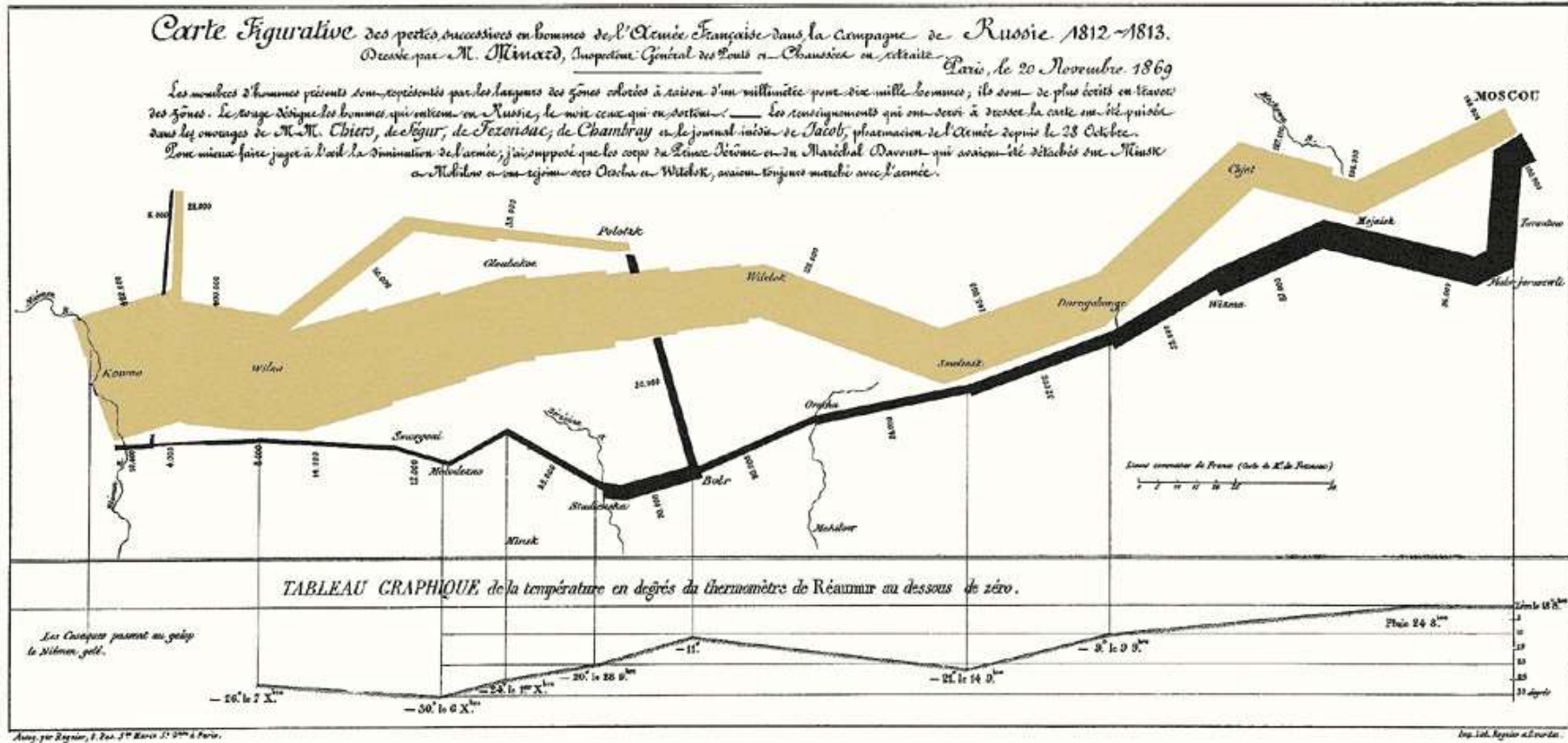




A Brief History of Data Visualization



What makes a good chart?



Napoleon's 1812 March by Charles Joseph Minard

Perhaps the most famous data presentation.

Reprinted in Tufte (2009), p. 41

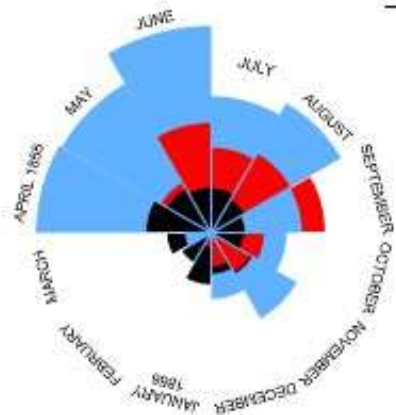


Florence Nightingale's 'Coxcombs' 1858

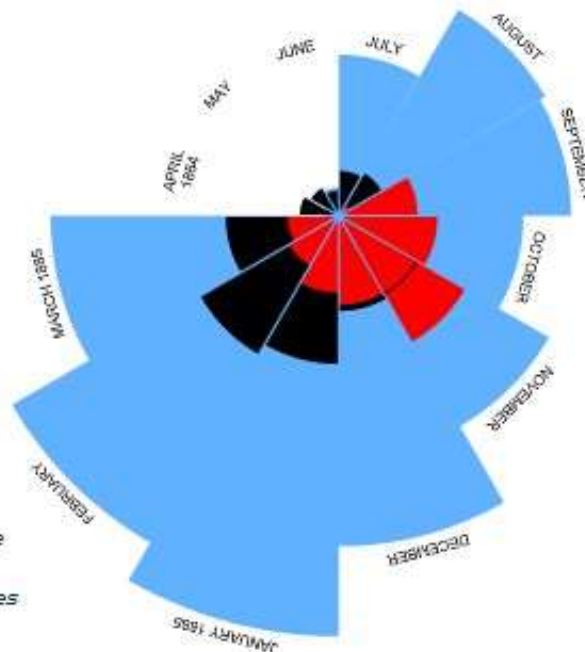


DIAGRAM OF THE CAUSES OF MORTALITY IN THE ARMY IN THE EAST

2. APRIL 1855 TO MARCH 1856



1. APRIL 1854 TO MARCH 1855



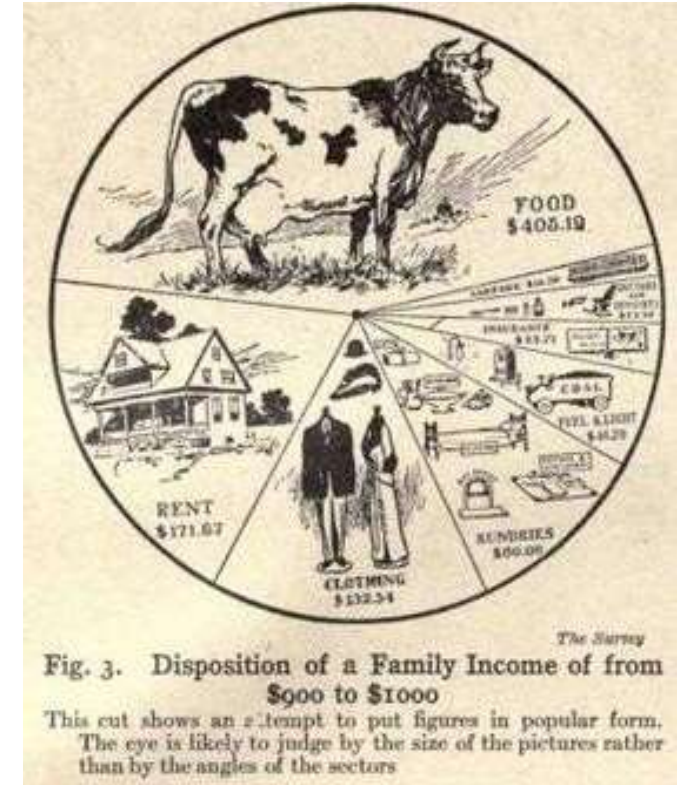
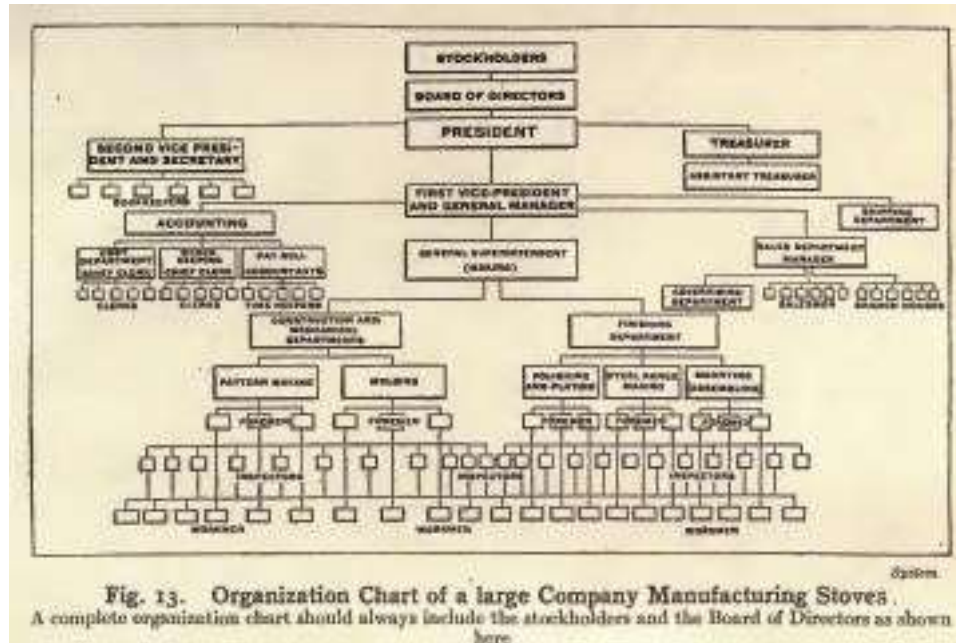
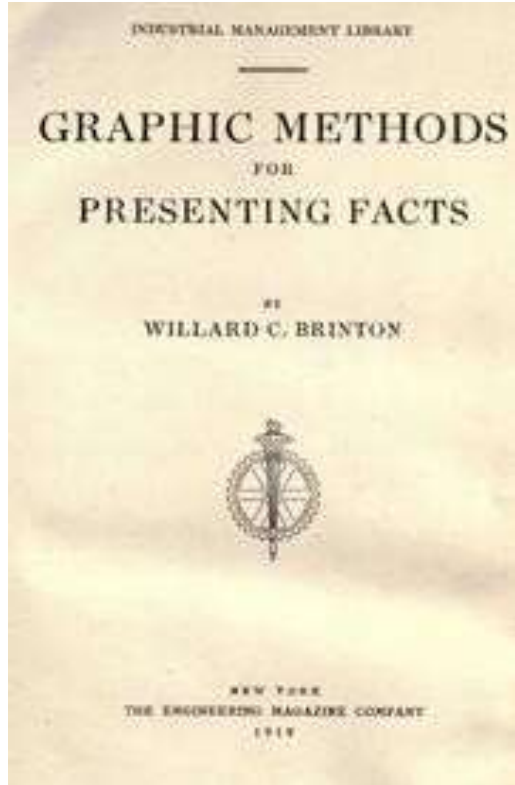
The Areas of the blue, red, & black wedges are each measured from the centre as the common vertex.
The blue wedges measured from the centre of the circle represent area for area the deaths from Preventable or Mitigable Zymotic diseases, the red wedges measured from the centre the deaths from wounds, & the black wedges measured from the centre the deaths from all other causes
The black line across the red triangle in Nov' 1854 marks the boundary of the deaths from all other causes during the month
In October 1854, & April 1855, the black area coincides with the red, in January & February 1856 the blue coincides with the black
The entire areas may be compared by following the blue, the red & the black enclosing lines.

- Pioneer hospital sanitation
- Meticulously gathered data
- Pioneer in applied statistics and visualization
- Nurse



Willard C. Brinton, 1914

First business book about visualization



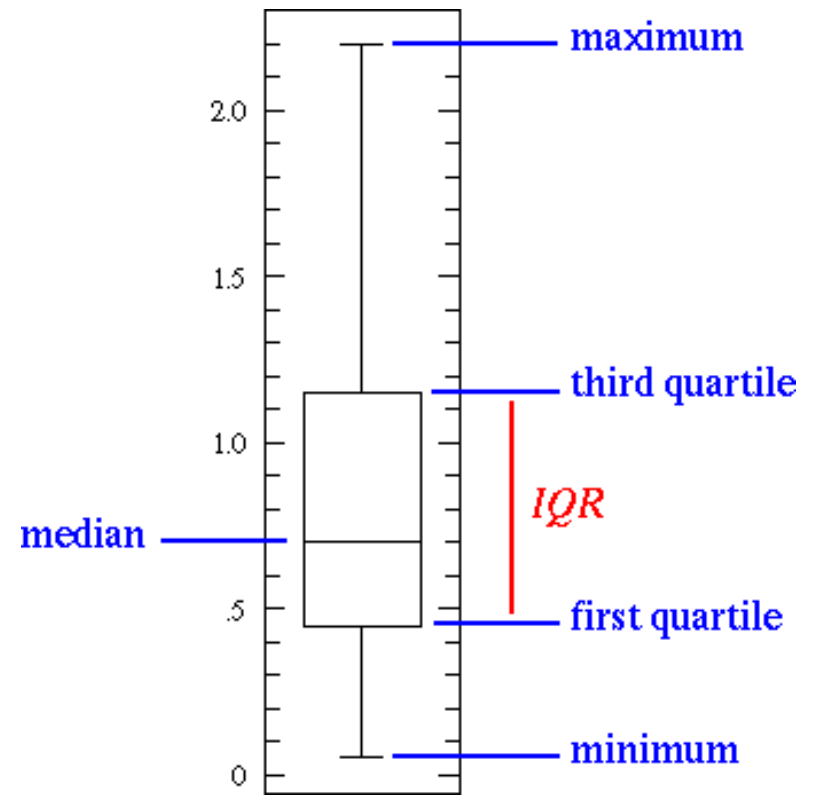
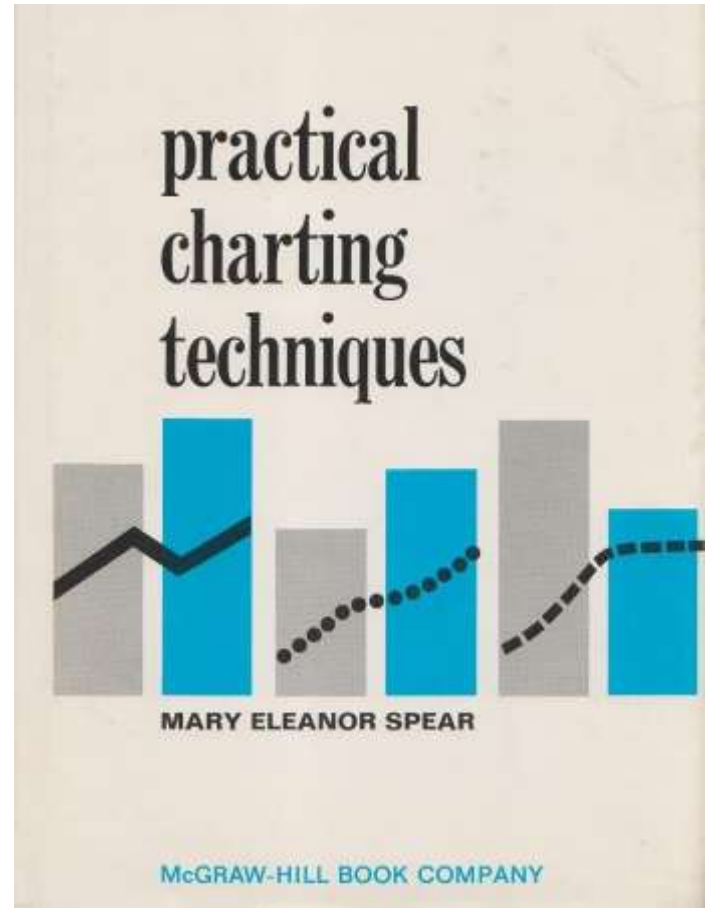
- Rules for presenting data
- American consulting engineer



Mary Eleanor Spear 1952, 1969



- Common-sense advice
- Invented box plot
- Worked for various US government agencies





Jacques Bertin 1967

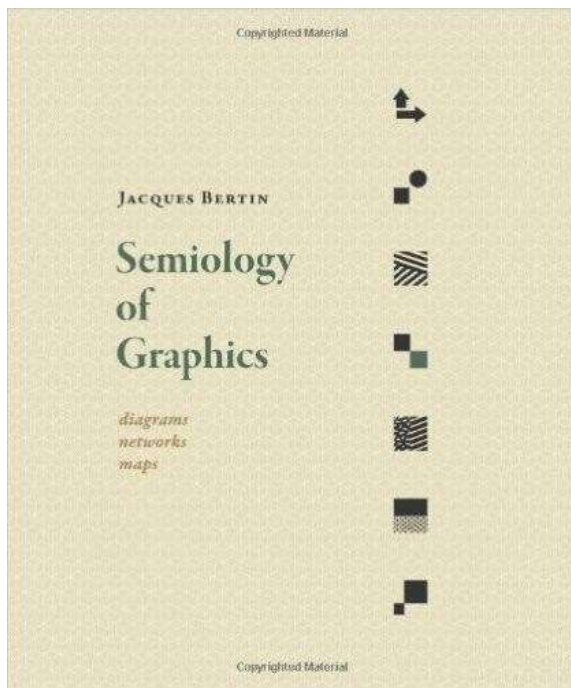


- Principle of expressiveness:
 - Say everything you want to say — no more, no less
 - Don't mislead
- Principle of effectiveness:
 - Use the best method available for showing your data
- Cartographer



Jacques Bertin

Seven Visual Variables



| Bertin's Original Visual Variables | |
|---|--|
| Position changes in the x, y location | |
| Size change in length, area or repetition | |
| Shape infinite number of shapes | |
| Value changes from light to dark | |
| Colour changes in hue at a given value | |
| Orientation changes in alignment | |
| Texture variation in 'grain' | |

- Position
- Size
- Shape
- Color
- Brightness
- Orientation
- Texture

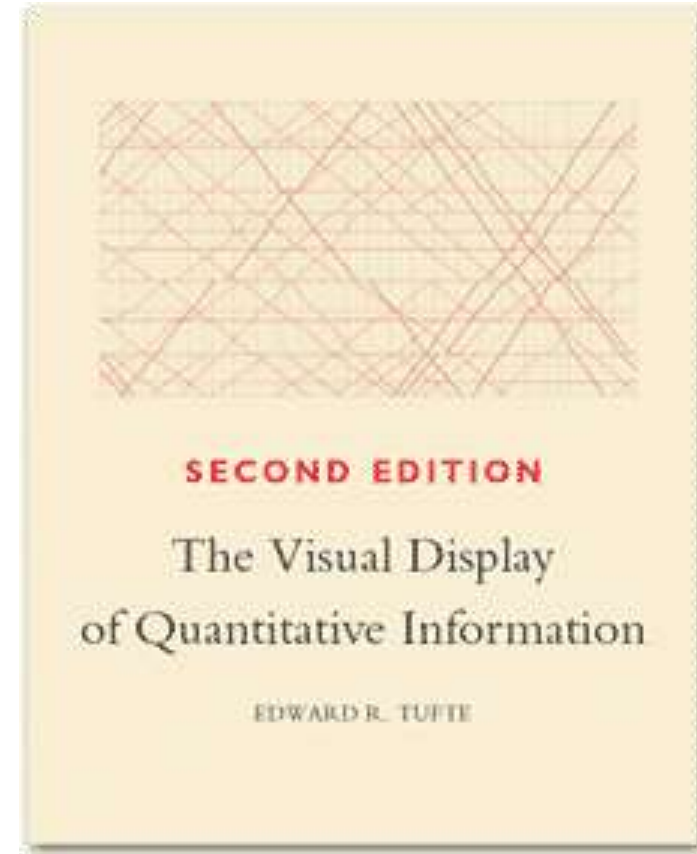


Edward Tufte

1983



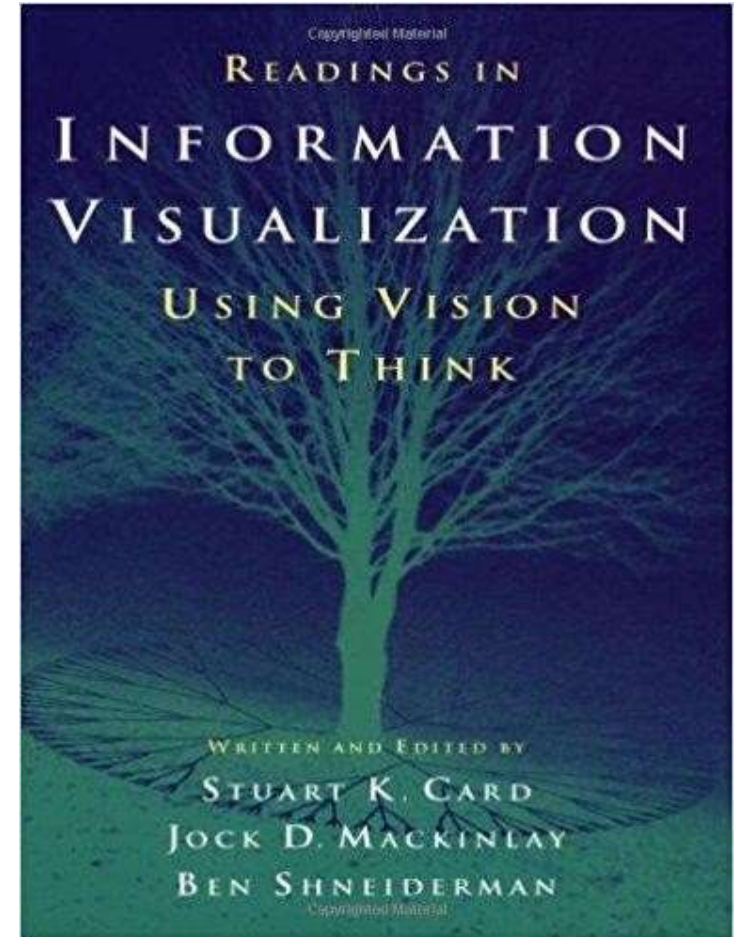
- Disciplined design principles
- Minimalist approach
- Professor emeritus at Yale University





Jock Mackinlay

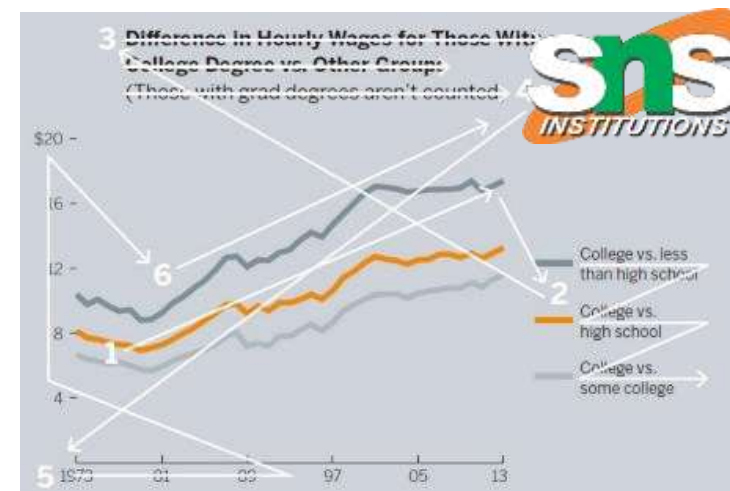
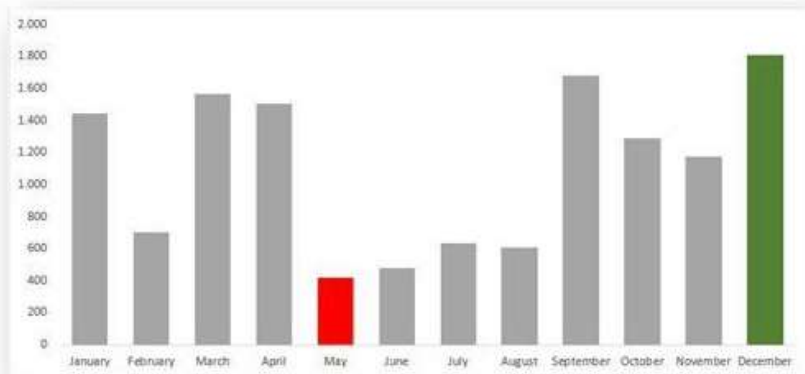
1986



- Automatically encode data with software
- Enable people to focus on ideas, concepts
- Added eighth variable to Bertin's list: motion
- VP of Research and Design, Tableau Software



When a Chart hits our Eyes



1. Visuals aren't read in a predictable, linear way
 - Create charts spatially, from the visual outward
2. We see first what stands out
 - Whatever stands out should support idea
3. We see only a few visuals at once
 - Plot as few visual elements as possible
4. We seek meaning and make connection
 - Relate visual elements in a meaningful way
5. We rely on conventions and metaphors
 - Embrace deeply ingrained conventions





Example: USA Energy Resources

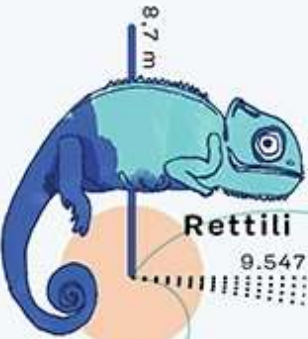
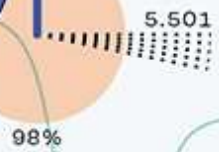




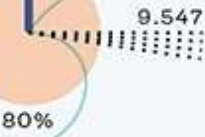
Gli animali formano un regno immenso



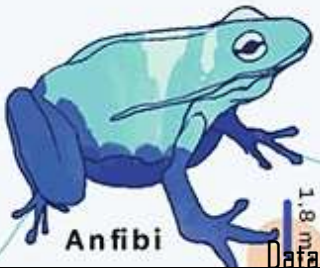
Mammiferi



Rettili



Ognuna con le proprie caratteristiche.



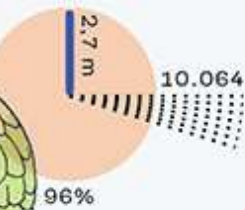
Anfibi



e composto da così tante specie.



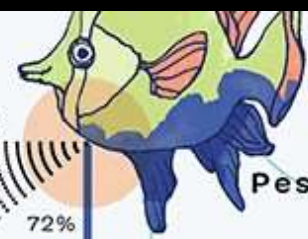
Uccelli



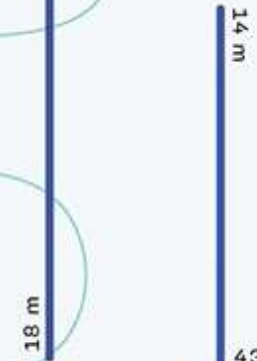
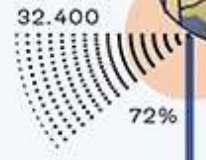
massima tra gli animali della categoria

Numero di specie scoperte

Percentuale di specie scoperte sul numero di specie stimate



Pesci



Molluschi



Pare che esistano 20 miliardi di miliardi di animali nel mondo!

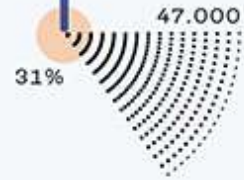


Insetti



Crostacei

che gli uomini non hanno ancora trovato il tempo di classificarli tutti!



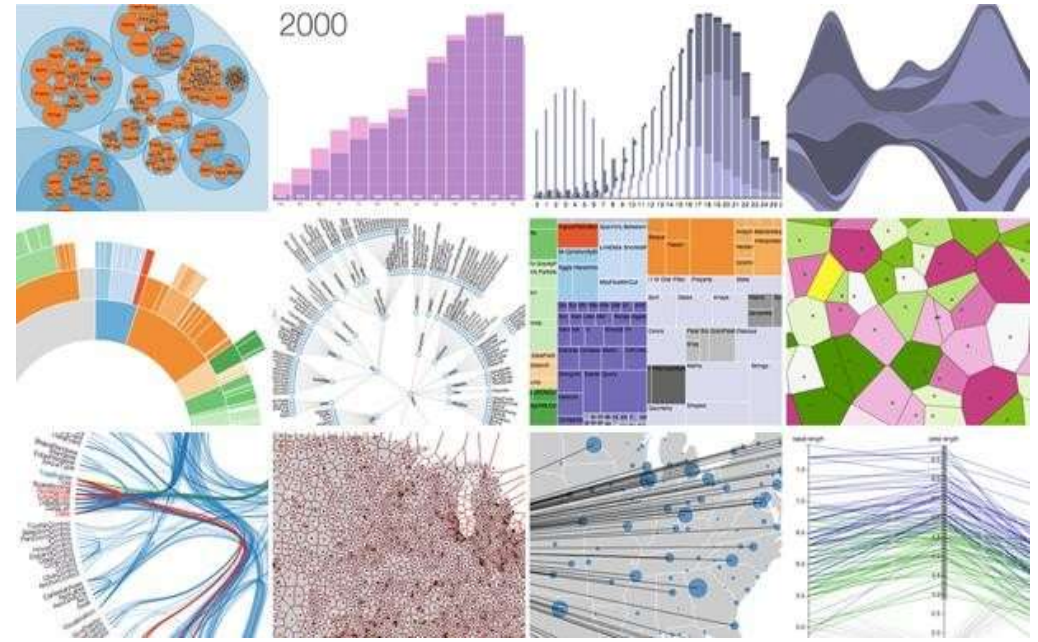
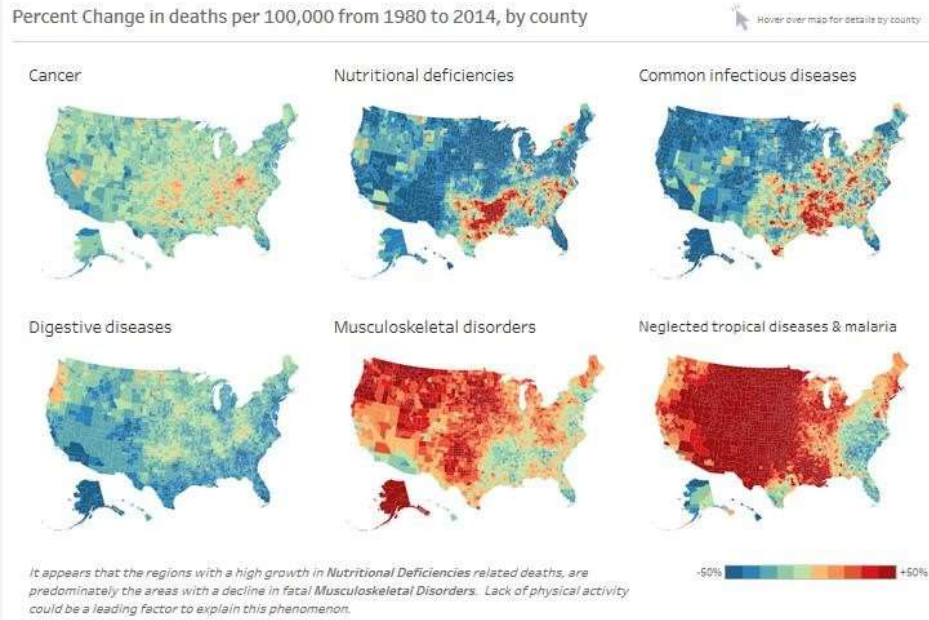
Aracnidi



Suddivisi in ben 8,7 milioni di specie diverse!



Vast Data Visualization Choice





What is data visualization and why is it important?



- **Data visualization** is the act of taking information (**data**) and placing it into a visual context, such as a map or graph. **Data visualizations** make big and small **data** easier for the human brain to understand, and **visualization** also makes it easier to detect patterns, trends, and outliers in groups of **data**.



Is data visualization a part of data science?

- **Data science** and **data visualization** are not two different entities. They are bound to each other. **Data visualization** is a **subset of data science**. **Data science** is not a single process or a method or any workflow.



What are the best data visualization software of 2023?

- WhSisense.
- Looker.
- Periscope Data.
- Zoho Analytics.
- **Tableau.**
- Domo.
- **Microsoft Power BI.**
- **Qlikview.**