



How **[not]** to lie with reports

Janis Gulbis

**To lie, or not to lie?
That is the question.**



Janis Gulbis

Data literacy

The ability to read, understand, argue with, and make decisions from information.



Community Day
April 8, 2022

**How we interpret
information?**

**Why it's easy to
lie with charts?**

**9 ways to lie with
charts**

Me and My Family



Family Drama – Gathering Facts



Family Drama – Gathering Facts

But she hit me
first!



Family Drama – Gathering Facts



No! I hit you
Yesterday!

Family Drama – Gathering Facts

But she was about
to hit me again



Family Drama – Gathering Facts



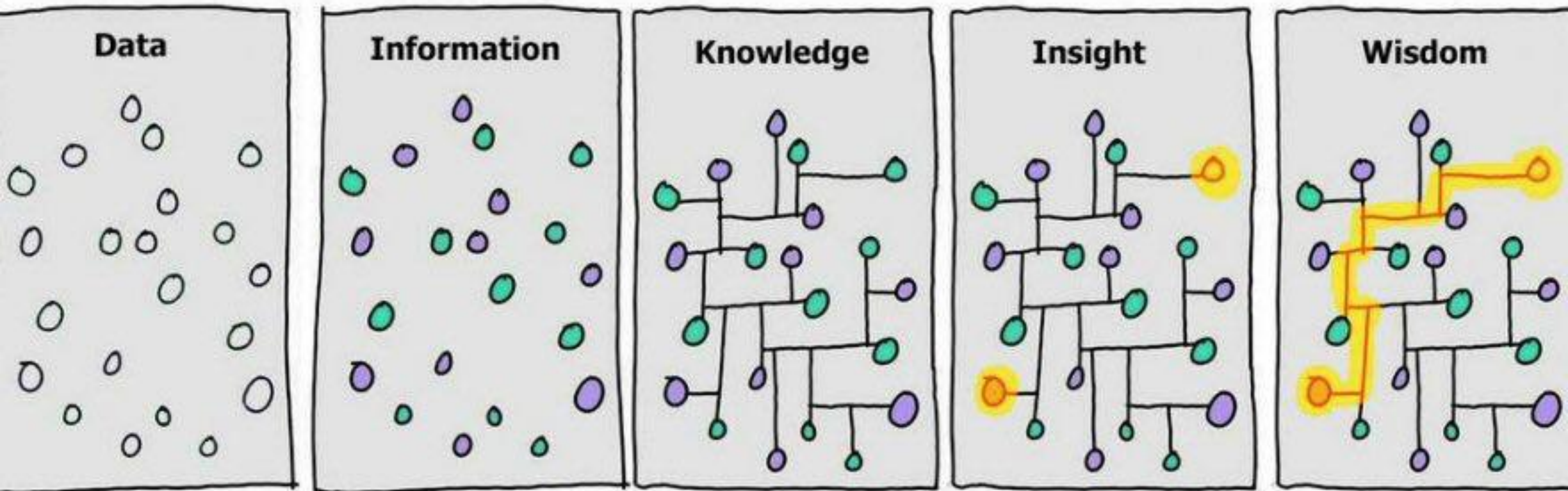
No screen time for today!



In search for the truth

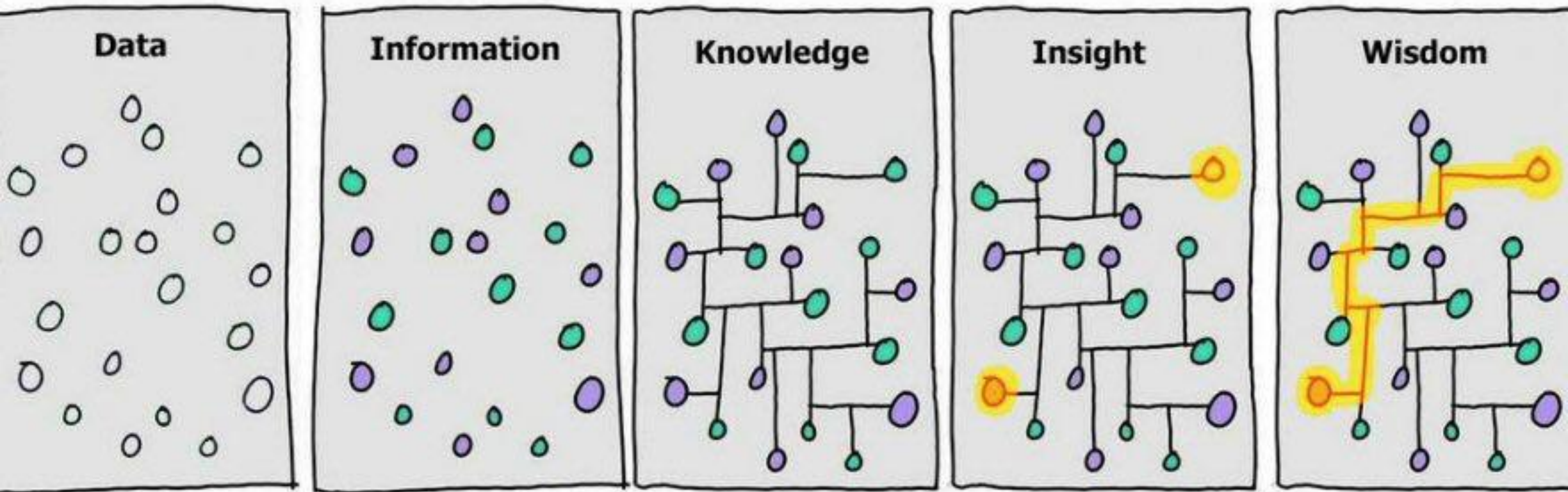
From Data to Wisdom

The Truth



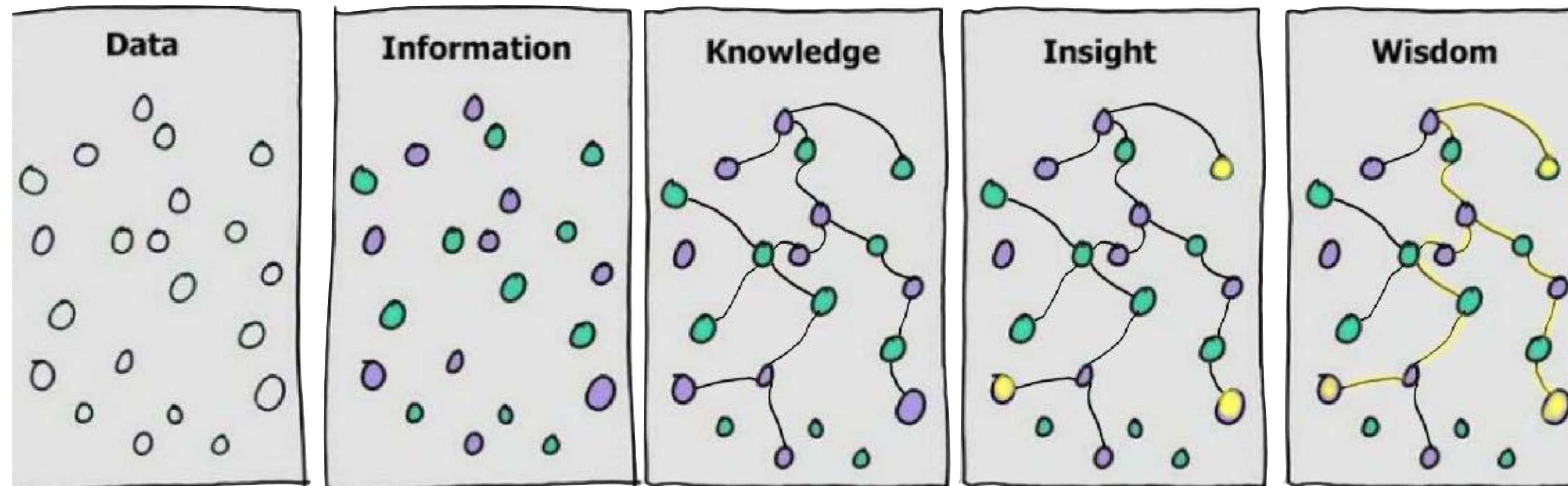
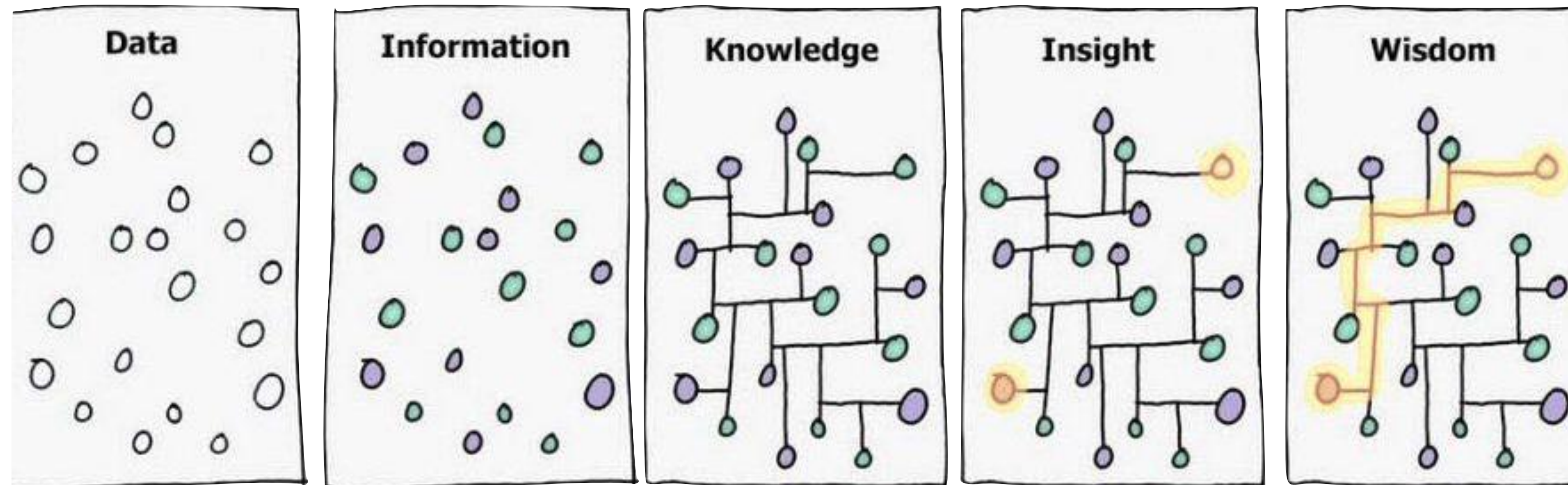
Do you know who is connecting dots?

A Truth???

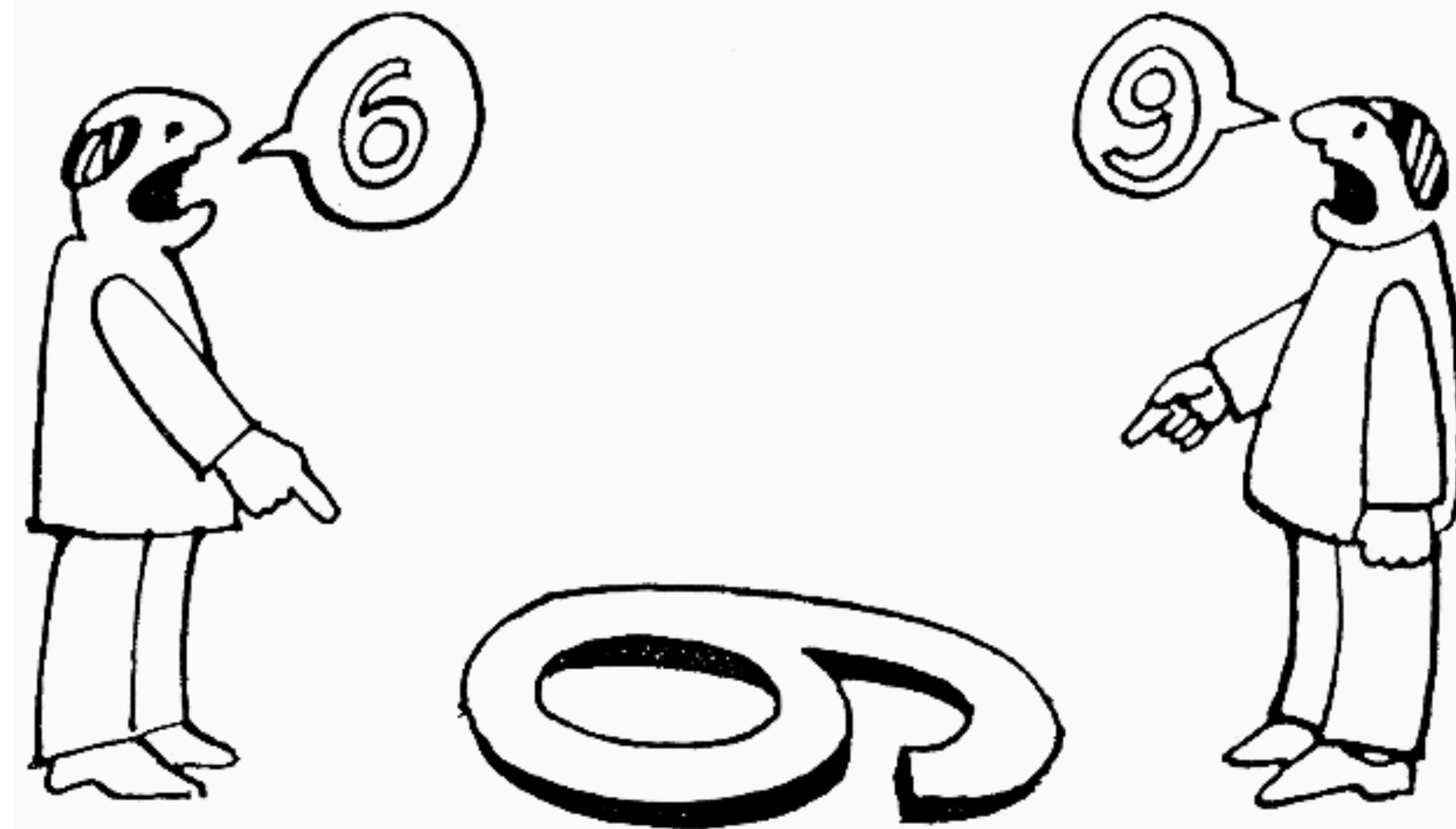
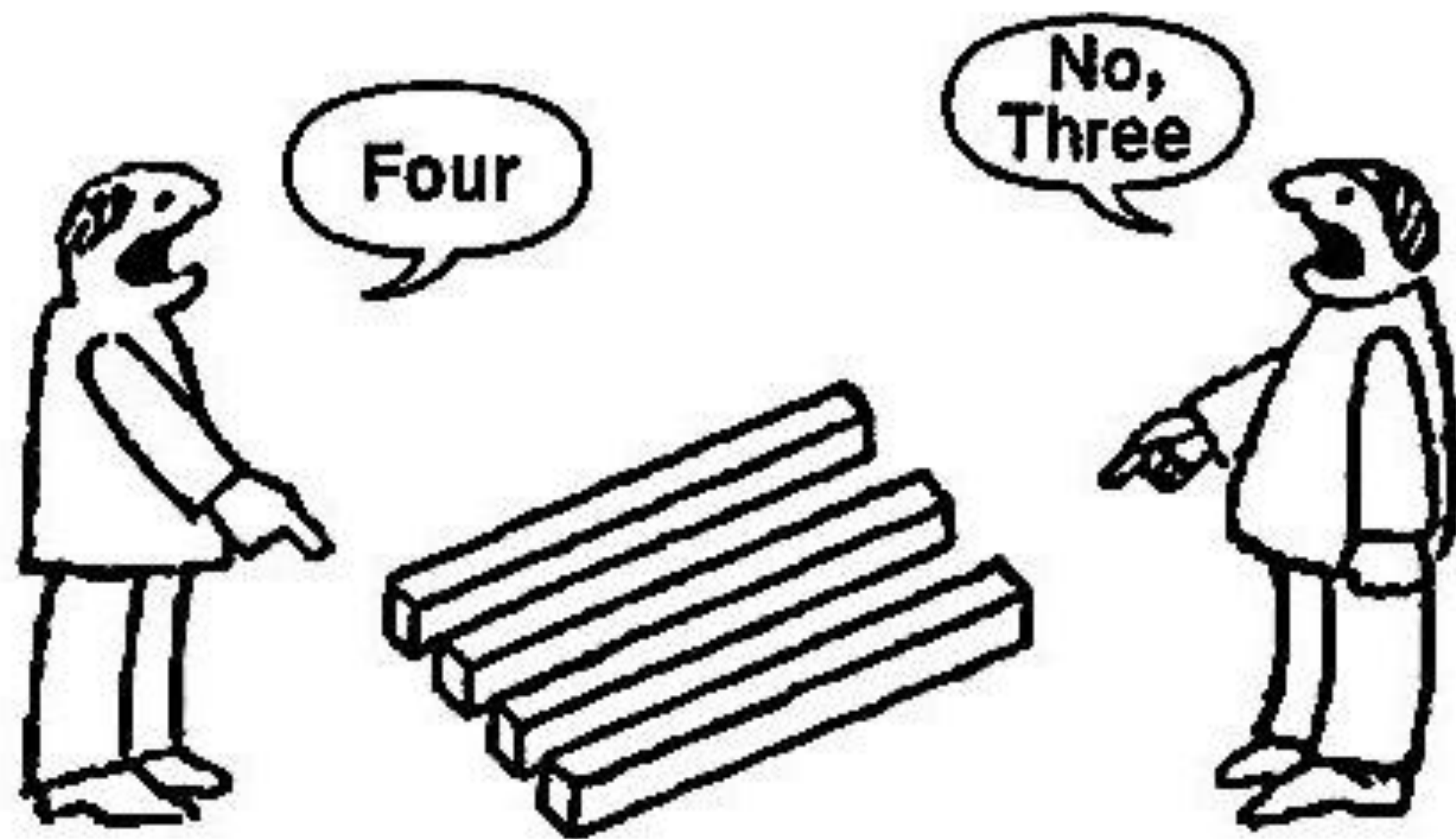


More than one truth

Which Truth?



Who is right?



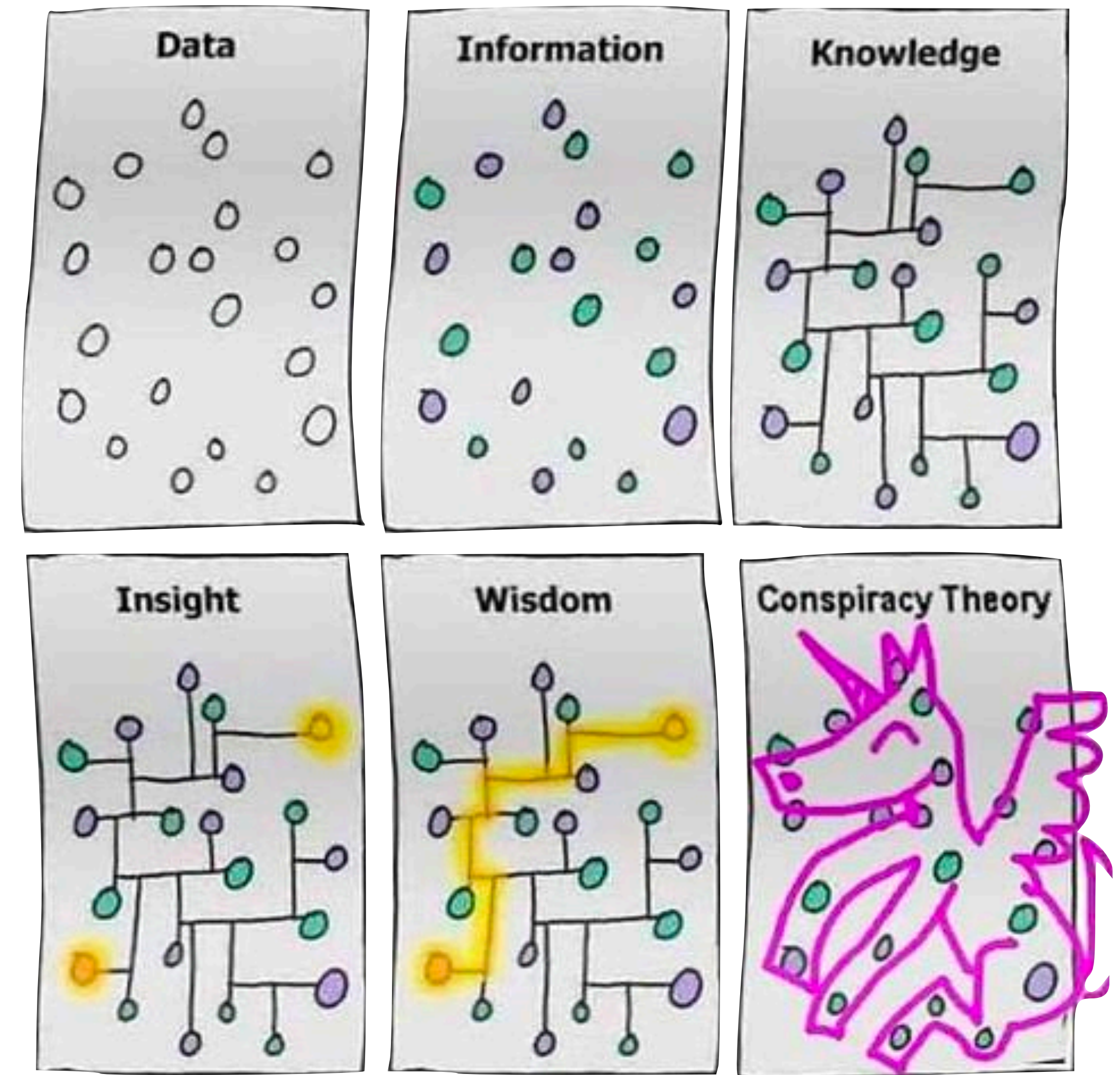
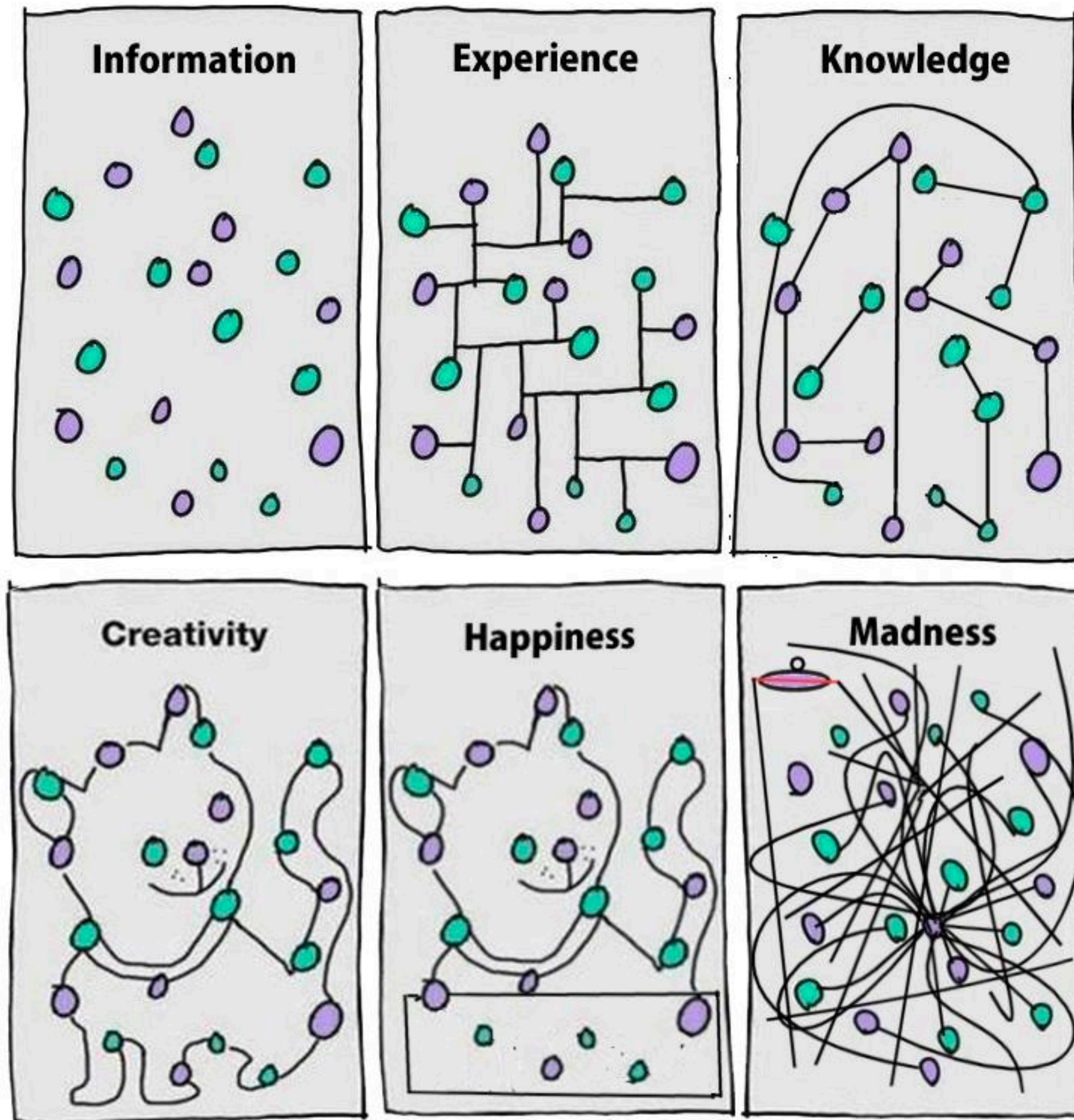




Shadowmatic

Triada Studio Games

Interpretation





Trust

**Why charts
can be misleading?**

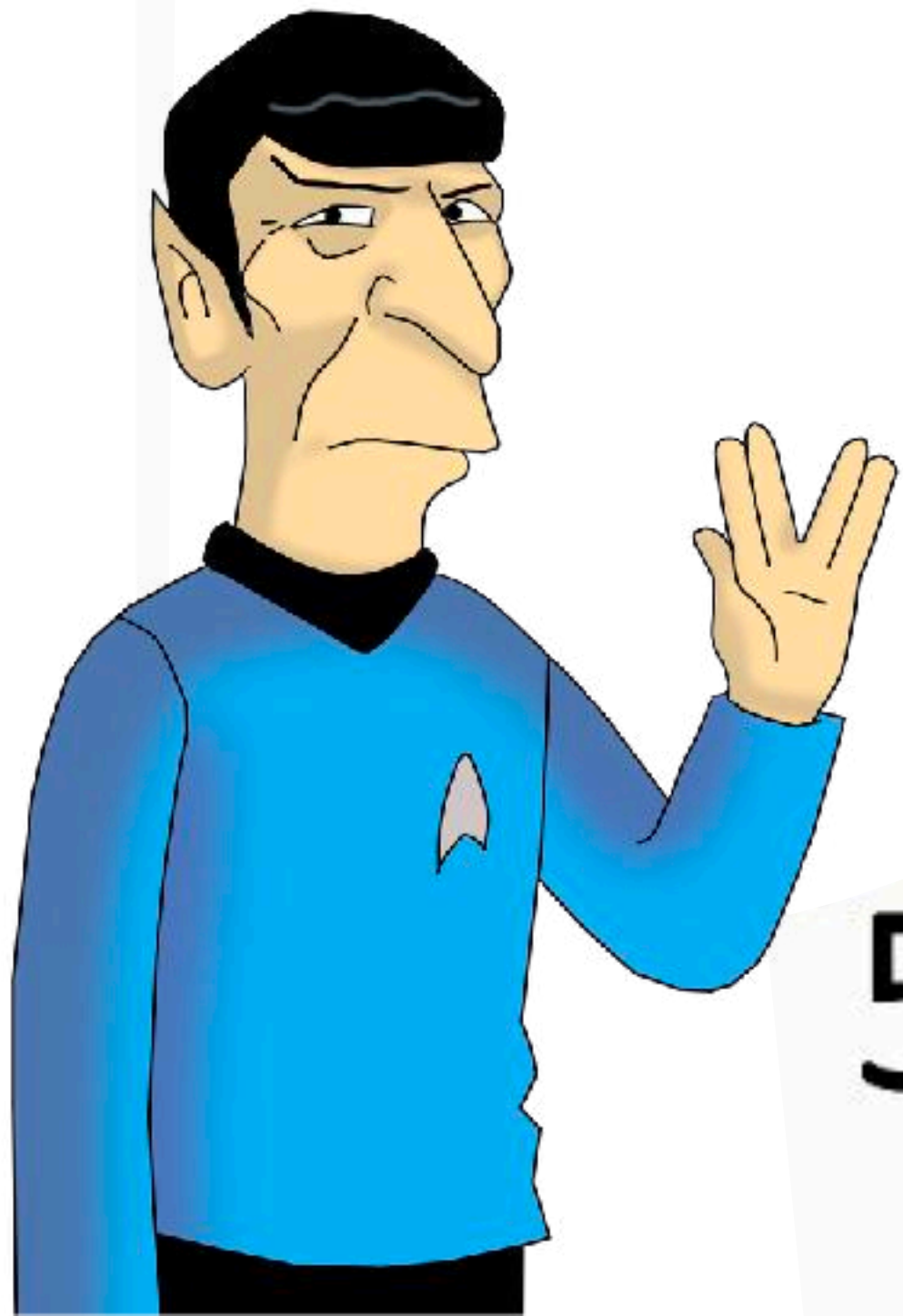
FACTS

90% of information
we process is visual

FACTS

**Brain processes images
60,000 times faster than text**

Jumping Right to Conclusions



5%

Facts

Let's
Jump!



Conclusion



95%

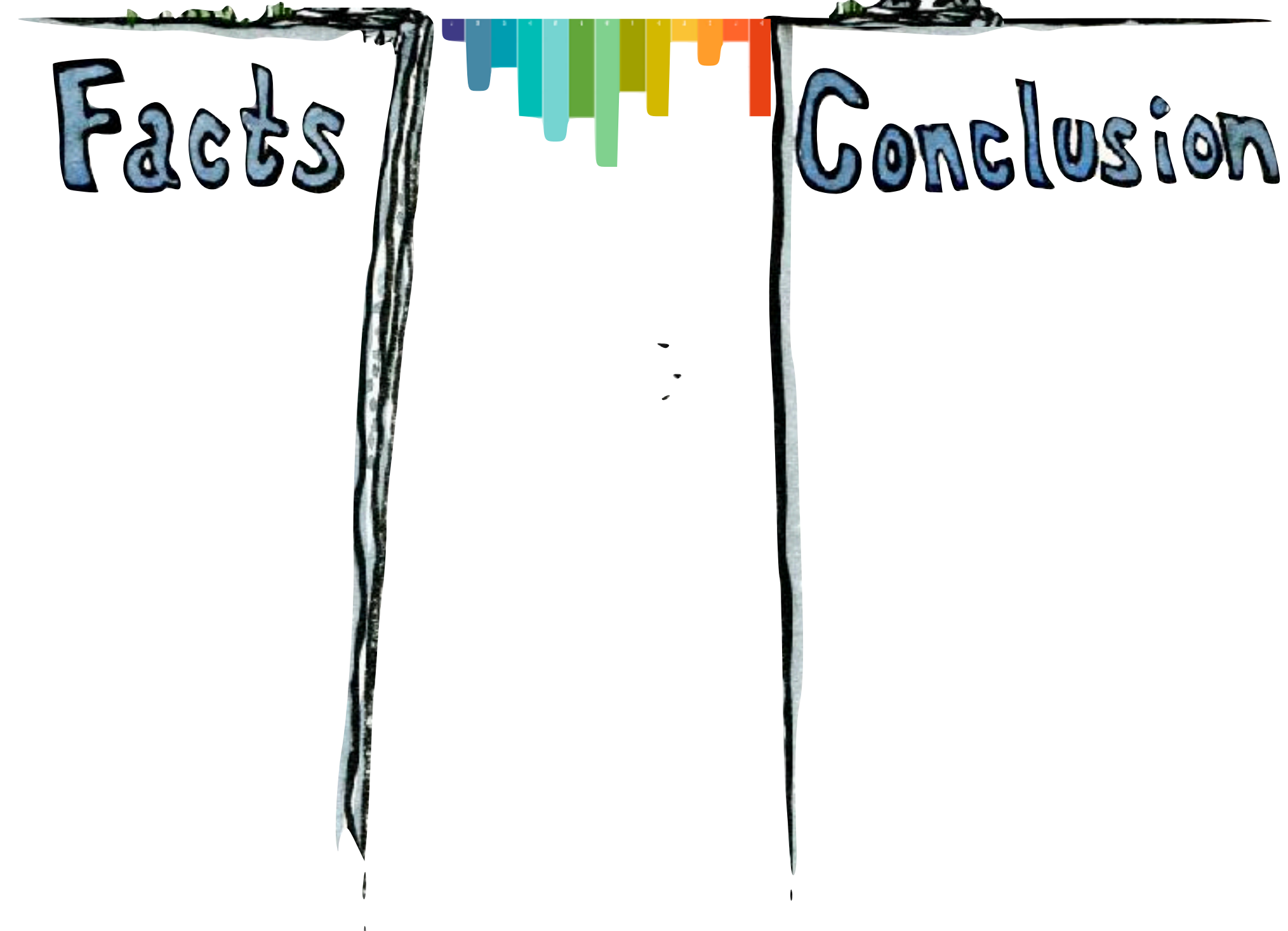
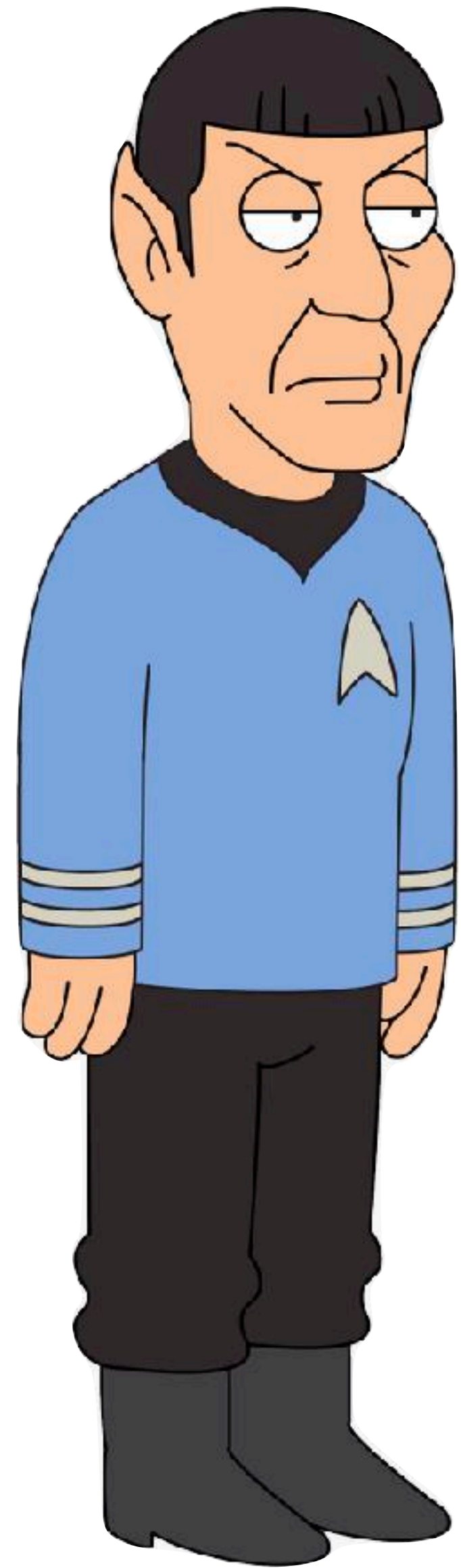
Slow

Rational
Analytical
Effortful
Reliable

Fast

Impulsive
Associative
Automatic
Error-Prone

Jumping Right to Conclusions



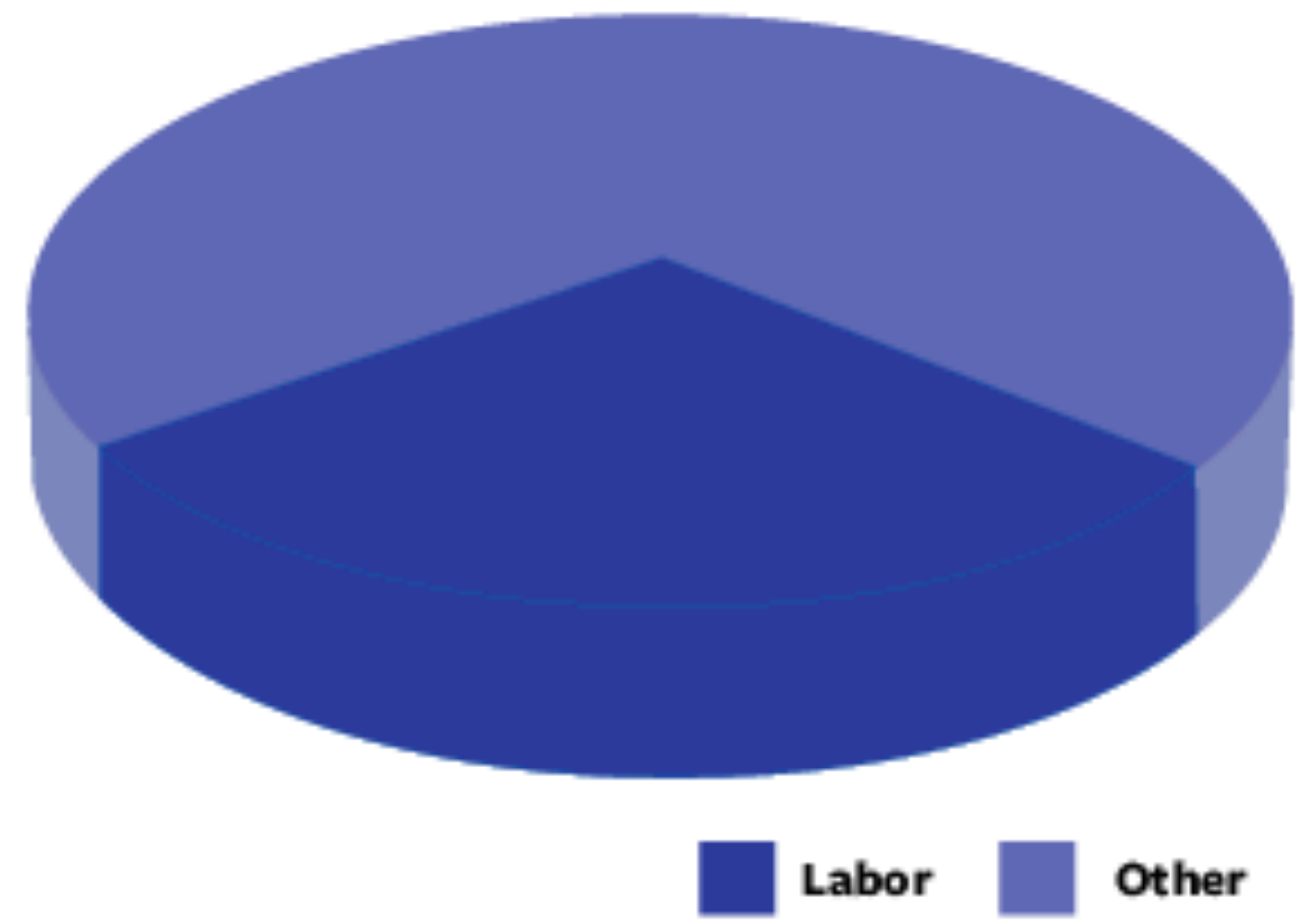
9 ways charts can mislead you

LIE #1

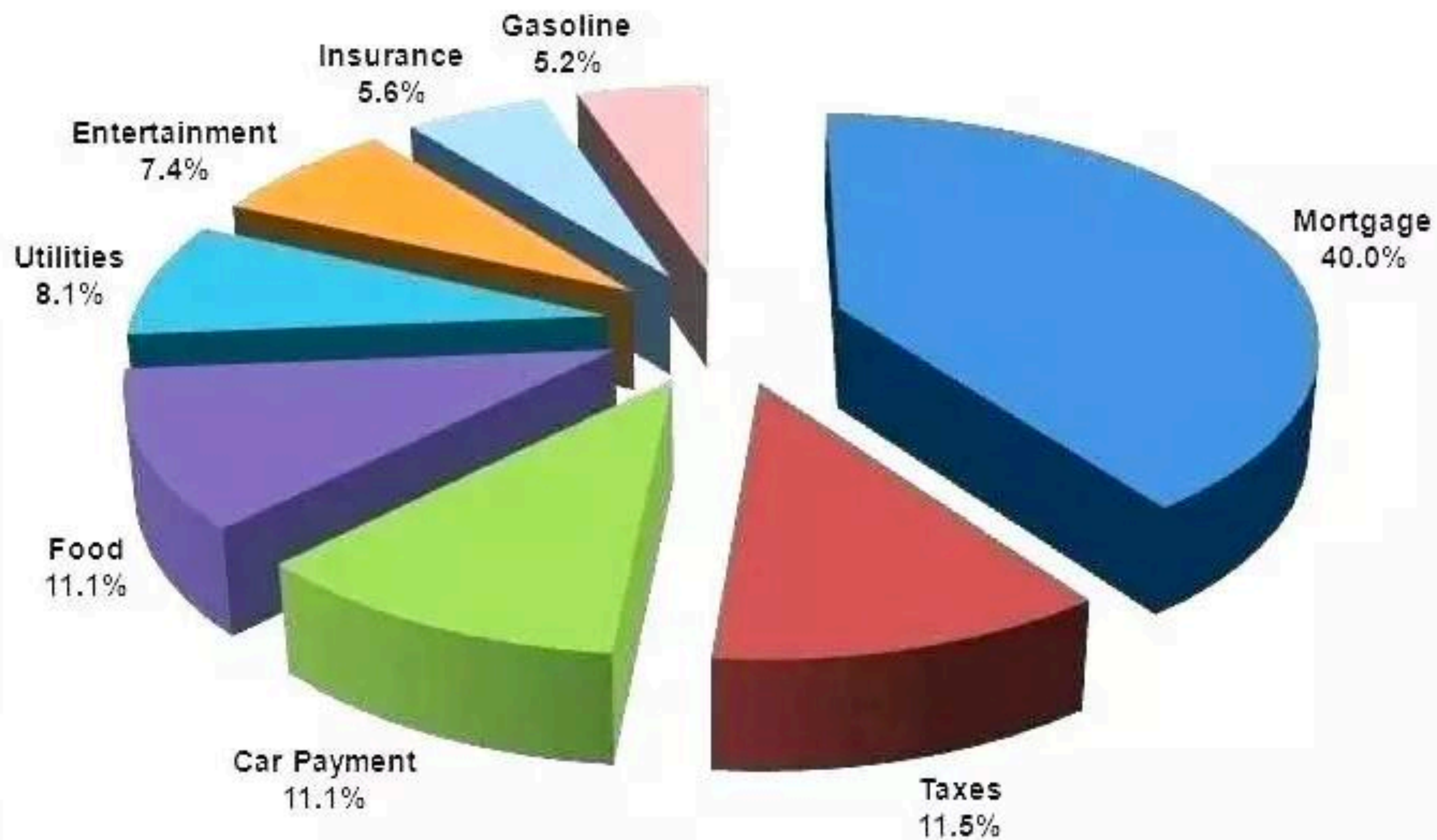
Visual Perspective

Lying with effects & animations

Perspective changes perception

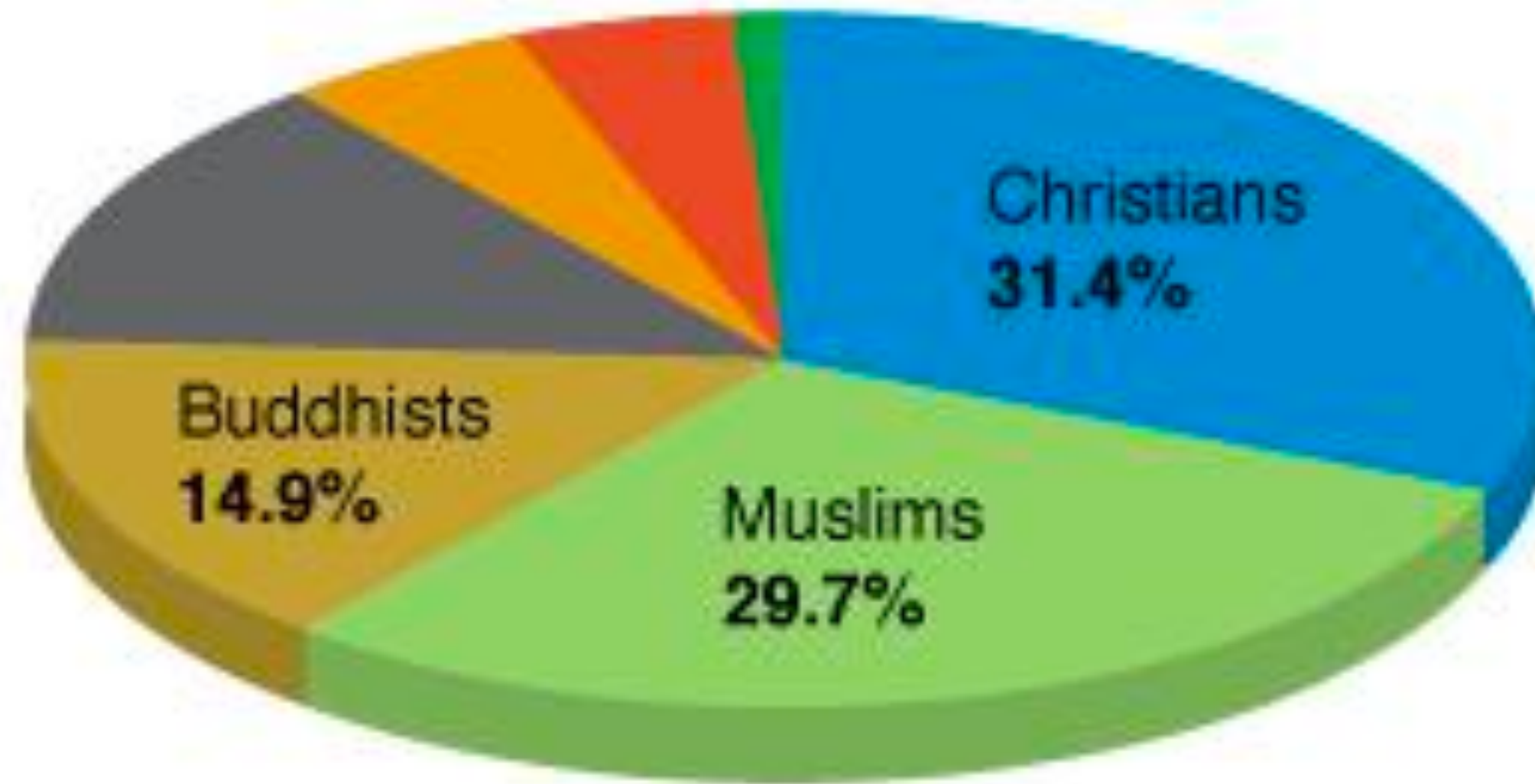


Personal Expenses



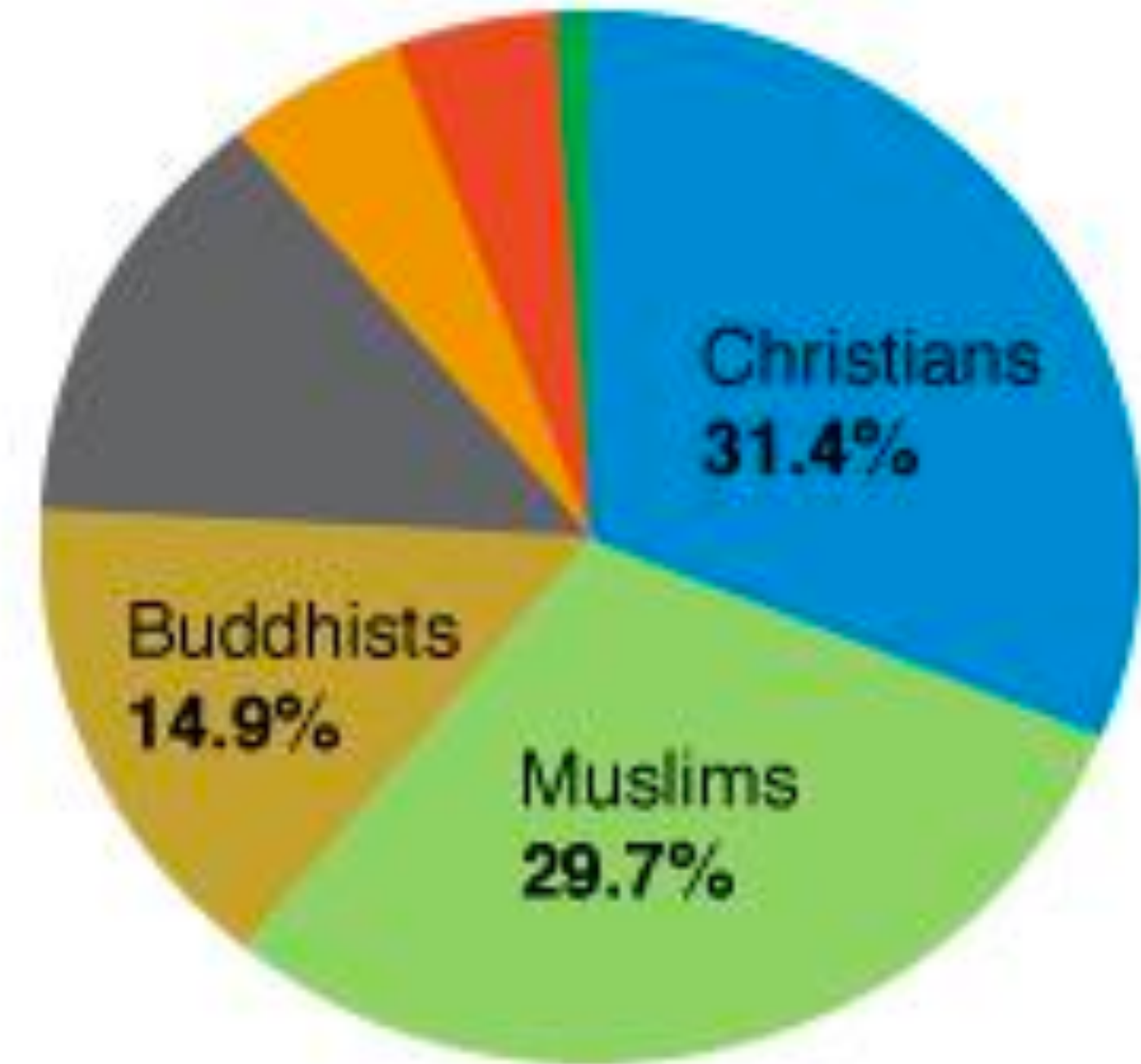
Religions in the world

WRONG



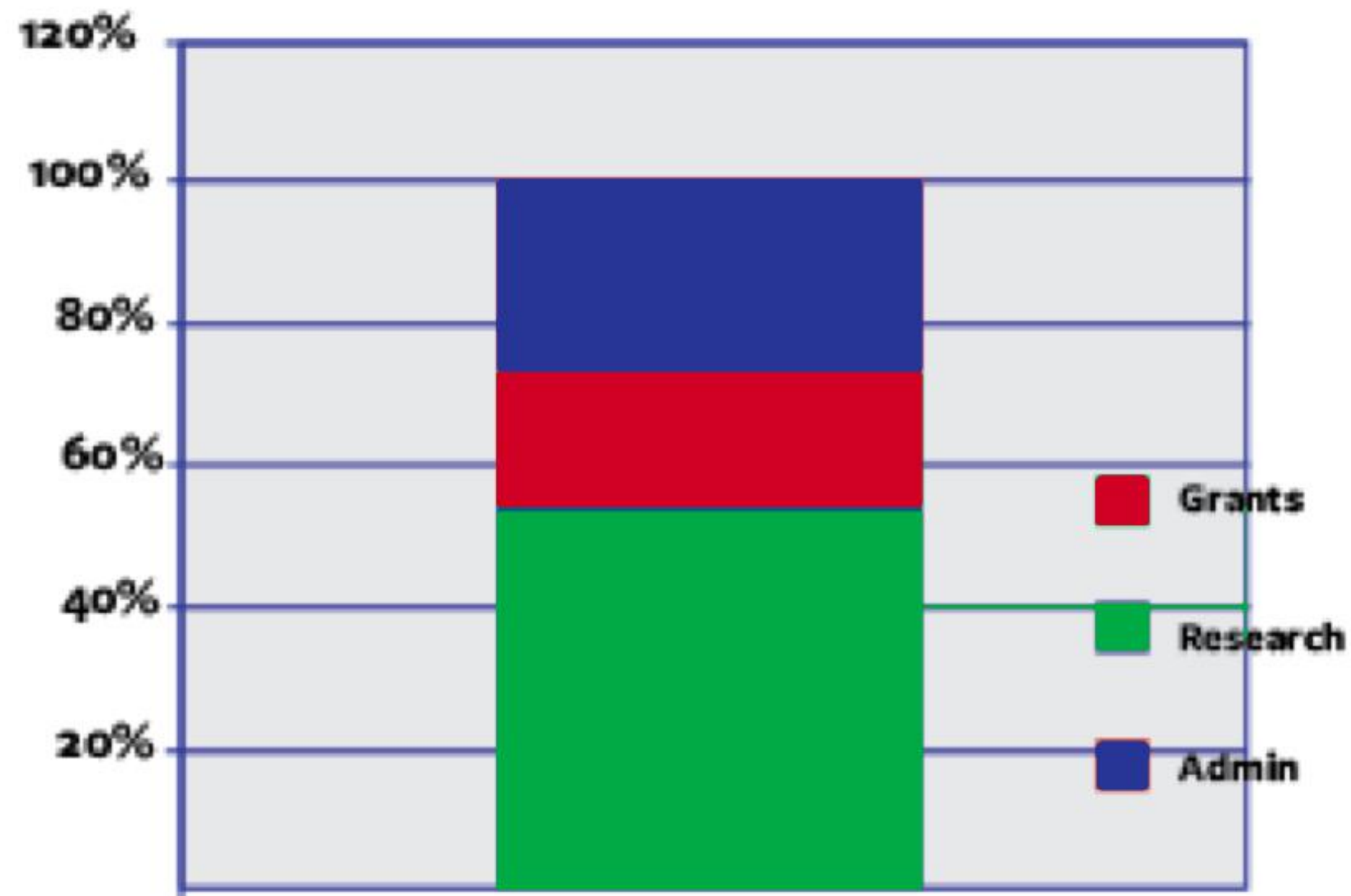
Religions in the world

RIGHT

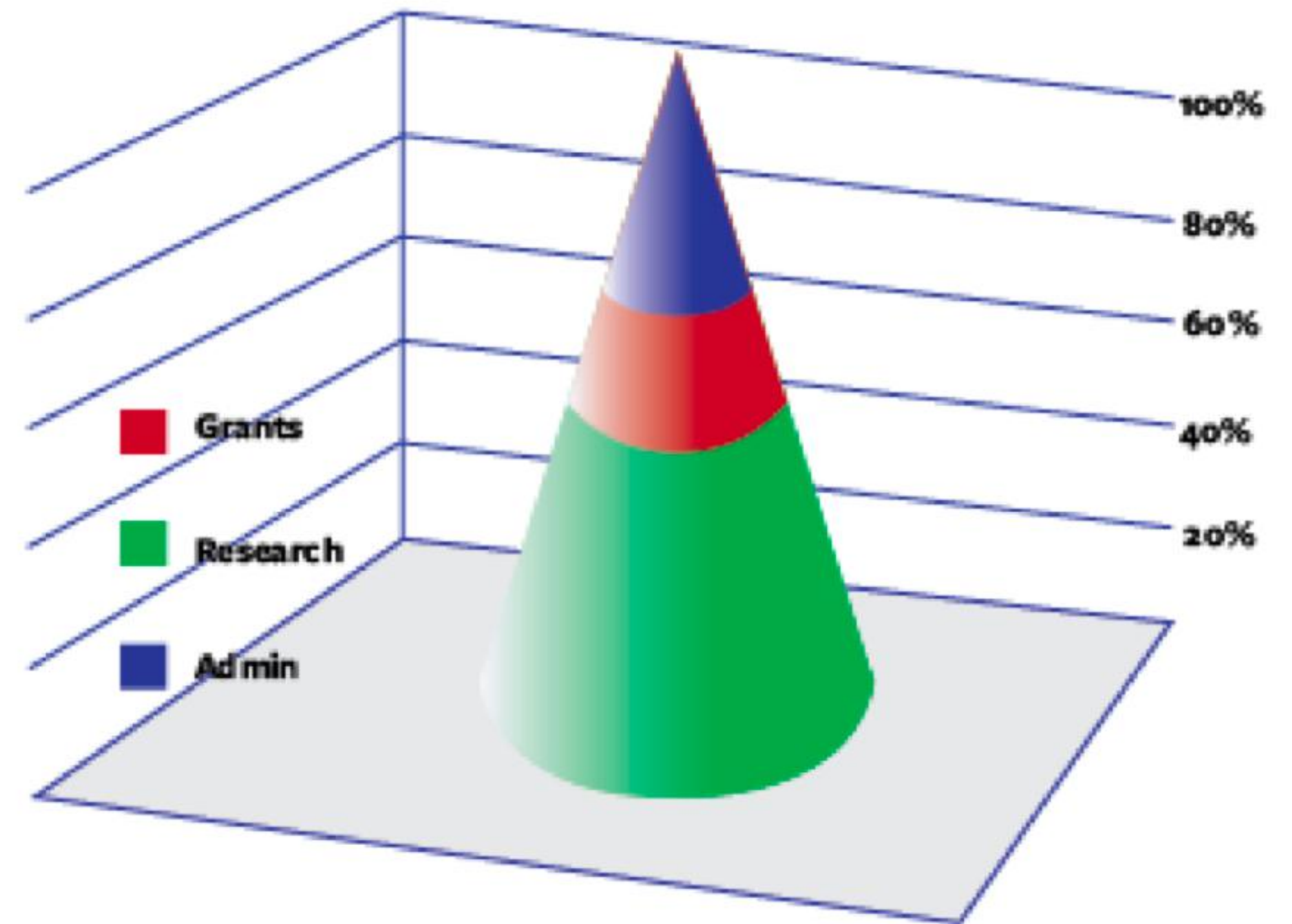


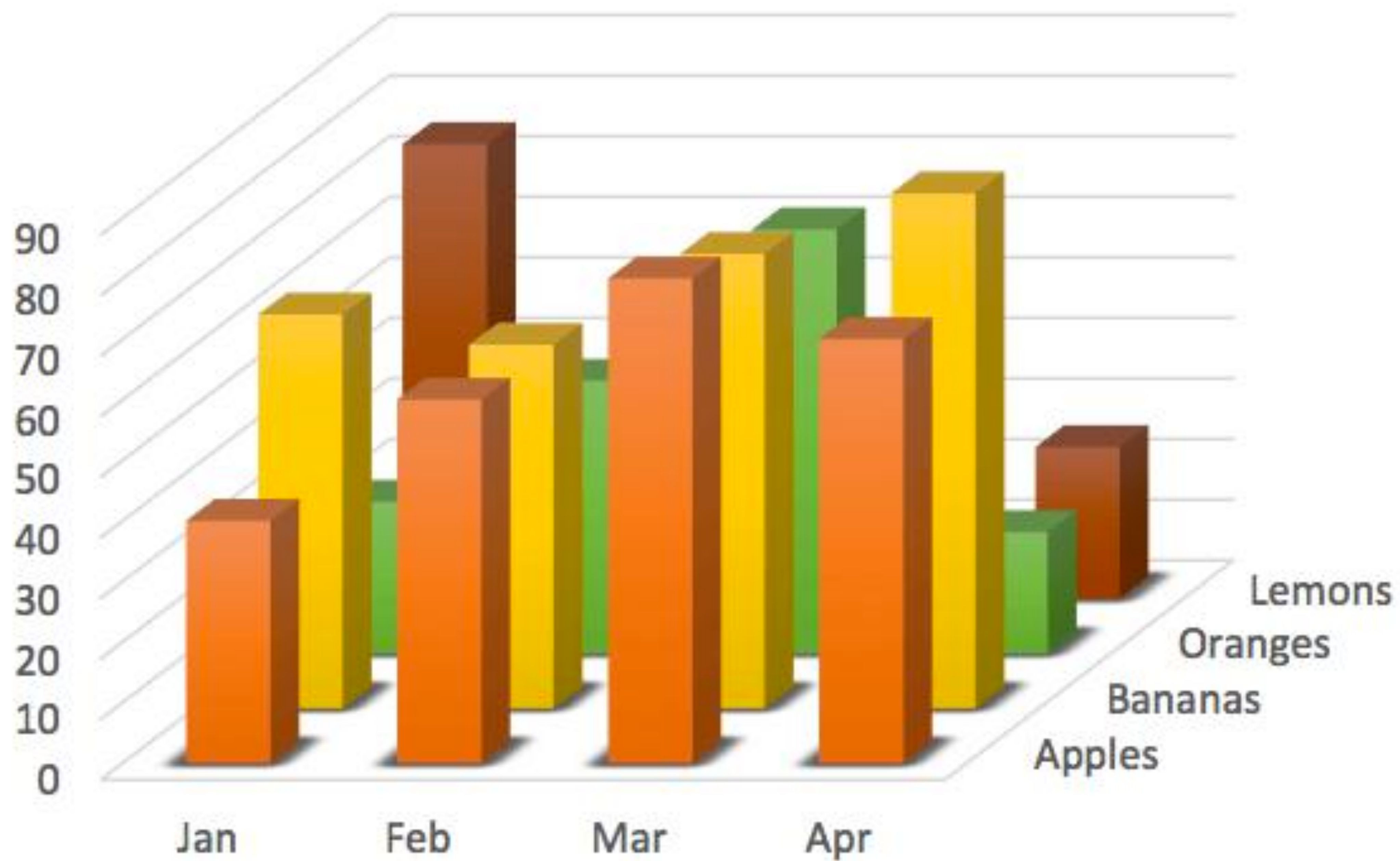
Shaping the truth

Administration Takes
27% of each dollar!

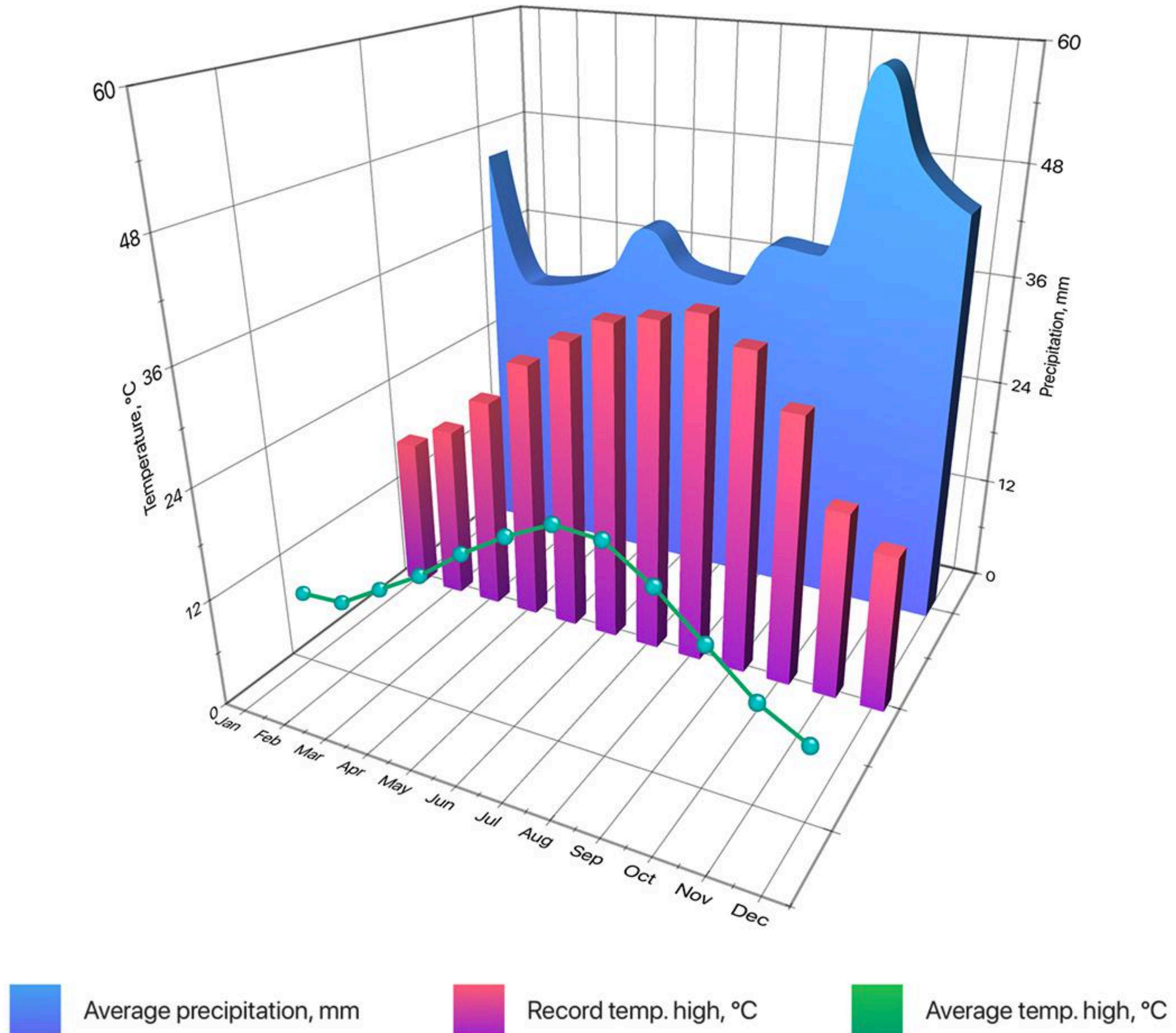


Administration
Expenses are Minimal





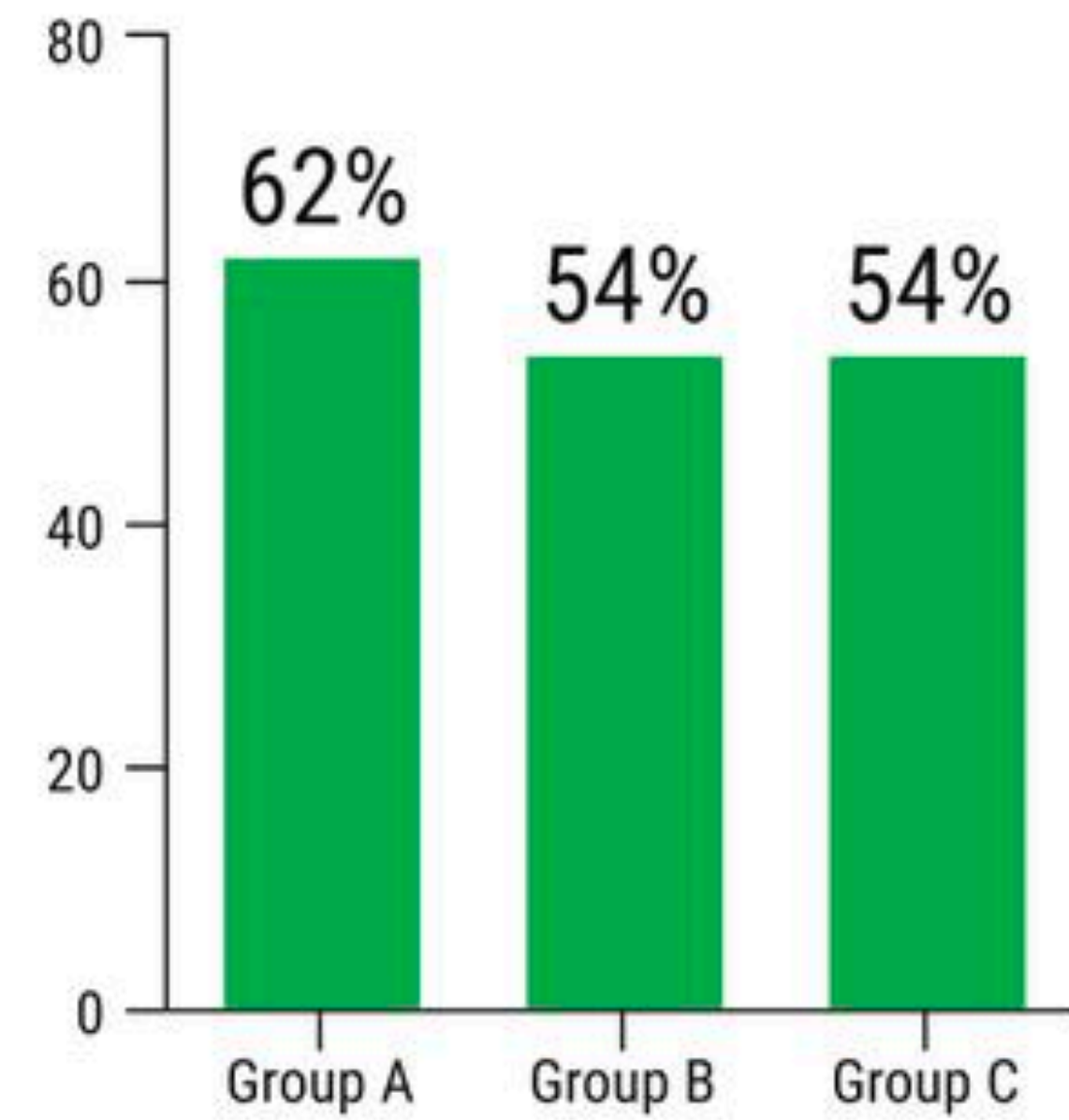
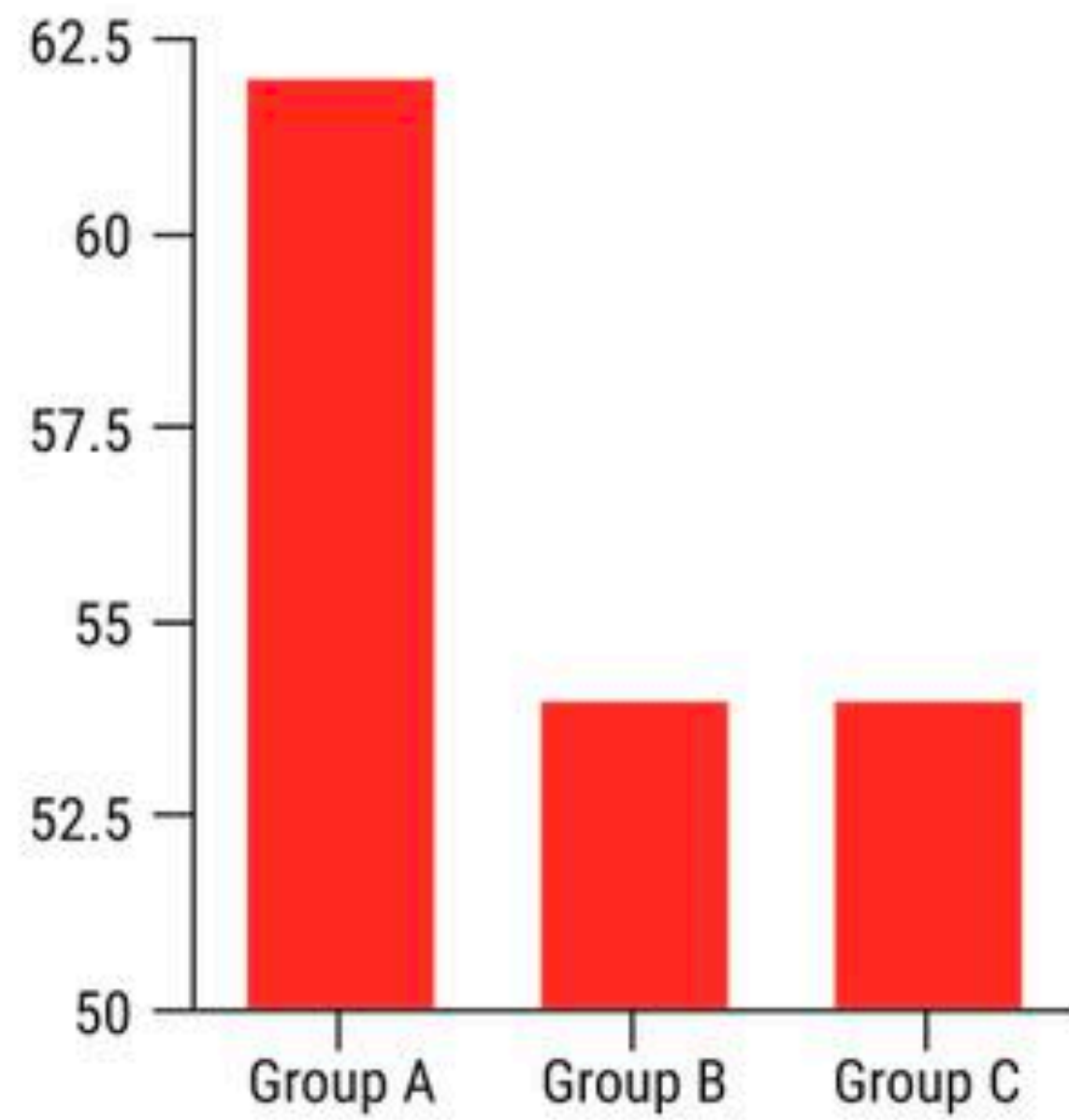
Climate data for London Heathrow (1981–present)



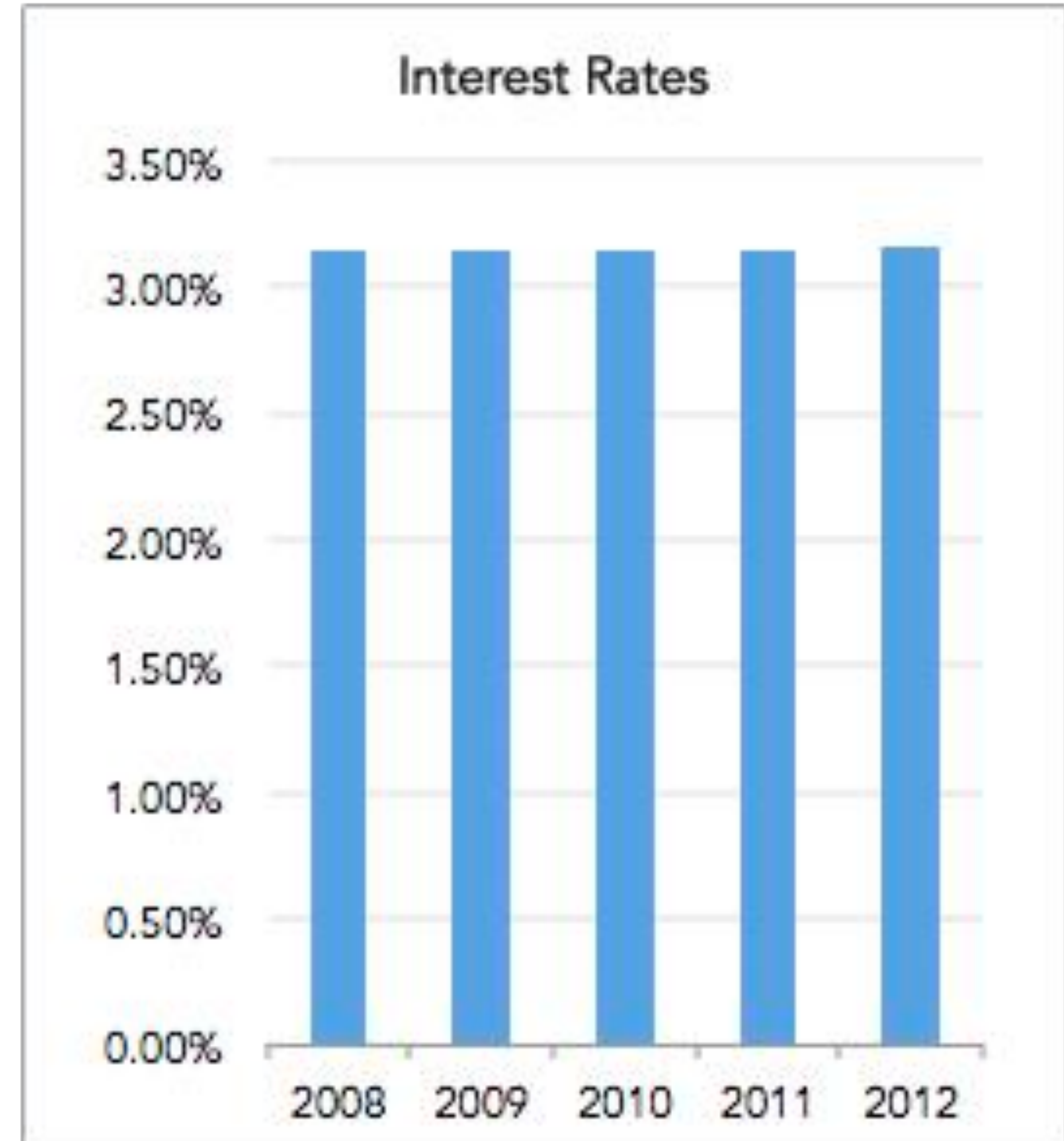
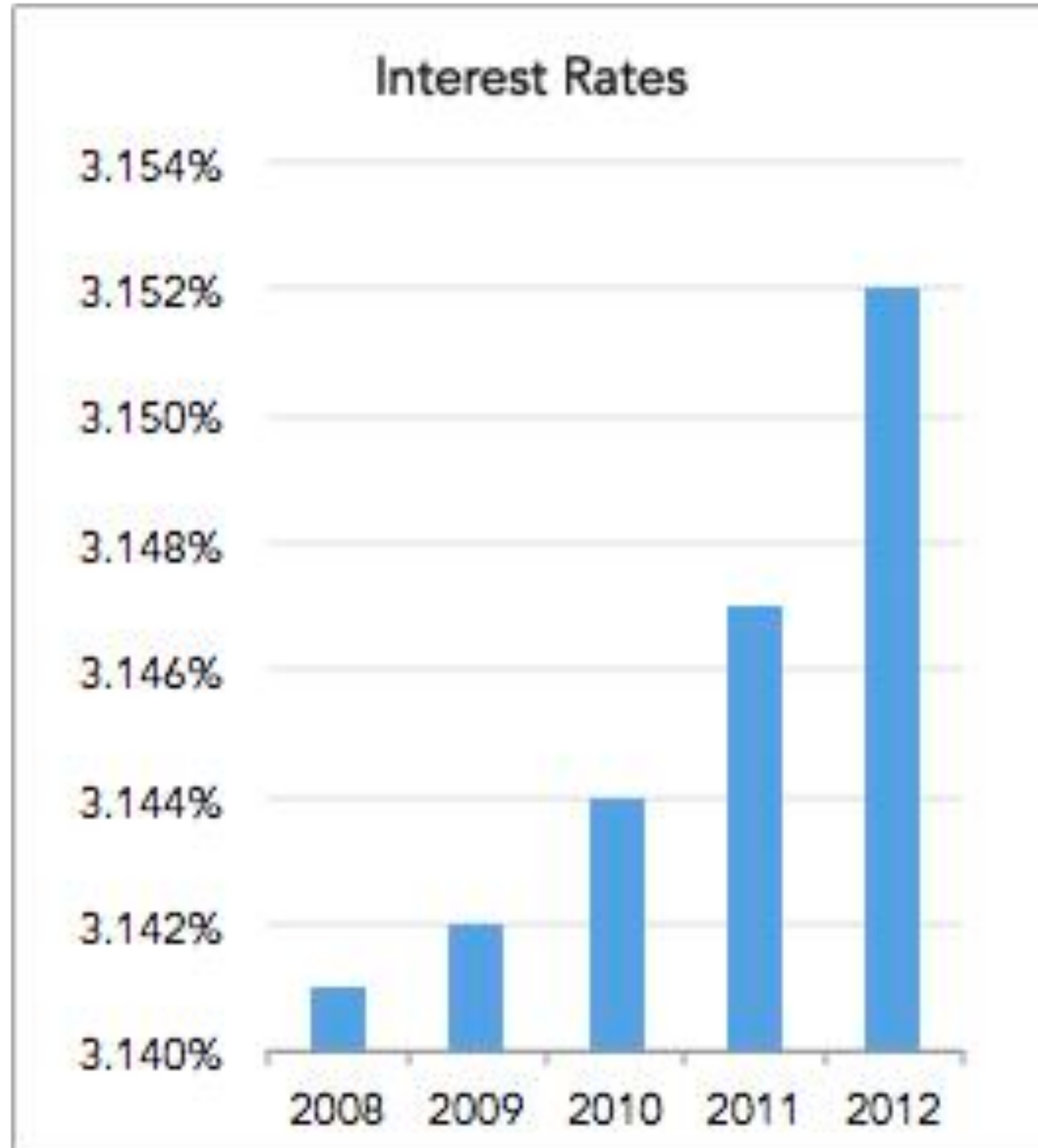
Omitting the Baseline

Cutting off the Y-axis

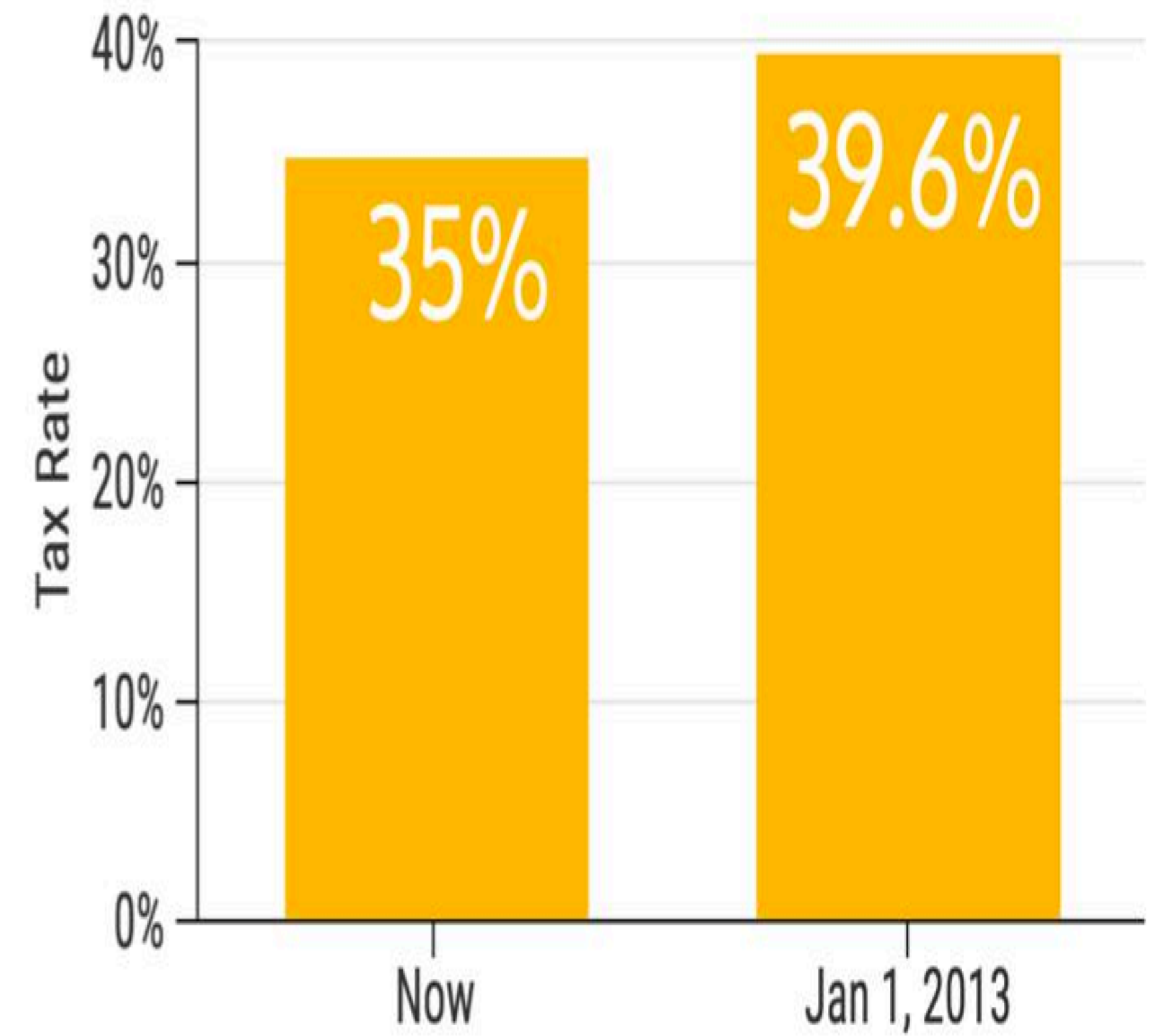
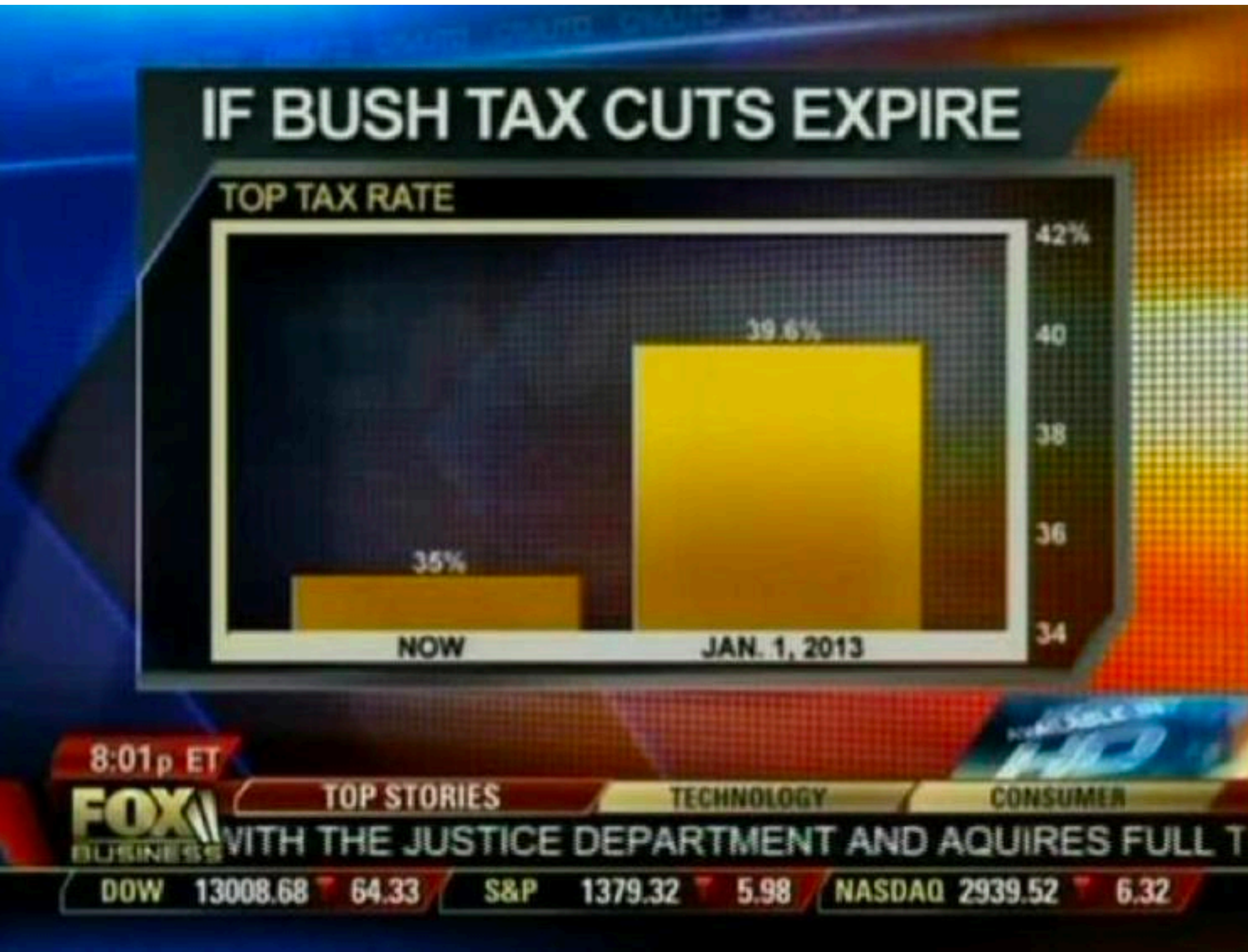
Shifting Baseline



Same data, different Y-Axis

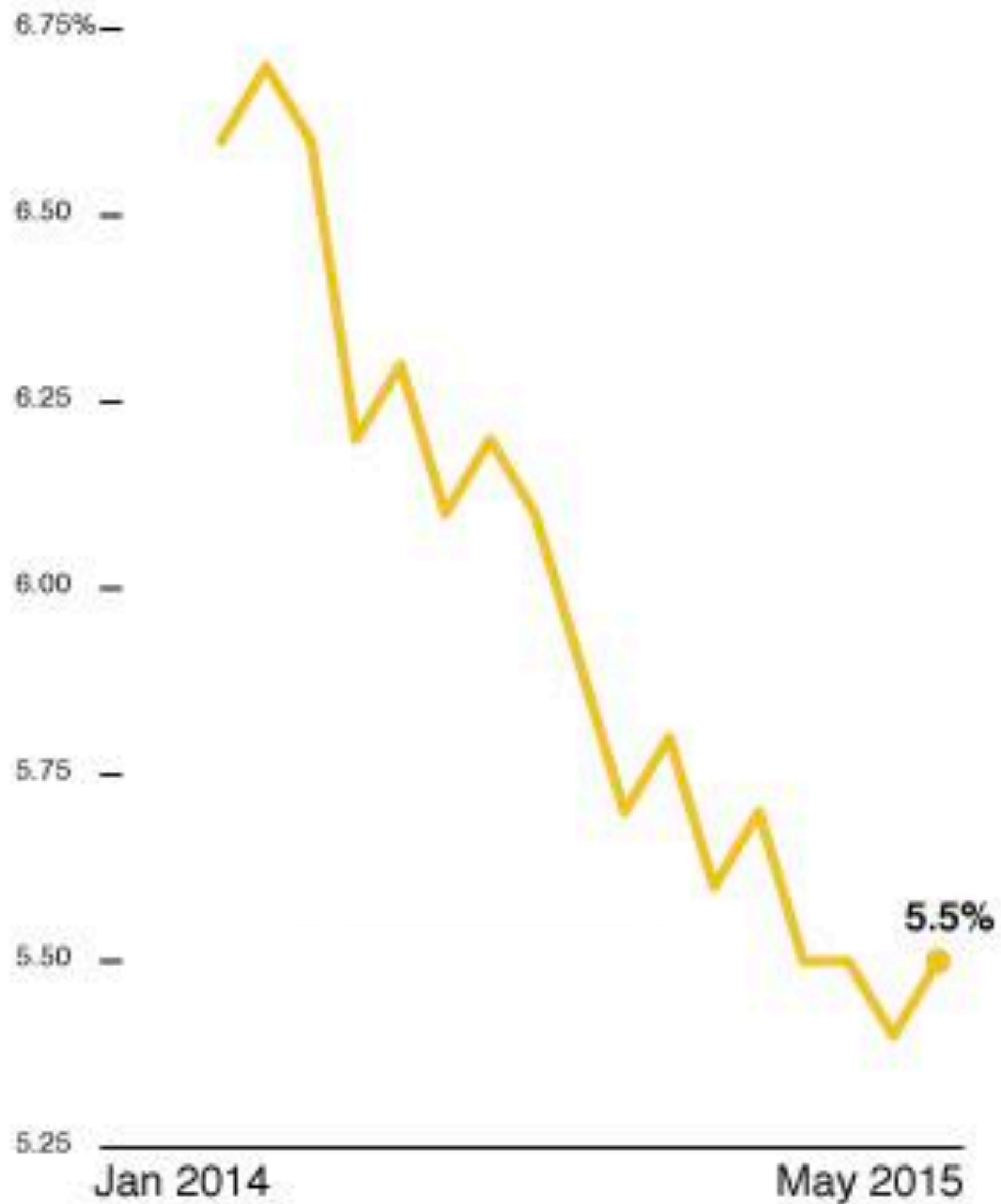


Exaggerating Political Impacts

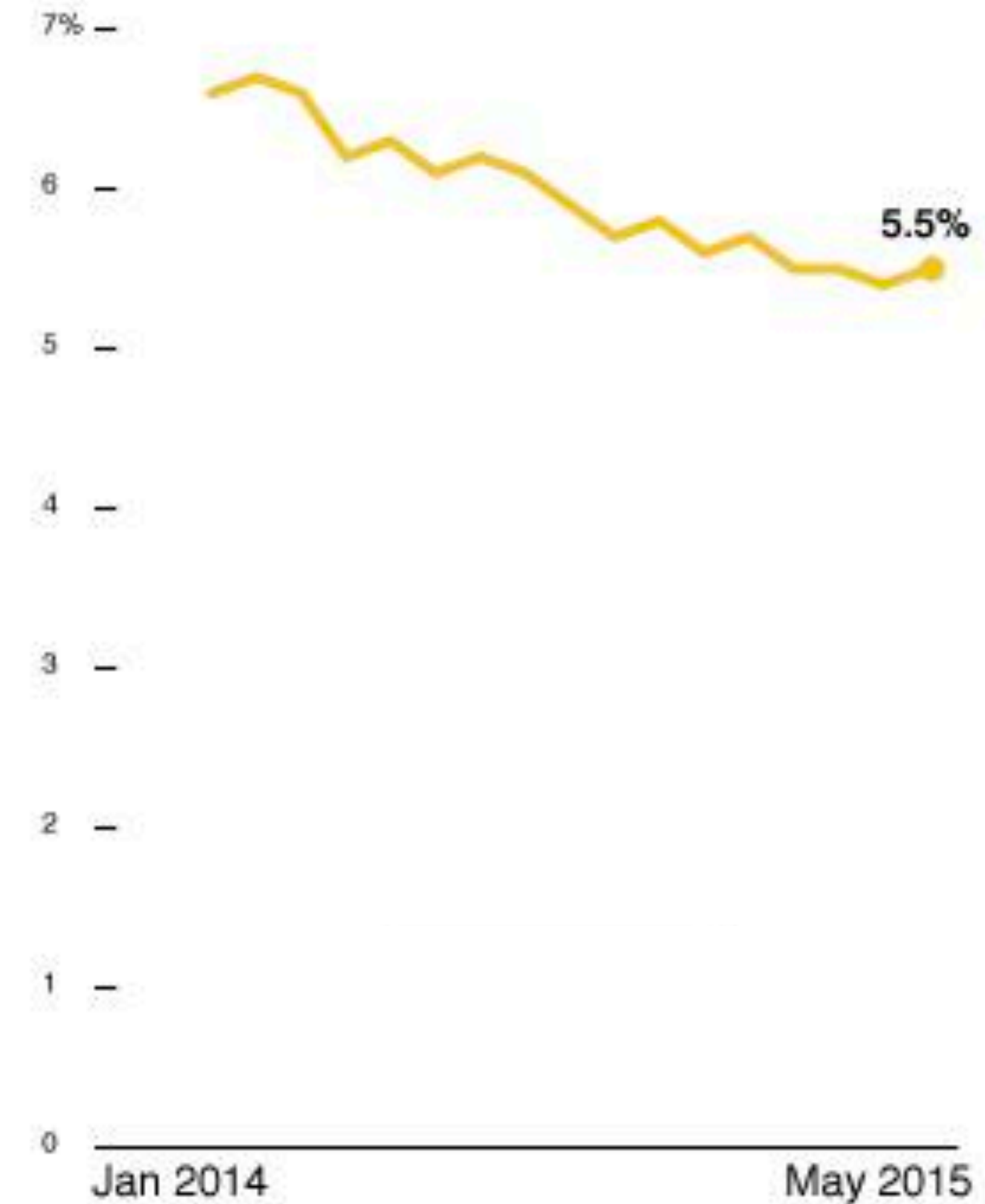


Same data, different Y-Axis

US GDP



US GDP



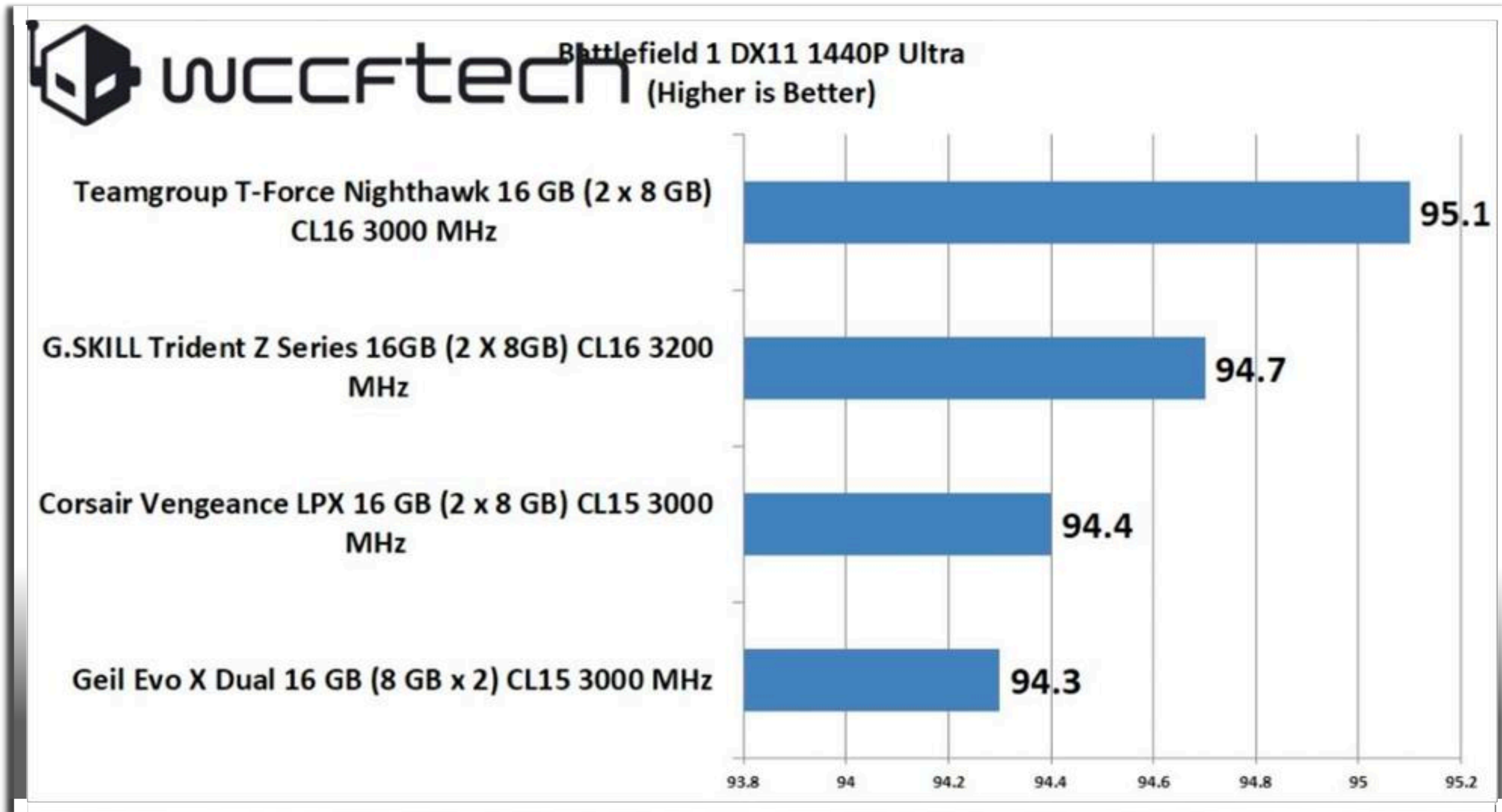
Unfair Comparison in Product Sales

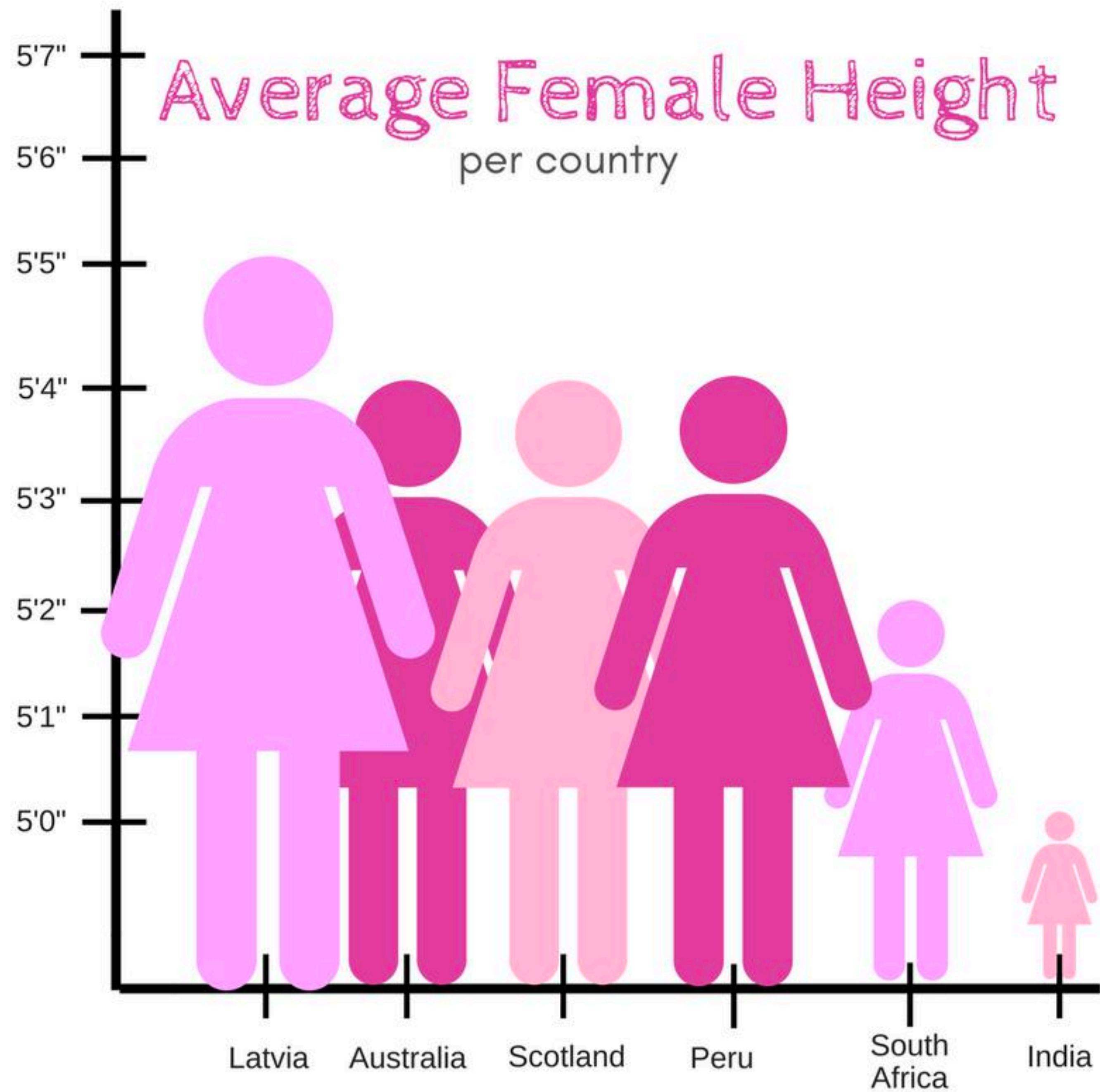
Food industry



Unfair Comparison in Product Sales

Tech industry

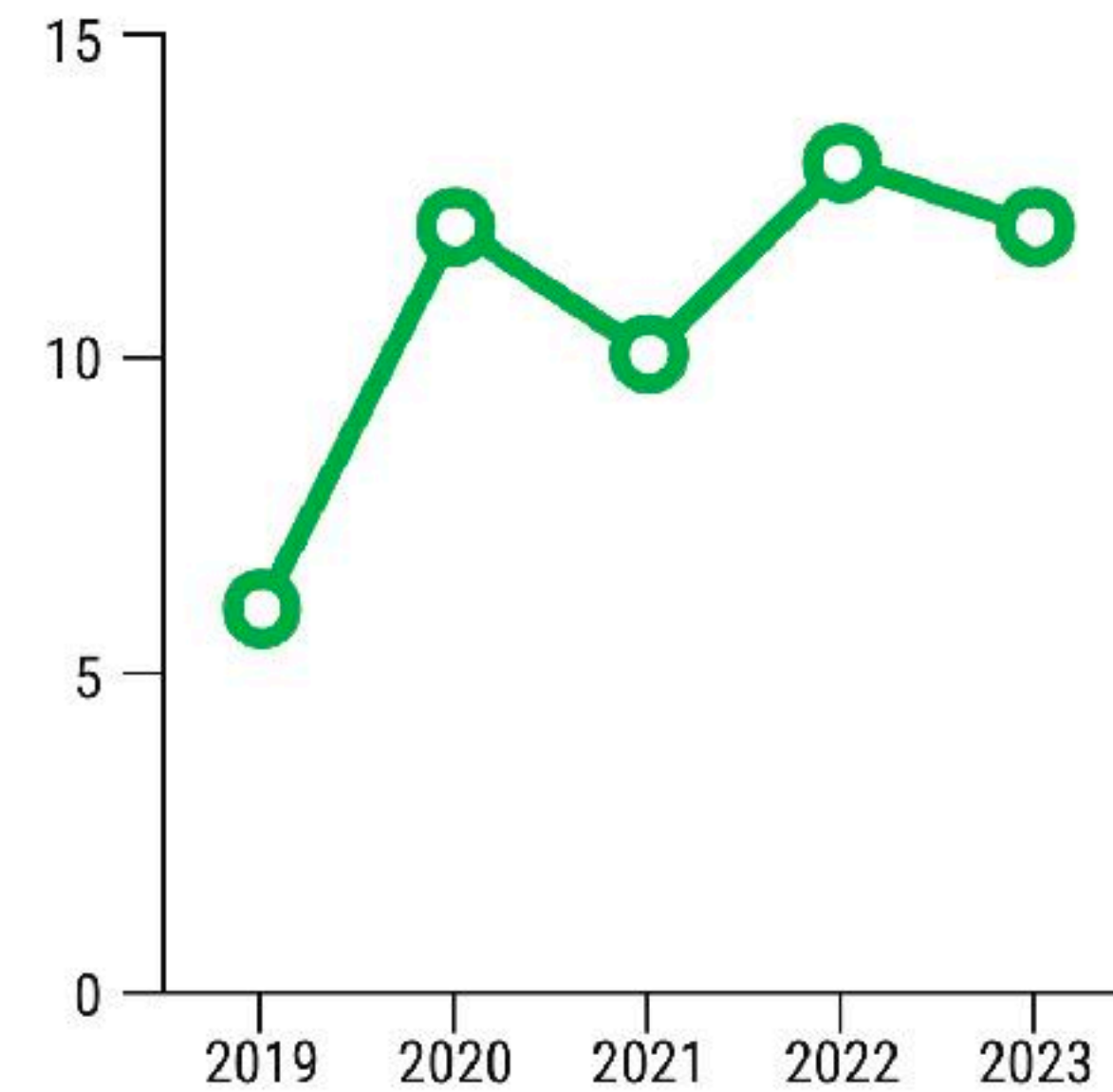
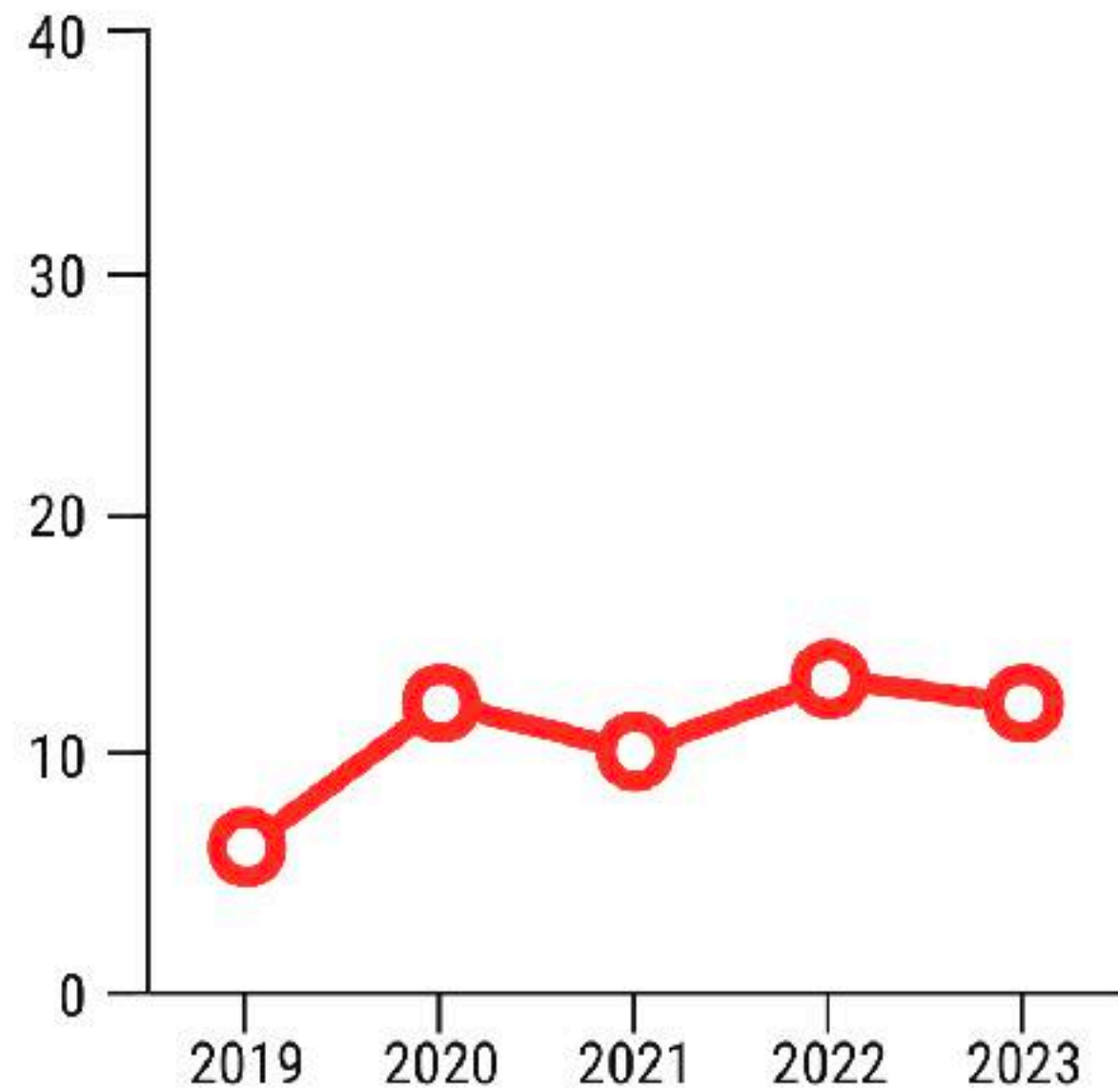




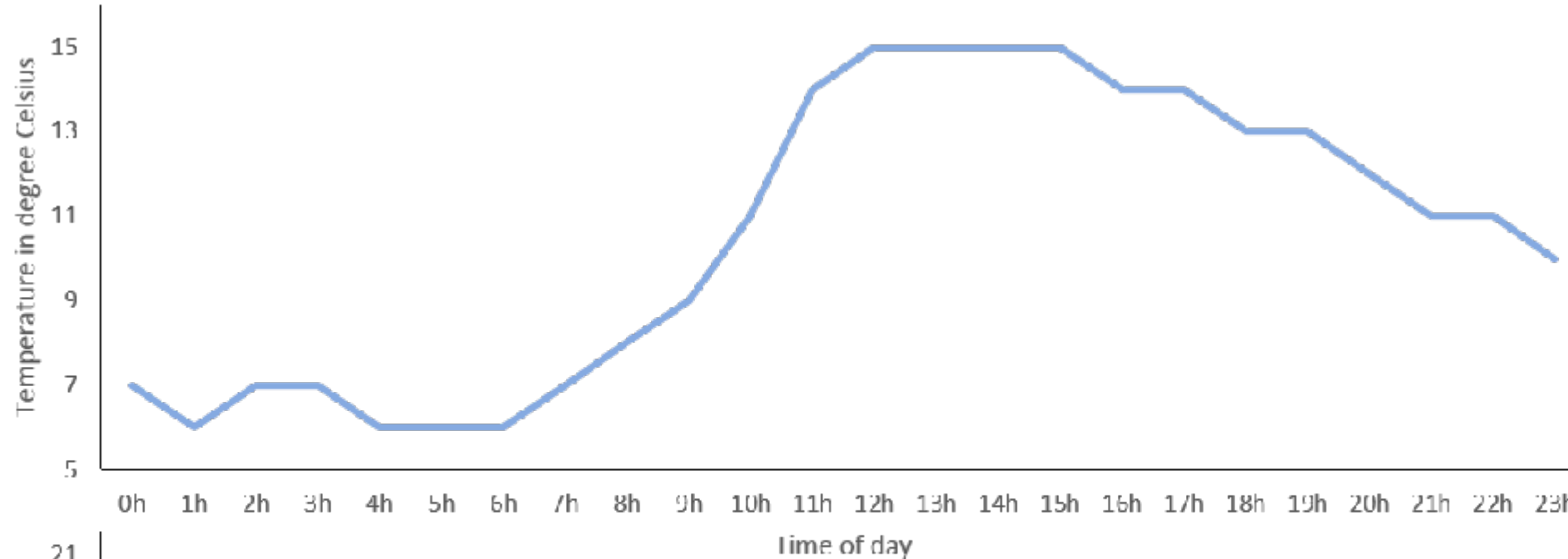
Shifting Scales

Manipulating the Y-axis

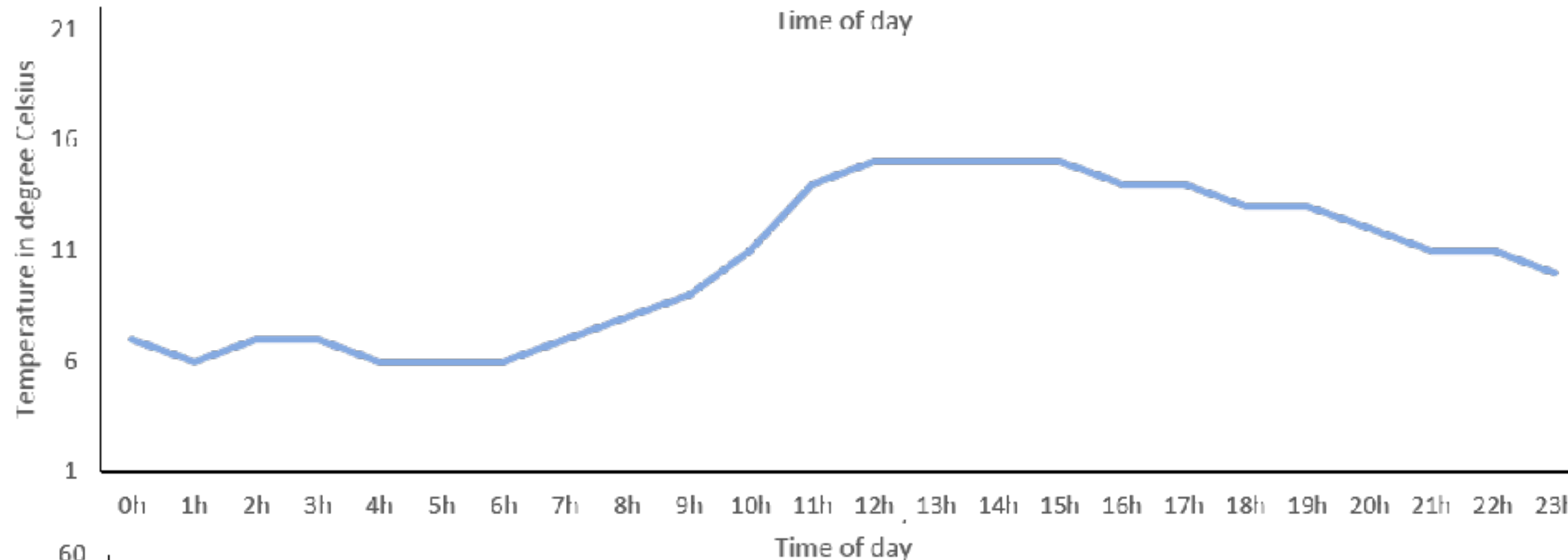
Manipulating the Y-Axis



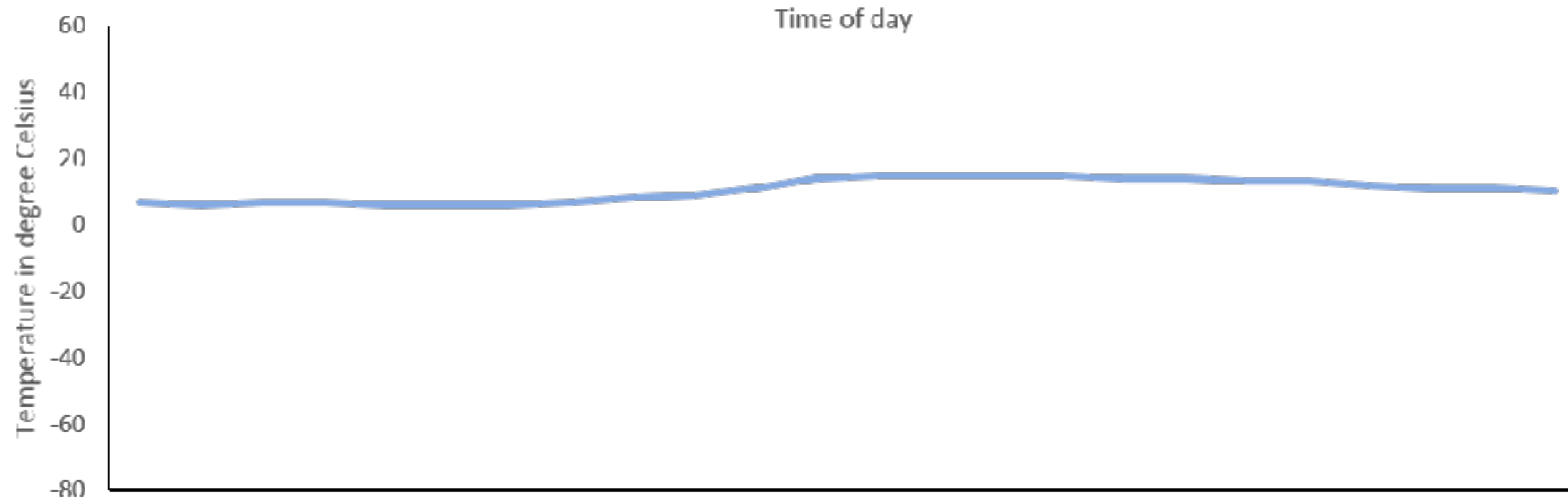
Temperature by the time of day



Y-Asis: +5C ... +15C



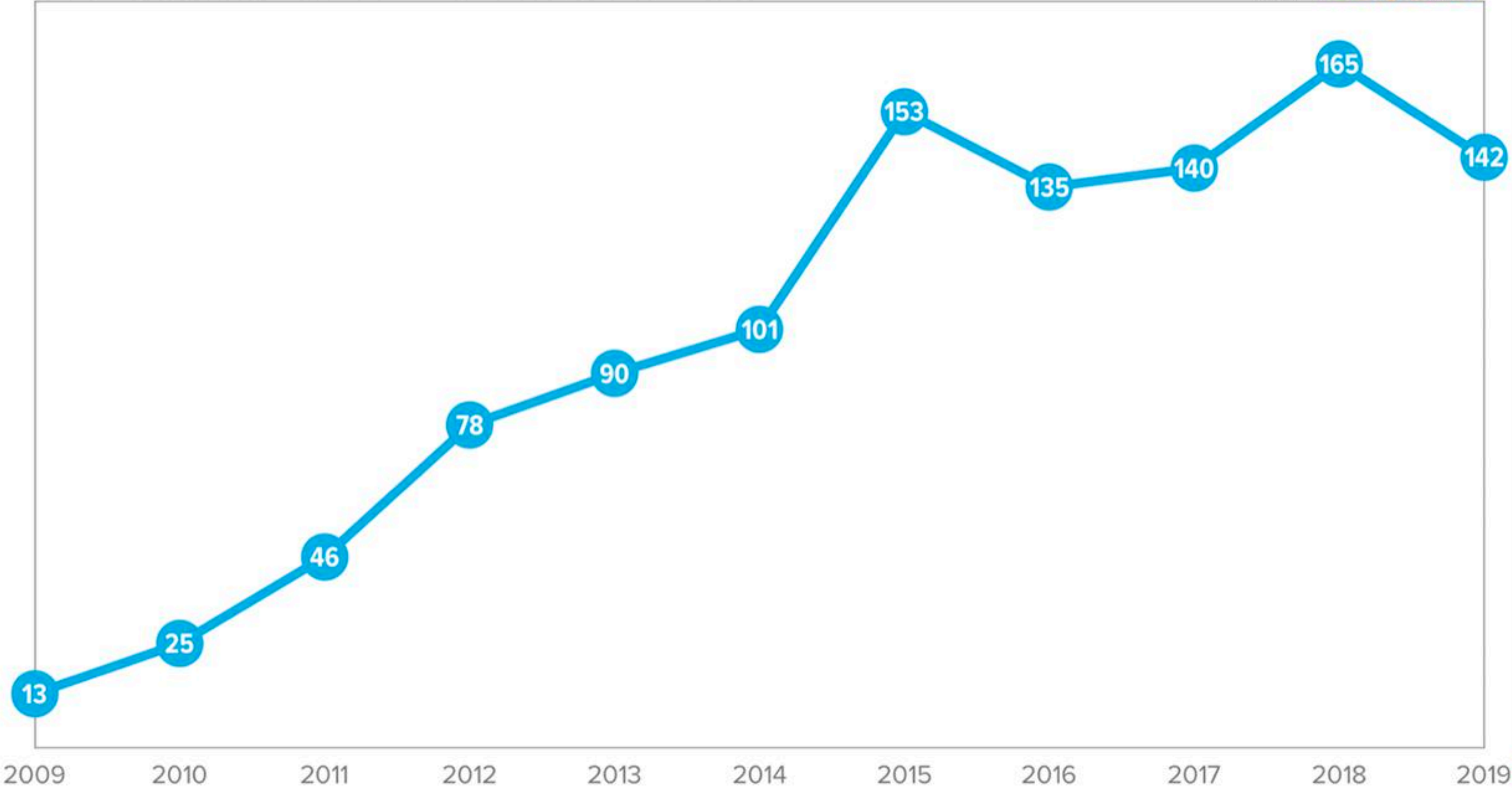
Y-Asis: +1C ... +21C



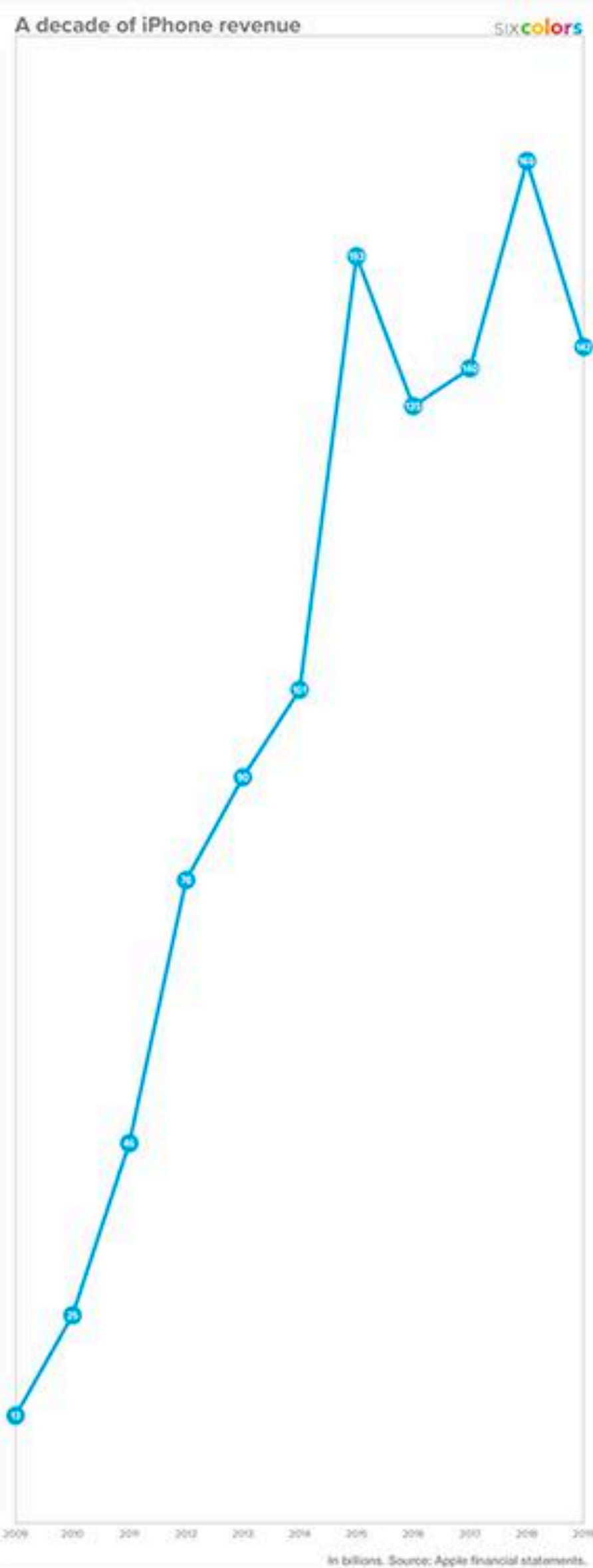
Y-Asis: -80C ... +60C

A decade of iPhone revenue

SIXcolors

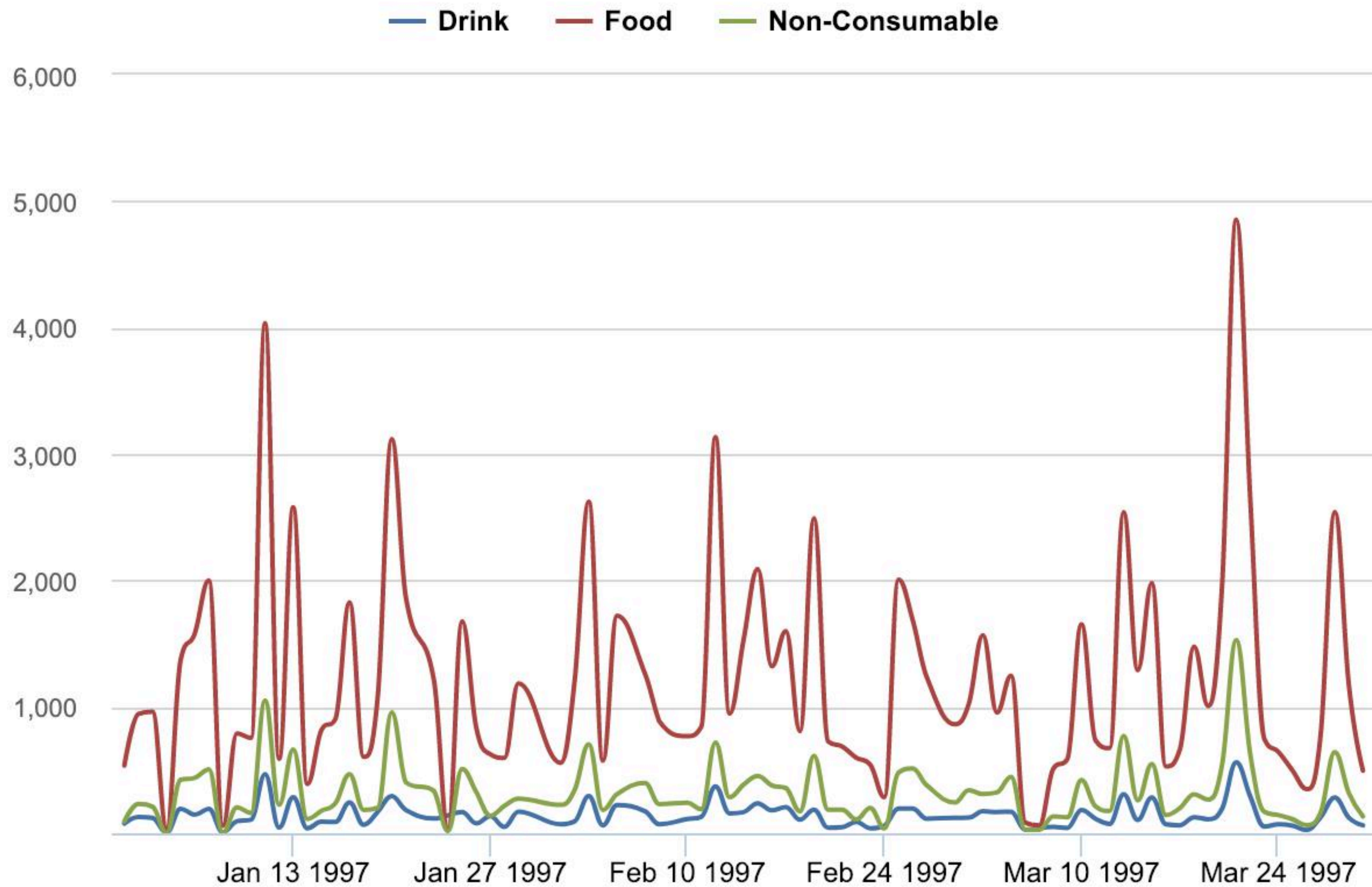


In billions. Source: Apple financial statements.



In billions. Source: Apple financial statements.

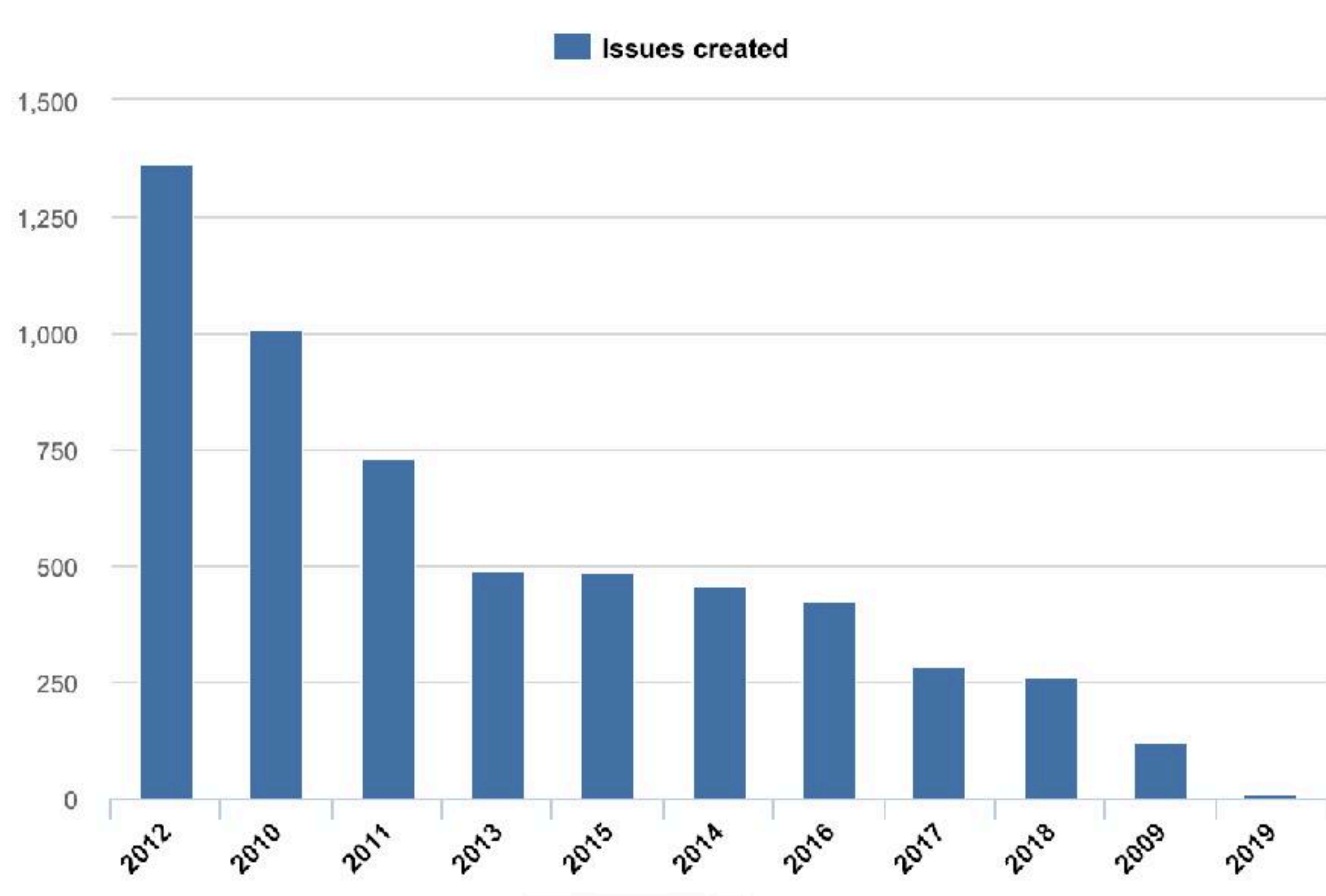
TimeLine Charts



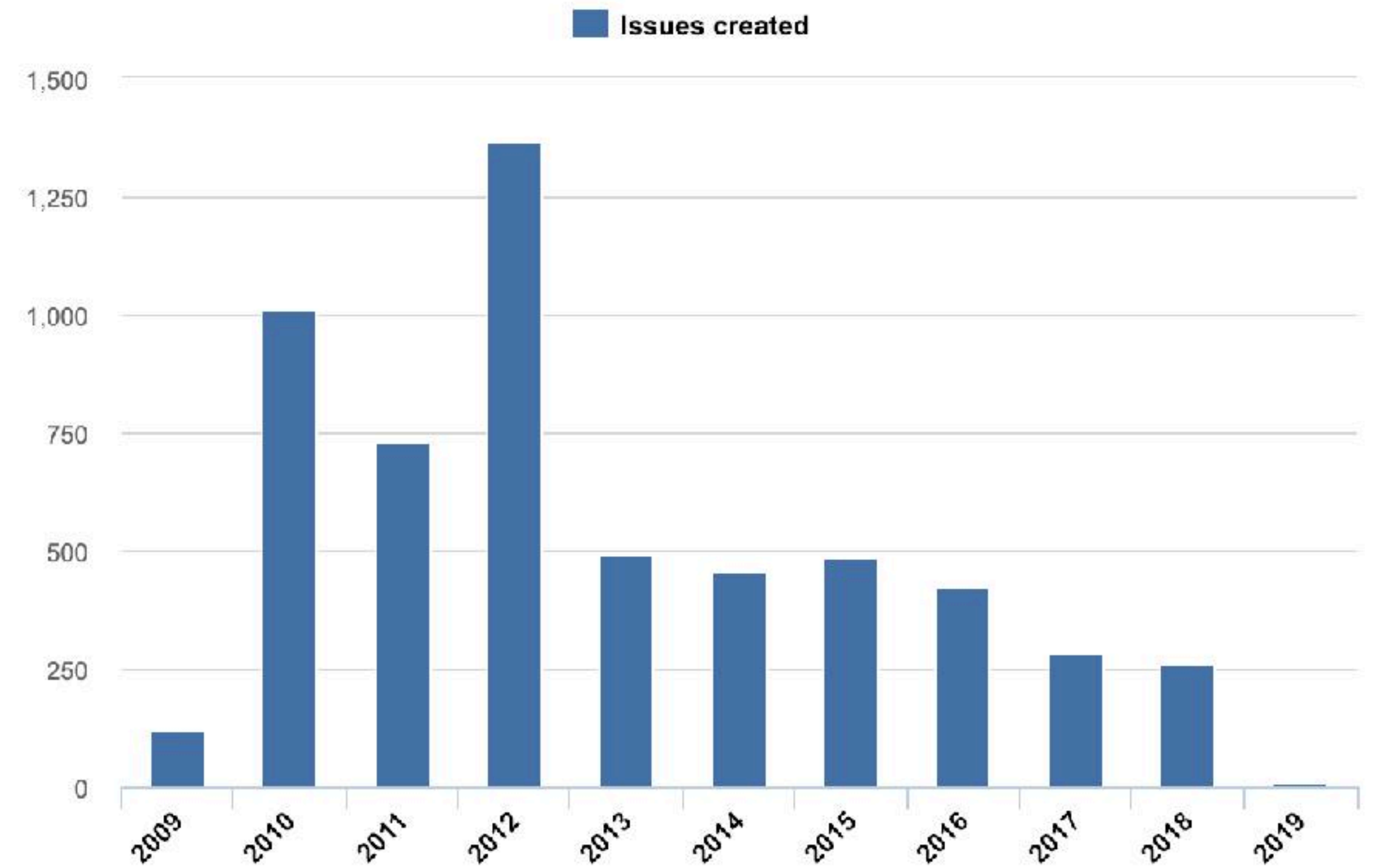
LIE #4

Going Against Conventions

Time axis sorted



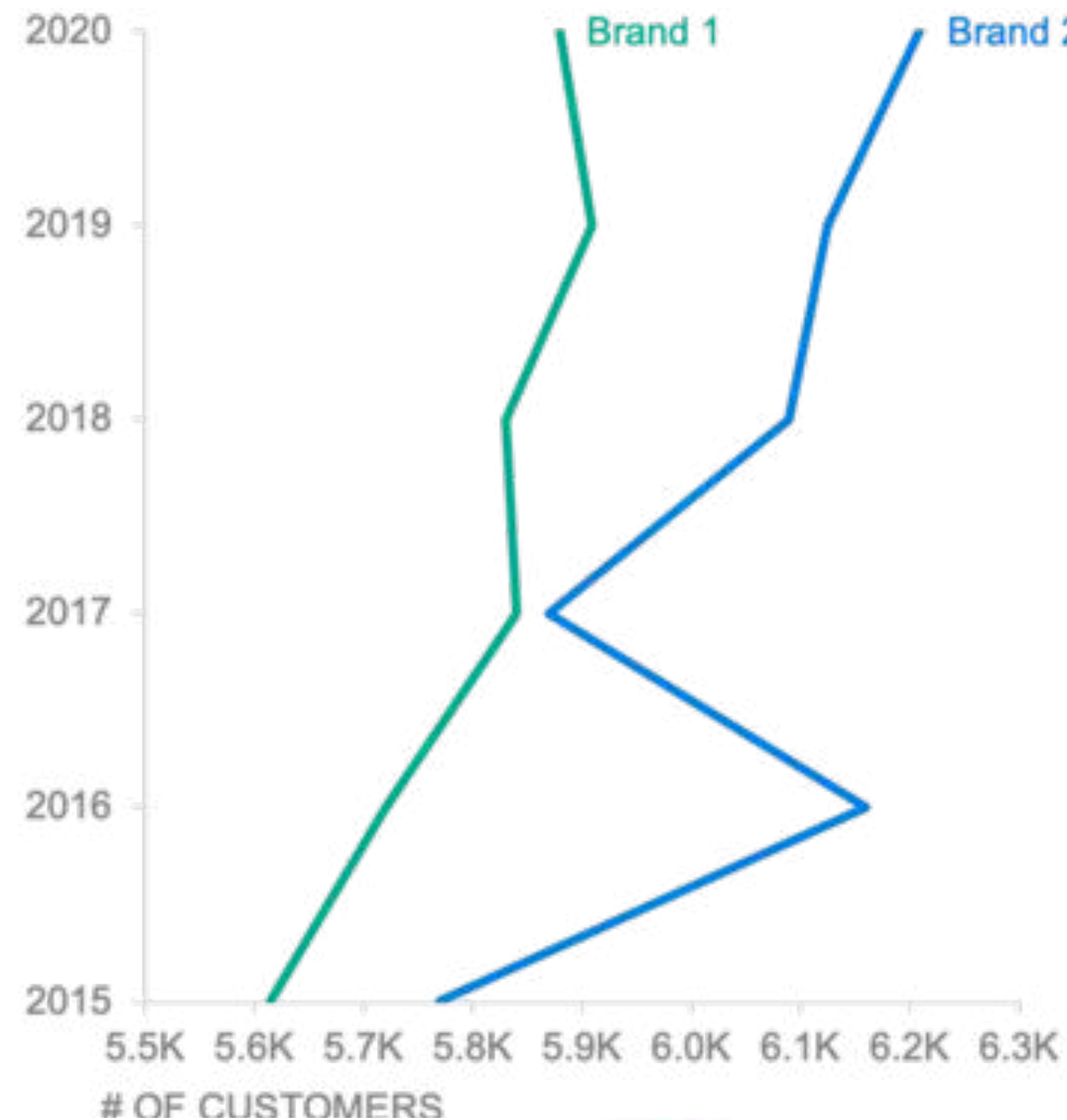
Chronological Data



Using Time on Y-axis

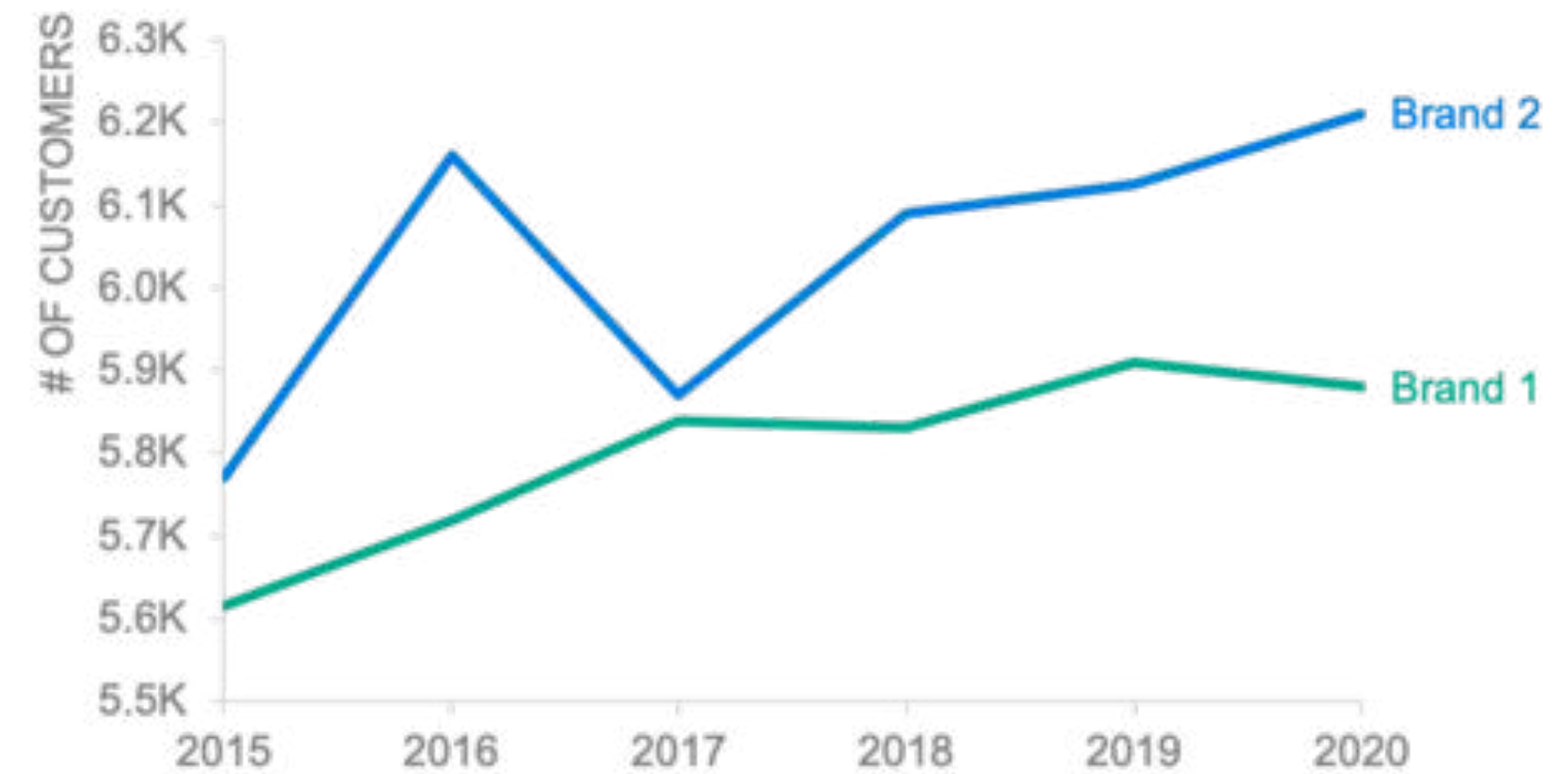
UNCONVENTIONAL TIME POSITION: Y-AXIS

Active customers: competitive analysis

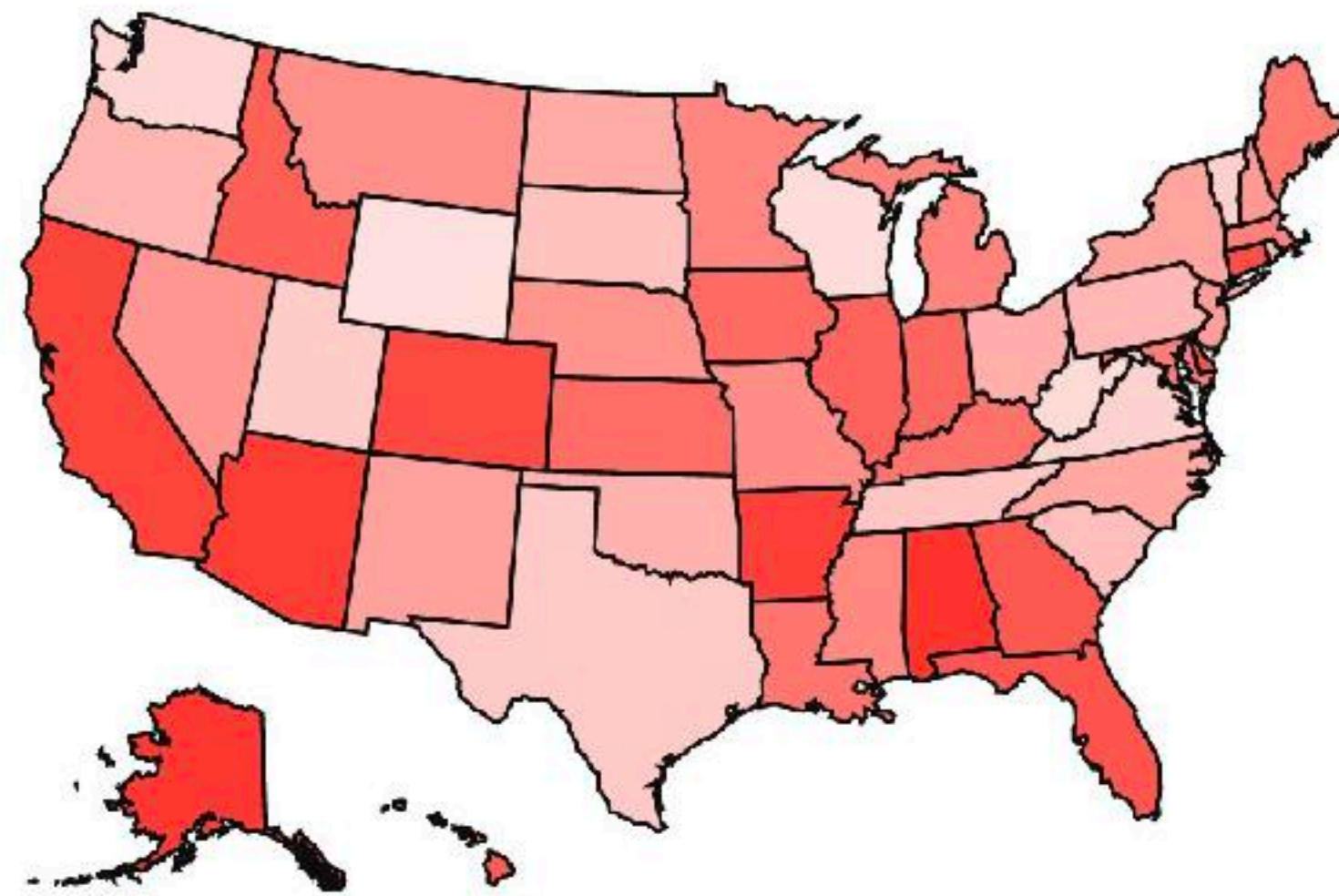


CONVENTIONAL TIME POSITION: X-AXIS

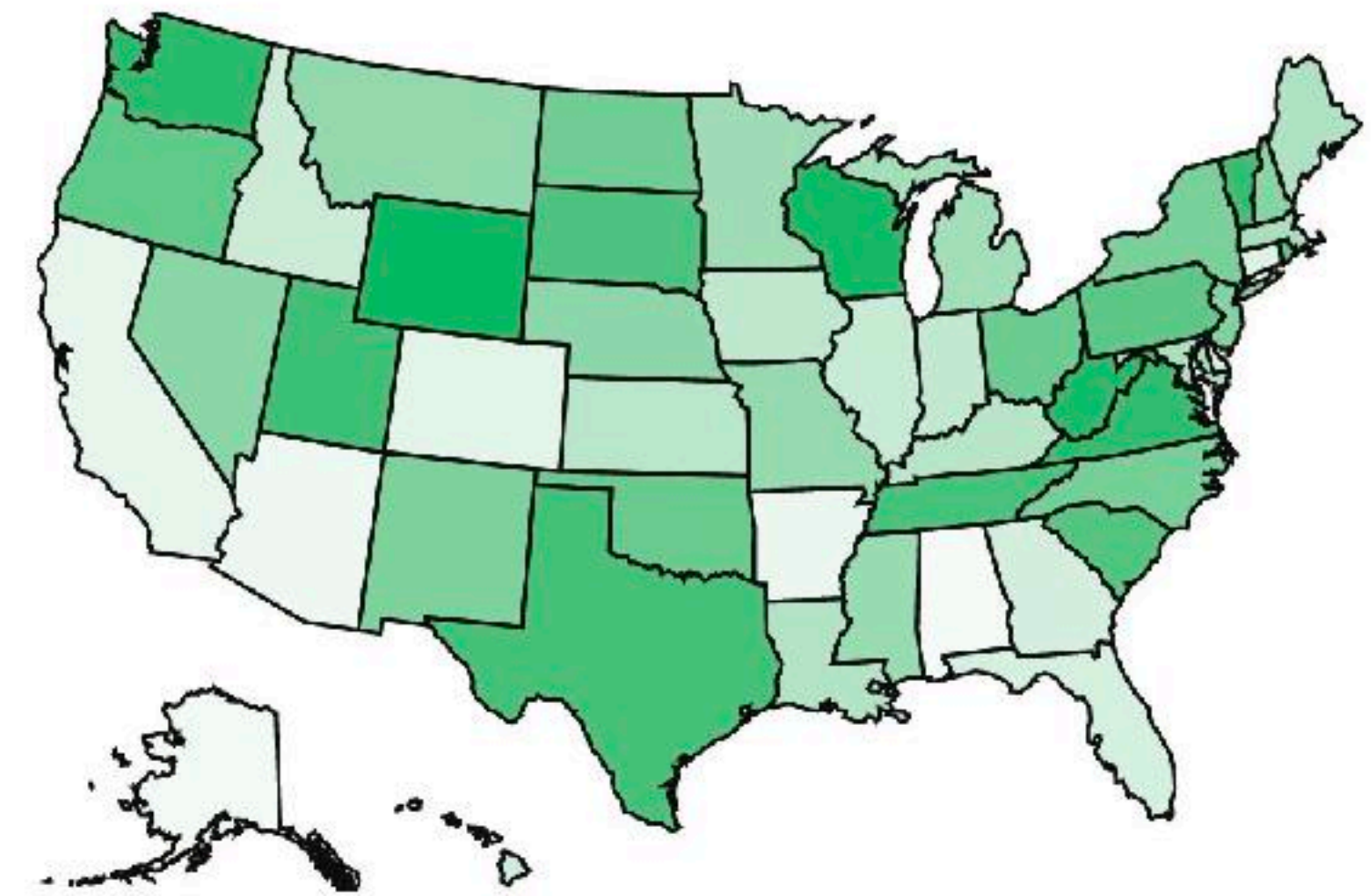
Active customers: competitive analysis



Darker Colors Usually Mean More



Individuals per km



Individuals per km

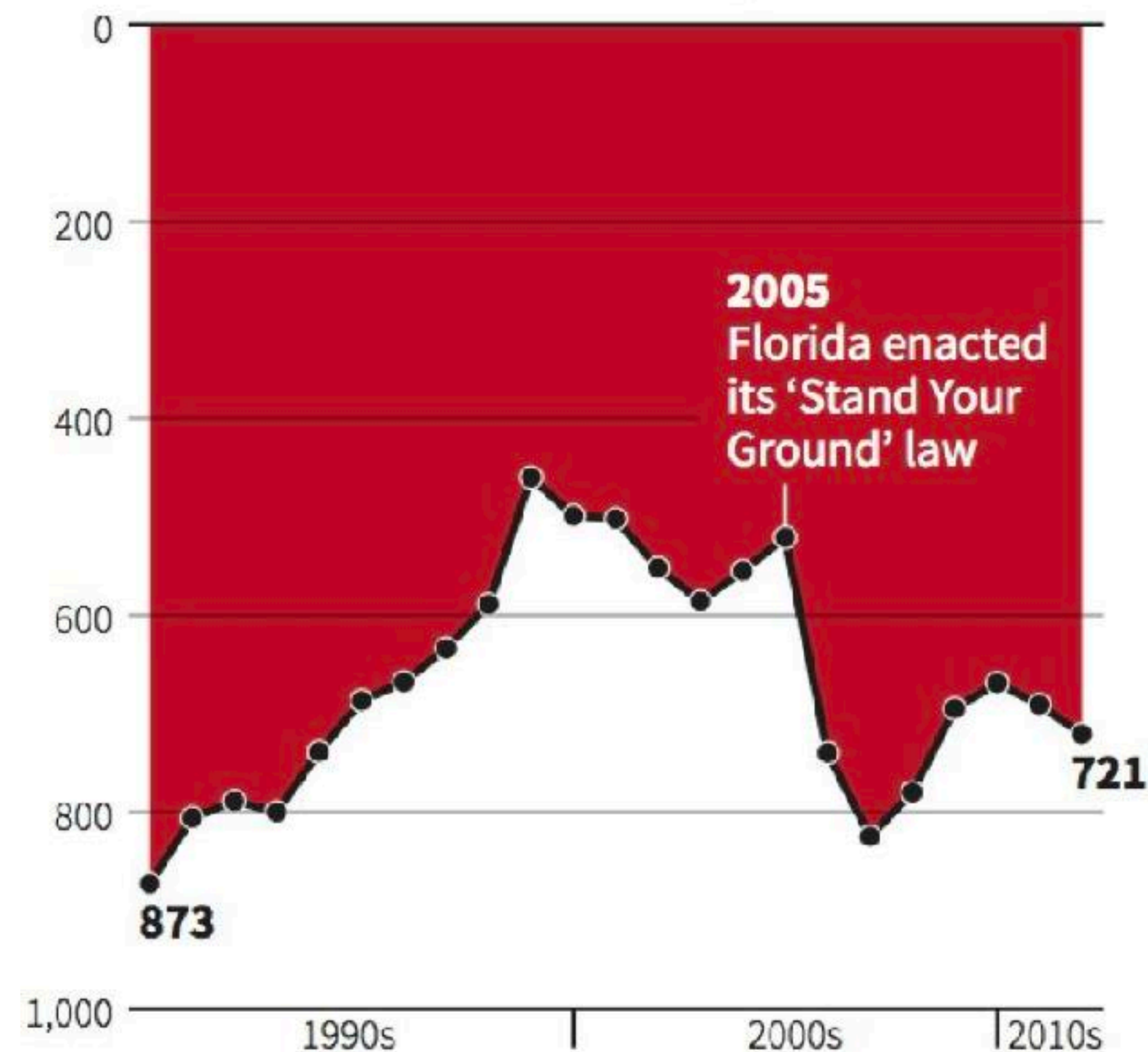


Initial Chart

Y-axis flipped

Gun deaths in Florida

Number of murders committed using firearms



Source: Florida Department of Law Enforcement

C. Chan 16/02/2014

REUTERS

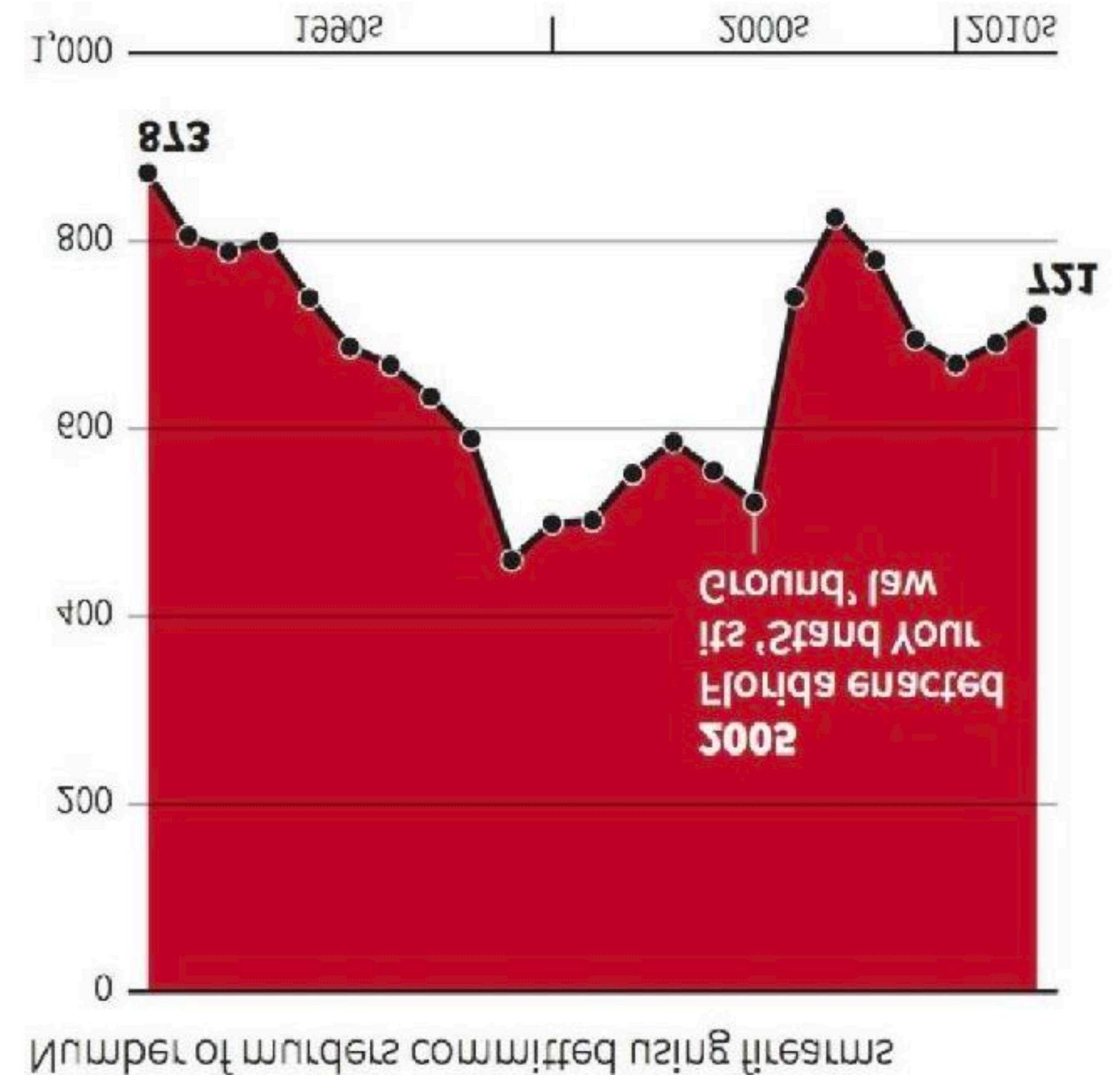
Correct

Y-axis as expected

C. Chan 16/02/2014

REUTERS

Source: Florida Department of Law Enforcement



Gun deaths in Florida

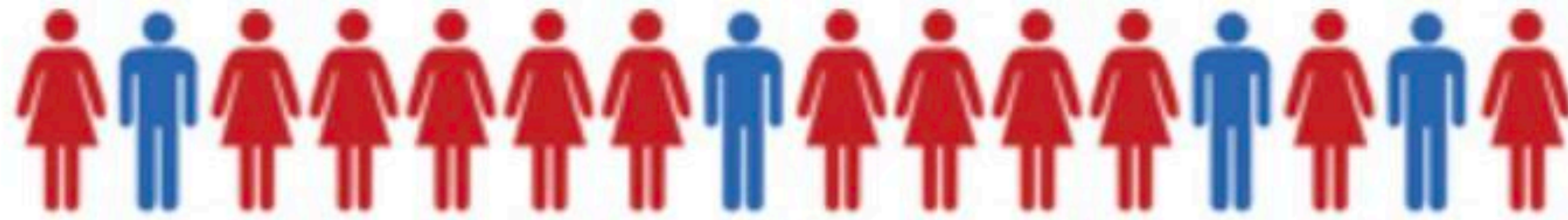
Biased (or too small) Sample Selection

Are You a Cat or a Dog Person?



Latest research shows **95%** of people **love dogs**, more than cats!

A Biased Sample Selection



12 females
75% female

4 males
25% male

A biased sample:



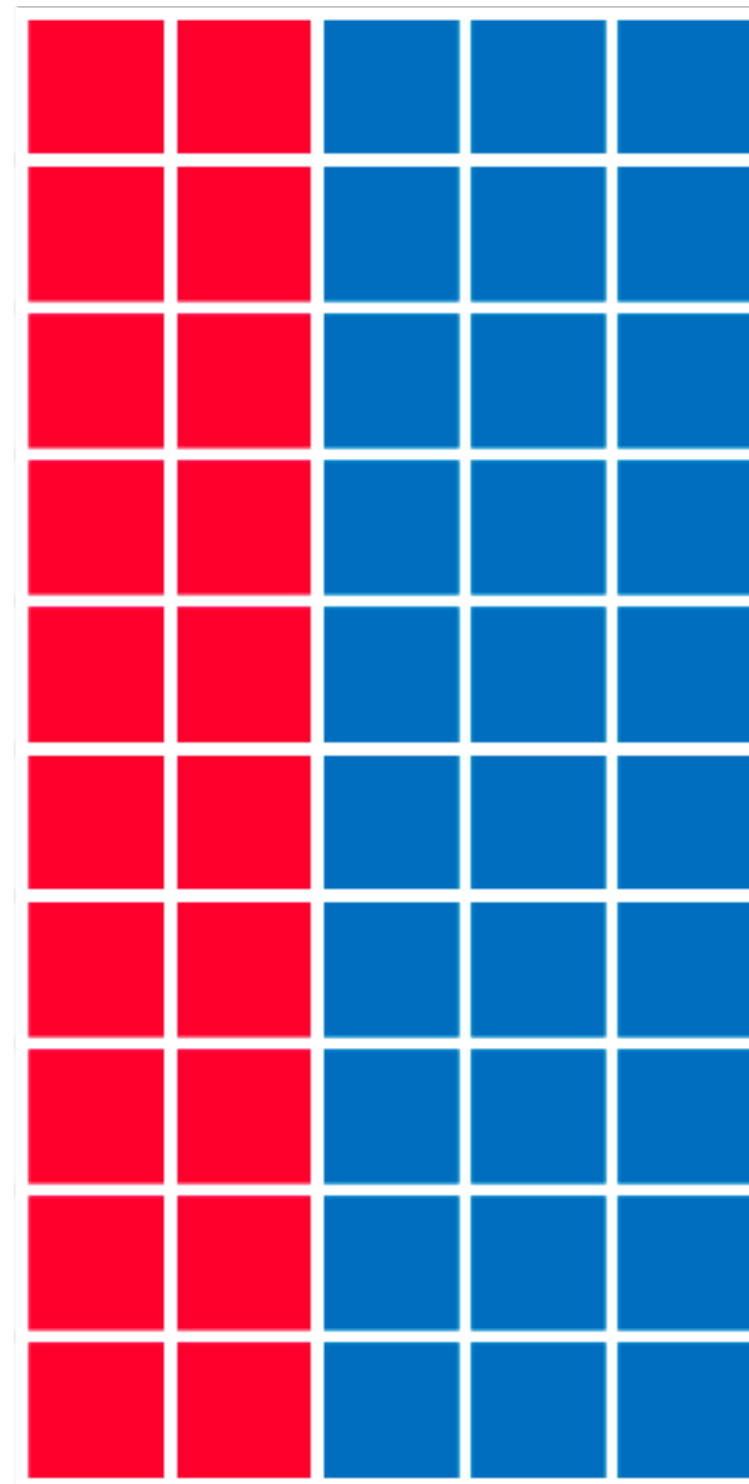
4 females
50% female

4 males
50% male

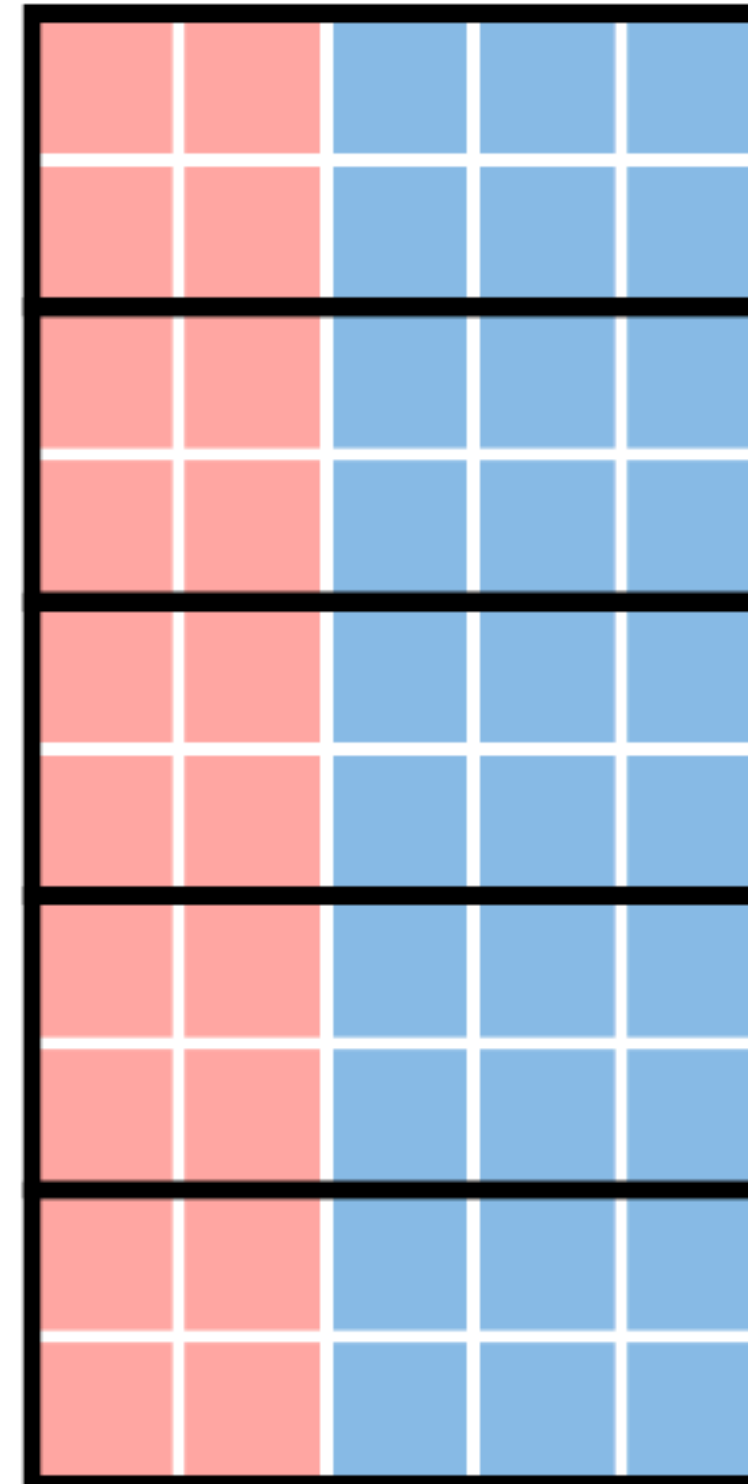
Does *not* accurately
represent the
population

A Biased Sample Selection

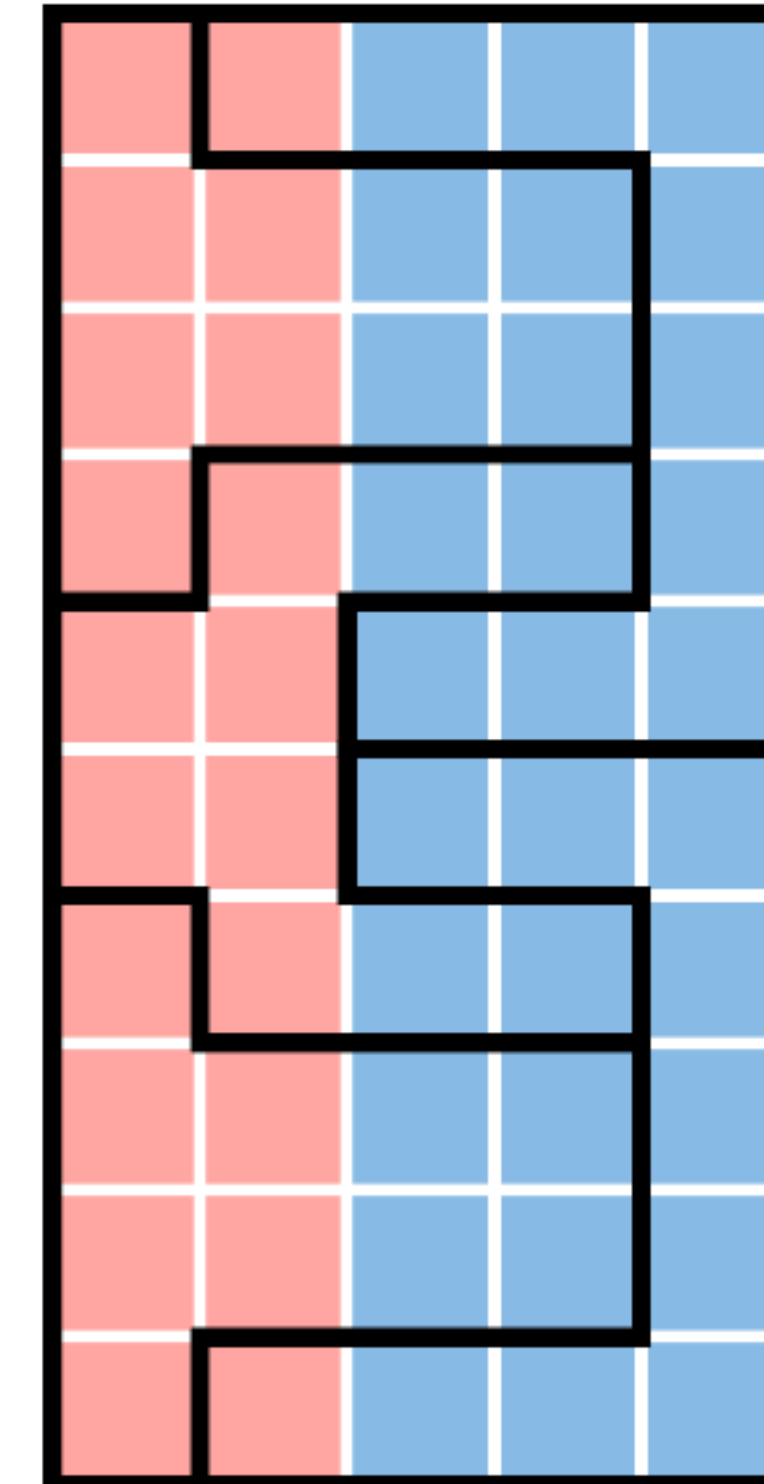
HOW TO STEAL AN ELECTION



50 PRECINCTS
60% BLUE
40% RED



5 DISTRICTS
5 BLUE
0 RED
BLUE WINS

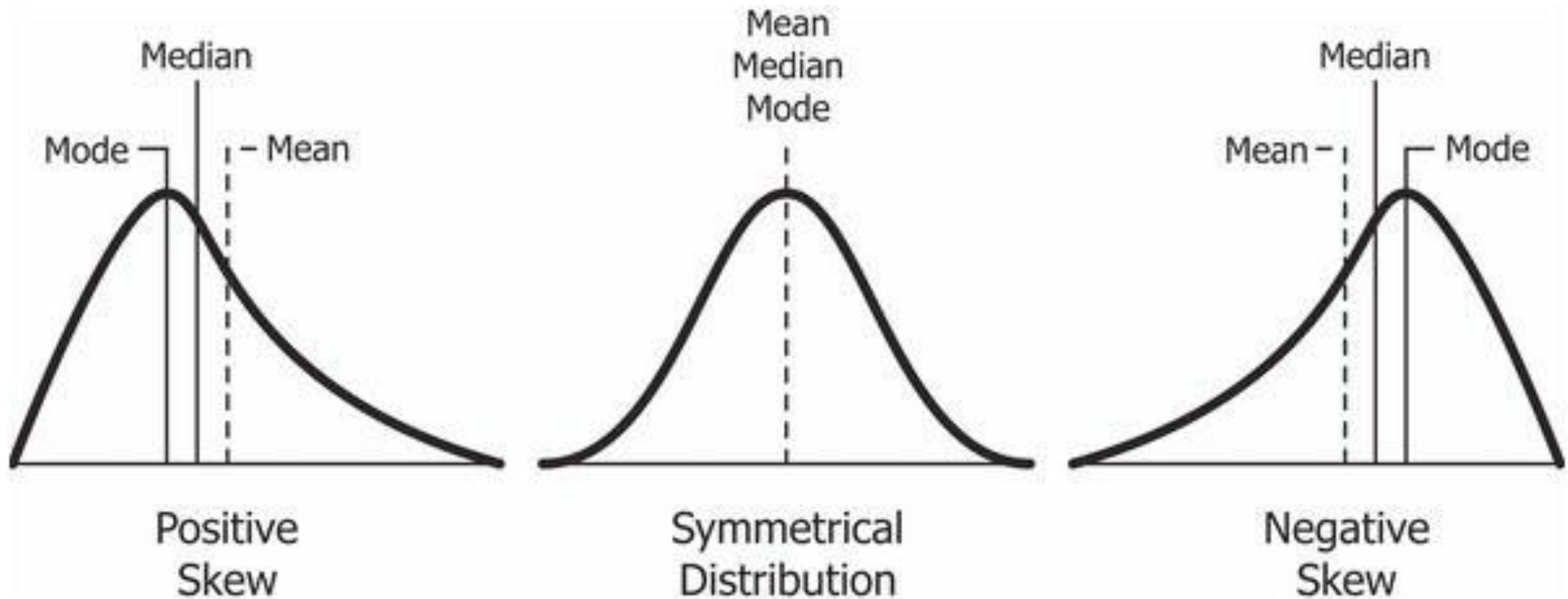


5 DISTRICTS
3 RED
2 BLUE
RED WINS

LIE #6

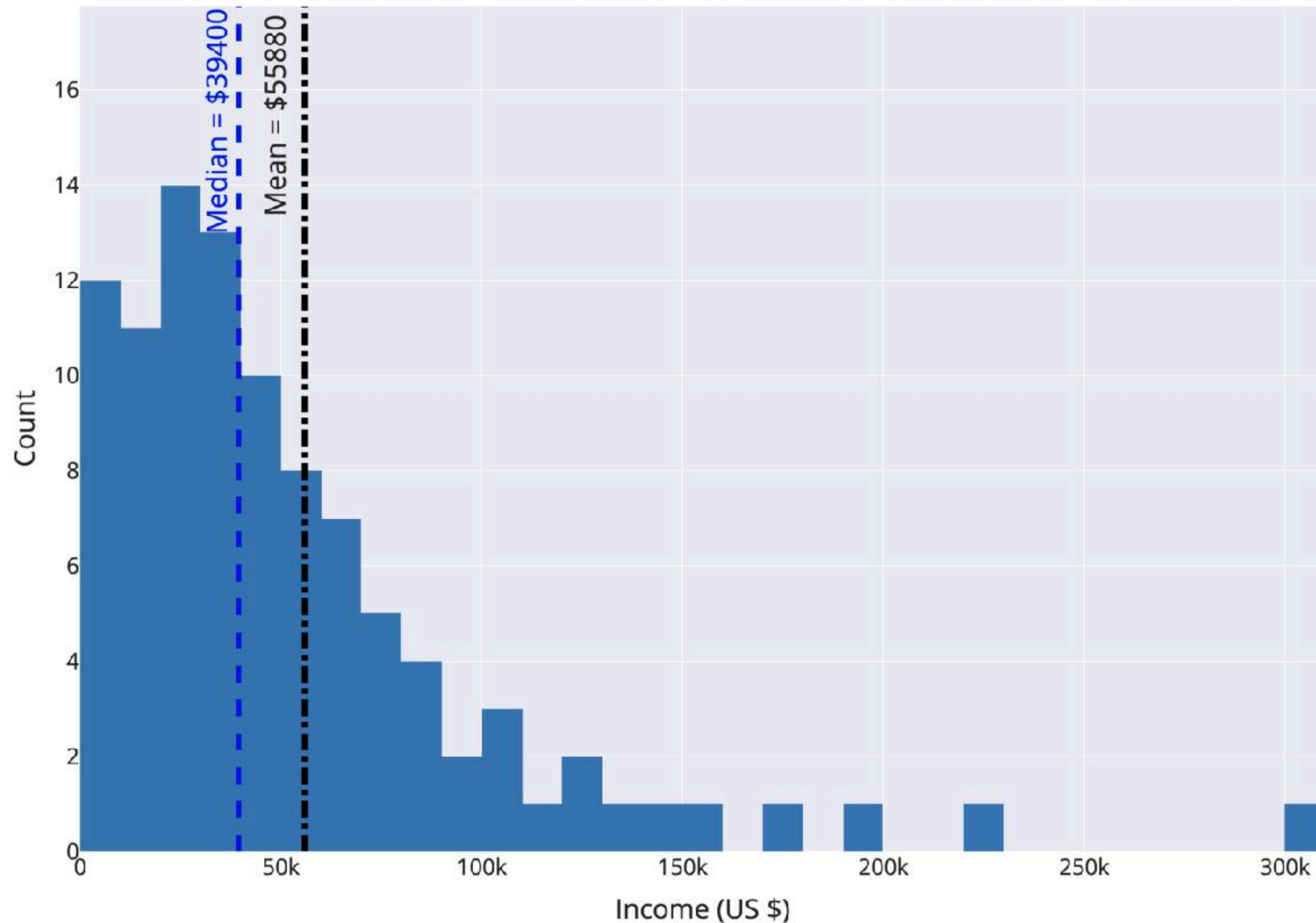
Averages

Which “Average” Are You Using?



Which “Average” Are You Using?

United States Income Distribution 2017



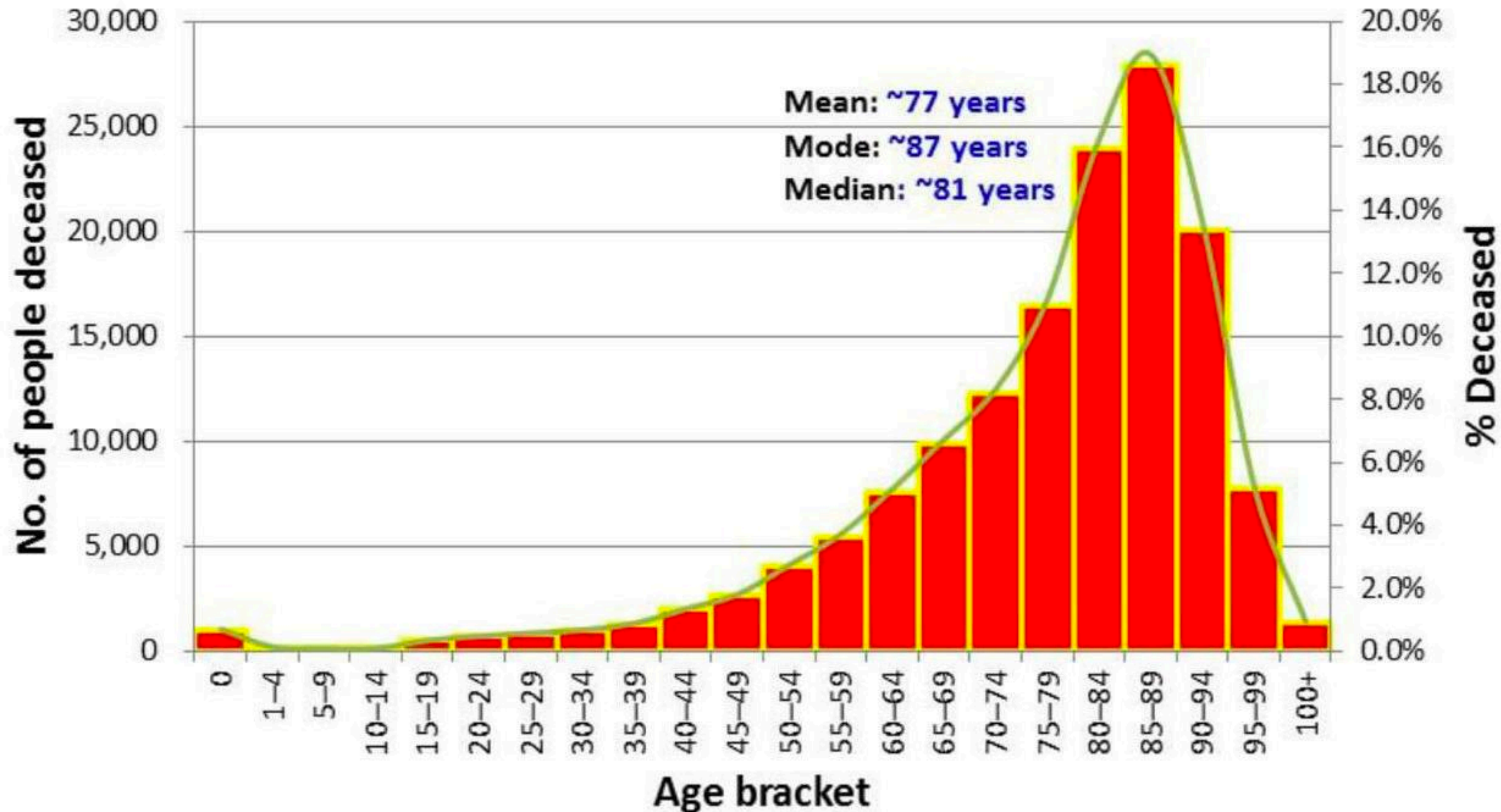
US Income Distribution '17

Median = \$39400

Mean = \$55880

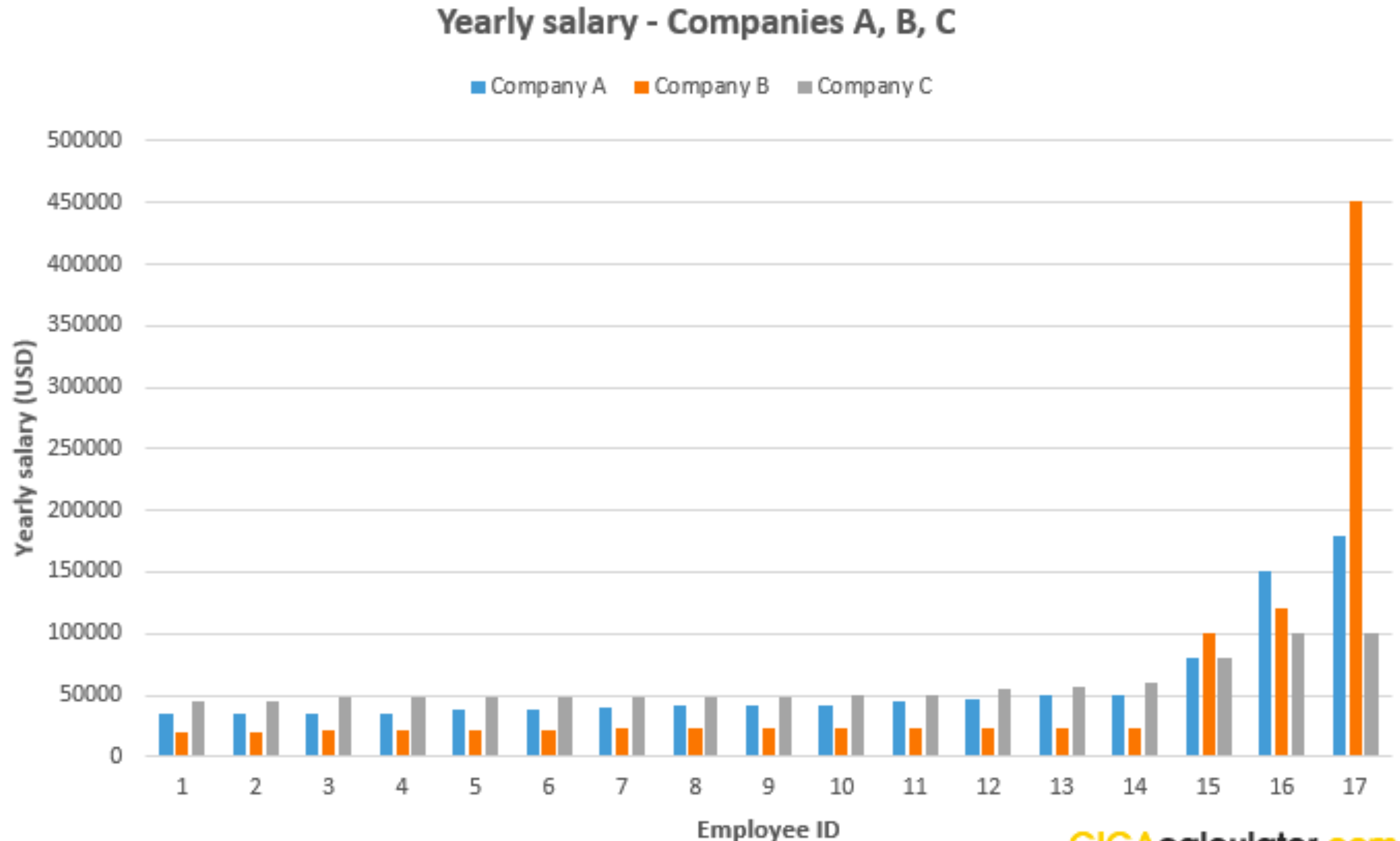
Which “Average” Are You Using?

Deaths in Australia in the year 2012

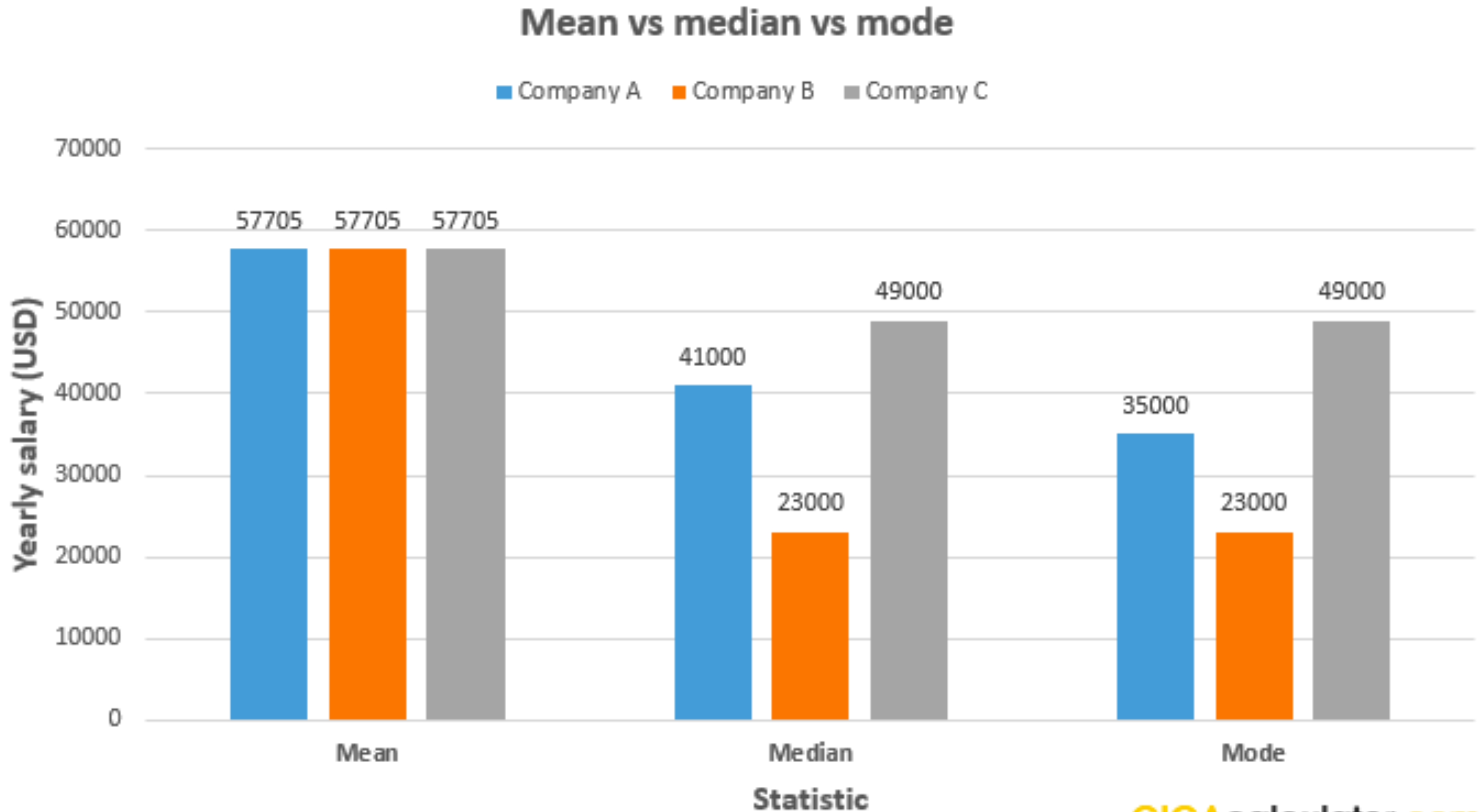


Median = 81 yrs
Mode = 87 yrs
Mean = 77 yrs

Example: Data Chart



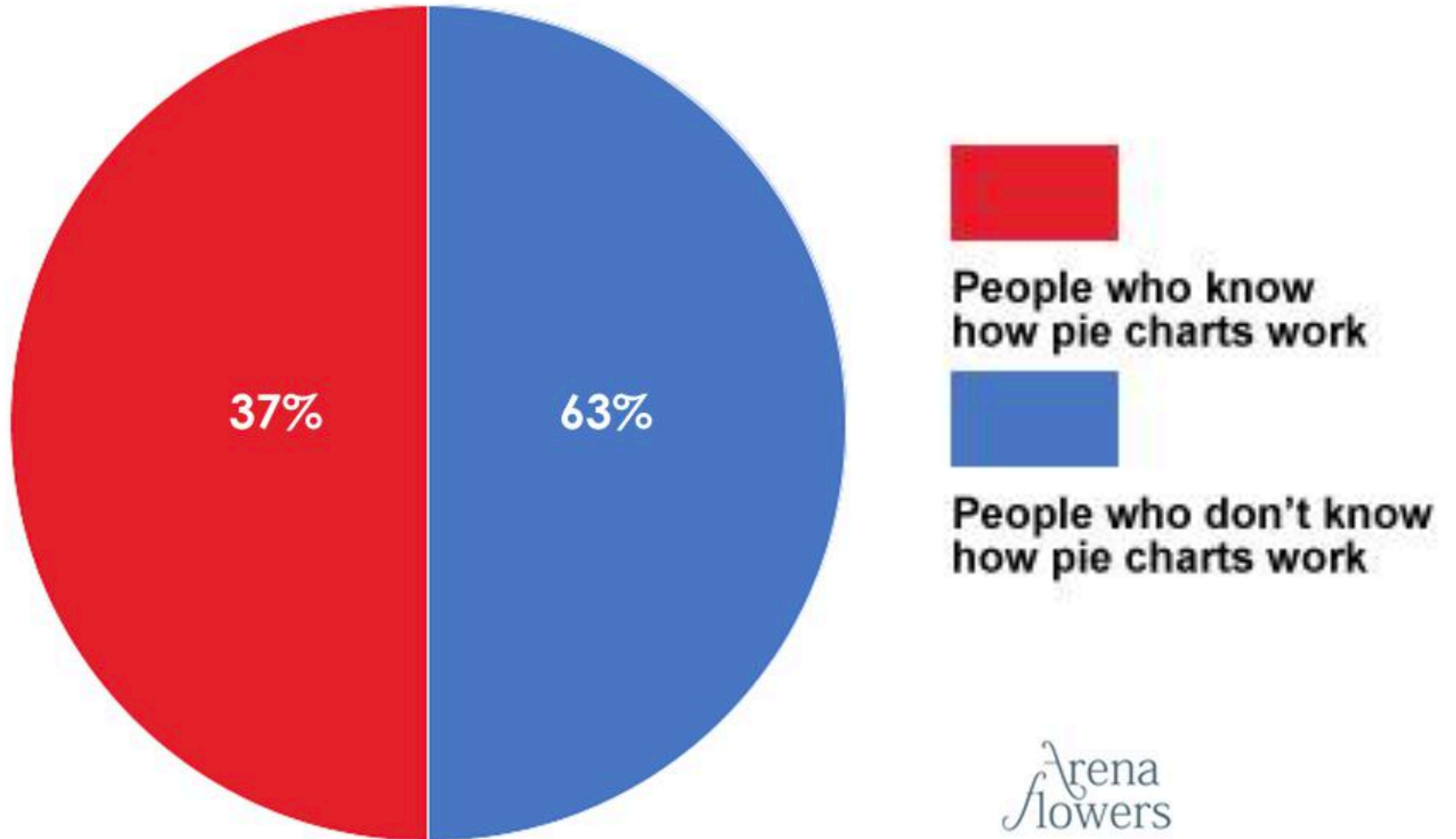
Example: Averages



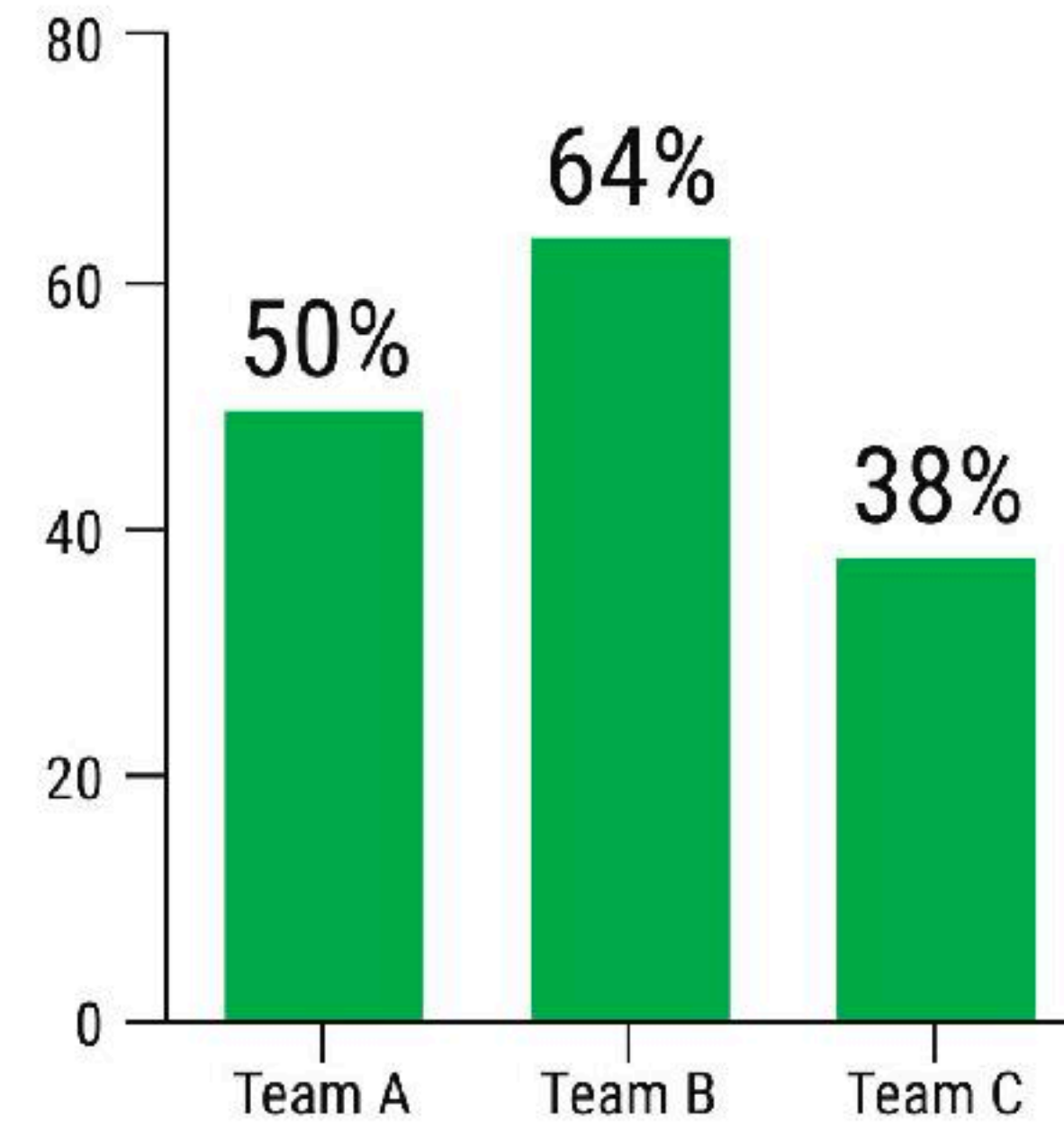
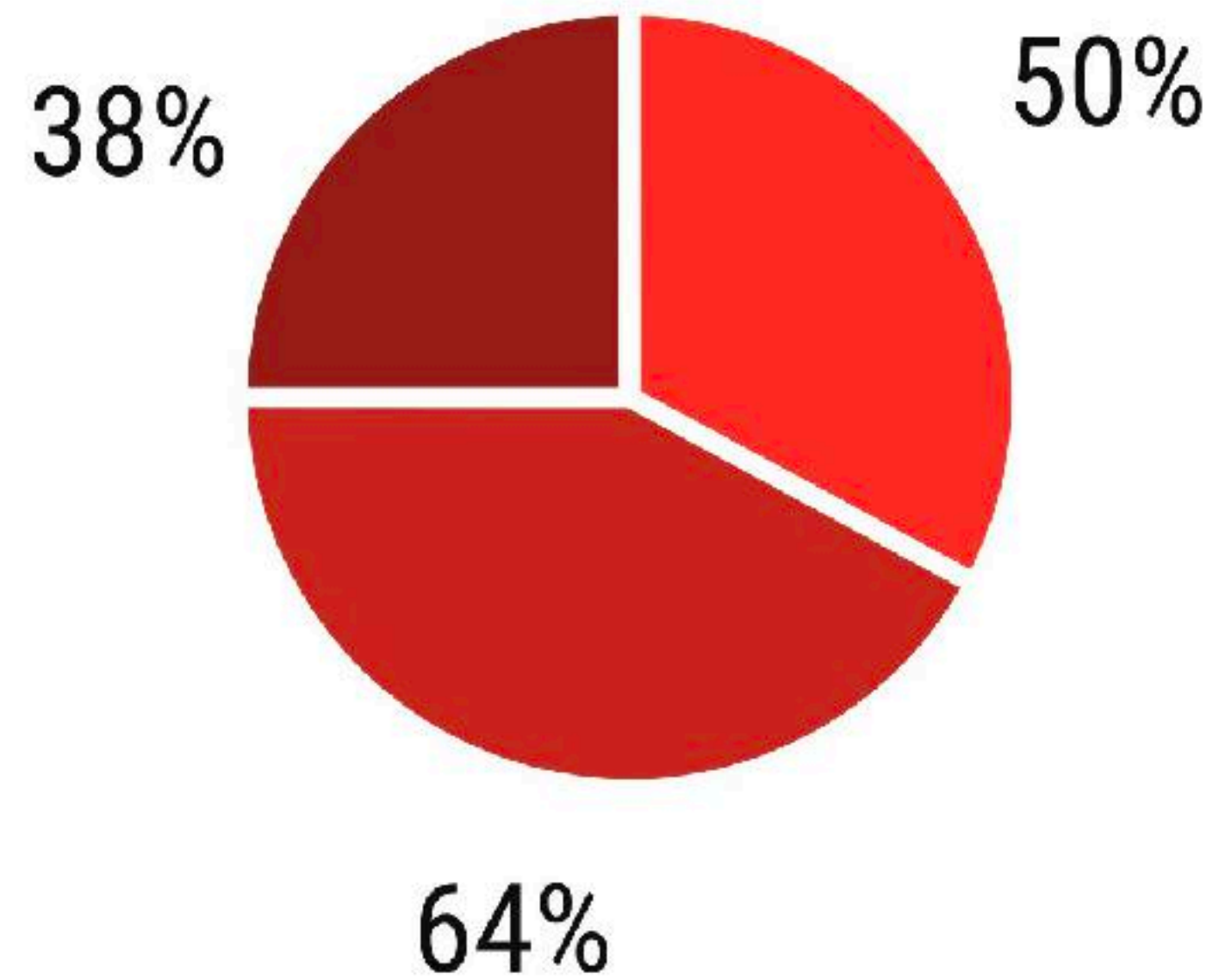
LIE #7

Wrong Use of Charts

How Pie Charts Work



Use Column Chart Instead



AMERICANS WHO HAVE TRIED MARIJUANA

CBS NEWS POLL

51%
TODAY

43%
LAST YEAR

34%
1997



Source: MOE +/- 4%

HIGH SUPPORT FOR LEGALIZING MARIJUANA

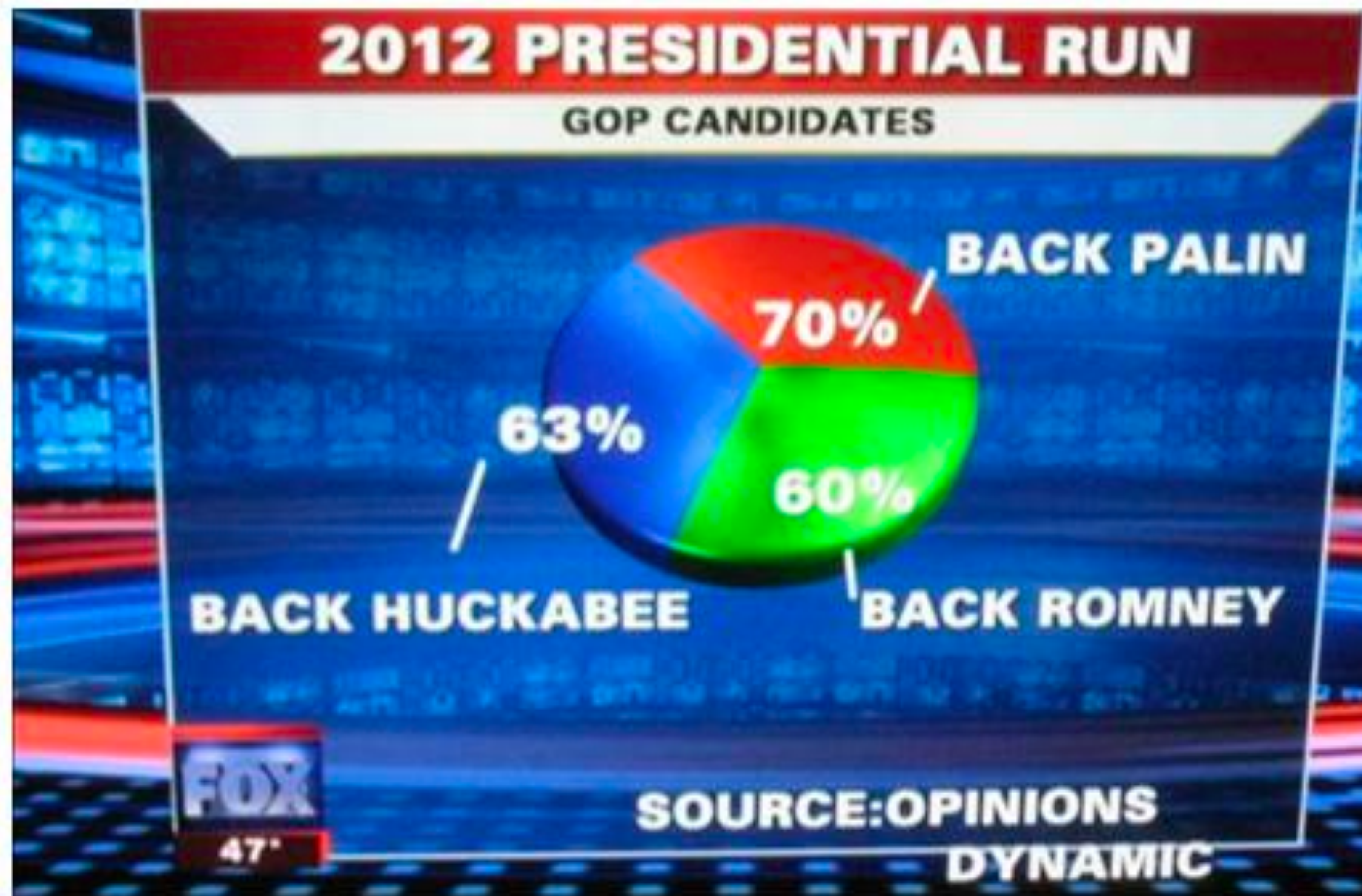
MORE THAN HALF OF AMERICANS SAY THEY'VE TRIED POT



LIVE

CBSN

Using Pie Chart instead of Bar Chart



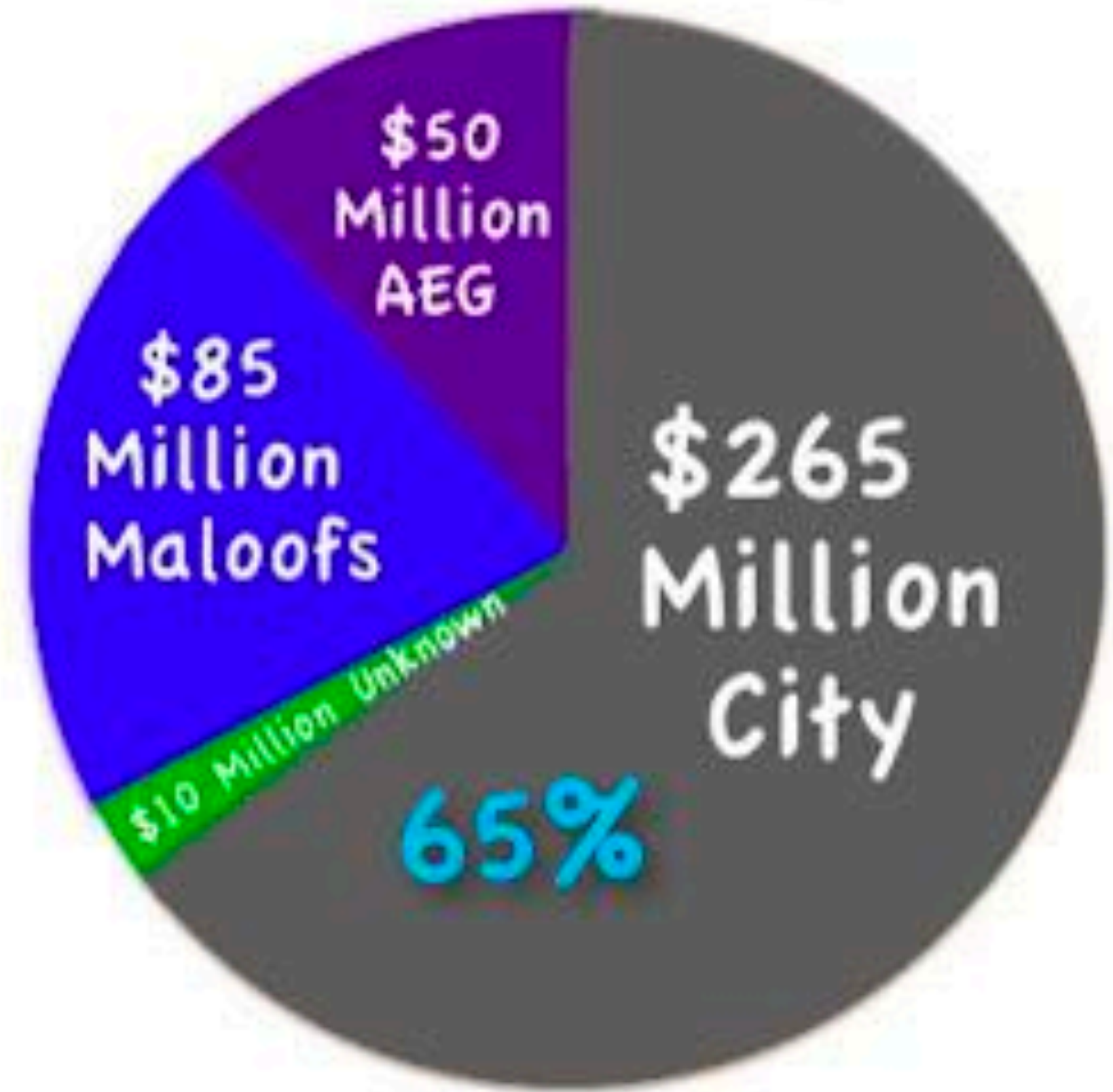
WRONG

ARENA FUNDING

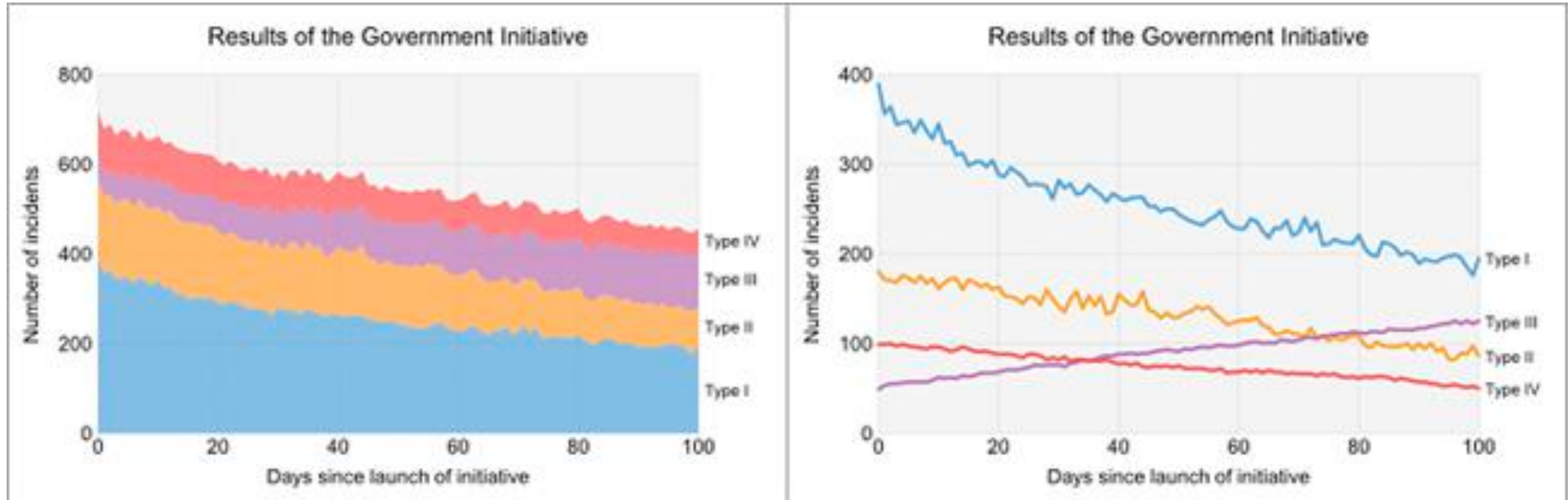


RIGHT

ARENA FUNDING



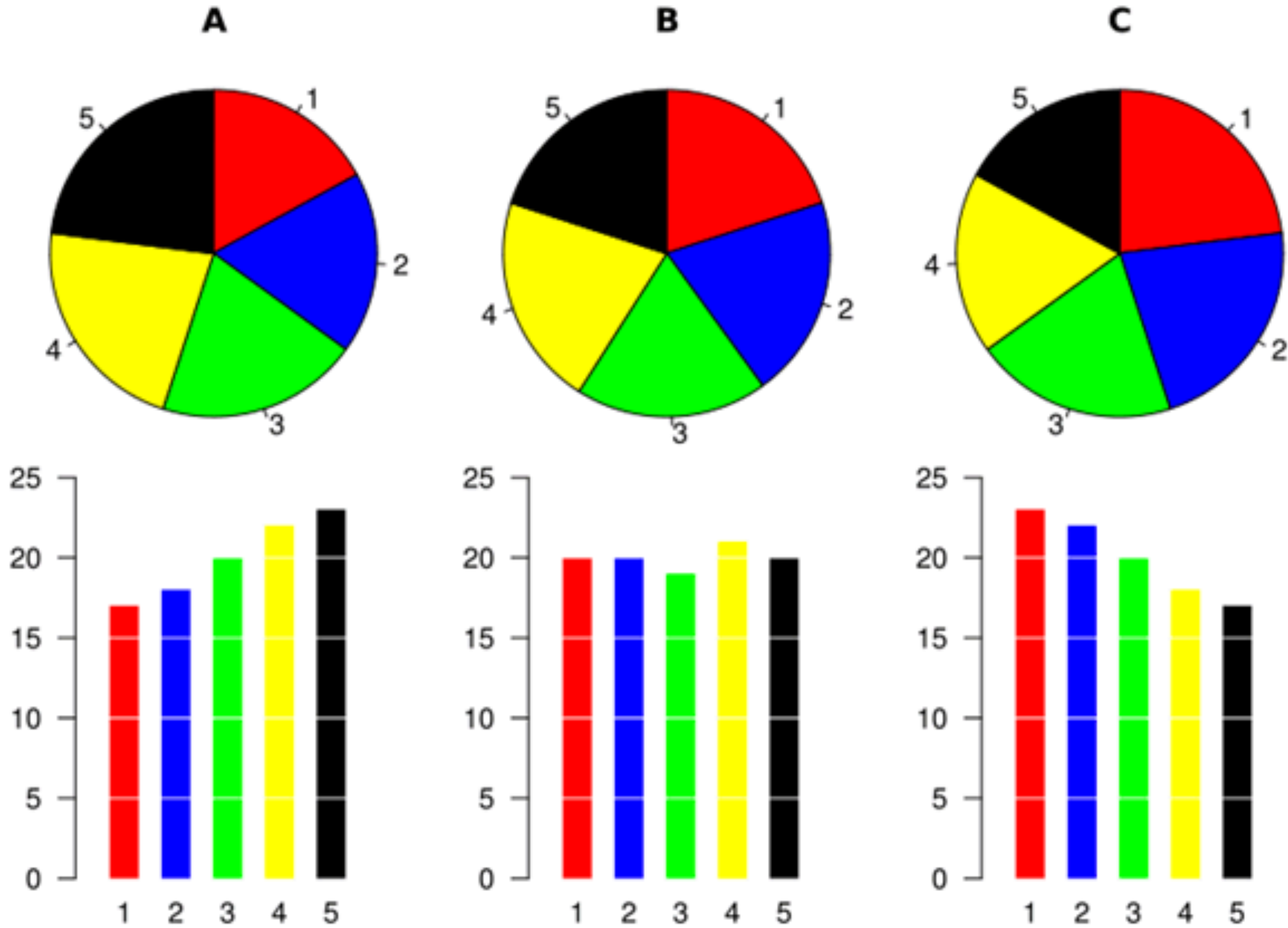
Using Stacked Area Chart instead of Lines



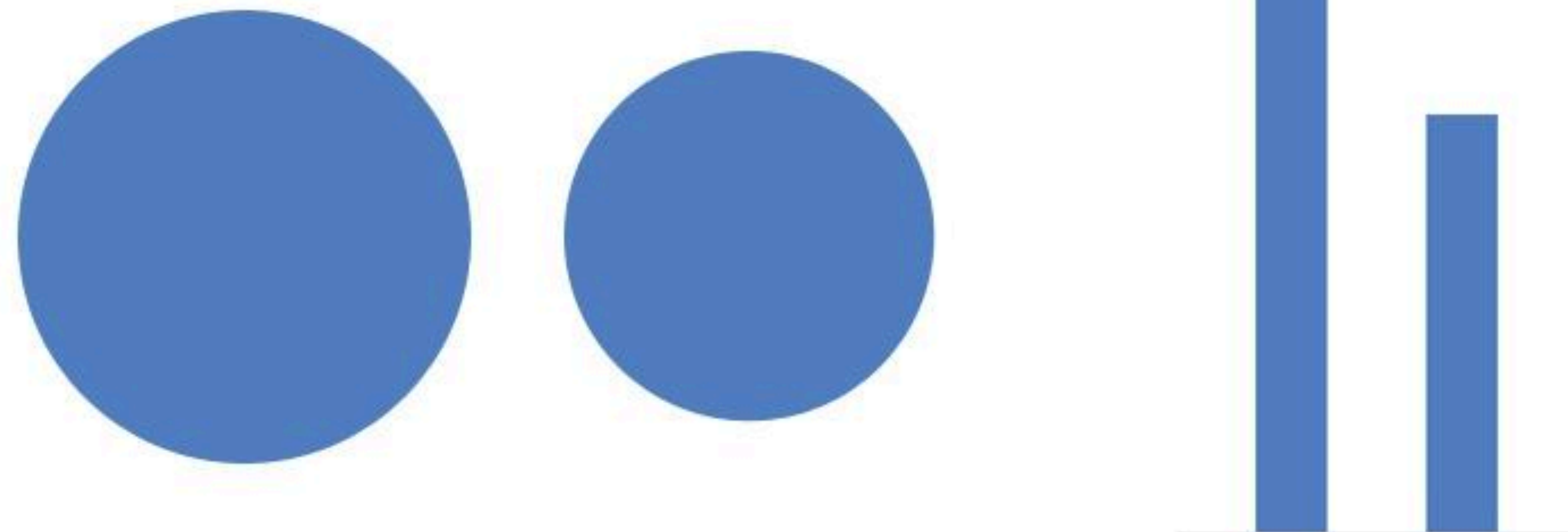
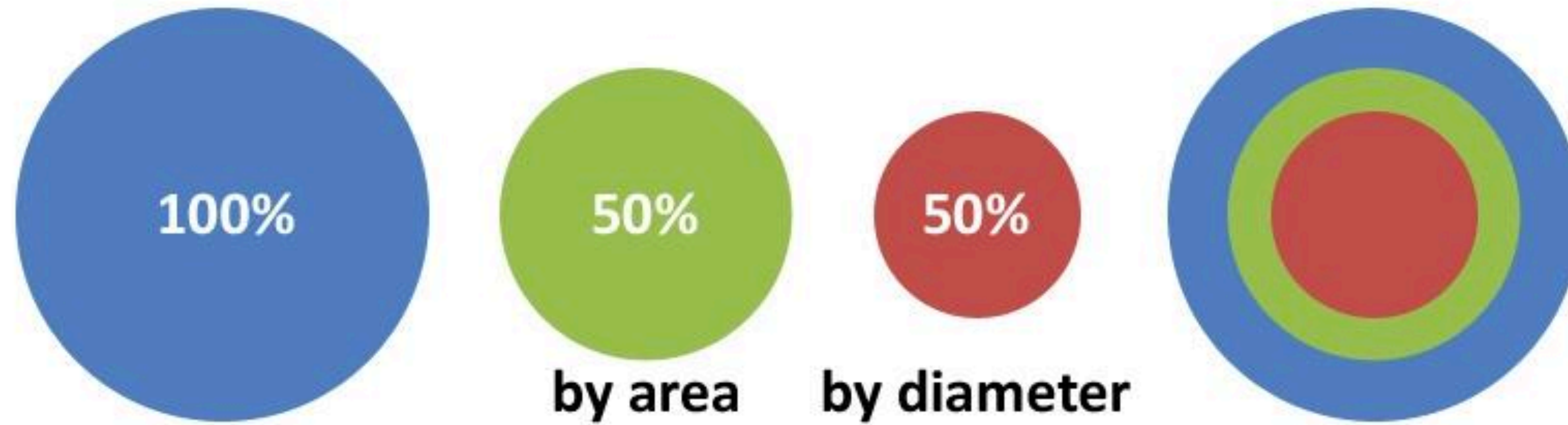
Using Multiple Axes



Pie Charts



Problems with Bubbles

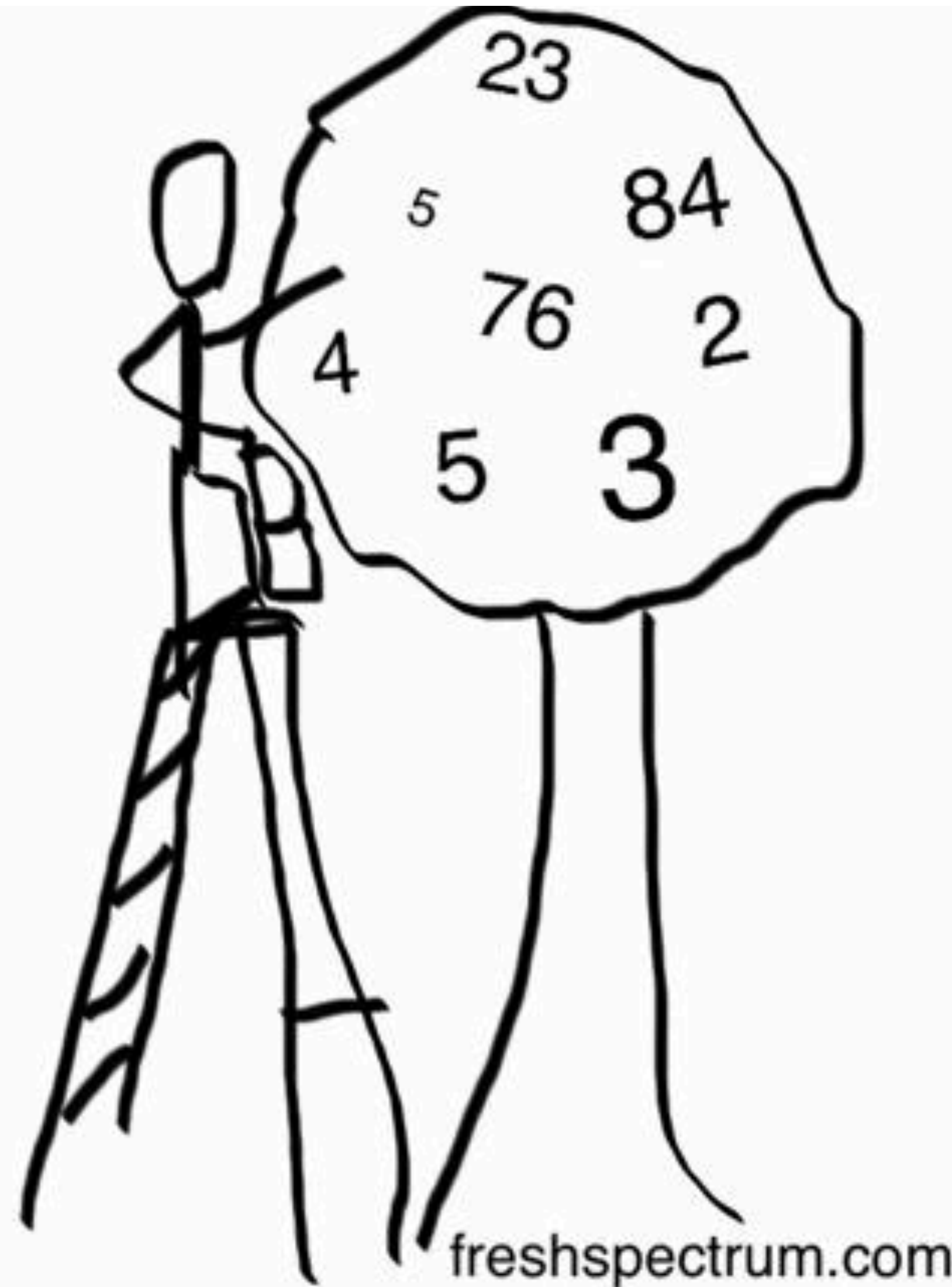


Cherry Picking

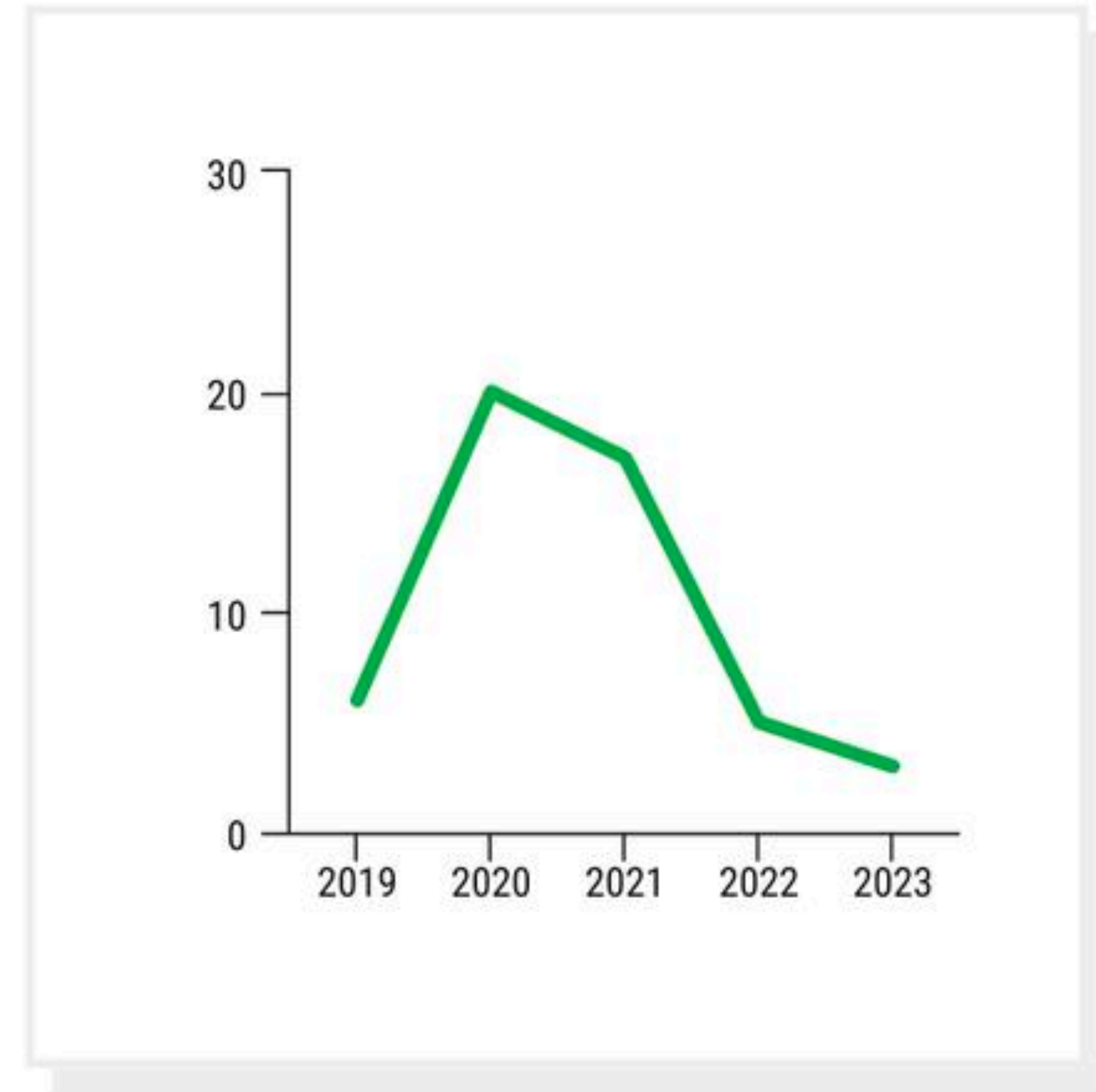
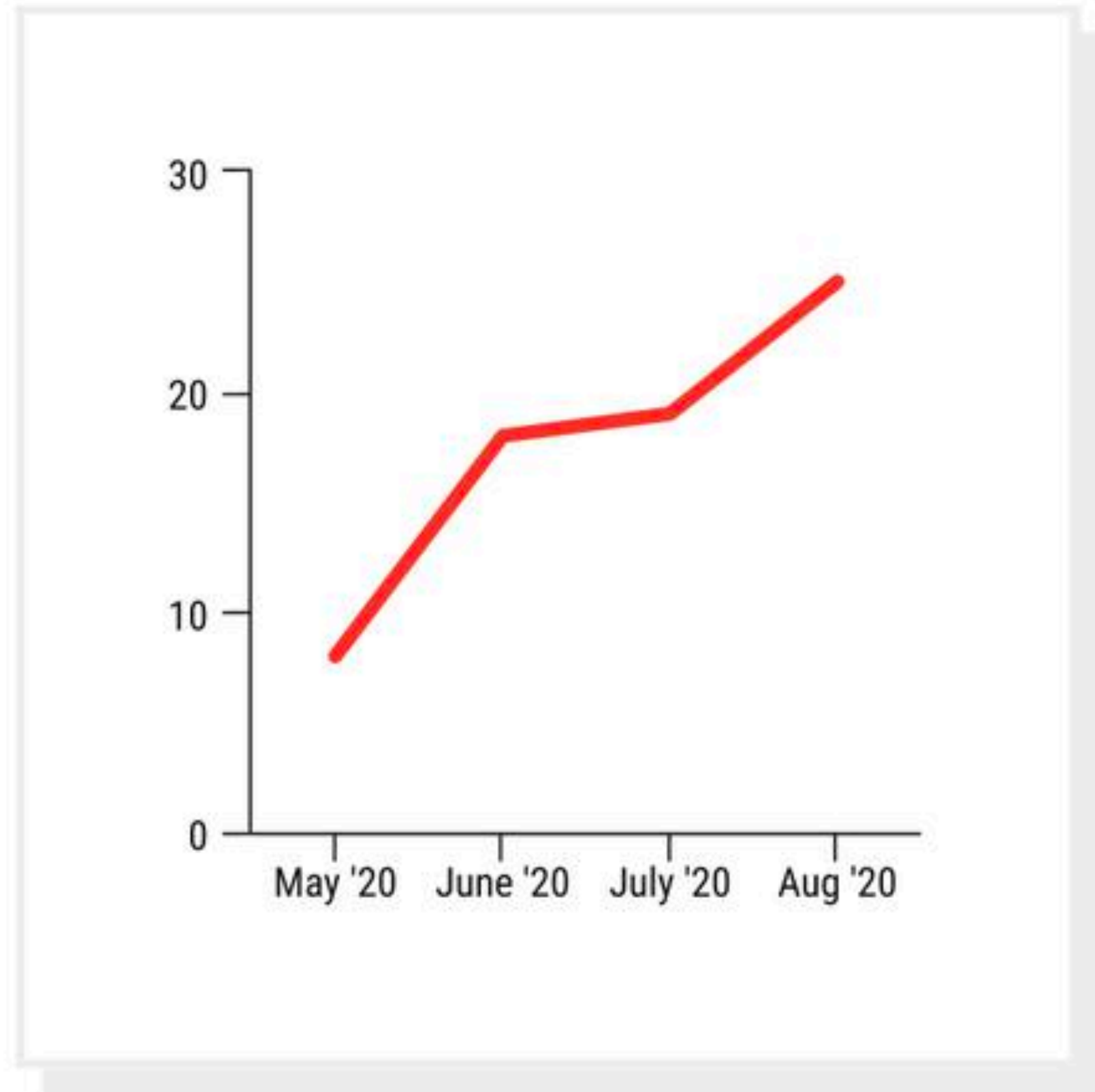
Choosing and taking only the most beneficial or profitable items, opportunities, etc., from what is available.

Cherry Picking Data

Try to grab that 84,
it would look really
good in our report



Cherrypicking Timeframes

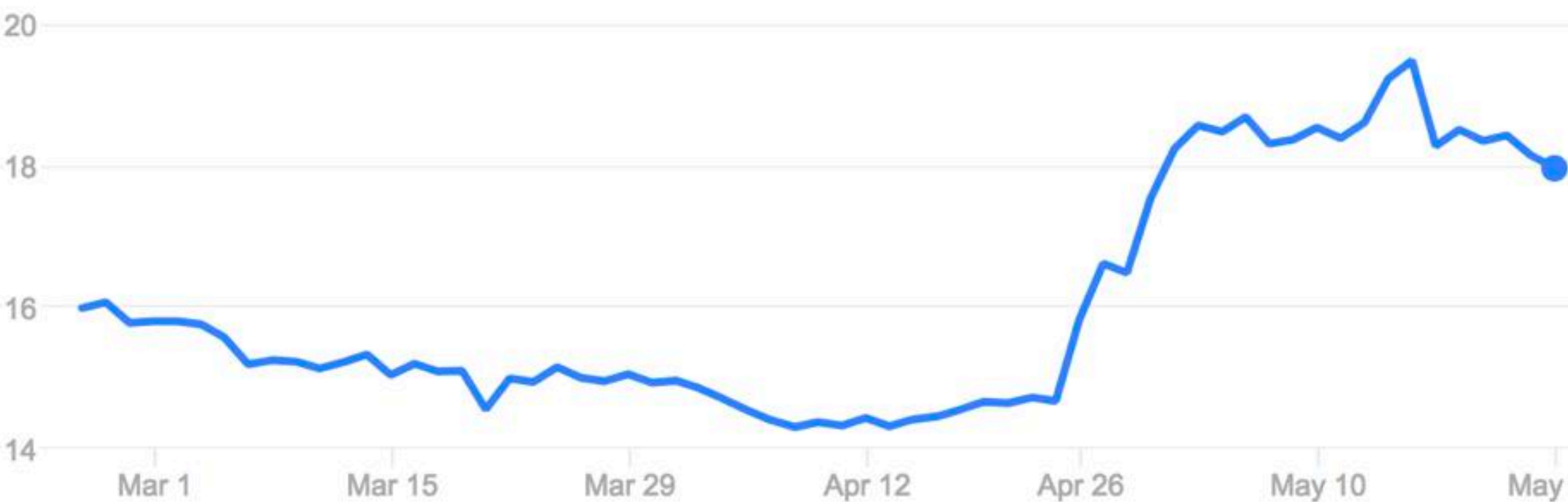


Stocks

Twitter Inc
NYSE: TWTR - May 24, 3:33 PM EDT

17.97 USD ↓0.17 (0.94%)

1 day 5 day 1 month 3 month 1 year 5 year max



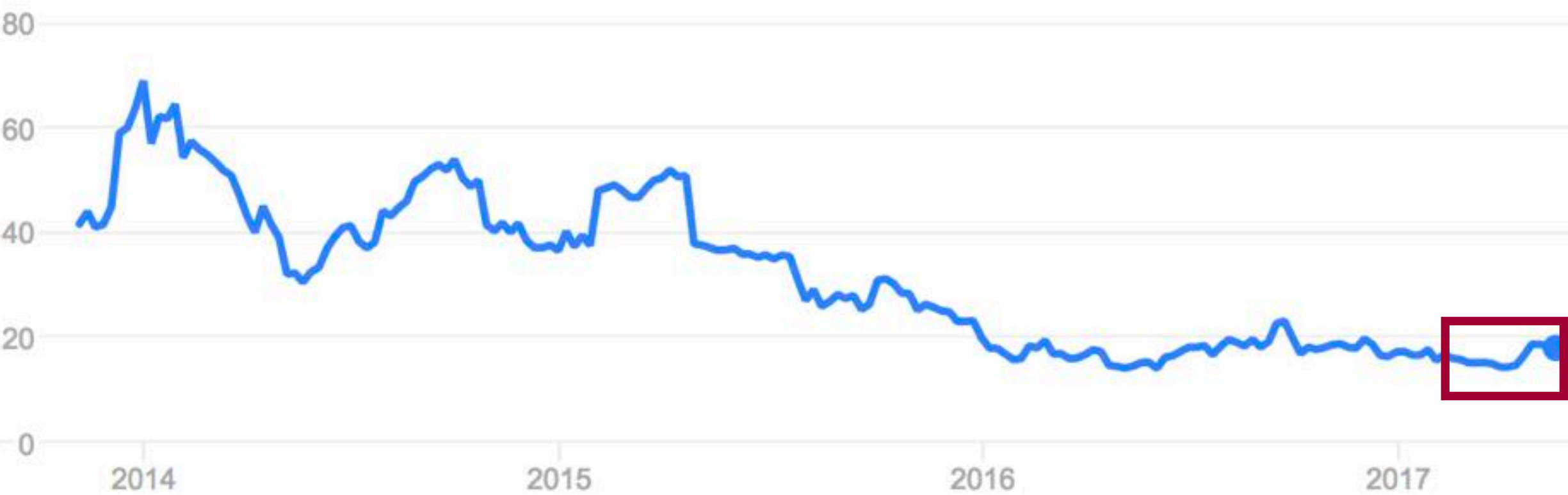
Open	18.10	Mkt cap	12.93B
High	18.34	P/E ratio	-
Low	17.83	Div yield	-



Twitter Inc
NYSE: TWTR - May 24, 3:34 PM EDT

17.98 USD ↓0.16 (0.91%)

1 day 5 day 1 month 3 month 1 year 5 year max



Open	18.10	Mkt cap	12.93B
High	18.34	P/E ratio	-
Low	17.83	Div yield	-



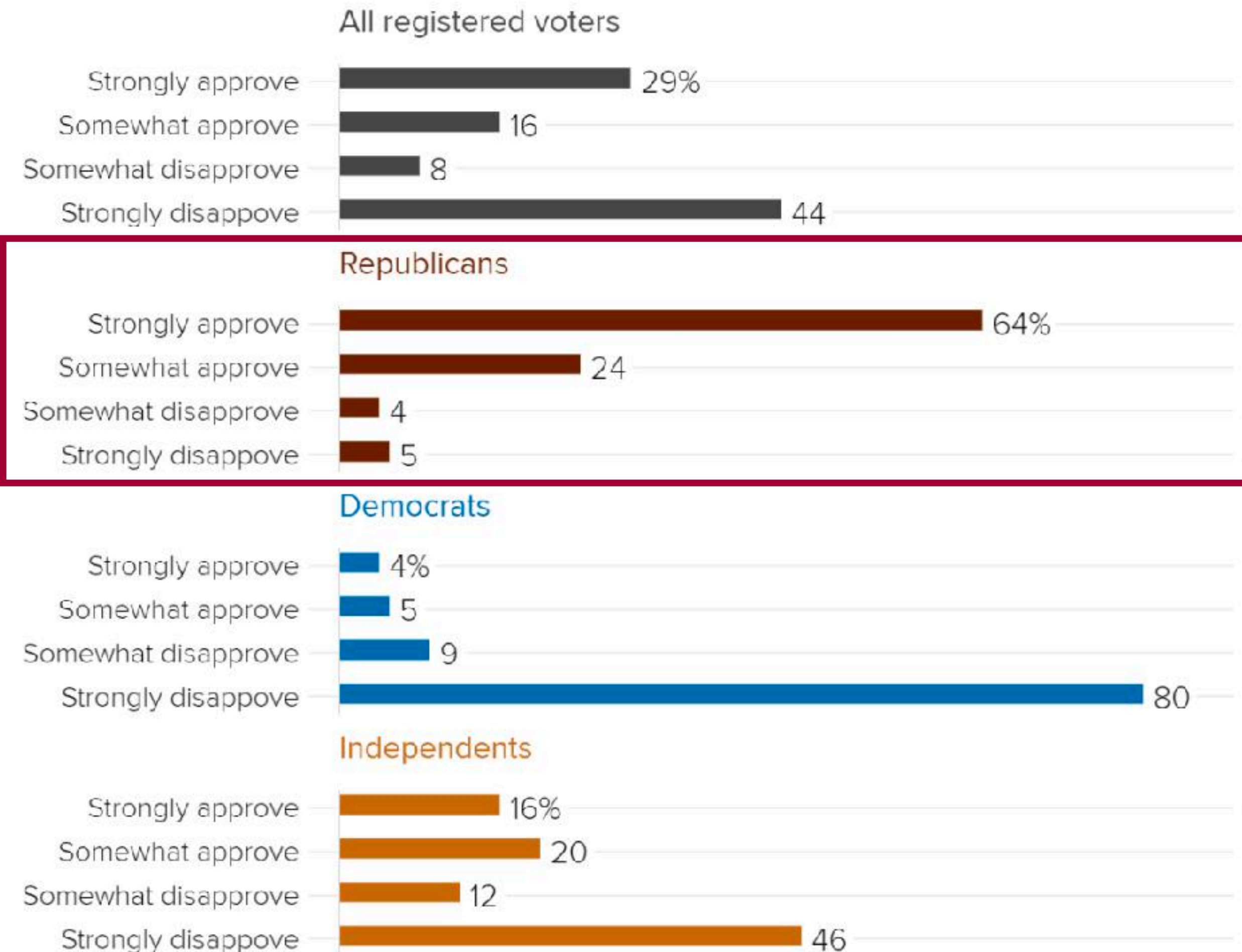
Biased Selection

Cherry

Full picture

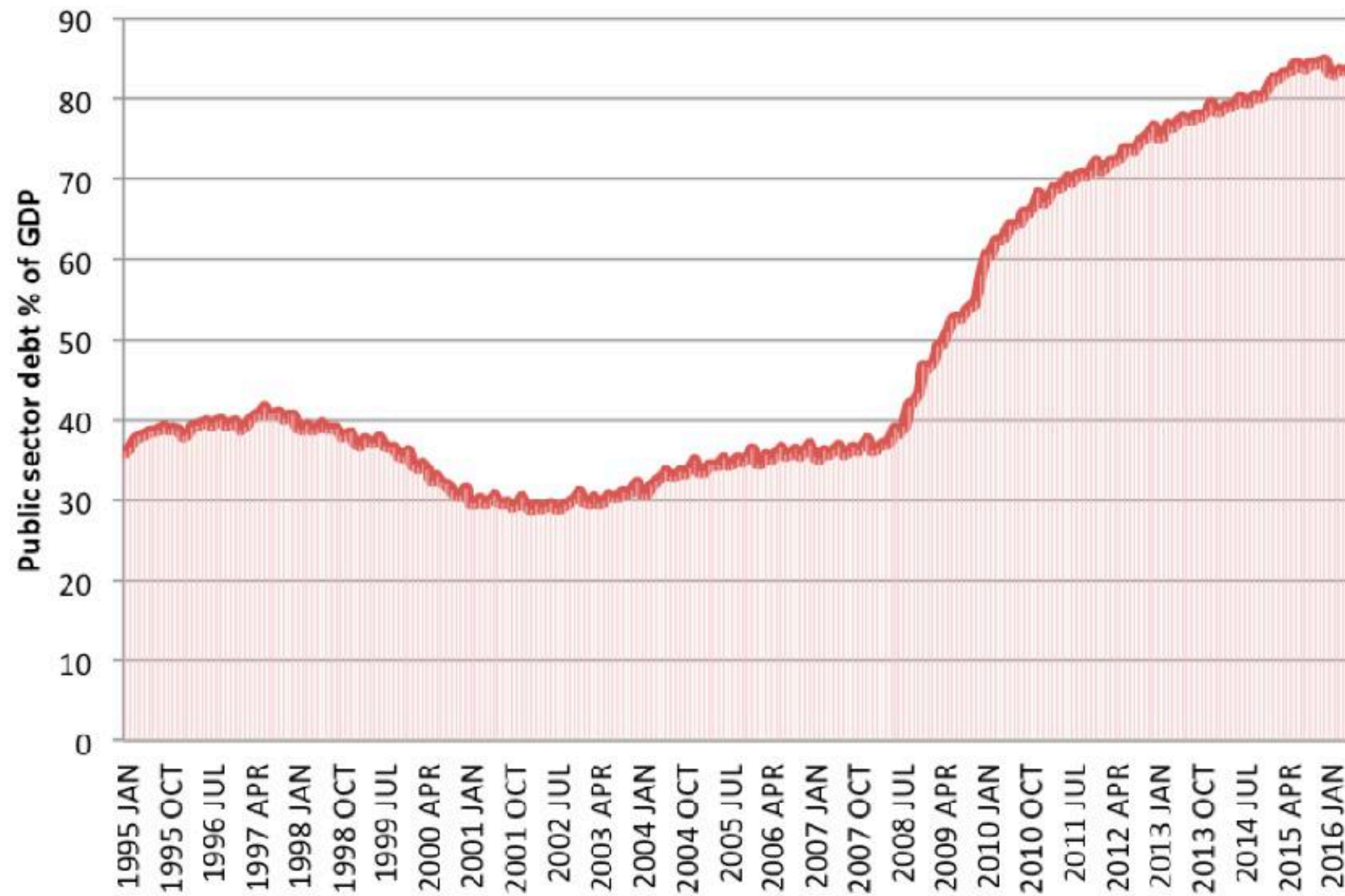


Strength of Trump approval/disapproval by party



Favorable Time Frame

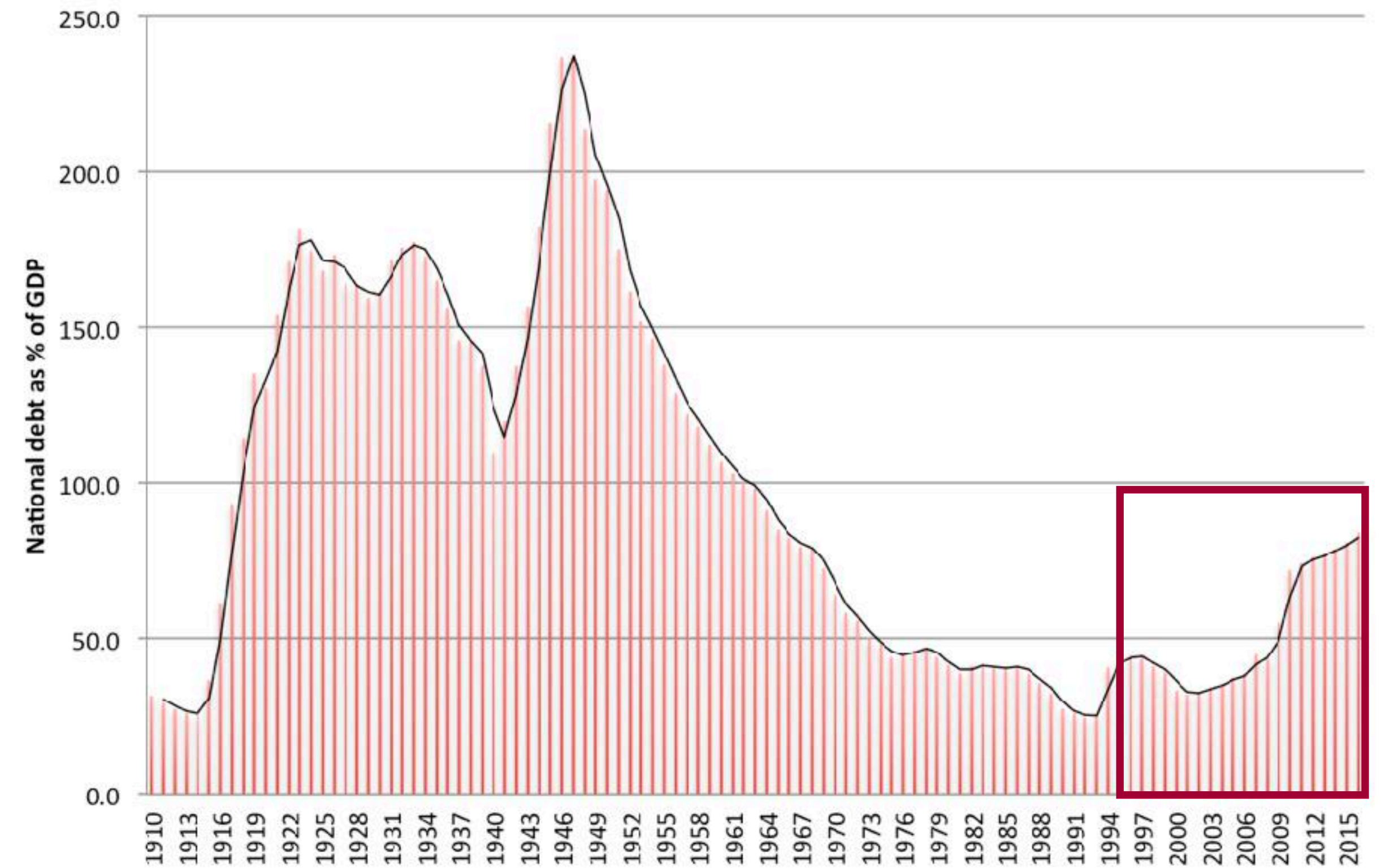
UK national debt % GDP



www.economicshelp.org | Source: ONS HF6X - June 2016

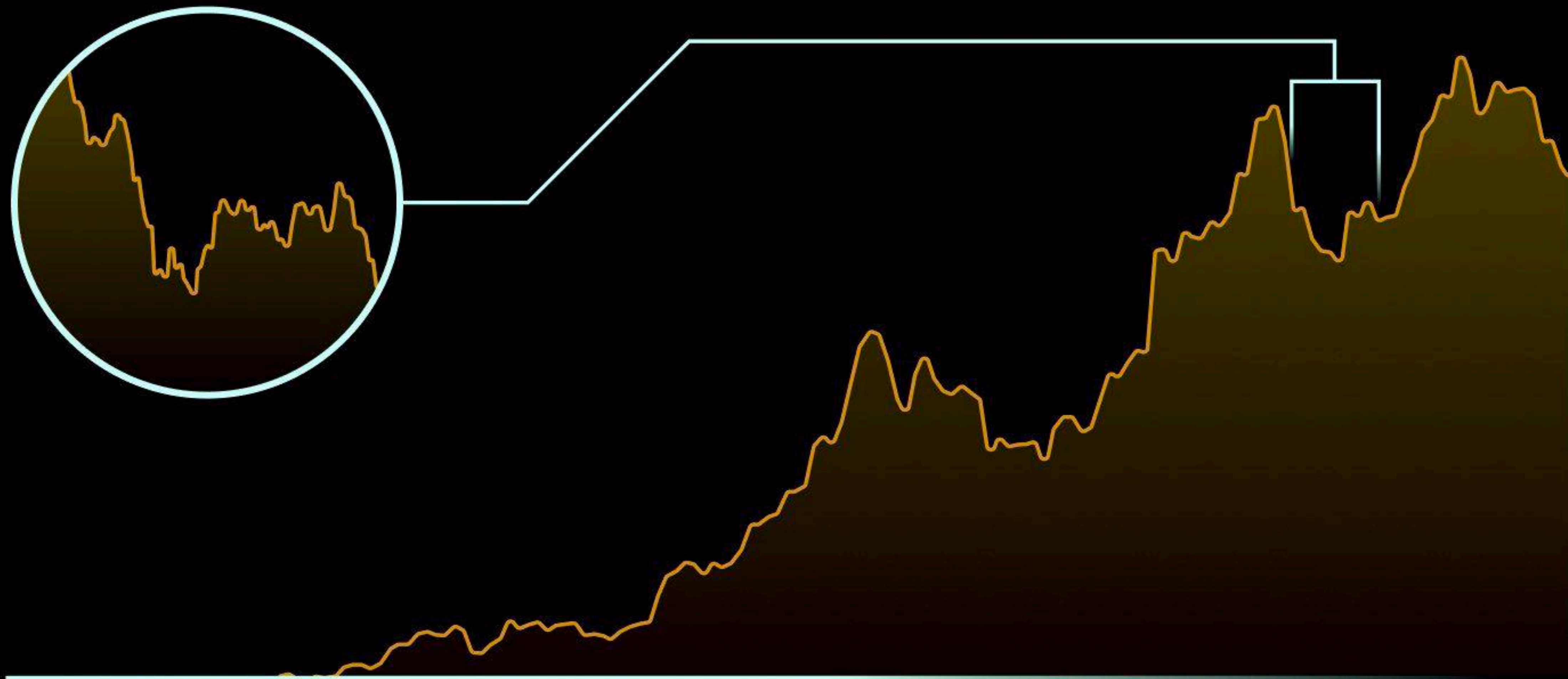


UK National debt



www.economicshelp.org | source - Reinhart, AER and OBR - 2016





WHEN IN DOUBT,

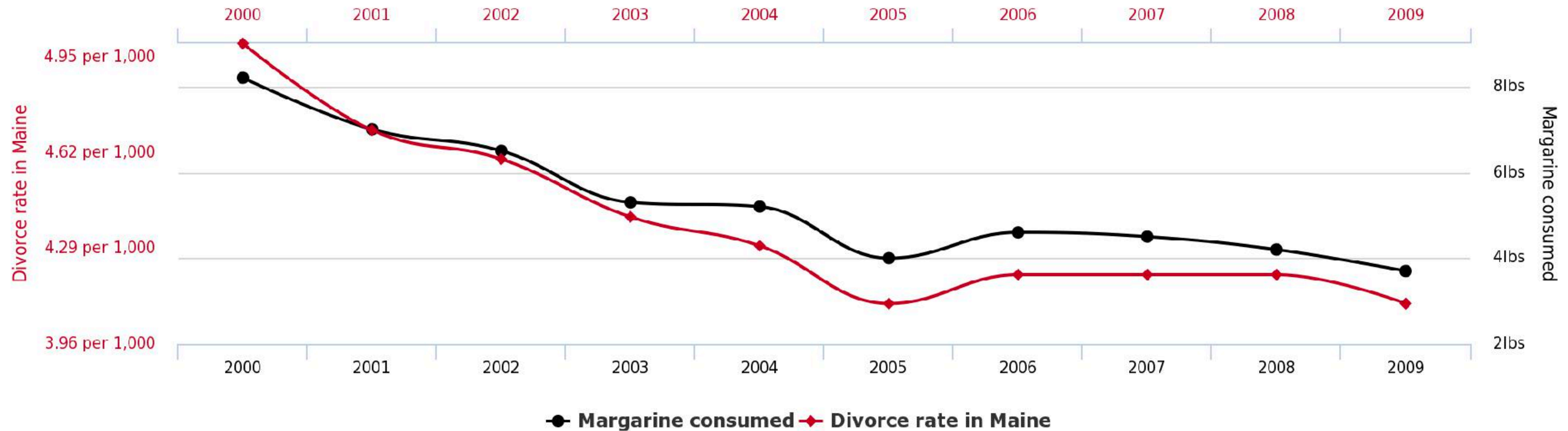
ZOOM OUT

~ Reggie Watts

False Correlation Fallacy

The idea that "correlation implies causation"

Divorce rate in Maine correlates with Per capita consumption of margarine

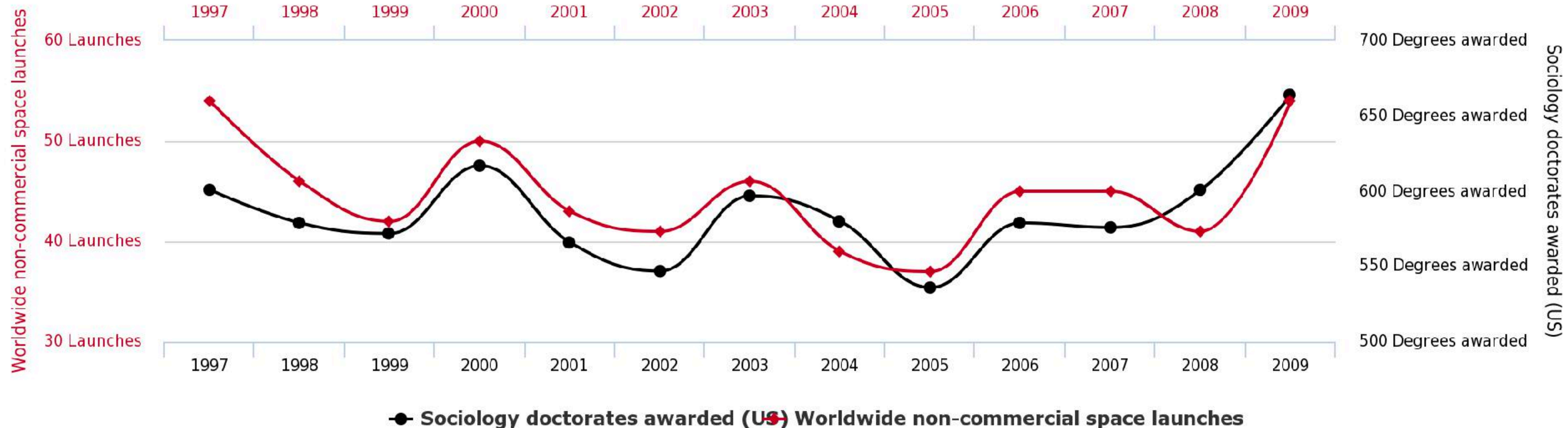


tylervigen.com

Worldwide non-commercial space launches

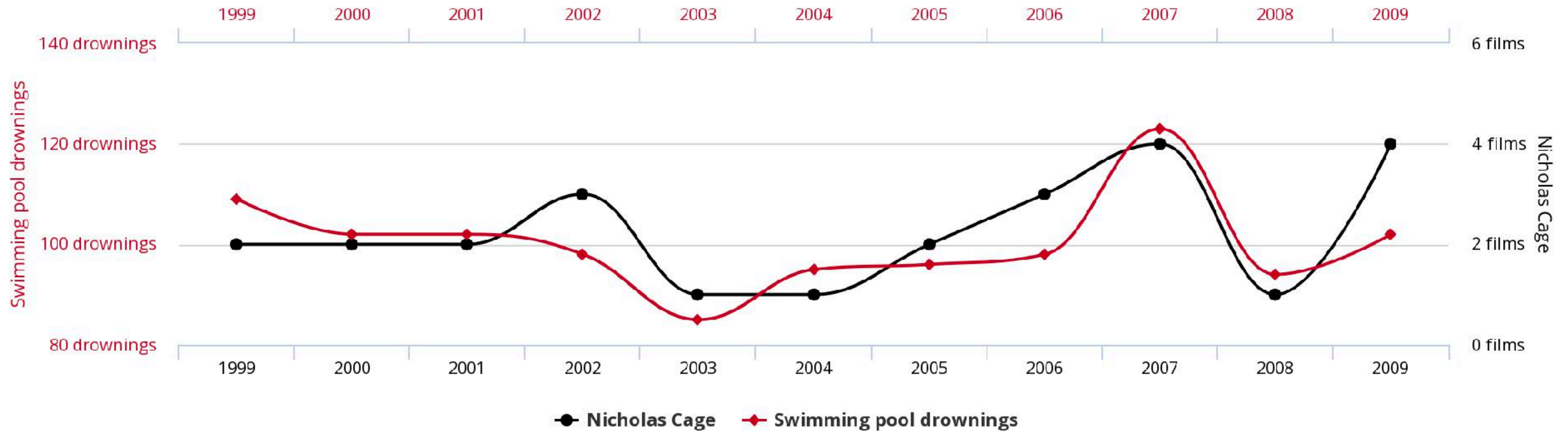
correlates with

Sociology doctorates awarded (US)



tylervigen.com

Number of people who drowned by falling into a pool correlates with Films Nicolas Cage appeared in



tylervigen.com



Questions?

community.eazybi.com
support@eazybi.com

An aerial photograph of a city at night, showing a dense grid of buildings and streets. The image is overlaid with a gradient that transitions from a deep red on the left side to a dark blue on the right side. The lights from the city are visible through the buildings.

Thank you!