

Data Visualization & Storytelling

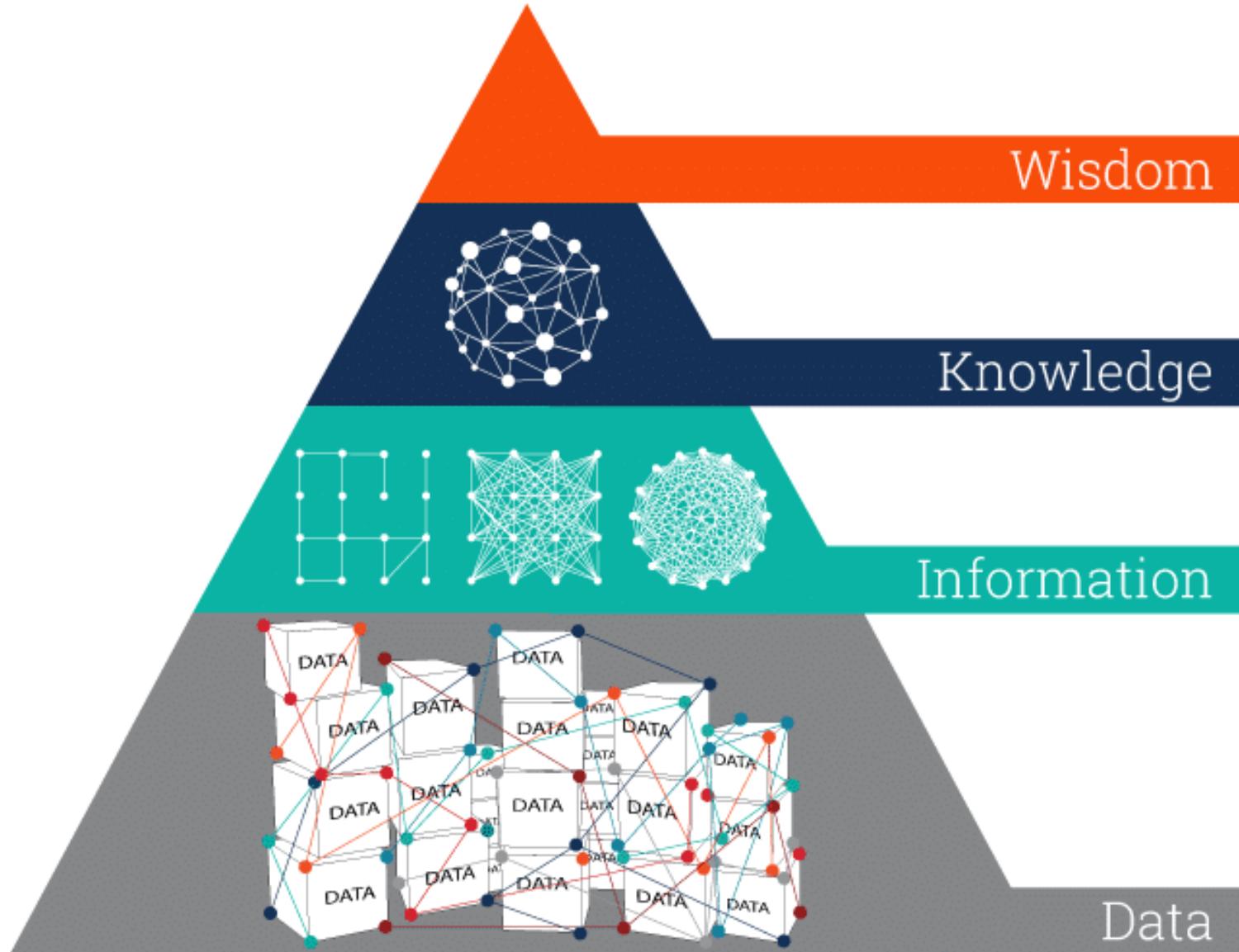
— *from tables to stories*

SPEAKERS

Mr.Saksit Srimarong

Agenda

1. Examples from the history of visualization
2. Chousing a chart for my data
3. Declutter charts
4. Tell a story



Each step up
the pyramid
answers
questions
about and
adds value
to the initial data.

Definition

Data visualization is the graphical representation of information and data. By using visual elements like charts, graphs, and maps, data visualization tools provide an accessible way to see and understand trends, outliers, and patterns in data.

Data visualization beginner's guide: a definition, examples, and learning resources
(<https://www.tableau.com/learn/articles/data-visualization>)

Visualization Goals



Analyze *exploratory*

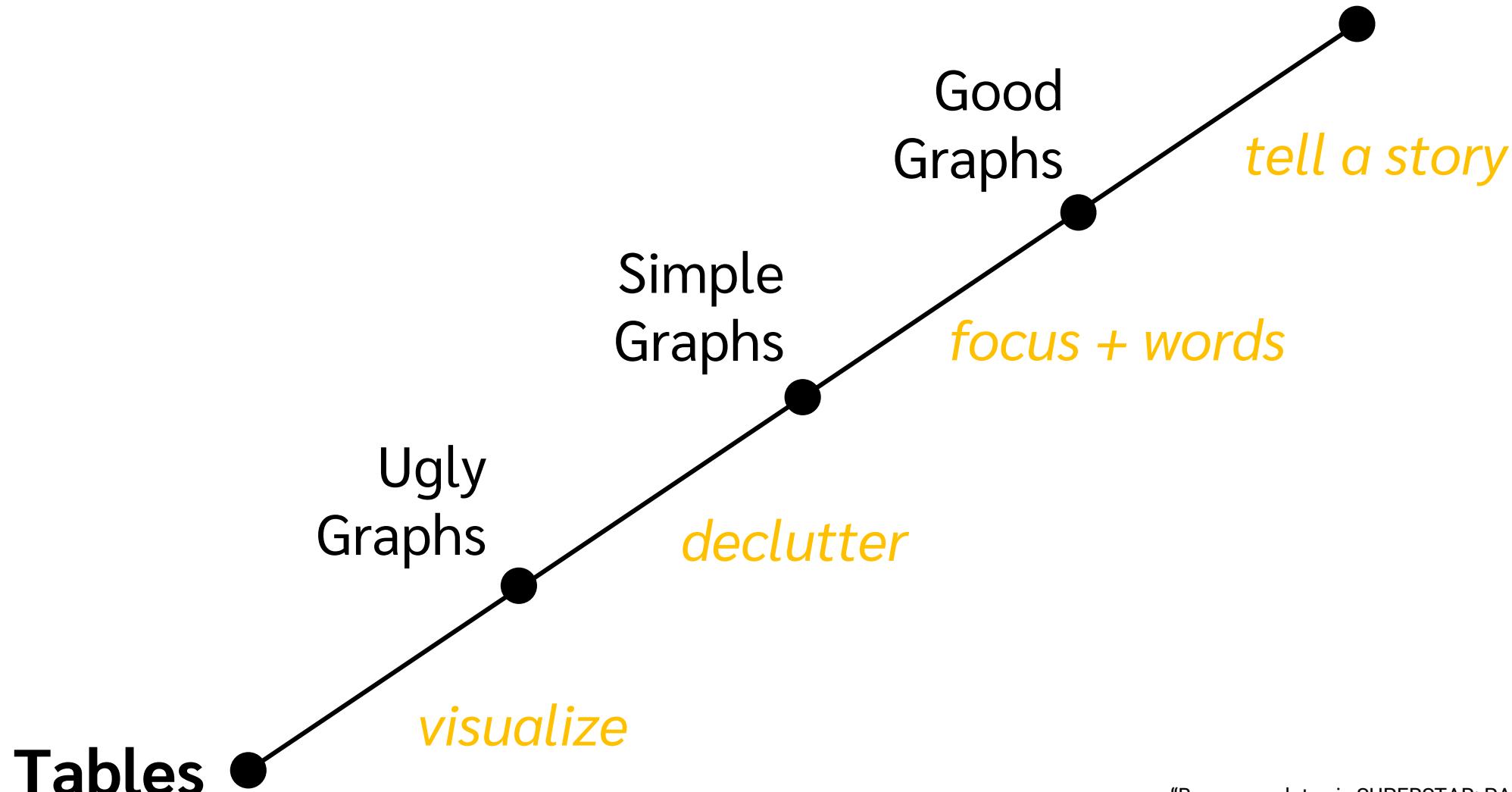
- Explore the data
- Assess a situation
- Determine how to proceed
- Decide what to do



Communicate *explanatory*

- Present data and ideas
- Explain and inform
- Provide evidence and support
- Influence and persuade

Data Stories



"Become a data viz SUPERSTAR: PART 1" - storytelling with data
<https://www.youtube.com/watch?v=ZRskHRowFCM>

6200 BC

1500 BC

1786

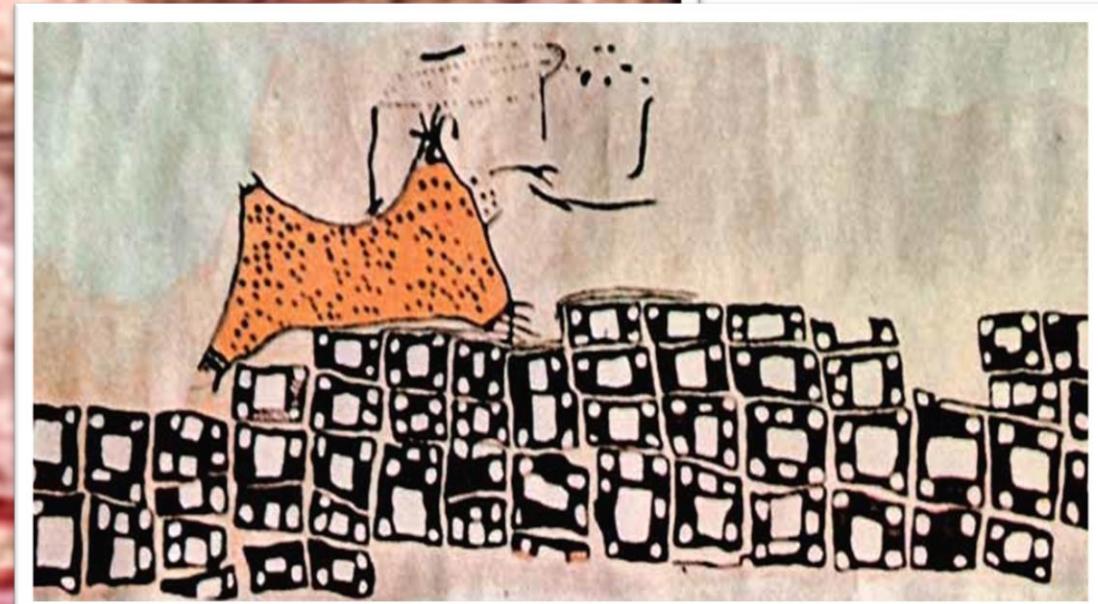
1801

1855

1861

GBDI
Present

A Wall Painting at Catal Huyuk



6200 BC

1500 BC

1786

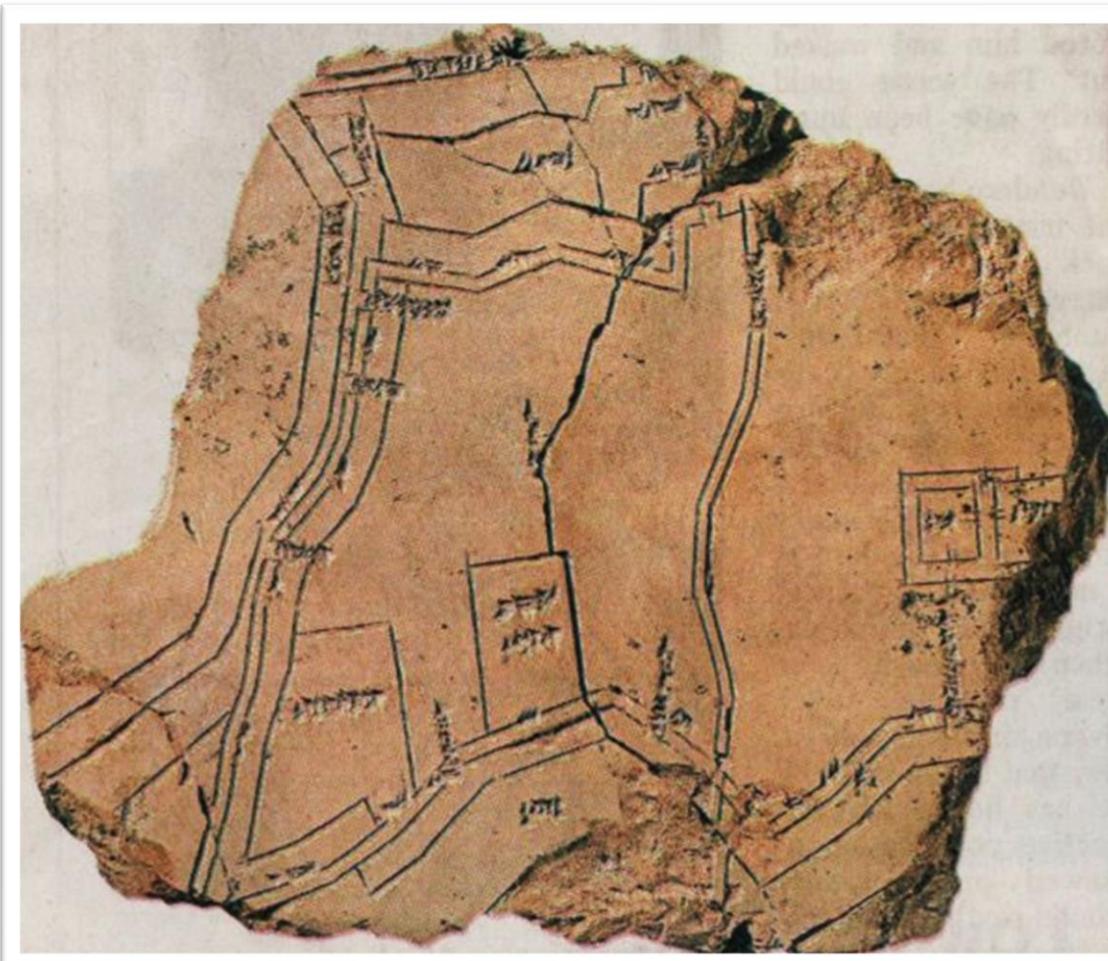
1801

1855

1861

GBDI
Present

Clay tablet from Nippur, Babylonia



6200 BC

1500 BC

1786

1801

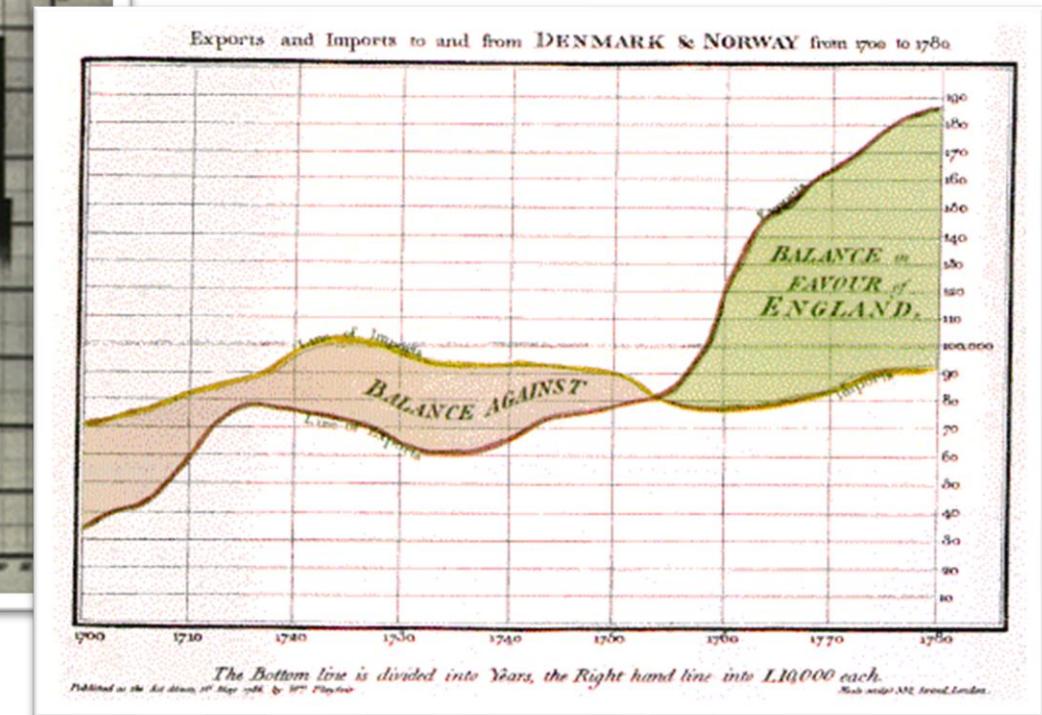
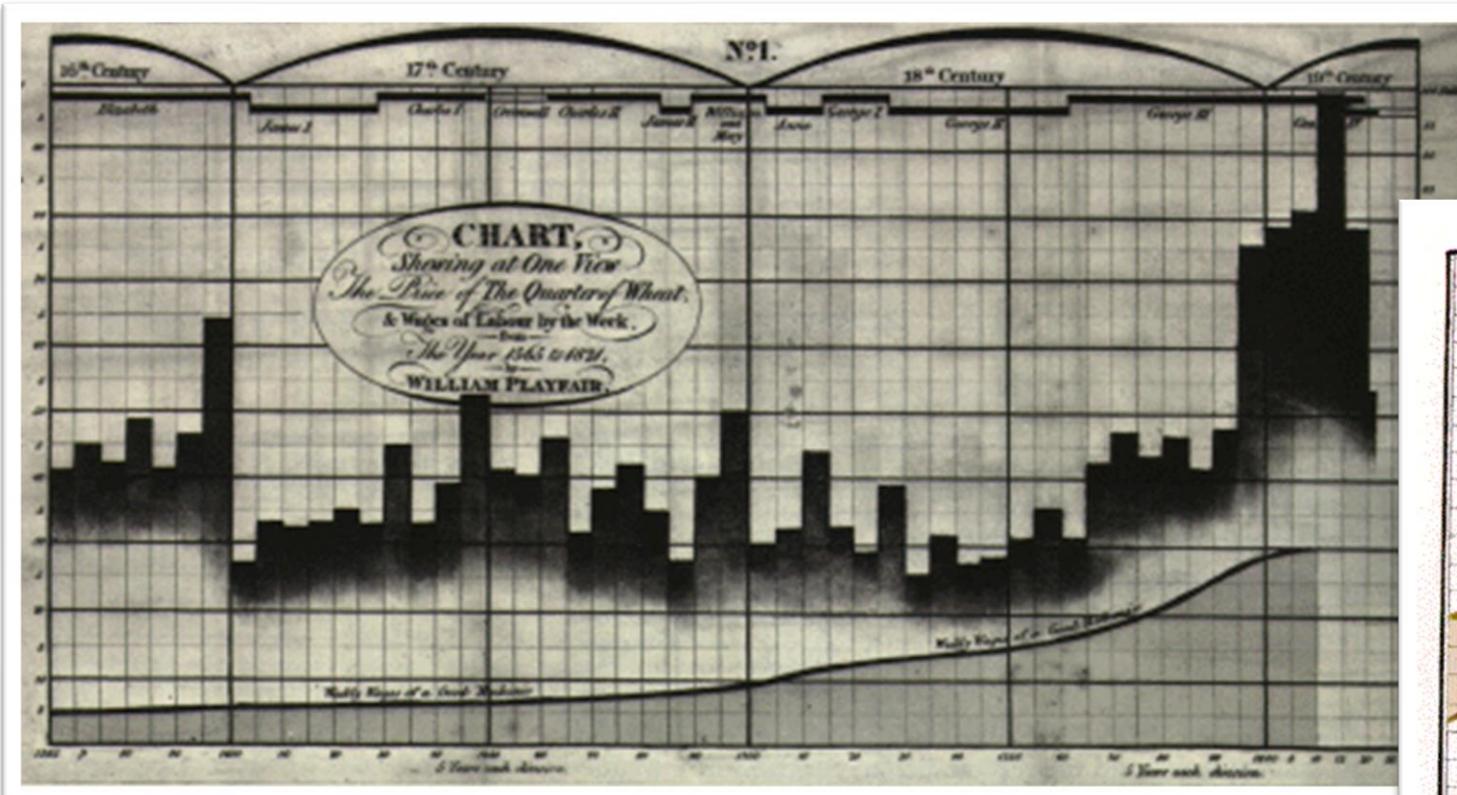
1855

1861

GBDI
Present

William Playfair: The Commercial and Political Atlas (Book)

– Abstract Data Presentation



6200 BC

1500 BC

1786

1801

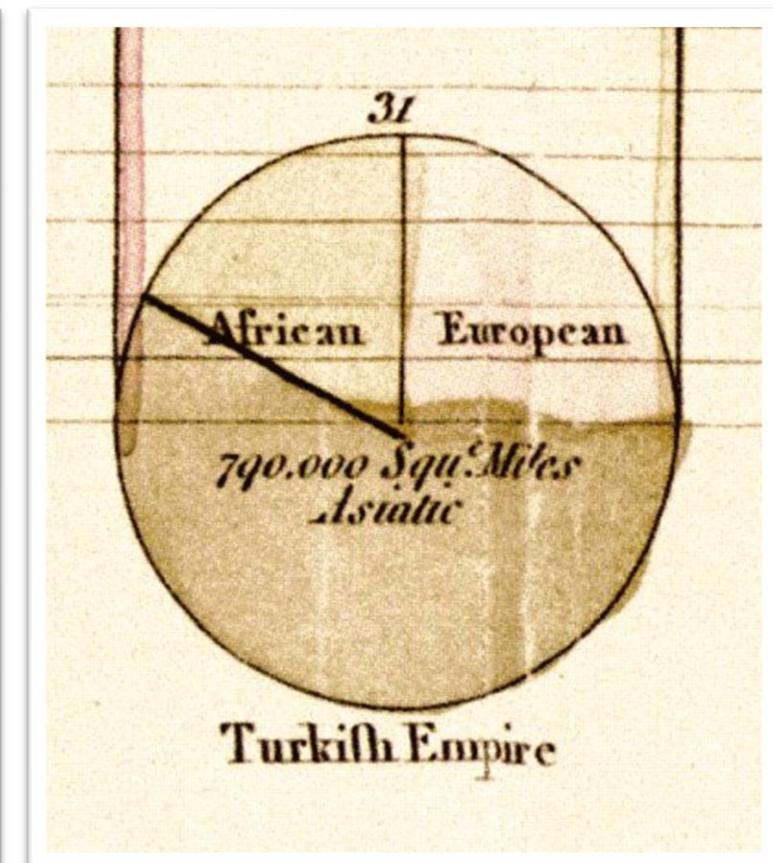
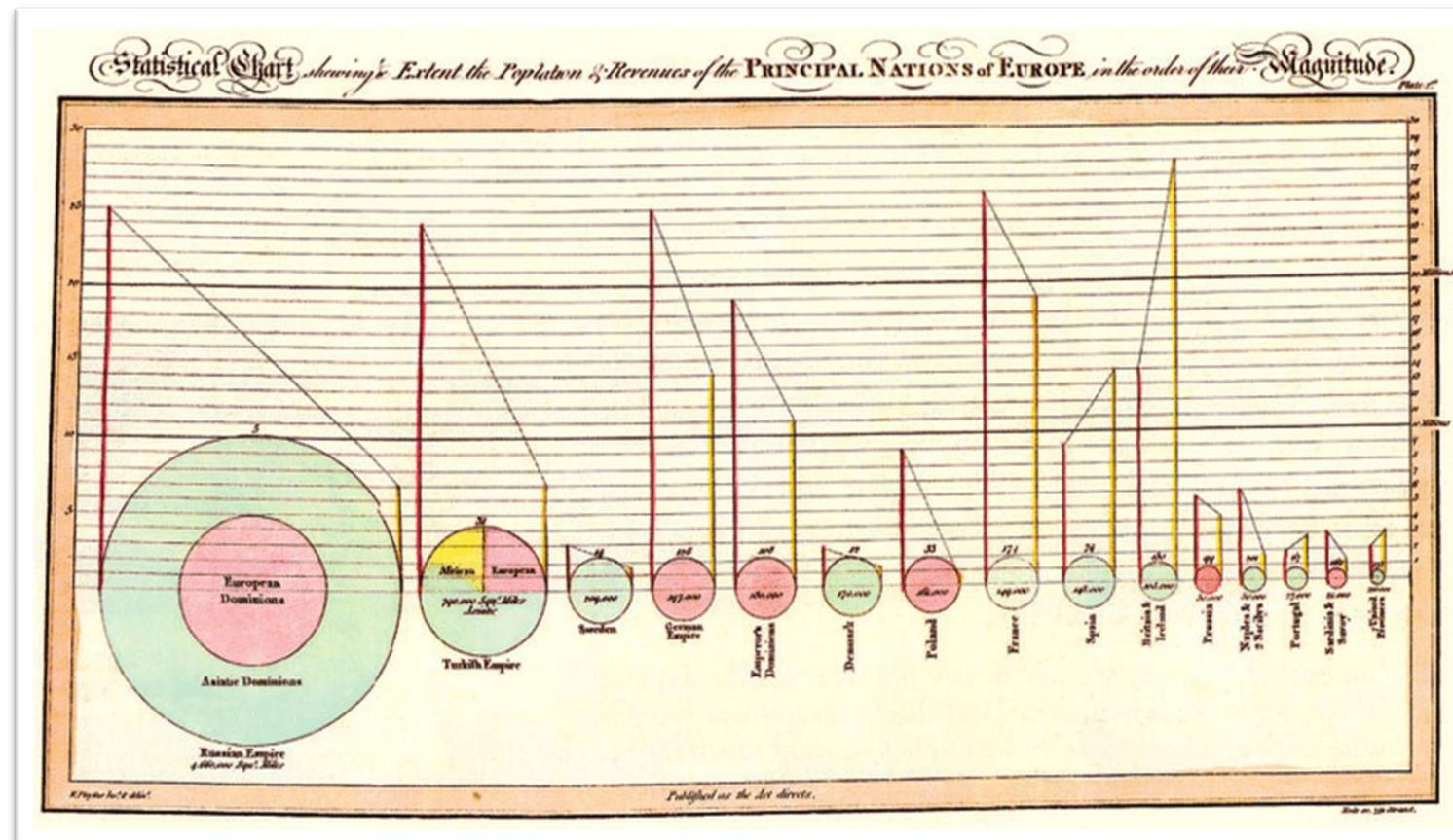
1855

1861

GBDI
Present

William Playfair: A Statistical Breviary (Book)

– The earliest recorded example of a Pie Chart



6200 BC

1500 BC

1786

1801

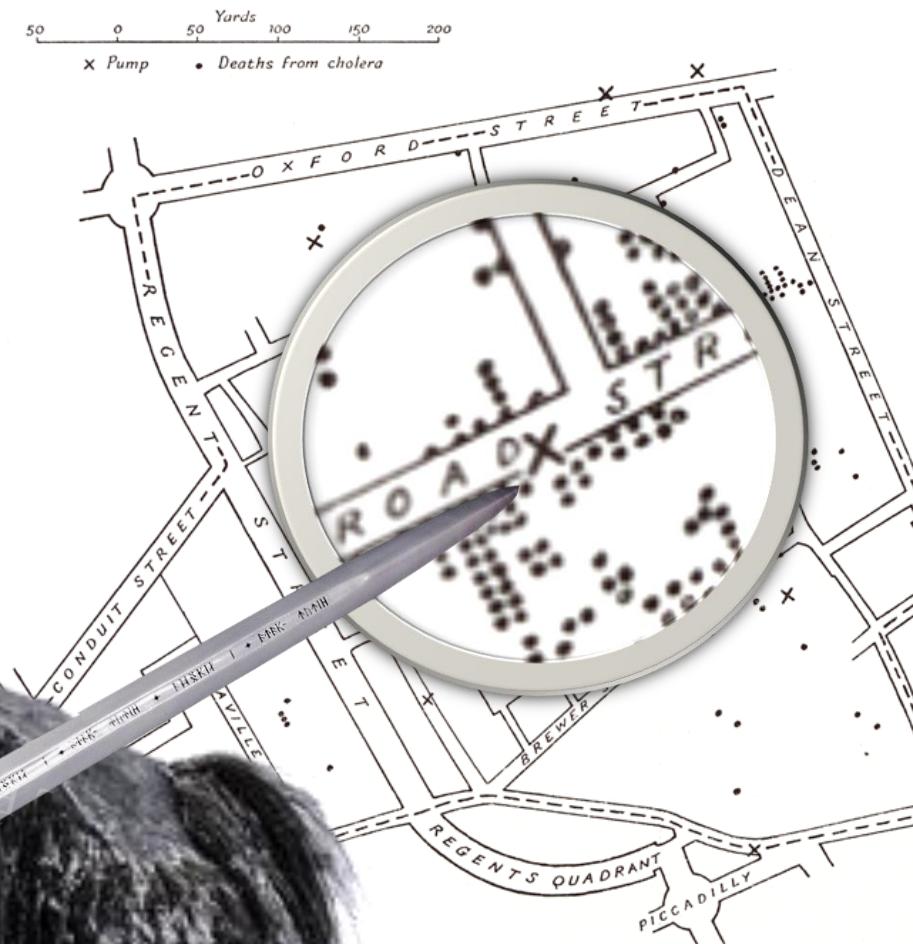
1855

1861

GBDI
Present

Dr. John Snow: Statistical Map Visualization

– London Cholera Epidemic



Broad Street Pump

6200 BC

1500 BC

1786

1801

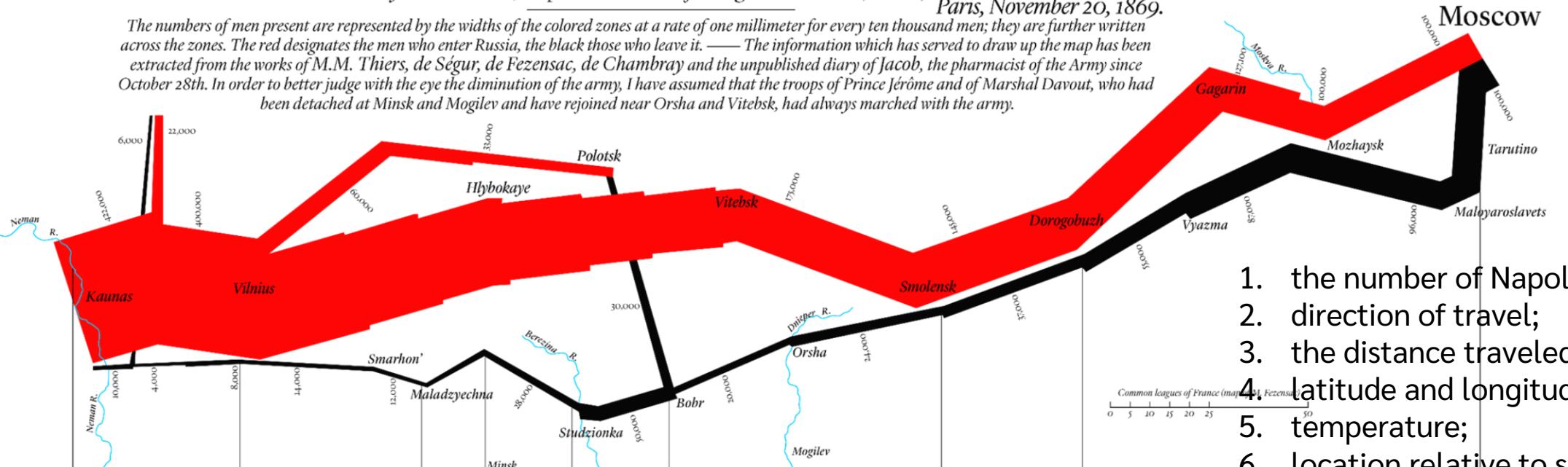
1855

1861

Charles Minard: Napoleon's March

*Figurative Map of the successive losses in men of the French Army in the Russian campaign 1812 ~ 1813
Drawn by M. Minard, Inspector General of Bridges and Roads (retired).*

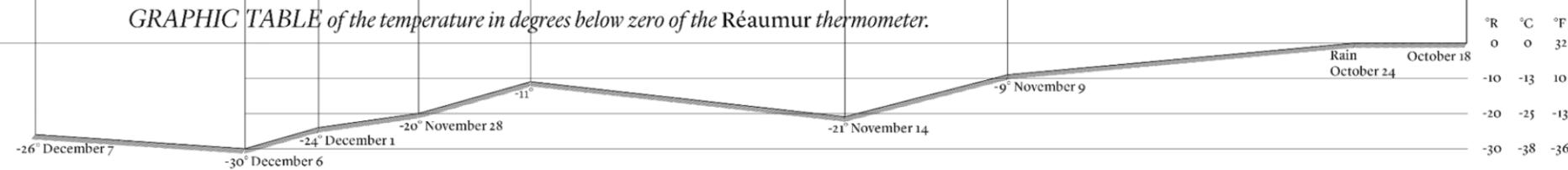
The numbers of men present are represented by the widths of the colored zones at a rate of one millimeter for every ten thousand men; they are further written across the zones. The red designates the men who enter Russia, the black those who leave it. — The information which has served to draw up the map has been extracted from the works of M.M. Thiers, de Ségur, de Fezensac, de Chambray and the unpublished diary of Jacob, the pharmacist of the Army since October 28th. In order to better judge with the eye the diminution of the army, I have assumed that the troops of Prince Jérôme and of Marshal Davout, who had been detached at Minsk and Mogilev and have rejoined near Orsha and Vitebsk, had always marched with the army.



1. the number of Napoleon's troops;
2. direction of travel;
3. the distance traveled;
4. latitude and longitude;
5. temperature;
6. location relative to specific dates

GRAPHIC TABLE of the temperature in degrees below zero of the Réaumur thermometer.

The Cossacks pass the frozen Neman at a gallop.



6200 BC

1500 BC

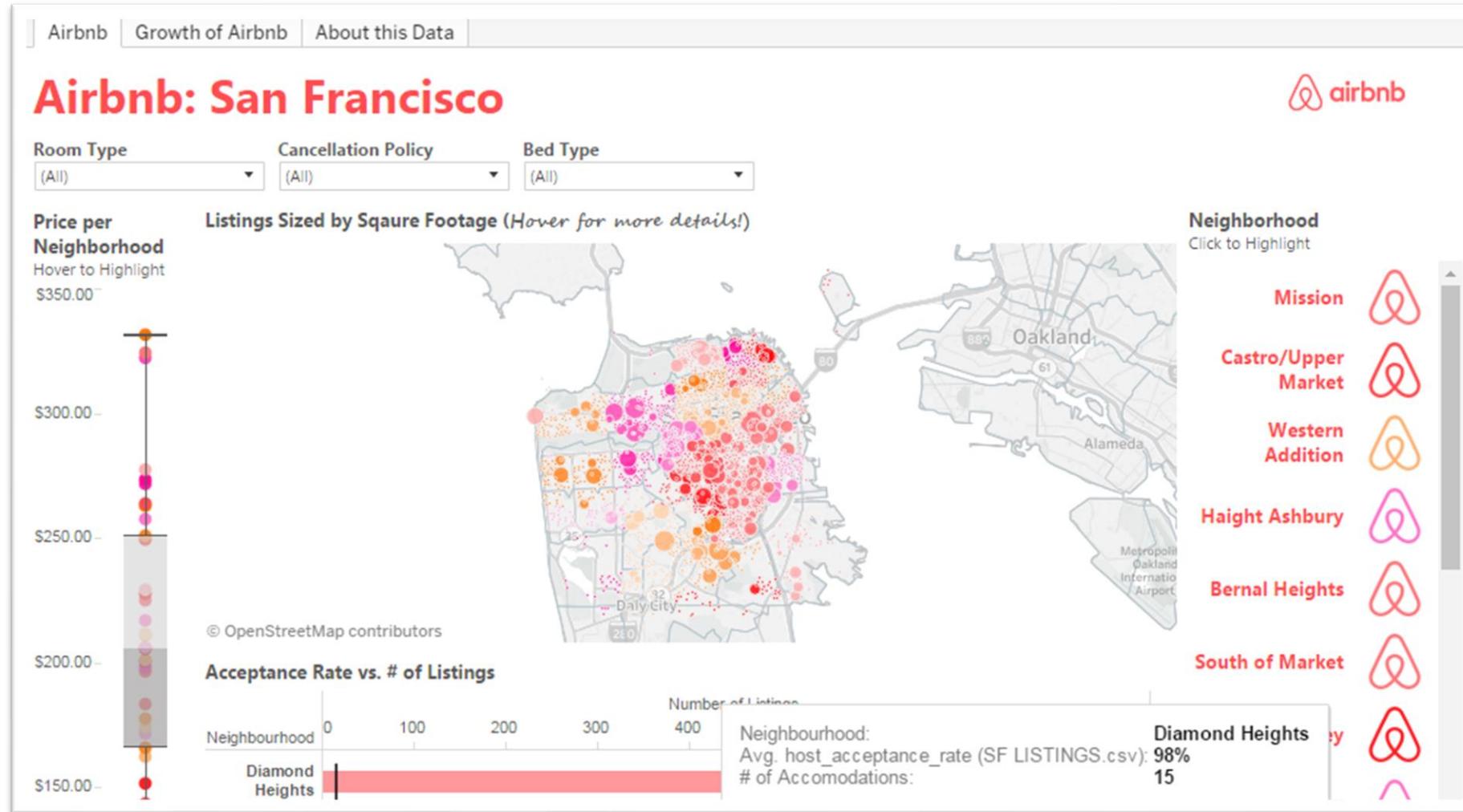
1786

1801

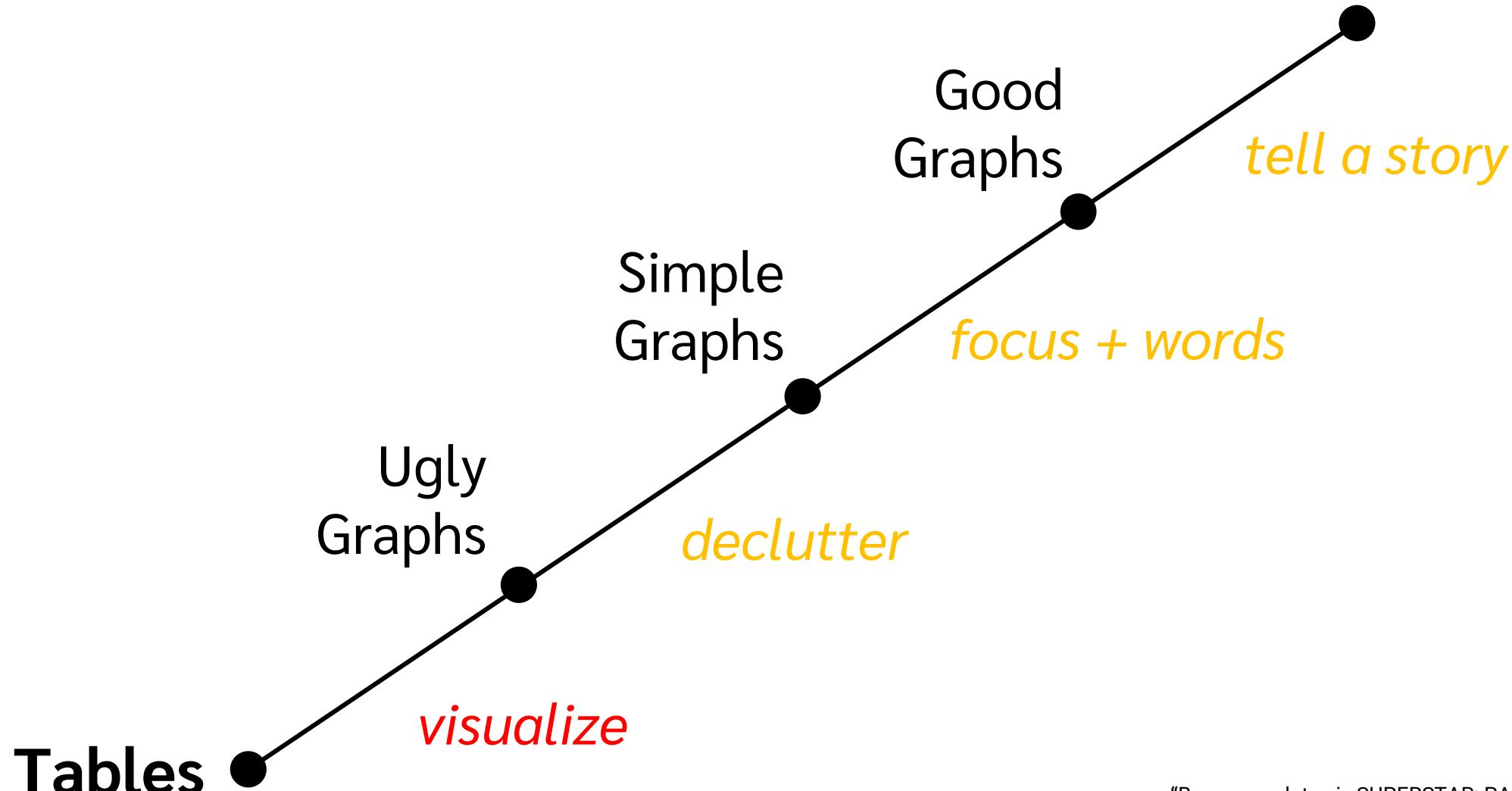
1855

1861

Interactive Visualization



Data Stories



"Become a data viz SUPERSTAR: PART 1" - storytelling with data
<https://www.youtube.com/watch?v=ZRskHRowFCM>

Tables > *visualize* > Ugly Graphs

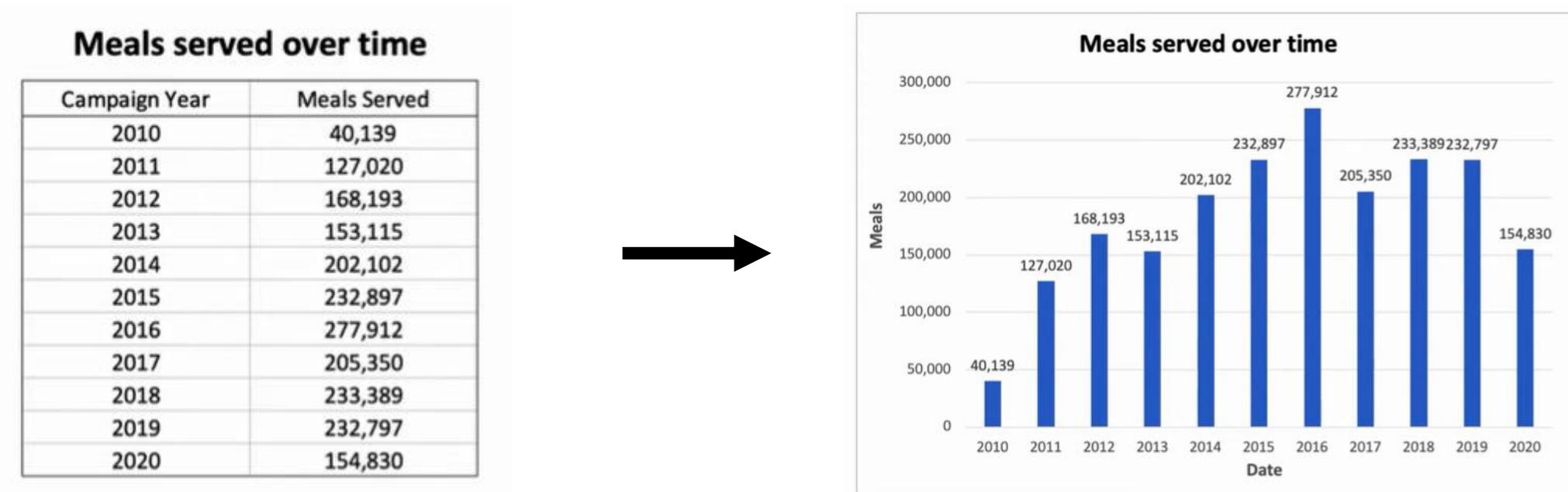
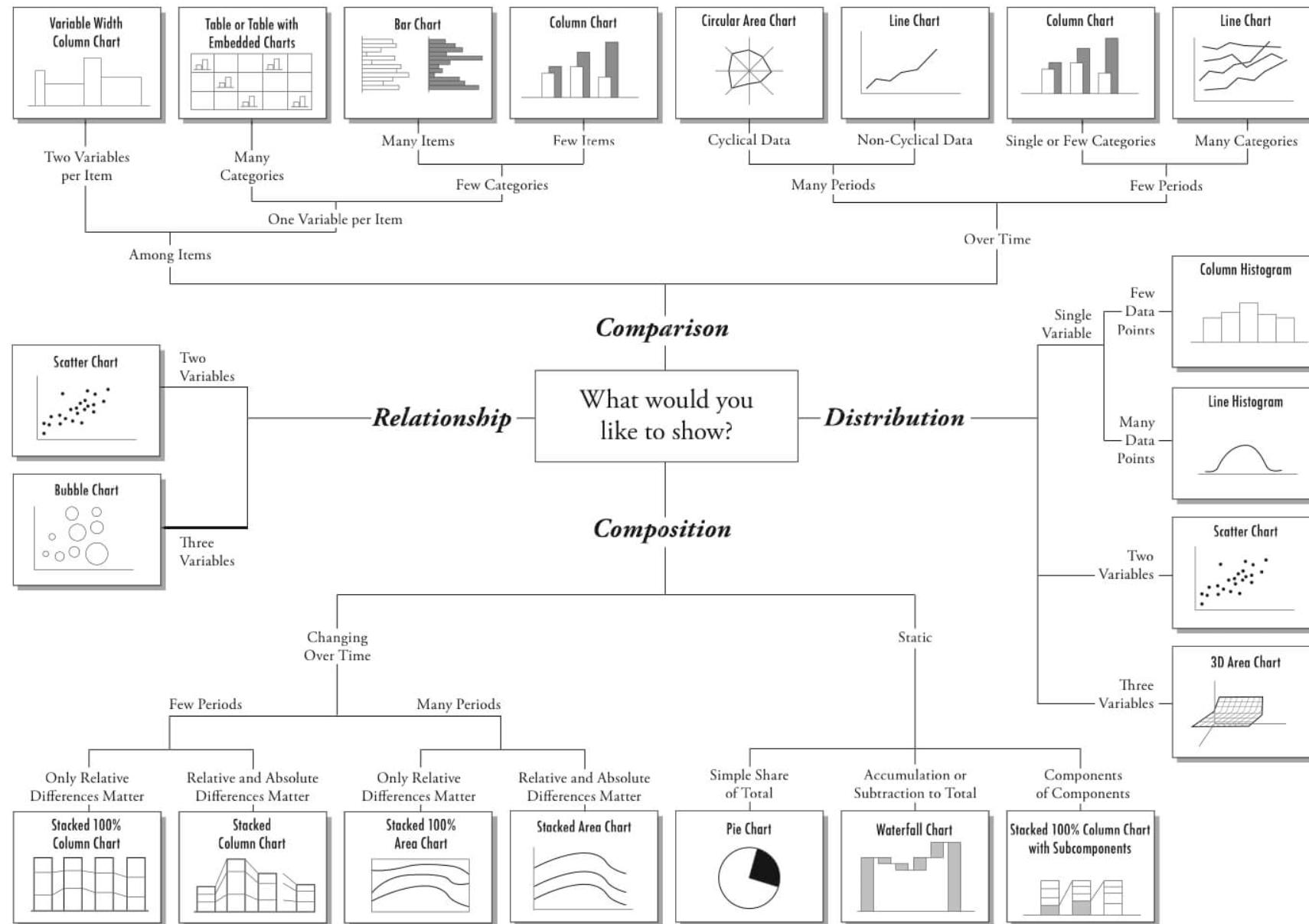
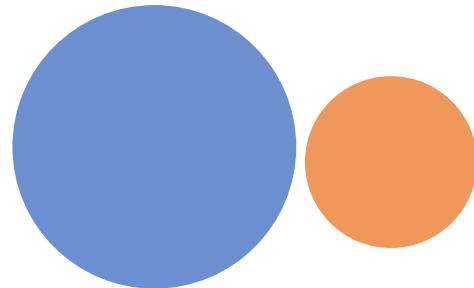


Chart Suggestions—A Thought-Starter

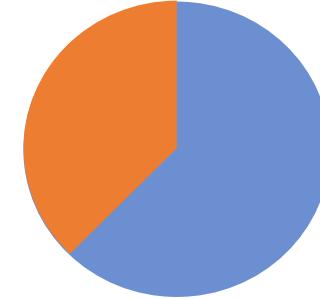
www.ExtremePresentation.com
 © 2009 A. Abela — a.abela@gmail.com



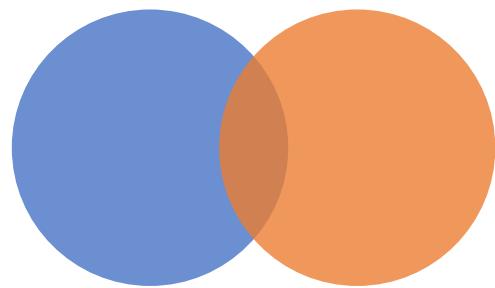
What do you want to tell from your data?



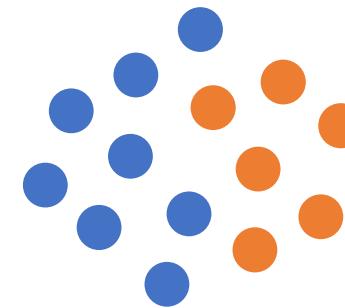
Comparison



Composition



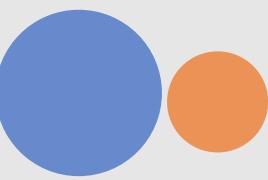
Relationship



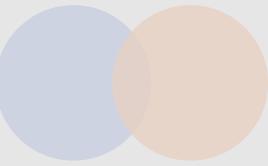
Distribution

1. Bar Chart / Column Chart

- Comparing data across categories



Comparison



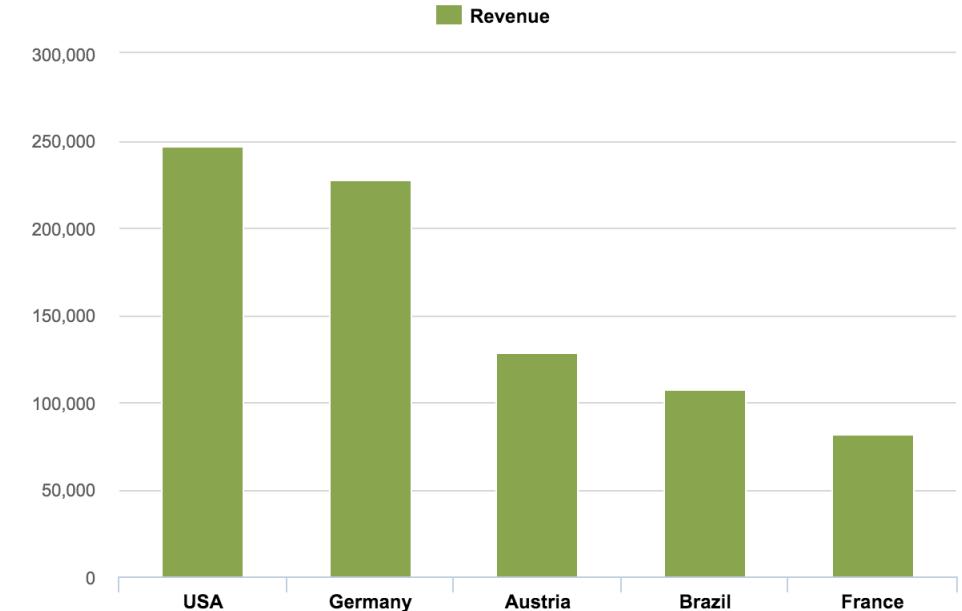
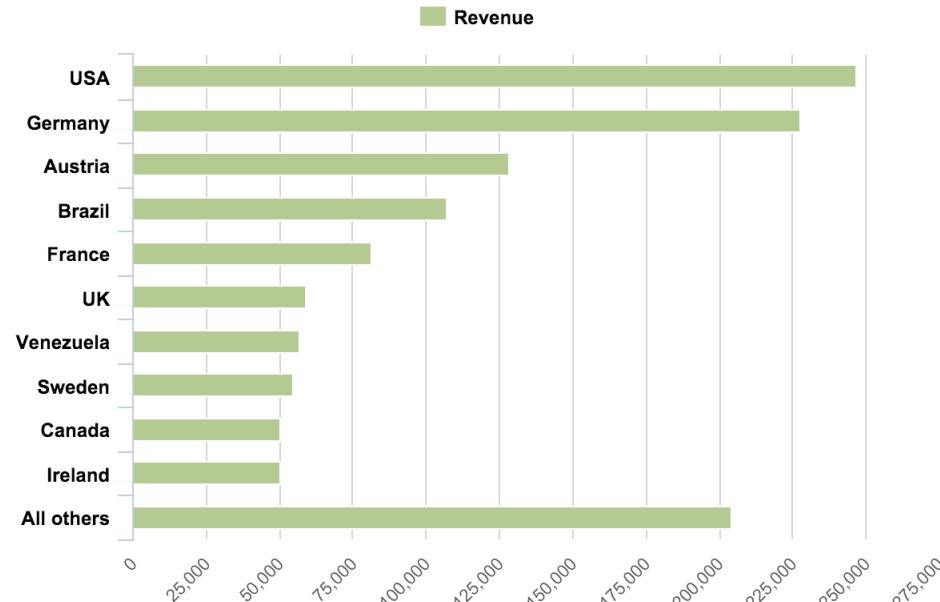
Relationship



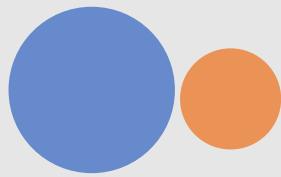
Composition



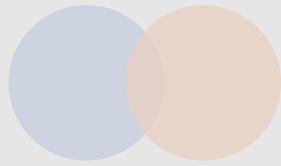
Distribution



<https://eazybi.com/blog/data-visualization-and-chart-types#:~:text=Bar%20charts%20are%20good%20for,never%20for%20comparisons%20or%20distributions.>



Comparison



Relationship



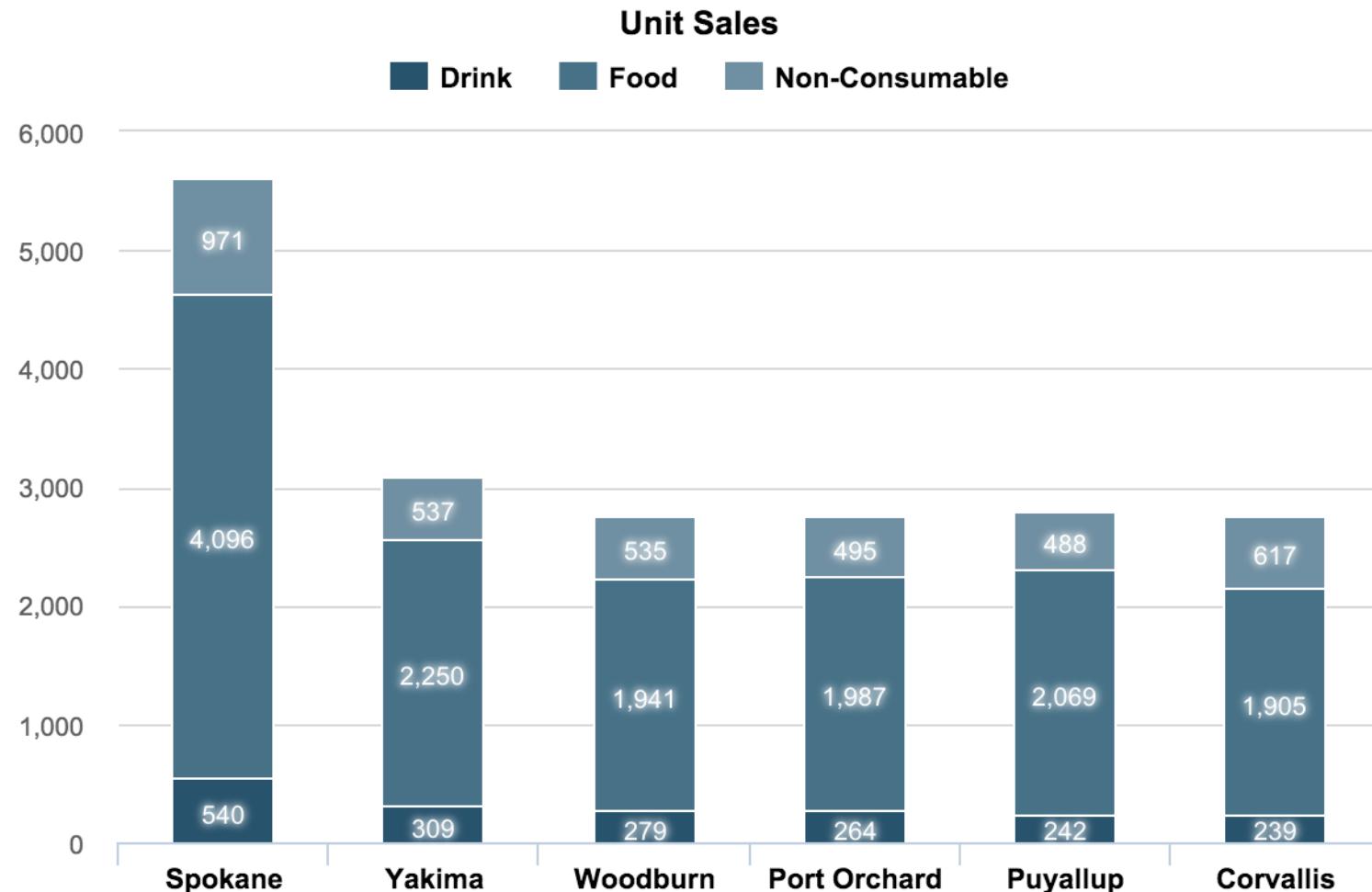
Composition



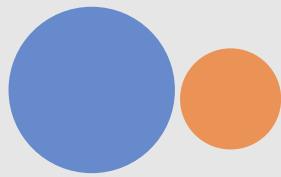
Distribution

2. Stacked Column Chart

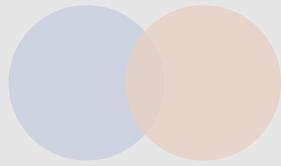
- Comparing data across categories including composition



<https://eazybi.com/blog/data-visualization-and-chart-types#:~:text=Bar%20charts%20are%20good%20for,never%20for%20comparisons%20or%20distributions.>



Comparison



Relationship



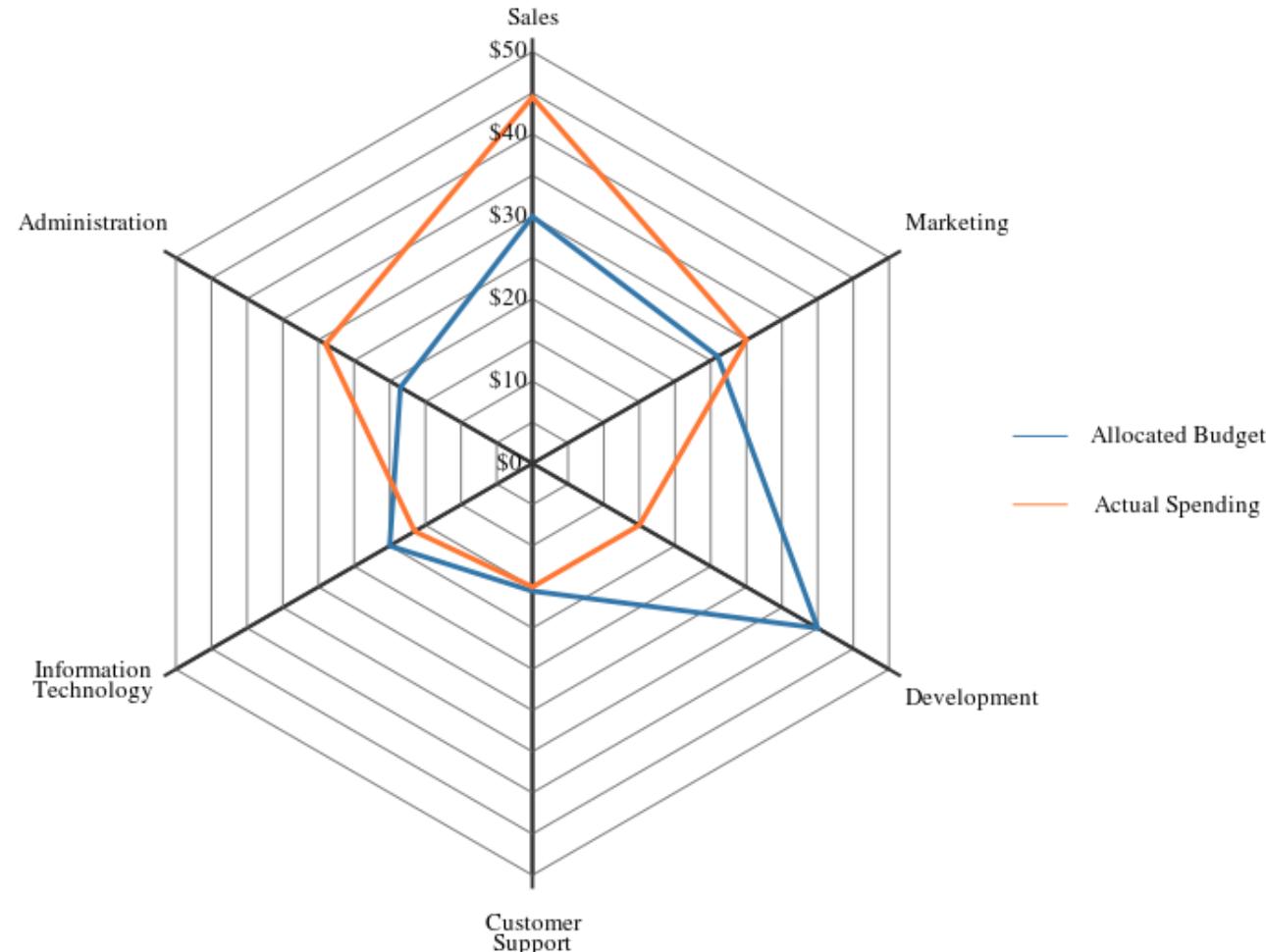
Composition

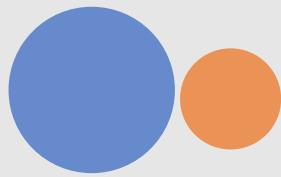


Distribution

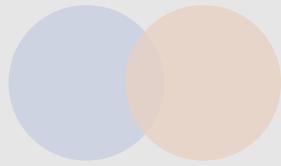
3. Radar Chart (Spider Chart)

- Comparing data across categories
- The performance metrics of any ongoing program.





Comparison



Relationship



Composition



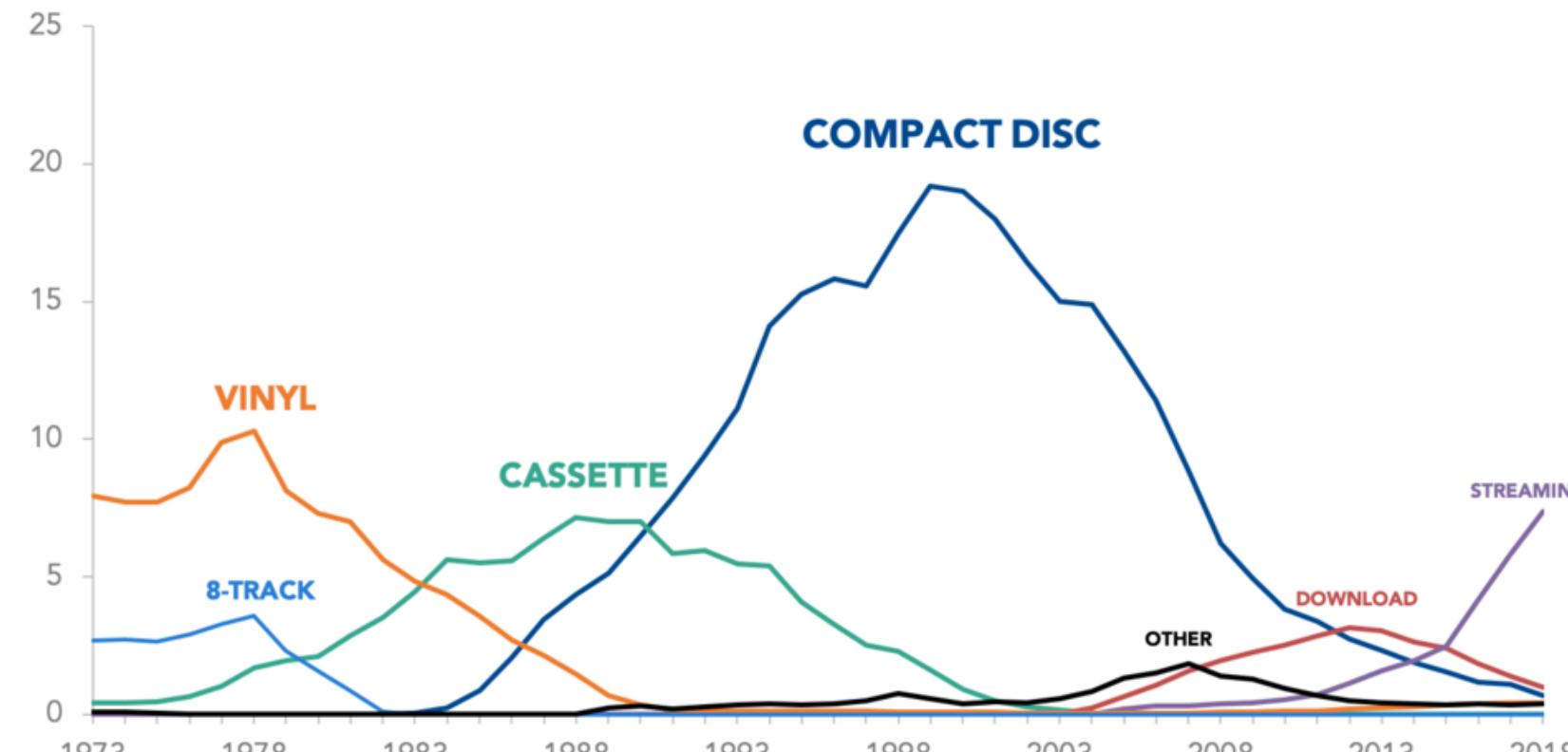
Distribution

4. Line Chart

- Viewing trends in data over time

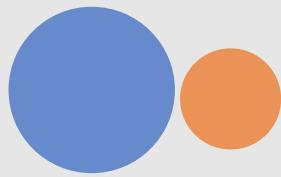
US music sales by format (inflation-adjusted)

IN BILLIONS (USD)

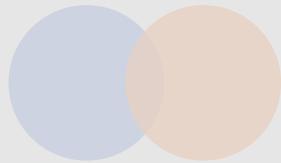


SOURCE: Recording Industry Association of America

<http://www.storytellingwithdata.com/blog/2020/4/9/what-is-an-area-graph>



Comparison



Relationship



Composition



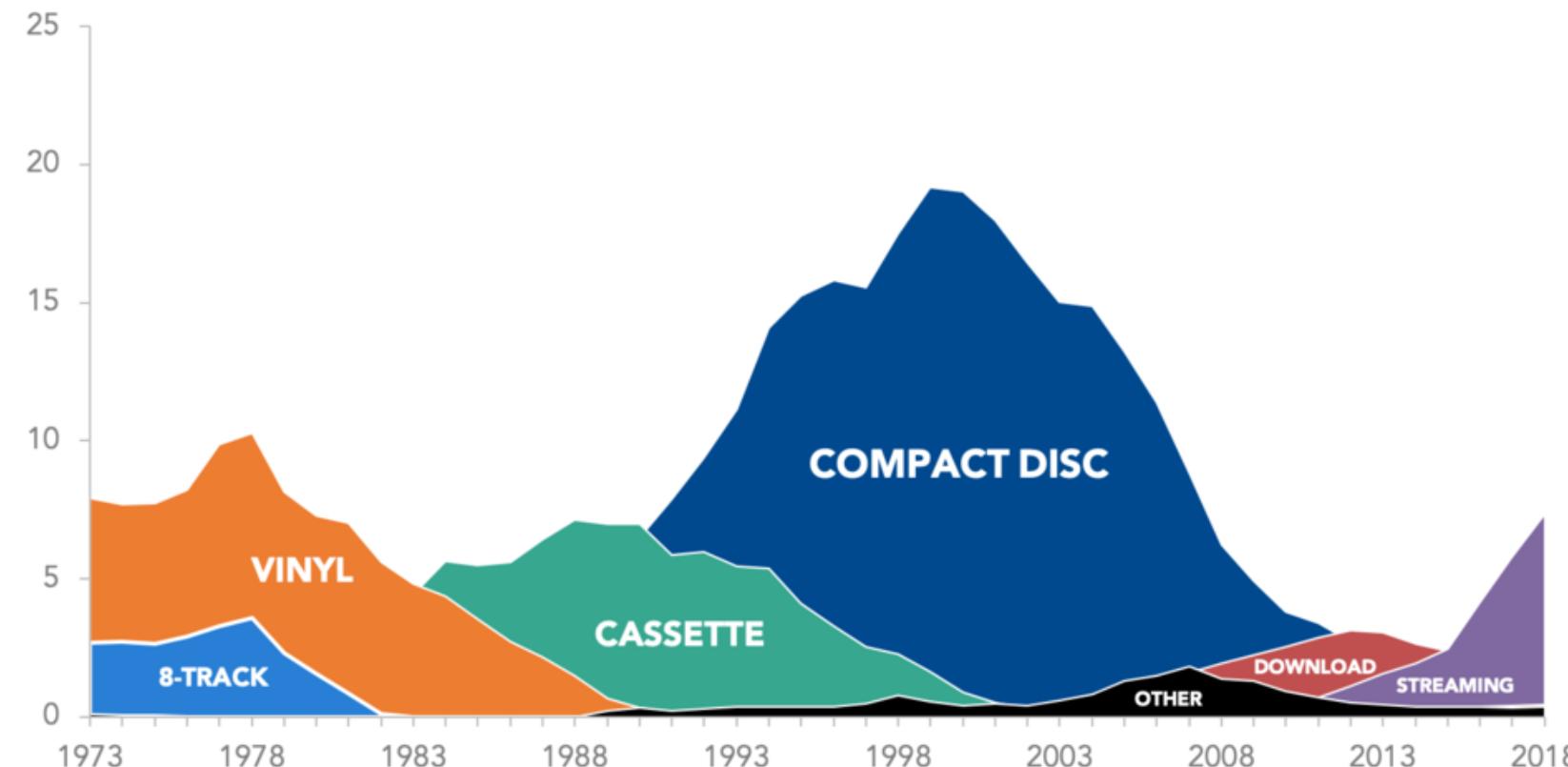
Distribution

5. Area Chart

- Conveying total amounts over time

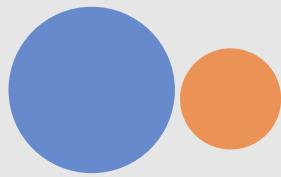
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IN BILLIONS (USD)

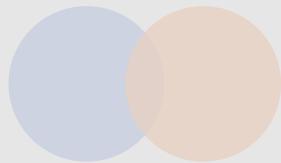


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Comparison



Relationship



Composition



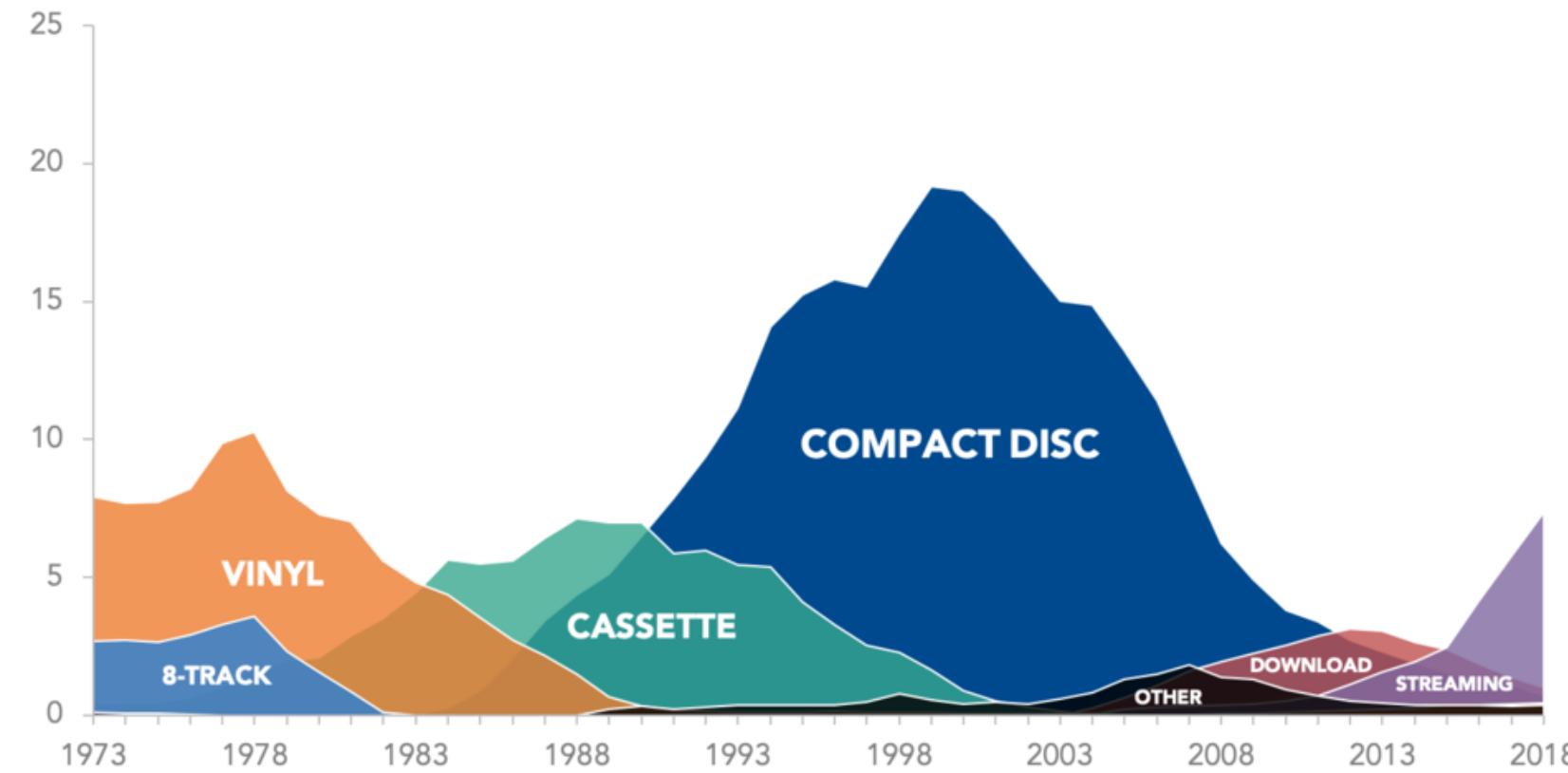
Distribution

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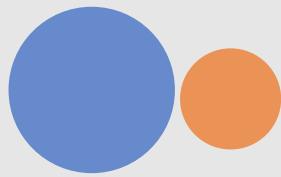
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IN BILLIONS (USD)

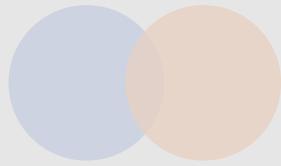


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Comparison



Relationship



Composition



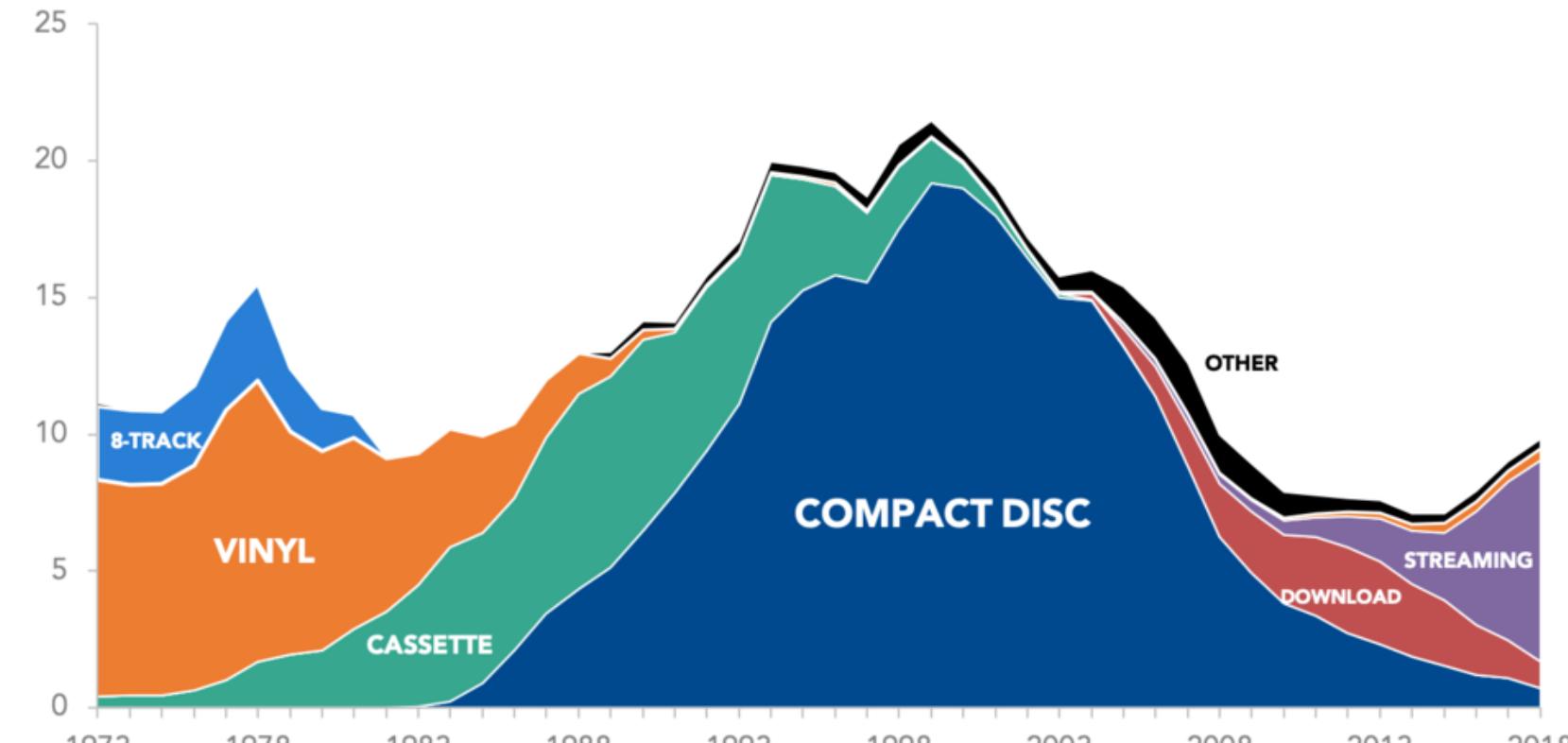
Distribution

5. Area Chart

- Conveying total amounts over time

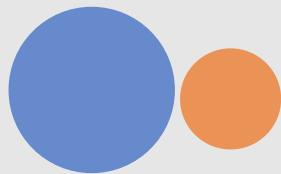
US music sales by format (inflation-adjusted)

IN BILLIONS (USD)



SOURCE: Recording Industry Association of America

<http://www.storytellingwithdata.com/blog/2020/4/9/what-is-an-area-graph>



Comparison



Relationship



Composition



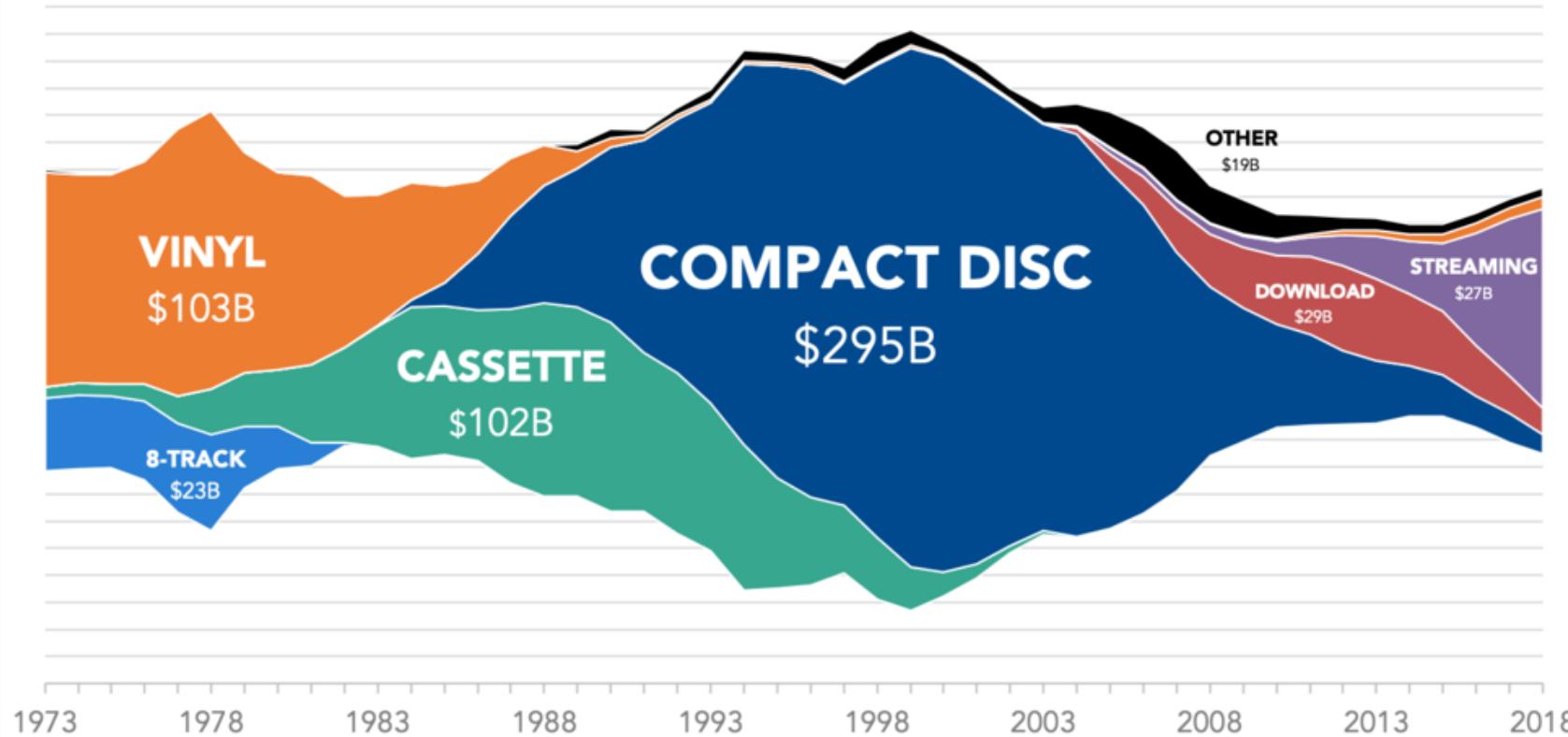
Distribution

5. Area Chart

- Conveying total amounts over time

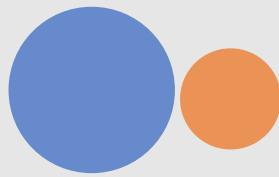
US music sales by format (inflation-adjusted)

EACH INTERVAL = \$1 BILLION (USD)

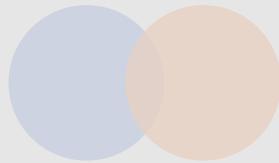


SOURCE: Recording Industry Association of America

<http://www.storytellingwithdata.com/blog/2020/4/9/what-is-an-area-graph>



Comparison



Relationship



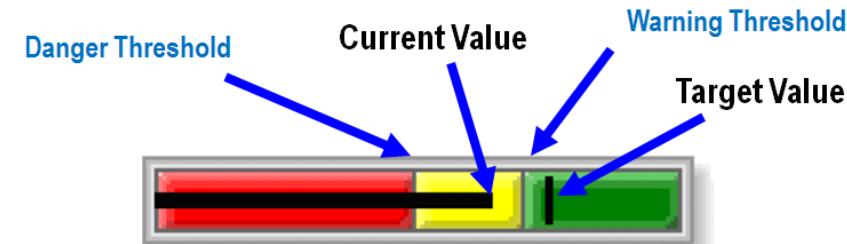
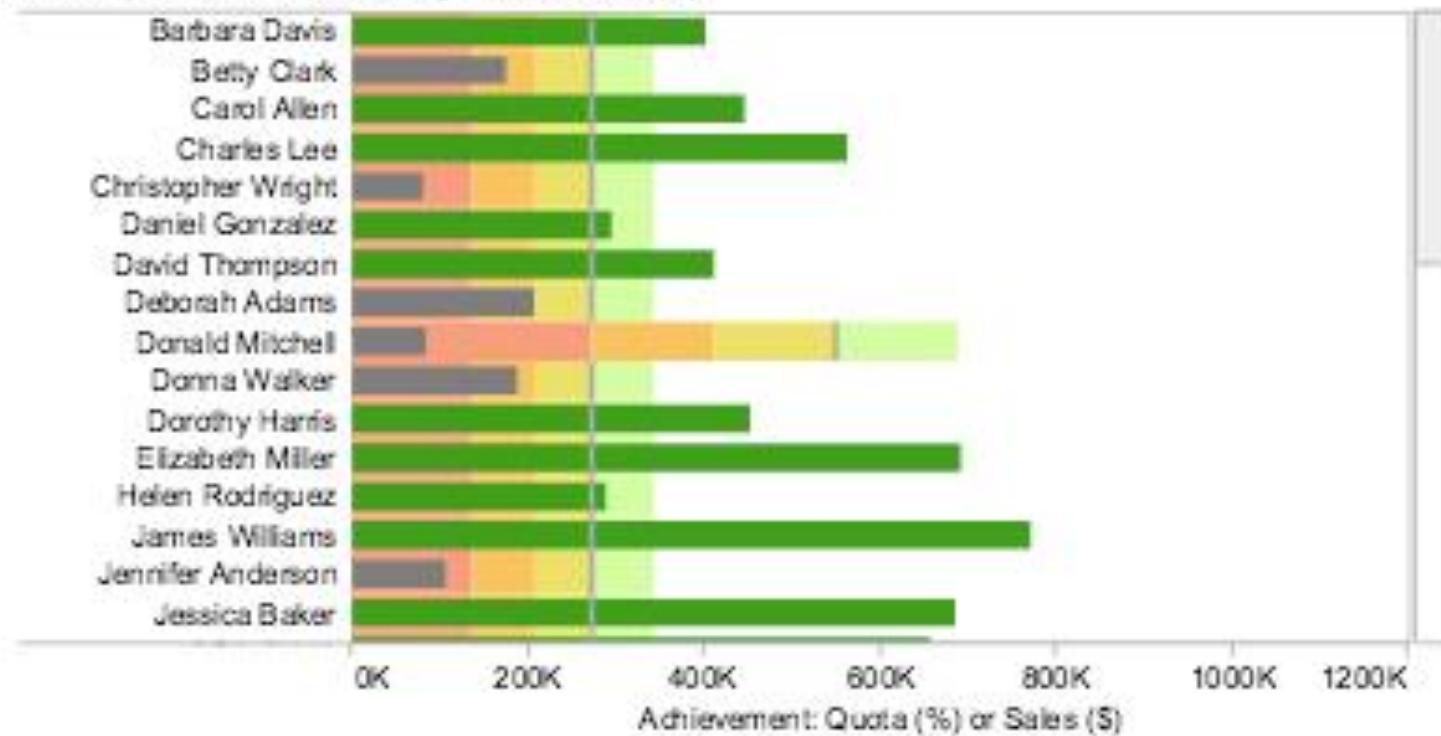
Composition

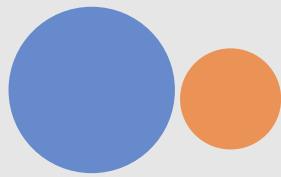


Distribution

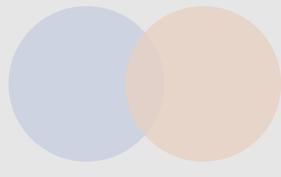
6. Bullet Chart

- Evaluating performance of a metric against a goal

**Salespeople in All Region: Sales (\$)**



Comparison



Relationship



Composition

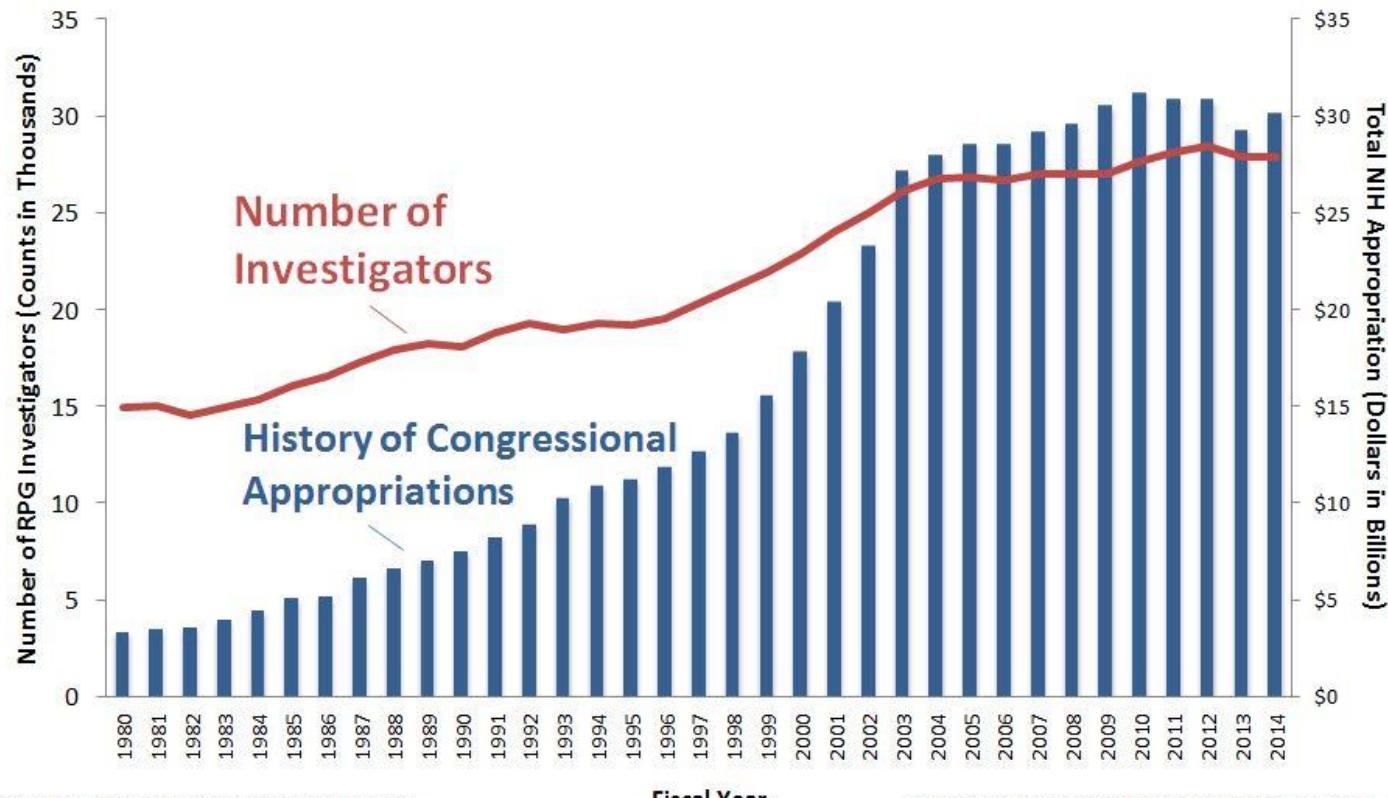


Distribution

Mixed Chart

- Line + Column

Number of Principal Investigators* Supported on NIH Research Project Grants (RPGs) and History of Congressional Appropriations

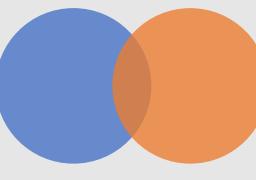


NIH Rock Talk Blog: <http://nexus.od.nih.gov/all/category/blog/>
 NIH RePORT: http://report.nih.gov/special_reports_and_current_issues/index.aspx

*Includes contact and multiple principal investigators. Excludes awards made with American Recovery and Reinvestment Act funds.



Comparison



Relationship



Composition



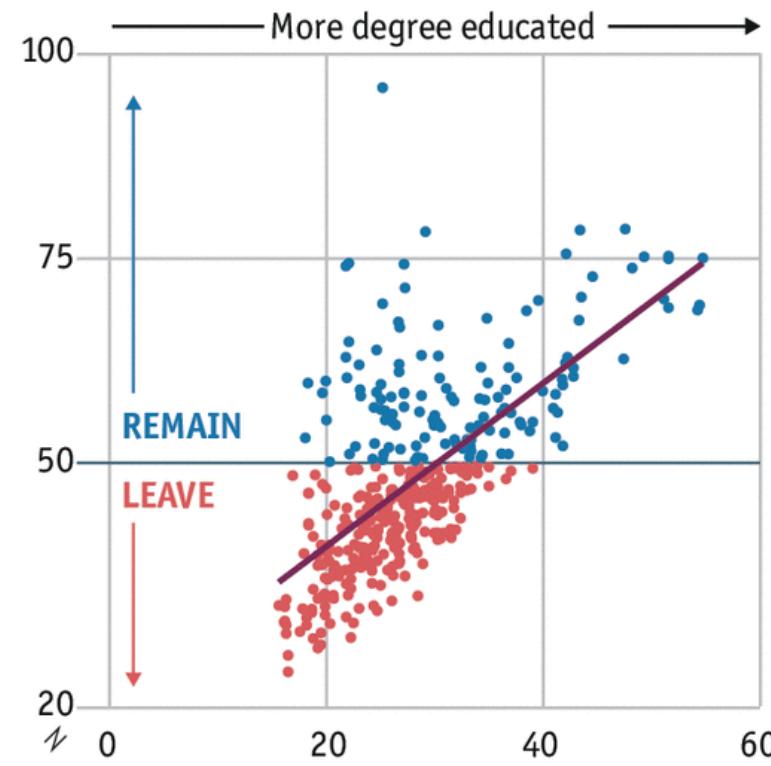
Distribution

1. Scatter Chart

- Relationship between different variables

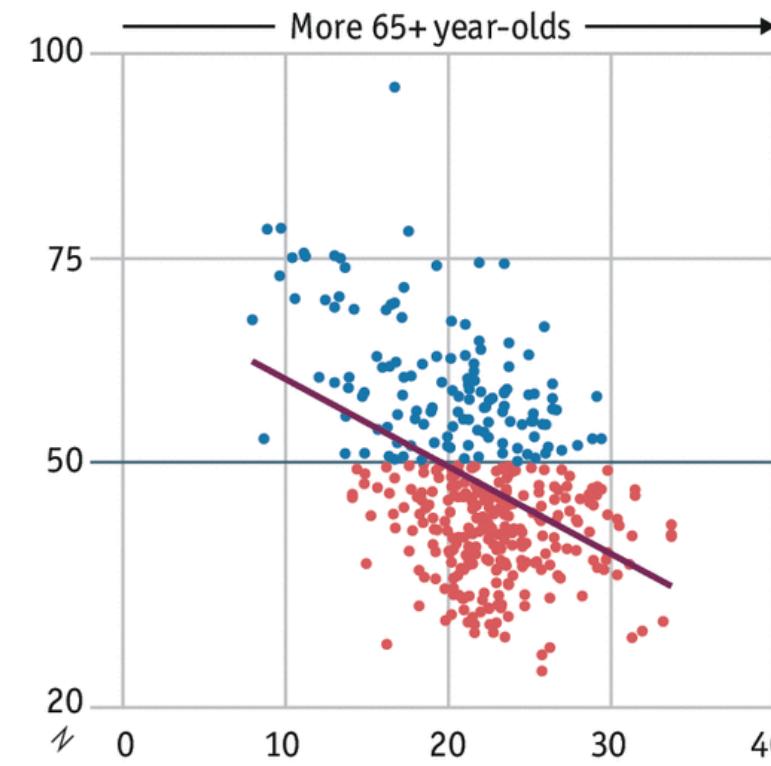
EU referendum results by demographics

Remain vote % by counting area



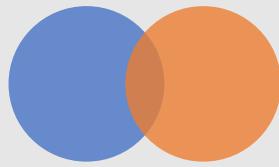
Sources: BBC; 2011 Census, UK Data Service

Economist.com





Comparison



Relationship



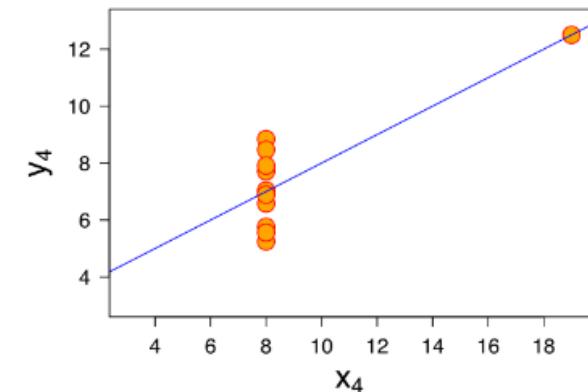
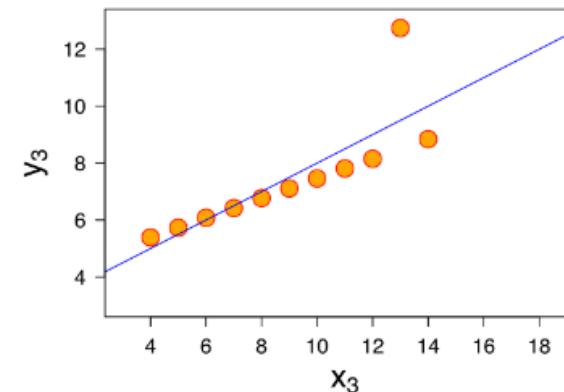
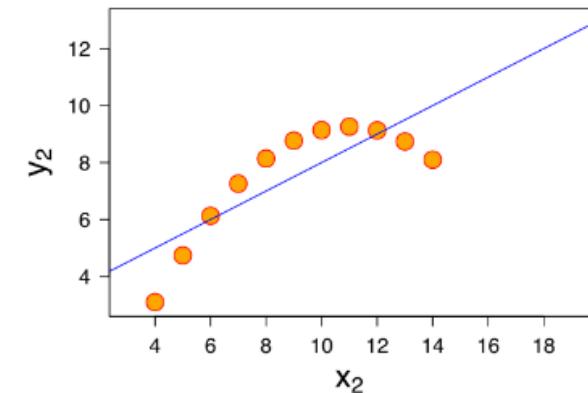
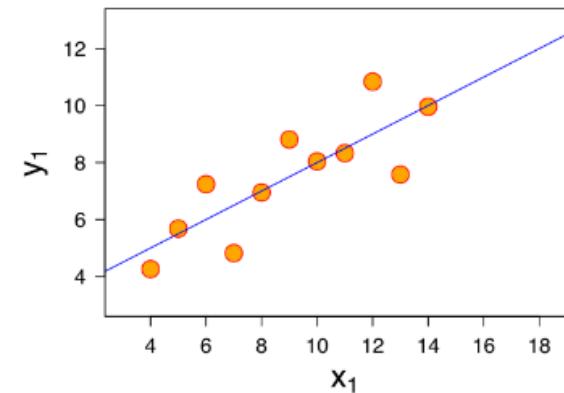
Composition

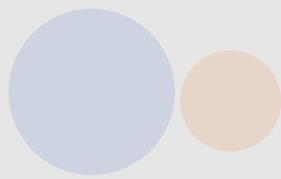


Distribution

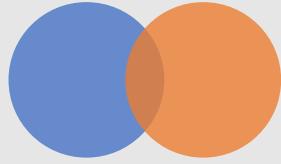
1. Scatter Chart - Anscombe's quartet

- All 4 sets of data shares many common statistics properties: means, variance, correlations, regression line, etc.
- the importance of graphing data.
- the effect of outliers and other influential observations on statistical properties.





Comparison



Relationship



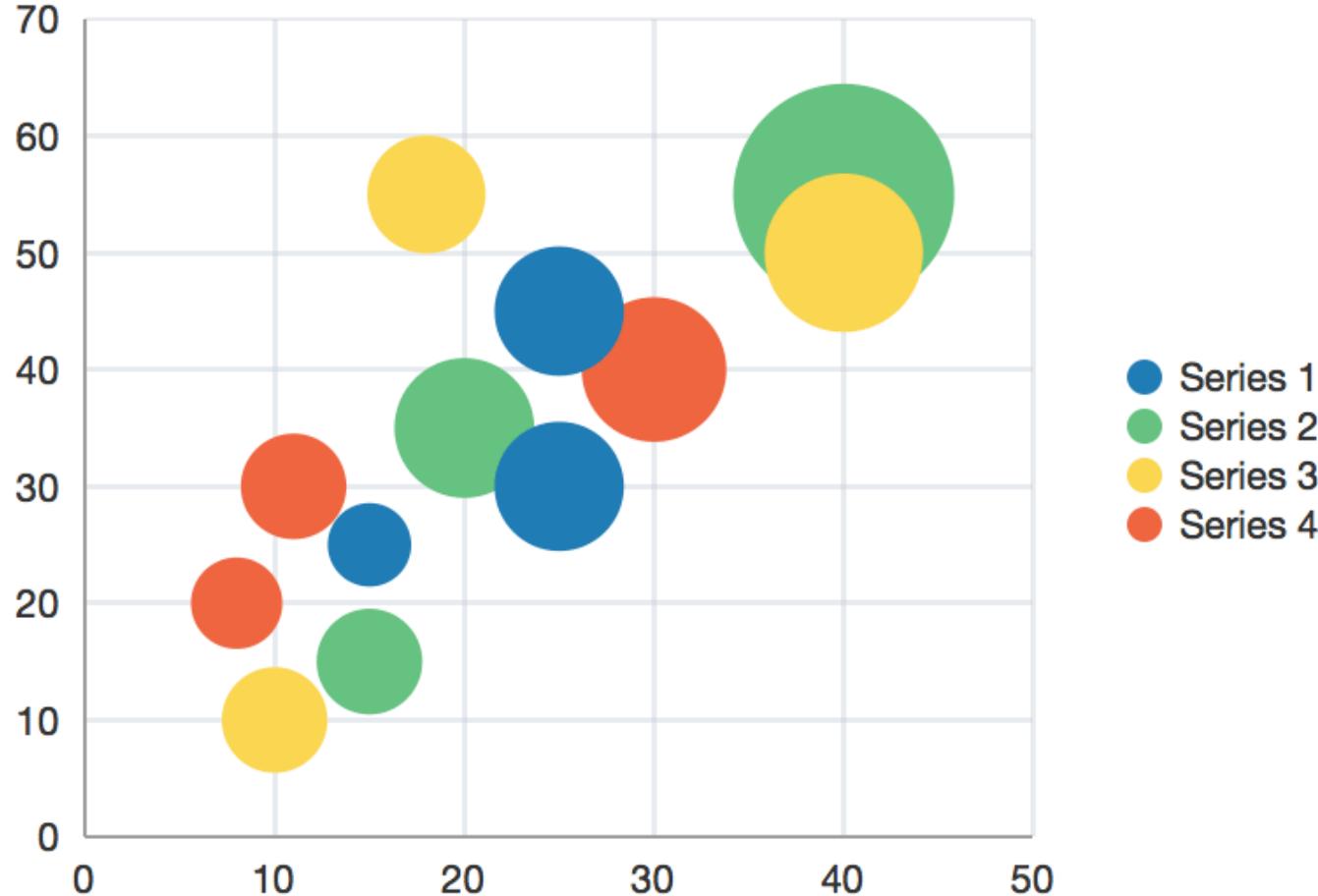
Composition



Distribution

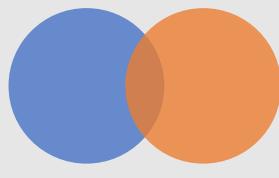
2. Bubble Chart

- Showing the concentration of data along two axes





Comparison



Relationship



Composition

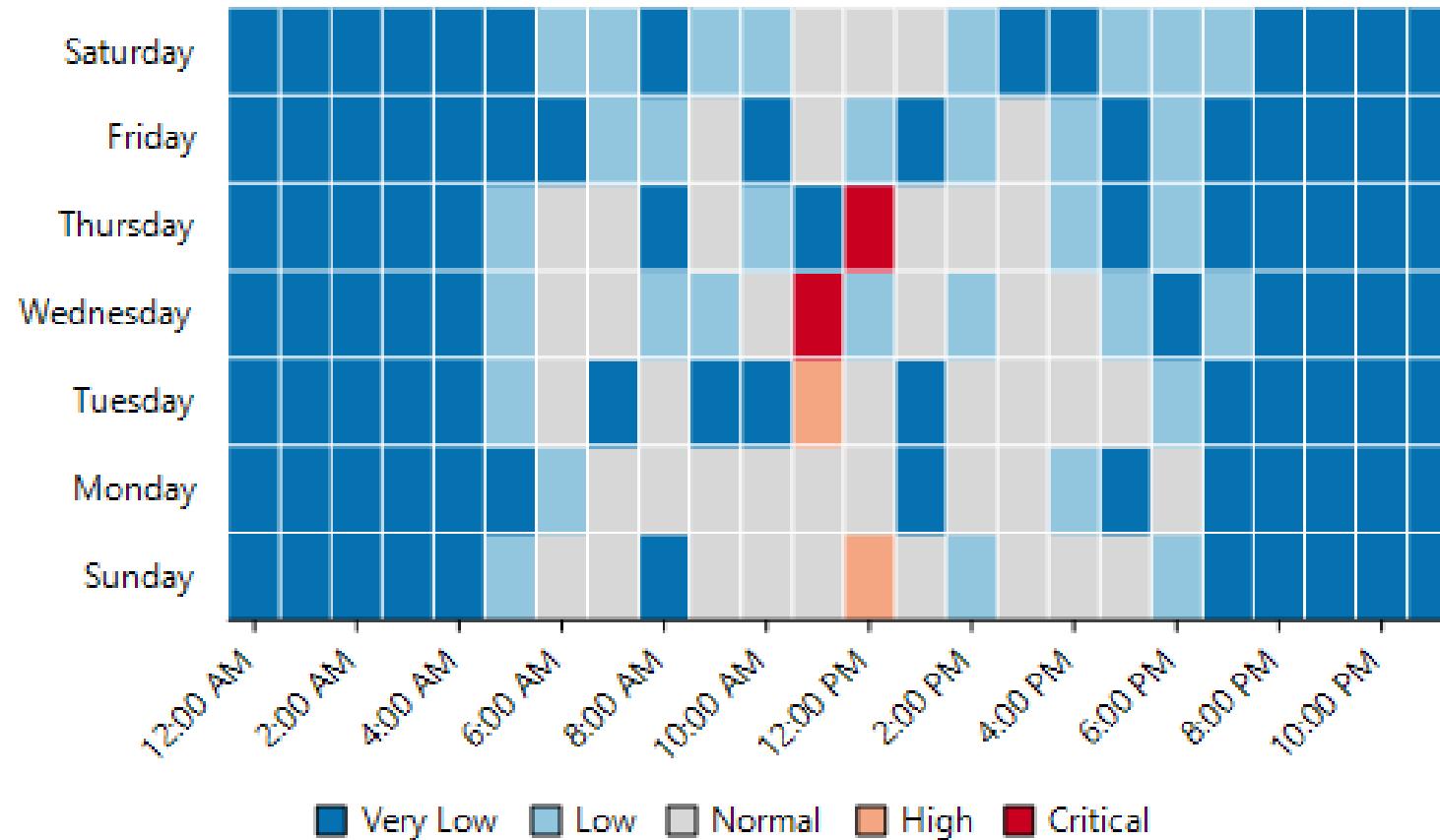


Distribution

3. Heatmap Chart

- Identify patterns, areas of concentration, and data variance

Weekly Traffic Intensity



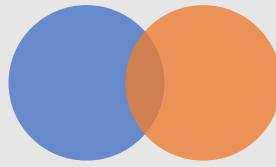
4. Crosstab Chart

- Table showing the relationship between two or more variables

Column % Column Comparisons	Under 25	25 to 39	40 or more	Male		Female	
				Under \$45,000	\$45,000 or more	Under \$45,000	\$45,000 or more
Coca-Cola	53% c	55% c	35%	45%	46%	55%	38%
Diet Coke	6%	13%	13%	9%	7%	11%	15%
Coke Zero	16%	19%	20%	21%	15%	18%	23%
Pepsi	6%	7%	10%	15%	10%	0%	8%
Diet Pepsi	1%	0%	5%	3%	0%	3%	5%
Pepsi Max	17% b	6%	15%	6%	20%	13%	10%
Dislike all cola	1%	0%	1%	0%	1%	0%	1%
Don't care	0%	0%	2%	0%	1%	0%	1%
NET	100% -	100% -	100% -	100% -	100% -	100% -	100% -
Column n	83	69	175	33	114	38	105
Column Names	A	B	C	A	B	A	B



Comparison



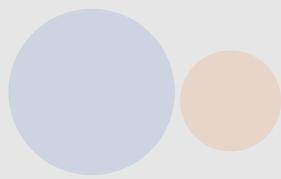
Relationship



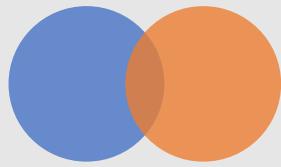
Composition



Distribution



Comparison



Relationship



Composition

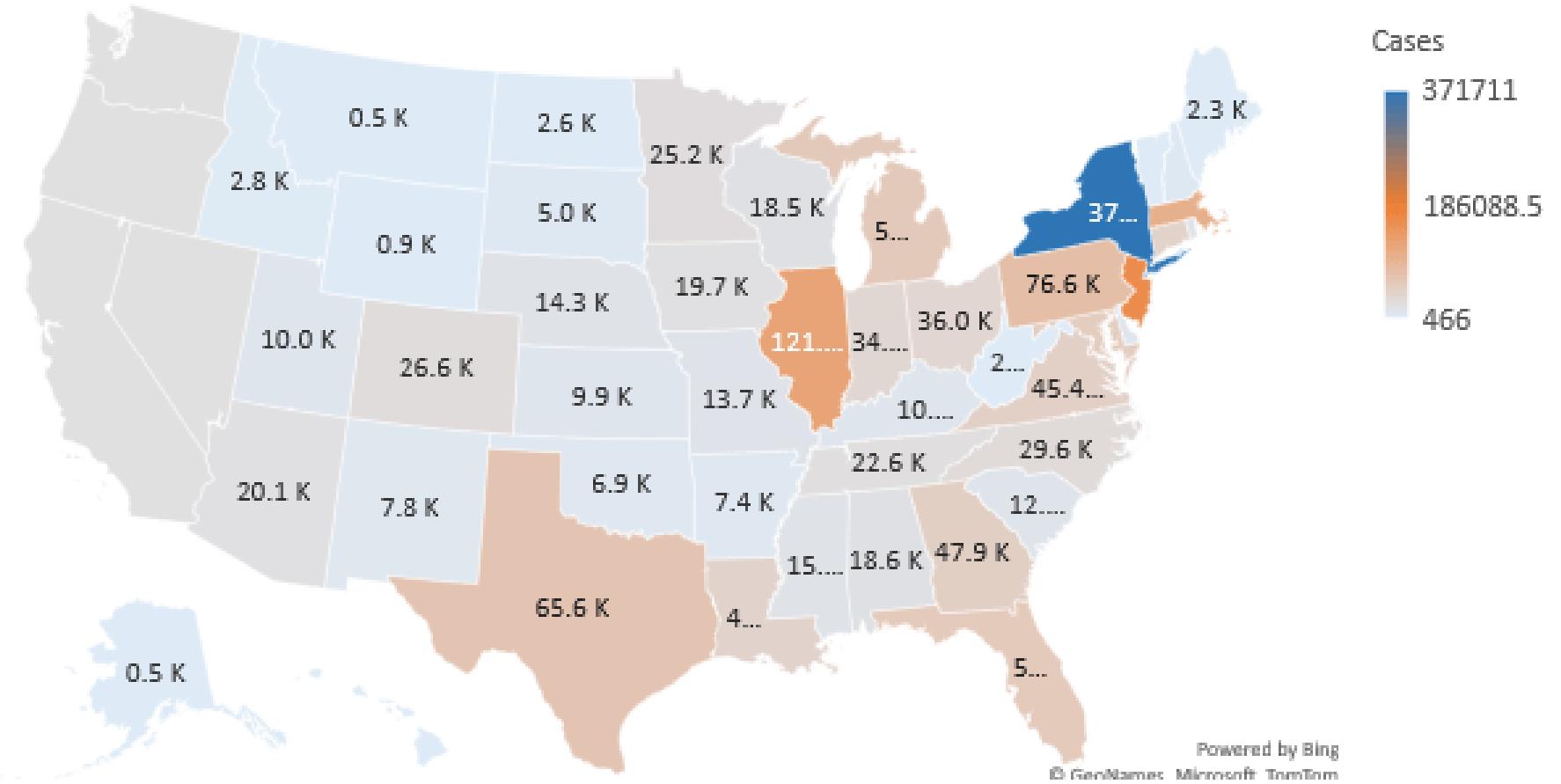


Distribution

5. Map Chart

- Showing geocoded data

Covid-19 Confirmed Cases



Mixed Chart

- Crosstab + Bar + Column

Comparison



Relationship



Composition



Distribution

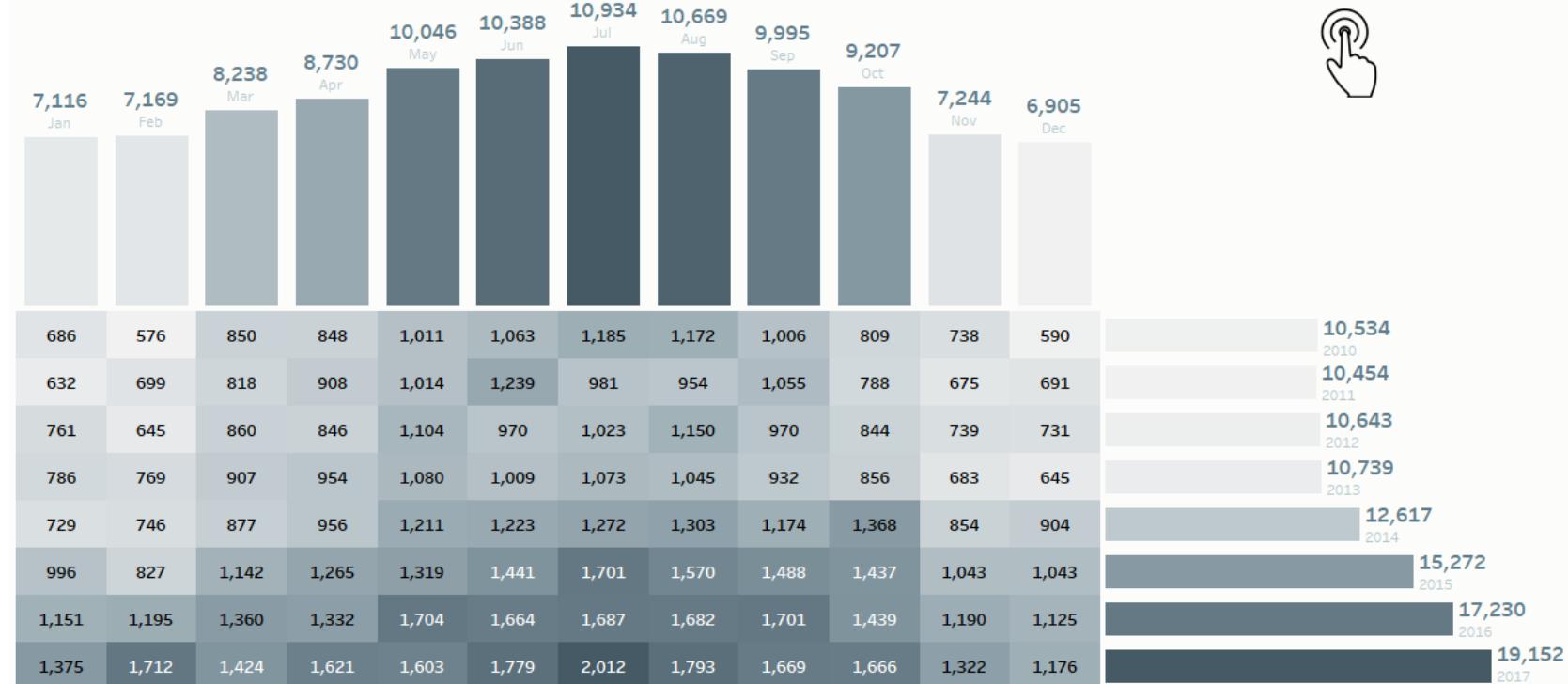
Rat Sightings in New York City

Since 2010, there have been an increasing number of reported rat sightings across the five NYC Boroughs, peaking each year in the summer months.

Rat Sightings for All

Select any Borough

(All)



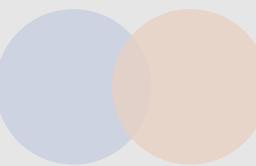
Data: NYC Open Data

Created by Brian Graves | [@NewPrediction](#)

Icons: Flaticon



Comparison



Relationship



Composition

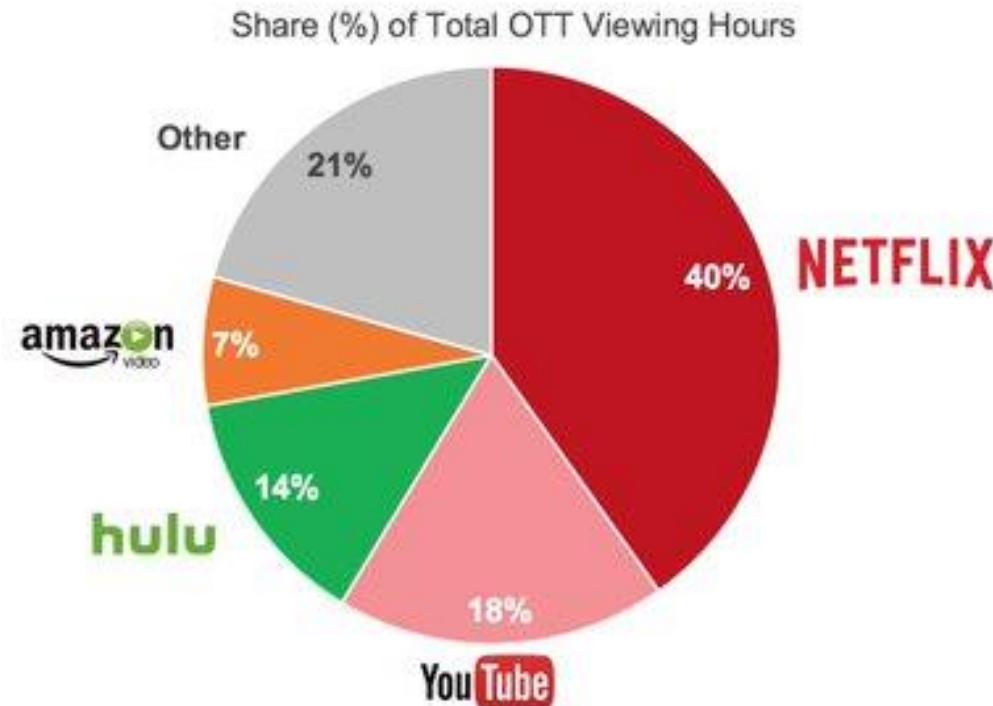


Distribution

1. Pie Chart

- Showing proportions
- Total of whole (1 or 100)

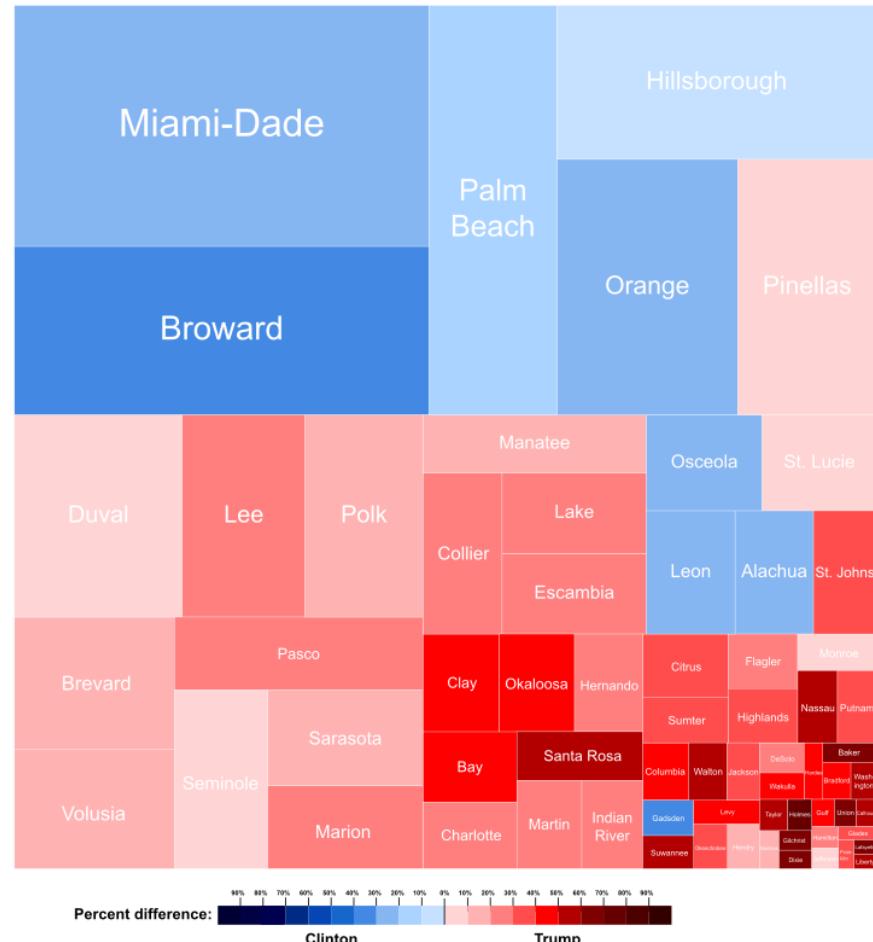
The four major OTT streaming services account for nearly 80% of viewing time for OTT households



2. Tree Map Chart

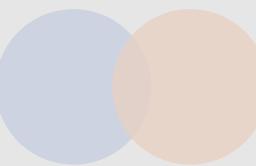
- Showing hierarchical data as a proportion of a whole

Florida Counties
United States presidential election, 2016





Comparison



Relationship



Composition

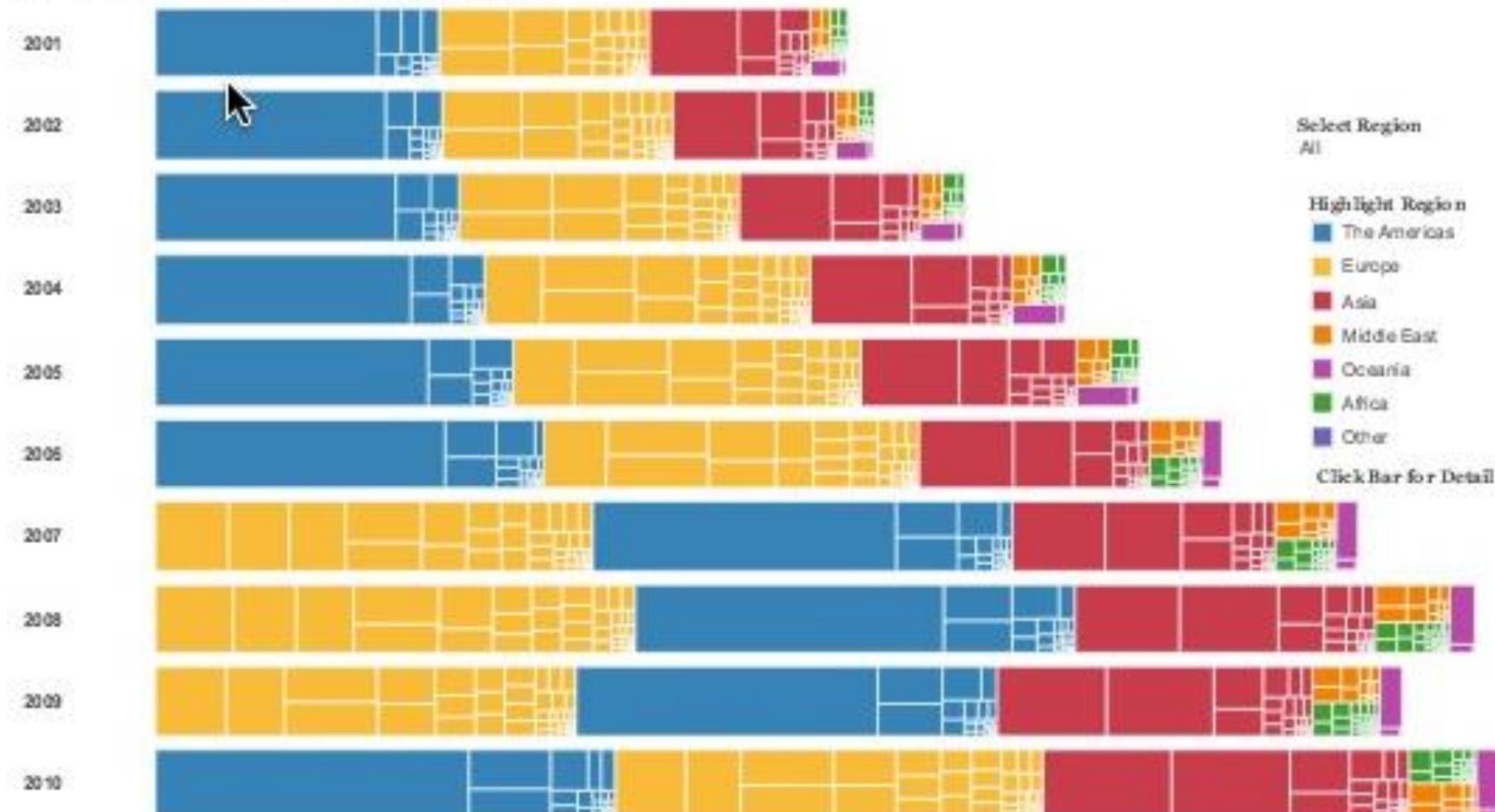


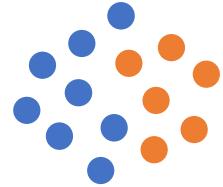
Distribution

Mixed Chart

- Treemap + Bar

World GDP Through Time





4.Distribution

Histogram chart

Box plot

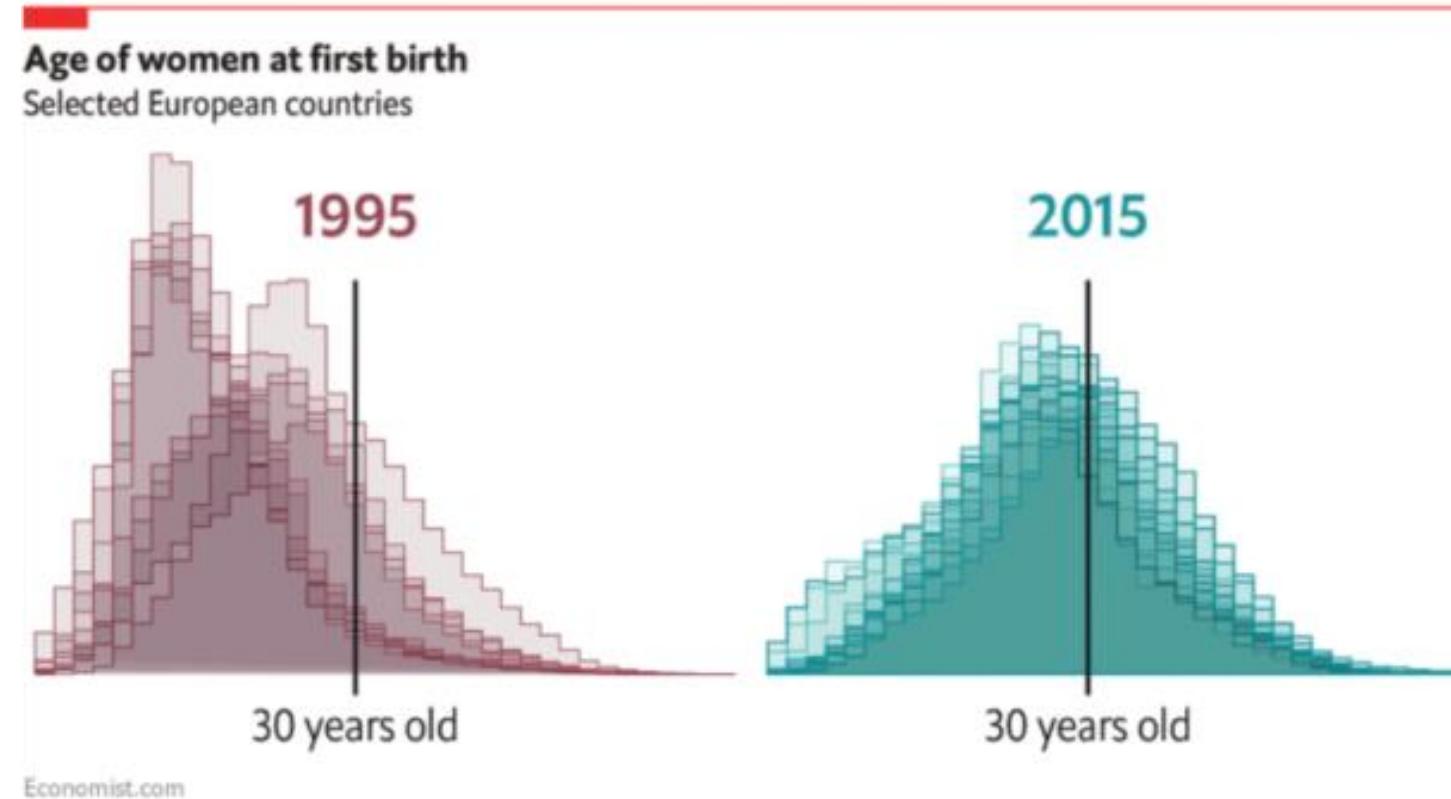
Histogram chart

When to use

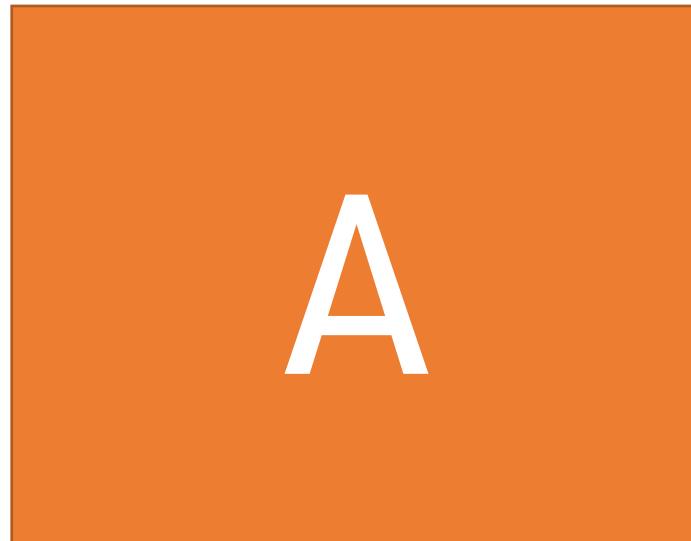
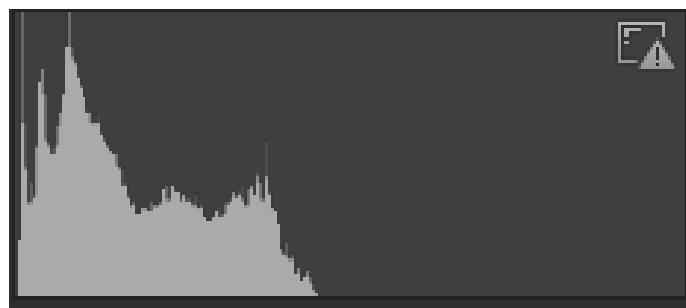
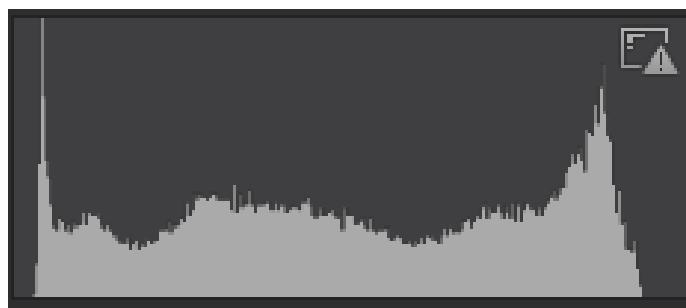
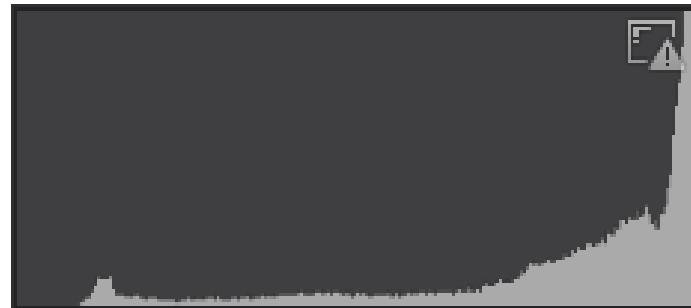
- Understanding the distribution of your data

Possible extension

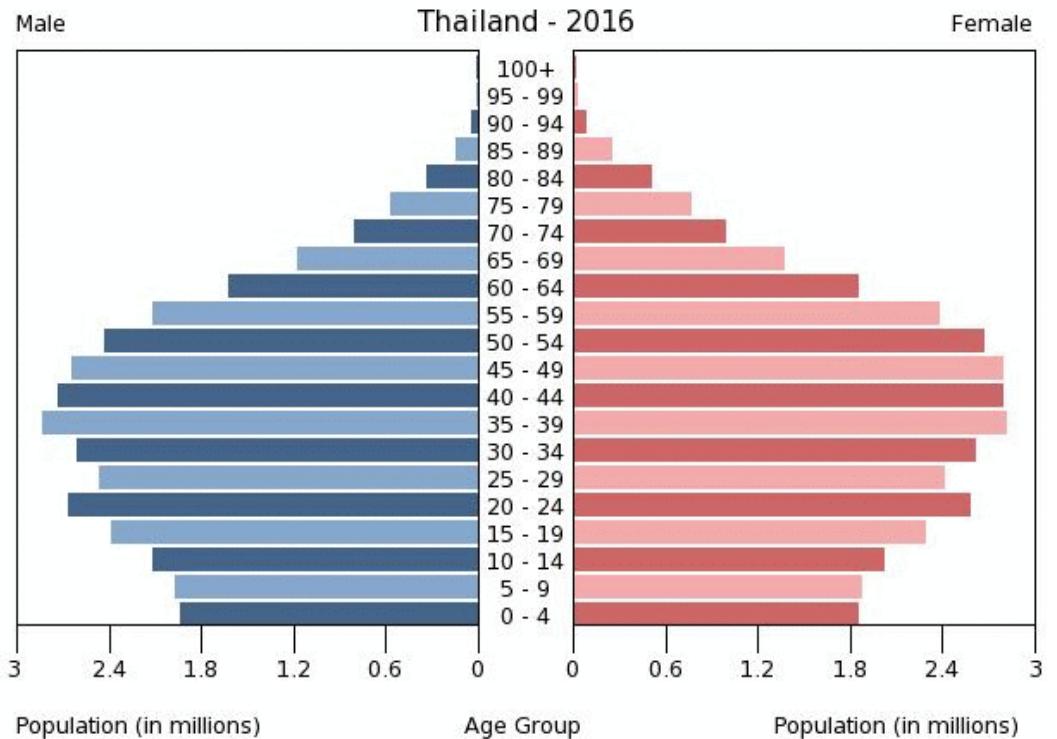
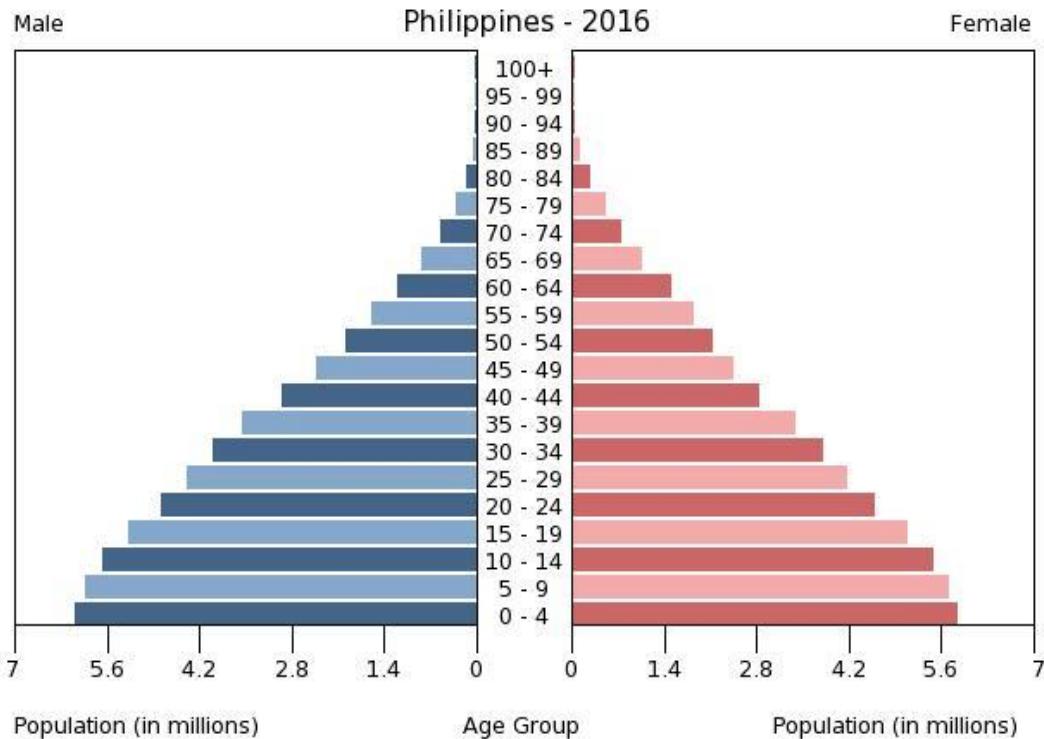
- Test different groupings of data
 - Add a filter



Histogram chart



Histogram chart



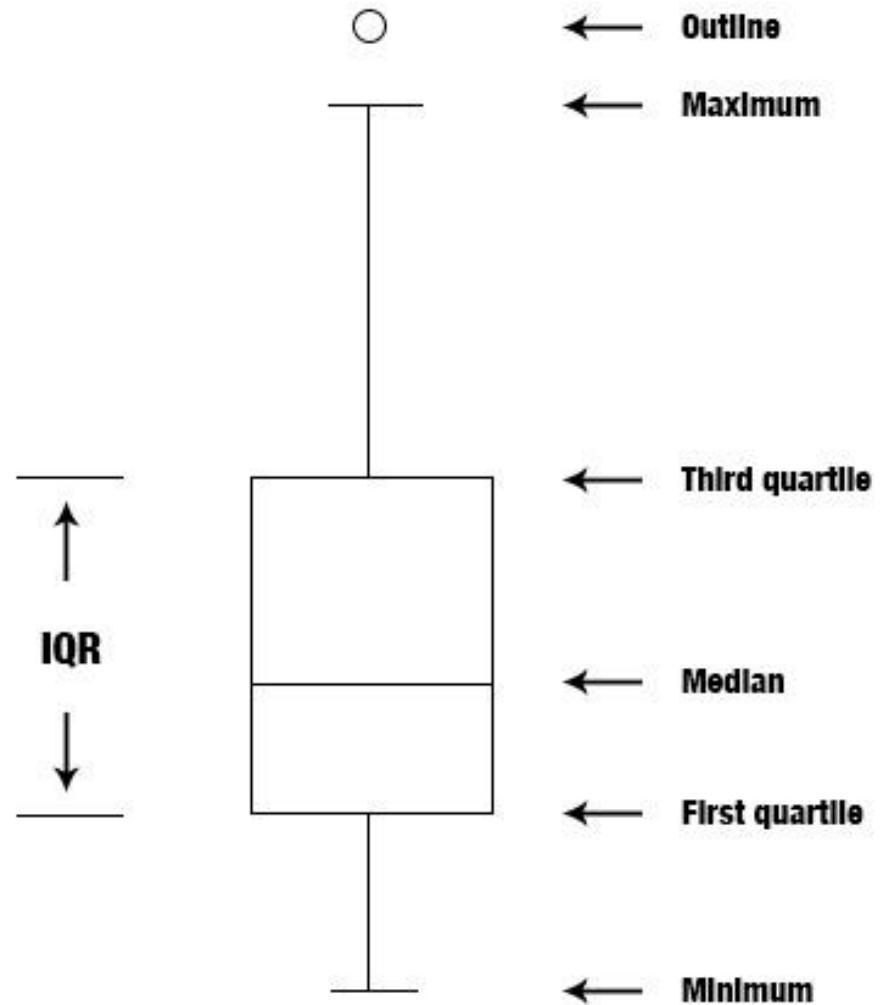
Box plot

When to use

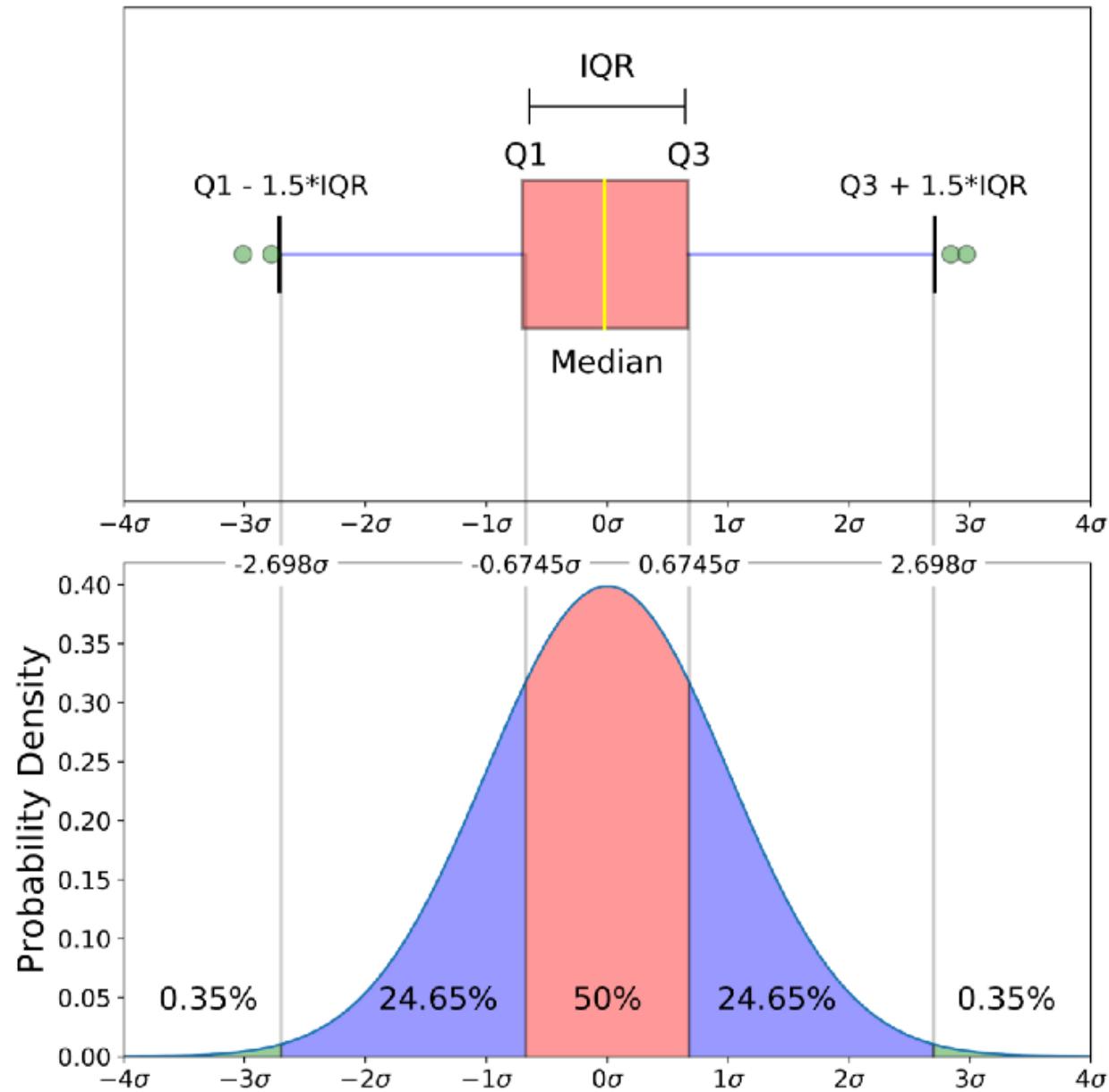
- Showing the distribution of a set of data

Possible extension

- Hiding the points within the box
- Comparing boxplots across categorical dimensions

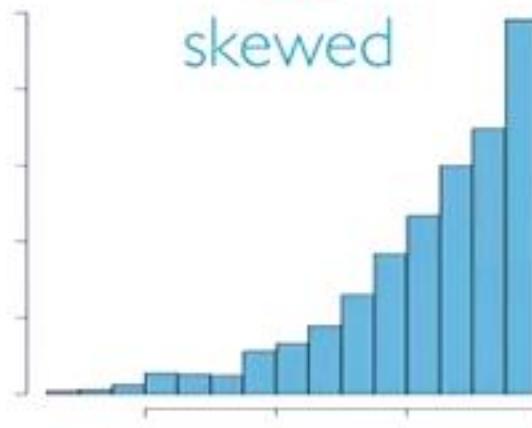


4. Distribution

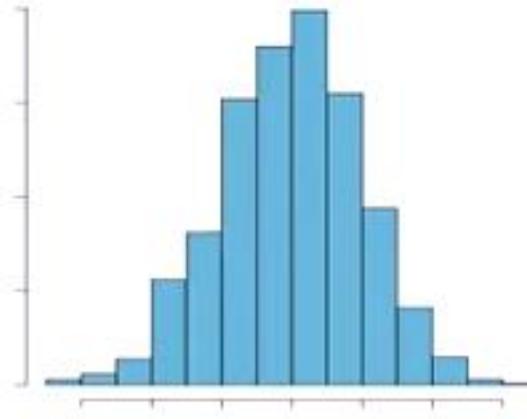


4. Distribution

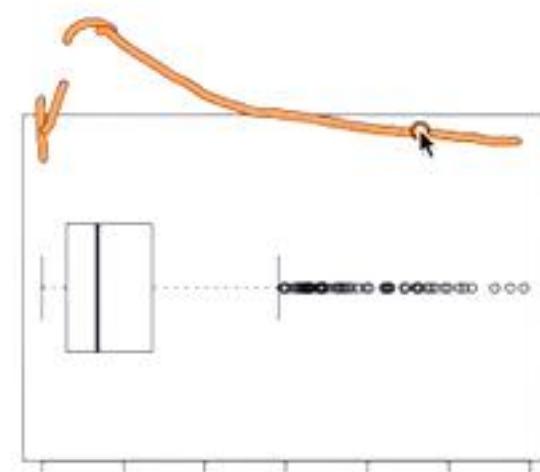
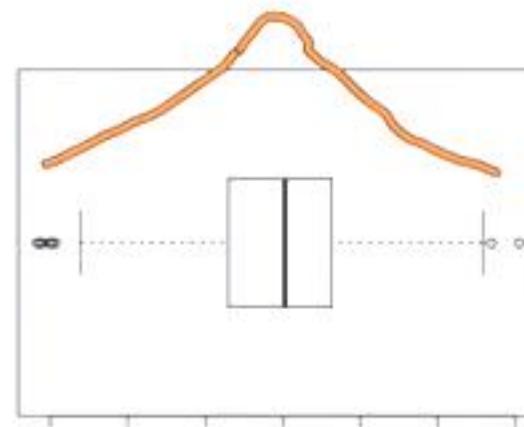
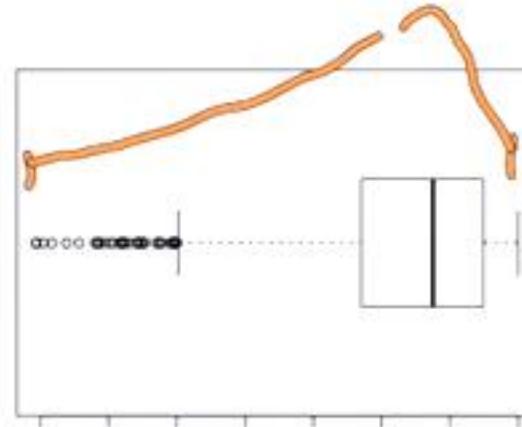
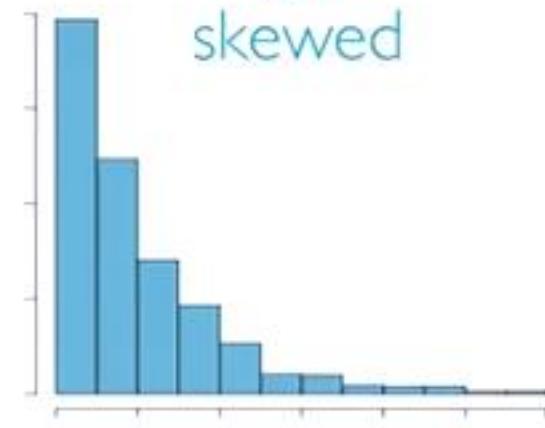
left
skewed



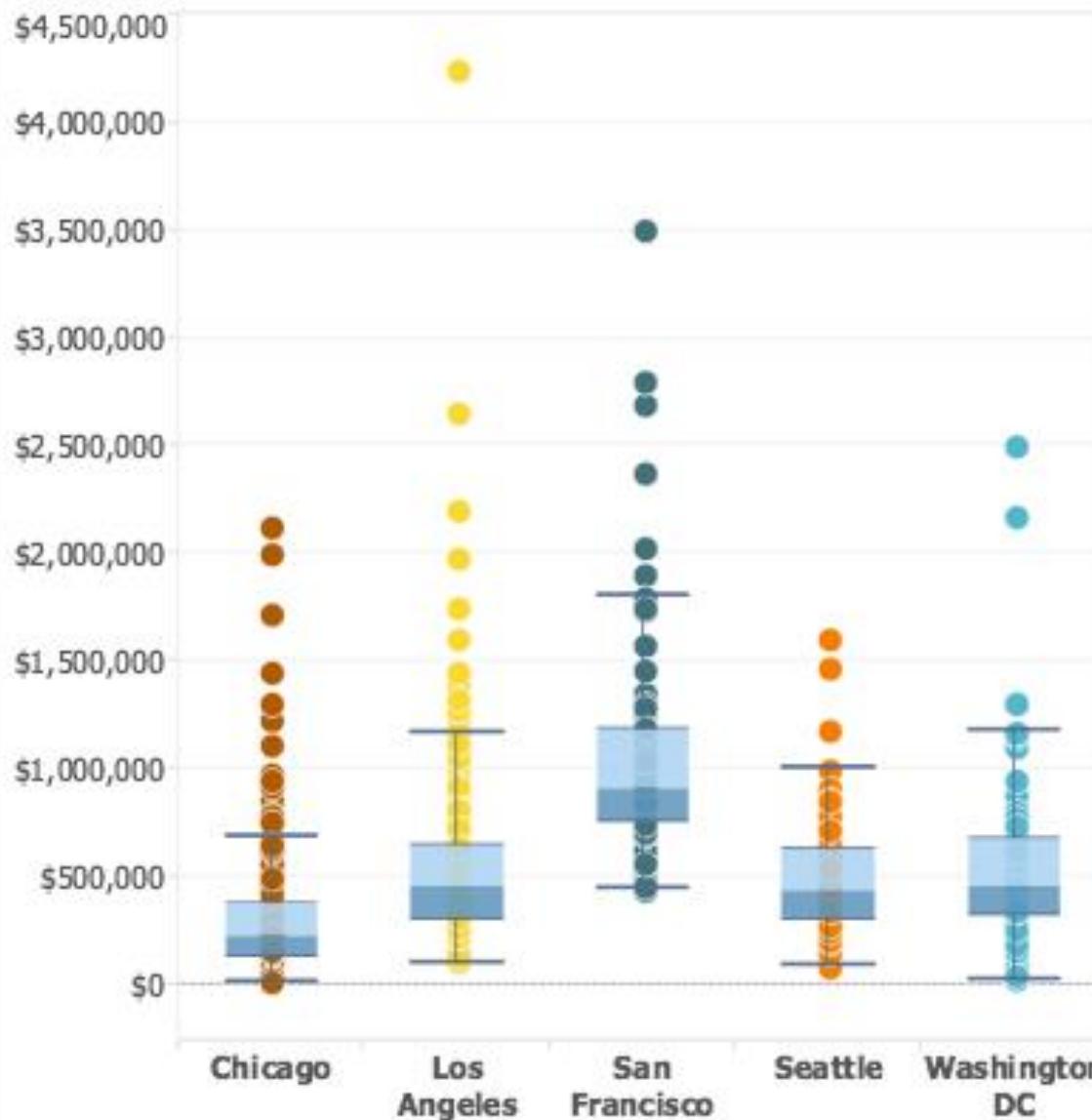
symmetric



right
skewed



Two Weeks of Home Sales



Filter Date Range

9/16/13 to 10/1/13

Filter by Home Type

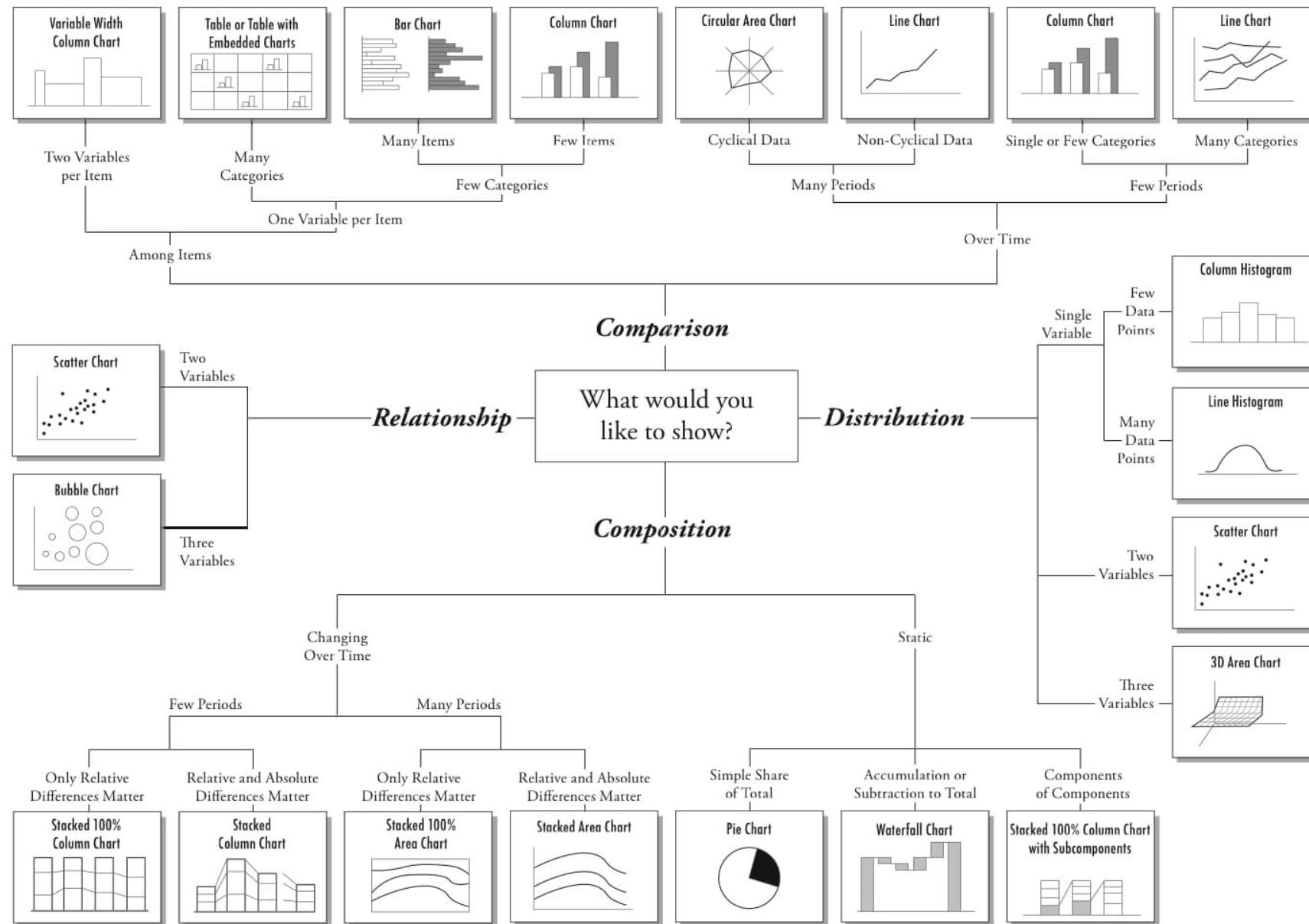
- Condo/Coop
- Multi-Family (2-4 Unit)
- Multi-Family (5+ Unit)
- Parking
- Single Family Residential
- Townhouse
- Vacant Land

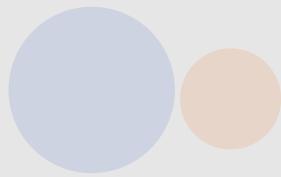
Homes Sold by City



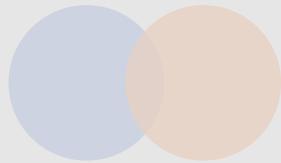
Chart Suggestions—A Thought-Starter

www.ExtremePresentation.com
 © 2009 A. Abela — a.abela@gmail.com





Comparison



Relationship

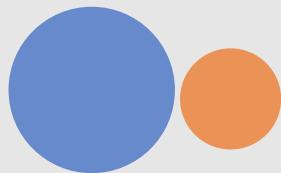


Composition

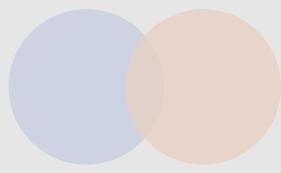


Distribution

Month	No. of Day
Aug	4
Sep	18
Oct	20
Nov	15
Dec	12
Jan	14
Feb	19
Mar	14
Apr	21



Comparison



Relationship

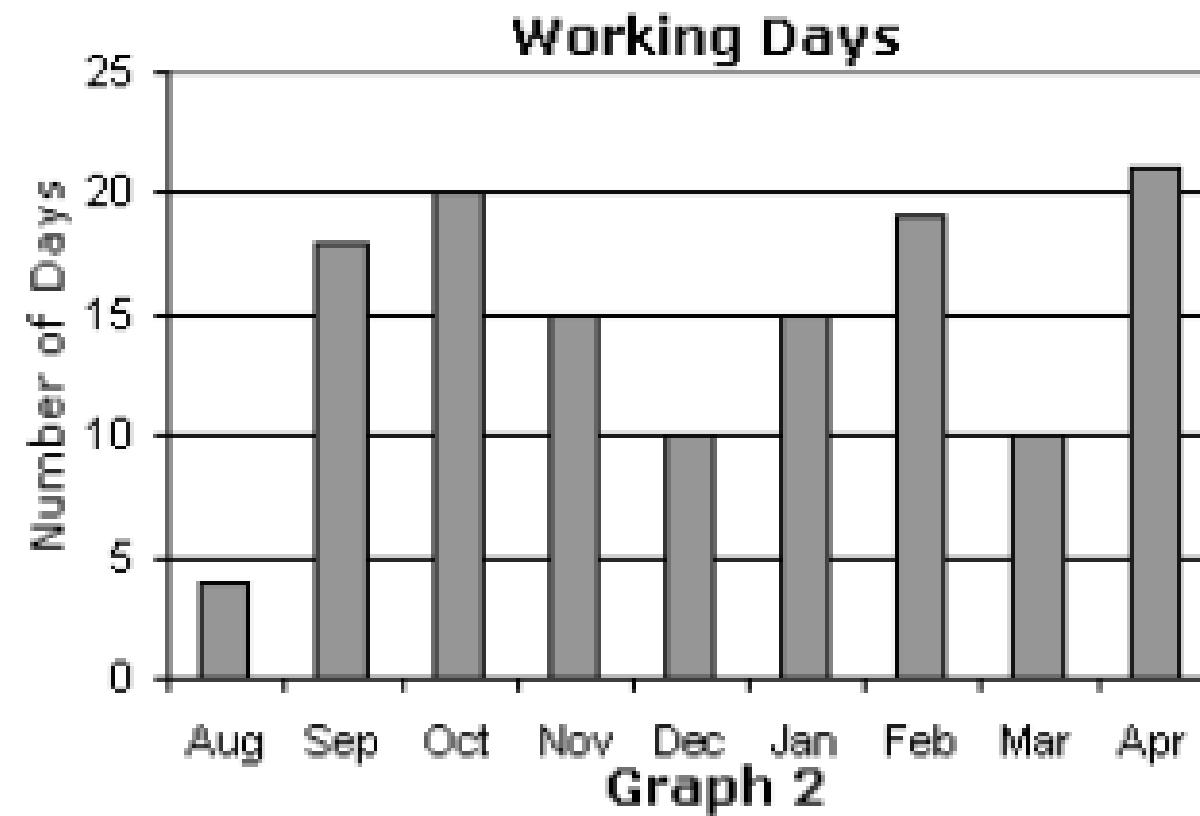


Composition



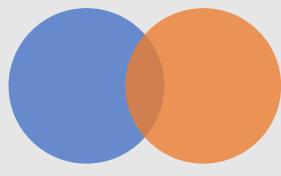
Distribution

Month	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr
No. of Day	4	18	20	15	12	14	19	14	21





Comparison



Relationship

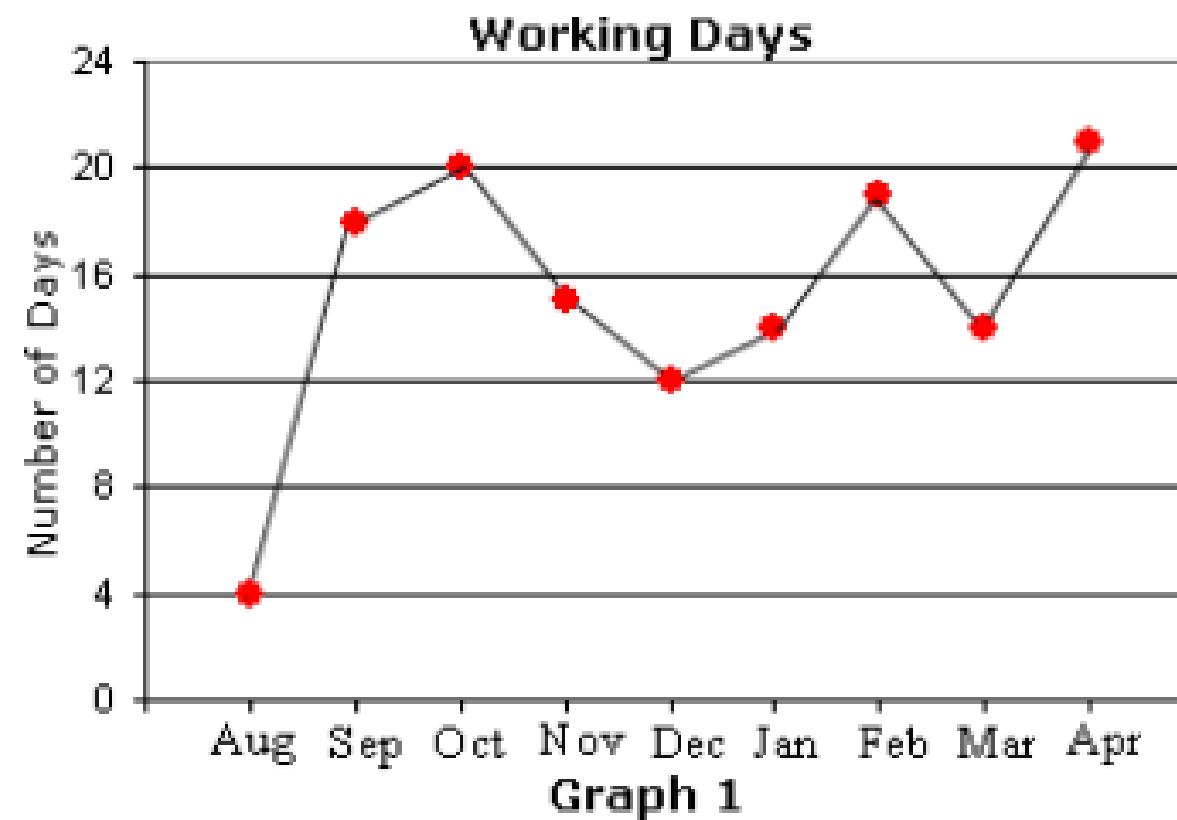


Composition



Distribution

Month	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr
No. of Day	4	18	20	15	12	14	19	14	21

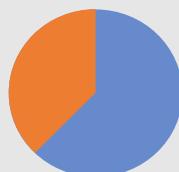




Comparison



Relationship

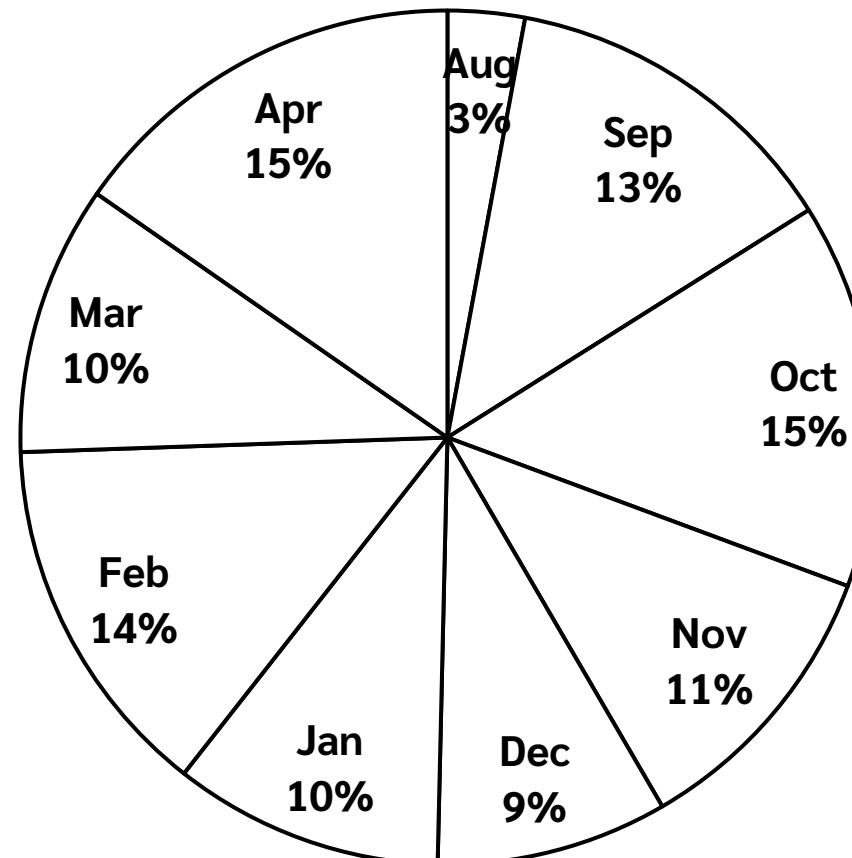


Composition



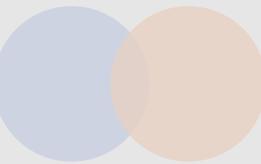
Distribution

Month	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr
No. of Day	4	18	20	15	12	14	19	14	21





Comparison



Relationship



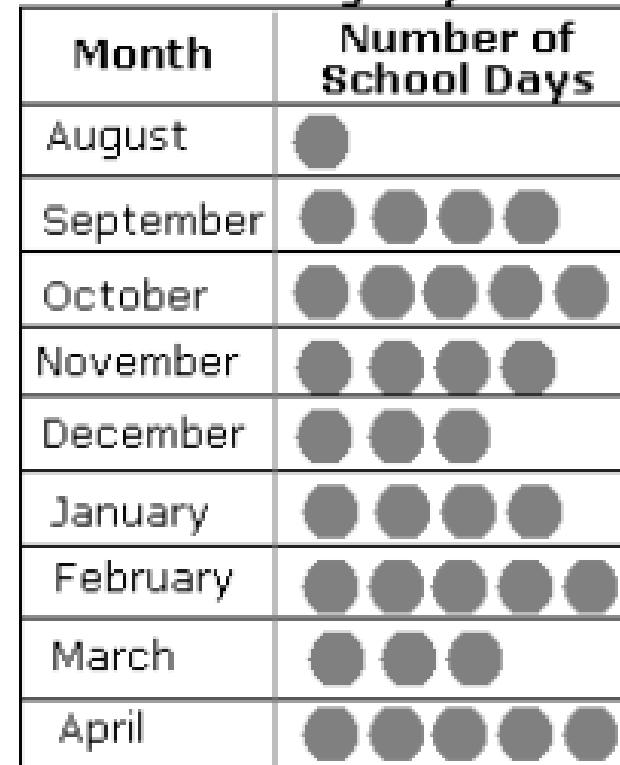
Composition



Distribution

Month	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr
No. of Day	4	18	20	15	12	14	19	14	21

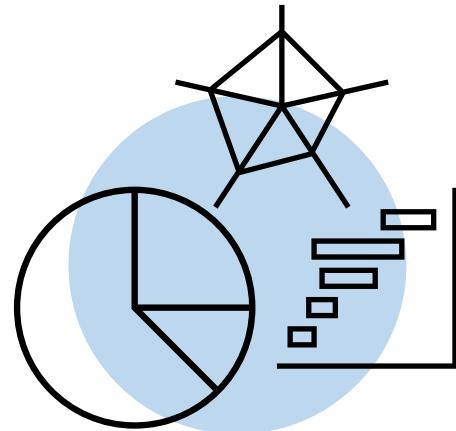
Working Days



= 4 days

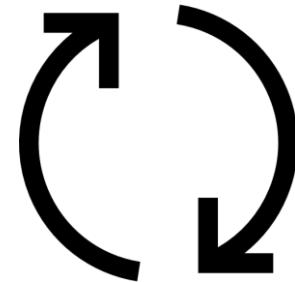
Graph 3

What do you want to tell from your data?



VISUAL ELEMENT
(GRAPHS / CHARTS)

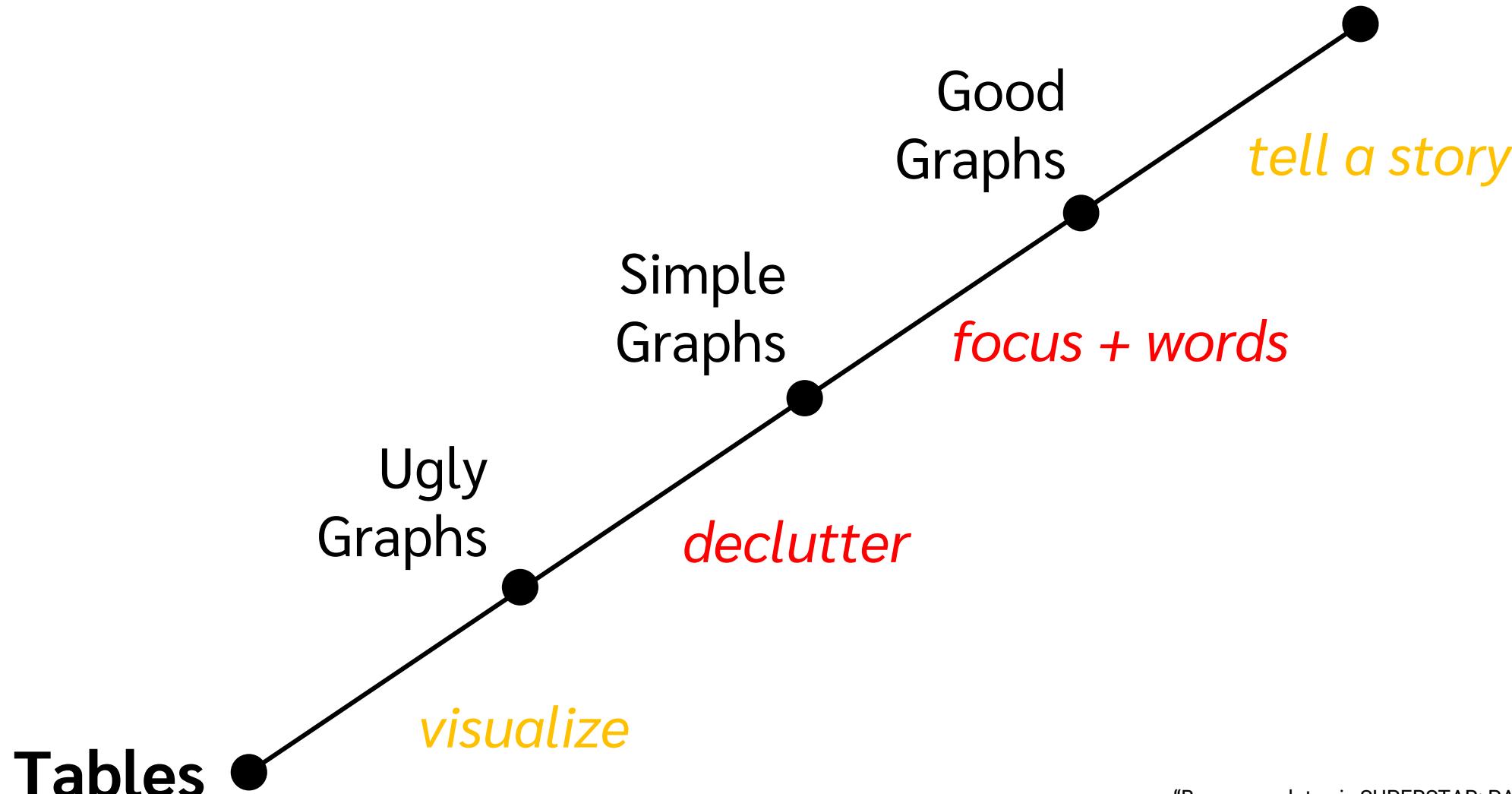
- Bar chart ยอดขายของประเทศไทย
สินค้า เทียบปีที่แล้วกับปีนี้
- Pie chart สัดส่วนคนติดโควิดวันนี้



THEME / STORY
(DASHBAORD)

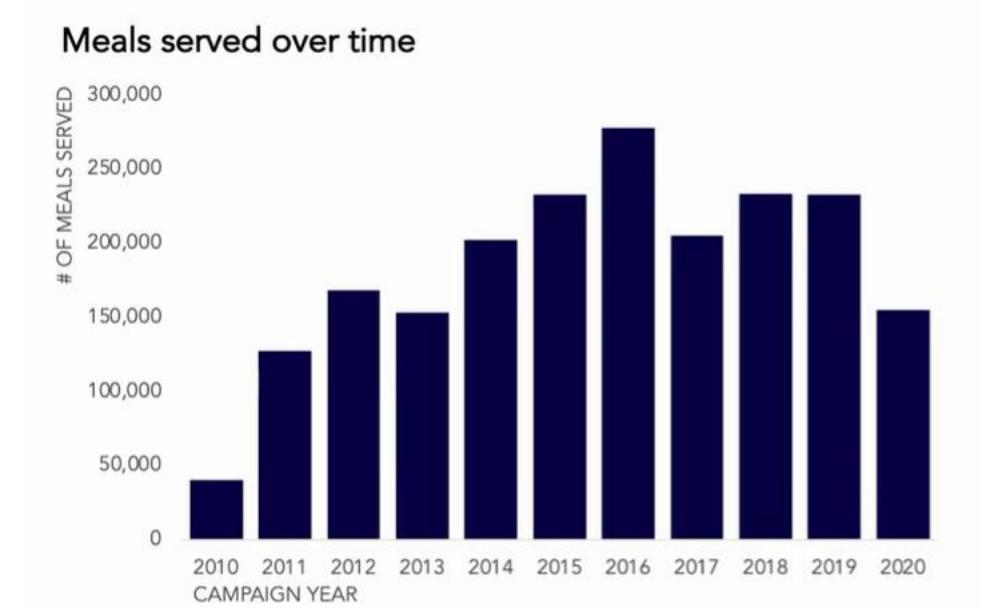
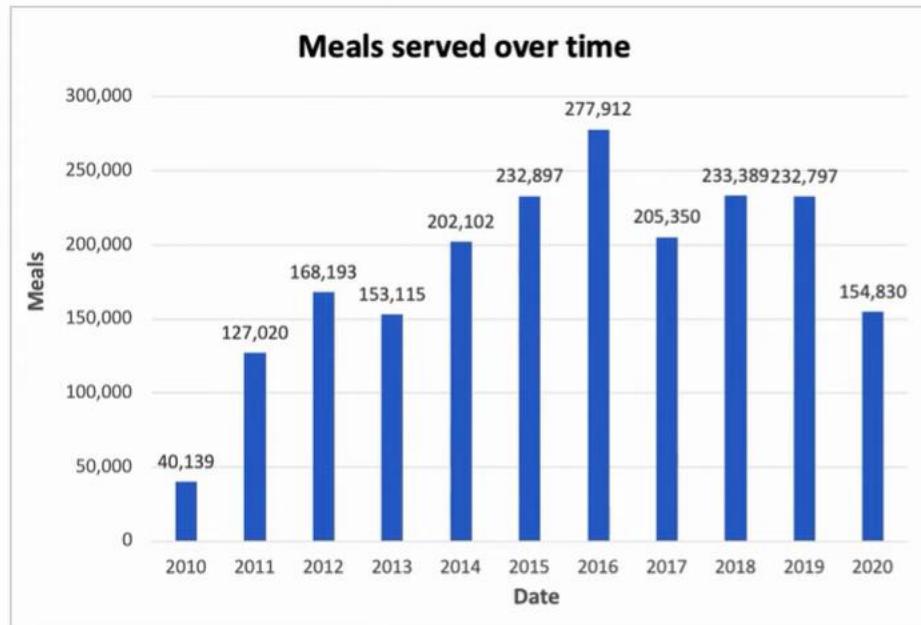
- การเติบโตของแผนก
- สถานการณ์โควิด
- การศึกษาไทย

Data Stories



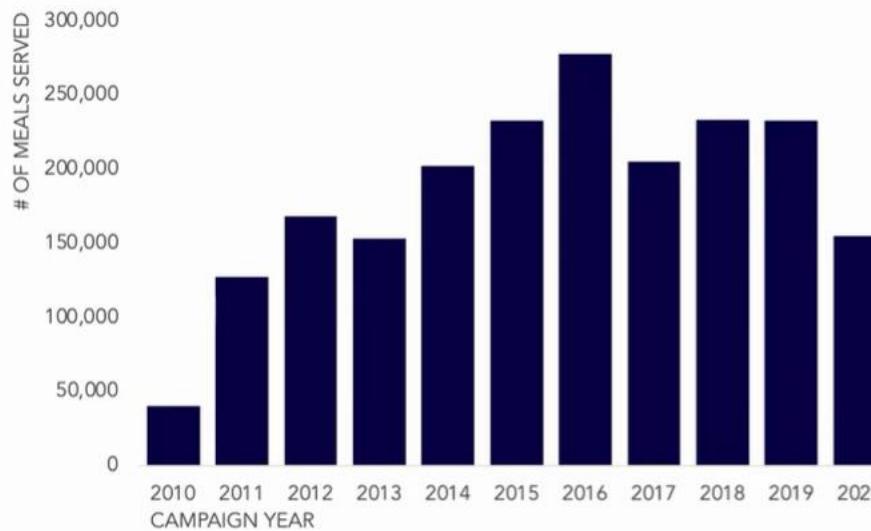
"Become a data viz SUPERSTAR: PART 1" - storytelling with data
<https://www.youtube.com/watch?v=ZRskHRowFCM>

Ugly Graphs > *declutter* > Simple Graphs

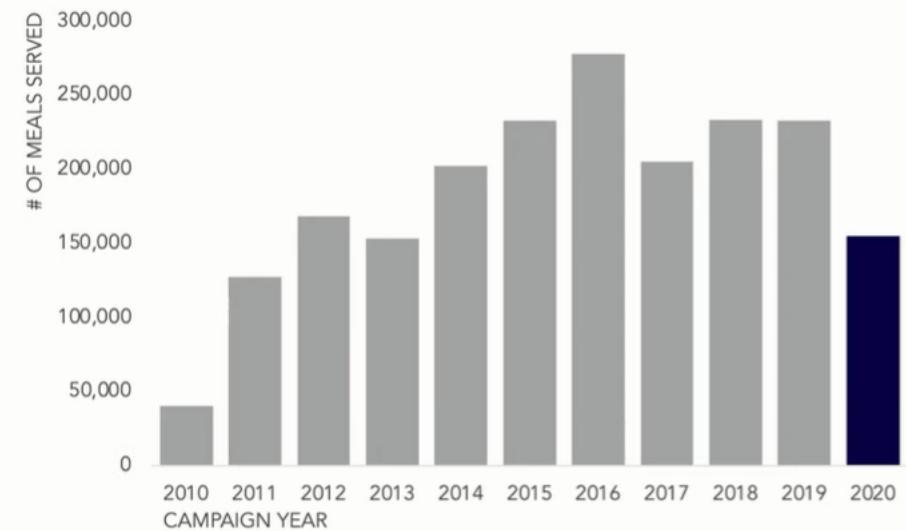


Simple Graphs > *focus+words* > Good Graphs

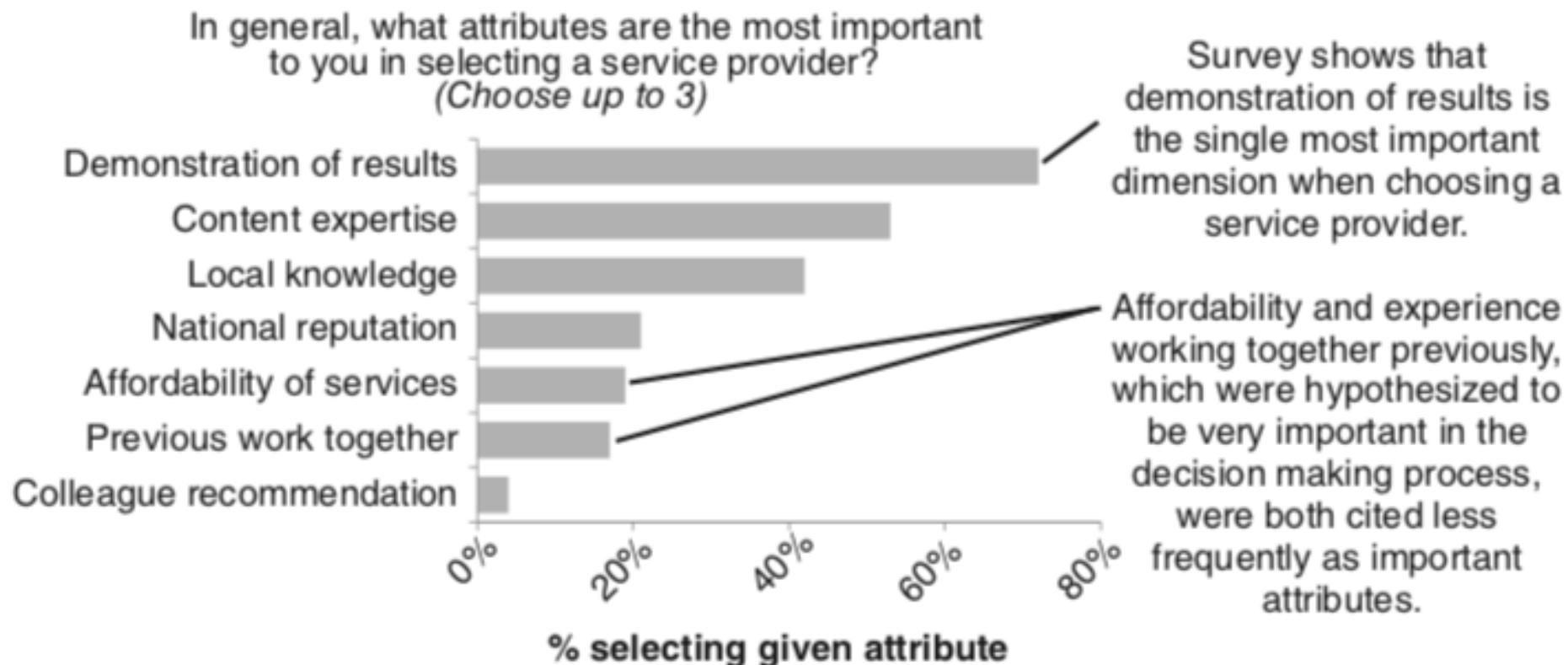
Meals served over time



Meals served over time: **big drop in 2020**



Demonstrating effectiveness is most important consideration when selecting a provider

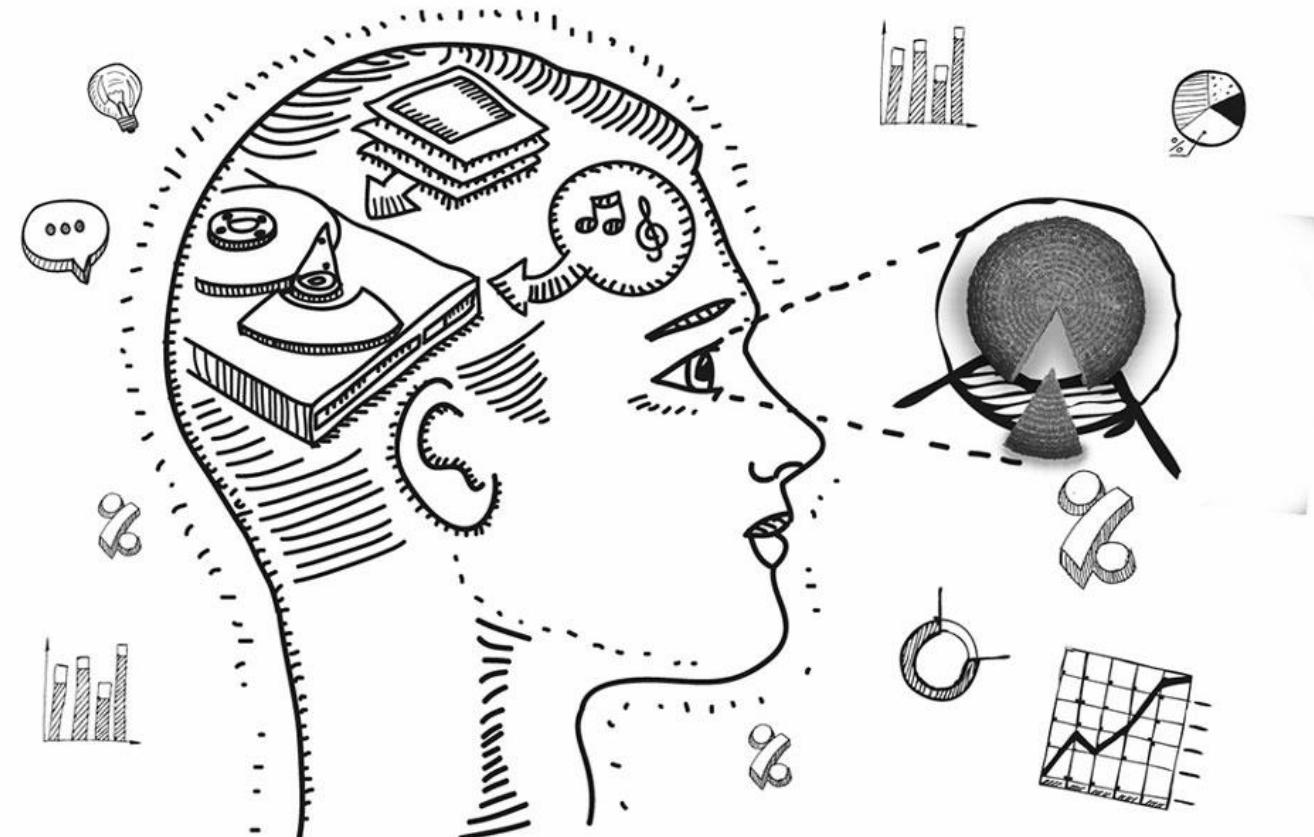


Data source: xyz; includes N number of survey respondents. Note that respondents were able to choose up to 3 options.

FIGURE 3.13 Summary of survey feedback

5 Steps to Declutter

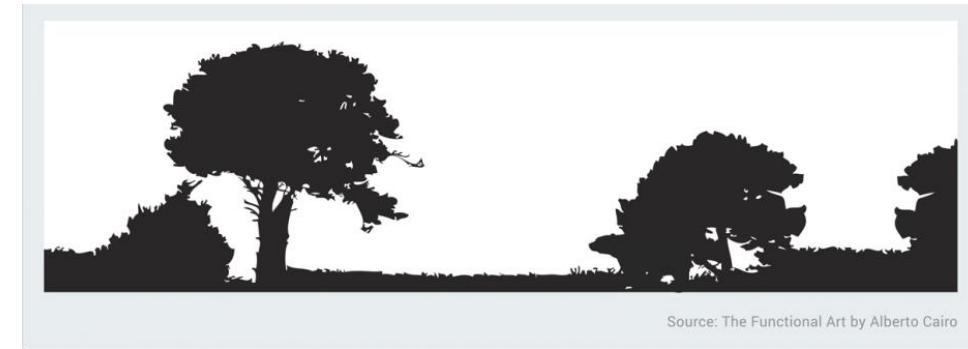
1. Leverage how people see
2. Employ visual order
3. Create clear contrast
4. Don't over complicate
5. Strip down & build up



How to declutter data visualizations (5 steps)
By storytelling with data
<https://www.youtube.com/watch?v=X79o46W5plI>

1. Leverage how people see

5 Data Storytelling Tips for Creating More Persuasive Charts and Graphs
Written by: Nayomi Chibana
<https://visme.co/blog/data-storytelling-tips/>



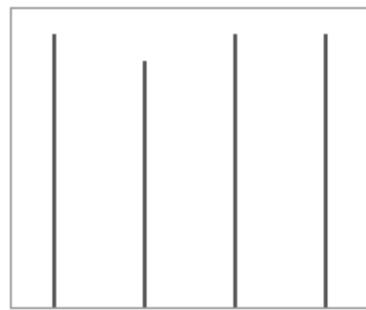
Source: The Functional Art by Alberto Cairo

1. Leverage how people see

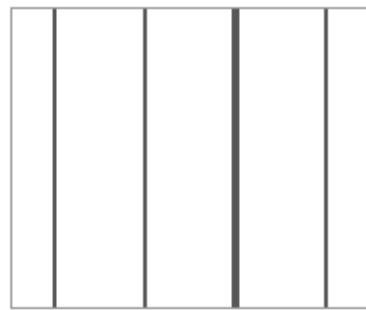
Colin Ware's Pre-attentive Attributes

FORM

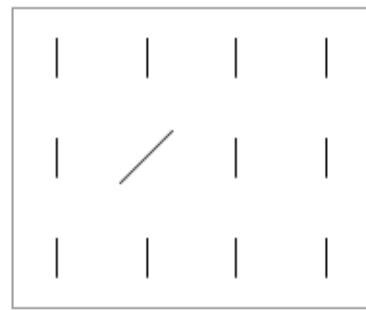
Length



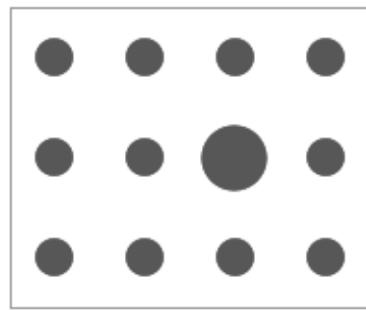
Width



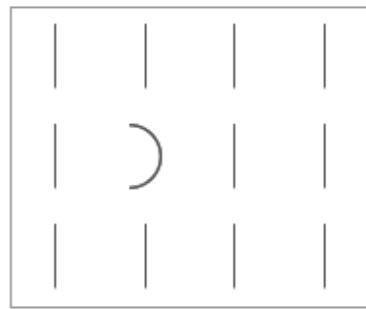
Orientation



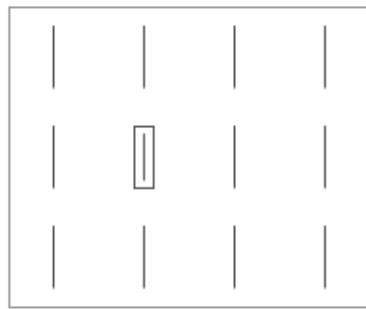
Size



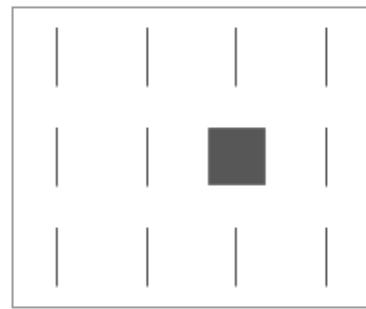
Curvature



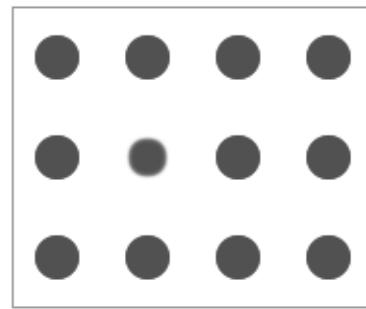
Enclosure



Shape

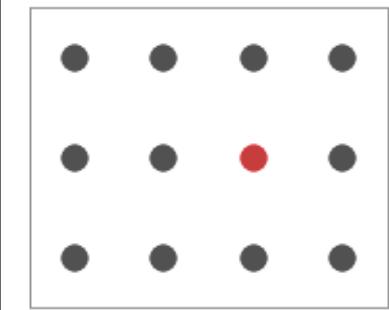


Blur

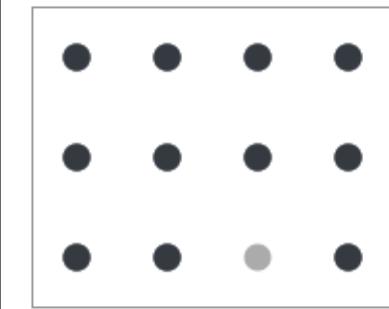


COLOR

Hue

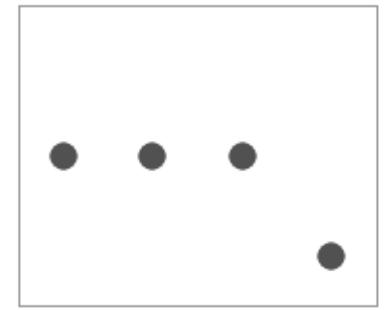


Intensity



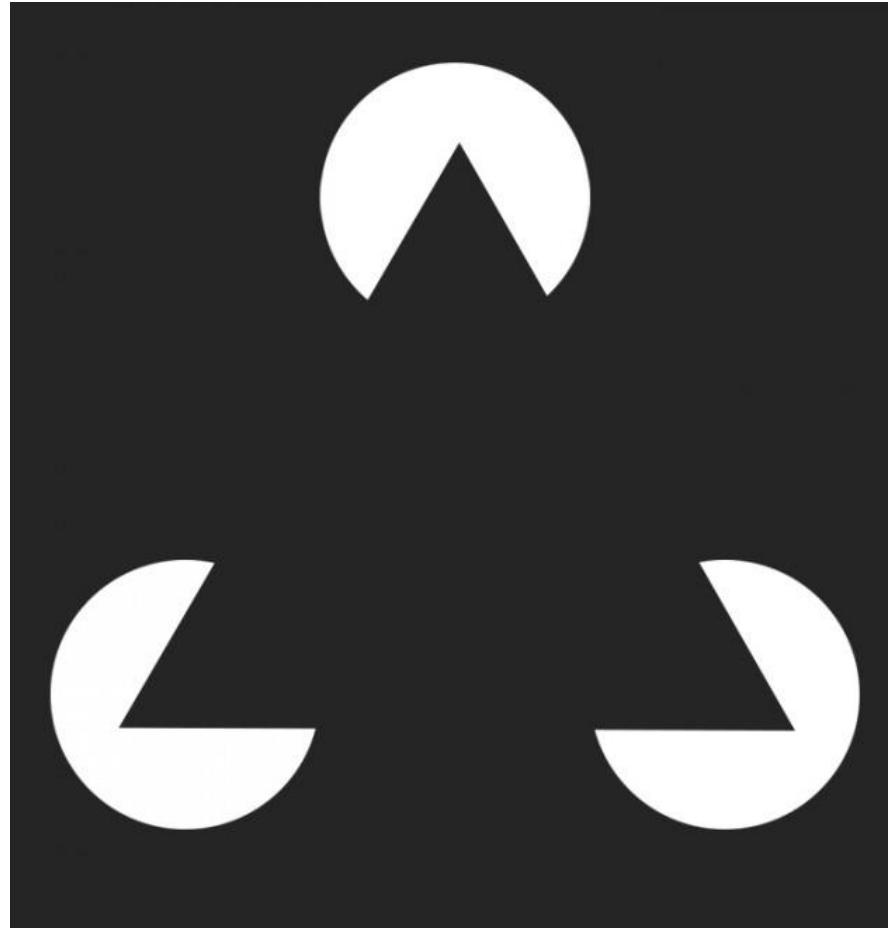
POSITION

2-D Position

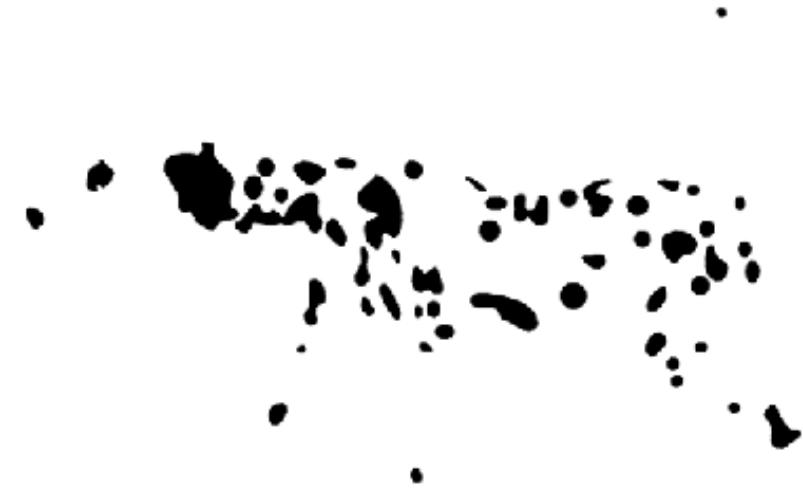


1. Leverage how people see

Gestalt Principles of Visual Perception



Source: *The Inspired Eye*



Source: *Gizmodo*

1. Leverage how people see

Gestalt Principles of Visual Perception

- Gestalt Principles describe how our mind organizes individual visual element into groups, to make sense of the entire visual
- Allow us to perform many tasks such as reduce the noise from chart, choose the ideal aspect ration, show relationships between elements more clearly.
- Can be used to highlight patterns.

1. Leverage how people see

Gestalt Principles of Visual Perception



Proximity



Similarity



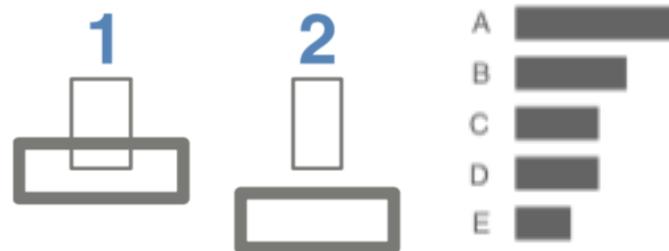
Enclosure

objects collected within a boundary
“Common regions”

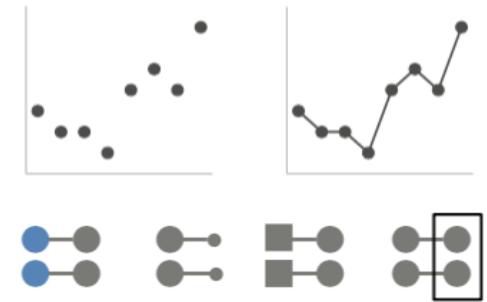


Closure

fill in gaps between elements to perceive a complete image



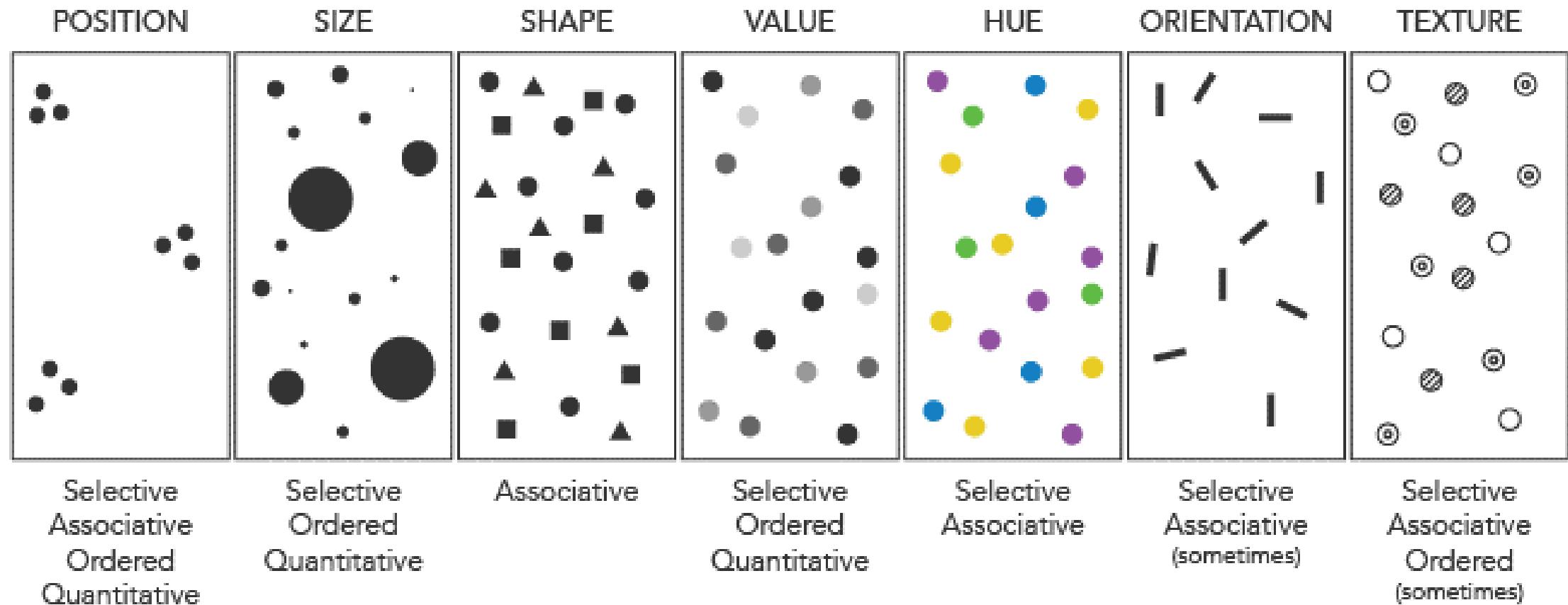
Continuity



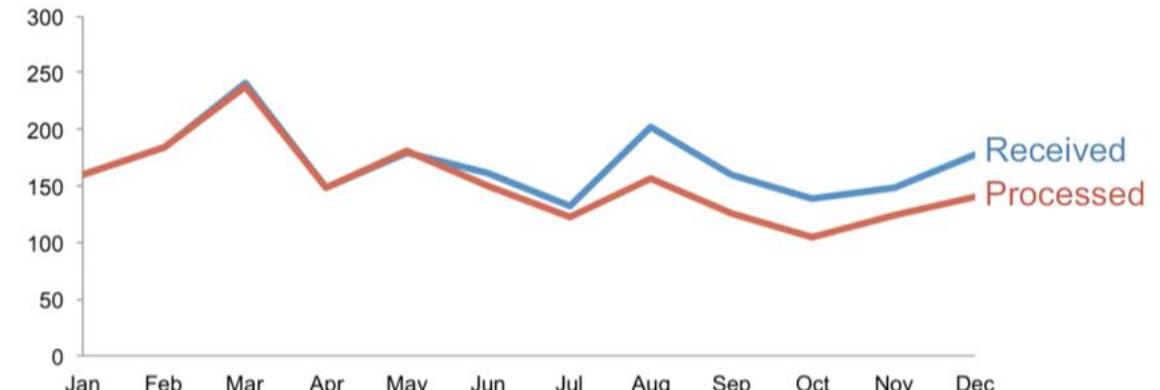
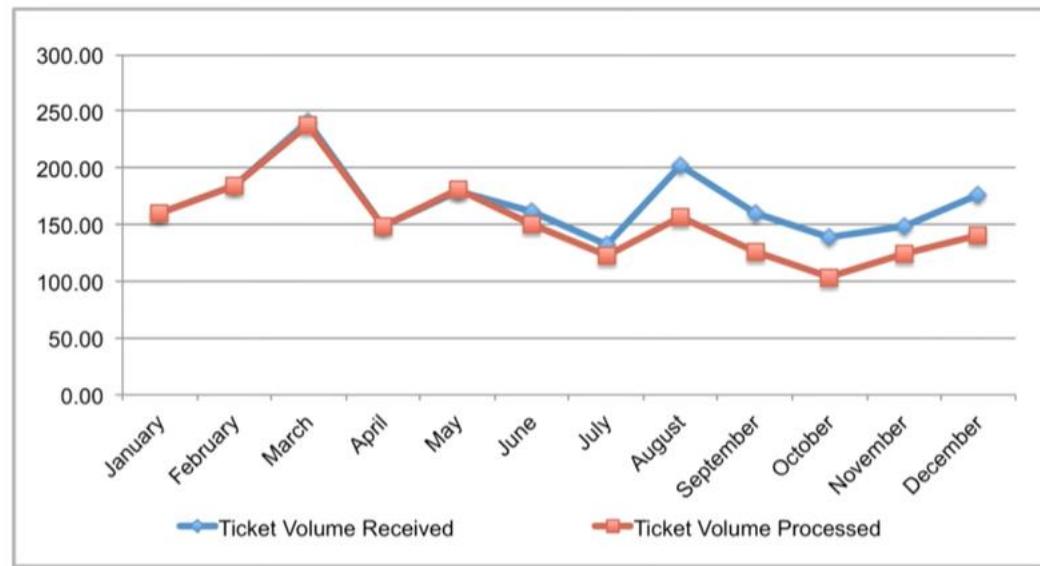
Connection

1. Leverage how people see

Bertin's Visual Variables



Identify and remove clutter



Source: Knaflic, Cole. *Storytelling With Data: A Data Visualization Guide for Business Professionals*, Wiley, © 2015.

storytelling with data

How to declutter data visualizations (5 steps)

By storytelling with data

<https://www.youtube.com/watch?v=X79o46W5plI>

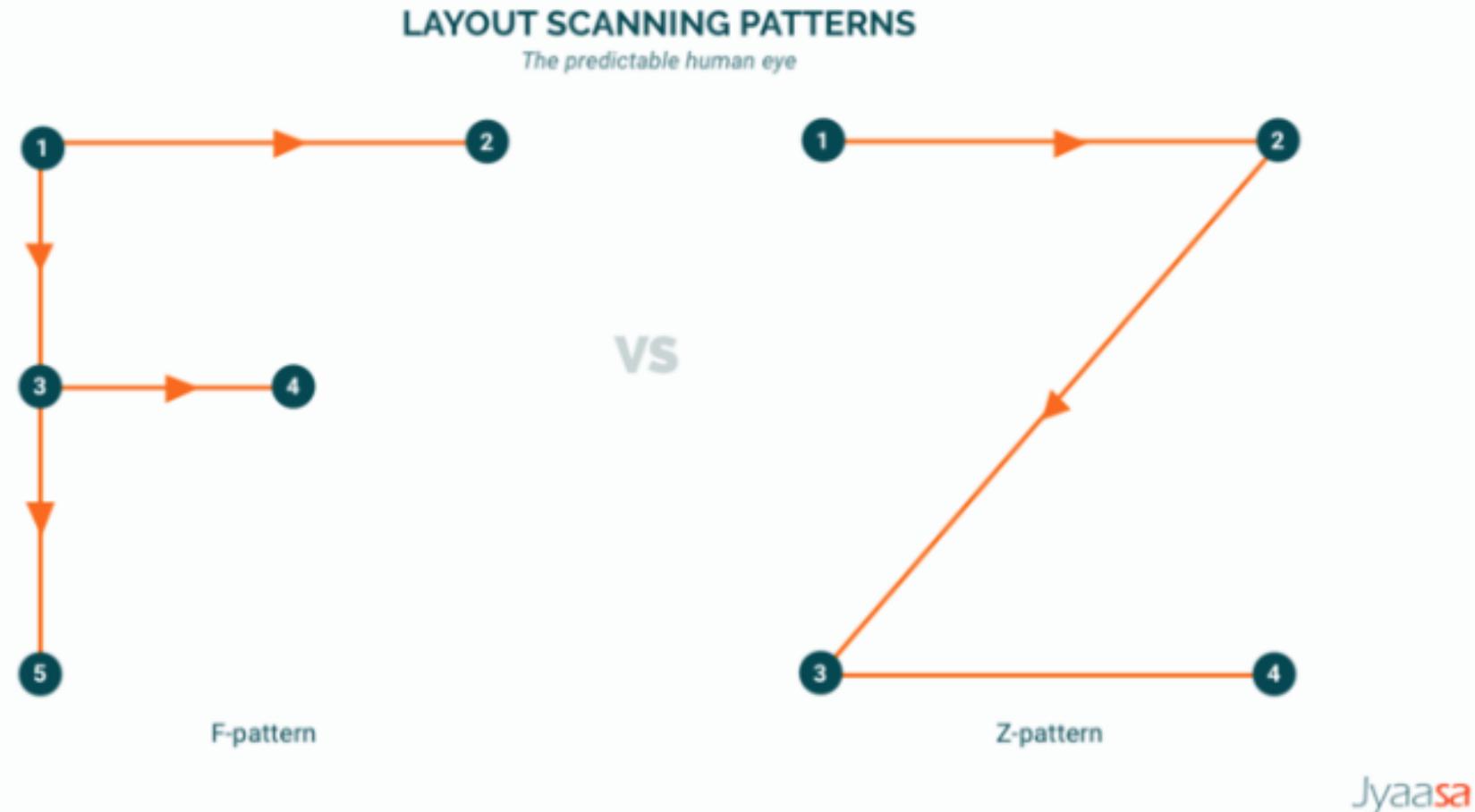
ແລ້ວກົມາຈບຖ່ຽນ

ຄຸນຈະອ່ານຂ້ອຄວາມ ຕຽບຕໍ່ກ່ອນ

ແລ້ວກົມາຈະອ່ານຂ້ອຄວາມນີ້
ຕ່ອດວຍວັນນີ້

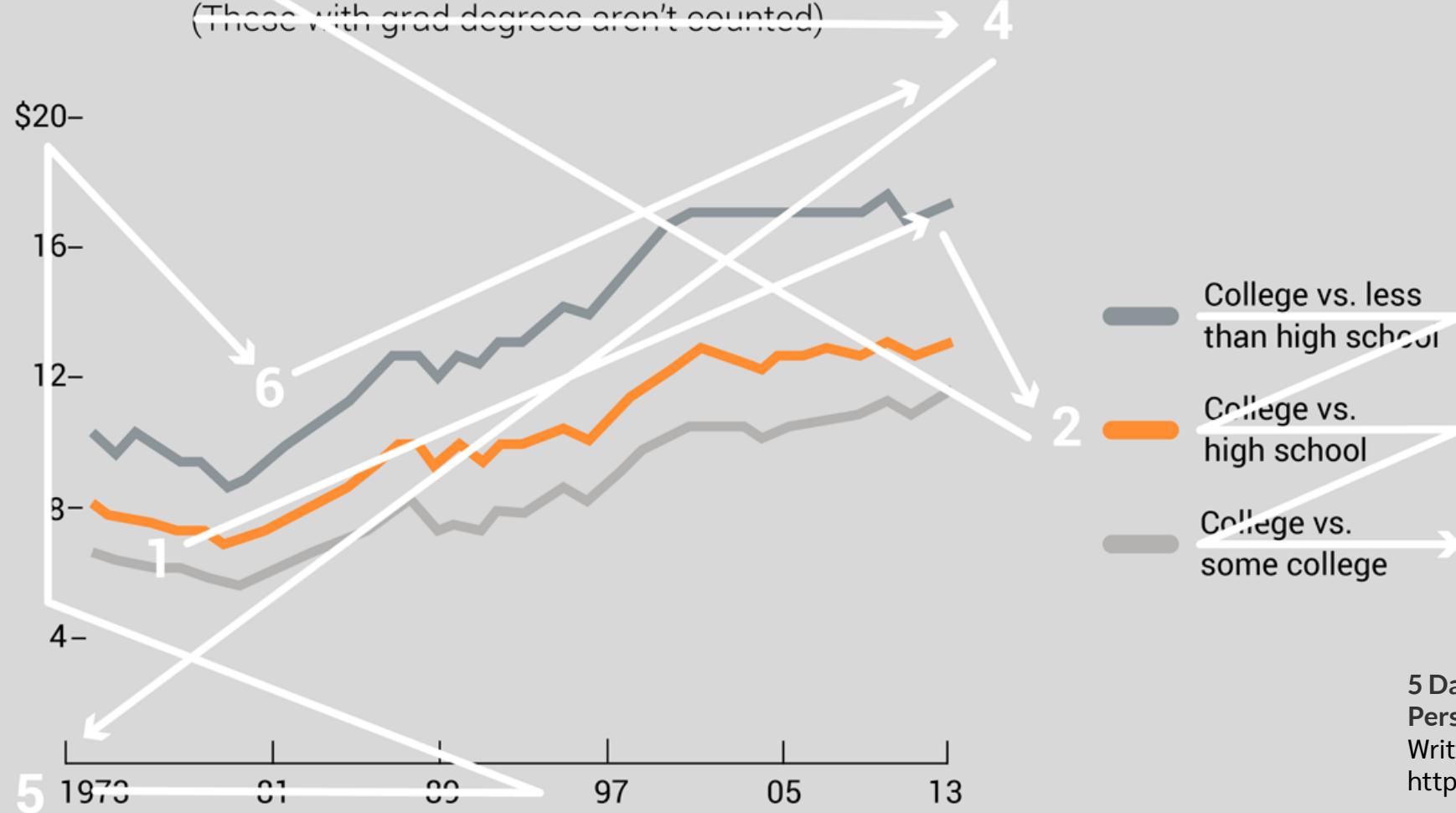
2. Employ visual order

Visual Hierarchy = Information Prioritization



3 Difference in Hourly Wages for Those With College Degree vs. Other Group

(Those with grad degrees aren't counted)



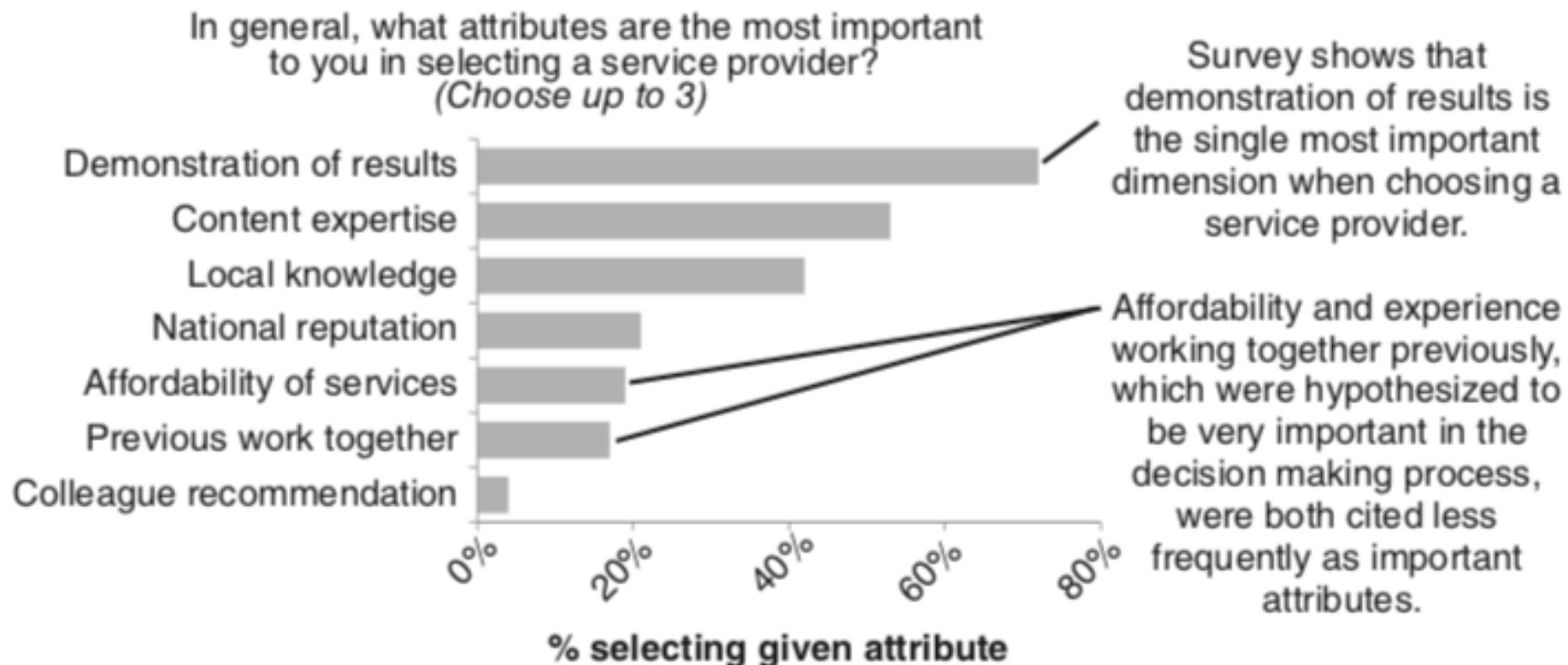
5 Data Storytelling Tips for Creating More Persuasive Charts and Graphs
Written by: Nayomi Chibana
<https://visme.co/blog/data-storytelling-tips/>

4. Don't over complicate

1. Consistency
2. Keep it clean
3. Use straightforward language
4. Remove unnecessary (signal-to-noise ratio)

How to declutter data visualizations (5 steps)
By storytelling with data
<https://www.youtube.com/watch?v=X79o46W5plI>

Demonstrating effectiveness is most important consideration when selecting a provider



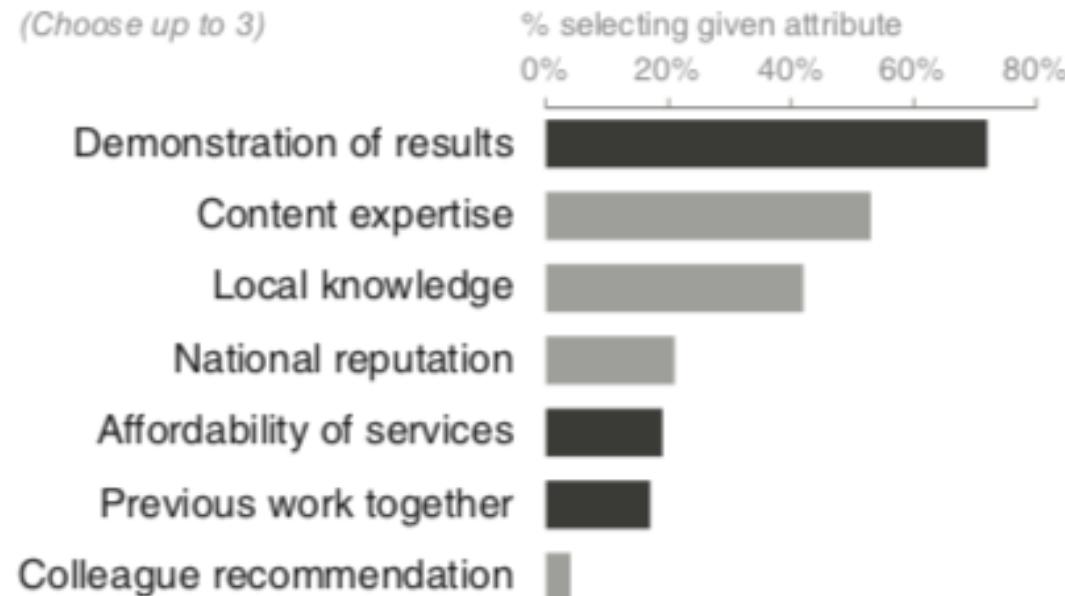
Data source: xyz; includes N number of survey respondents. Note that respondents were able to choose up to 3 options.

FIGURE 3.13 Summary of survey feedback

Demonstrating effectiveness is most important consideration when selecting a provider

In general, **what attributes are the most important** to you in selecting a service provider?

(Choose up to 3)



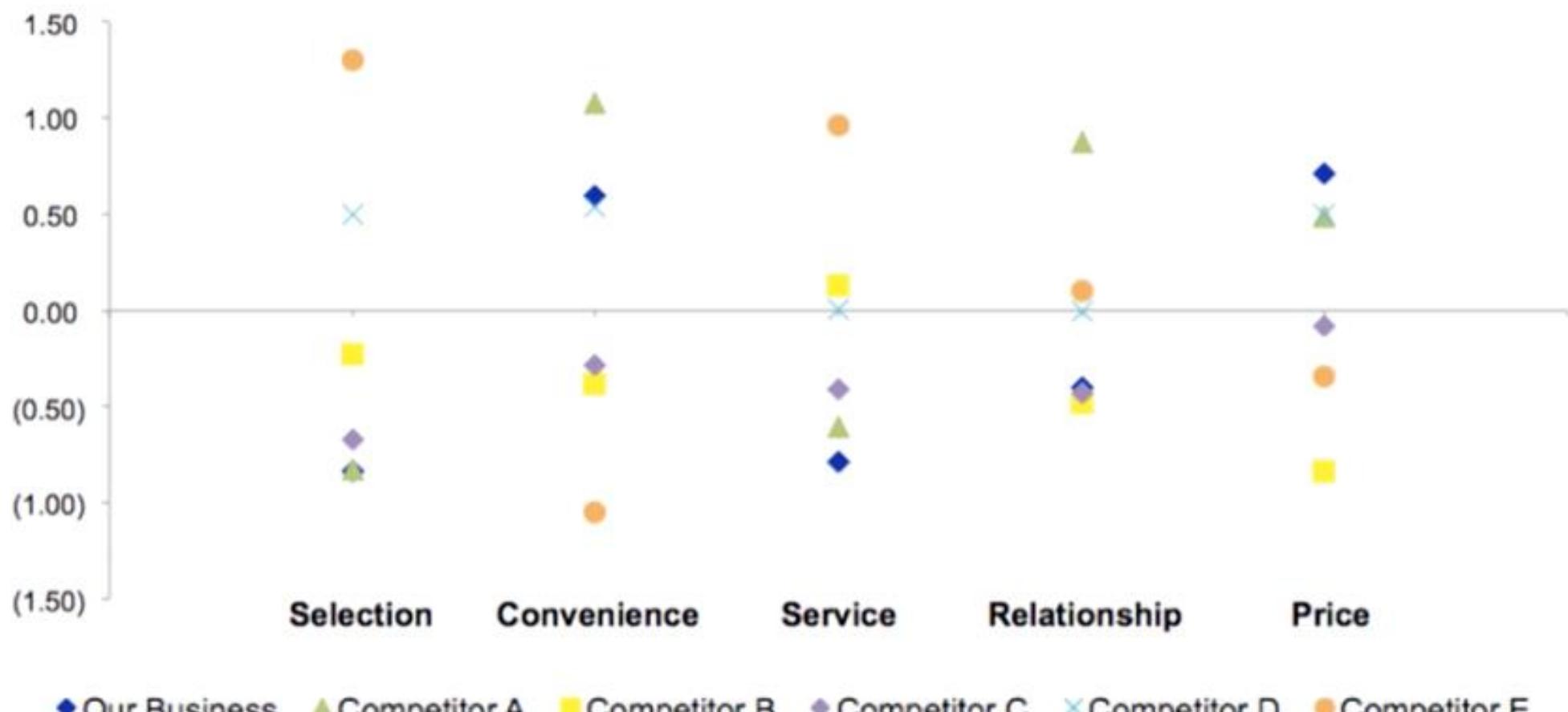
Survey shows that **demonstration of results** is the single most important dimension when choosing a service provider.

Affordability and experience working together previously, which were hypothesized to be very important in the decision making process, were both cited less frequently as important attributes.

Data source: xyz; includes N number of survey respondents.
Note that respondents were able to choose up to 3 options.

FIGURE 3.14 Revamped summary of survey feedback

Weighted Performance Index

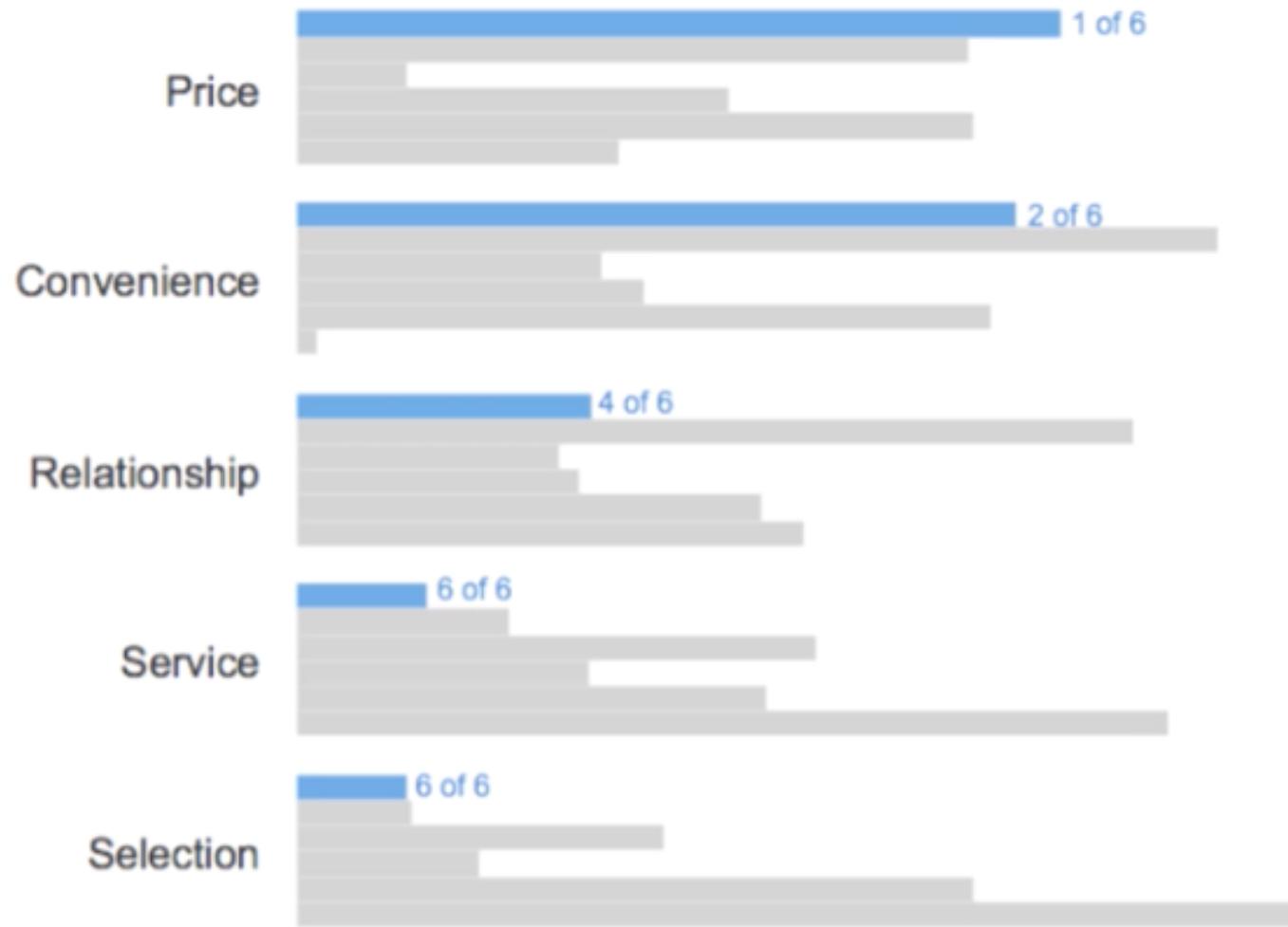


Performance overview

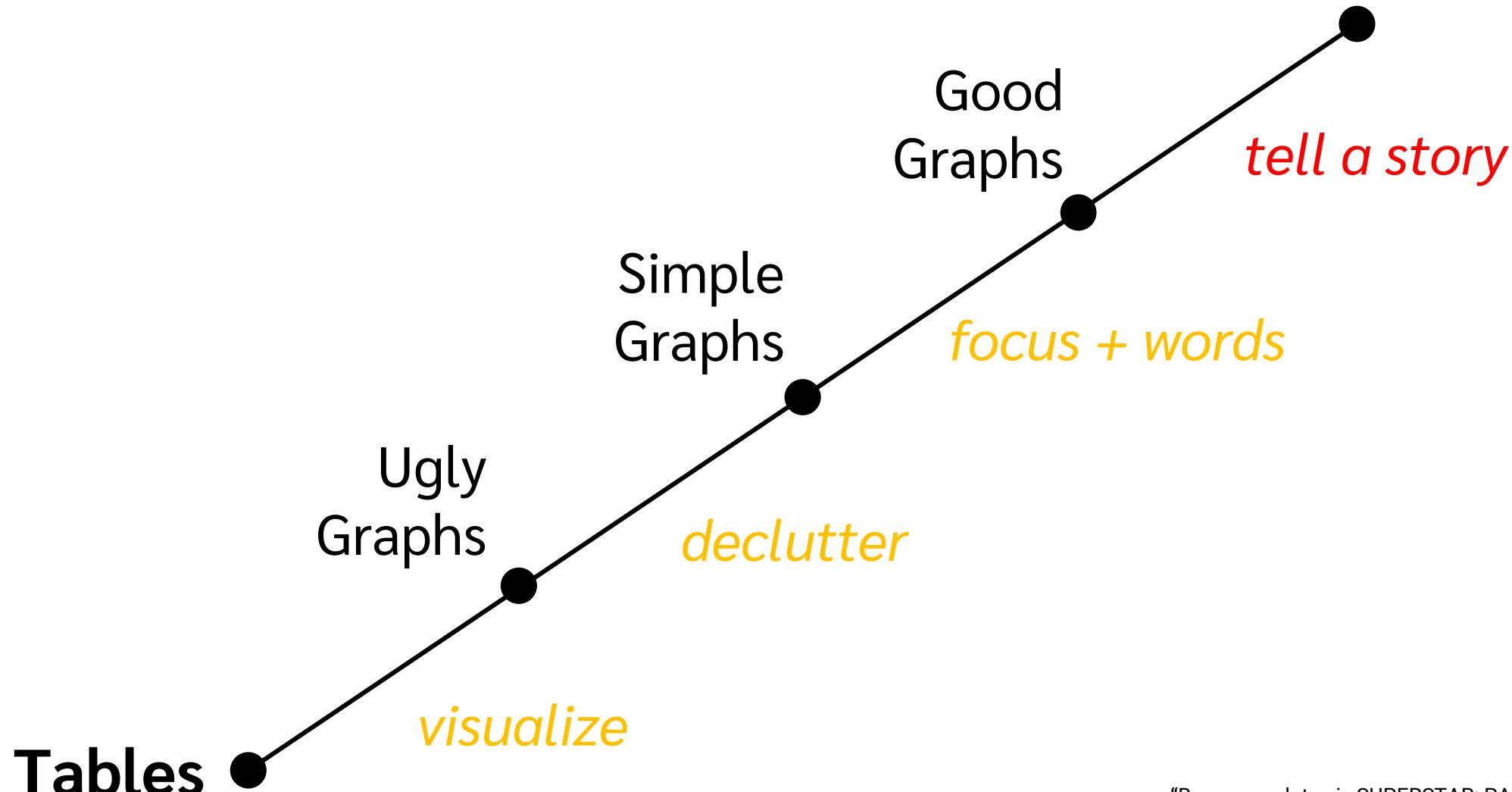
■ Our business

- Competitor A
- Competitor B
- Competitor C
- Competitor D
- Competitor E

Weighted performance index | relative rank



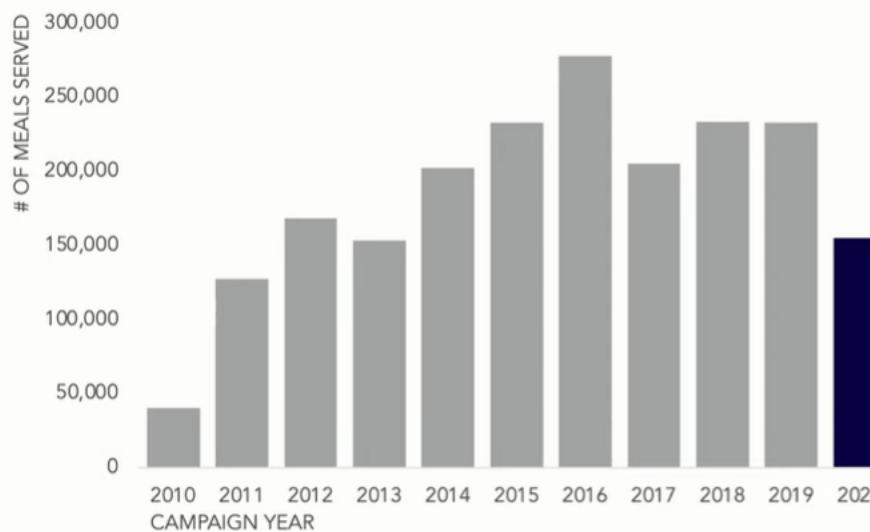
Data Stories



"Become a data viz SUPERSTAR: PART 1" - storytelling with data
<https://www.youtube.com/watch?v=ZRskHRowFCM>

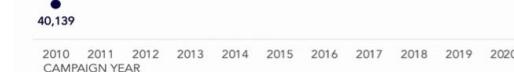
Good Graphs > *tell a story*

Meals served over time: **big drop in 2020**

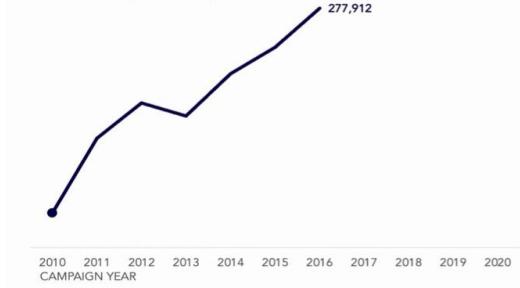


We have an opportunity to
make a difference in 2021
by feeding our community

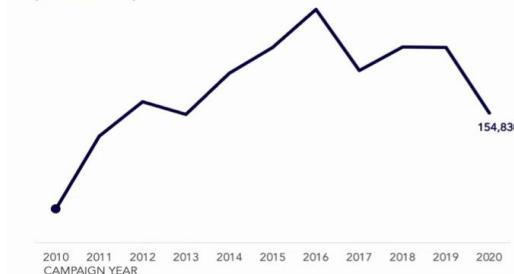
40,000 meals served
in first year pilot program



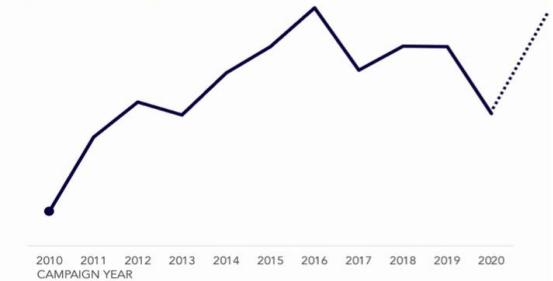
As company grew, so did giving
...and meals served



Marked drop in 2020
(COVID-19)

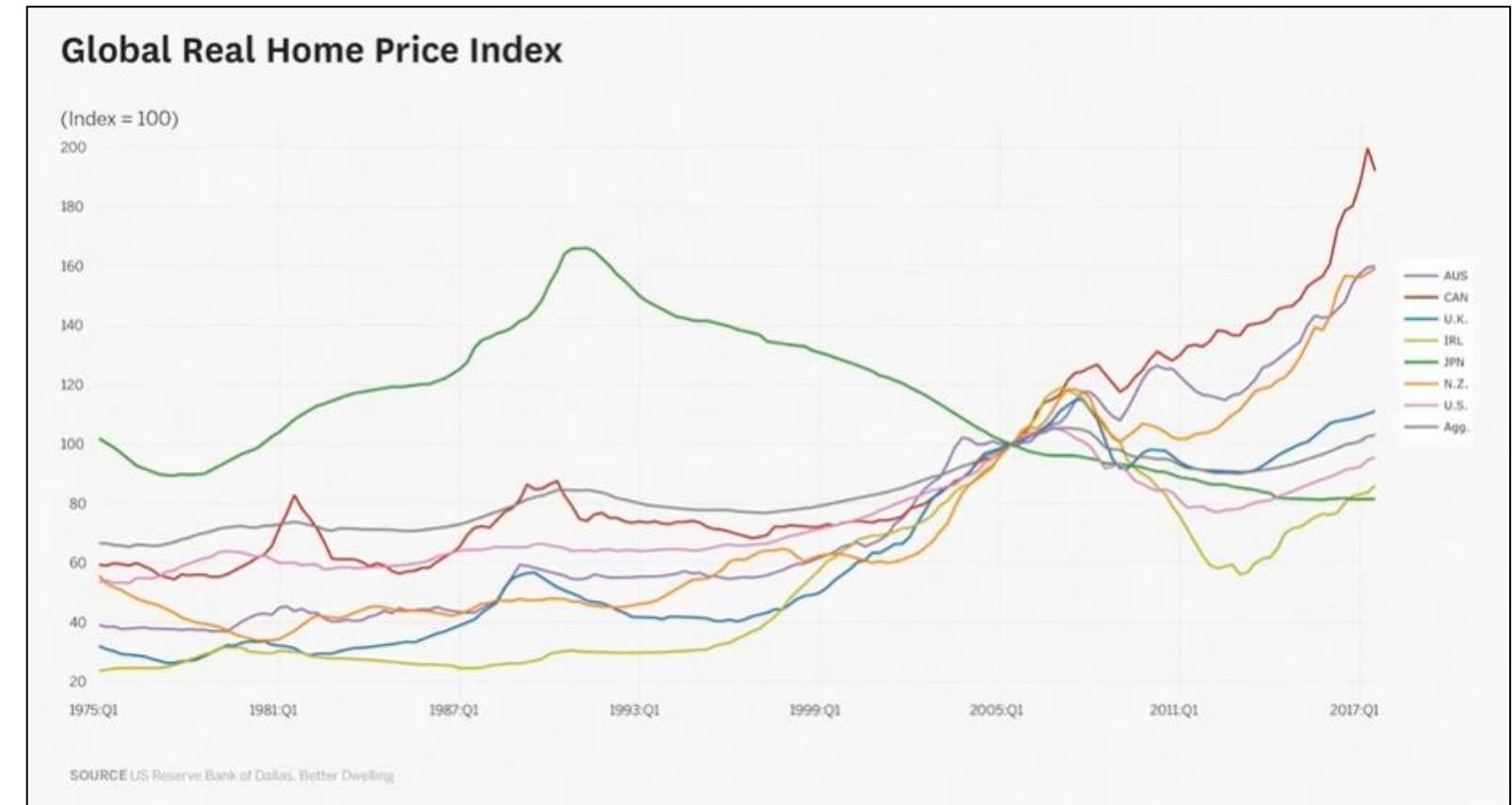


Let's make a difference in 2021
Goal > 300K meals



Telling Stories with Data in 3 Steps

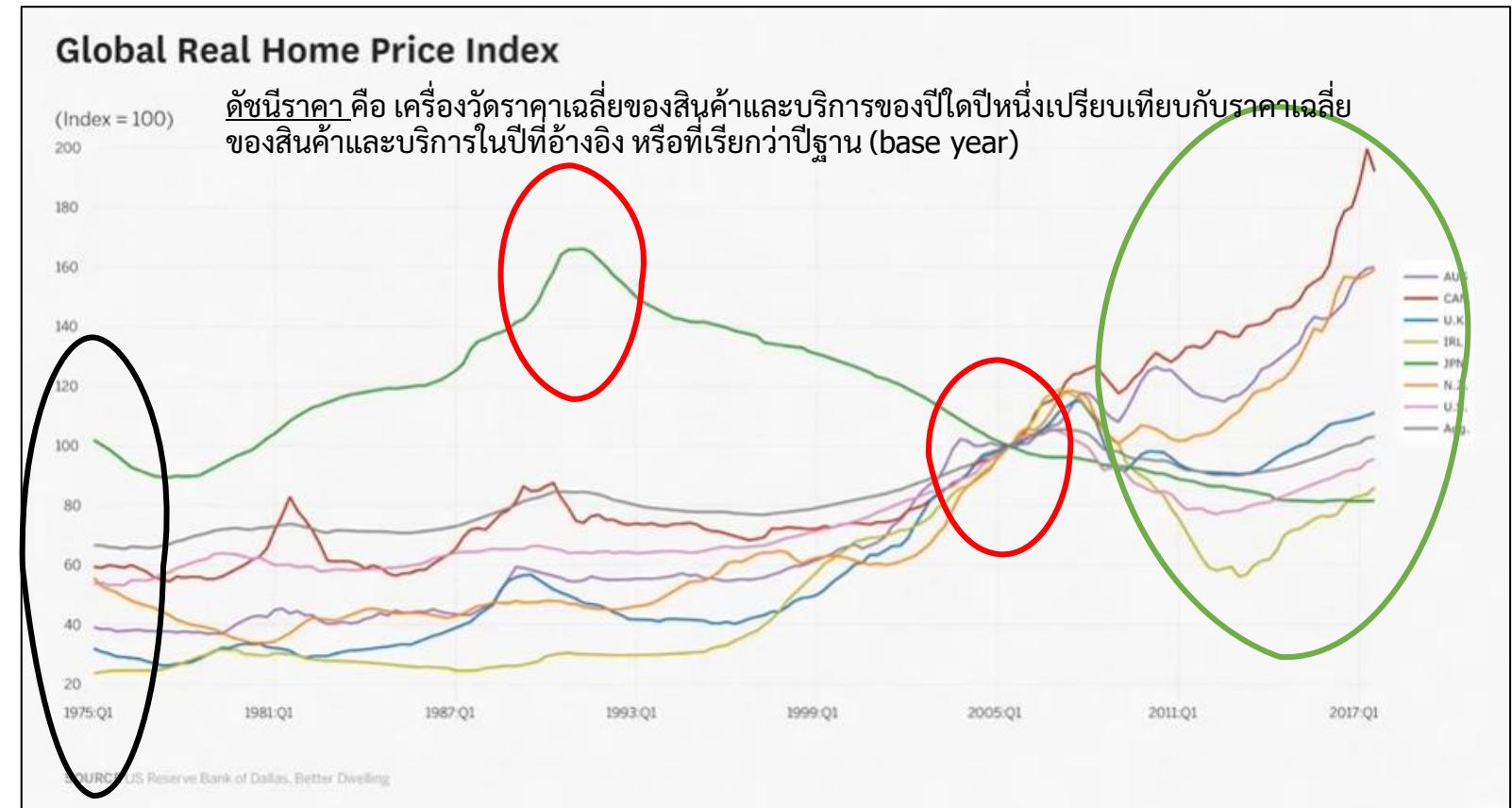
1. Setup
2. Conflict
3. Resolution



“Telling Stories with Data in 3 Steps (Quick Study)” - Harvard Business Review
https://www.youtube.com/watch?v=r5_34YnCmMY

Telling Stories with Data in 3 Steps

1. Setup
2. Conflict
3. Resolution



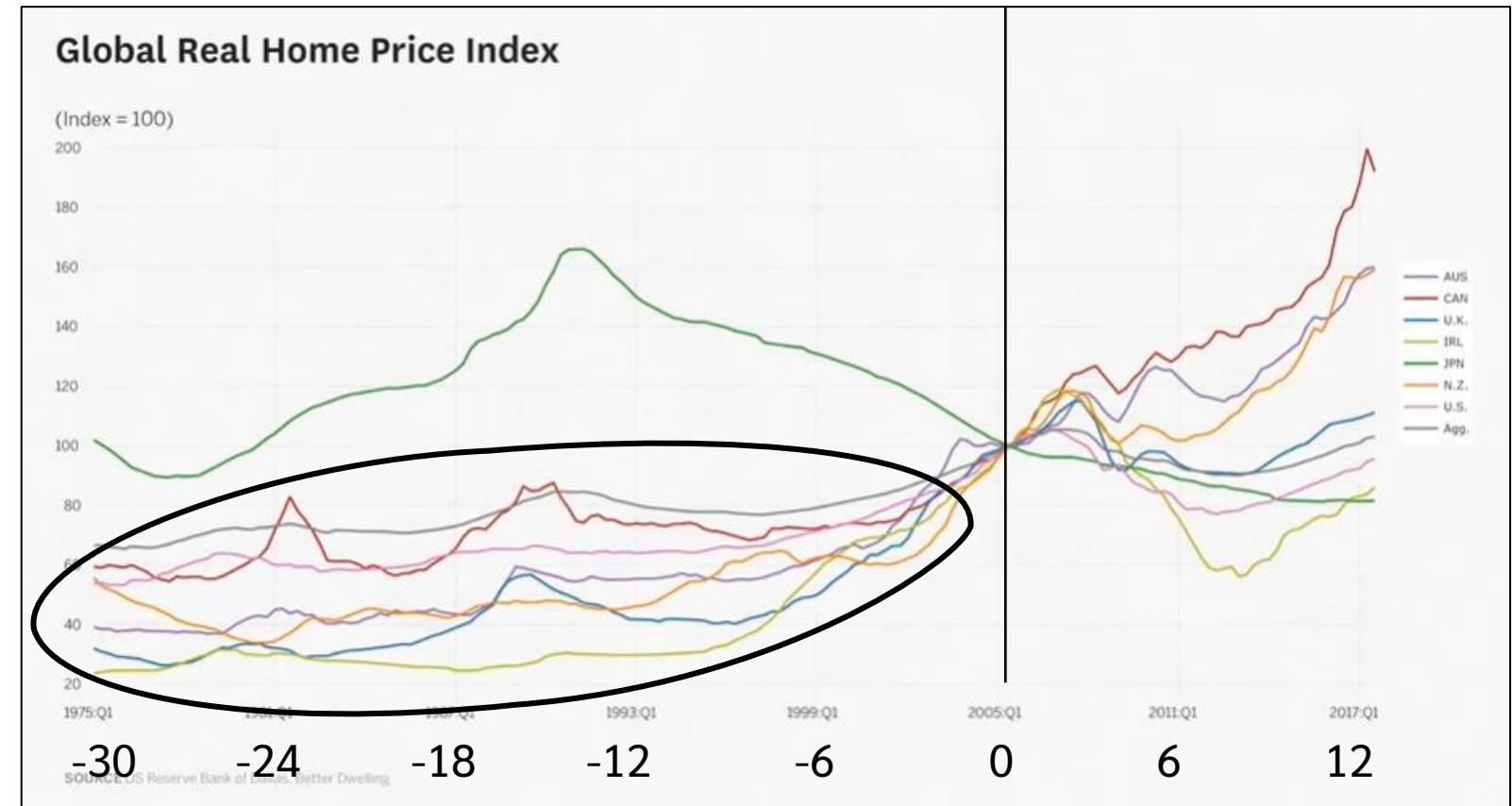
Telling Stories with Data in 3 Steps

1. Setup

The '*before*' state of data

2. Conflict

3. Resolution



Telling Stories with Data in 3 Steps

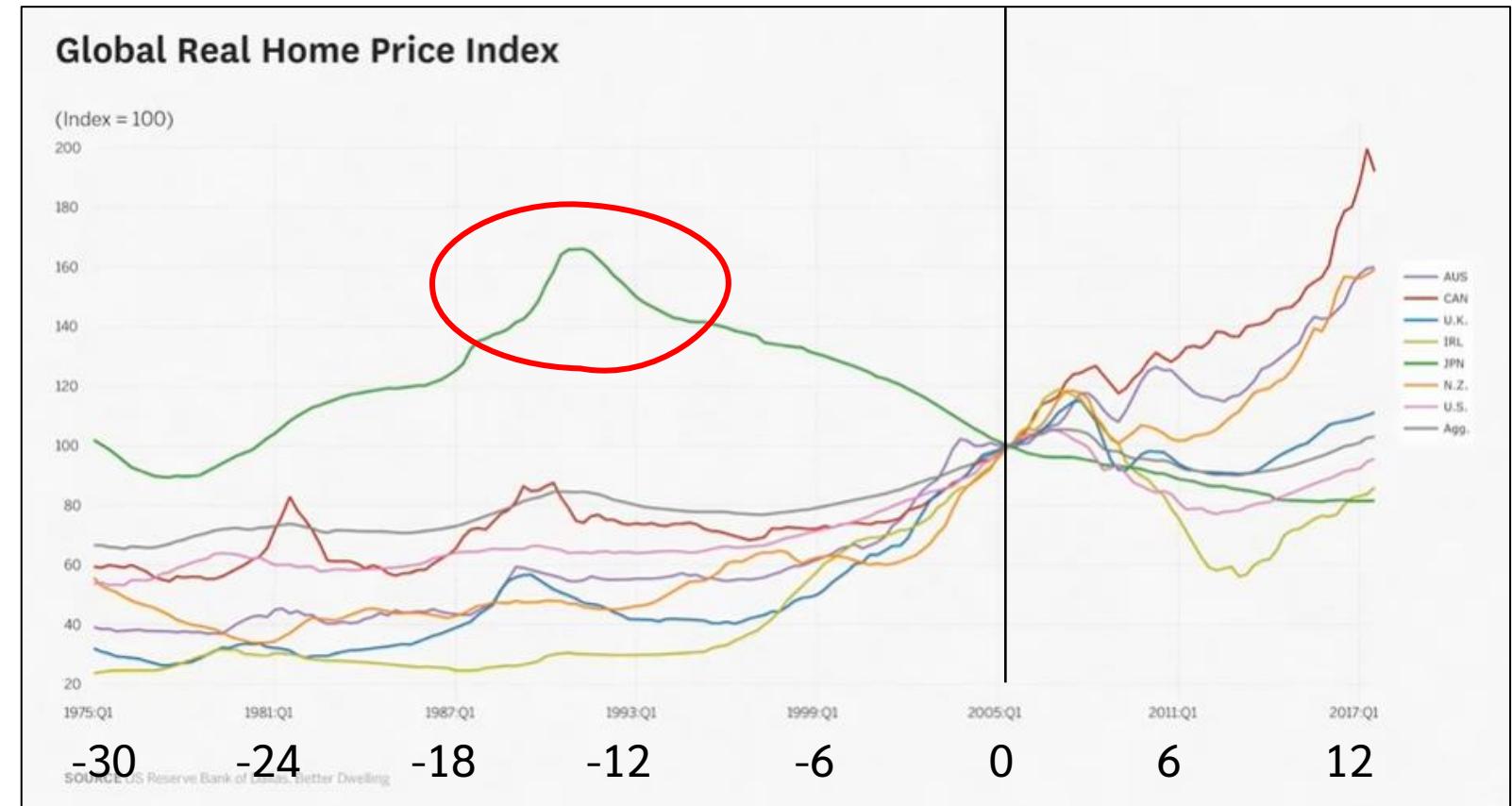
1. Setup

2. Conflict

How the data change.

*'What is causing the
change'*

3. Resolution



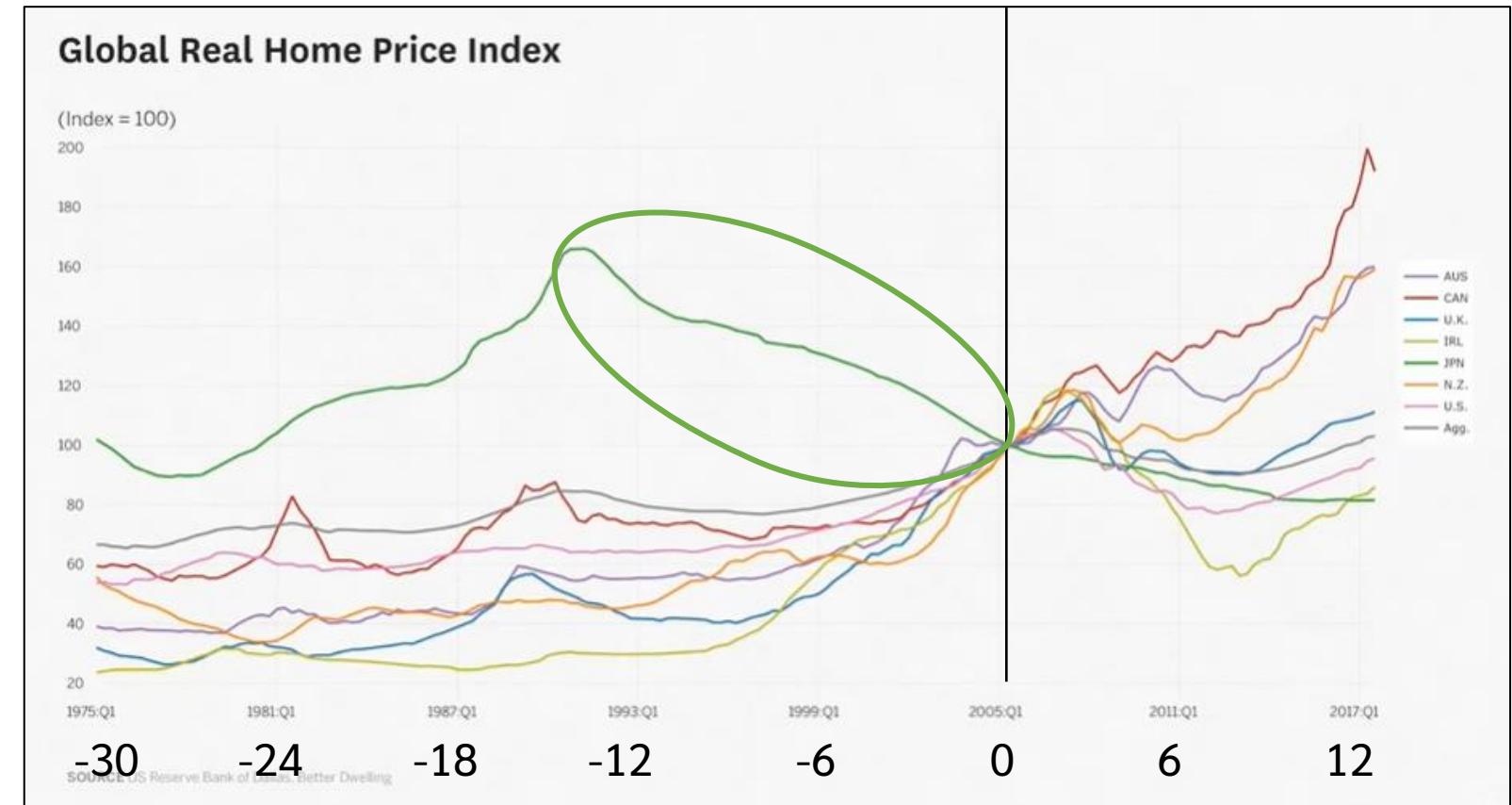
Telling Stories with Data in 3 Steps

1. Setup

2. Conflict

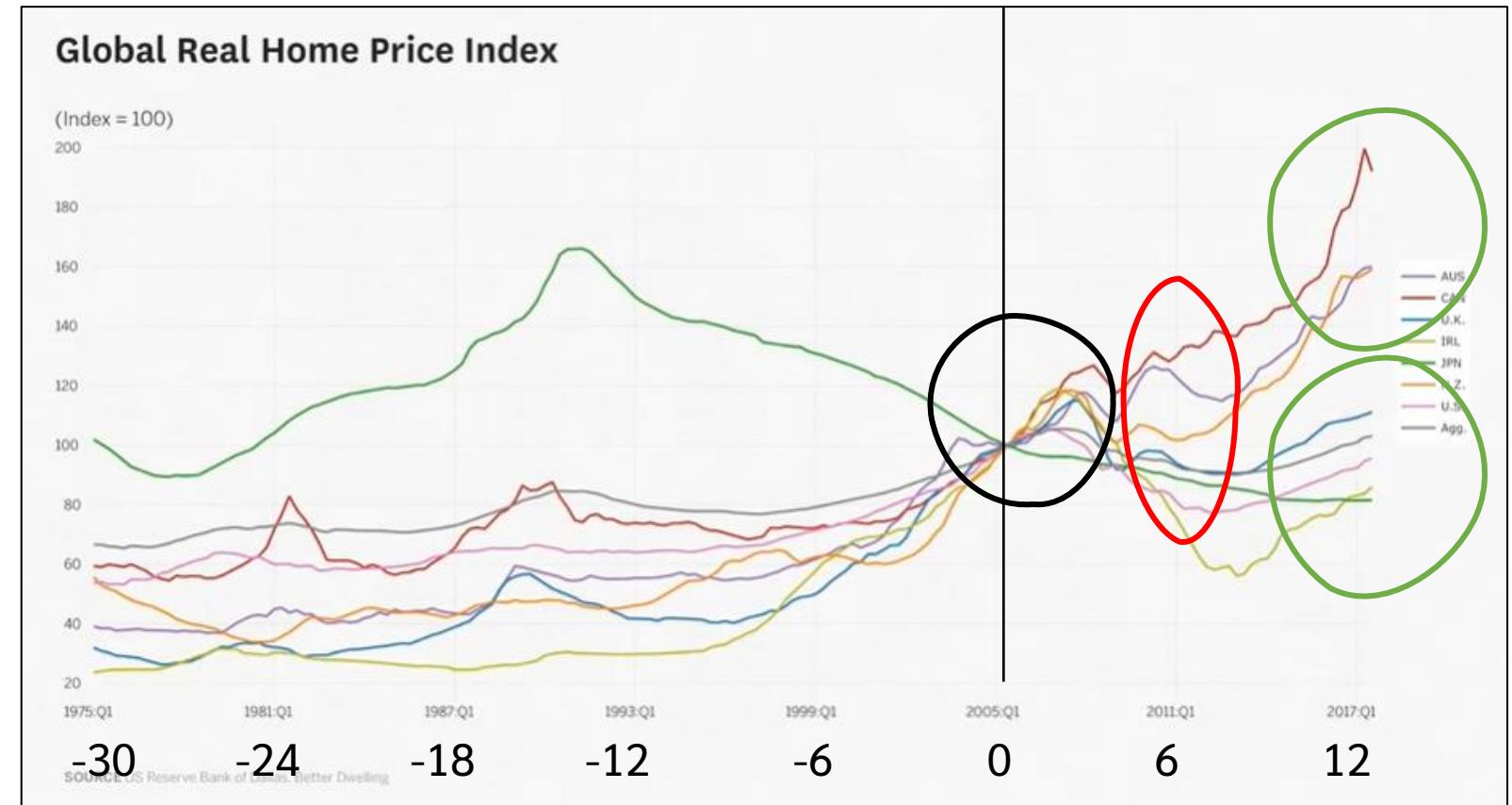
3. Resolution

The ‘*after*’ state that change leads to



Telling Stories with Data in 3 Steps

1. Setup
2. Conflict
3. Resolution



"Telling Stories with Data in 3 Steps (Quick Study)" - Harvard Business Review
https://www.youtube.com/watch?v=r5_34YnCmMY

รูปแบบการนำเสนอ

- สถานการณ์ > อดีต > ข้อเสีย > **ไอเดีย** > **ข้อดี**
- สถานการณ์ > **โอกาส** > แผนการ > ผลลัพธ์
- **ปัญหา** > สาเหตุ > ทางออก > **ผลลัพธ์** > สรุป
- **ภาพรวม** > 1 > 2 > 3 > สรุป
- **Hook** > ทำไม > อะไร > ยังไง > **ผลลัพธ์**
- บทนำ > สารบัญ > 1 > 2 > 3 > สรุป

