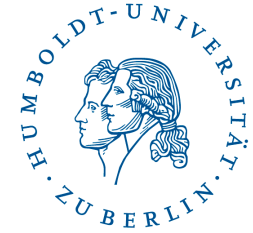


# Visualisations



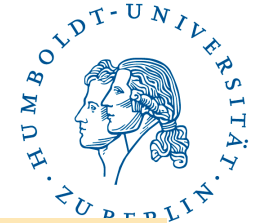
# Human perception

# Gestalt Laws of Perceptual Organization

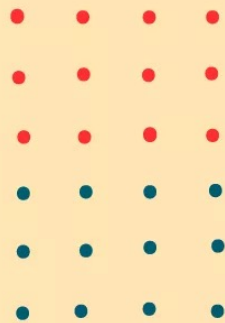


- Gestalt psychology – how human mind organize and interpret visual data
- Humans have advanced perceptual abilities – good at recognizing patterns
- Wolfgang Kohler & Kurt Koffka developed rules how human group small objects to form larger ones (perceptual organization) ~ Gestalt laws
- A set of principles for understanding some of the ways in which perception works.
- Sometimes lead to incorrect perceptions of the world
- Actual heuristics or shortcuts
- Heuristics are usually designed for speed not for accuracy

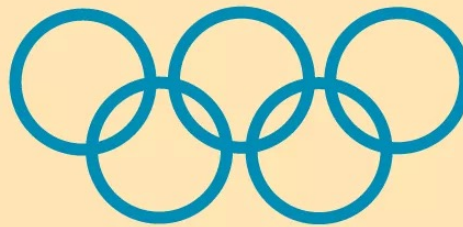
# Gestalt Laws of Perceptual Organization



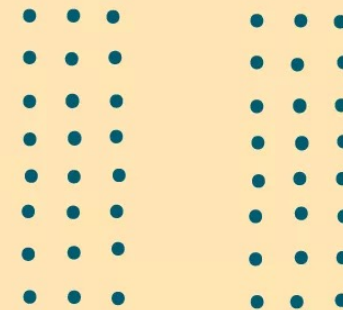
## Examples of the Gestalt Laws



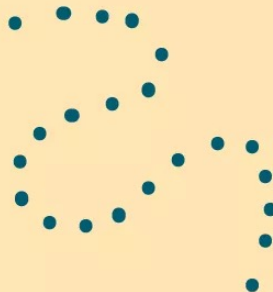
Law of Similarity



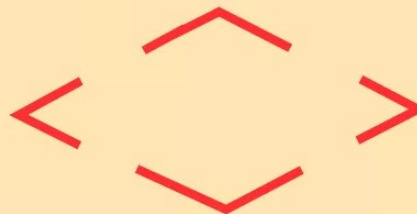
Law of Pragnanz or the  
Law of Good Figure



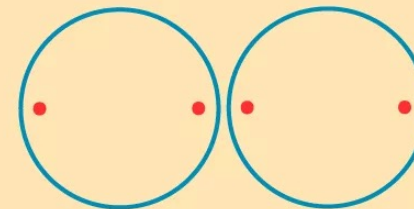
Law of Proximity



Law of Continuity

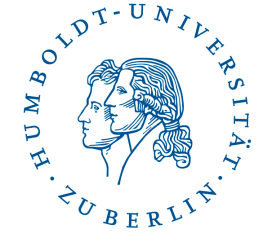


Law of Closure

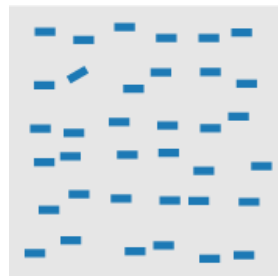


The Law of Common Region

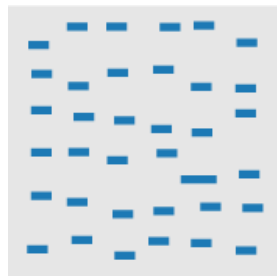
## Pre-attentive characteristics



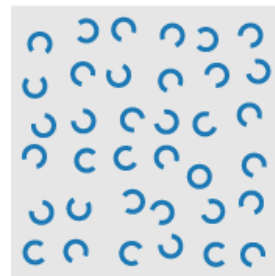
Set of visual properties are detected rapidly ( $< 250$  ms) in multi-element display and accurately by low-level visual system



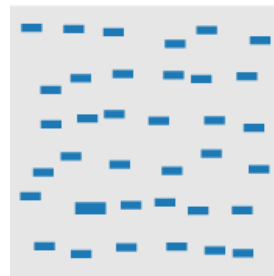
line orientation



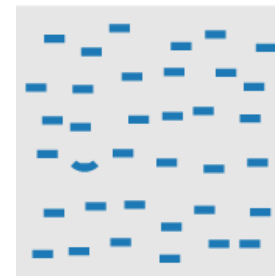
length/width



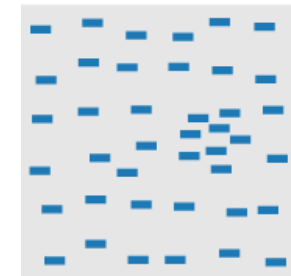
closure



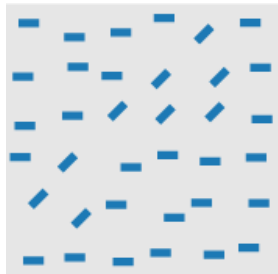
size



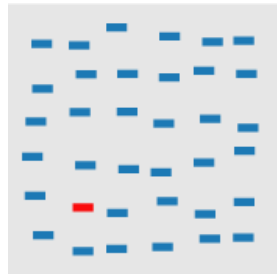
curvature



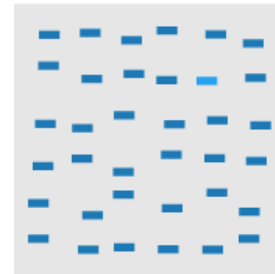
density/contrast



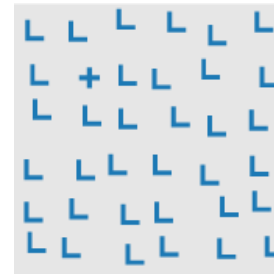
number



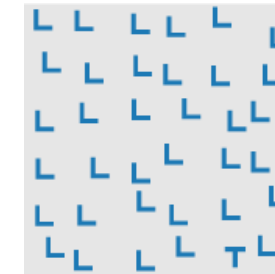
color



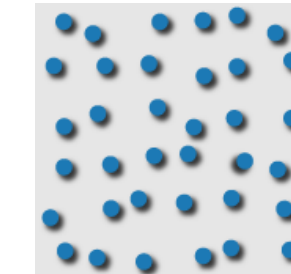
intensity



intersection



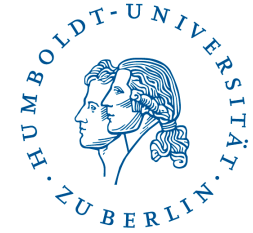
terminators



lighting direction

<https://www.csc2.ncsu.edu/faculty/healey/PP/>

# Perception in visualisations



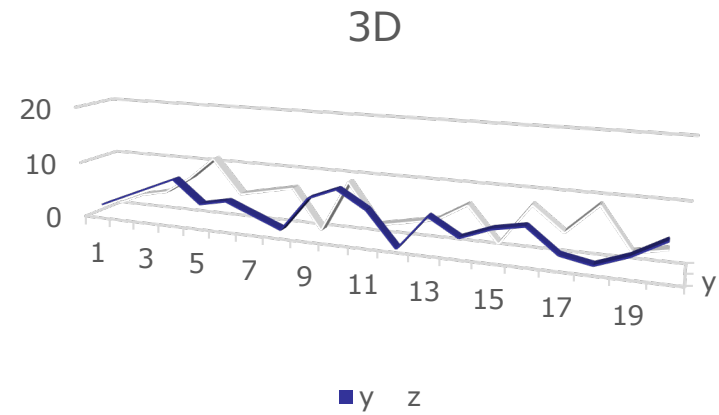
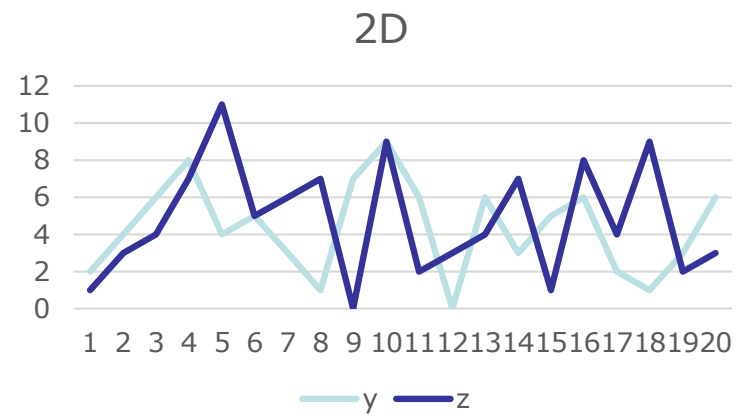
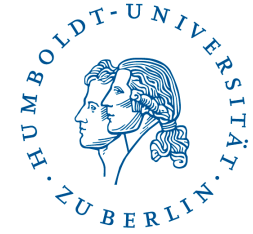
- Color
- Texture
- Motion
- Nonphotorealism

<https://www.csc2.ncsu.edu/faculty/healey/PP/>



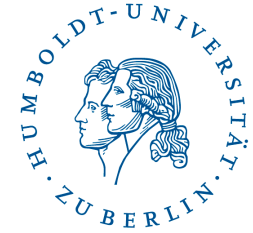
# **Tips for creating useful visualizations**

## Tips: No 3D graphs

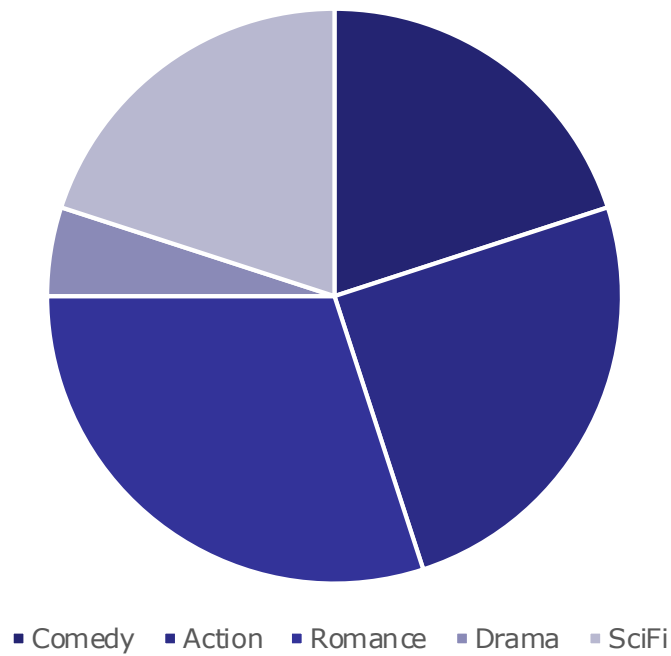




## Tips: No pie charts

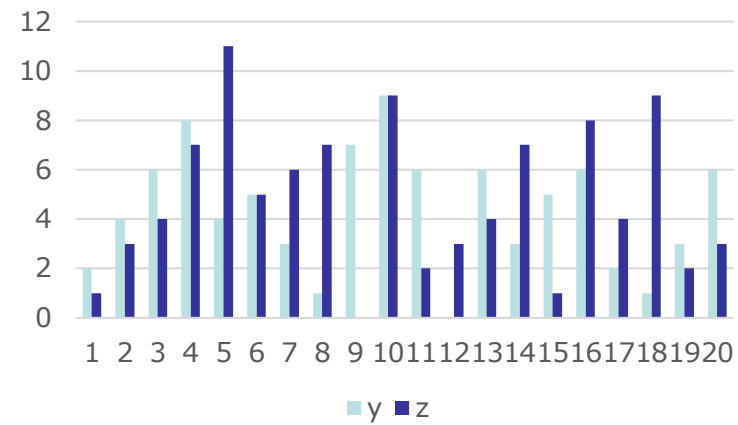
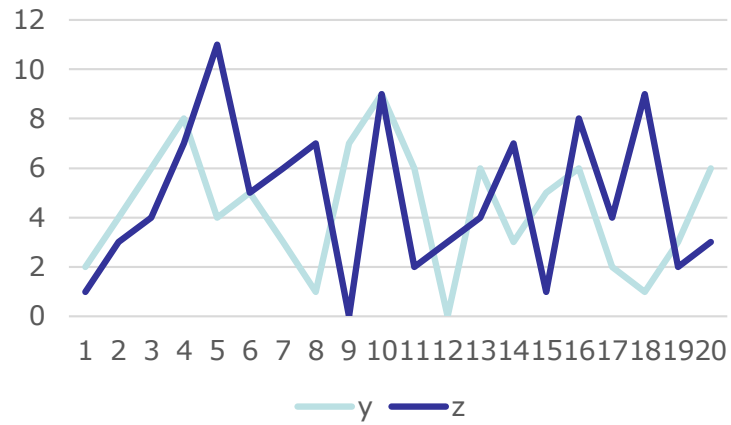
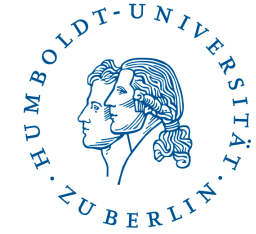


Types of movies



Pre-attentive characteristics does not help with showing exact quantitative differences

## Tips: Use common sense

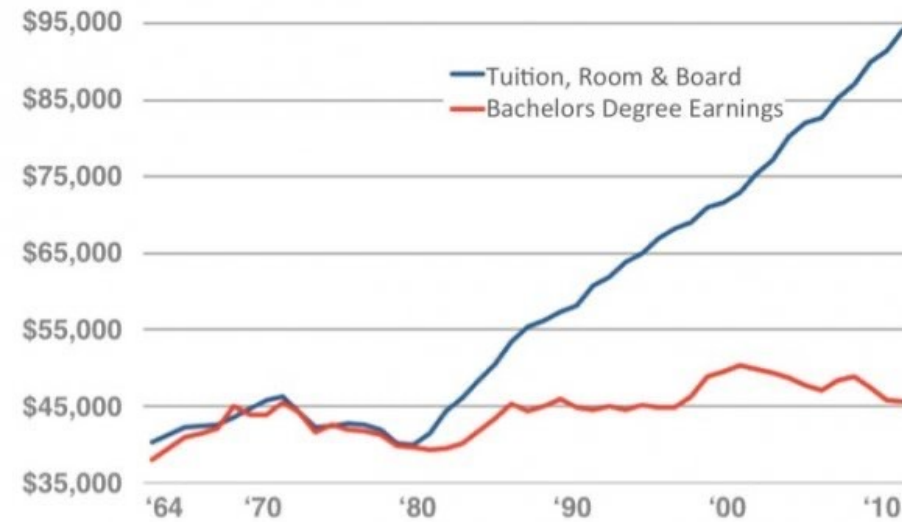


## Tips: Don't misled the users



### The diminishing financial return of higher education

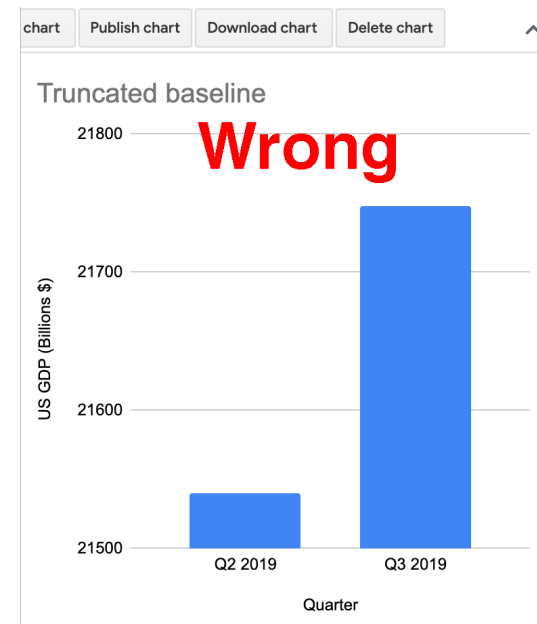
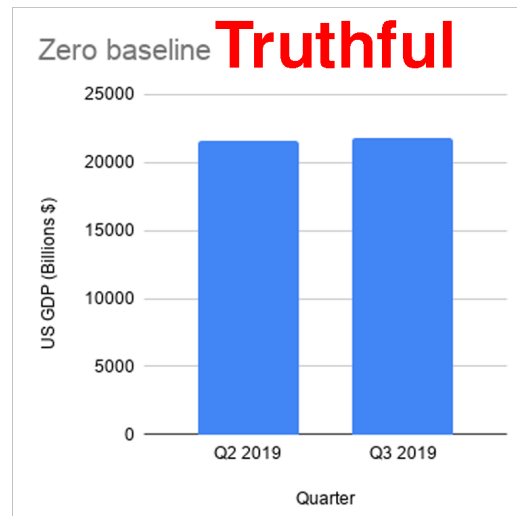
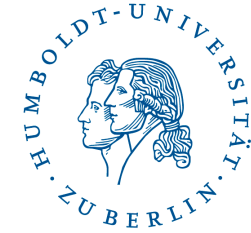
Costs of 4-yr degree vs. earnings of 4-yr degree



Source: Source; U.S. Census Data & NCES Table 345.

Notes: All figures have been adjusted to 2010 dollars using the Consumer Price Index from the BLS.

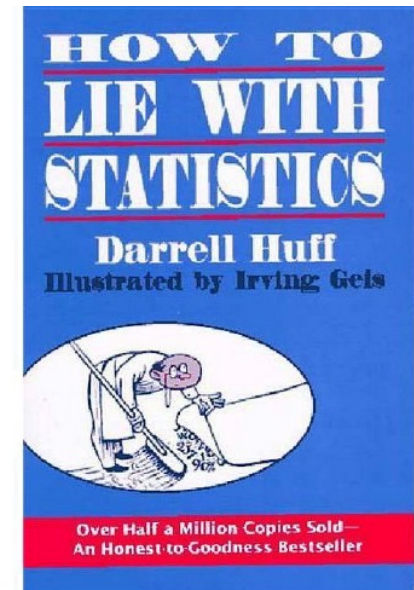
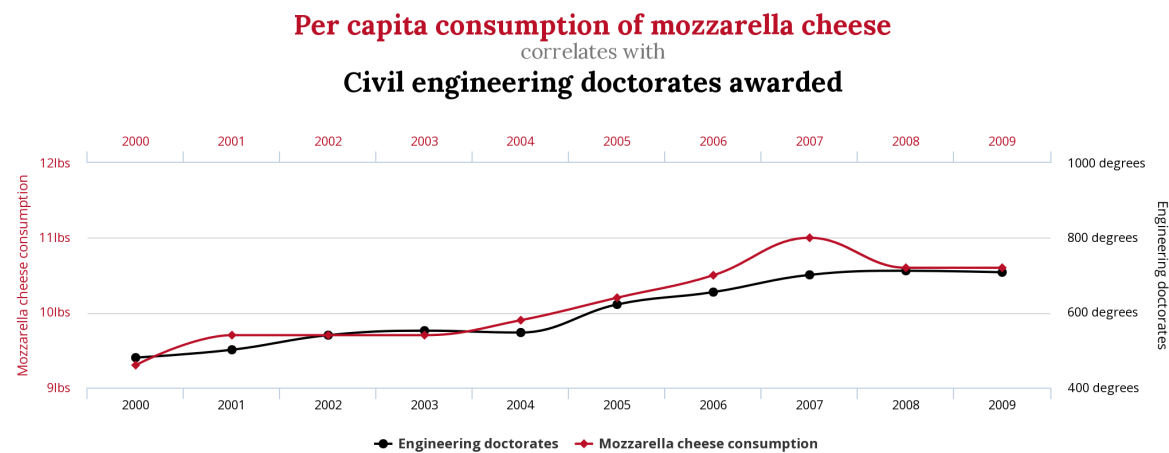
## Tips: Do not lie



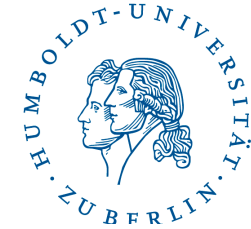
# How (not) to lie with statistics



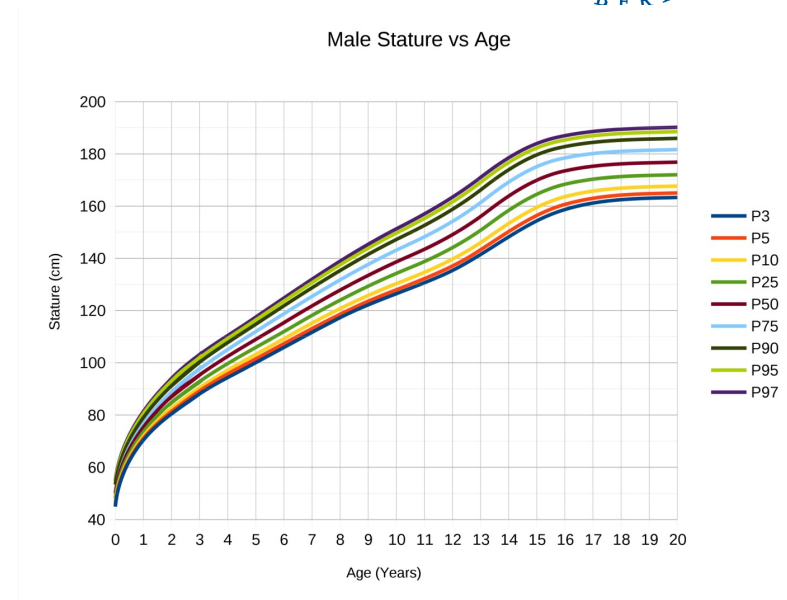
Correlation is not causation



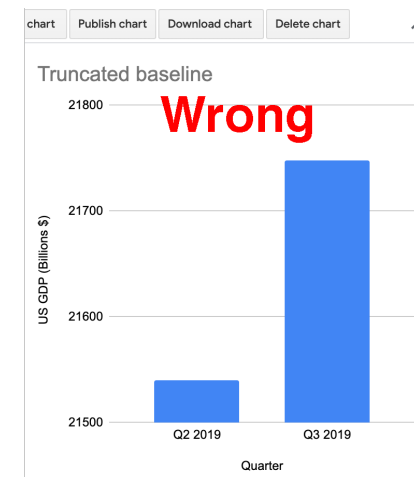
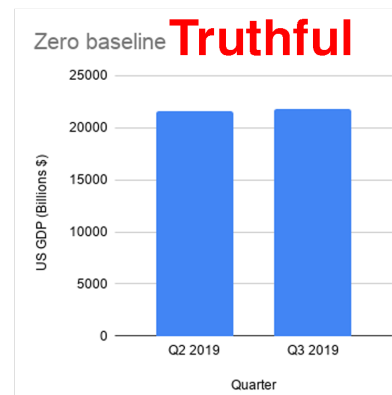
# How (not) to lie with statistics



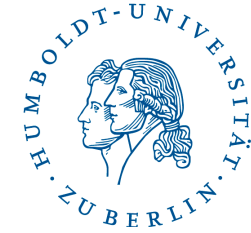
- Relationships does not last forever



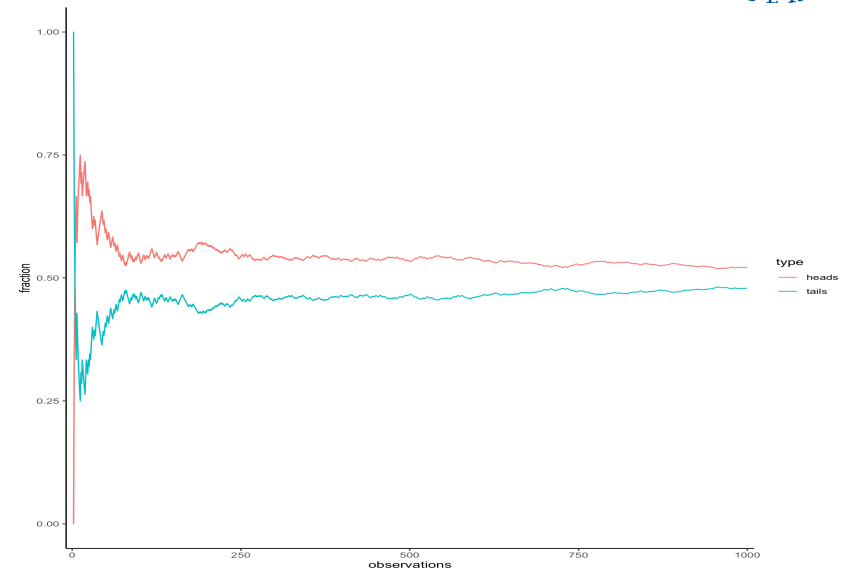
- Check axes



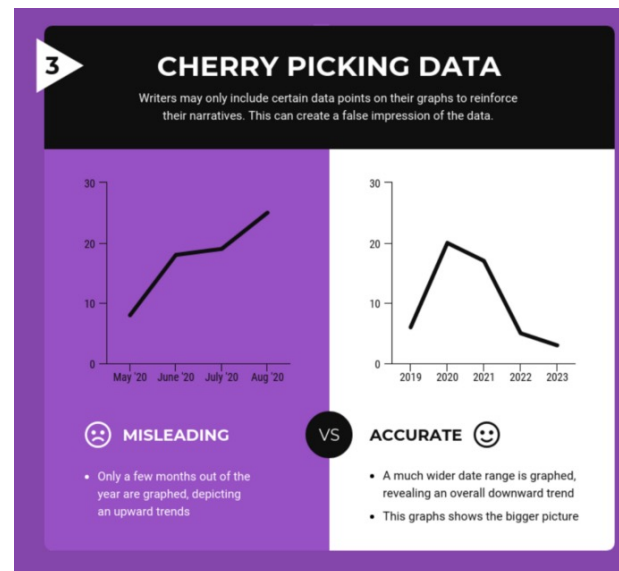
# How (not) to lie with statistics



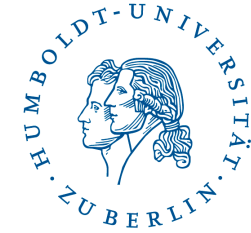
- Small sample size produce shocking statistics



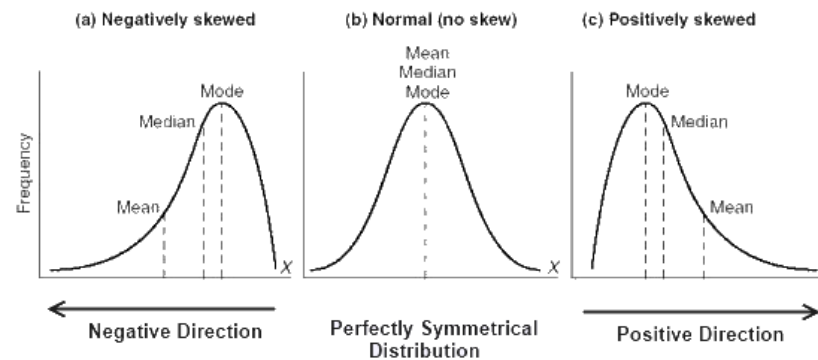
- Cherrypicking data



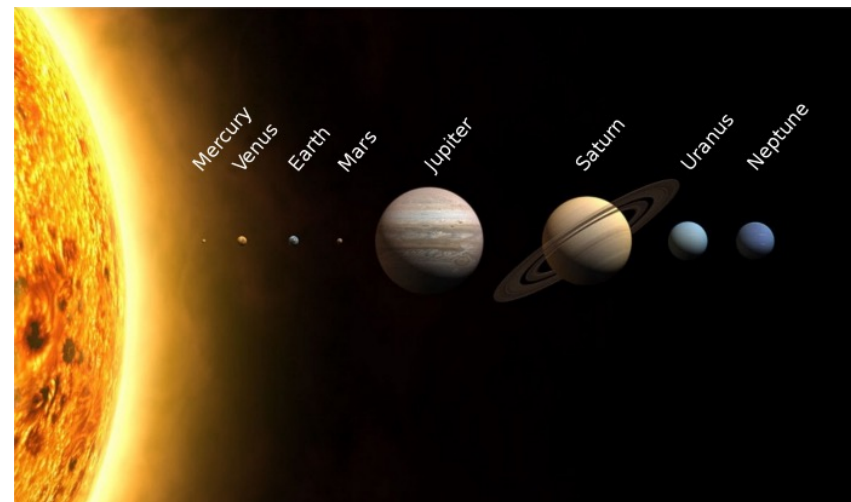
# How (not) to lie with statistics



- What average is used



- Comparison to common baseline





# How (not) to lie with statistics



- Selection bias