

Presentation and visualization

2021-Sept. **What is information visualization?**

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What is
information visualization?



Marti Hearst

*“To show information in a **spatial or graphical representation**, in order to facilitate **comparison, pattern recognition, change detection**, and other **cognitive aptitudes of our visual system**”*



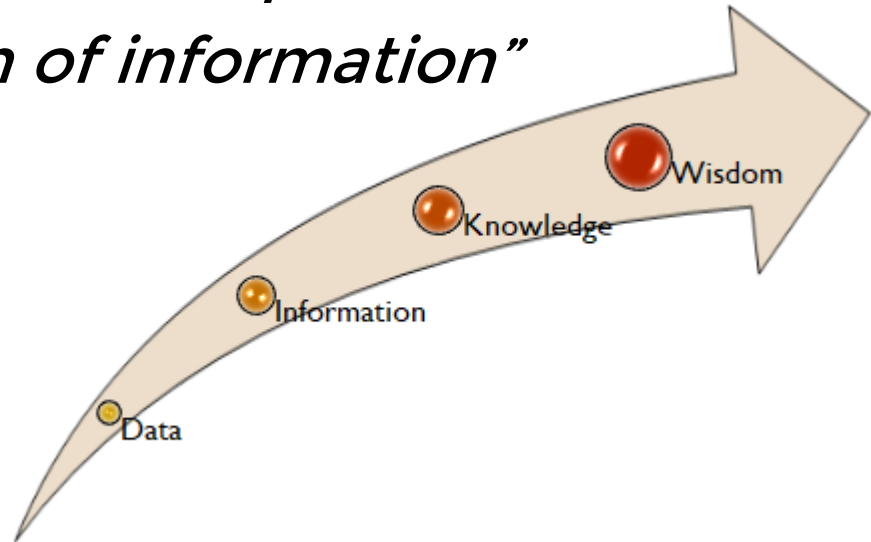
Robert Spencer

*“Get and **Ahaaa!** answer from the user, indicating she obtained a **new view of the data** which has helped to **better understand it**”*



Juan Carlos Dürsteler

*“The **knowledge interiorization** process
through the perception of information”*



In brief

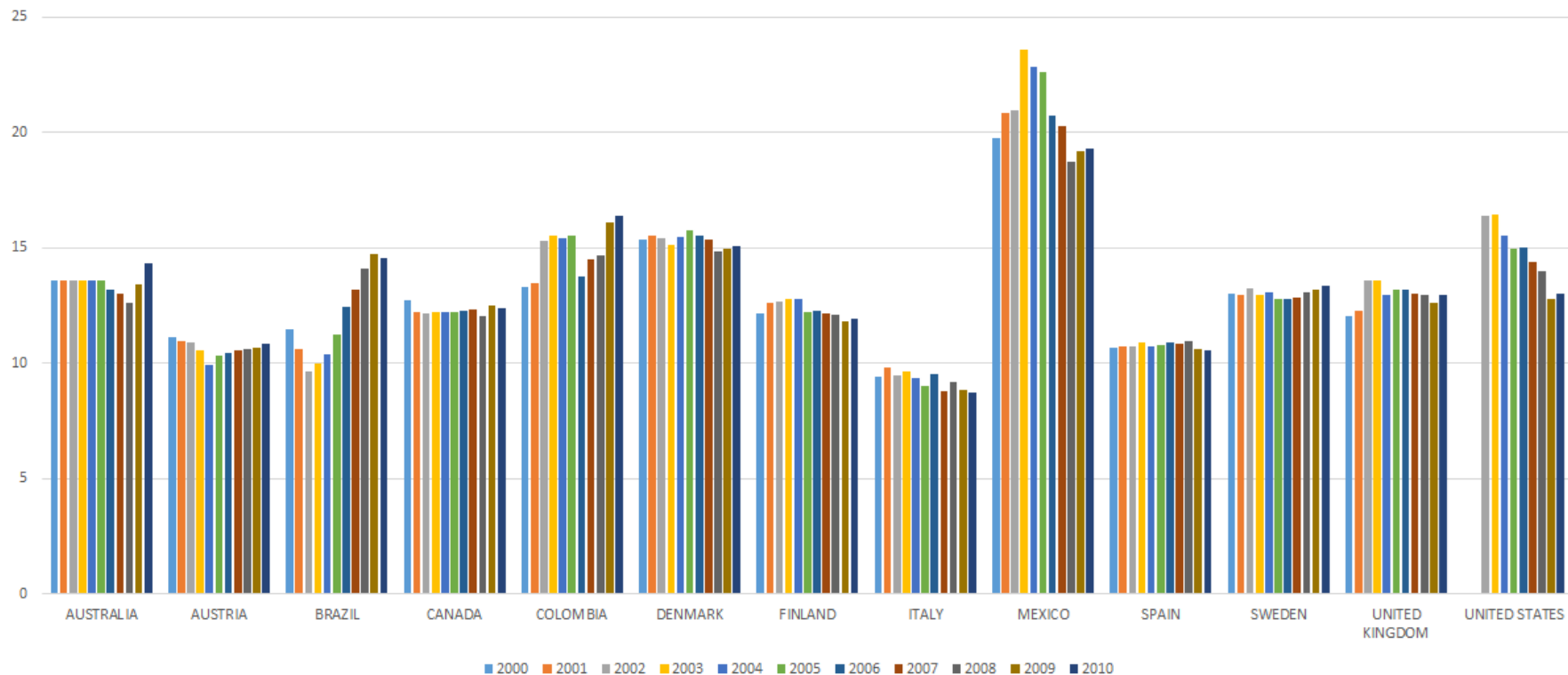
- **Communicate**
 - **Clearly**
 - **Efficiently**
- **Facilitate discovery**
 - **To identify relations**
 - **To discover patterns**
- **Help digest the data**

A very simple example: (2000-2010) public expenditure percentage on education

- Which country is spending more on education?
- Which country is increasing its inversion?
- Which one is decreasing it?

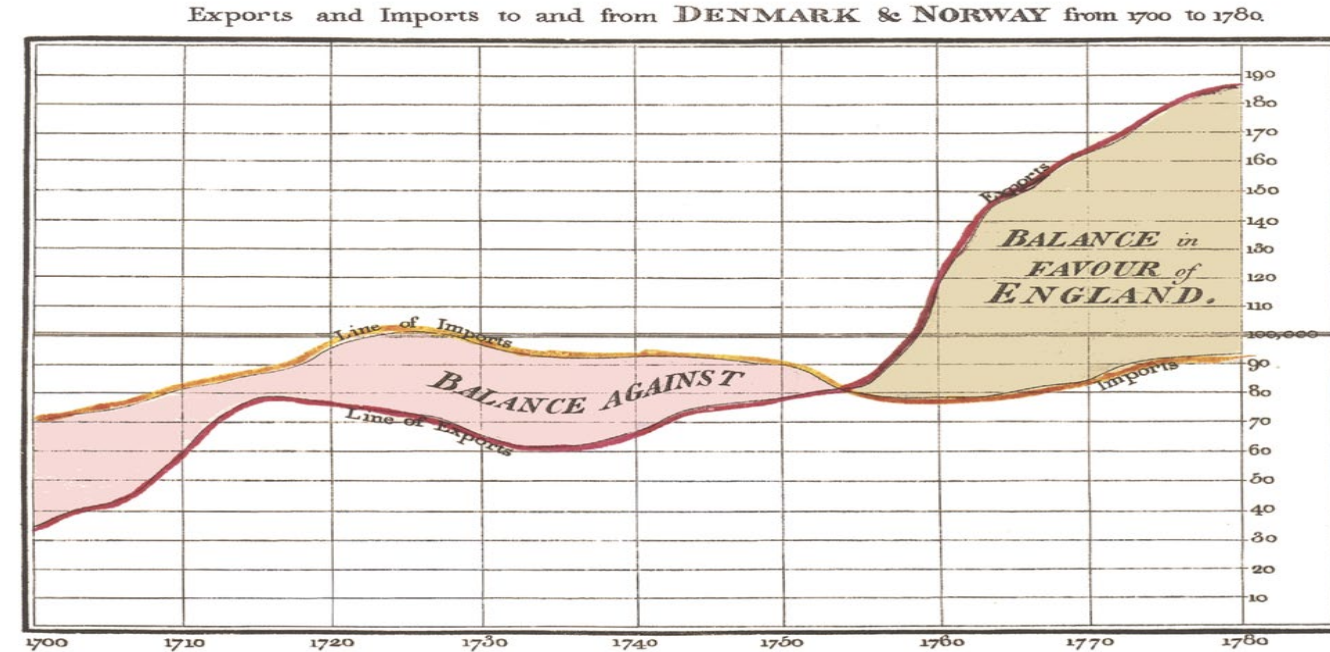
Country	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
AUSTRALIA	13,6	13,6	13,6	13,6	13,6	13,6	13,2	13,0	12,6	13,4	14,3
AUSTRIA	11,1	10,9	10,9	10,5	10,0	10,3	10,5	10,5	10,6	10,7	10,9
BRAZIL	11,5	10,6	9,6	10,0	10,4	11,3	12,4	13,2	14,1	14,7	14,6
CANADA	12,7	12,2	12,2	12,2	12,2	12,2	12,3	12,4	12,1	12,5	12,4
COLOMBIA	13,3	13,5	15,3	15,5	15,4	15,5	13,8	14,5	14,7	16,1	16,4
DENMARK	15,3	15,5	15,4	15,1	15,5	15,8	15,5	15,4	14,8	14,9	15,1
FINLAND	12,2	12,6	12,7	12,8	12,8	12,2	12,3	12,2	12,1	11,8	12,0
ITALY	9,4	9,8	9,5	9,6	9,4	9,0	9,5	8,8	9,2	8,9	8,7
MEXICO	19,8	20,8	21,0	23,6	22,8	22,6	20,7	20,3	18,7	19,2	19,3
SPAIN	10,7	10,7	10,7	10,9	10,7	10,8	10,9	10,9	10,9	10,6	10,6
SWEDEN	13,0	12,9	13,2	13,0	13,1	12,8	12,8	12,9	13,1	13,2	13,3
UNITED KINGDOM	12,1	12,3	13,6	13,6	13,0	13,2	13,2	13,0	13,0	12,6	13,0
UNITED STATES	–	–	16,4	16,4	15,5	15,0	15,0	14,4	14,0	12,8	13,0

A very simple example



Some **nicer** examples

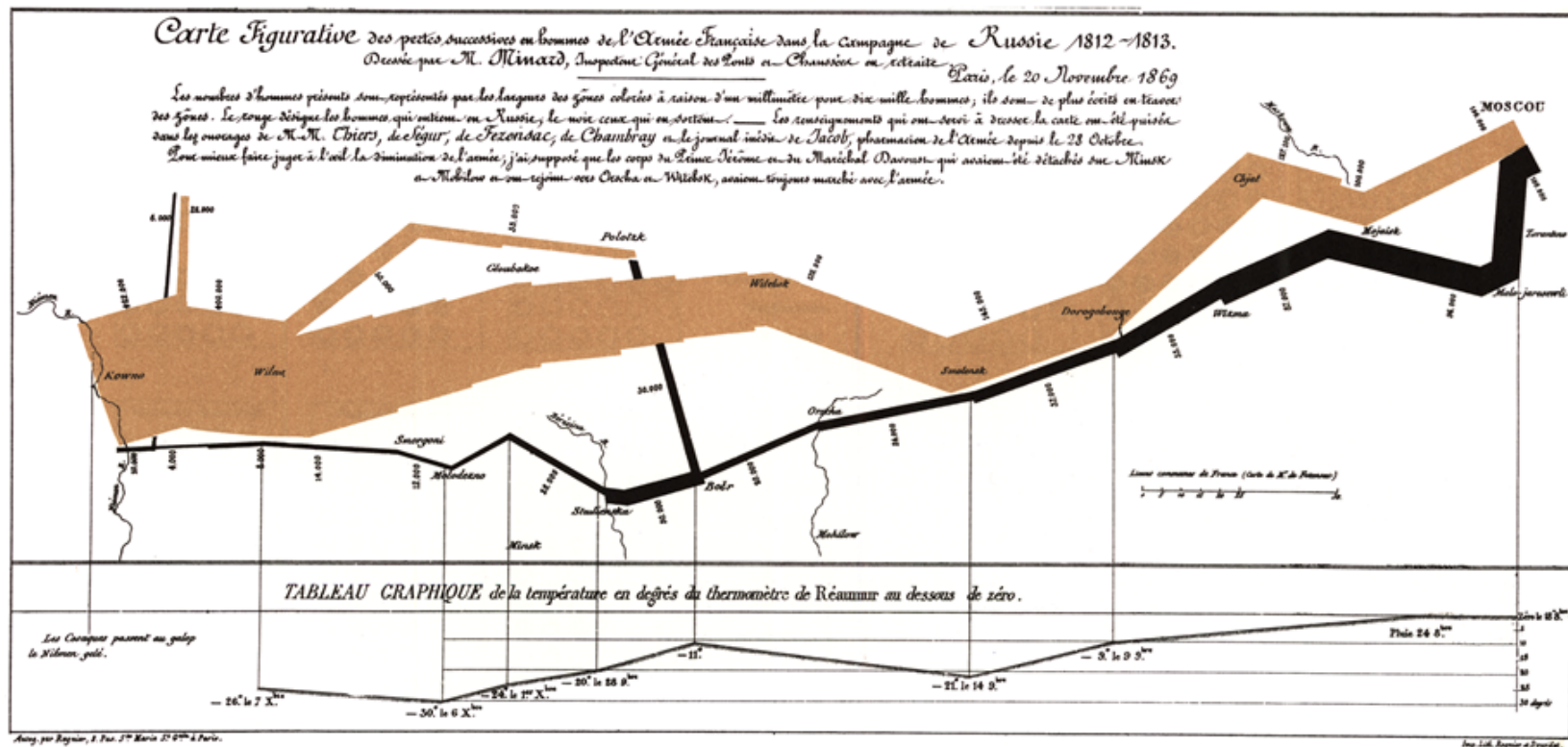
Communicate example I: William Playfair (1786)



Line, bar and pie charts were all invented by William Playfair.

The Bottom line is divided into Years, the Right hand line into £10,000 each.
Published as the Act directs, 1st May 1786, by W^m Playfair. Made engravt 352, Strand, London.

Communicate example II: [Joseph Minard](#)



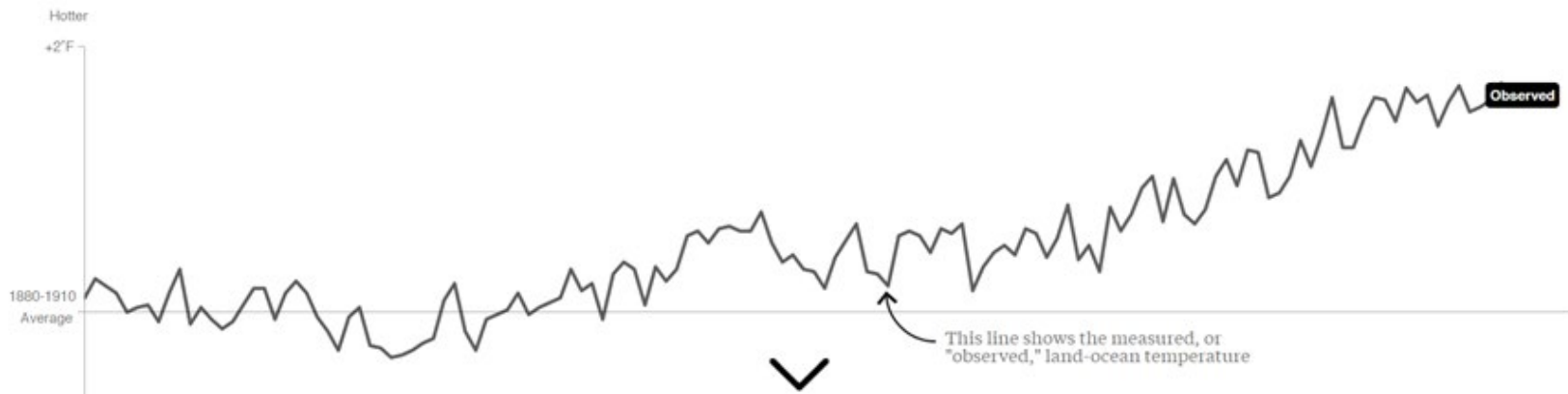
Flow map of Napoleon's Russian campaign. 1812. By Joseph Minard

Communicate example III: New York Times

What's Really Warming the World?

By Eric Roston  and Blacki Miglozzi  | June 24, 2015

Skeptics of manmade climate change offer various natural causes to explain why the Earth has warmed 1.4 degrees Fahrenheit since 1880. But can these account for the planet's rising temperature? Scroll down to see how much different factors, both natural and industrial, contribute to global warming, based on findings from NASA's Goddard Institute for Space Studies.



Knowledge discovery I

What was the cause of the cholera epidemics in London in 1854?

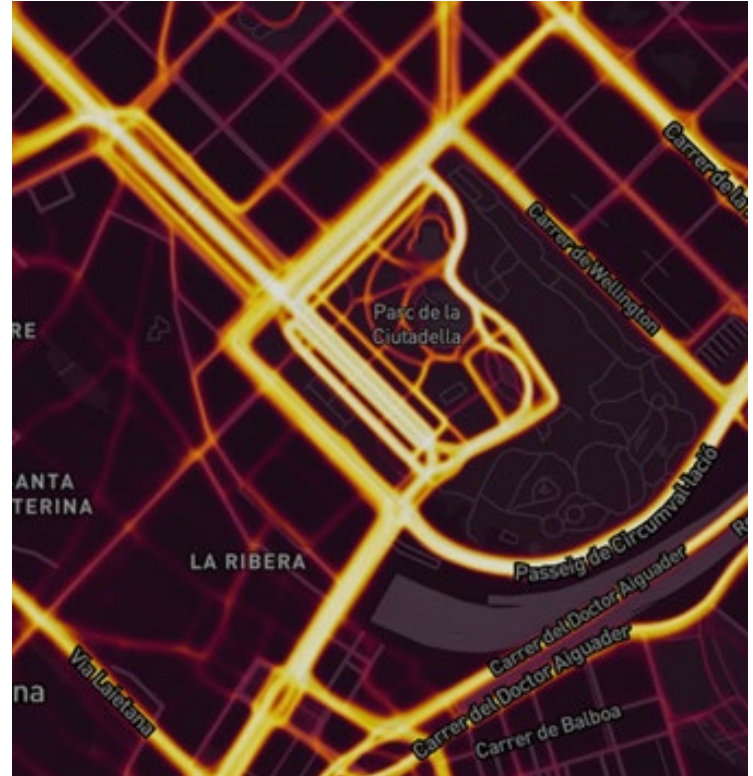
John Snow discovered it through visualization



Source: *Visual Explanations* Tufte Graphics Press, 1997

Knowledge discovery II (incidental)

Strava heat map made visible [military bases](#)



Knowledge discovery III

The New York Times

You Draw It: What Got Better or Worse During Obama's Presidency

By LARRY BUCHANAN, HAEYOUN PARK and ADAM PEARCE JAN. 15, 2017

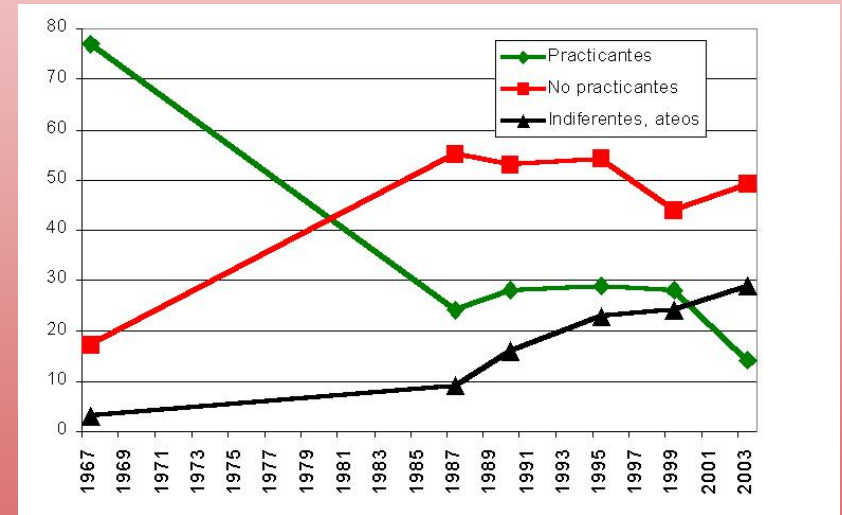
To communicate clearly
you must avoid some
misleading practices

Misleading practices

Scales are not regular



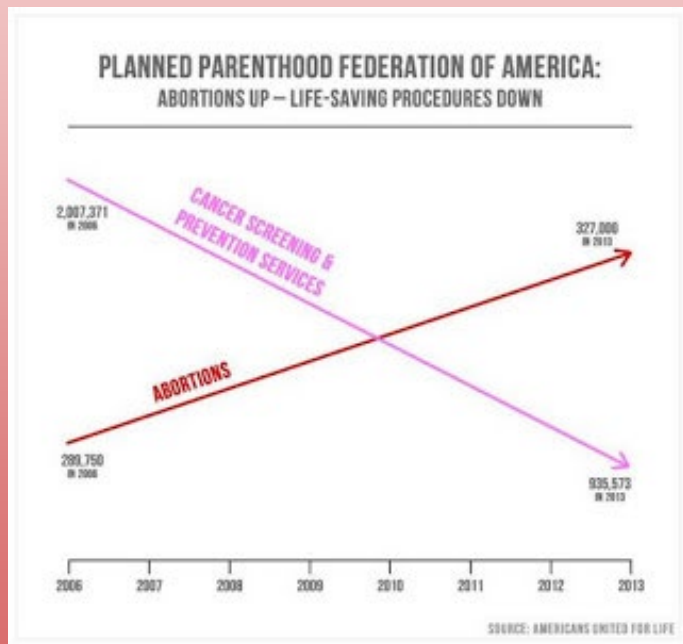
What is wrong?



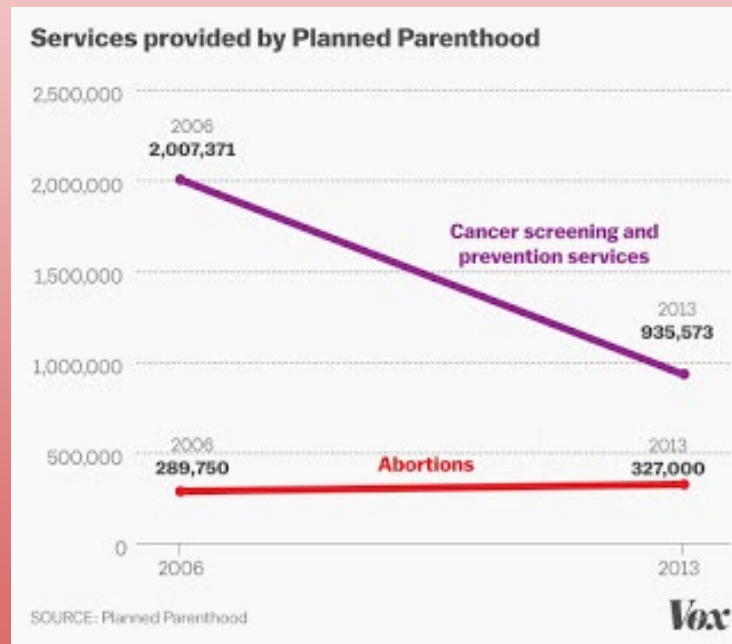
Source: malaprensa
[<http://www.malaprensa.com>]



Dual axes



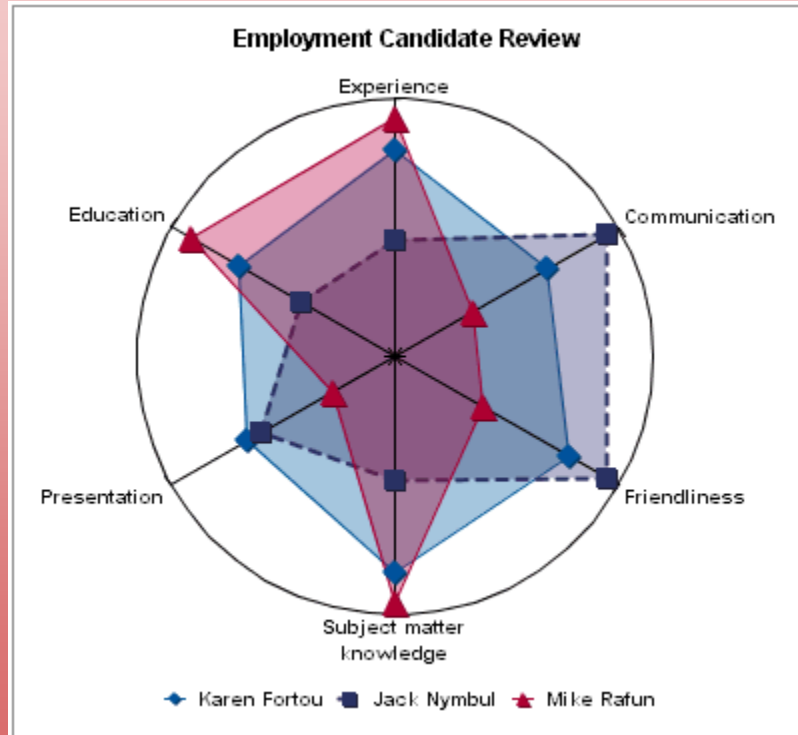
What is wrong?



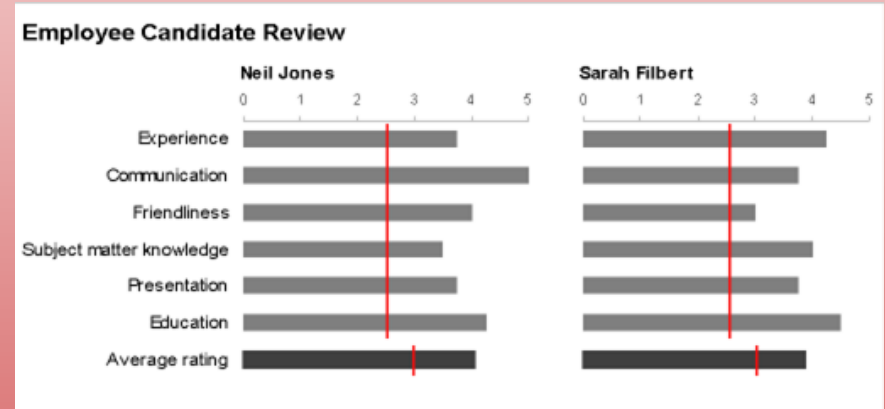
Source: Cairo *Truthful charts*



Use the appropriate chart

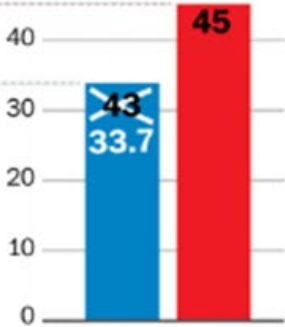


What is wrong?

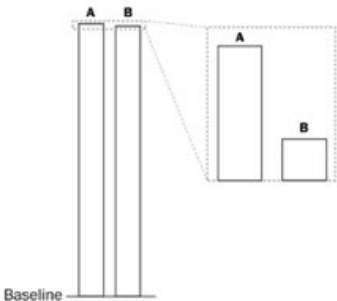


Source: Few *Perceptual edge*

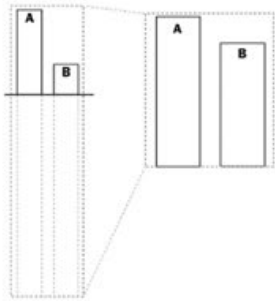
Bar charts length. Always start at 0



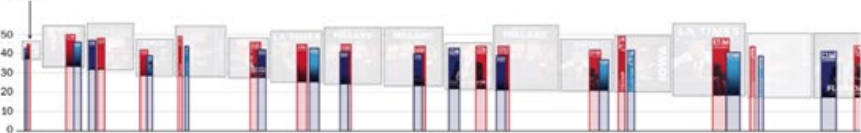
EXAGGERATING A LEAD



DIMINISHING A LEAD

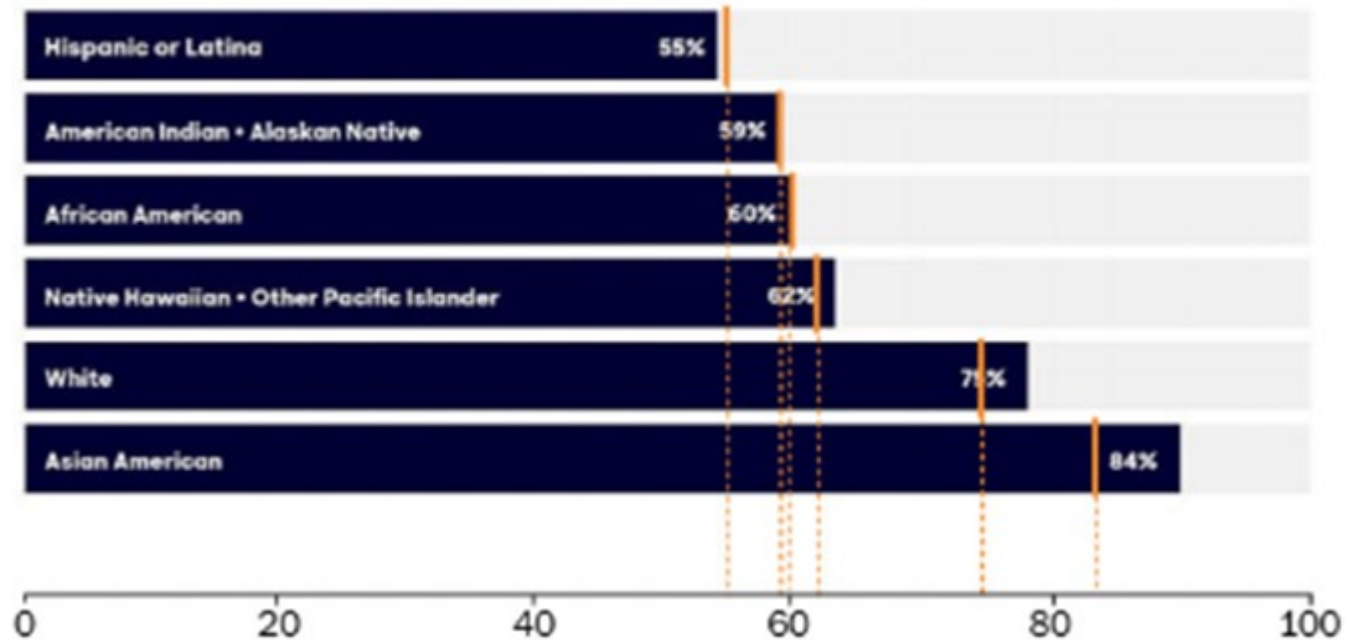


The chart above

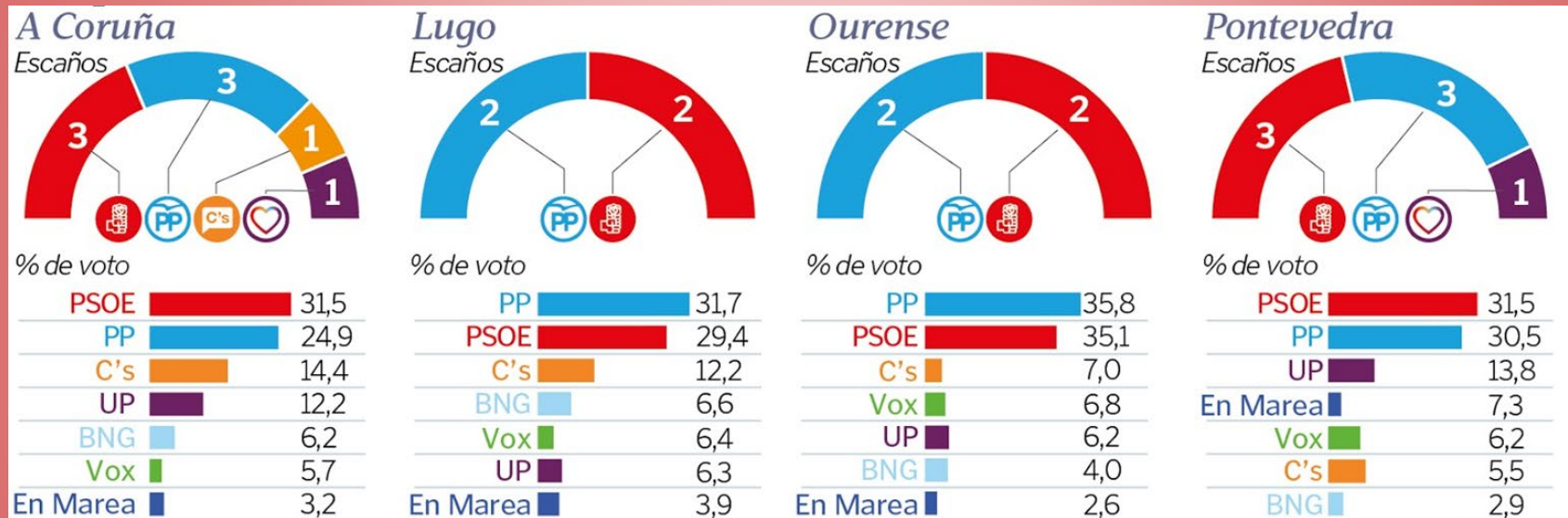




Use scales wisely



Use scales wisely II



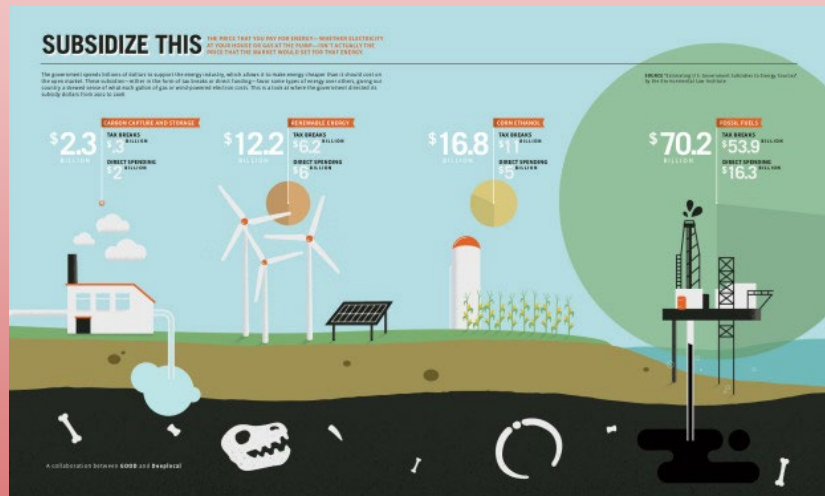
Fuente: Sonda



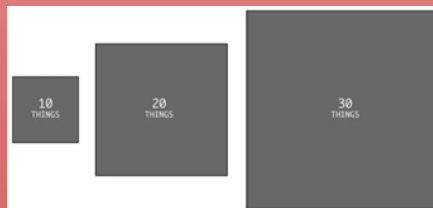
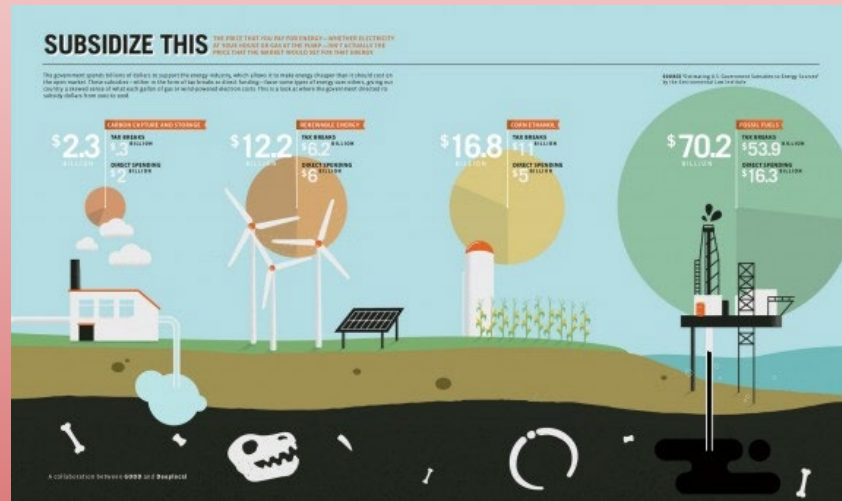
LA VOZ

Area vs diameter, be careful!

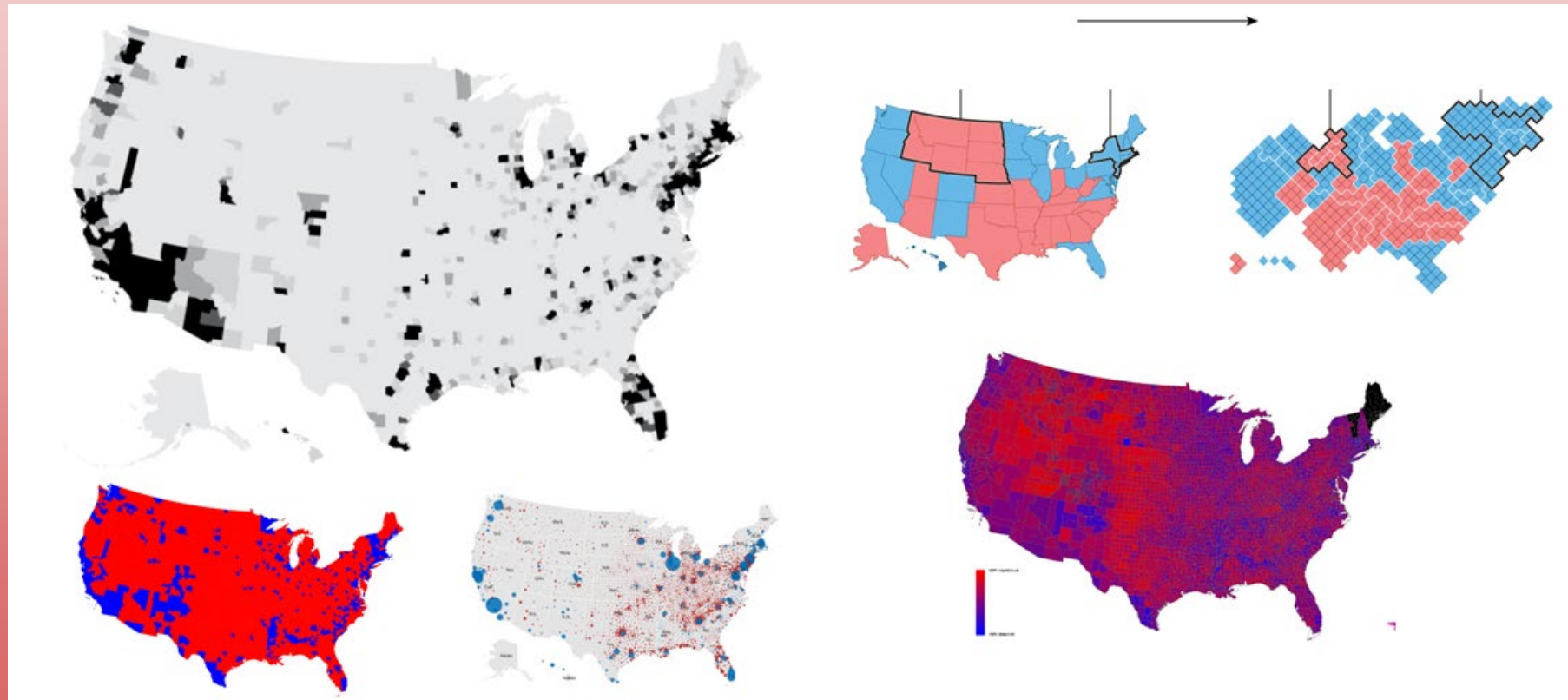
Bad



Right



Don't oversimplify with aggregation





Small size effect

Highest kidney cancer death rates

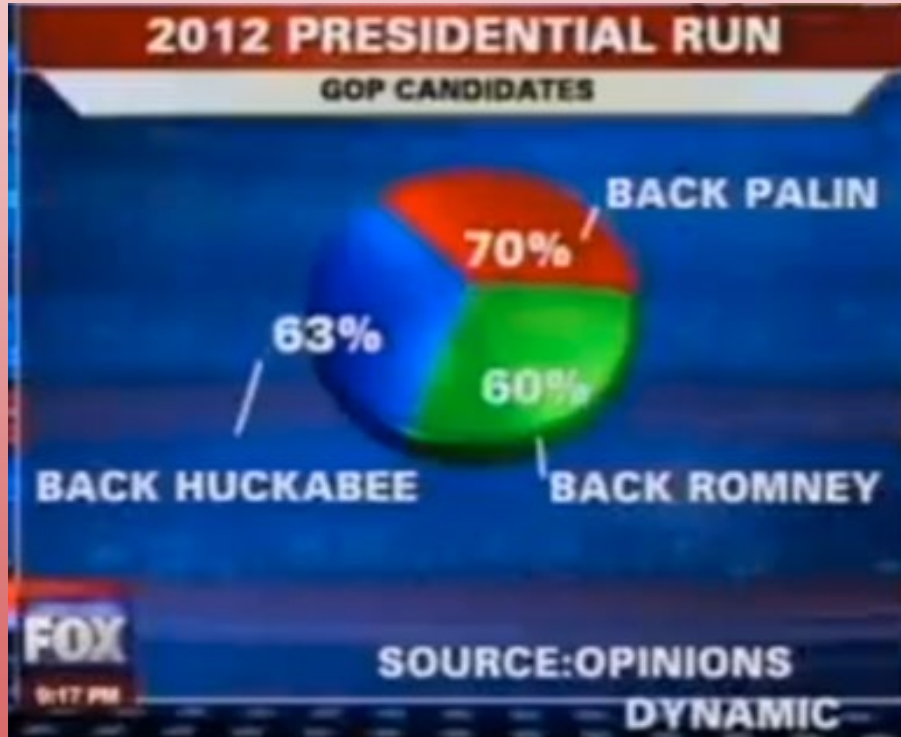


Lowest kidney cancer death rates





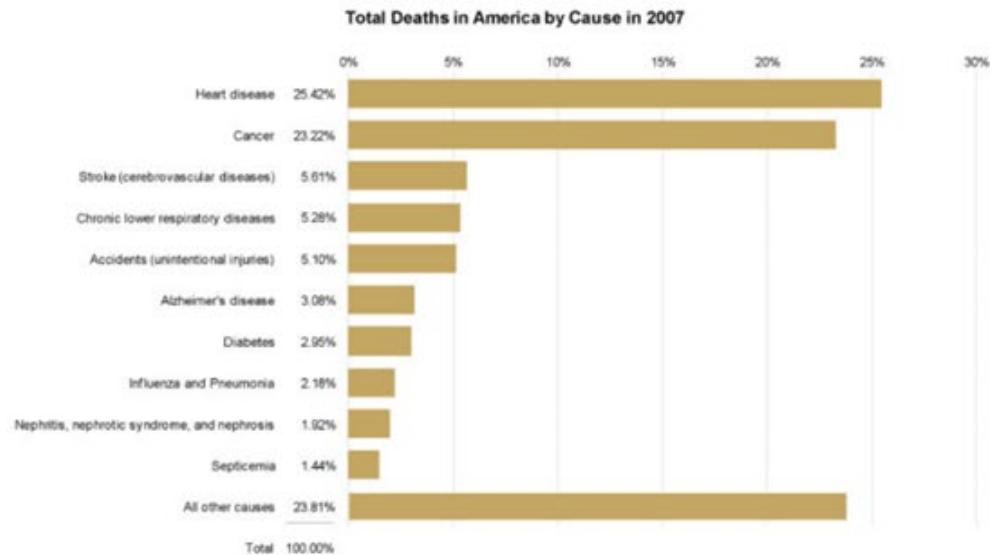
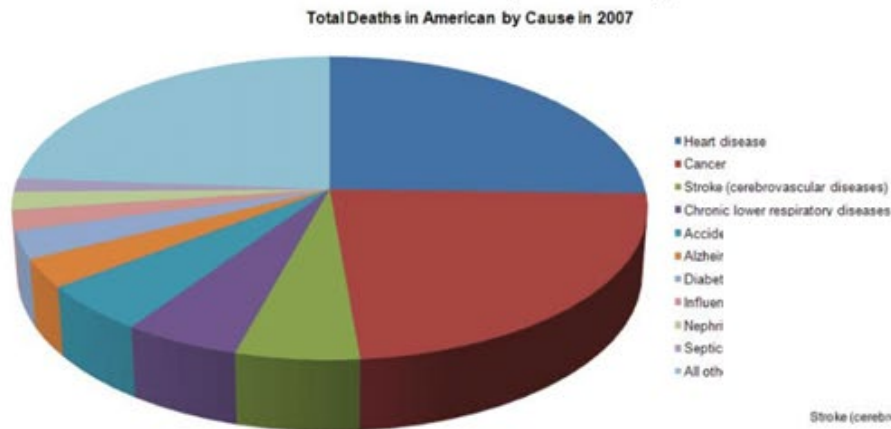
Basic arithmetics. Follow conventions



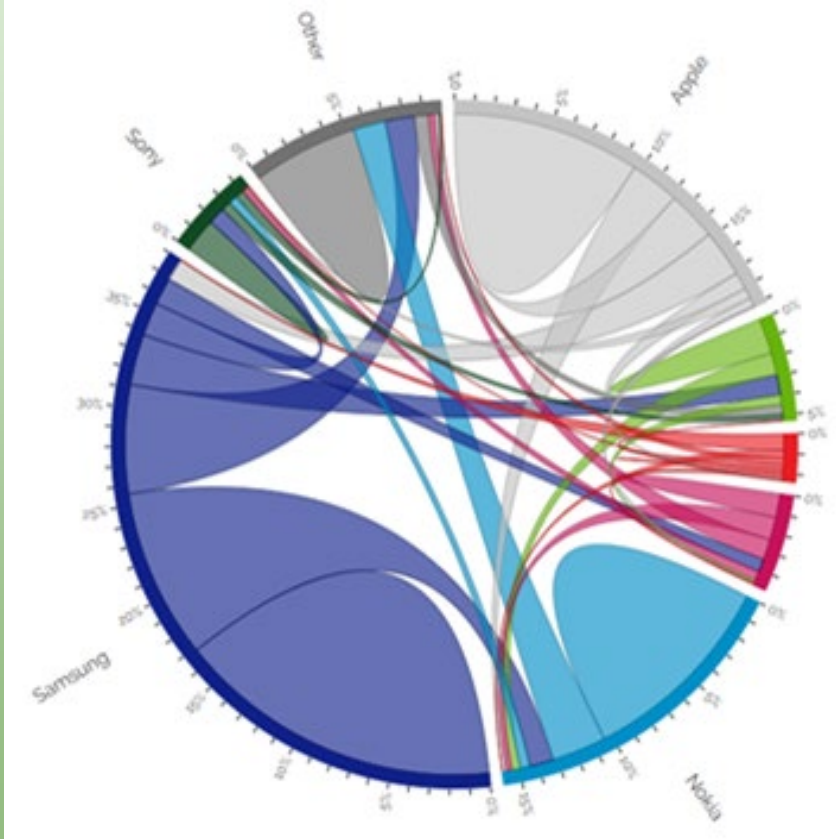
To communicate clearly
you must follow some
best practices

Best practices

Use the appropriate chart



Offer clear legends: title, key to encodings, axes



You may even [offer a tutorial](#), if the type of chart is not usual.

Tell uncertainty if it is relevant



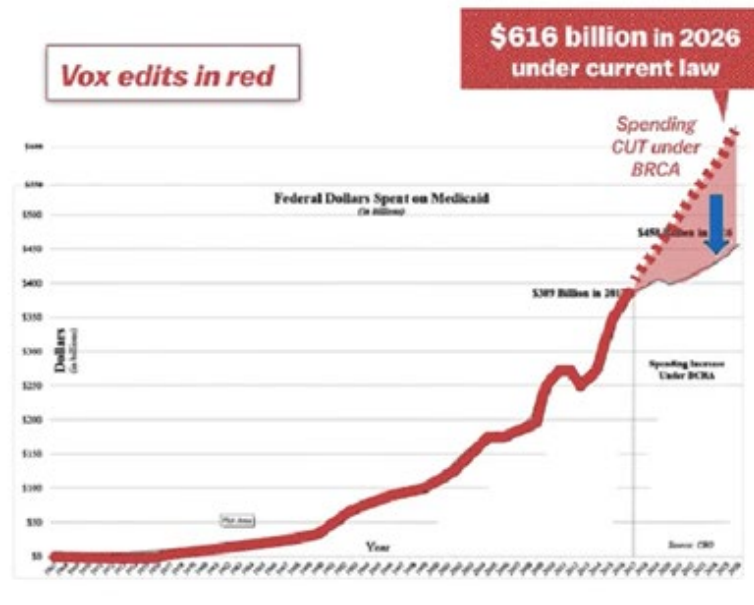
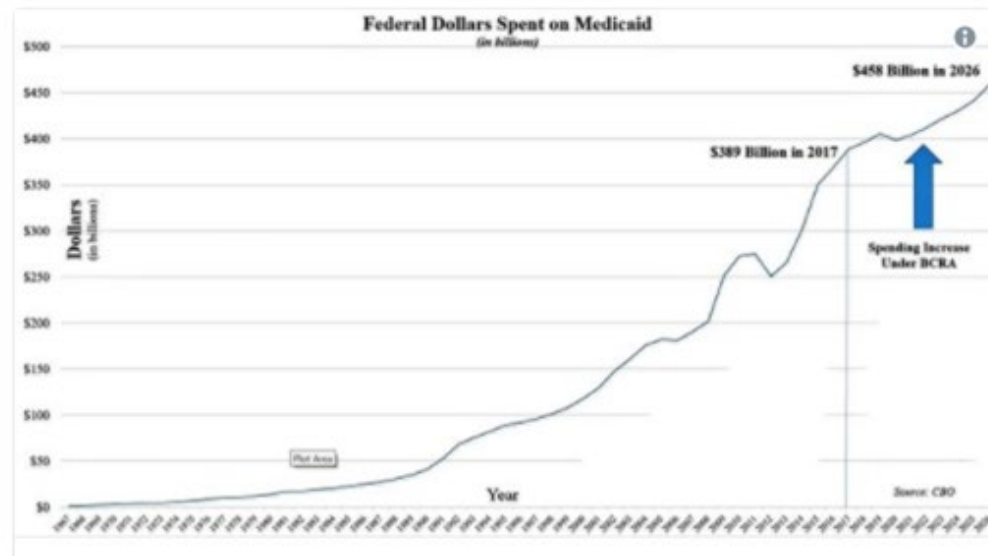
How do you interpret this graph?

Which areas will be affected by the hurricane?

Disclose the **origin** of your data

- Readers should be able to go to the facts behind your chart and check them
 - Tell your sources
 - Link to them if possible

Give context to your data I

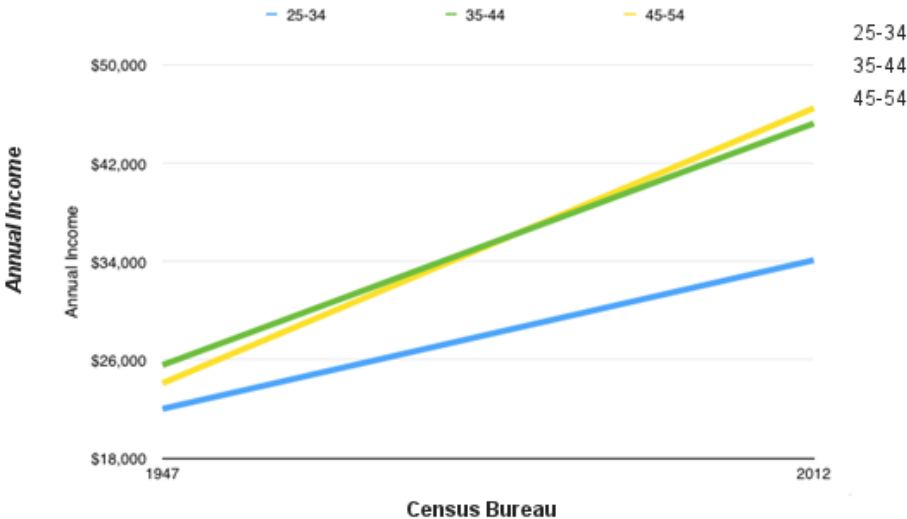




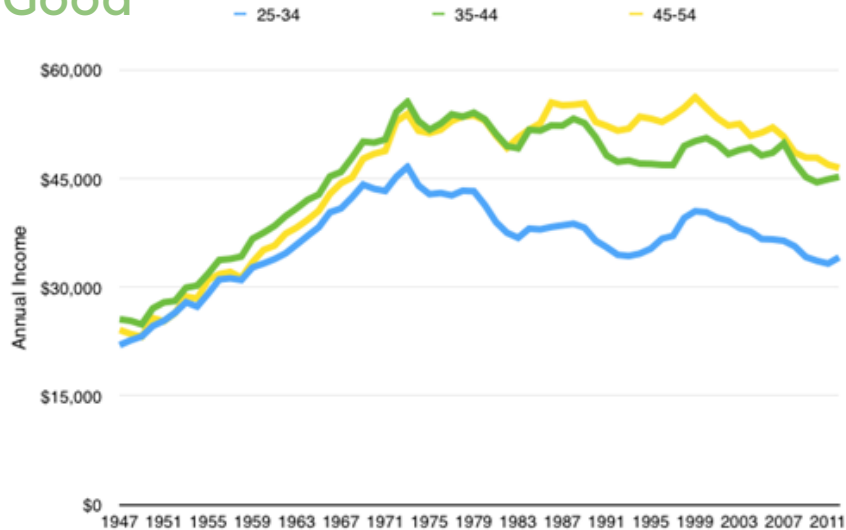
Give context to your data II

Bad

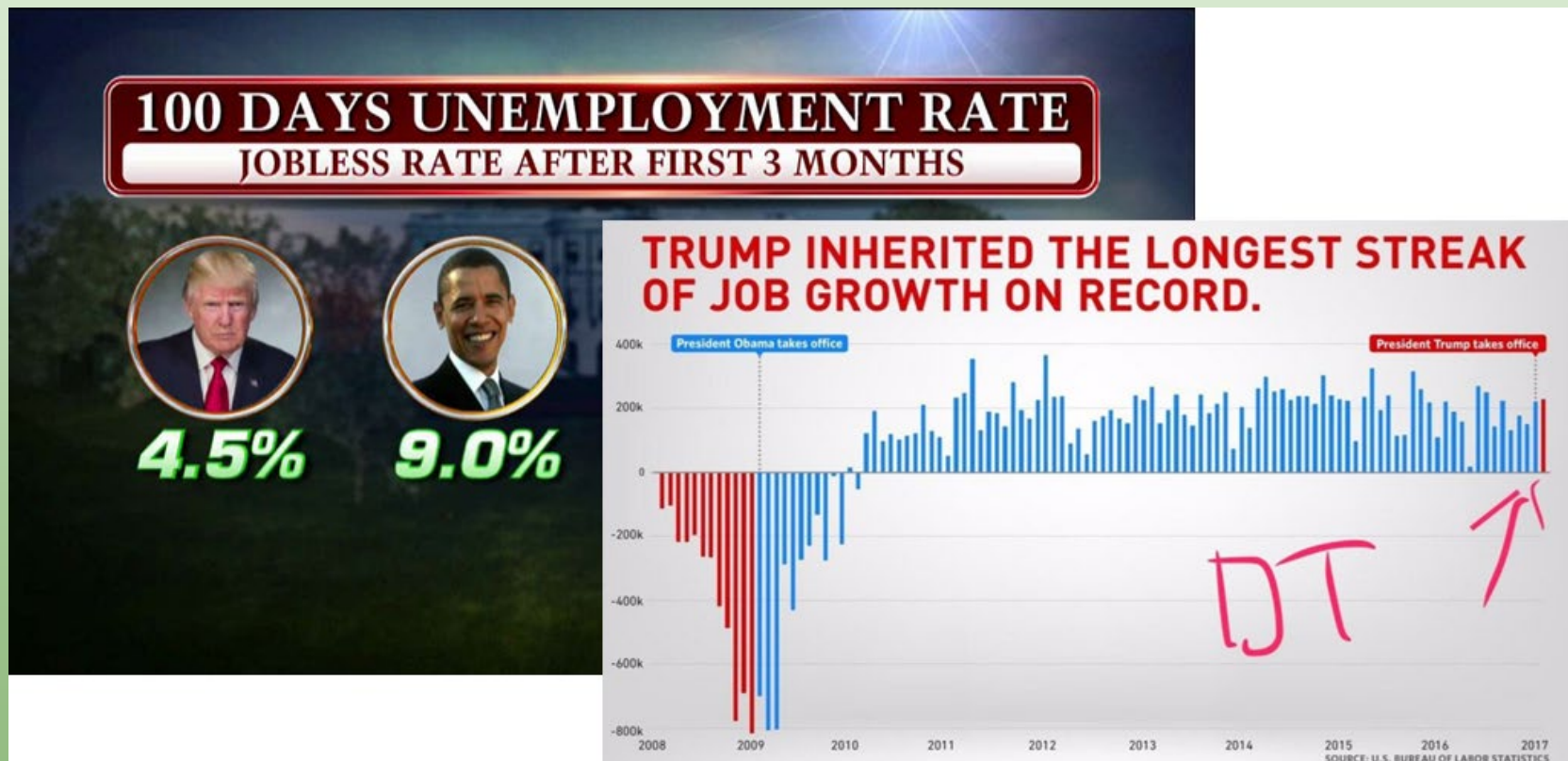
The Great Retrenchment



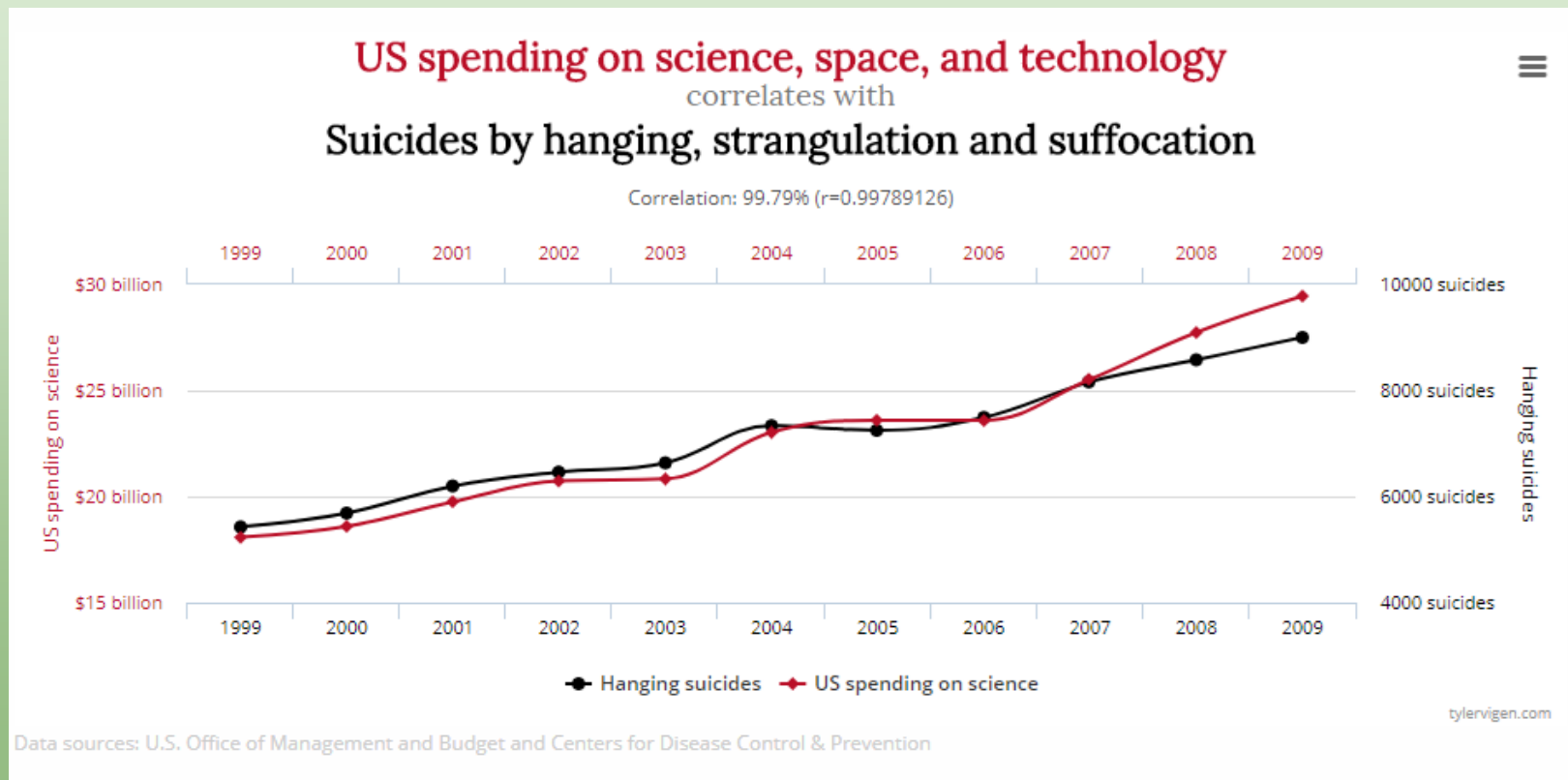
Good



Give context to your data III



Don't give the bad context



Ethics

- Become aware from your own biases
- Don't twist facts to fit your agenda
- Don't share before checking

