



DATA VISUALIZATION

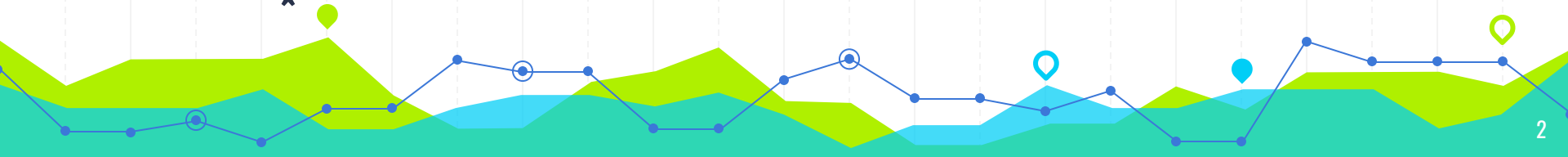
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Aram Pérez Dios - aram.perez.dios.04@ull.edu.es

INDEX

1. Introduction
2. Good practices
3. Benefits and dangers of data visualization
4. Data visualization in JS

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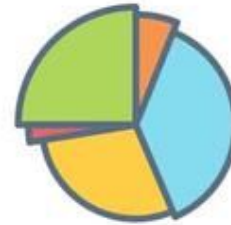
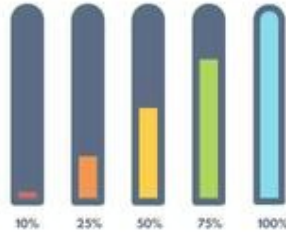


INTRODUCTION

And a bit of history

1

WHAT IS DATA VISUALIZATION



WHY IS DATA VISUALIZATION IMPORTANT

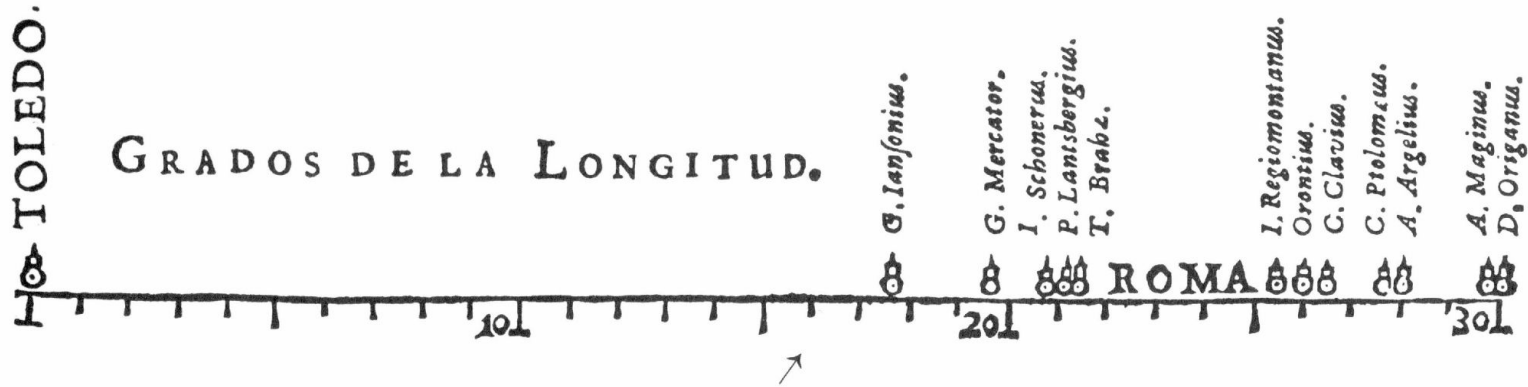
Better decision making



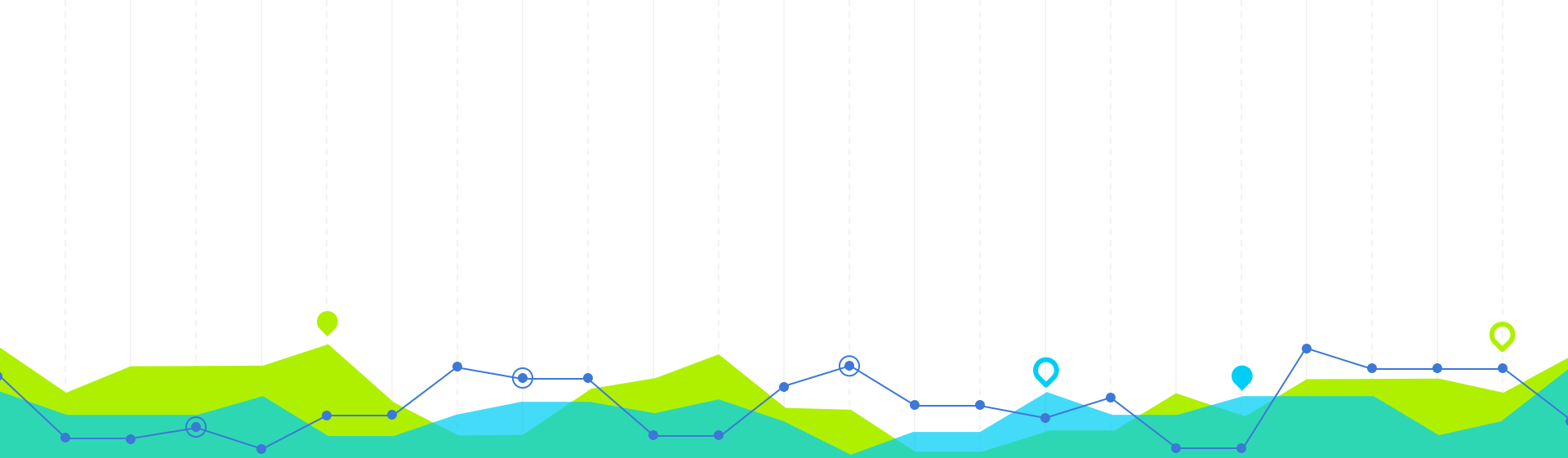
Meaningful narrative



DATA VISUALIZATION HISTORY



Michael Florent Van Langren, 1644



GOOD PRACTICES

What to do and not to

2

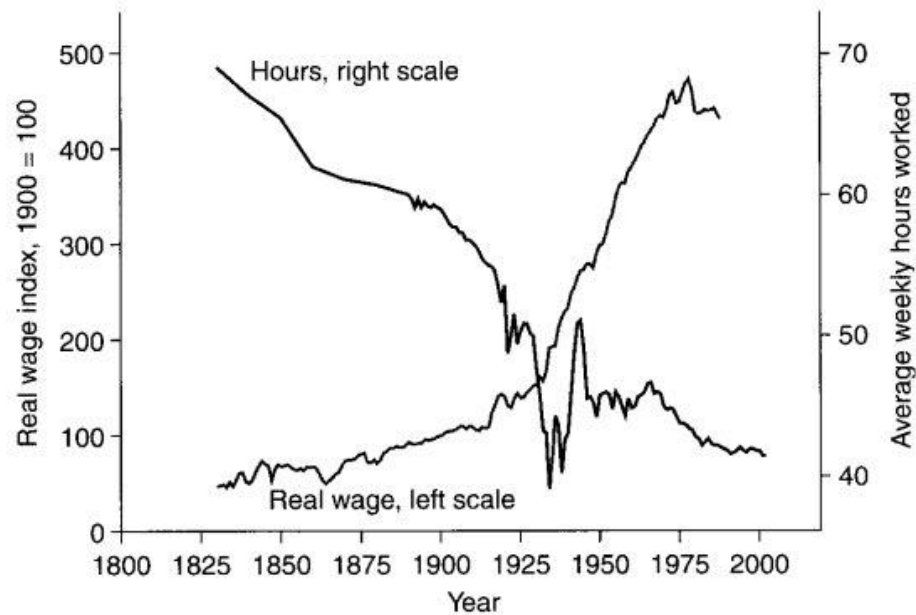
GOOD PRACTICES

- **Accurate:** The visualization should accurately represent the data and its trends
- **Clear:** Your visualization should be easy to understand



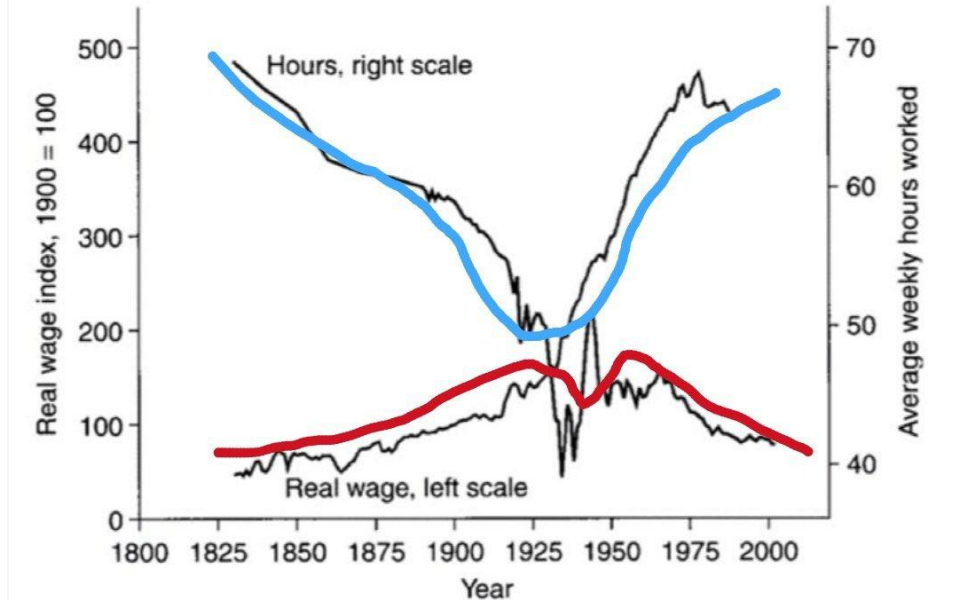
GOOD PRACTICES

Having a clear representation:



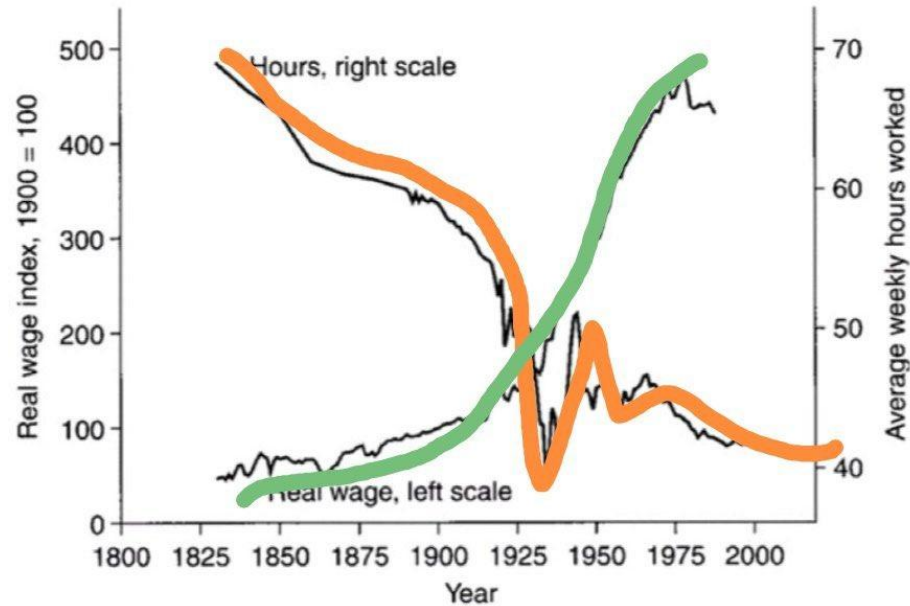
GOOD PRACTICES

Having a clear representation:



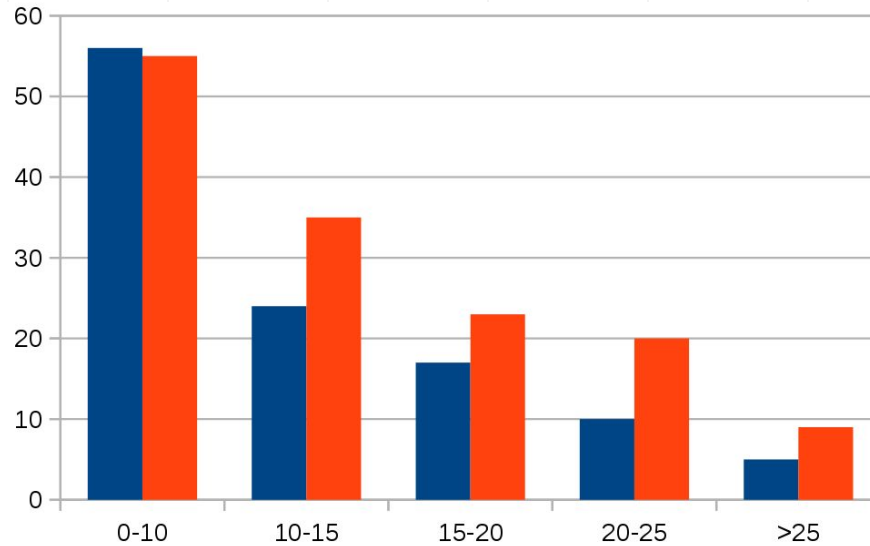
GOOD PRACTICES

Having a clear representation:



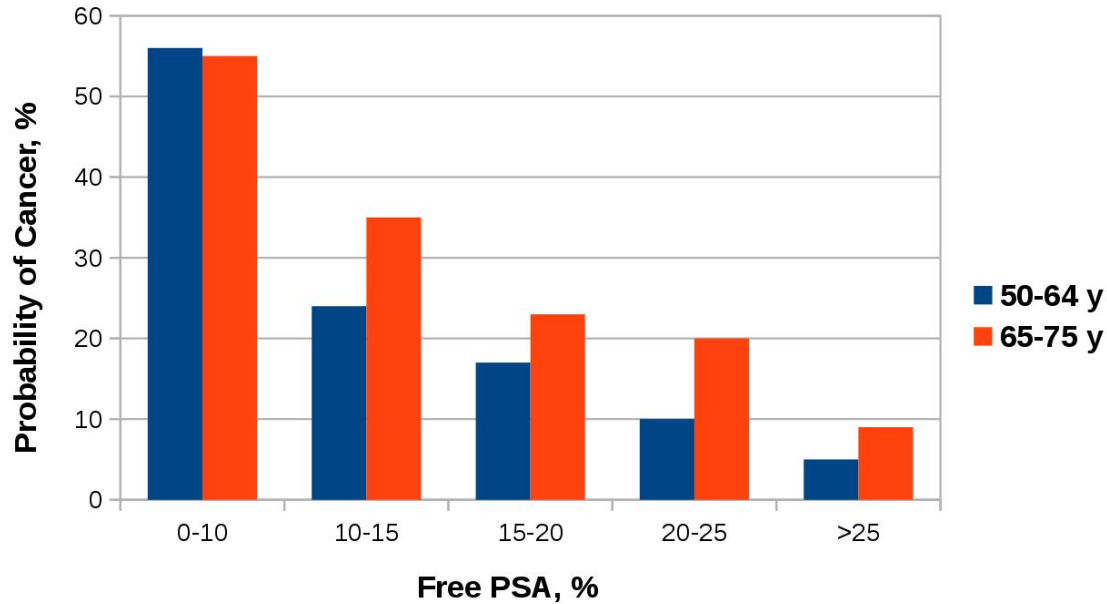
GOOD PRACTICES

Axis labels and graph legend:

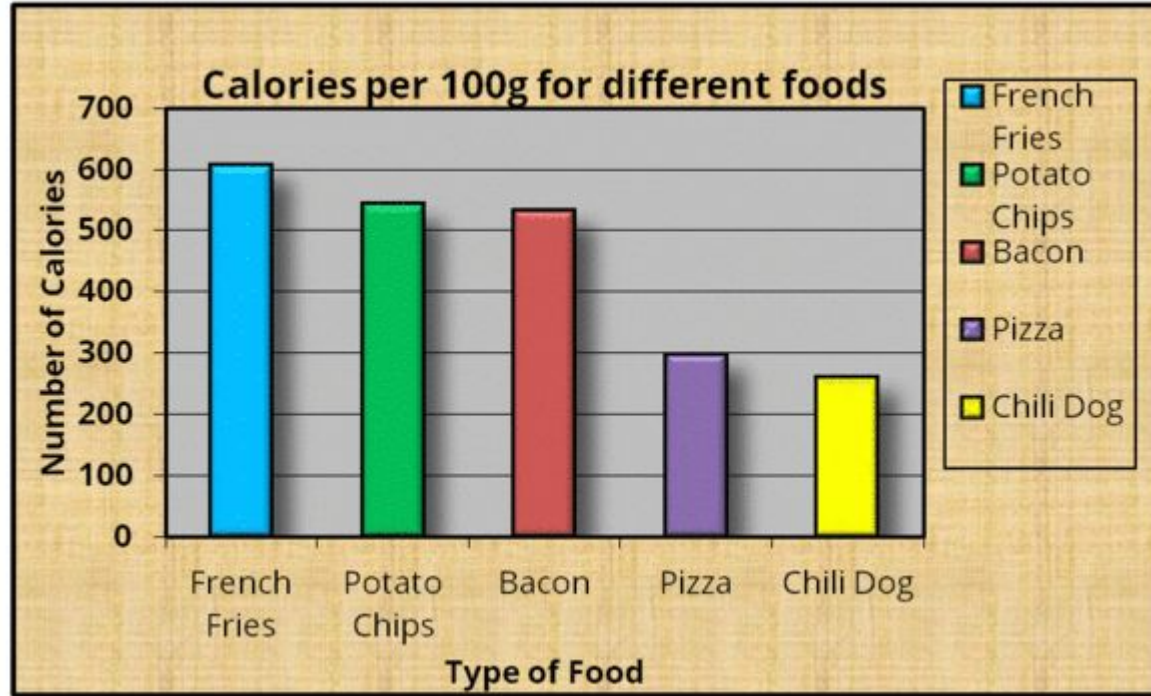


GOOD PRACTICES

Axis labels and graph legend:



GOOD PRACTICES

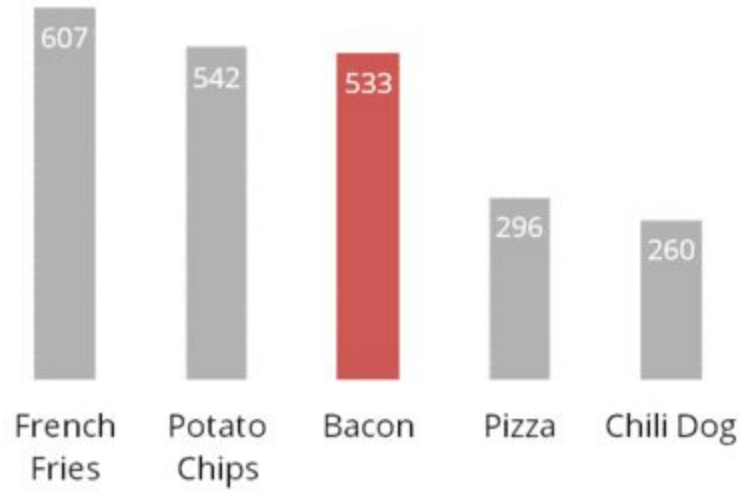


Created by Darkhorse Analytics

www.darkhorseanalytics.com

GOOD PRACTICES

Calories per 100g



Created by Darkhorse Analytics

www.darkhorseanalytics.com

GOOD PRACTICES

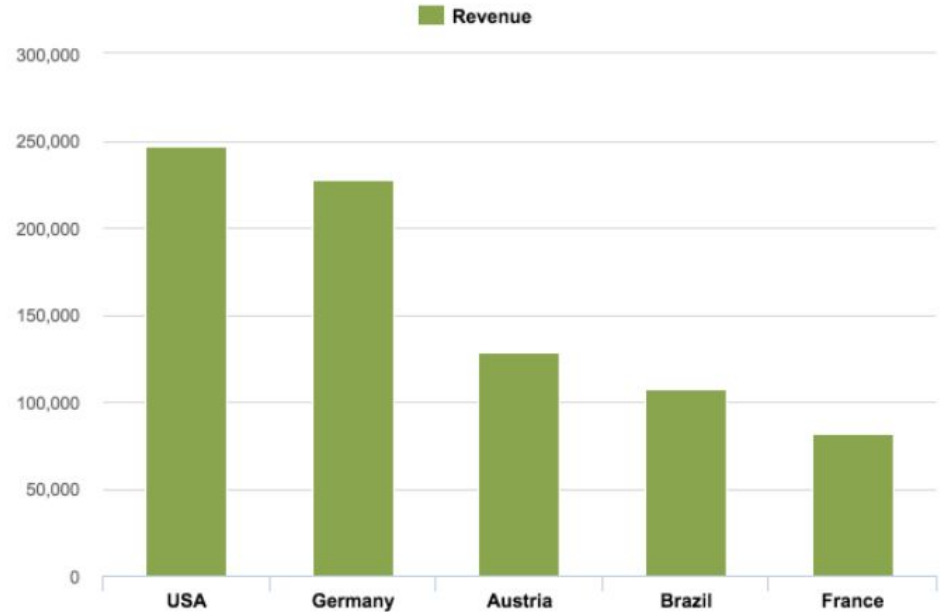
Select the right chart

- Line chart
- Bar Chart
- Pie Chart
- Histogram
- Scatter Plot
- BoxPlot
- Bubble Chart
- Treemap
- radar graph
- Heatmap
- Density Maps
- ...

GOOD PRACTICES

Select the right chart: Column chart

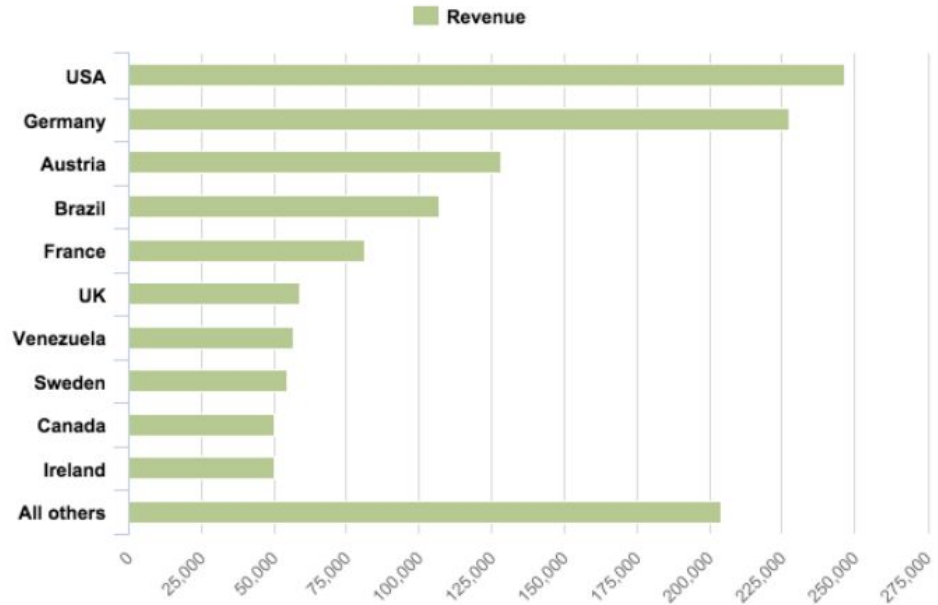
- For comparisons
- Small number of categories
- Axis must start at 0



GOOD PRACTICES

Select the right chart: Bar chart

- Bigger category names
- More Categories



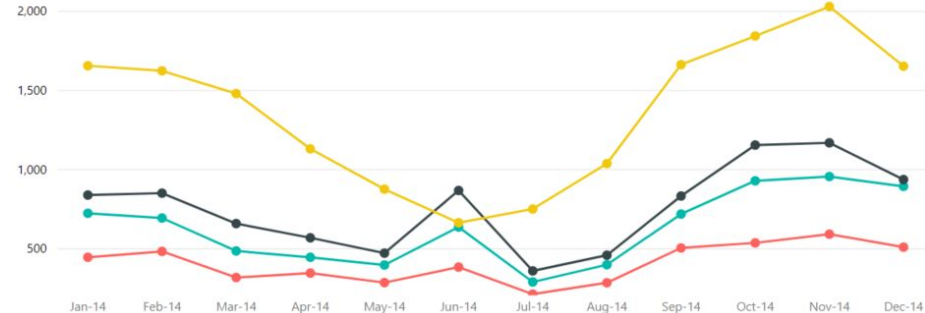
GOOD PRACTICES

Select the right chart: Line chart

- When the dataset is continuous
- The axis can start as non zero, but not ideal
- Careful with the aspect ratio

Total Units by Month and Manufacturer

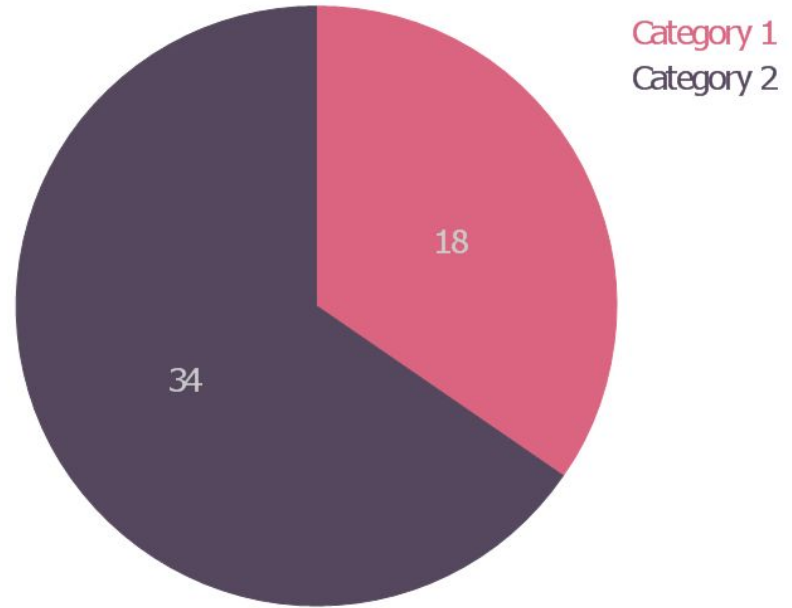
Manufacturer Aliqui Natura Pirum VanArsdel



GOOD PRACTICES

Select the right chart: Pie chart

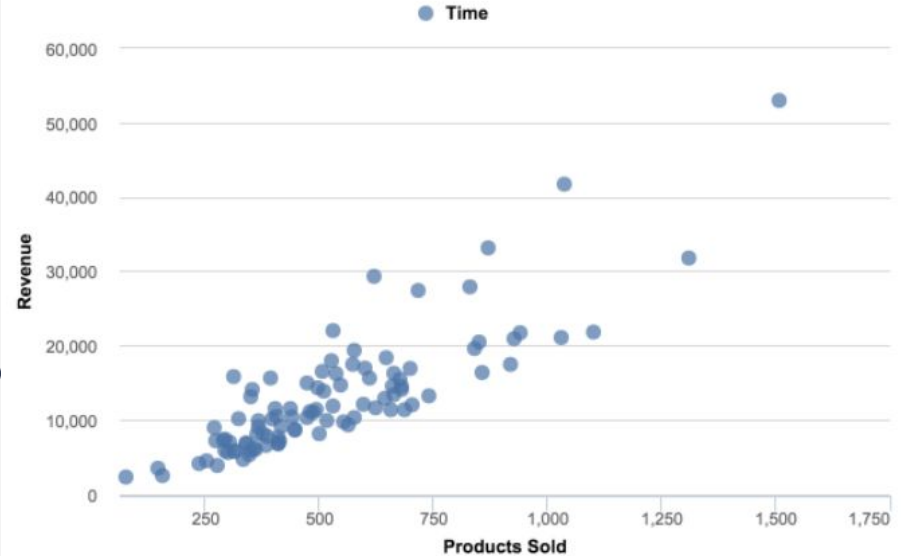
- **Less than 6 categories**
- **Unless there's a dominant class**
- **Ideally, only 2 categories**
- **NO 3D EFFECTS**



GOOD PRACTICES

Select the right chart: Scatter plots

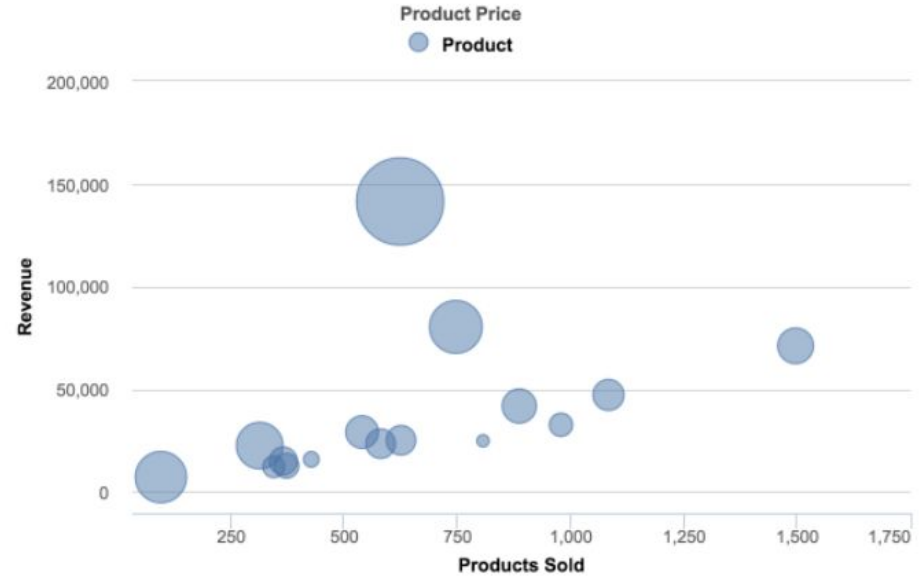
- Used for dispersion and correlation analysis
- Used to represent clusters too



GOOD PRACTICES

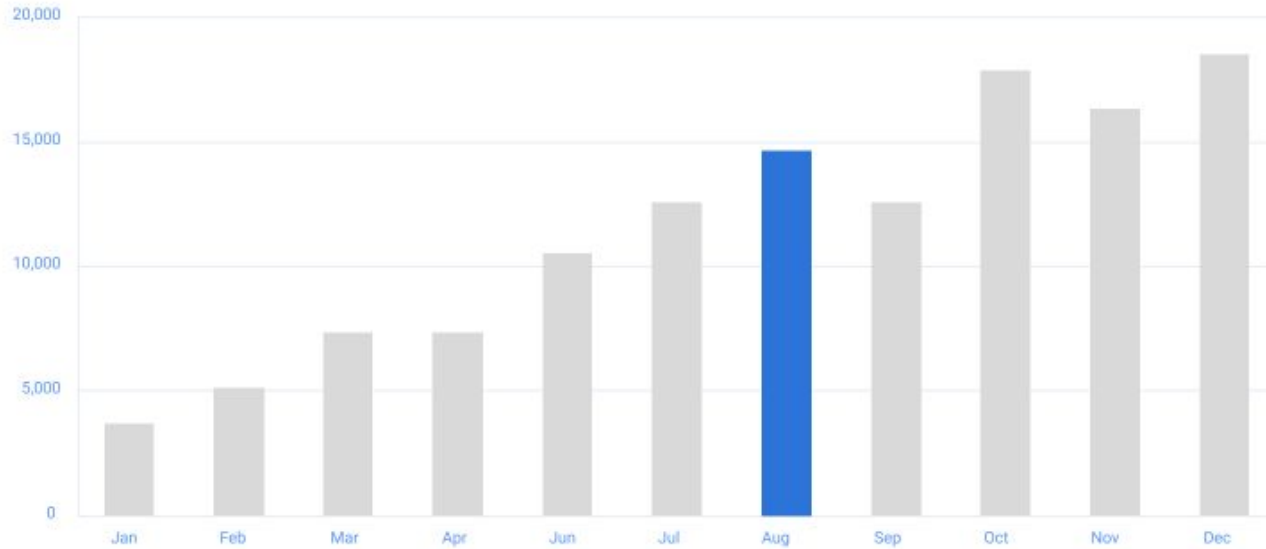
Select the right chart: Bubble plots

- Used to add a dimension to scatter plots
- Used to represent relationships



GOOD PRACTICES

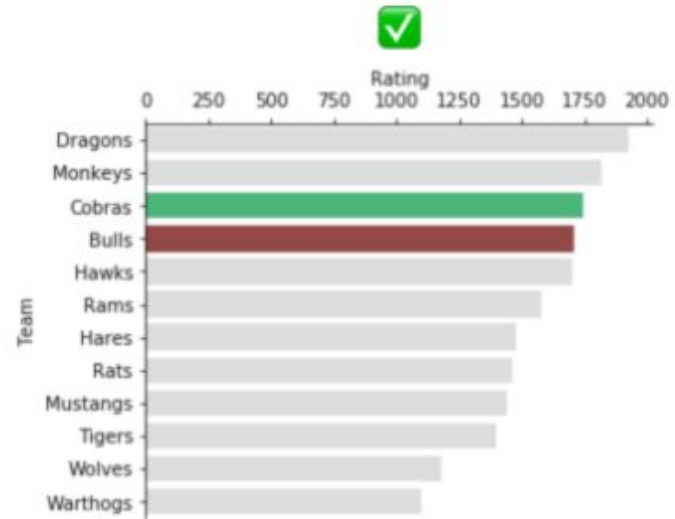
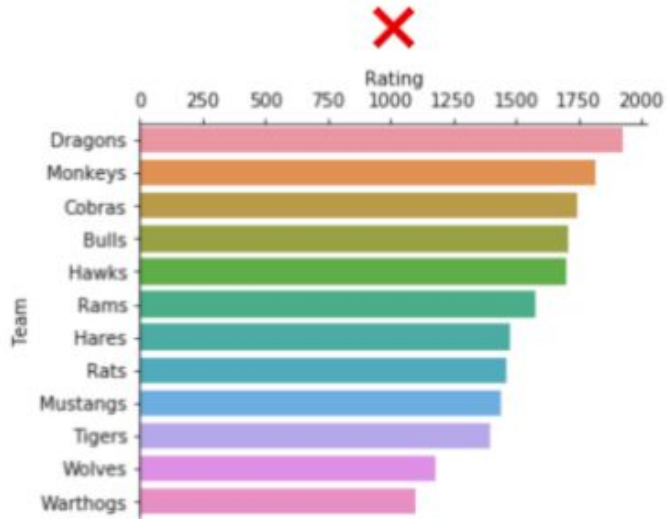
Good use of color:



The blue bar among grey bars clearly communicates the focus point to the audience

GOOD PRACTICES

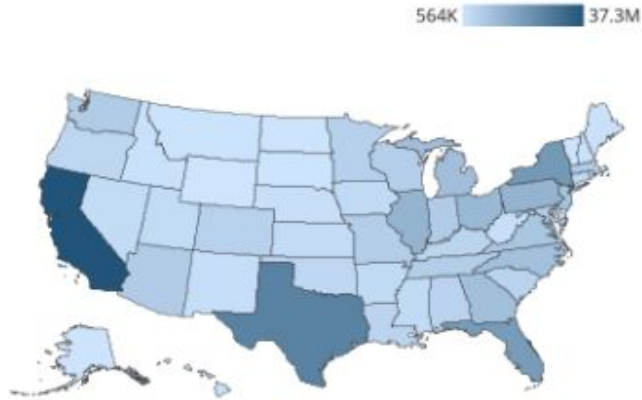
Good use of color:



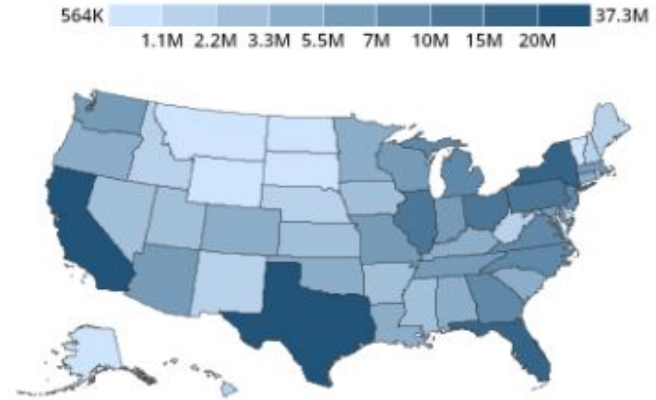
GOOD PRACTICES

Good use of color:

2010 US Population



2010 US Population

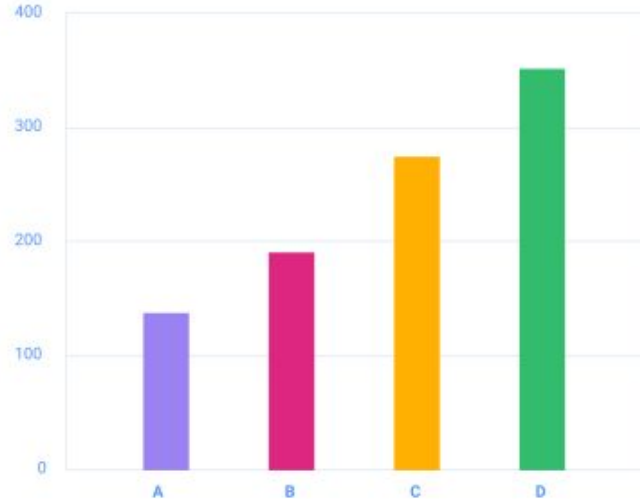


GOOD PRACTICES

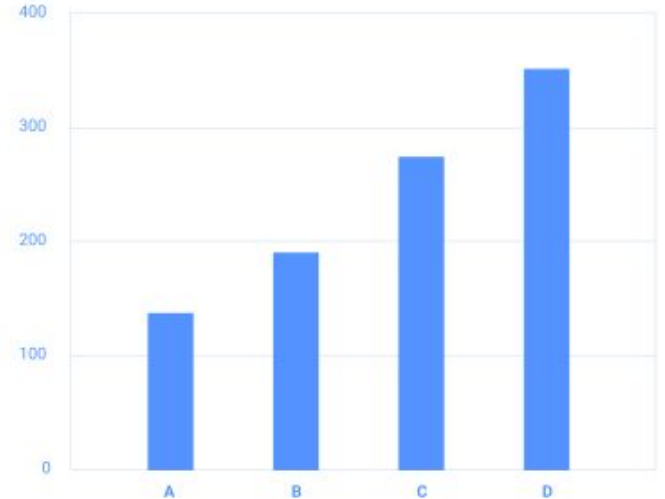
Applying the Gestalt principles:

- **Similarity:**

Costs/Revenues



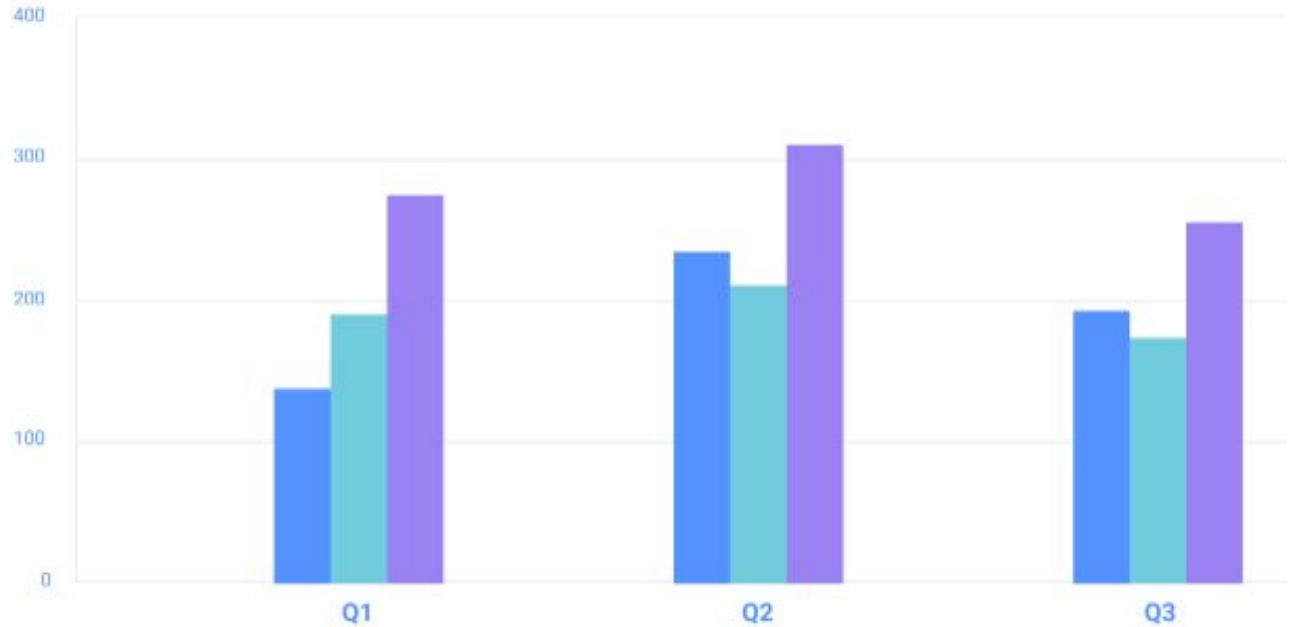
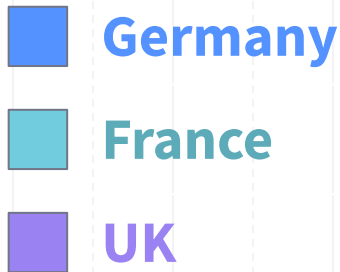
Costs/Revenues



GOOD PRACTICES

Applying the Gestalt principles:

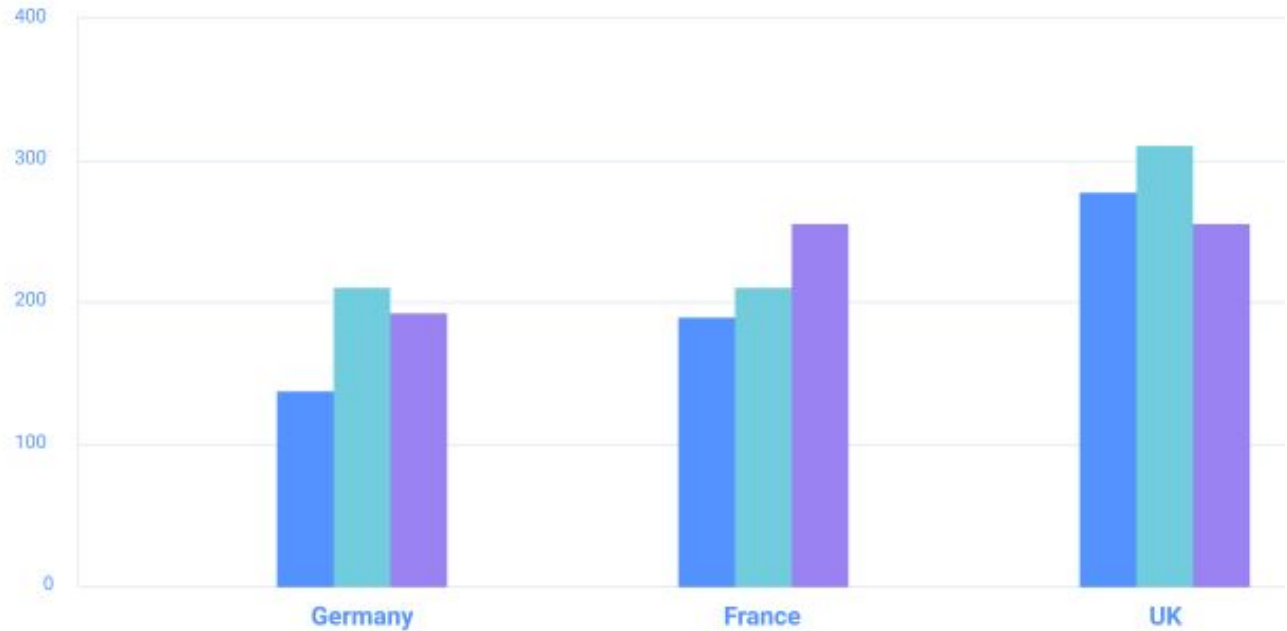
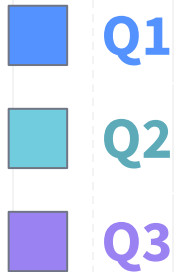
- **Proximity:**



GOOD PRACTICES

Applying the Gestalt principles:

- **Proximity:**



GOOD PRACTICES

Applying the Gestalt principles:

- **Enclosure:**





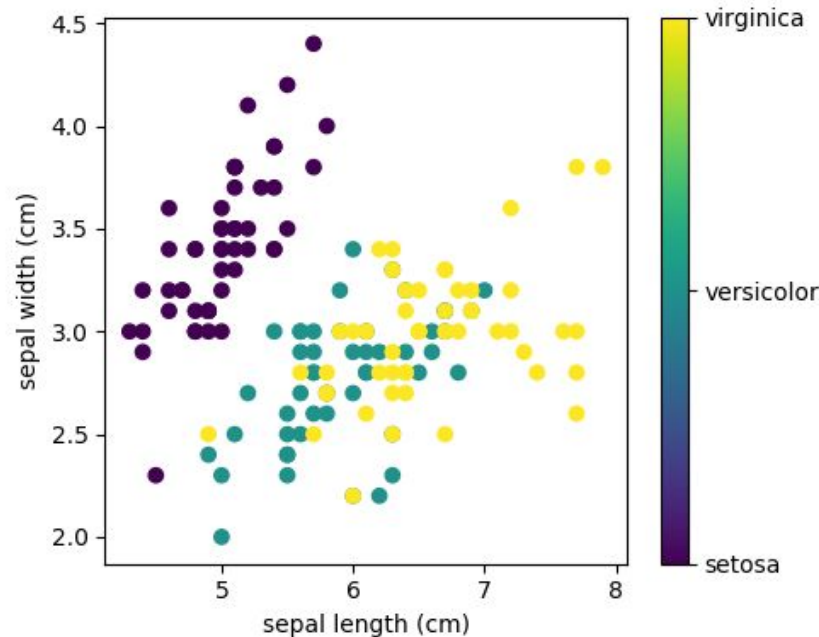
PROS AND CONS OF DATA VISUALIZATION

3

Information sharing:

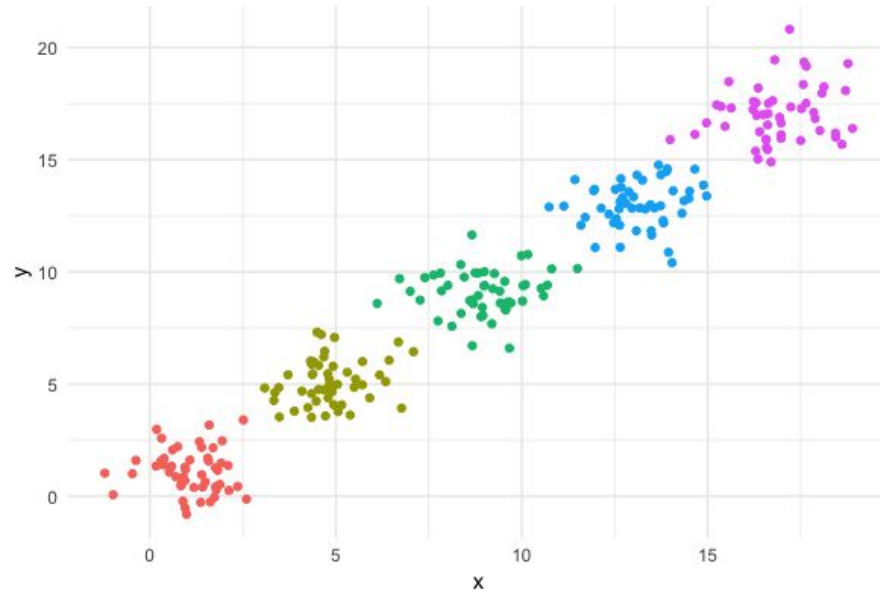
<i>Iris setosa</i>				<i>Iris versicolor</i>				<i>Iris virginica</i>			
Sepal length	Sepal width	Petal length	Petal width	Sepal length	Sepal width	Petal length	Petal width	Sepal length	Sepal width	Petal length	Petal width
5.1	3.5	1.4	0.2	7.0	3.2	4.7	1.4	6.3	3.3	6.0	2.5
4.9	3.0	1.4	0.2	6.4	3.2	4.5	1.5	5.8	2.7	5.1	1.9
5.4	3.4	1.5	0.2	6.9	3.1	4.9	1.5	7.1	3.0	5.9	2.1
4.6	3.1	1.5	0.2	5.5	2.3	4.0	1.3	6.3	2.9	5.6	1.8
5.0	3.6	1.4	0.2	5.5	2.8	4.6	1.5	6.5	3.0	5.8	2.2
5.4	3.6	1.7	0.4	6.7	3.5	4.9	1.3	6.7	3.0	6.6	2.6
4.6	3.4	1.4	0.3	6.3	3.3	4.7	1.6	4.9	2.5	4.5	1.7
5.0	3.4	1.5	0.2	4.9	2.4	3.3	1.0	7.3	2.9	6.3	1.8
4.4	2.9	1.4	0.2	4.6	3.0	4.4	1.3	6.3	3.7	5.3	2.0
4.9	3.1	1.5	0.1	5.2	2.7	3.9	1.4	7.2	3.6	6.1	2.5
5.4	3.7	1.5	0.2	5.0	2.0	3.5	1.0	6.5	3.2	5.1	1.5
4.8	3.4	1.6	0.2	5.4	2.6	4.0	1.5	5.5	3.4	5.3	2.0
4.0	3.0	1.4	0.1	6.0	2.2	4.0	1.0	6.8	3.0	5.5	2.1
4.3	3.0	1.1	0.1	6.1	2.9	4.7	1.4	5.7	2.5	5.0	1.4
5.8	4.0	1.2	0.2	6.6	3.0	4.4	1.5	6.8	3.5	5.8	2.1
5.7	4.4	1.5	0.4	6.7	3.1	4.4	1.4	6.4	3.2	5.3	2.3
5.4	3.9	1.3	0.4	5.6	3.0	4.5	1.5	6.5	3.0	5.5	1.8
5.1	3.8	1.7	0.2	5.8	3.2	4.7	1.0	7.0	3.0	6.7	2.2
5.7	3.8	1.5	0.3	6.2	3.2	4.5	1.5	7.7	2.6	6.9	2.3
5.1	3.8	1.5	0.3	5.6	2.5	3.9	1.3	6.0	2.2	5.0	1.5
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4.6	3.6	1.0	0.2	6.3	2.5	4.9	1.5	7.7	2.8	6.7	2.0
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4.8	3.4	1.0	0.2	6.4	2.9	4.3	1.3	6.7	3.3	5.7	2.1
5.0	3.0	1.6	0.2	6.6	3.0	4.4	1.4	7.2	3.2	6.0	1.8
5.0	3.4	1.6	0.4	6.8	2.8	4.6	1.4	6.2	2.8	4.8	1.9
5.5	3.5	1.6	0.2	6.7	3.0	5.0	1.7	7.1	3.0	5.9	1.9
5.2	3.4	1.4	0.2	6.0	2.9	4.5	1.5	6.4	2.8	5.6	2.1
4.7	3.2	1.6	0.2	5.5	2.6	3.5	1.0	7.2	3.0	5.8	1.6
4.8	3.2	1.6	0.2	5.7	2.6	3.8	1.1	7.4	3.0	6.1	1.9
5.4	3.4	1.5	0.4	5.5	2.4	3.7	1.0	7.9	3.8	6.4	2.0
5.2	4.1	1.5	0.1	5.8	2.7	3.9	1.2	6.4	2.8	5.6	2.1
4.9	3.2	1.2	0.2	6.0	3.0	5.1	1.5	6.8	2.8	5.1	2.8
4.9	3.1	1.5	0.2	5.4	3.0	4.5	1.5	6.1	2.6	5.6	1.4
5.0	3.2	1.2	0.2	6.0	3.4	4.5	1.6	6.7	3.0	6.1	2.3
4.5	3.0	1.5	0.3	6.7	3.0	4.7	1.5	6.4	3.4	5.6	2.4
4.9	3.6	1.4	0.1	6.3	2.3	4.4	1.3	6.4	3.1	5.5	1.8
4.4	3.0	1.3	0.2	5.6	3.0	4.1	1.3	6.0	3.0	4.8	

VS



BENEFITS OF DATA VISUALIZATION

Easier pattern recognition:



BENEFITS OF DATA VISUALIZATION

Faster decision making:



DANGERS OF DATA VISUALIZATION

- **Complex data visualization is hard**
- **Visualized data is prone to misinterpretation**
- **Wrong-minded individuals can exploit it**



EXAMPLES OF MALICIOUS DATA VISUALIZATION

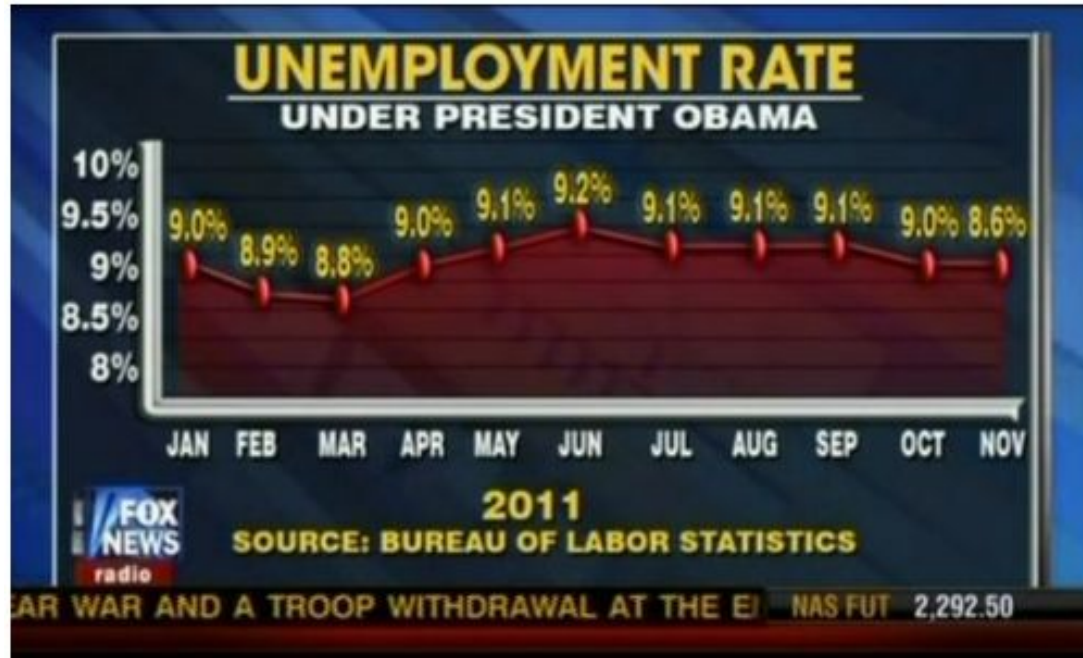
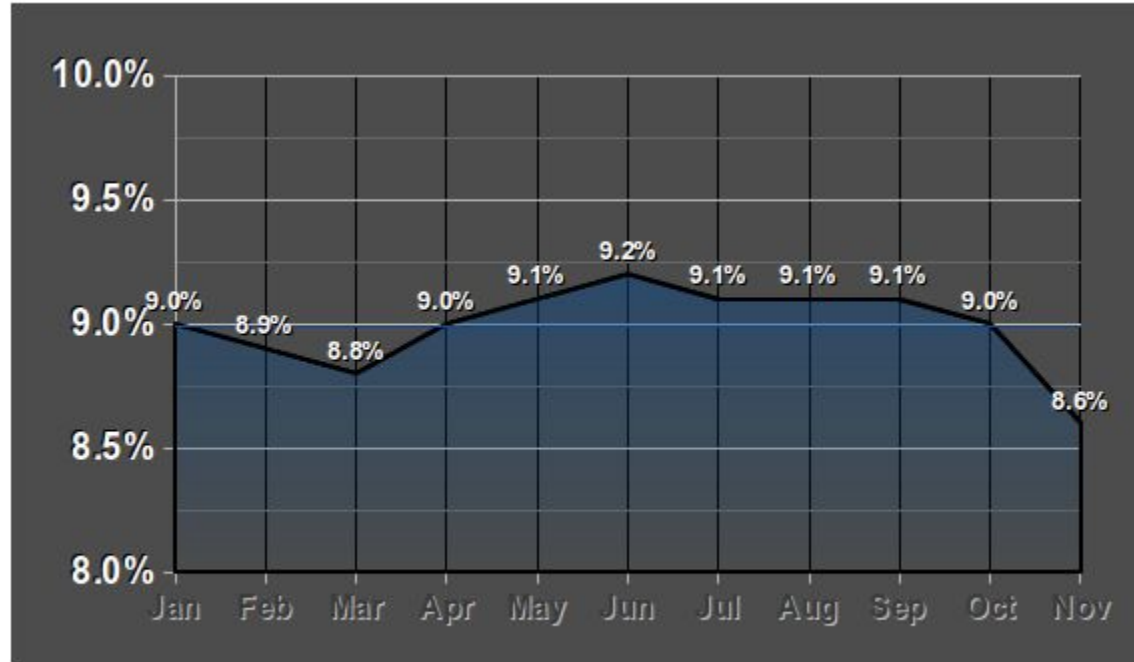


Image Source: <http://cloudfront.mediamatters.org>

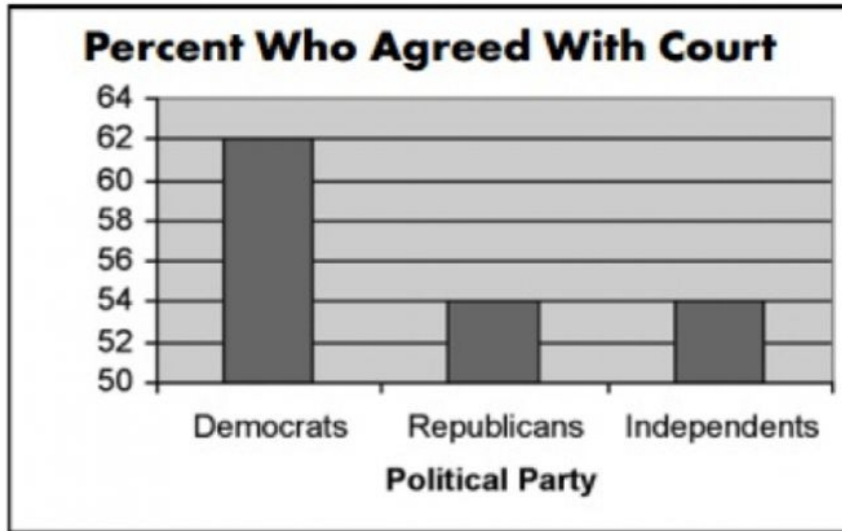
EXAMPLES OF MALICIOUS DATA VISUALIZATION



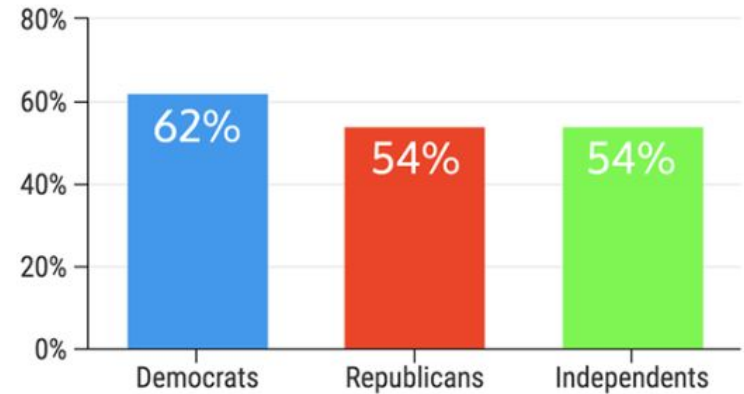
Source: <http://freethoughtblogs.com/fousycanuck/2011/12/14/im-better-at-graphs-than-fox-news/>

EXAMPLES OF MALICIOUS DATA VISUALIZATION

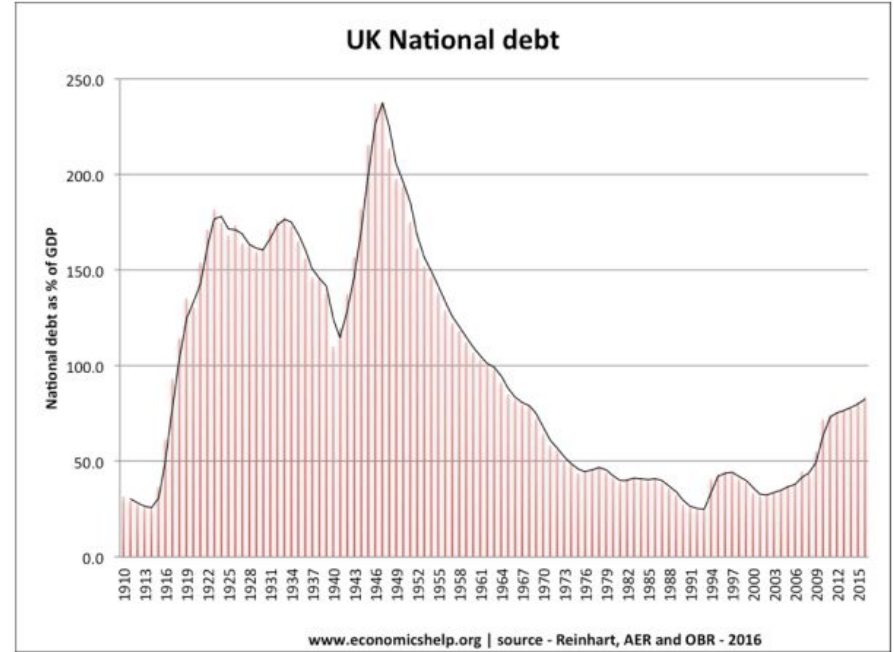
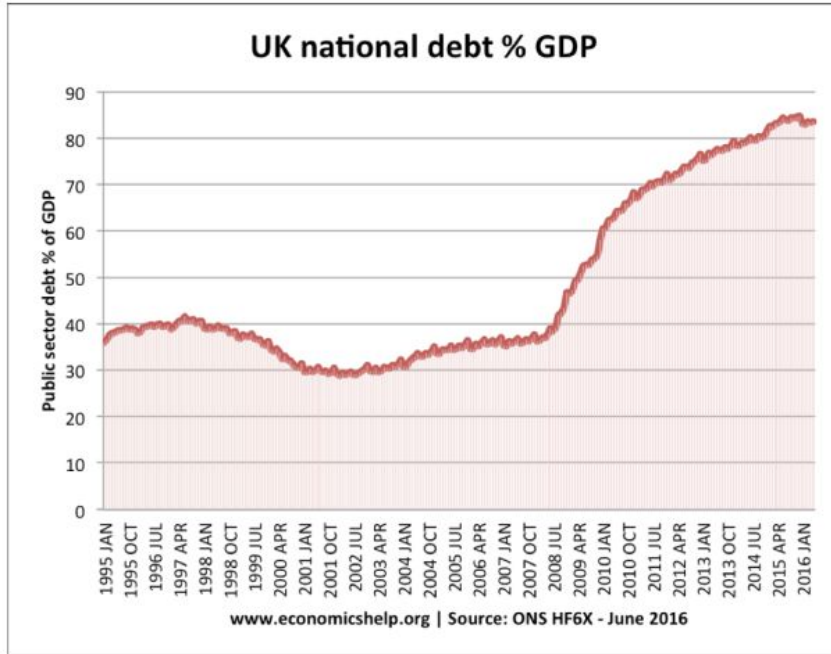
Truncating the graph:



Percent Who Agreed With Court

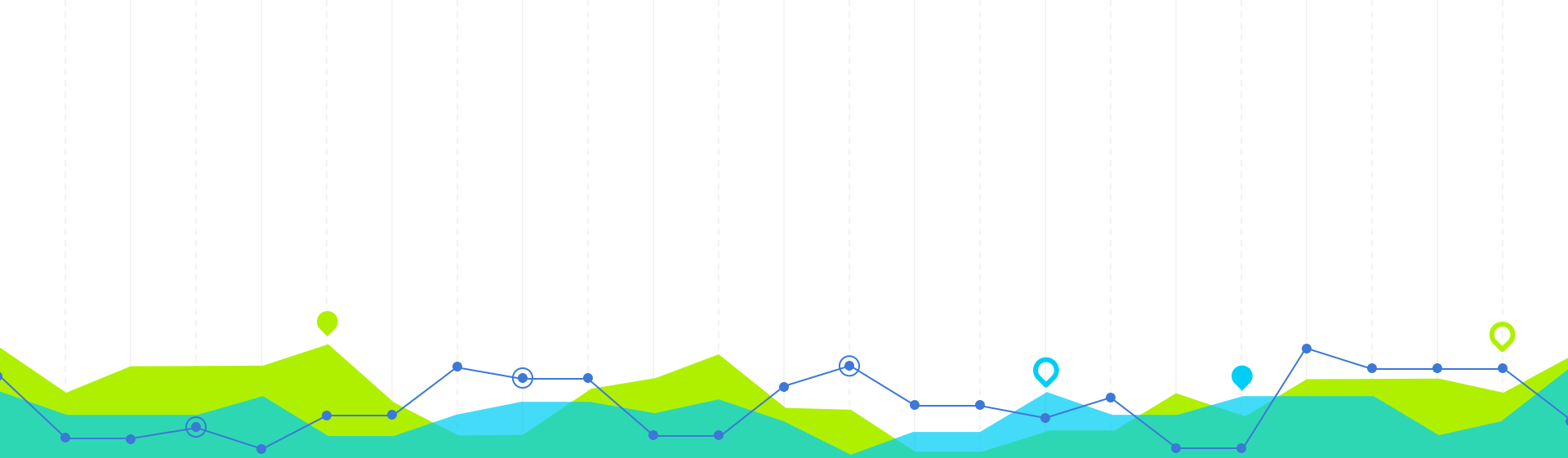


EXAMPLES OF MALICIOUS DATA VISUALIZATION



Source: www.economicshelp.org

Source: www.economicshelp.org

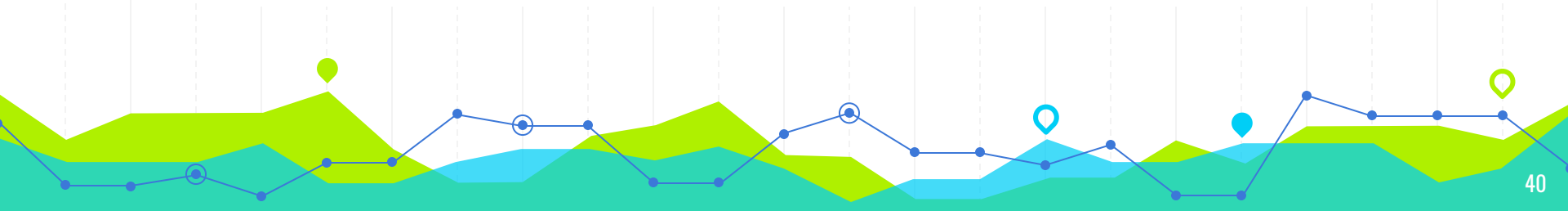


DATA VISUALIZATION IN JAVASCRIPT

4



Chart.js



THANKS!

Any questions?

You can find us at

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aram.perez.dios.04@ull.edu.es

REFERENCES

Chart.js:

[Chart.js documentation](#)

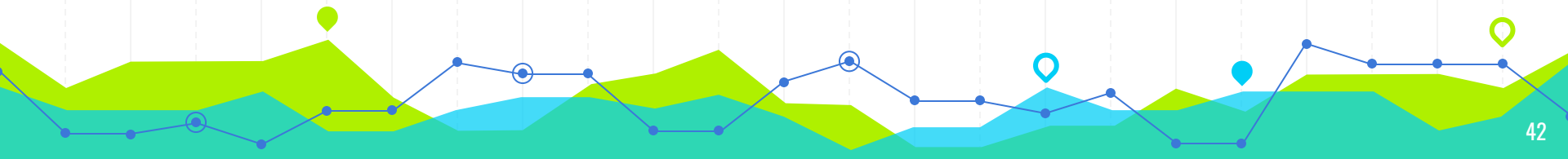
[Line graph animation tutorial](#)

Psychology:

[Gestalt psychology](#)

[Gestalt principles in design](#)

[Data visualization psychology article](#)



REFERENCES

Misleading statistics:

15 misleading data visualization examples

More misleading statistics examples

Even more misleading graphs



REFERENCES

History:

Brief history of data visualization

Chart types:

When to use each graph

Other JS chart libraries:

ApexCharts.js

D3.js

