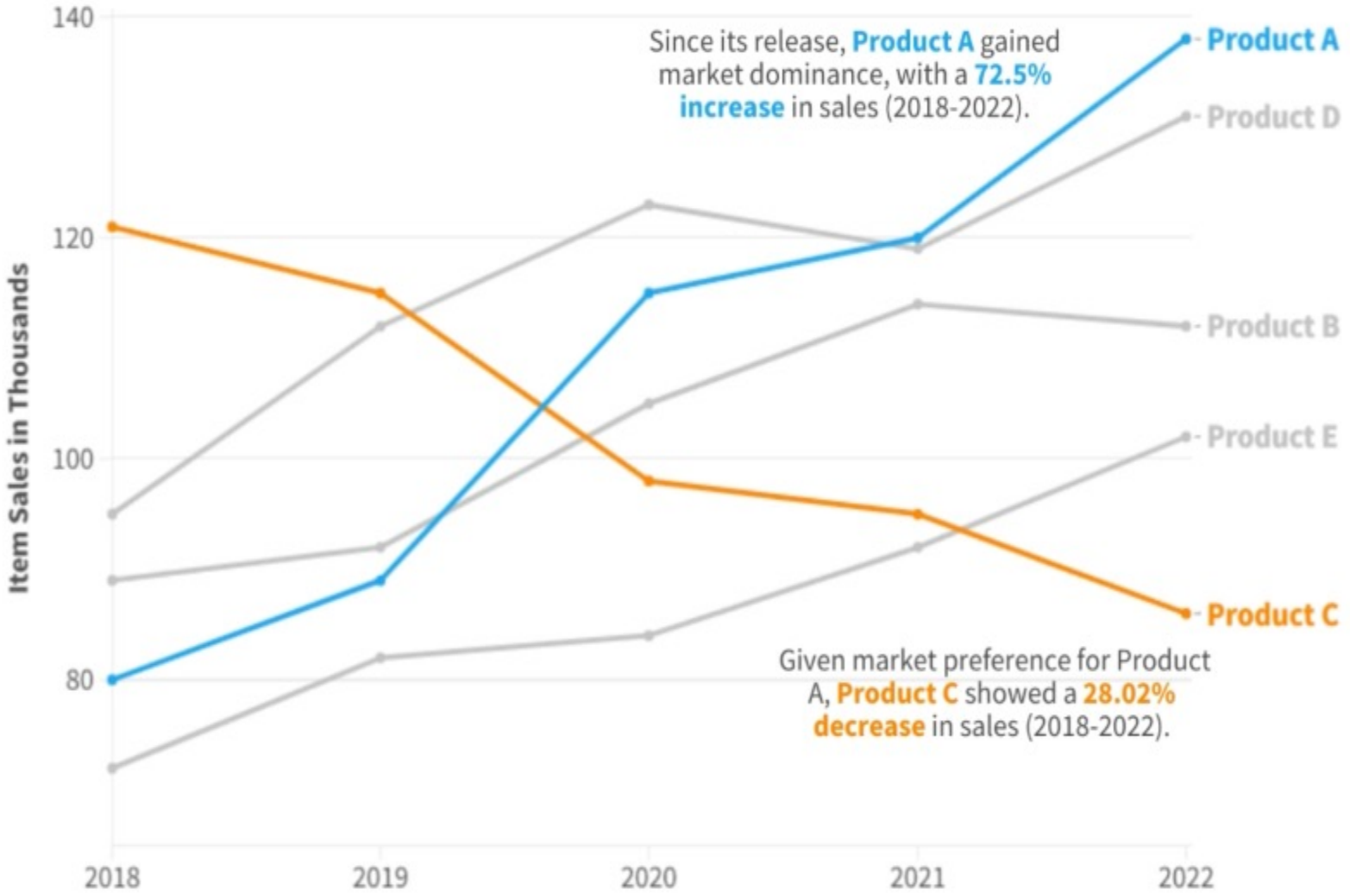
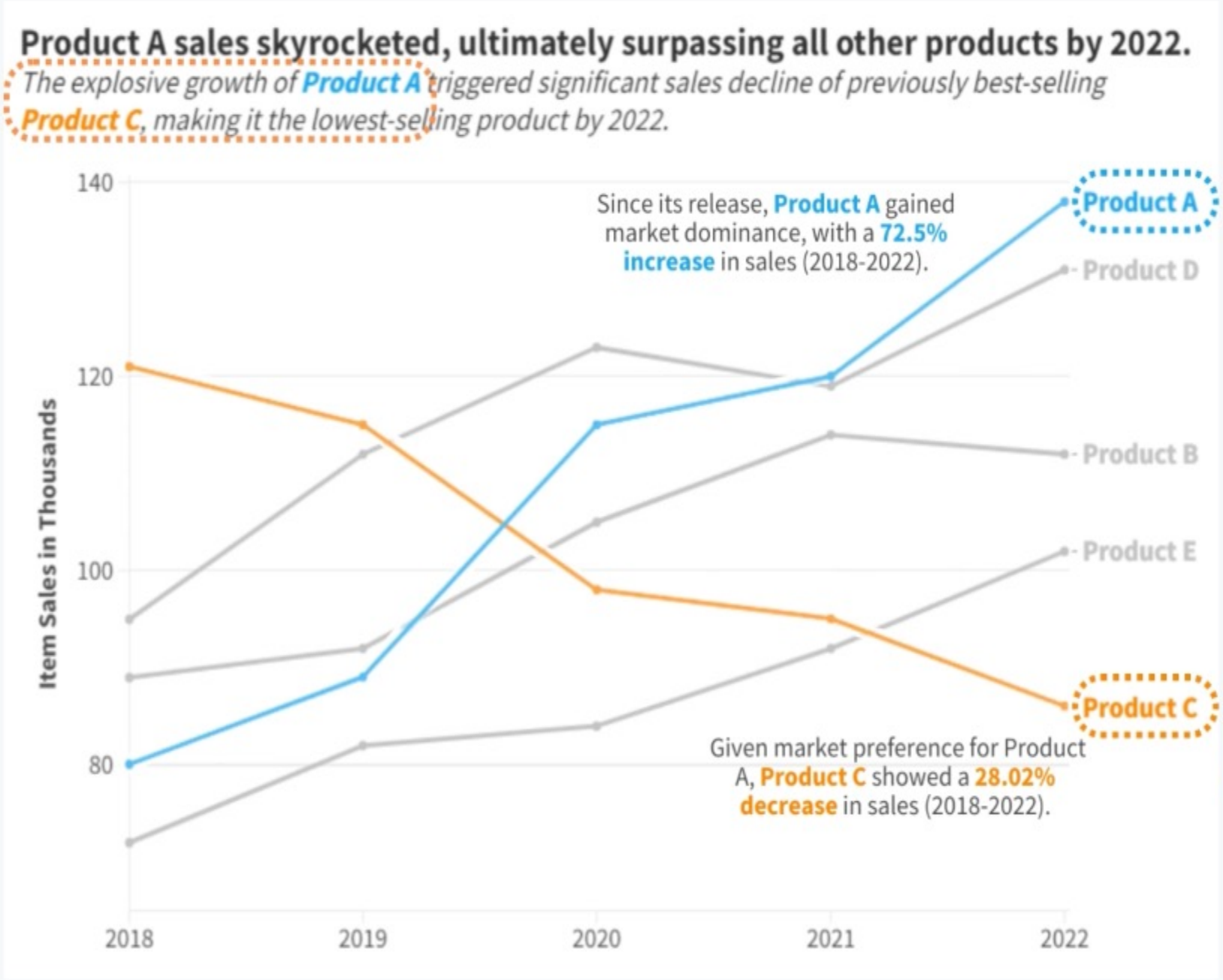
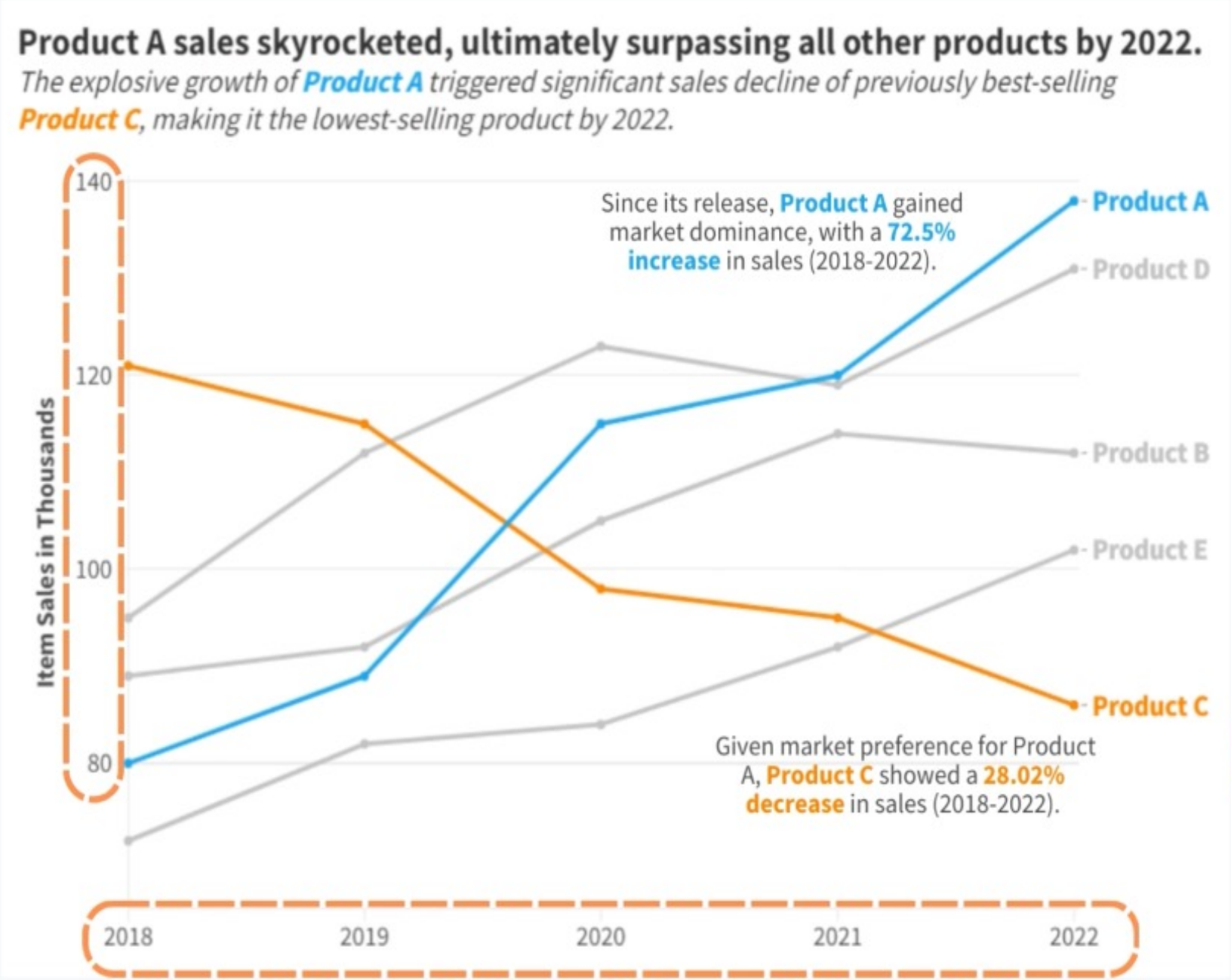


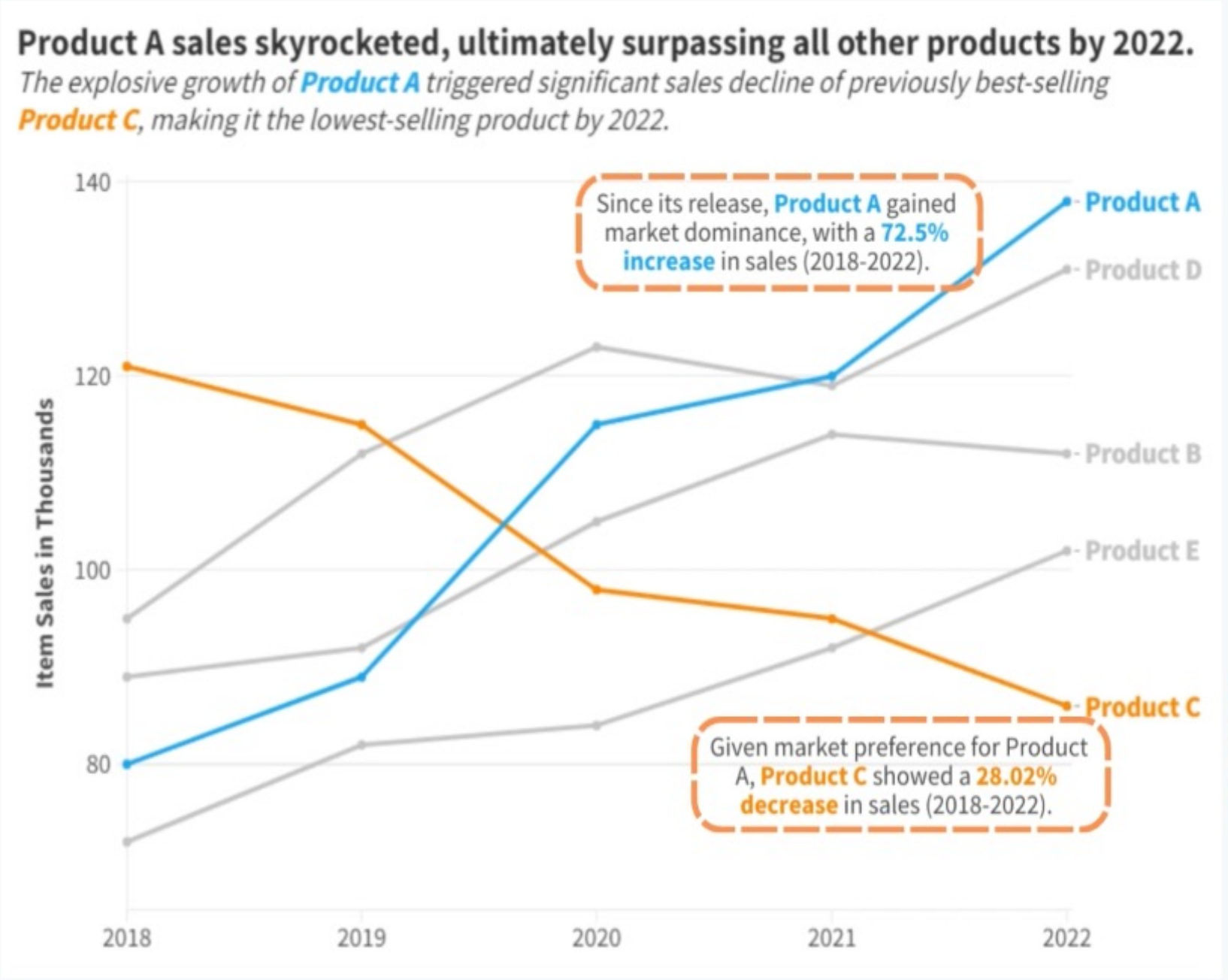
1. Bold title on top
2. Smaller font subtitle
3. Blue and orange text and lines



1. Bold title on top
2. Smaller font subtitle
3. Blue and orange text and lines
4. Smaller axis labels

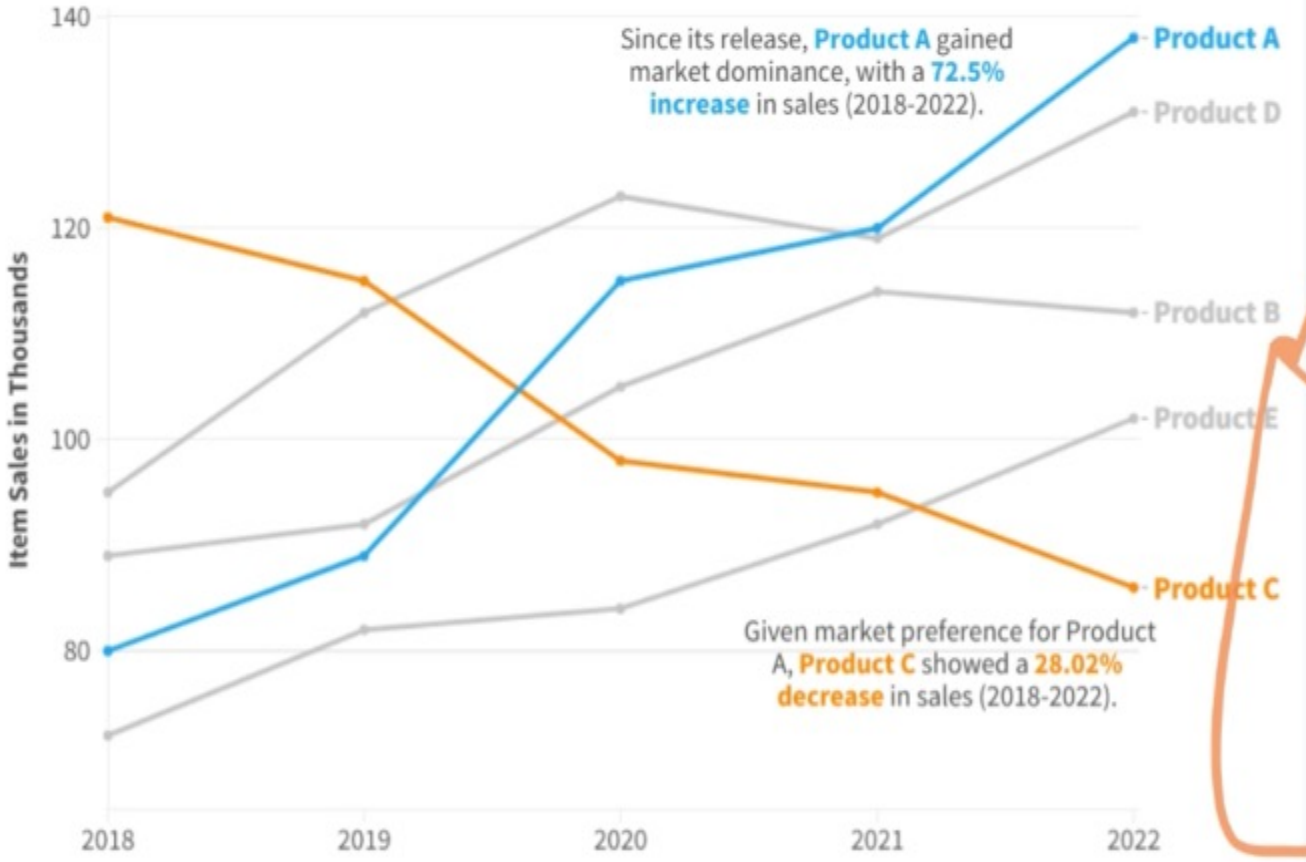


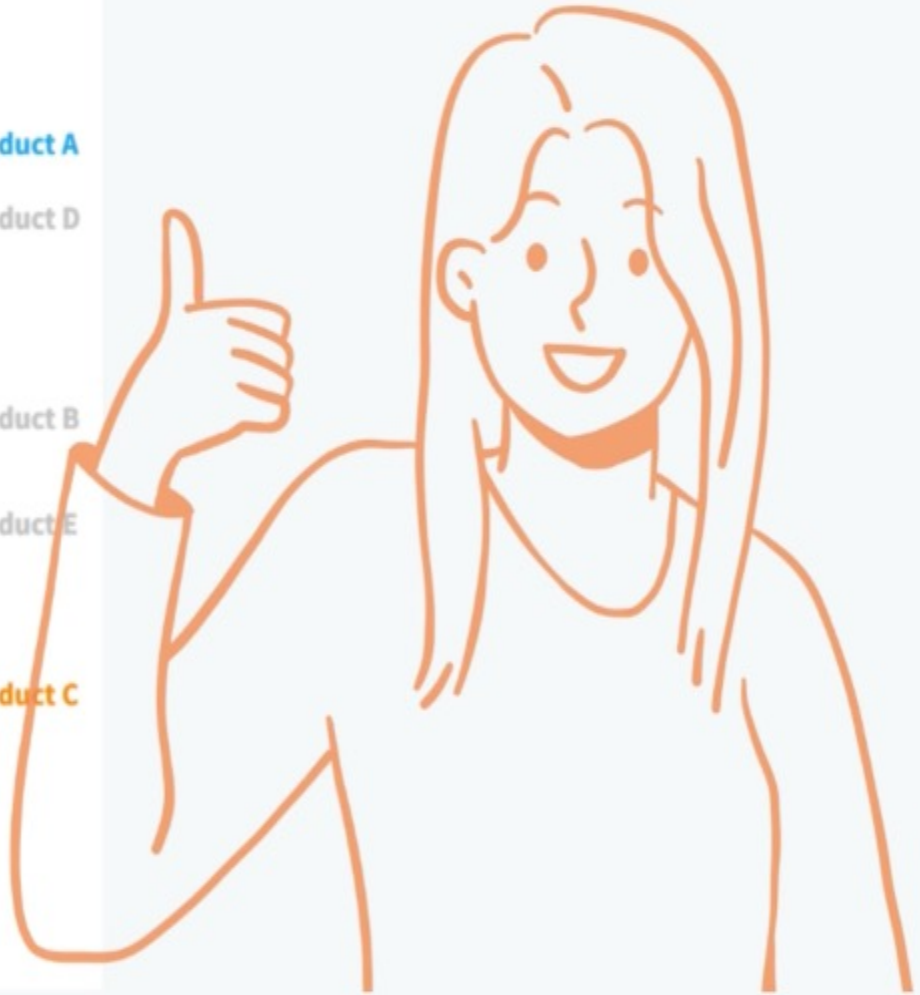
1. Bold title on top
2. Smaller font subtitle
3. Blue and orange text and lines
4. Smaller axis labels
5. Annotations for key insights



Product A sales skyrocketed, ultimately surpassing all other products by 2022.

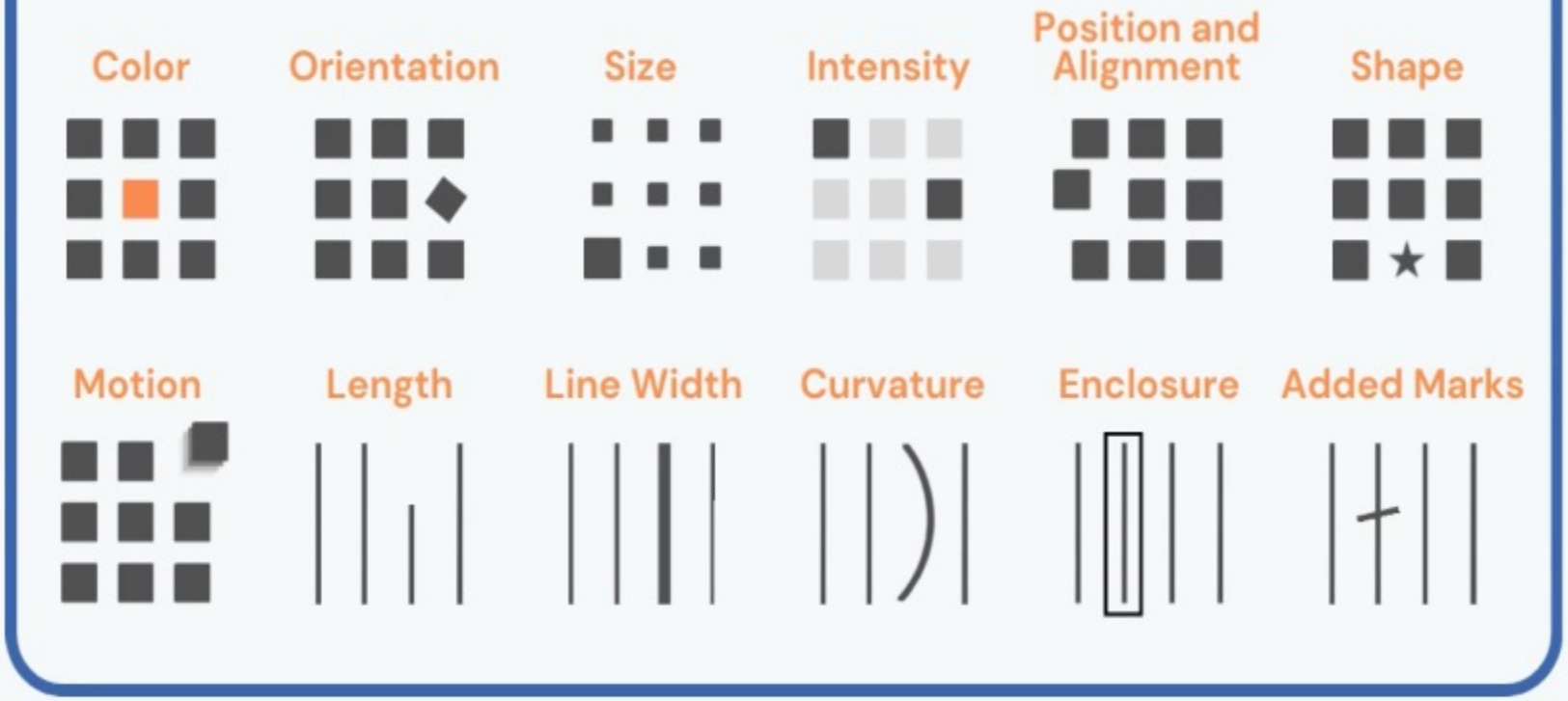
*The explosive growth of **Product A** triggered significant sales decline of previously best-selling **Product C**, making it the lowest-selling product by 2022.*





Visual Hierarchy

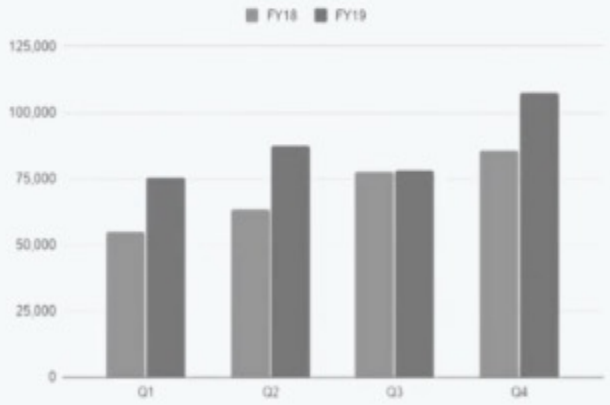
Pre-Attentive Properties

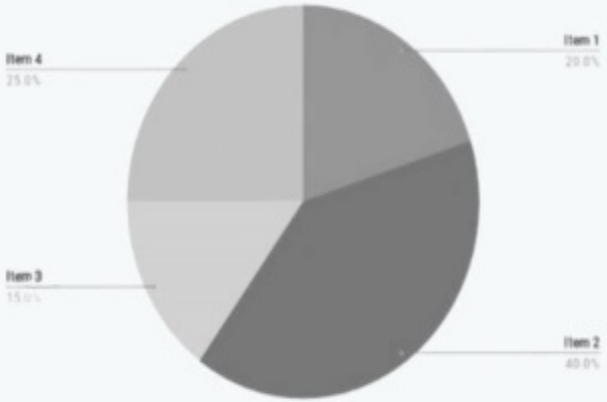


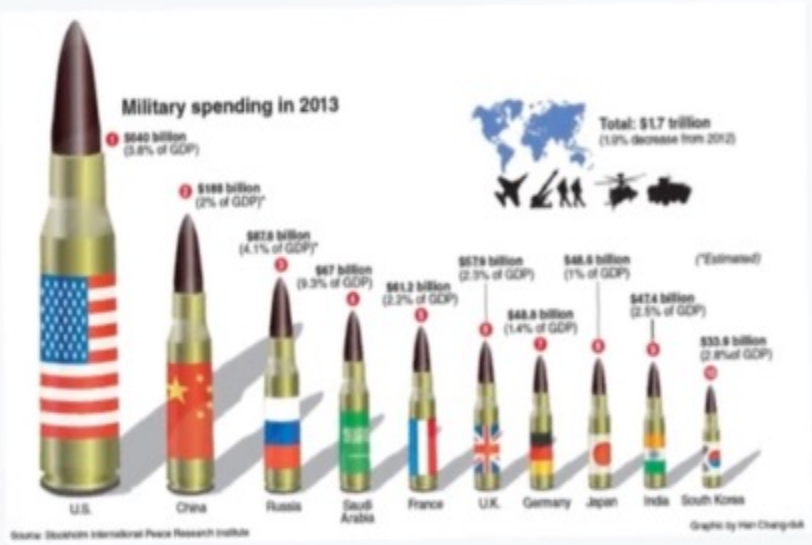
Secrets to Effective Visuals

C. Minimize Chart Junk

Data is boring,
so I need to make an attractive visual to grab the audience's attention.

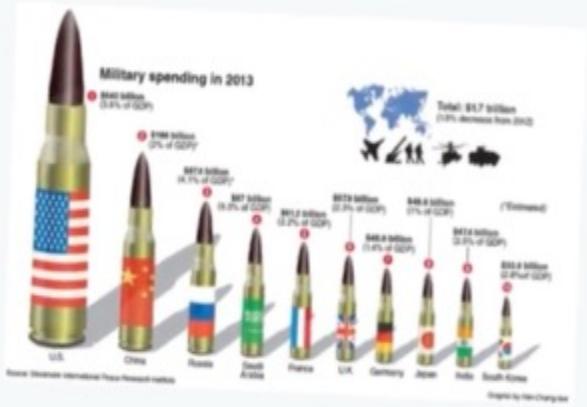





Military spending in 2013
$640 billion
(3.8% of GDP)
$188 billion
(2% of GDP)*
$87.8 billion
(4.1% of GDP)*
$67 billion
(9.3% of GDP)
$61.2 billion
(2.2% of GDP)
$57.9 billion
(2.5% of GDP)
$48.8 billion
(1.4% of GDP)
$48.6 billion
(1% of GDP)
$47.4 billion
(2.5% of GDP)
$33.9 billion
(2.8%of GDP)
Total: $1.7 trillion
(1.9% decrease from 2012)
("Estimated)
U.S.
China
Russia
Saudi Arabia
France
U.K.
Germany
Japan
India
South Korea
Source: Stockholm International Peace Research Institute
Graphic by Han Chang-duk


HOW LONG WILL IT LAST?

Unnecessary Clutter!



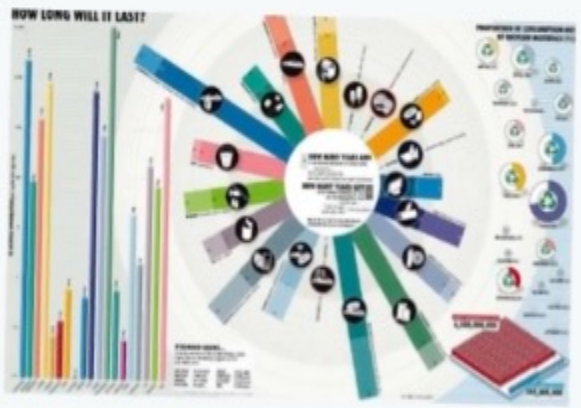


CHART JUNK

Visual elements in charts and graphs that are **NOT NECESSARY** to comprehend the information represented.

✗ Distract the viewer

✗ Waste space or graphics

Common Forms of Chart Junk

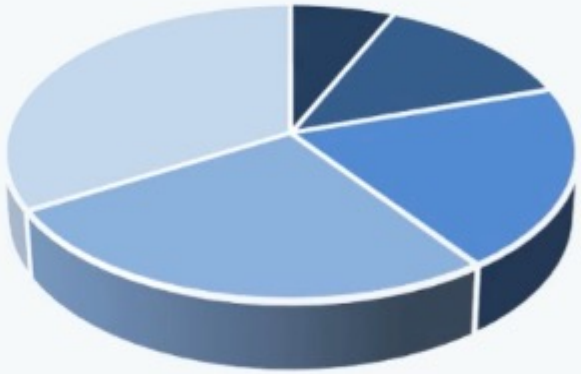
Effective Data Storytelling, Dykes, (2019)

Common Forms of Chart Junk

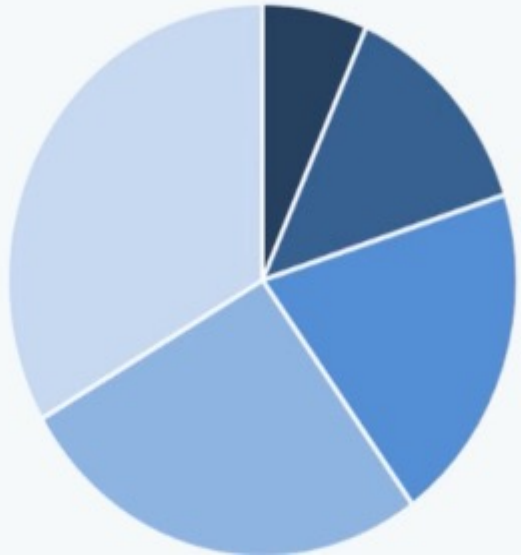
Effective Data Storytelling, Dykes, (2019)

1) 3D Effects

✗ More Chart Junk



✓ Less Chart Junk

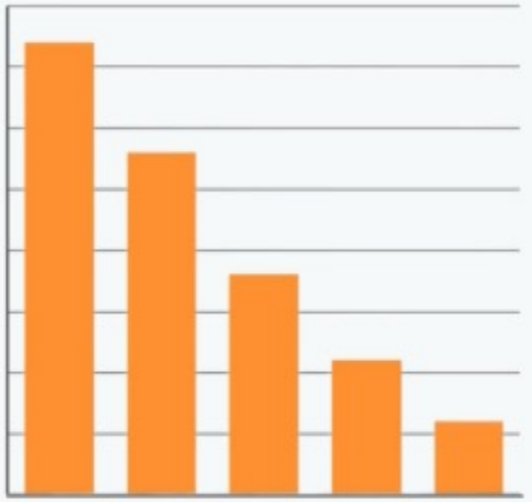


Common Forms of Chart Junk

Effective Data Storytelling, Dykes, (2019)

2) Dark Gridlines

More Chart Junk



Less Chart Junk

Common Forms of Chart Junk

Effective Data Storytelling, Dykes, (2019)

3) Nonstrategic Use of Color

✗ More Chart Junk

✓ Less Chart Junk

Common Forms of Chart Junk

Effective Data Storytelling, Dykes, (2019)

4) Overdetailed Chart Axes

✗ More Chart Junk

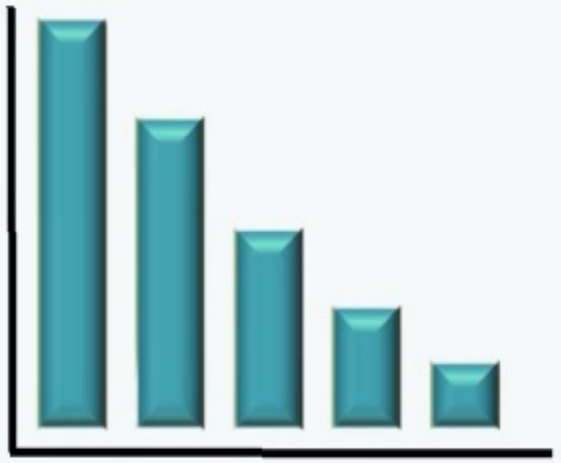
✓ Less Chart Junk

Common Forms of Chart Junk

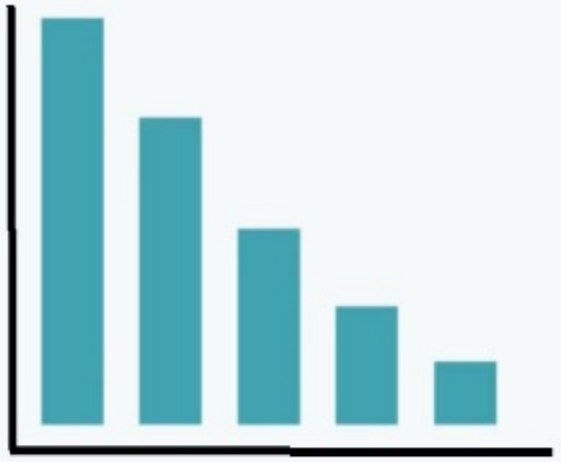
Effective Data Storytelling, Dykes, (2019)

5) Artistic Effects

✗ More Chart Junk



✓ Less Chart Junk

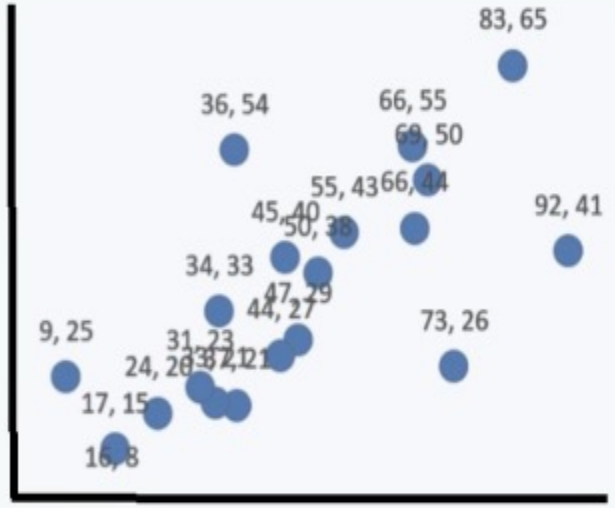


Common Forms of Chart Junk

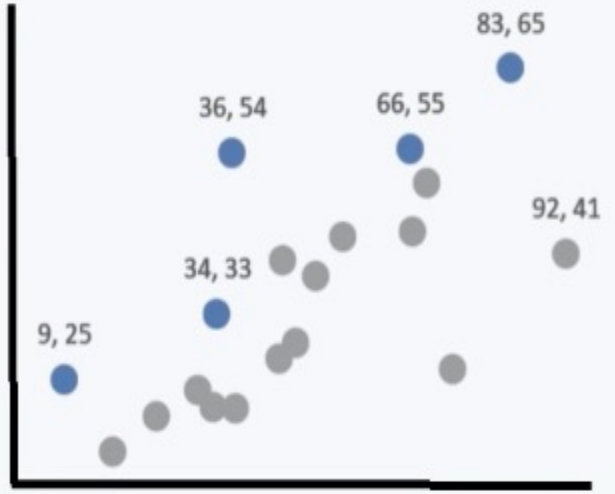
Effective Data Storytelling, Dykes, (2019)

6) Overuse of Labeling

More Chart Junk



Less Chart Junk



Remember!

Poor design burdens your audience with **unnecessary visual load**, preventing them from understanding your message.

LEARNING ROADMAP:

Navigating Your Path to Success

Course 1:
Driving Change and Action through Insight

Course 1:
Unearthing Stories in Data

Course 2:
3 C's of Building Your Data Story

Course 3:
The Value of Visuals

Course 3:
Visualizing the Story

COMPLETED

6

Course 4:
Secrets to Effective Visuals