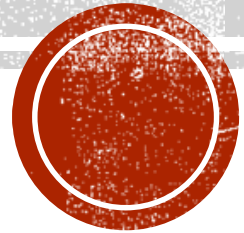
WEAPONIZED LIES

How to Think Critically in the Post-Truth Era



WHAT IS "POST-TRUTH"?

- "relating to or denoting circumstances in which objective facts are less influential in shaping public opinion than appeals to emotion and personal beliefs"--The Oxford Dictionary's Word of the Year for 2016

- We are being bombarded with information everyday, and only a fraction of it is based on facts, and the truth.
- According to the author, people create euphemisms to call falsehoods or lies in different ways, such as counterknowledge, half-truths, extreme views, conspiracy theories because they don't want to offend the liars.

  - The media and other sources are feeding us with information they want us to believe or to persuade us to be on the same side of their opinions.

EVALUATING NUMBERS

1. Plausibility

Statistics (numbers) seem to represent facts given to us by nature and it's just a matter of finding them.

BUT, it's important to remember that people gather statistics.

STATISTICS ARE NOT FACTS. THEY ARE INTERPRETATIONS.

a. Plausibility Test

"In the thirty-five years since marijuana laws stopped being enforced in California, the number of marijuana smokers has double every year."

Is this claim plausible?

Doubling of ONE smokers every year for thirty-five years would yield more than 17 billions - larger than the population of the entire world.

Example 1: You've just taken on a position as a telemarketer, your boss tries to motivates you, claims, "Our best salesperson made **1,000** sales a day"..
Is this plausible?

- Dialing a phone number: minimum 5 seconds
- Time for the phone to ring: 5 seconds
- Make a pitch: minimum 10 seconds
- Get the buyer's credit card number and address: 40 seconds
- Assume every call ends in sale, which is not realistic

→ 60 seconds per call, or one call per minute→ 60 sales per hour→ maximum 480 sales in an eight-hour workday with no breaks.

Therefore, **1,000** sales is not plausible, even with the most optimistic estimate.

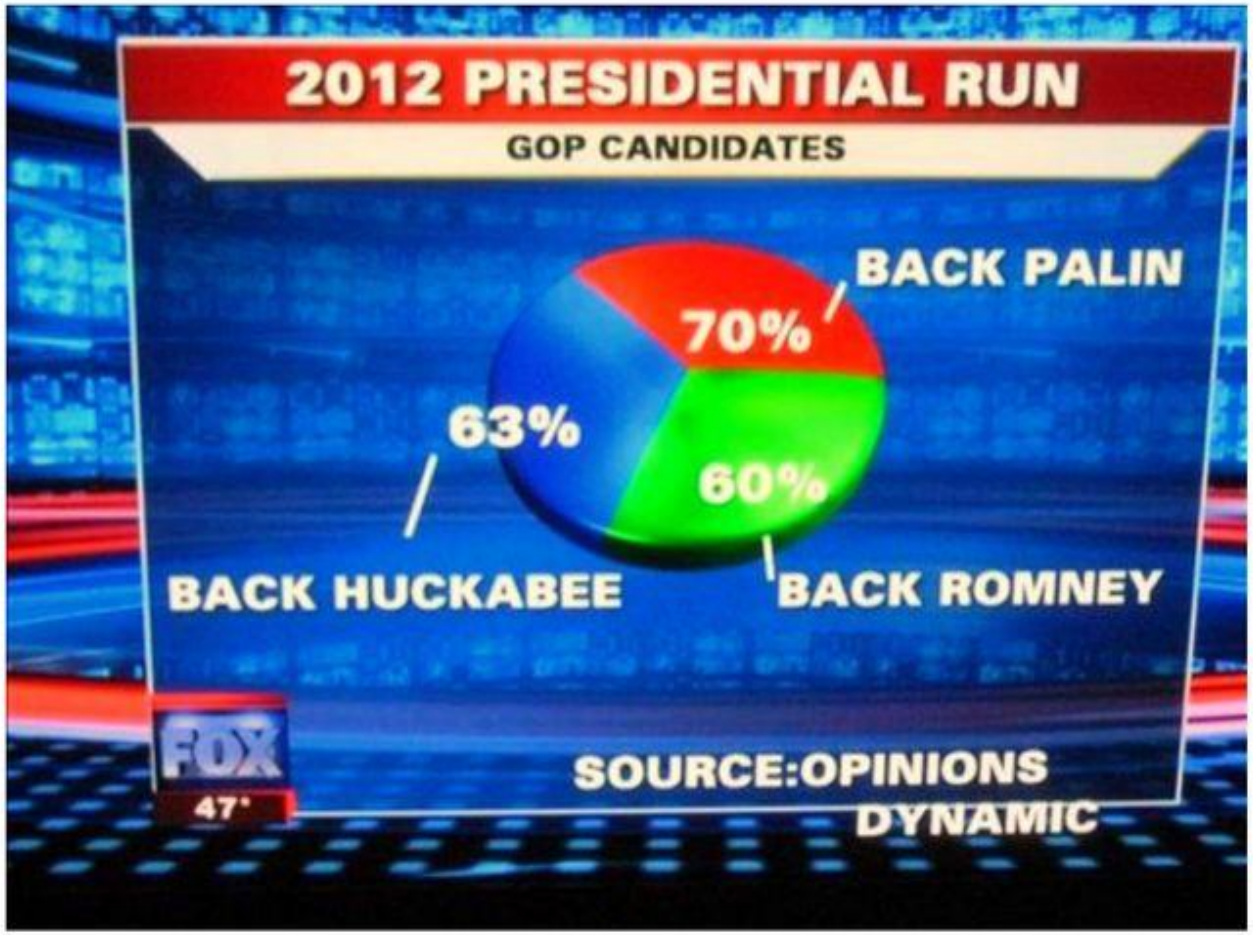
Example 2: In the U.S., **150,000** girls and young women die of anorexia each year. Plausible?

According to the U.S. Centers for Disease Control, Annual number of deaths:

- Girls and women between age 15 and 24 is about 8,500
- Women from 25-44 is 55,000

→ 150,000 deaths is not plausible since the anorexia deaths cannot be THREE times the number of all deaths

Example 3:


2012 PRESIDENTIAL RUN
GOP CANDIDATES
BACK PALIN
70%
63%
60%
BACK HUCKABEE
BACK ROMNEY
FOX
47'
SOURCE:OPINIONS
DYNAMIC

b. Errors

Even if the numbers pass plausibility, there are THREE kinds of errors can lead you to believe things that aren't so:

i) How the numbers were collected
ii) How they were interpreted
iii) How they were presented graphically

2. Fun With Averages

Averages can be helpful in summarizing statistics, allowing us to characterize a large amount of datas with a single number, hence sometimes oversimplifying and misleading in representing a whole group.

a. Three ways in calculating averages

➢ i) Mean: Add up all the observations or reports and divide by the number of observations or reports

ii) Median: The middle number in the set of numbers or distribution

iii) Mode: The observation or report with the highest frequency

a. Problems with Averages

Outliner Problem

Your fundraiser visits a room with 9 people, and their incomes are the following:

Person 1	-$500,000
Person 2	$96,000
Person 3	$97,000
Person 4	$99,000
Person 5	$100,000
Person 6	$101,000
Person 7	$101,000
Person 8	$101,000

Mean: $299,000/9 = $32,222 per person

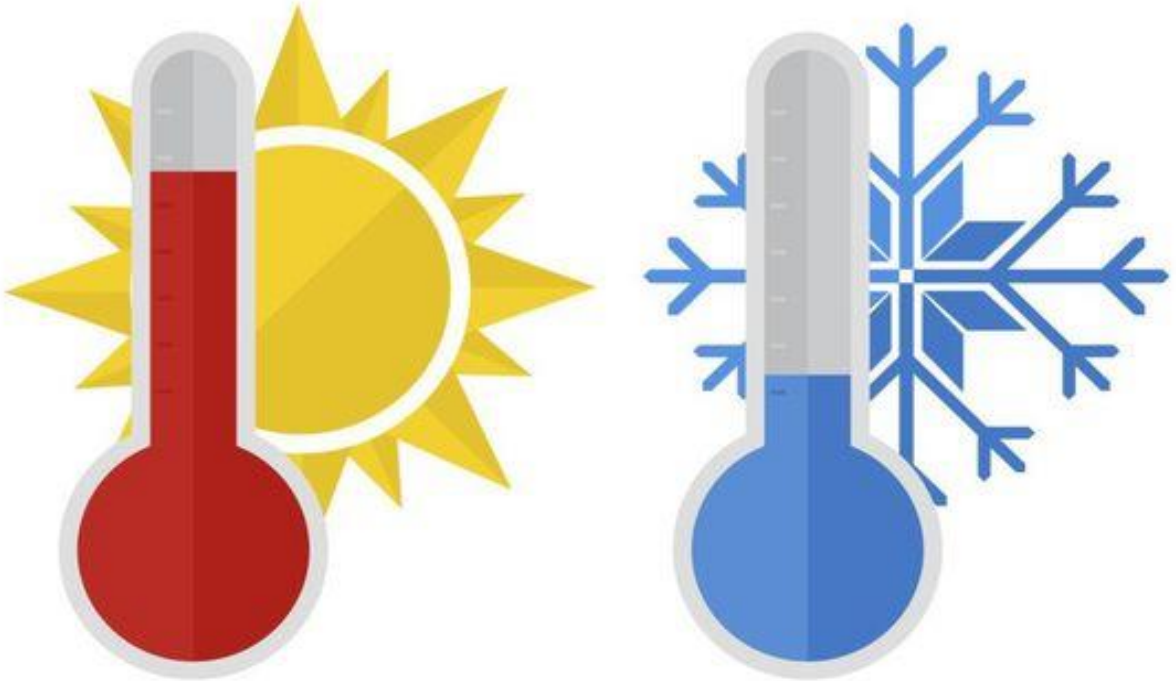
→ This doesn't characterize the income of the people in the room at all.

→ It suggests that your fund-raiser might not want to visit these people, when it's really only one odd person with a deficit of $500,000, the outliner, that brings down the average.

Range Problem

The average temperature in Death Valley, California, is a comfortable 77°F.

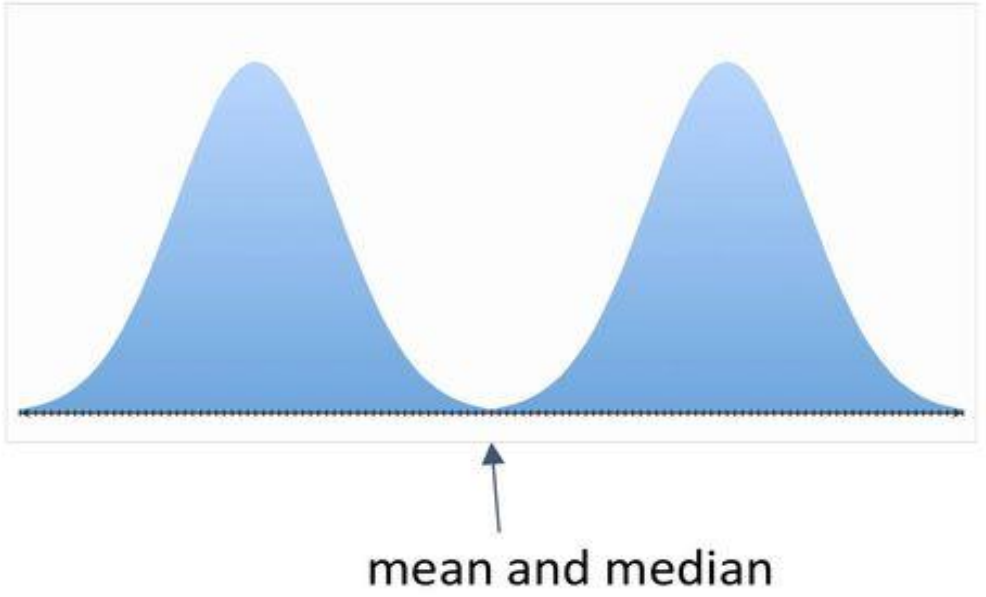
However, the range can kill you with temperatures ranging from 15 degrees to 134 degrees on record.



Bimodal Distribution

Example, this graph might show

- x-axis: the amount of money spent on lunches each week.
- y-axis: how many people spent that amount
- Imagine there are two different groups in the surveys
  - Left hump: students buying school lunches
  - Right hump: Business executives going to fancy restaurants



→ There is heterogeneity in the sample. Similarly, comparing apples with oranges

b. Common Fallacies

Averages can be manipulative and biased. When drawing conclusions about individuals and groups based on averages, people tend to encounter these two fallacies:

i) Ecological fallacy: when we make inferences about an individual based on aggregate data (group mean)
ii) Exceptional fallacy: when we make inferences about a group based on knowledge of a few exceptional individuals

3. Axis Shenanigans

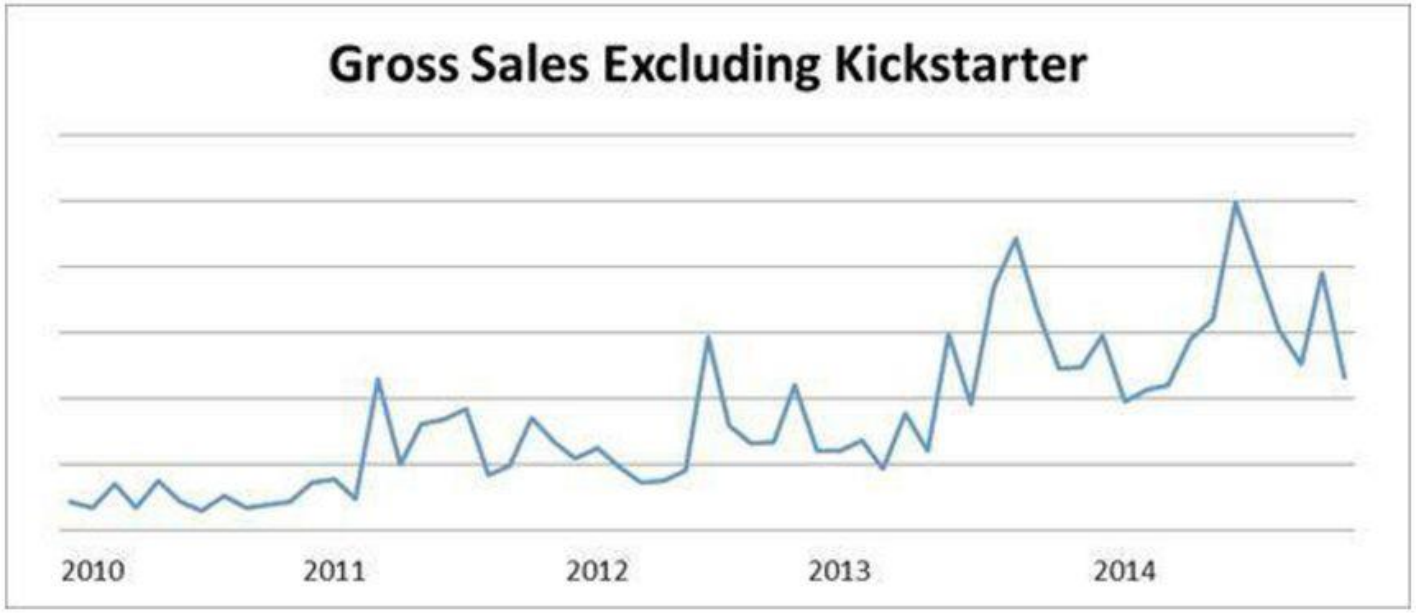
The human brain did not evolve to process large amounts of numerical data presented as text.

It is difficult or impossible for most people to detect patterns and trends of data. Therefore, we tend to rely on **graphs or charts**.

However, there are many ways that graphs can be used to manipulate, distort, and misrepresent data

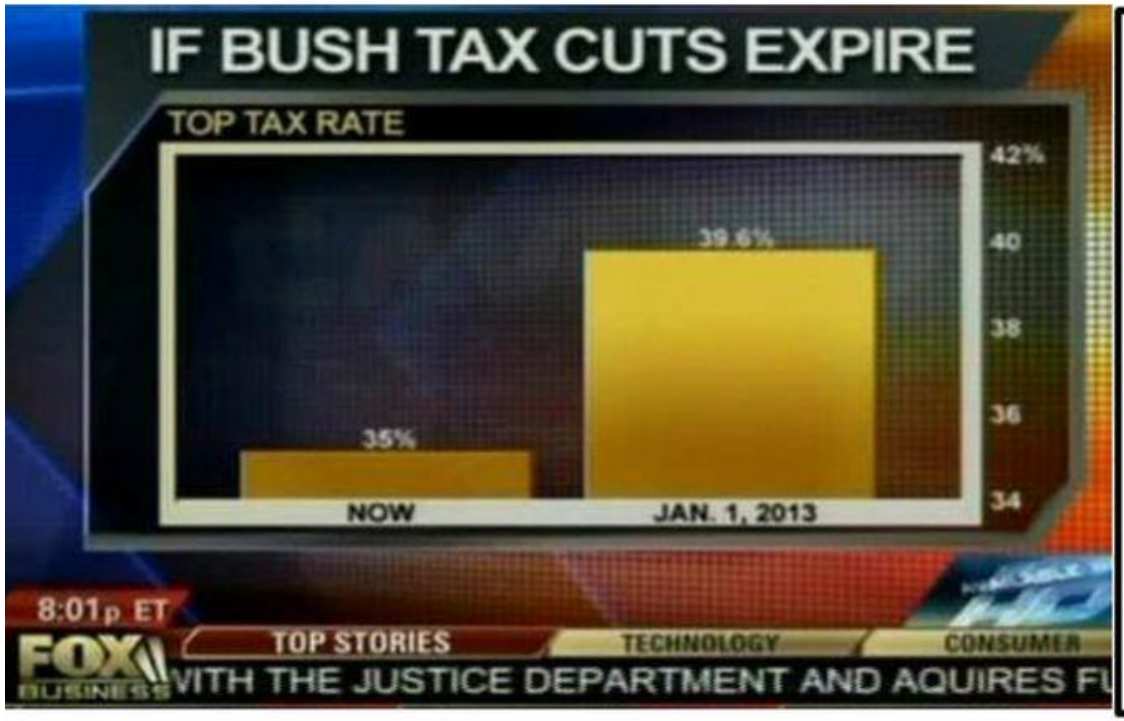
A. UNLABELED AXES: "THE MOST FUNDAMENTAL WAY TO LIE WITH A STATISTICAL GRAPH IS NOT TO LABEL THE AXES" ❖ IF YOUR AXES AREN'T LABELED, YOU CAN DRAW OR PLOT ANYTHING YOU WANT!

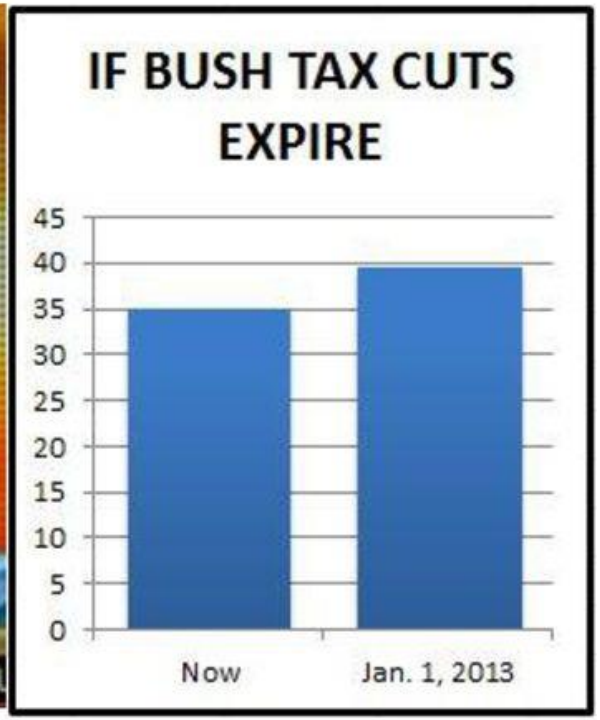
Example: Gross sale of a publishing company



B. TRUNCATED VERTICAL AXIS: A WELL-DESIGNED GRAPH SHOULD CLEARLY SHOW READERS RELEVANT END POINTS OF A CONTINUUM, ESPECIALLY WHEN THE GRAPH IS PRESENTING SOME ACTUAL OR PROJECTED CHANGE IN QUANTITY.

HOWEVER, IF YOUR AIM IS TO CREATE PANIC OR OUTRAGE, START YOUR Y-AXIS NEAR THE LOWEST VALUE.

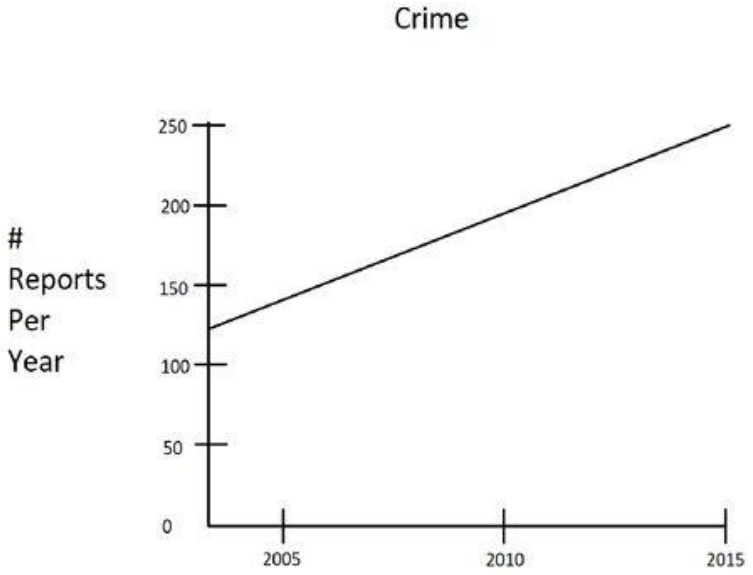


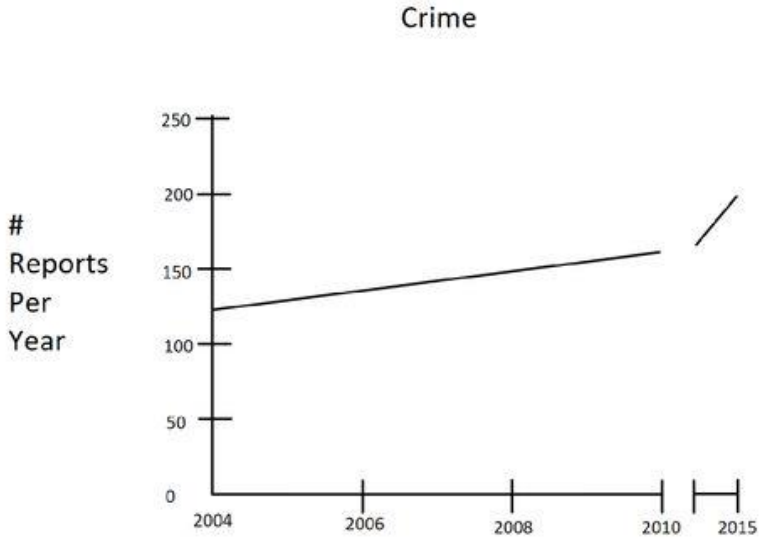


C. DISCONTINUITY IN VERTICAL OR HORIZONTAL AXIS:

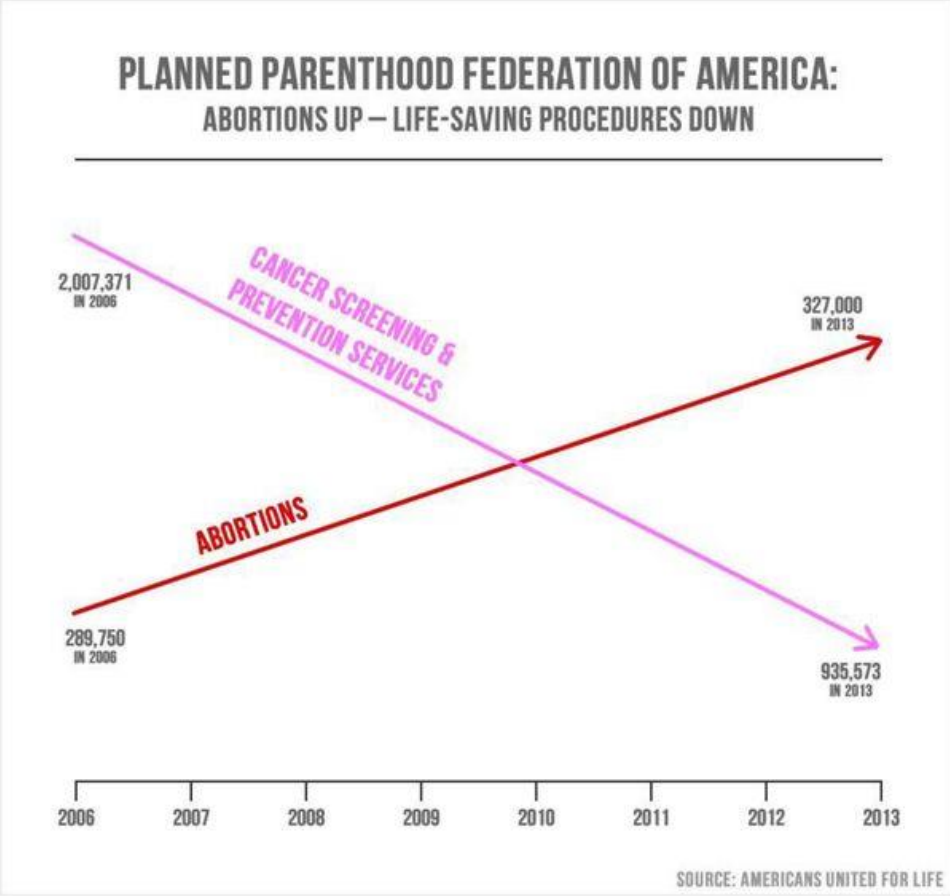
❖ USING THE SAME DATA, JUST CREATE A DISCONTINUITY IN AXIS

➢ THIS WILL DISTORT THE TRUTH AND DECEIVE THE EYE MARVELOUSLY



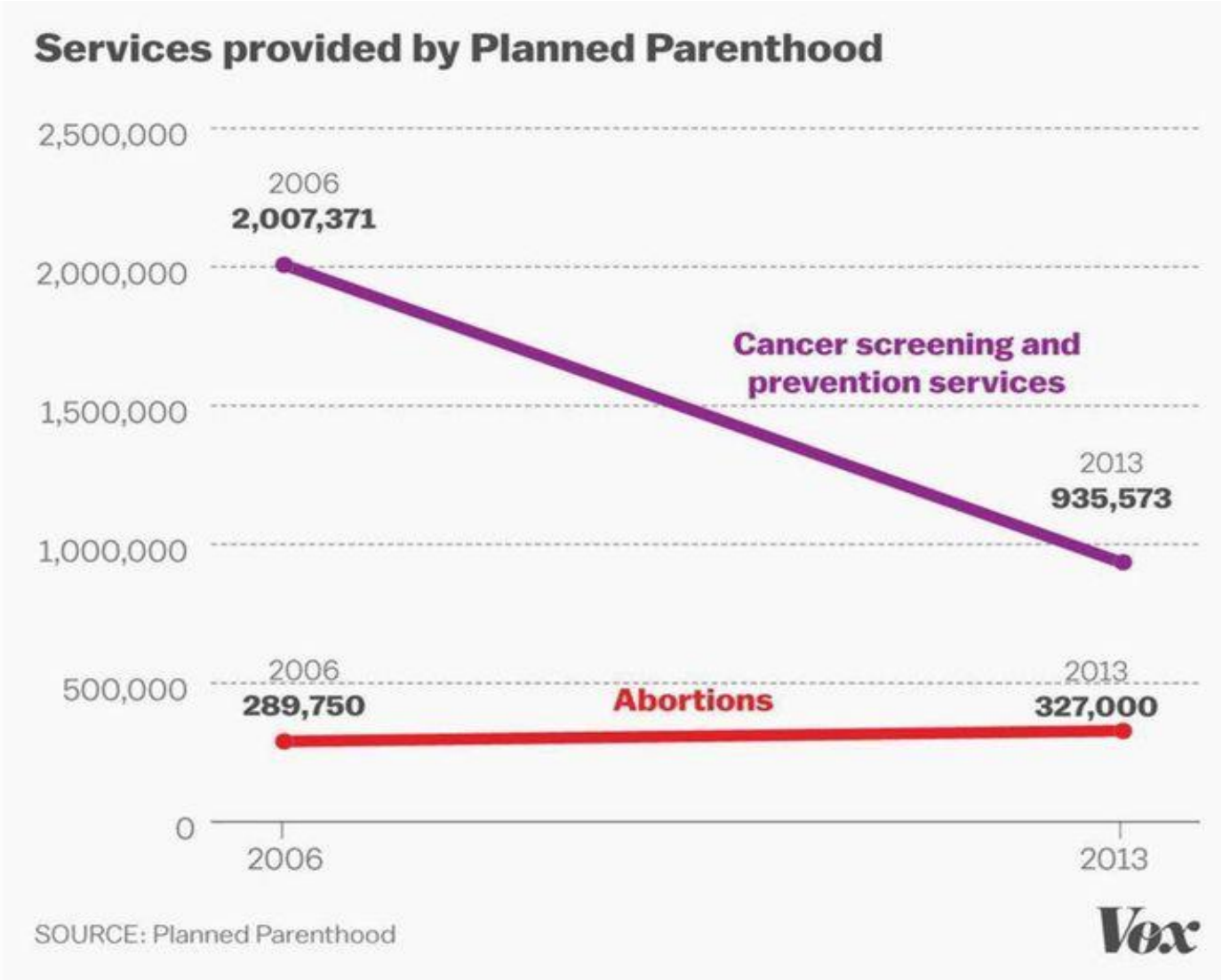


D. THE DREADED DOUBLE Y-AXIS: "THE GRAPH MAKER CAN GET AWAY WITH ALL KINDS OF LIES SIMPLY ARMED WITH THE KNOWLEDGE THAT MOST READERS WILL NOT LOOK AT THE GRAPH VERY CLOSELY"



- Increased the number of performed abortion
- Decreased the number of cancer screening and prevention procedure
- The visualization makes it seem that the number of abortion procedures exceeded those for cancer.
- People can draw a false conclusion form this distort graph
  - Planned Parenthood's mission is to perform as many abortion as it can.

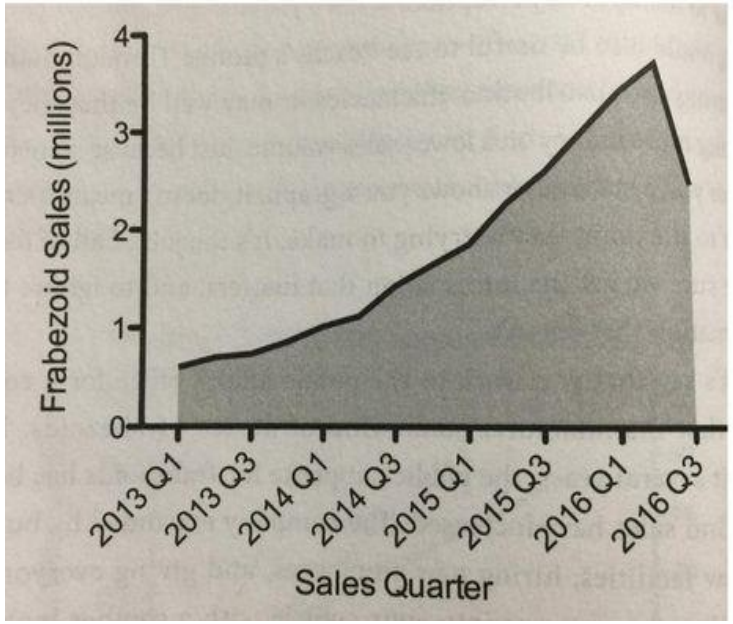
- Abortion just increased modestly compared to the reduction in cancer service.
- The cancer service performances is nearly 7 times in 2006 and 3 times in 2013 as abortion performance.



LEVITIN STARTS THIS CHAPTER OF PART ONE WITH A SCENARIO OF A COMPANY THAT HAS DROPPED IN SALES FOR THE QUARTER.

- THE COMPANY HAS TO SHOW A REPORT OF SALES AT A CONFERENCE. WHAT DO THEY DO TO MAKE IT LOOK LIKE SALE

E. Hijinks With How Numbers Are Reported

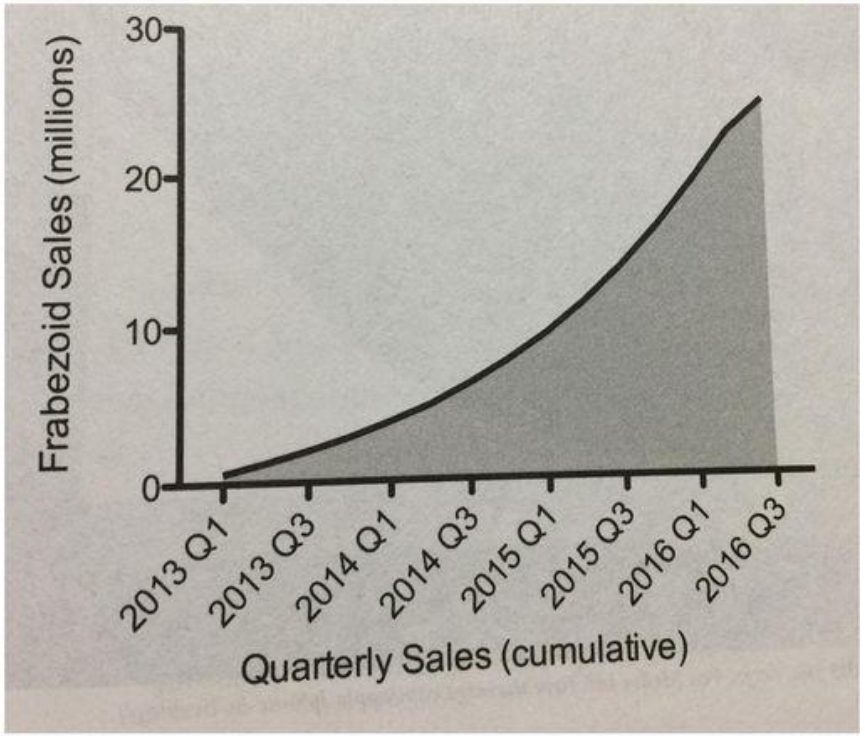


What do you do?

LEVITIN EXPLAINS THAT THE USE OF THIS GRAPH IS VISUALLY MORE APPEALING.
IT GIVES THE VIEWER THE ILLUSION THAT SALES HAVE INCREASED, BUT POOR SALES ARE STILL SLIGHTLY VISIBLE IN THE GRAPH

Solution

→ Cumulative sales graph - the total sales to date.



THIS IS ONE OF MANY WAYS COMPANIES AND INDIVIDUALS CAN MANIPULATE NUMBERS IN THEIR FAVOR. CEO OF APPLE, TIM COOK, IS A REAL LIFE EXAMPLE OF HOW THIS GRAPH WAS USED TO FLUFF IPHONE SALES.

4. Plotting Things That Are Unrelated

- There are many things happen at the same time, BUT that does not mean that one is causing the other.
- "Correlation does not imply causation"
- Two formulations of this rule:
  - After this, therefore because of this.
  - With this, therefore because of this.
- Actually, there is no actual connection between two items that are correlated.

5. Interpreting and Framing

- A statistic will be properly created and reported, but people will misreport it because they've misunderstood it or they didn't realize that a small change in wording can change the meaning.
- Sometimes the statistic being reported is not the relevant one.


Colgate
Sensitive Pro-Relief
9 OUT OF 10 DENTISTS WHO TRIED WOULD RECOMMEND IT
Independent Survey April 2011 n=77


SENSODYNE
4 PACK
Extra Whitening
9 OUT OF 10
DENTISTS RECOMMEND
SENSODYNE® TOOTHPASTE
SENSITIVITY RELIEF

6. Interpolation and Extrapolation

- Interpolation: Taking two data points and estimates the value that would have occurred between them.
- Extrapolation: Making estimates outside the range of our observations.

If your coffee started out at 145 degree (F), you'd observe the temperature decreasing over time like this:

Elapsed Time (mins)	Temp (F)
0	145
1	140
2	135
3	130

You conclude that your coffee loses 5 degrees every minute.

Interpolated: Want to know what the temperature between measurements.

→ Your interpolation is going to be quite accurate.

Extrapolated: Likely to come up with an absurd conclusion.

→ The coffee will reach freezing after thirty minutes.

7. Comparing Apples and Oranges

"One way to lie with statistic is to compare things that are different from one another"

Example:

Data shows that in 2010 there are 3,482 active-duty U.S. military personnel died out of a total of 1,431,000 people in the military. This gives a rate of 2.4 deaths per 1,000.

Across the United States, in 2010 the death rate was about 8.2 deaths per 1,000.

→ Therefore, from this comparison, we might conclude that it is safer to be in the military than to be stateside in the comfort of your own home.

However, the two samples are not similar, and they shouldn't be compared directly.

8. How Numbers Are Collected

Sampling

- A sample has to be representative. A sample is representative if every person or thing in the group you're studying has an equally likely chance of being chosen.
- Stratified random sampling is better than non-stratified.
  - Example: stratified sample from different-sized schools.
- The margin of error is how accurate the results are
- The confidence interval is how confident you are that your estimate falls within the margin error.

A. Sampling Biases

- Researchers sometimes make errors in judgment about whether every person or thing is equally likely to be sampled.

- "If you want to lie with statistics and cover your tracks, take the average height of people near the basketball court; ask about income by sampling near the unemployment office; estimate statewide incidence of lung cancer by sampling only near a smelting plant. If you don't disclose how you selected your sample, no one will know."

B. Two types of Participation Bias:

- Non-response error: people who respond to your survey are different from the ones who don't.

- Coverage error: Some members of the population from which you want to sample cannot be reached and therefore have no chance of being selected.

C. Reporting Bias:

People sometimes lie when asked their opinion.

- Ex: Harvard graduates overstating their income to appear more successful

Lack of standardization

- Standardization must be clear, replicable, and precise procedures for collecting data so that each person who collects it does it in the same way.

D. Measurement Error:

- Measurement error turns up whenever we quantify anything.
  - Ex: A 1960 U.S. Census study recorded 62 women age 15-19 with 12 or more children, and a large number of 14 year old widows.

- Measurement error also occurs when the instruments you're using to measure doesn't actually measure what you intended it to measure.
  - Ex: using a yardstick to measure human hair.D.

E. Definitions

- How something is defined or categorized can make a huge difference in the statistic you end up with.
  - Ex: what does it mean to be homeless?

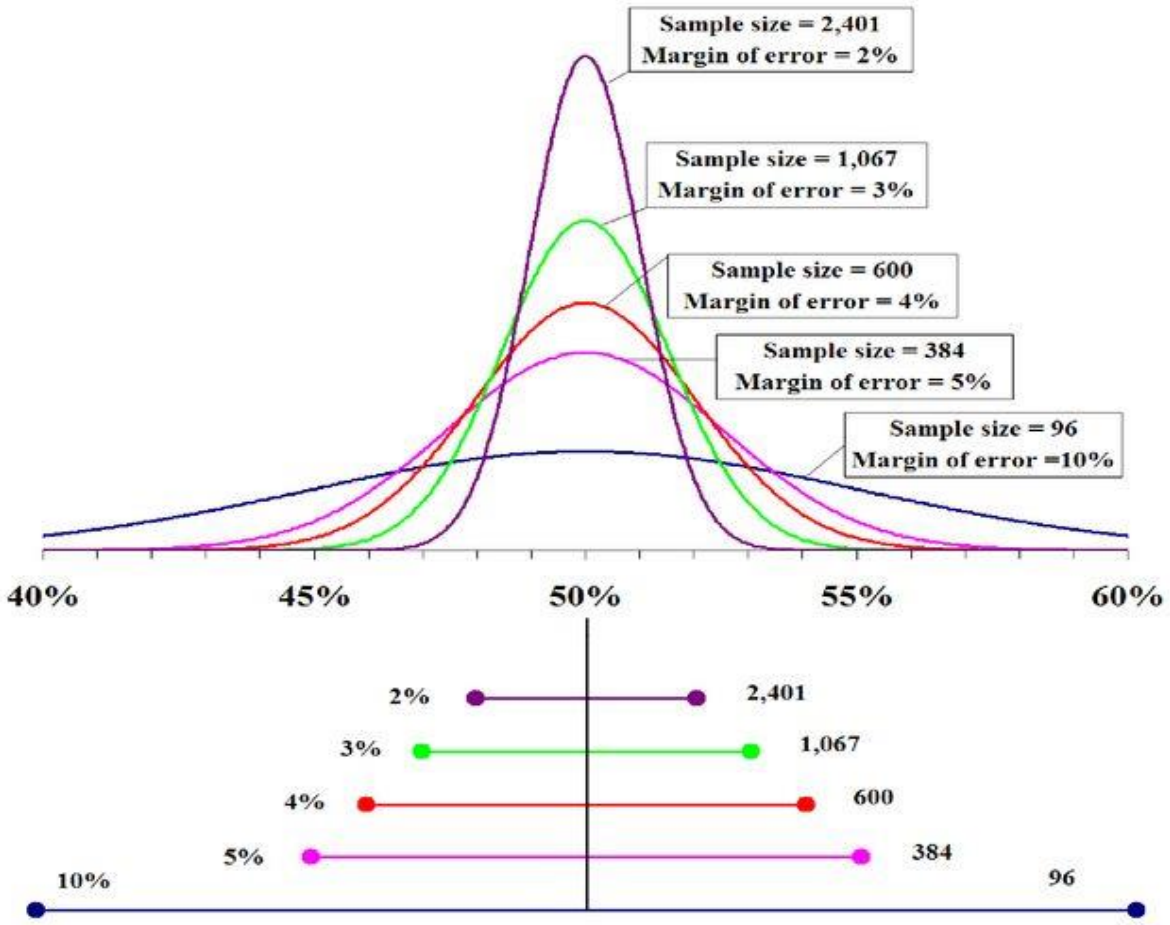
- Thus we need to be aware of the element in the research and how they are defined.

F. Things That are Unknowable or Unverifiable

- GIGO is a famous saying coined by early computer scientists: garbage in, garbage out.
- At the time, people would blindly put their trust into anything a computer output indicated because the output had the illusion of precision and certainty.
- If a statistic is composed of a series of poorly defined measures, guesses, misunderstandings, oversimplifications, mismeasurements, or flawed estimates, the resulting conclusion will be flawed.
- Thus one should question how such statistic was composed.

G. SIZE OF SAMPLE:

For each sample size, one is 95% confident that the "true" percentage is in the region indicated by the corresponding segment. The larger the sample is, the smaller the margin of error is.



Thinking Carefully

There are many ways to manipulate, distort, and misrepresent data.

→ The careful consumer of information will avoid being drawn in by them.