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Recap

1. What is a dimension
2. What is a measure/fact
3. What is the basic form of data modeling called?
4. Why is understanding data modeling important?

The History of Data Visualization

Every day we create 2.5 quintillion (10^{18}) bytes of data - so much that **90 percent of the world's data today has been created in the last two years** alone.

-IBM CMO Study, 2011


Çatalhöyük – 6200 BC



Consider Your Audience

- Decision maker? What's known?
- Relevant background info?
- Default Biases?
- What data should be used?
- Is audience familiar with the data?
- Risk? Do we need hedge them upfront?
- What will they use it to do?
- What does success look like?
- One sentence test.

Storyboarding




Problem

-What are we trying to solve




Who

-Audience
-You



What

-Action



Mechanism

-Tableau
-PowerPoint?
-Power BI?
-Excel?



Tone

-Success/Failure?



How

-Possible types of graph/chart

Different Types

Two main types of data visualization

- Exploration
- Explanation

Exploration

- Discover new areas of interest
- Pose new questions
- Discover new stories

Explanation

- Answer a question
- Support a decision
- Convey information
- Increase efficiency

Two main types of data

- Qualitative
- Quantitative

Qualitative

- Can also be categorical
 - Favorite color = blue
 - Gender, State, etc.

Quantitative

- Expressed in numbers and can be counted and aggregated easily
- Fully additive facts

How we see the world

The need to visualize data

"Use a picture. It's worth a thousand words."

-Tess Flanders, 1911

The need to visualize data

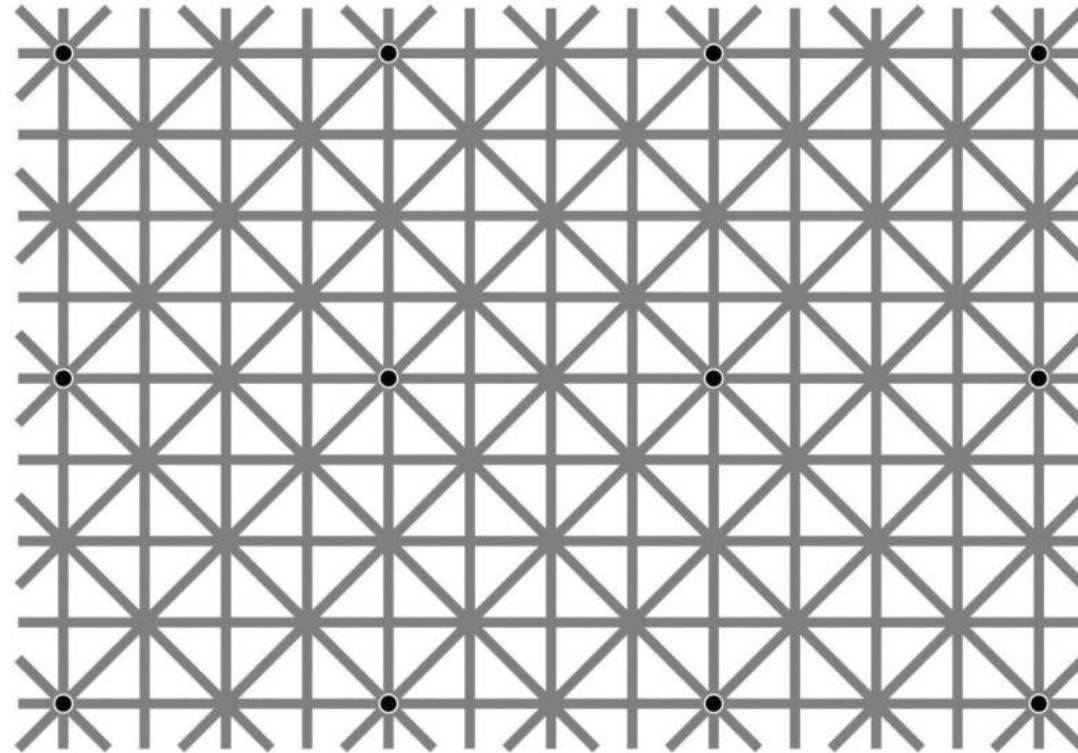
- Human brain processes images 60,000x faster than text.

-Persuasion and the Role of Visual Presentation Support: The UM/3M Study, 1986

- 90 percent of the information transmitted to the brain is visual.

-MIT News, January 16, 2014

How many dots do you see?



Ninio's Extension Illusion

How many dots do you see?

- There are 12 dots. It is difficult to see all of the dots because the grid prevents us from seeing the whole picture. If we removed the grid we could see all 12 dots, but when presented on a grid, our perception changes entirely.
- “Our visual system is lazy. Regular patterns are tempting because you can look at a small portion and think you have the whole thing figured out”- Martinez-Conde

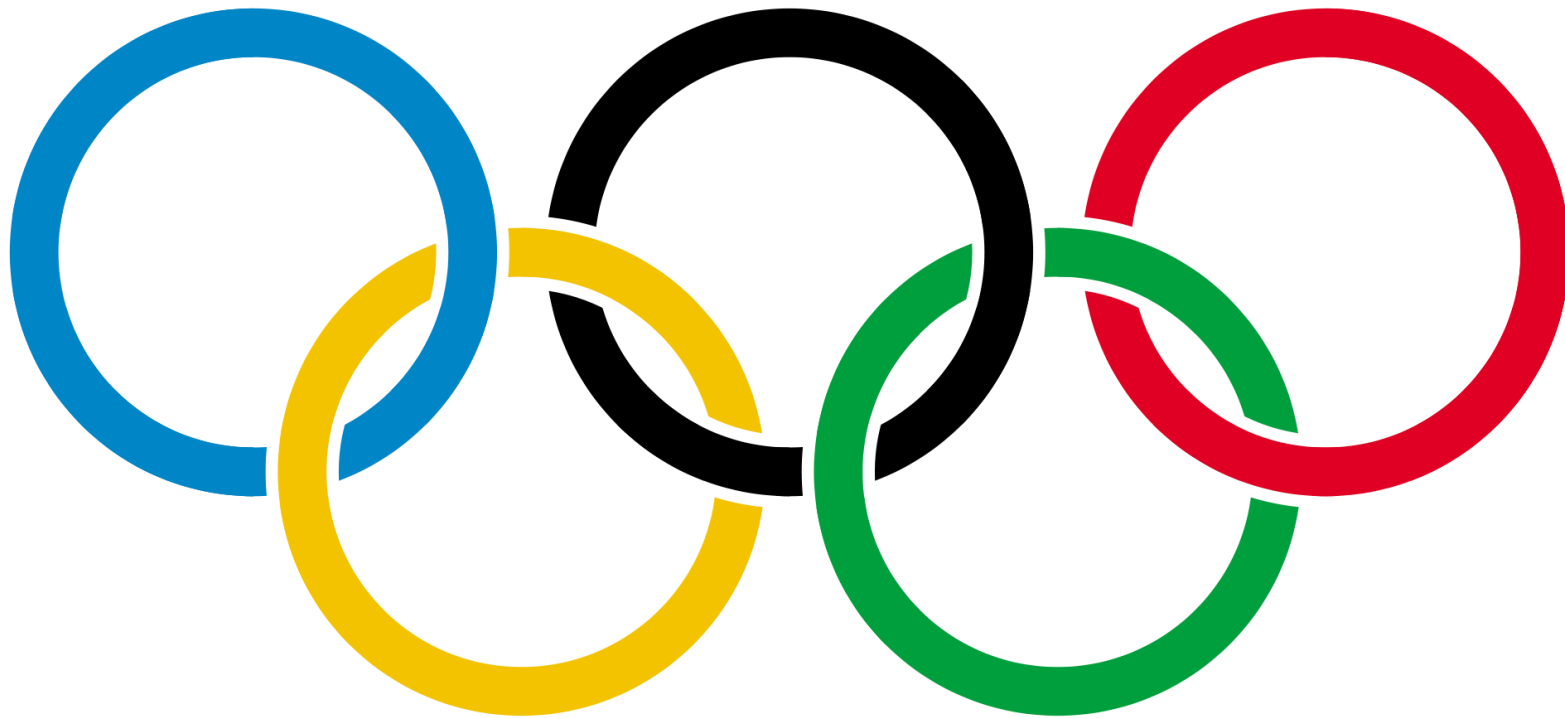
Ninio's Extension Illusion

The Gestalt Principles

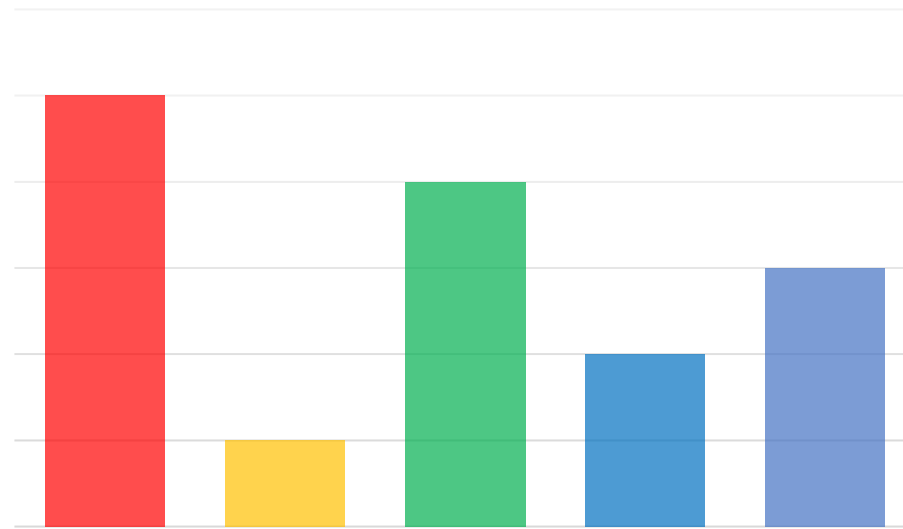
Gestalt

- Introduced by Christian von Ehrenfels
- Psychological term meaning unified whole
 - The whole is different (not greater) than the sum
- Gestalt Effect –
 - Ability of the mind to generate whole images from a collection of parts

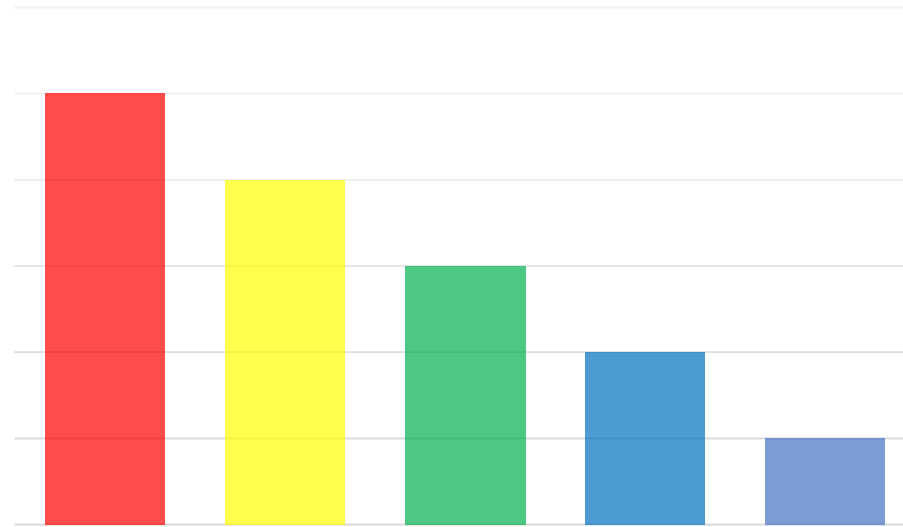
Law of Pragnanz



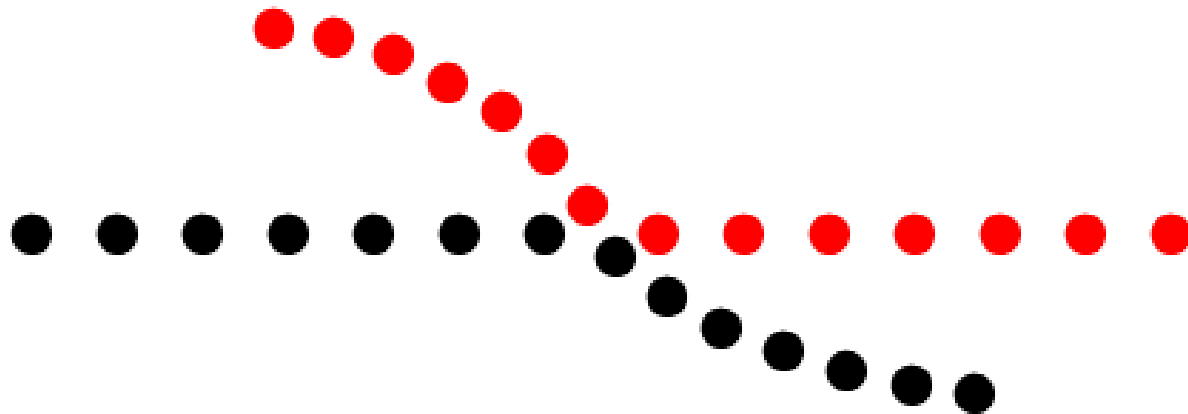
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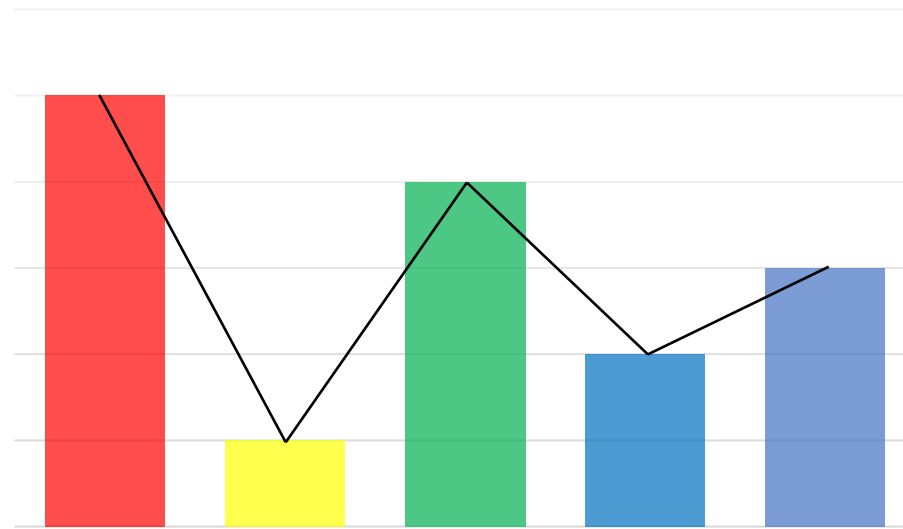
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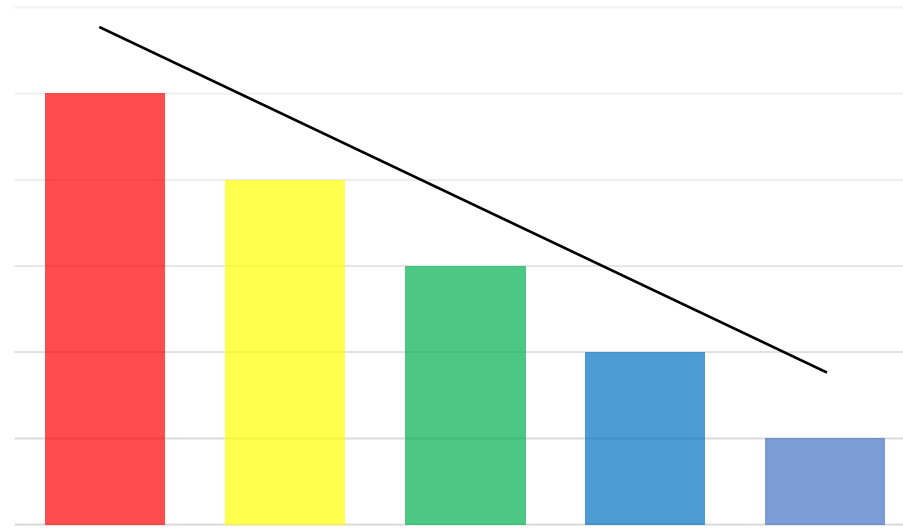
Law of Continuity



Law of Continuity



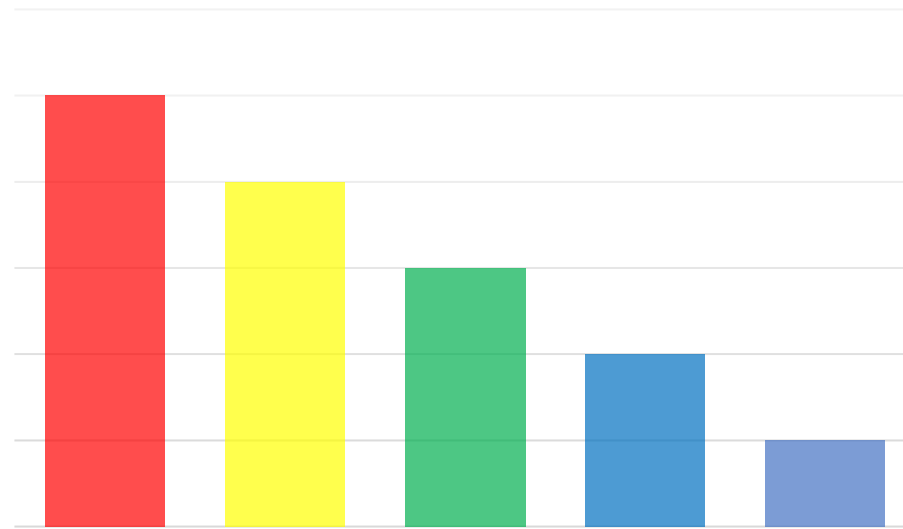
Law of Continuity



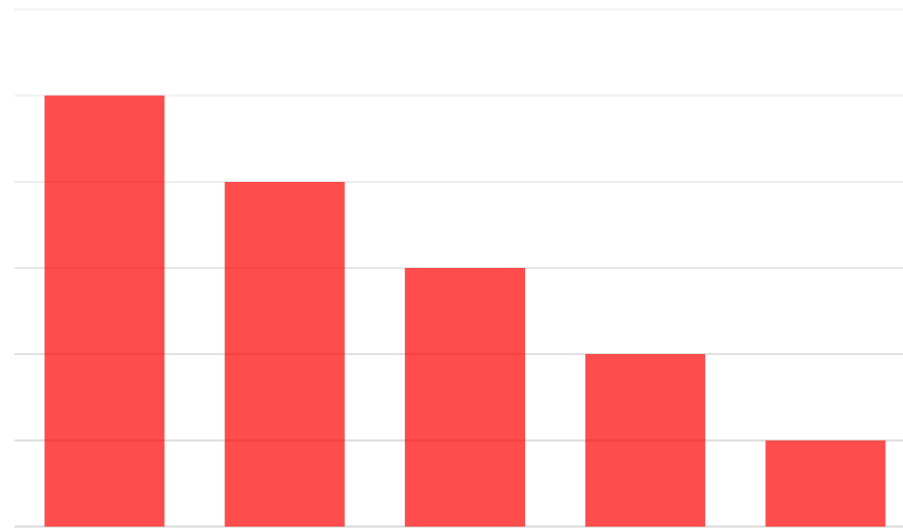
Law of Similarity



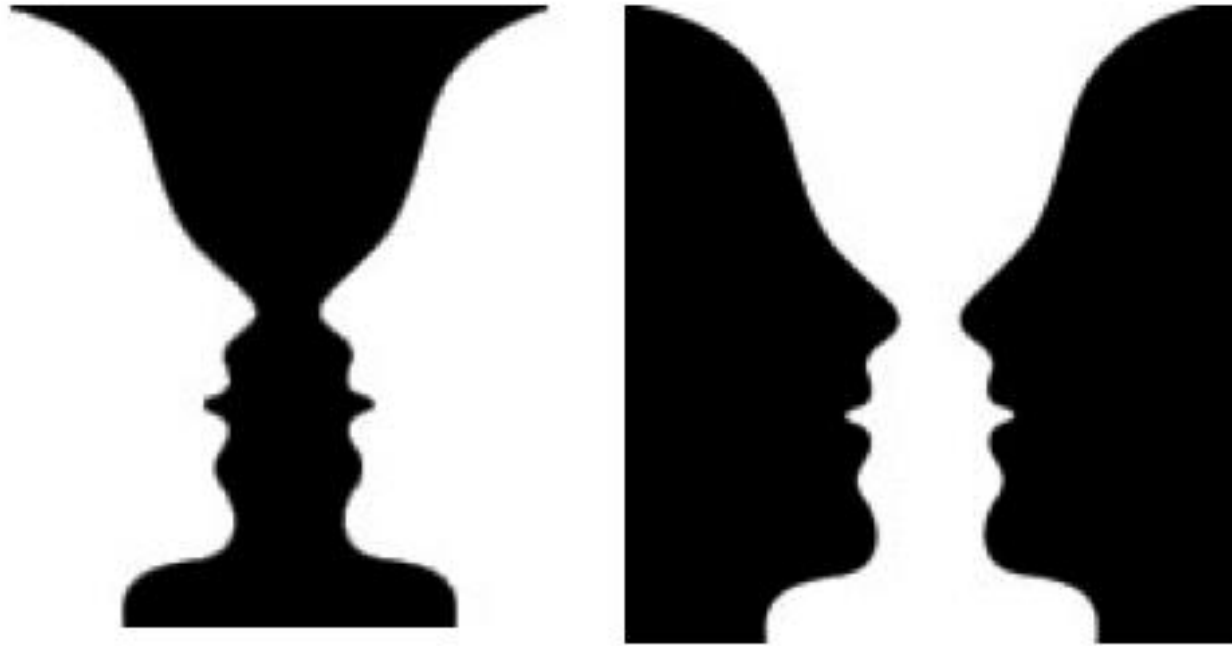
Law of Similarity



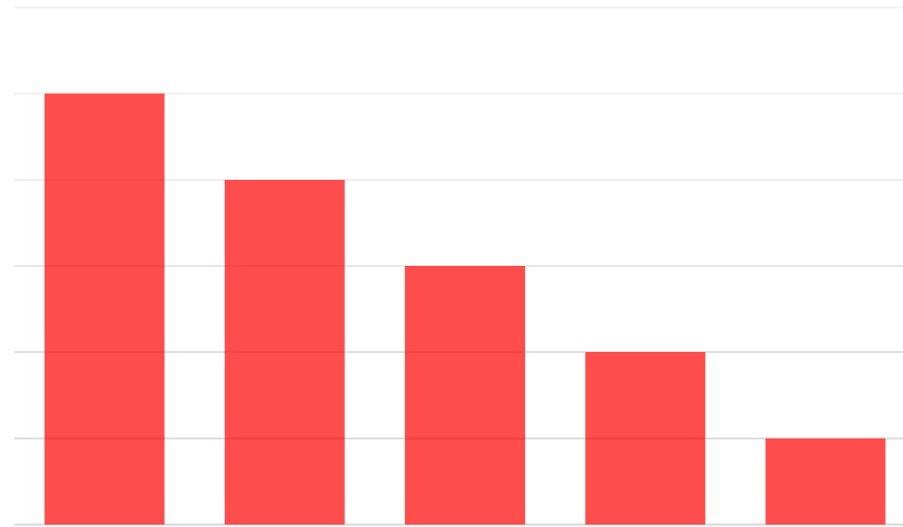
Law of Similarity



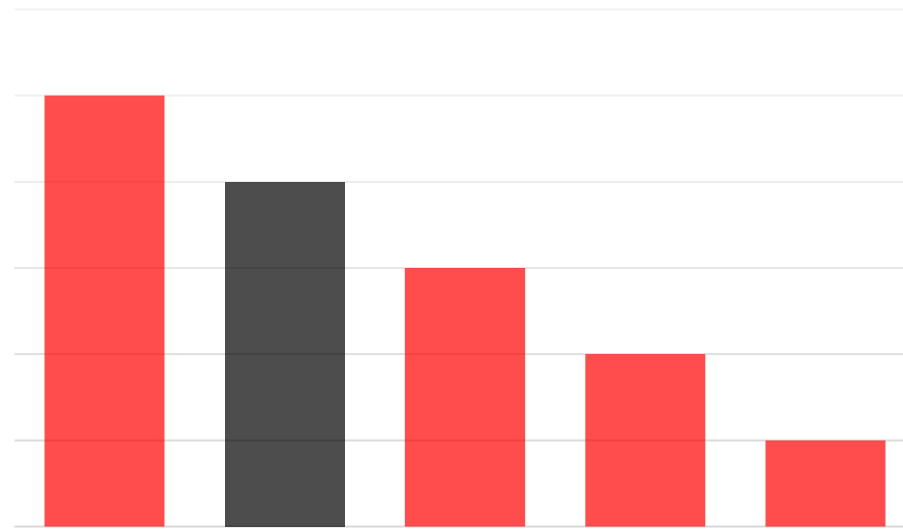
Law of Focal Point



Law of Focal Point



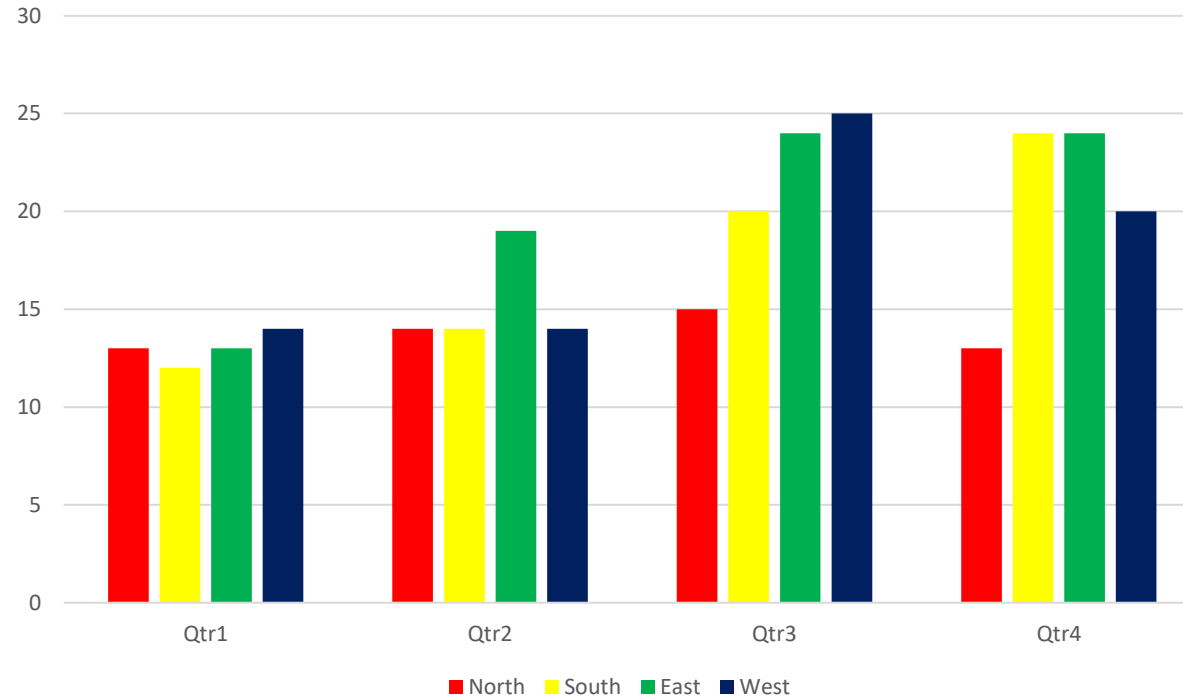
Law of Focal Point



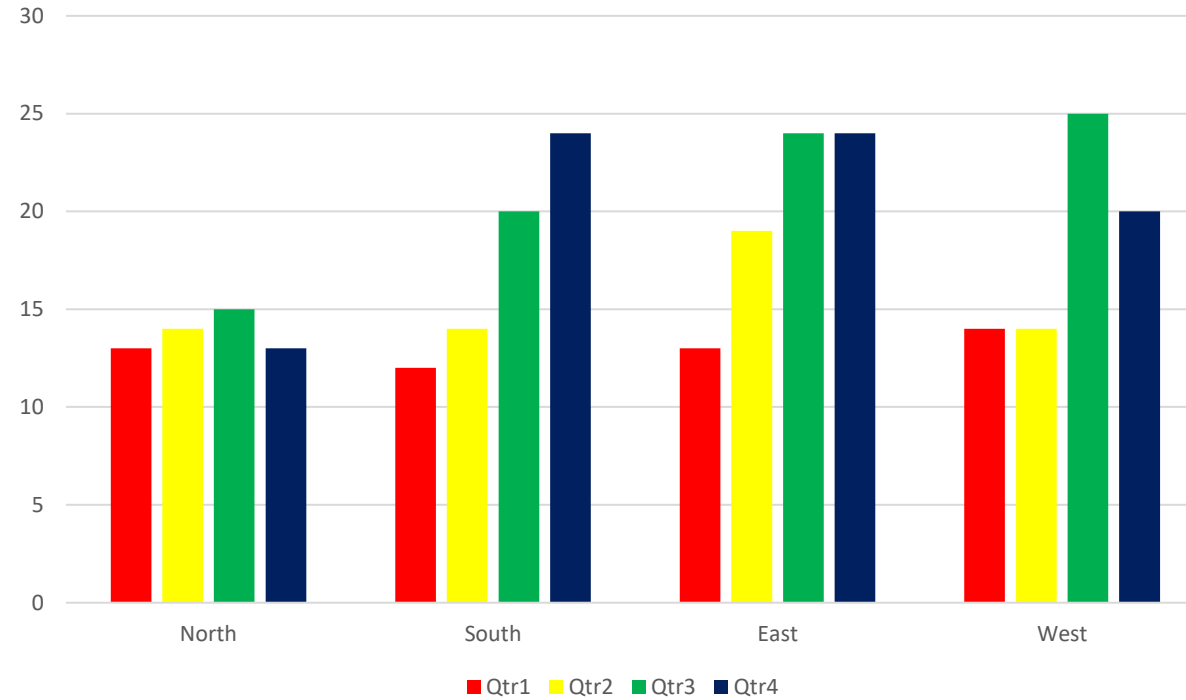
Law of Proximity



Law of Proximity



Law of Proximity



Colors

Colors

- We don't see the same thing.
- They have innate meanings and feelings

Normal Vision



Deuteranopia



Protanopia



Tritanopia



What can we do?

- Be conscious of red and greens together.
- Find a CVD friendly palette when possible.
- Shading and gradients!
- Use help!
 - [The Colorlab - http://colorlab.wickline.org/colorblind/colorlab/](http://colorlab.wickline.org/colorblind/colorlab/)
 - [Coblis - http://www.color-blindness.com/coblis-color-blindness-simulator/](http://www.color-blindness.com/coblis-color-blindness-simulator/)

Pitfalls to Avoid

- Not engaging the audience or user first!
- Visual Clutter – Keep it Simple
- Color Abuse
- Poor Design
- Bad Data
- Pie Charts 😊

Resources

- Gestalt Psychology – http://en.wikipedia.org/wiki/Gestalt_psychology
- Color Matters – <http://www.colormatters.com>
- CVD Color Lab - <http://colorlab.wickline.org/colorblind/colorlab/>
- Coblis - <http://www.color-blindness.com/coblis-color-blindness-simulator/>
- Data Visualization Catalogue - <https://datavizcatalogue.com/search.html>

DATA



SORTED

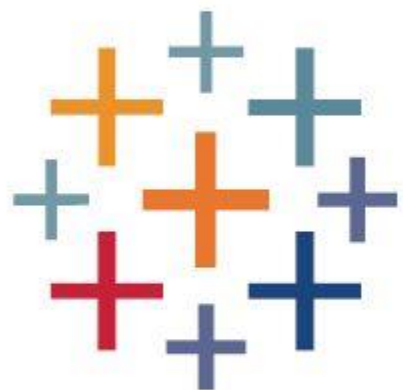


ARRANGED



PRESENTED
VISUALLY





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S O F T W A R E

What is Tableau

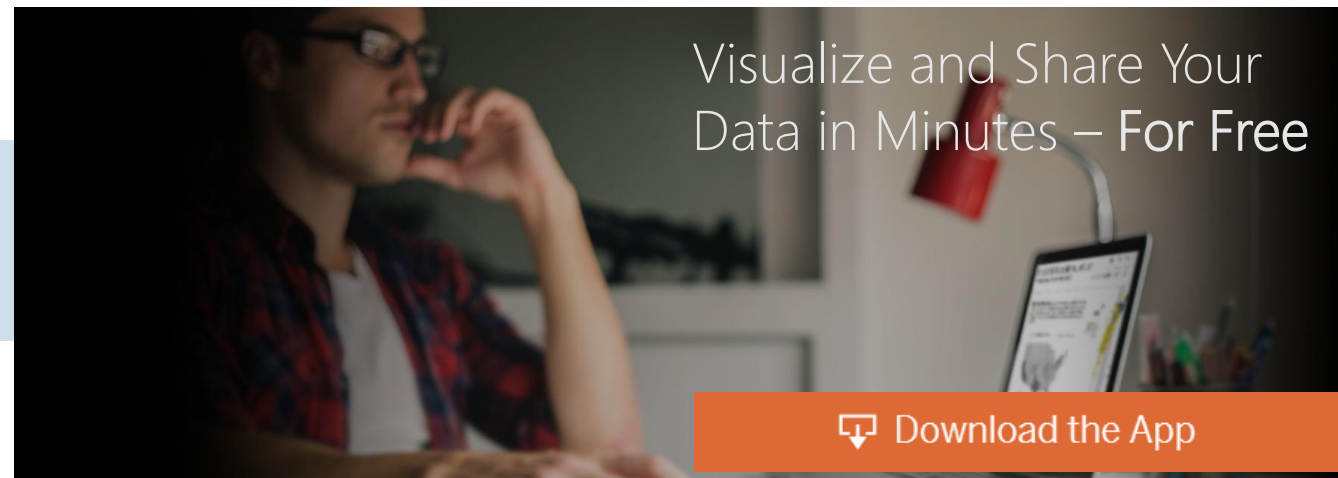
What is Tableau

Tableau is a suite of products that enables anyone to create, collaborate and captivate. Tableau compliments your natural ability to understand data visually.

“Tableau helps people **see**
and **understand** their data.”

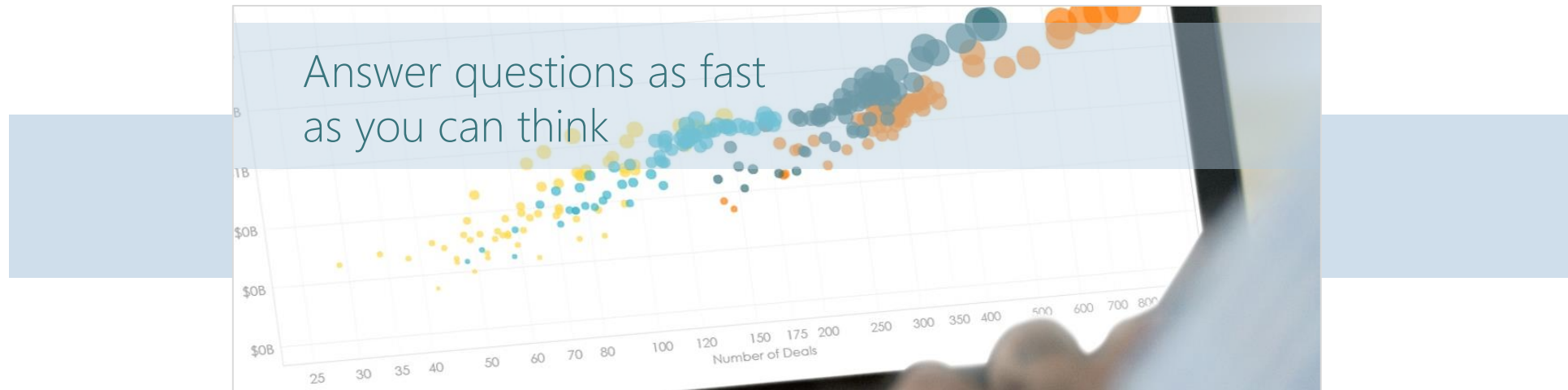
Tableau Product Family

Tableau Public



<http://bit.ly/tabpublic>

Tableau Desktop



<http://bit.ly/tabdesktop>

Tableau Reader

Answer questions as fast
as you can think

<http://bit.ly/tabreader>

Tableau Online




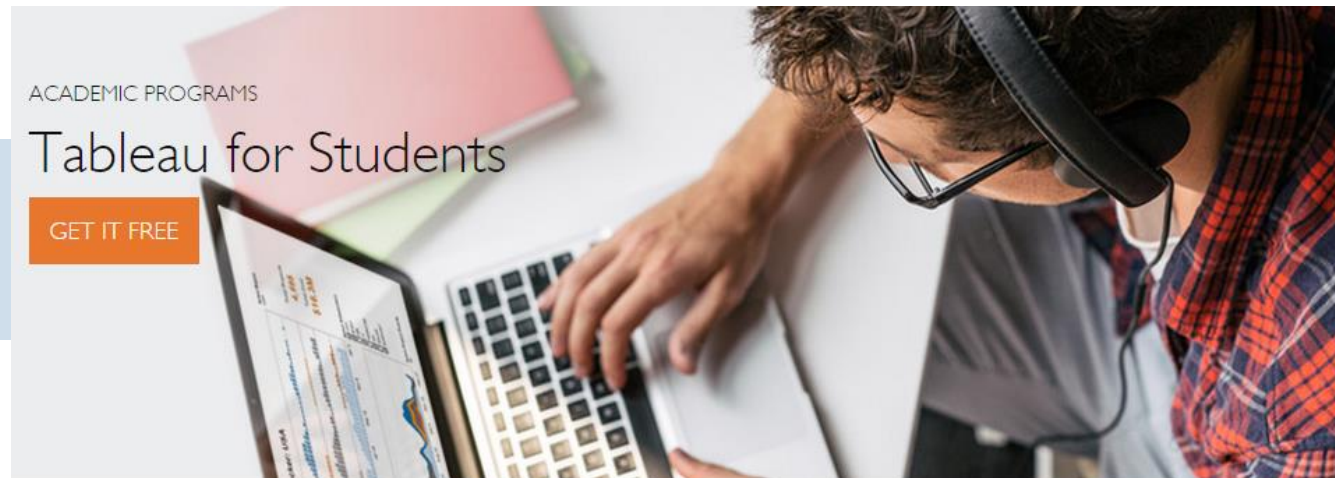
TABLEAU ONLINE

Rapid-fire Cloud BI.
Whenever, wherever.

TRY IT
FREE

<http://bit.ly/tableauonline>

Tableau for Students



<http://bit.ly/tabstu>

Tableau for Non-Profits

The background image shows a tablet displaying a Tableau dashboard with a map and charts, resting on an open notebook with handwritten notes and a pen. The text is overlaid on this image.

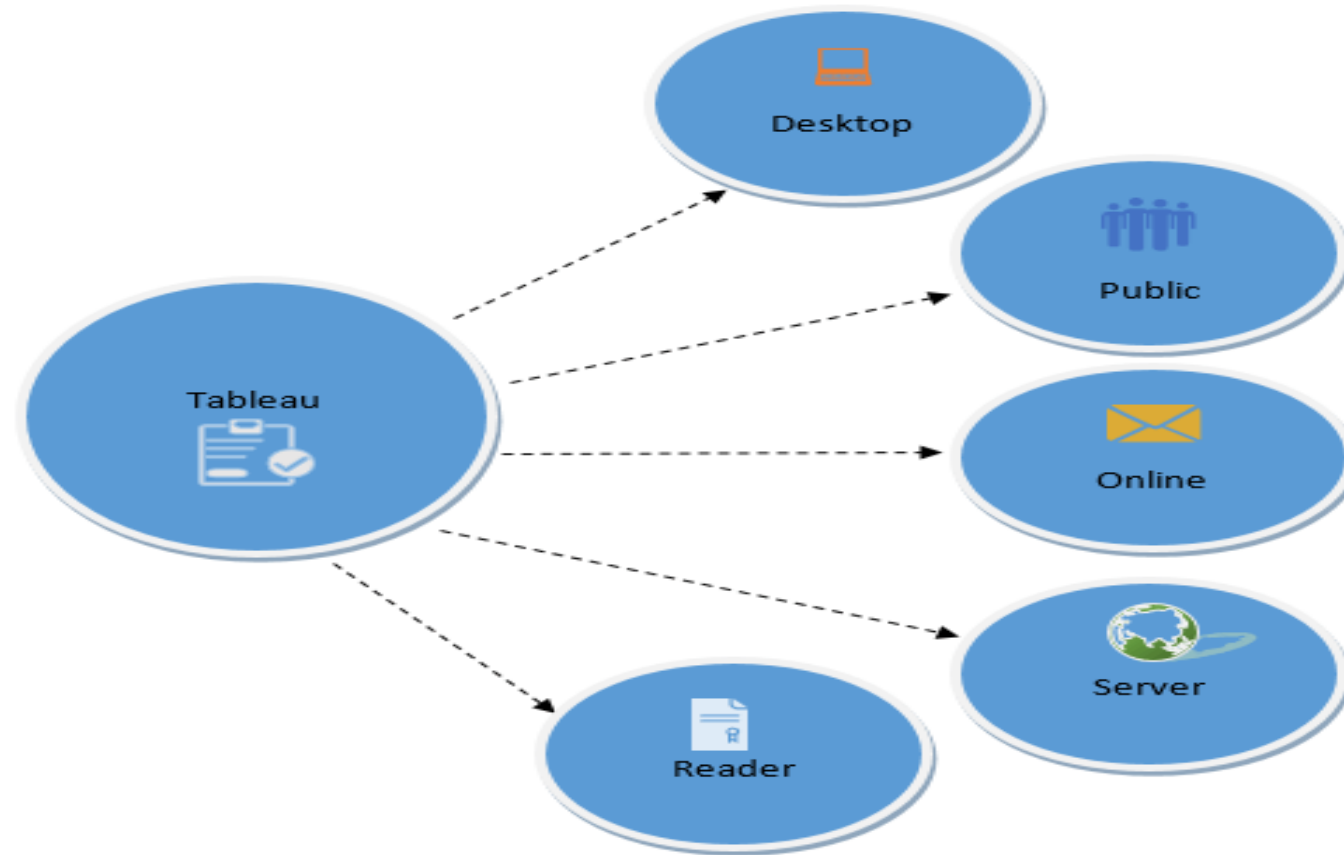
Our mission is to encourage the use of facts and analytical reasoning to solve the world's problems

Tableau Foundation.
Let's build a better world with data.

GET IT NOW

<http://bit.ly/tabnonprofit>

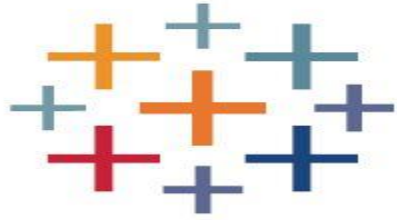
Tableau Public



Source: <https://www.guru99.com/what-is-tableau.html>

Tableau: Definitions

- A **worksheet** contains a single view along with shelves, cards, legends, and the Data and Analytics panes in its side bar. For details on the worksheet workspace, see [The Tableau Workspace](#).
- A **dashboard** is a collection of views from multiple worksheets. The Dashboard and Layout panes are available in its side bar. For more details about creating dashboards, see [Dashboards](#).
- A **story** contains a sequence of worksheets or dashboards that work together to convey information. The Story and Layout panes are available in its side bar. For more details about creating stories, see [Stories](#).
- A worksheet is where you build views of your data by dragging and dropping fields onto shelves.
- A dashboard is a combination of several views that you can arrange for presentation or to monitor.
- A story is a sequence of views or dashboards that work together to convey information.



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S O F T W A R E



+ **a b l e a u**®
S O F T W A R E

- Create a map with the highest sales per state
- Create a chart that shows the sales per year
- Create a chart showing the top 5 subcategory
- Create a chart showing the lowest selling product
- Create a visual showing all sales
- Allow the end user to filter by year



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S O F T W A R E

- Create a map with the highest profit per state
- Create a chart that shows the profit by month and year
- Create a chart showing the bottom 5 products
- Create a chart showing the highest selling product
- Create a visual showing states with the lowest amount of sales
- Allow the end user to filter by city