



Northwestern
University

Data Visualization Best Practices

Week 2

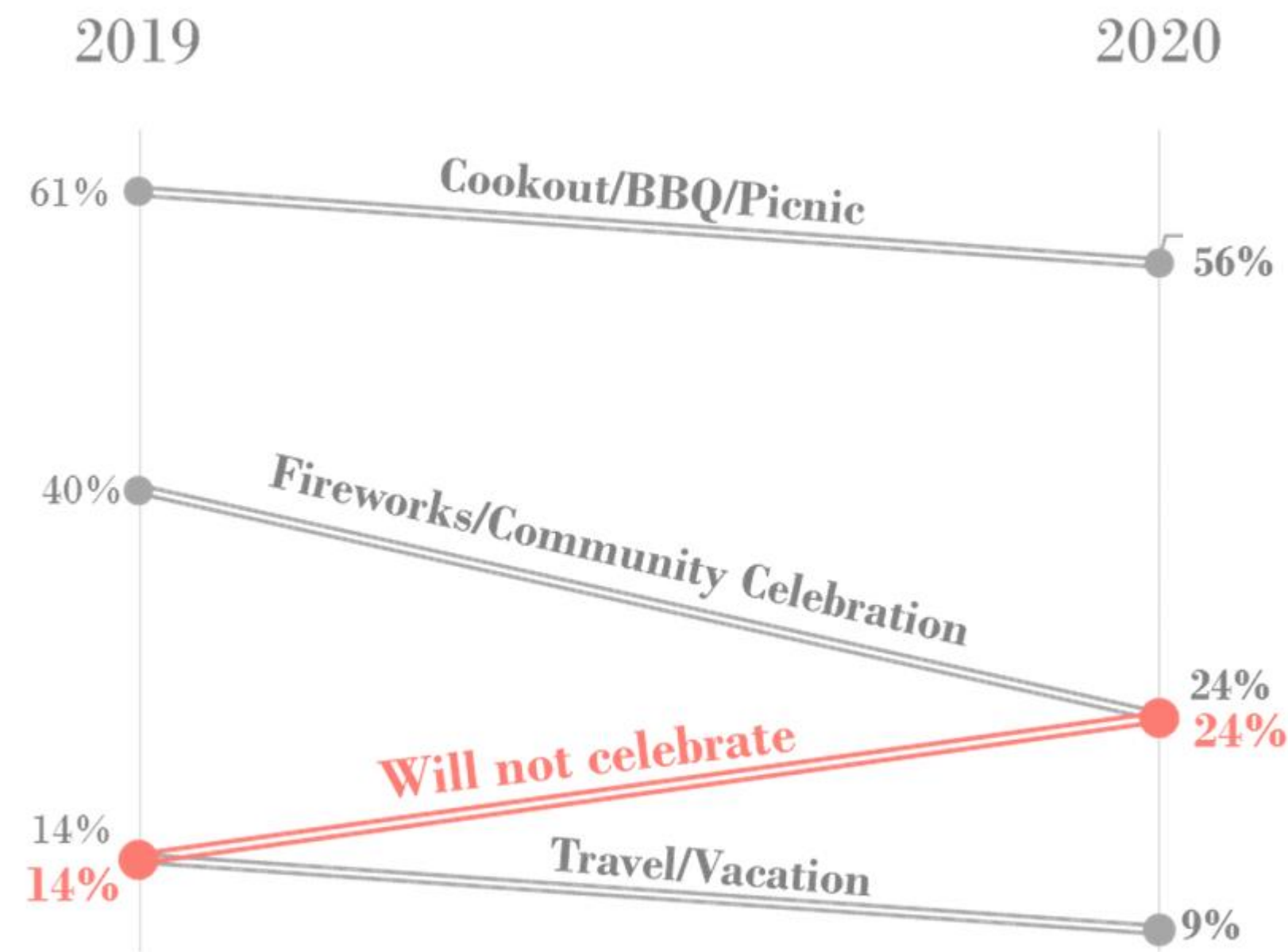


Core Rules in Data Visualization

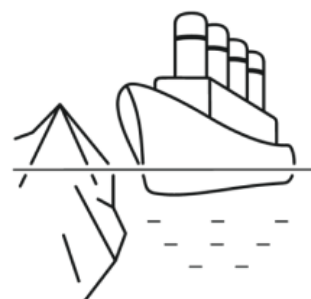


In 2020, 1 in 4 Americans will not to celebrate Independence Day

Independence Day celebration plans

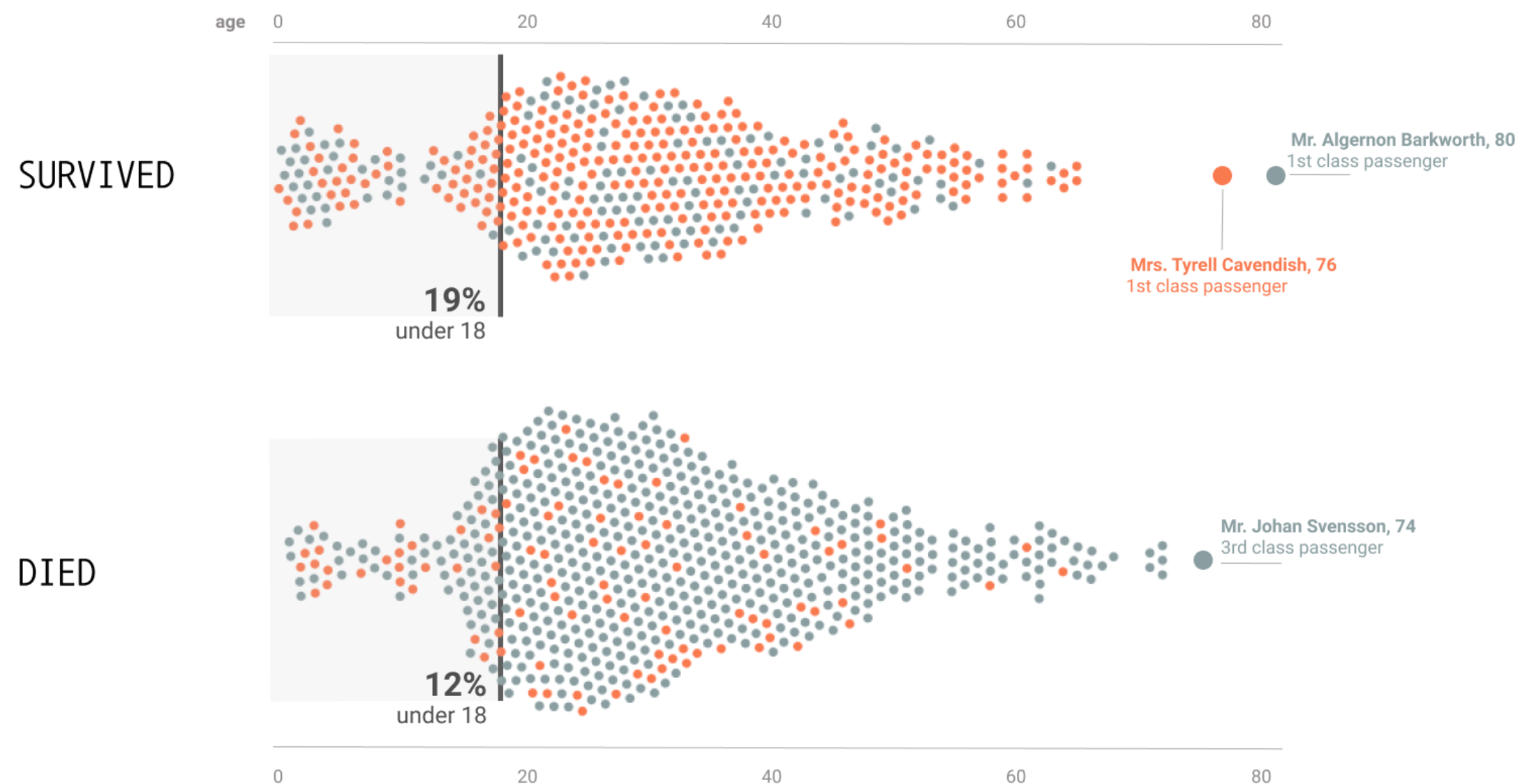


Data source: NRF and Prosper Insights & Analytics survey
7,762 consumers, conducted June 1-June 9, 2020, margin of error +/- 1.1%



WHO SURVIVED THE TITANIC?

The “Women and children first” (WCF) policy gave women and kids a survival advantage over men



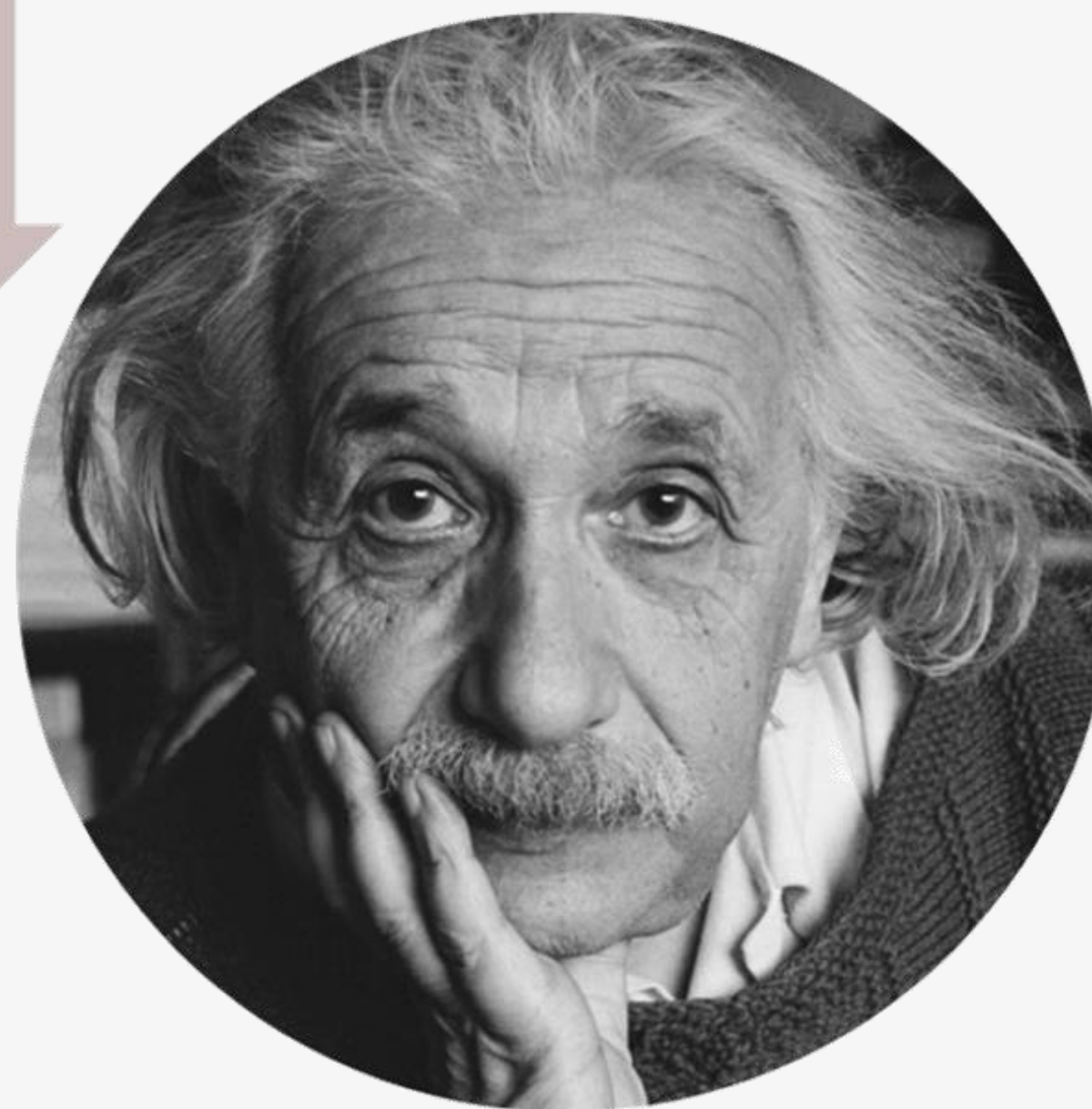
Source: personal data visualization

Data Visualization Best Practices





Picture Yourself Somewhere Here

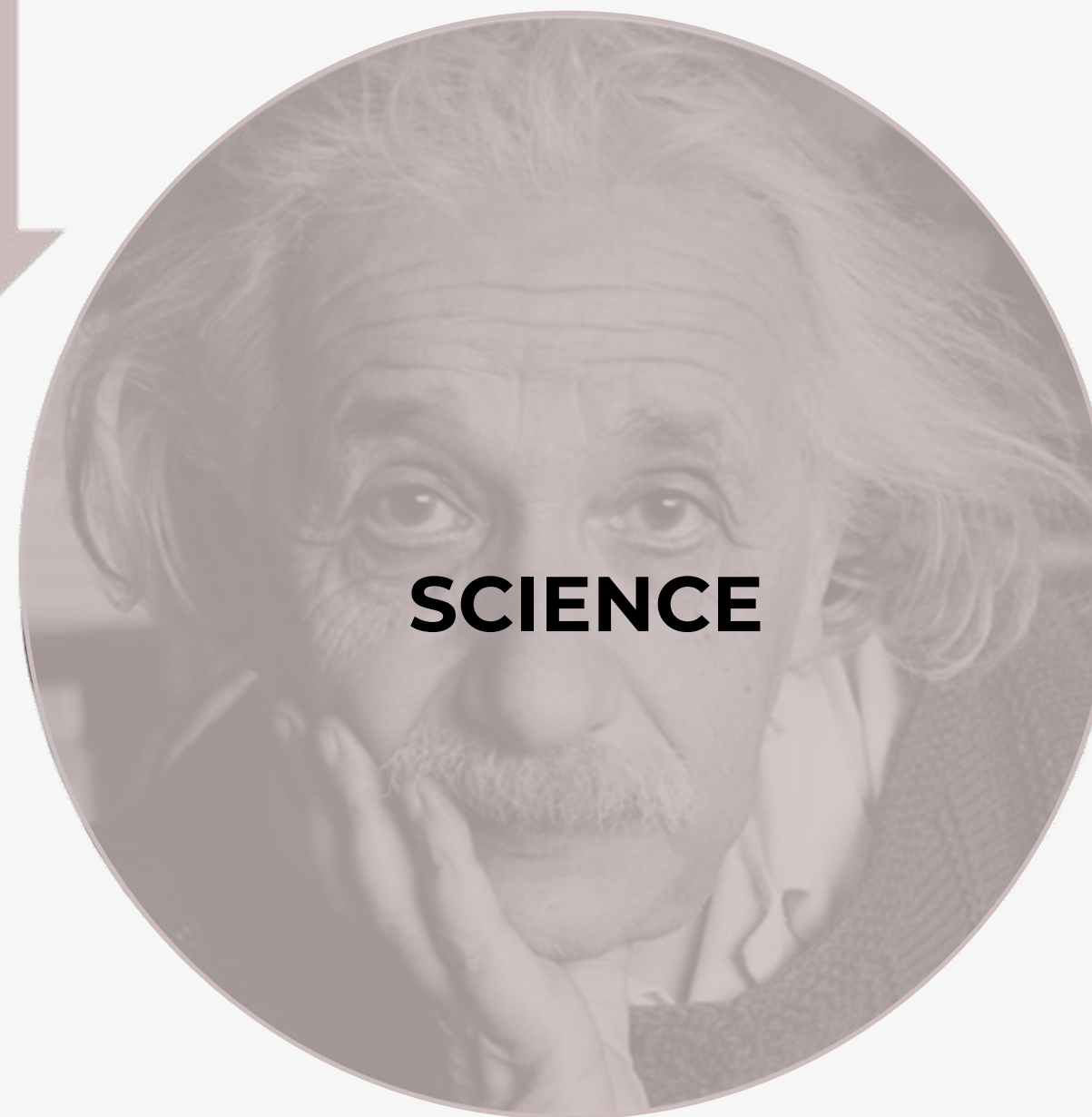




Picture Yourself Somewhere Here



CRAFT

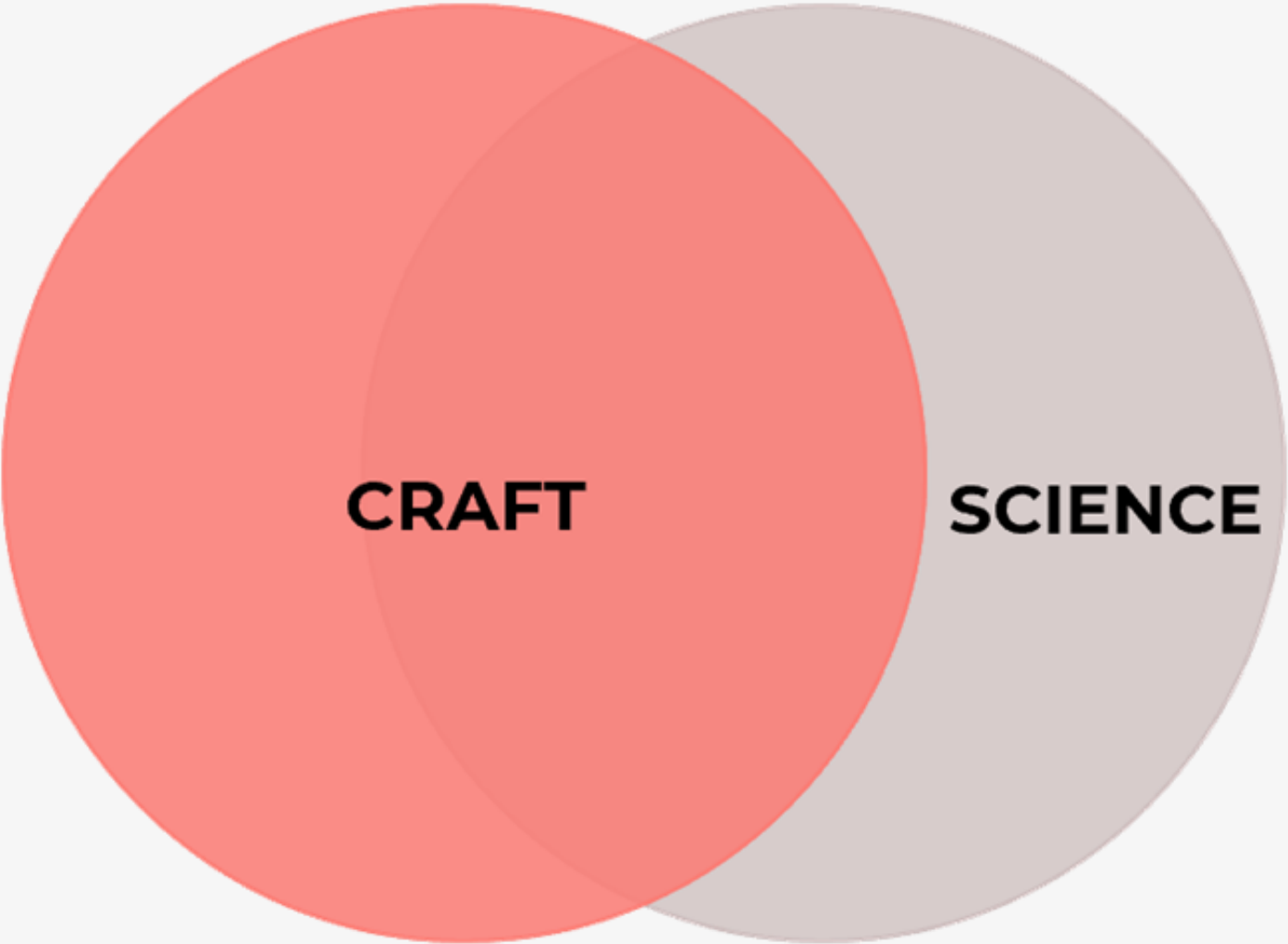


SCIENCE

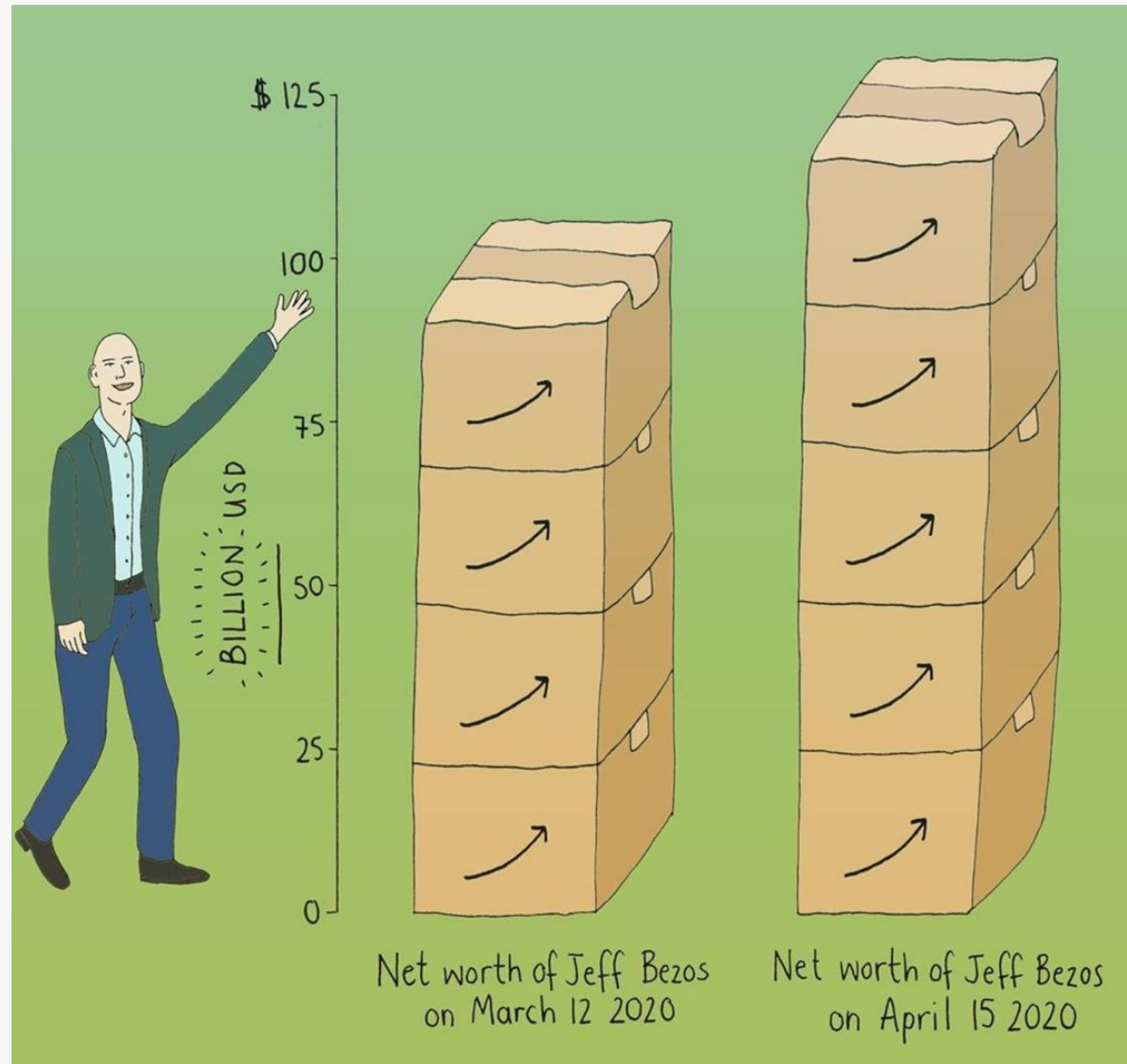
3 Schools of Thought



JOURNALISM



BEAUTY
UNDERSTANDING
IMPLICATION

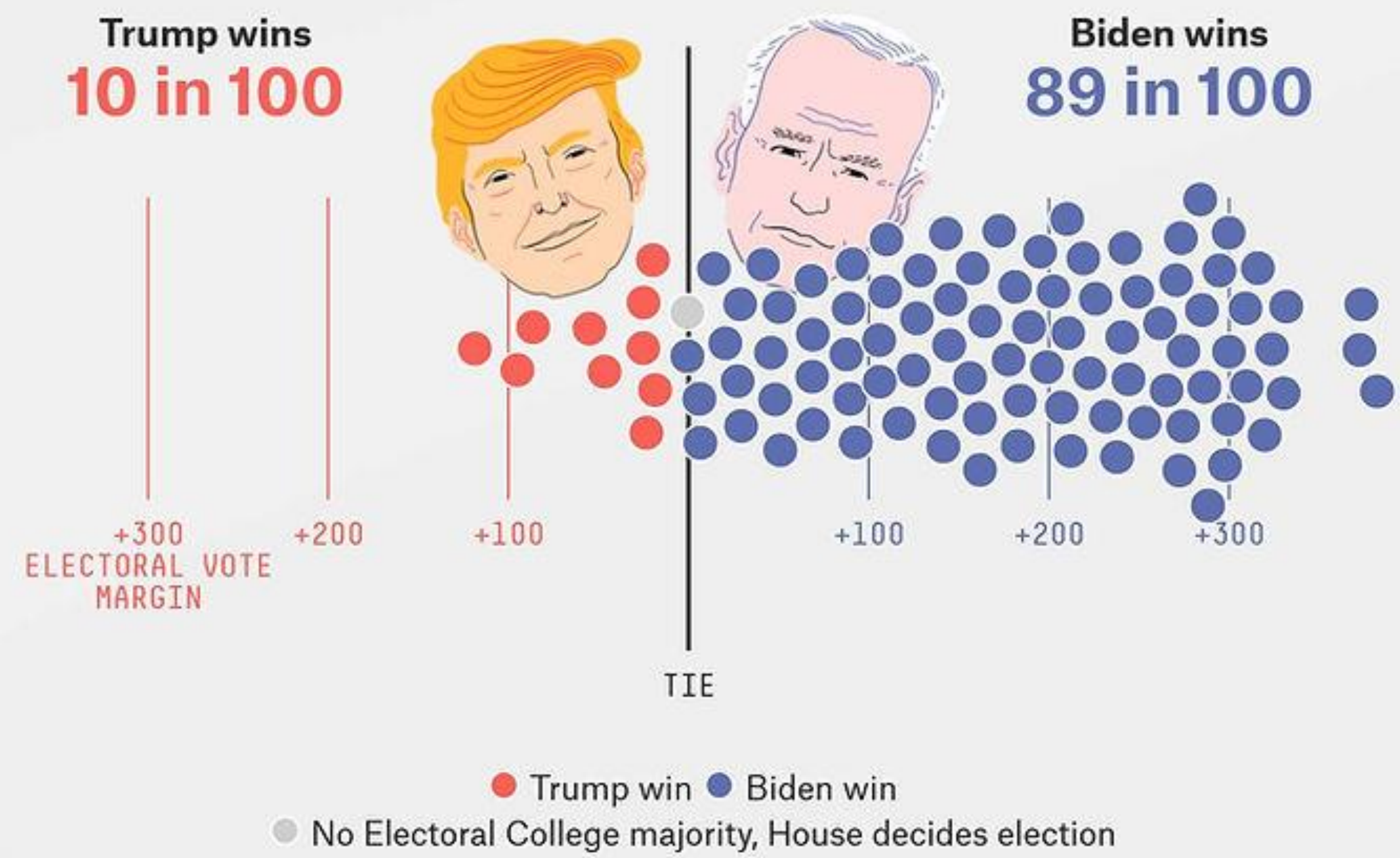


Author: Mona Chalabi



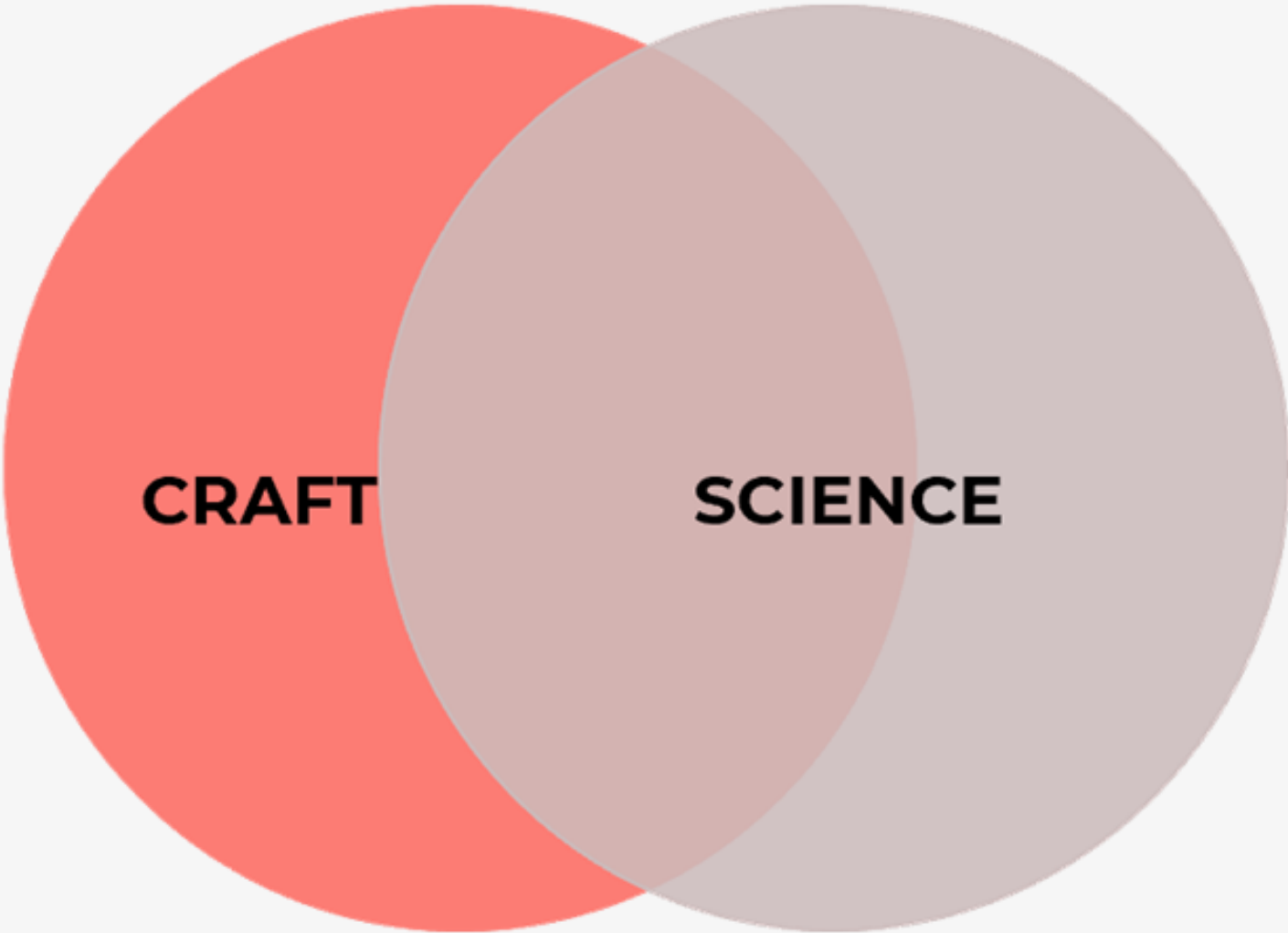
Biden is *favored* to win the election

We simulate the election 40,000 times to see who wins most often. The sample of 100 outcomes below gives you a good idea of the range of scenarios our model thinks is possible.





BUSINESS DASHBOARDS (EXPLORATORY)



UNDERSTANDING

IMPLICATION

BEAUTY

WEBINARS

UPCOMING

WEBINAR NAME	REGISTERED
5/20/2020 DATA VISUALIZATION: GLOBALIZATION OF DATA VISUALIZATION	330
5/28/2020 ROLE OF DATA MINING IN THE RETAIL SECTOR	213
6/4/2020 STRATEGIES FOR DATA COLLECTION	287
6/9/2020 DATA BREACHES: TYPE, VULNERABILITIES AND THREATS	115
6/11/2020 BUSINESS INTELLIGENCE: AVOID BAD DATA	268

PREVIOUS

WEBINAR NAME	ATTENDEES
4/27/2020 STREET TALK: DATA SUCCESS	270 3 CONVERSIONS
4/23/2020 10 WAYS TO REINVENT YOUR BIG DATA	284 0 CONVERSIONS
4/21/2020 DOUBLE YOUR PROFIT WITH THESE 5 TIPS ON DATA ANALYTICS	301 6 CONVERSIONS
4/17/2020 HOW TO TEACH DATA ANALYTICS LIKE A PRO	274 5 CONVERSIONS
4/12/2020, THINK OF DATA. I BET YOU'LL MAKE THE SAME MISTAKE AS MOST PEOPLE DO	288 6 CONVERSIONS

FILTERS |

WEBINAR DATE
All

GUEST PRESENTER?
All

EXPORT |

WEBINAR CONVERSIONS

WEBINAR DATE: 1/8/2019 - 4/27/2020

WEBINARS

113

(7 PER MONTH)

ATTENDEES

33.0K

(292 PER WEBINAR)

CONVERSIONS

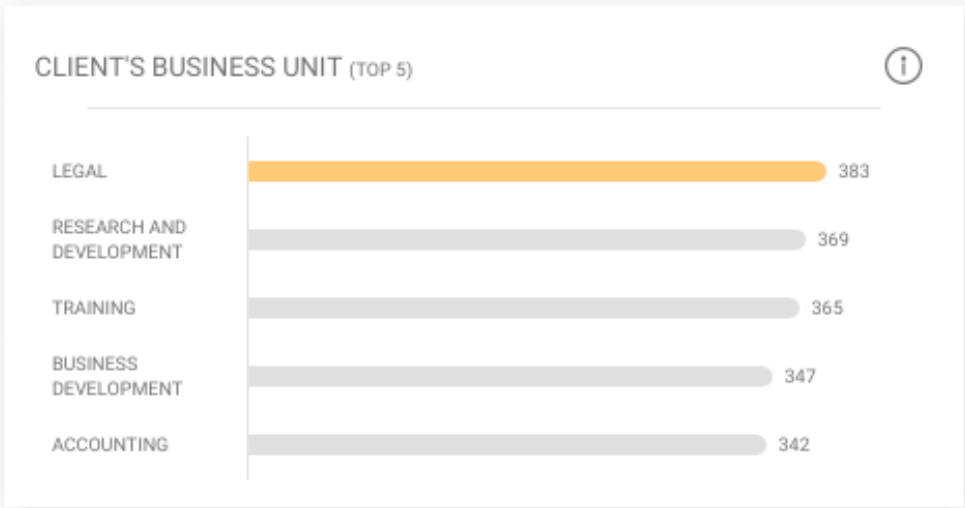
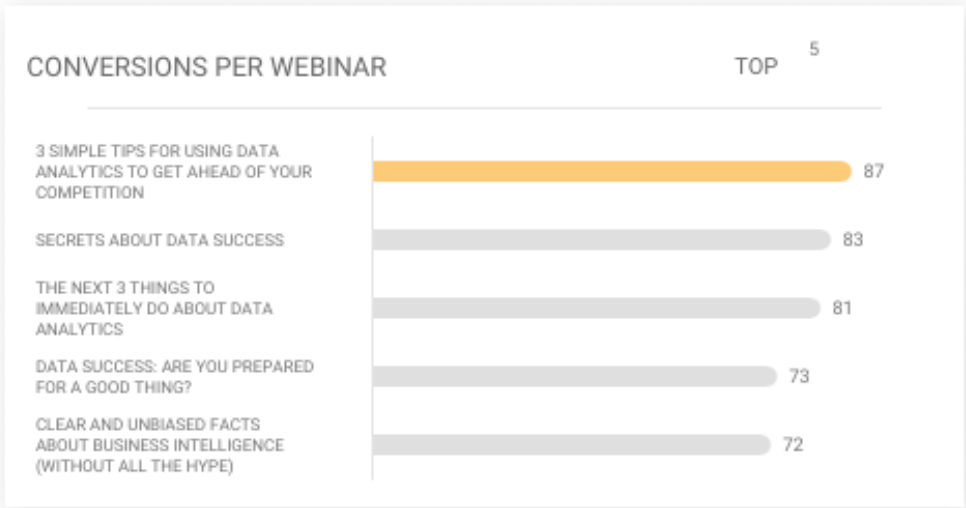
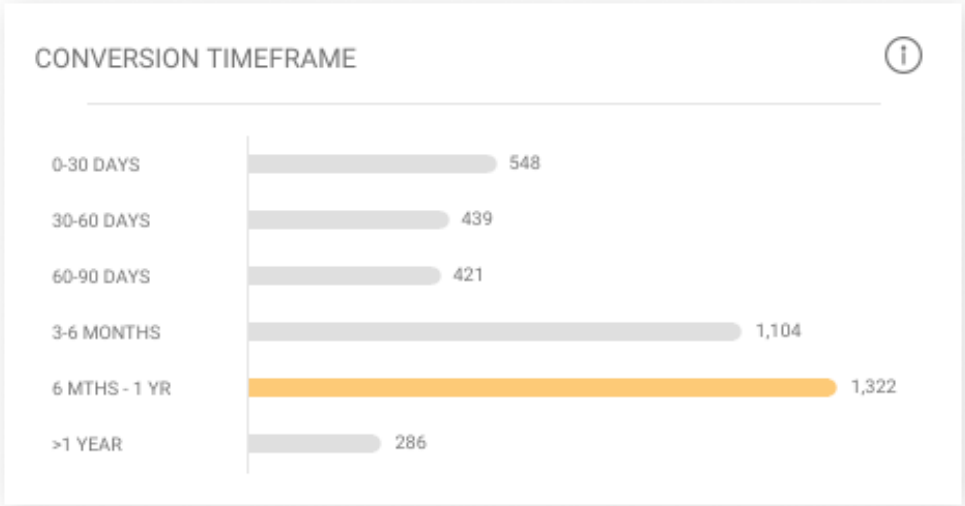
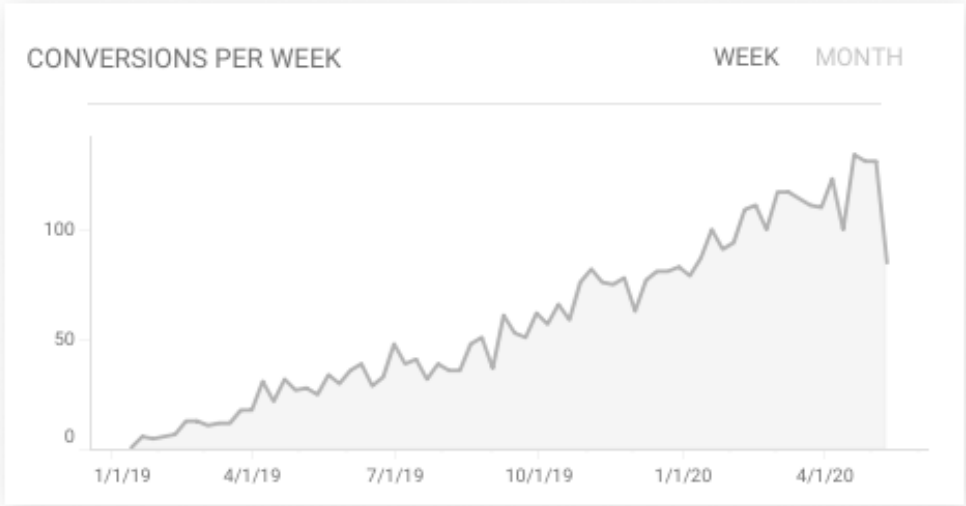
4,120

(12.5% RATE / 36 PER WEBINAR)

REVENUE GENERATED

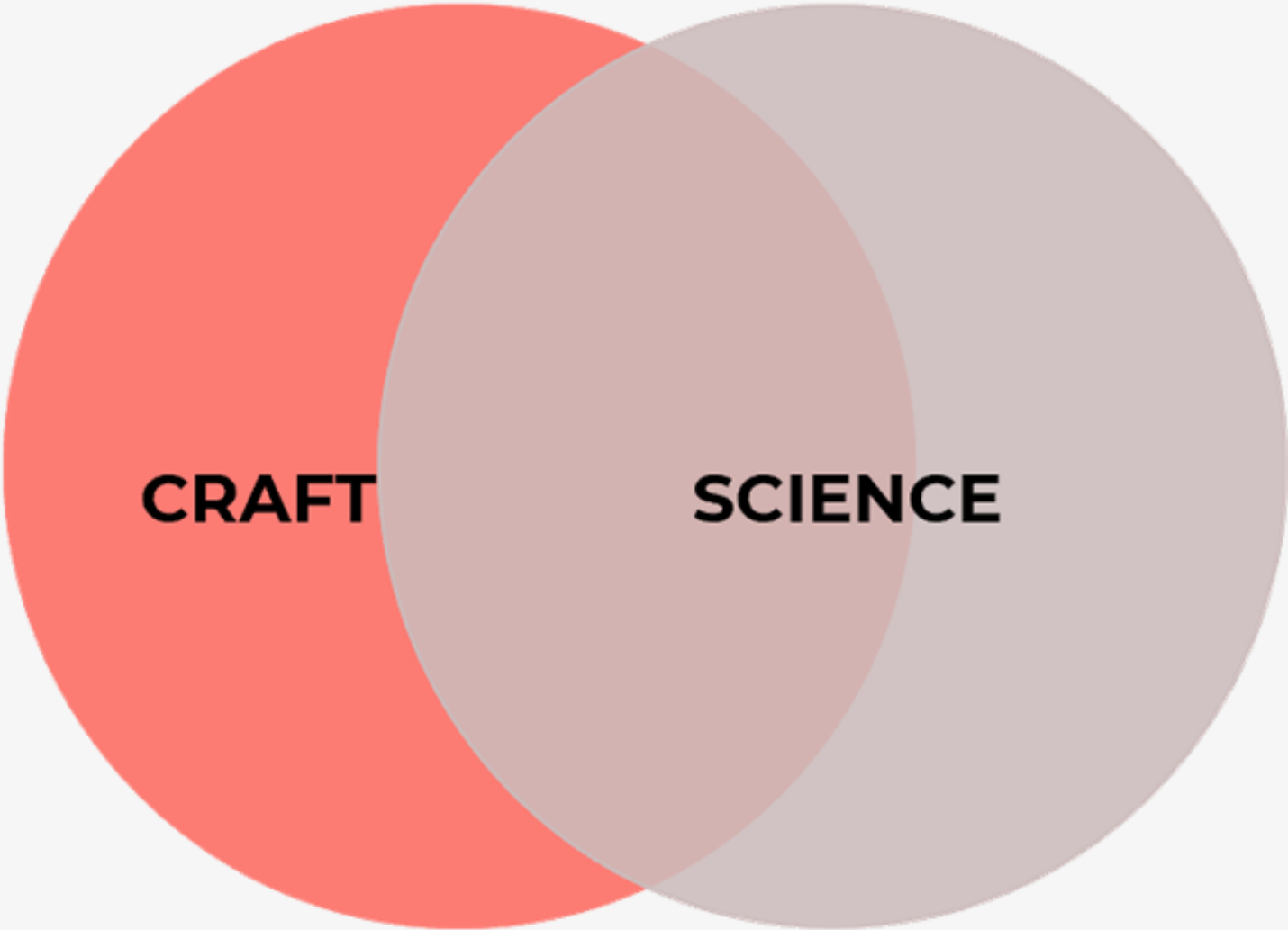
\$4.94M

(\$1.2K PER CONVERSION)





BUSINESS DATA VISUALIZATION (EXPLANATORY)



IMPLICATION

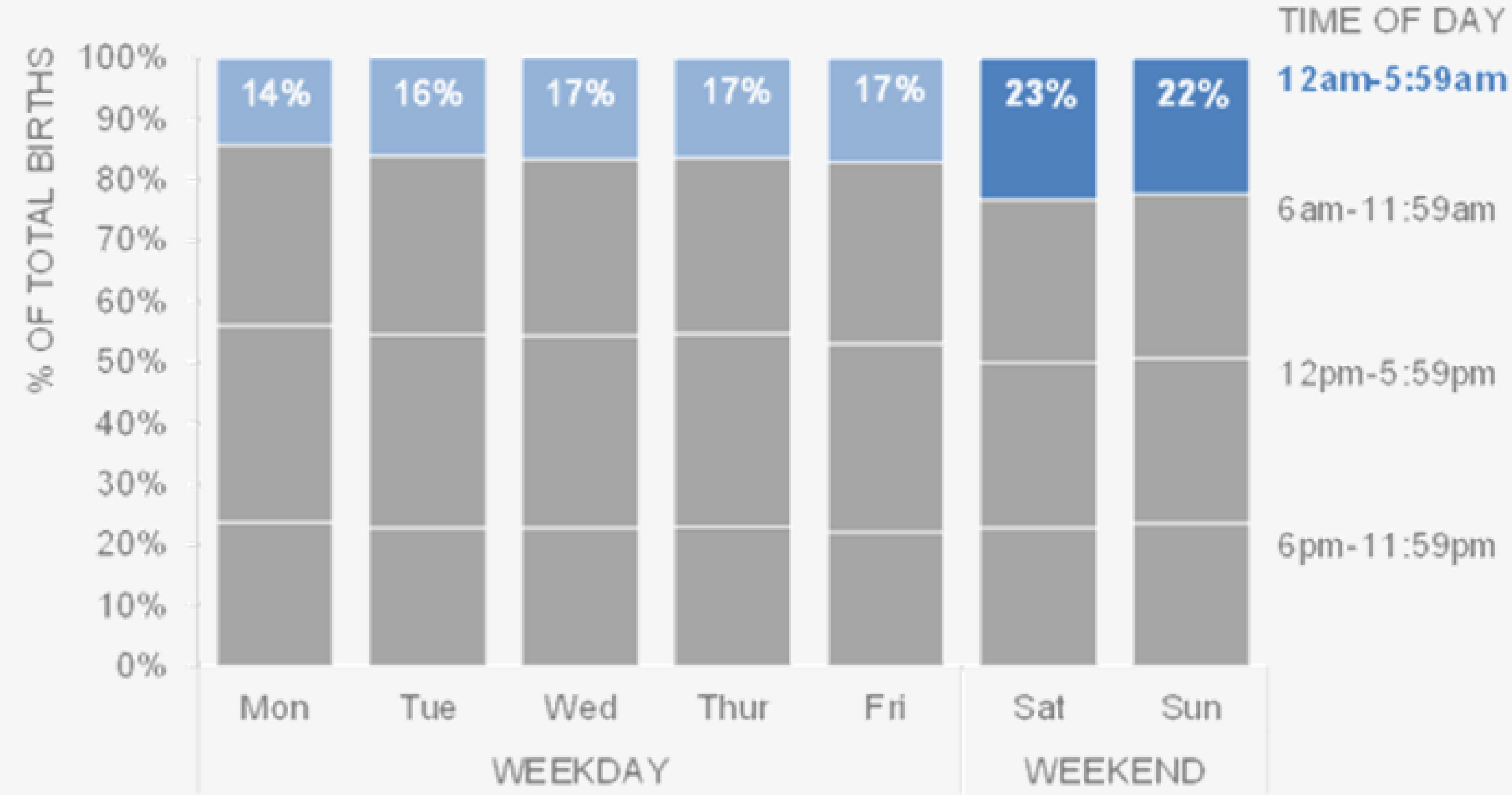
UNDERSTANDING

BEAUTY



When babies are born

Weekend deliveries are more likely to be in early morning, compared to weekdays



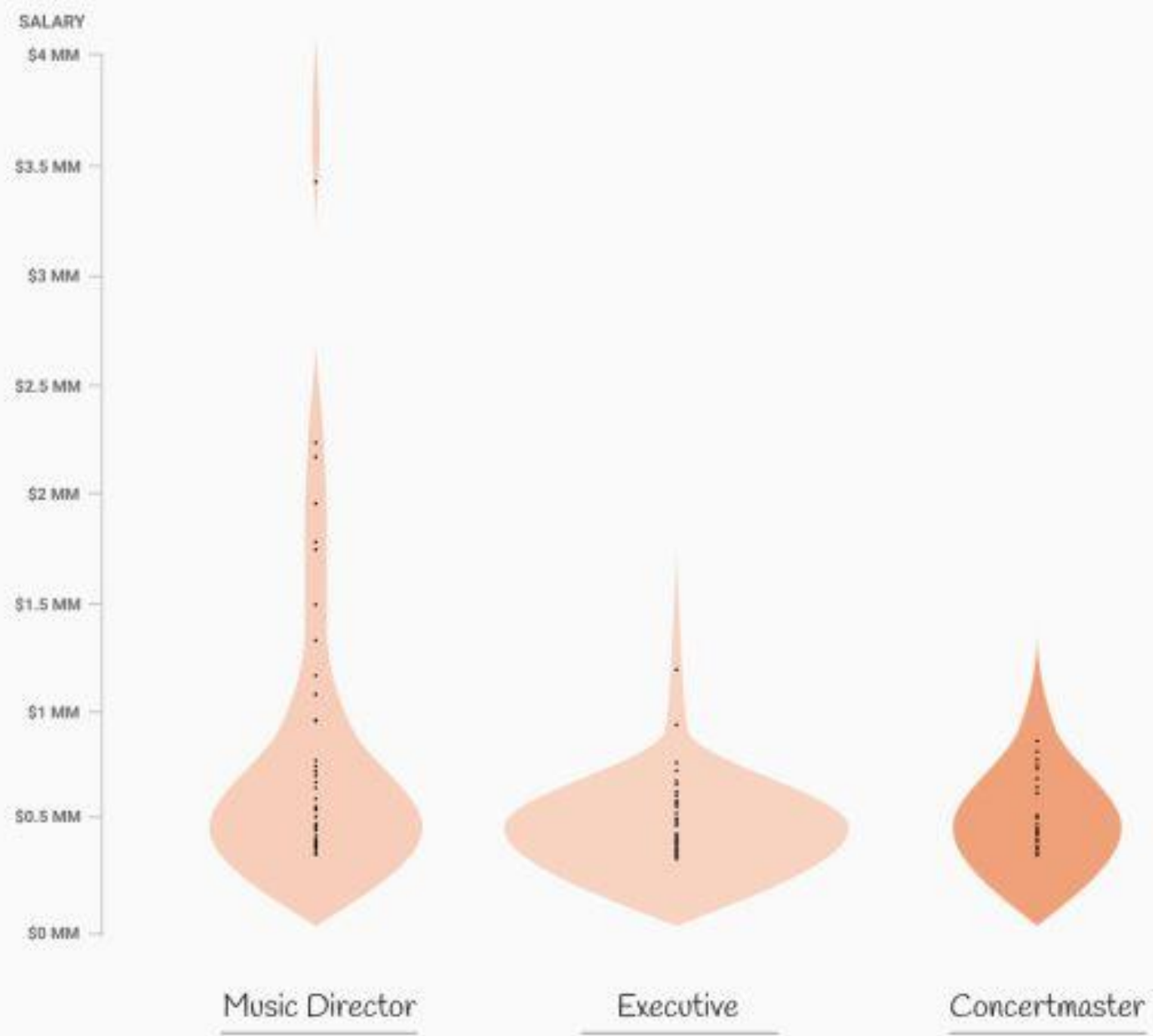
Data source: CDC (National Vital Statistics Reports, Vol. 67, No. 1, January 31, 2018)

Source: www.storytellingwithdata.com



Unlike Music Directors, top Concertmasters don't make millions

Concertmasters are first chair violinists of an orchestra. The Adaptistration orchestra compensation reports is a big picture overview of all compensation across US.




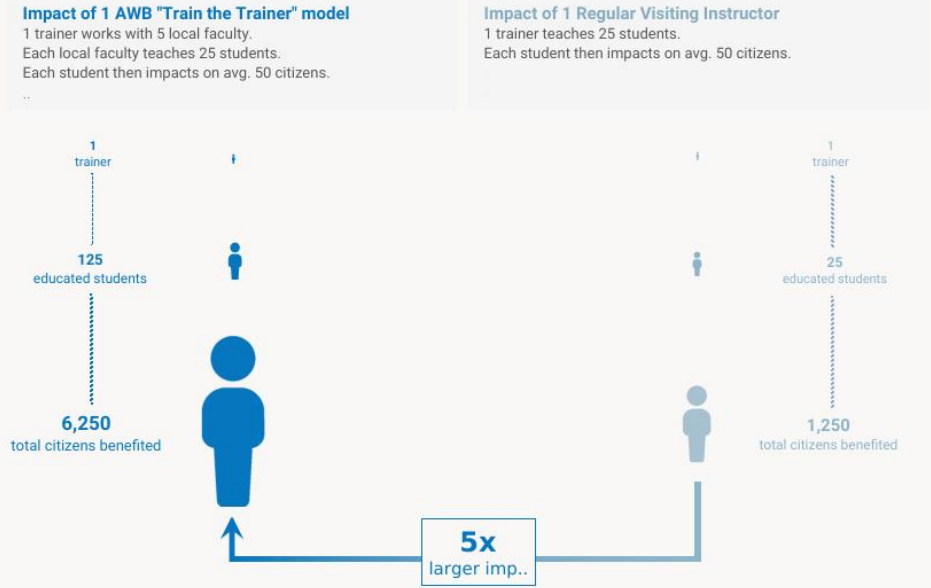
Source: Adaptistration Compensation Report 2020
Author: Rebeca Pop, Vizlogue



EDUCATION IS KEY TO A FLOURISHING SOCIETY



 **THE POWER OF ONE:** Through the “train-the-trainer” model that AWB uses, each project builds local capacity and expertise, creating sustainable programs that are multiplied and persist long after the volunteers return home.



 **DIVERSITY OF IMPACT:** In 2018 and 2019, AWB worked on **32 projects** across **16 countries**. Each project and each country has its own unique story.

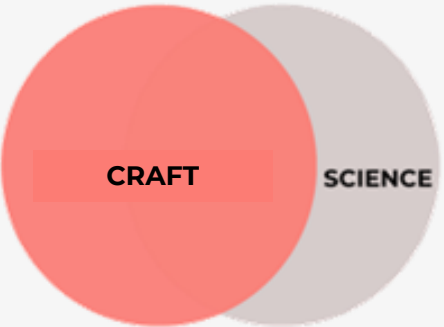


-> DONATE! Help us educate, inspire..

There are many things developing nations need to foster sustainable health and prosperity, **education** is often the forgotten ingredient. **Academics Without Borders (AWB)** works to change that by helping developing nation universities build the programs, capacity and plans they need to educate the next generation of professionals and leaders.

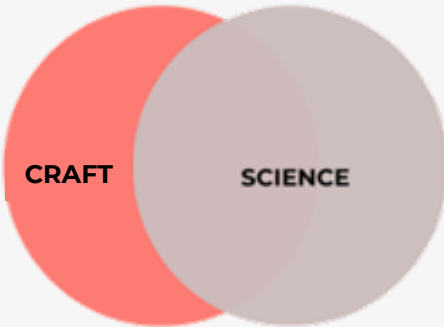


JOURNALISM



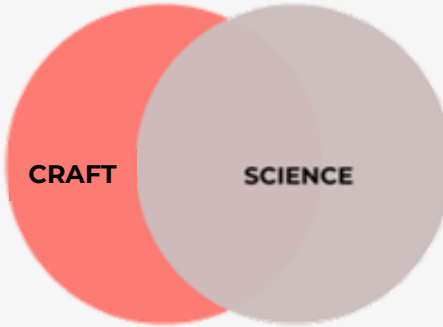
BEAUTY
UNDERSTANDING
IMPLICATION

BUSINESS DASHBOARDS
(EXPLORATORY)



UNDERSTANDING
IMPLICATION
BEAUTY

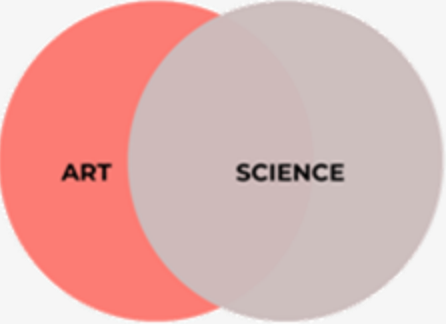
BUSINESS DATA VISUALIZATION
(EXPLANATORY)



IMPLICATION
UNDERSTANDING
BEAUTY



**BUSINESS DASHBOARDS
(EXPLORATORY)**

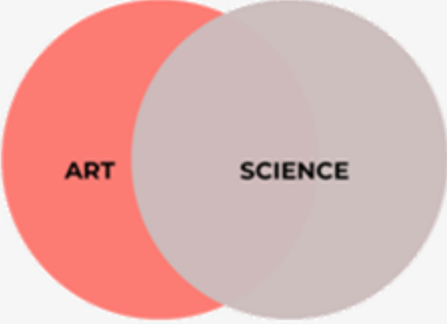


UNDERSTANDING

IMPLICATION

BEAUTY

**BUSINESS DATA VISUALIZATION
(EXPLANATORY)**



IMPLICATION

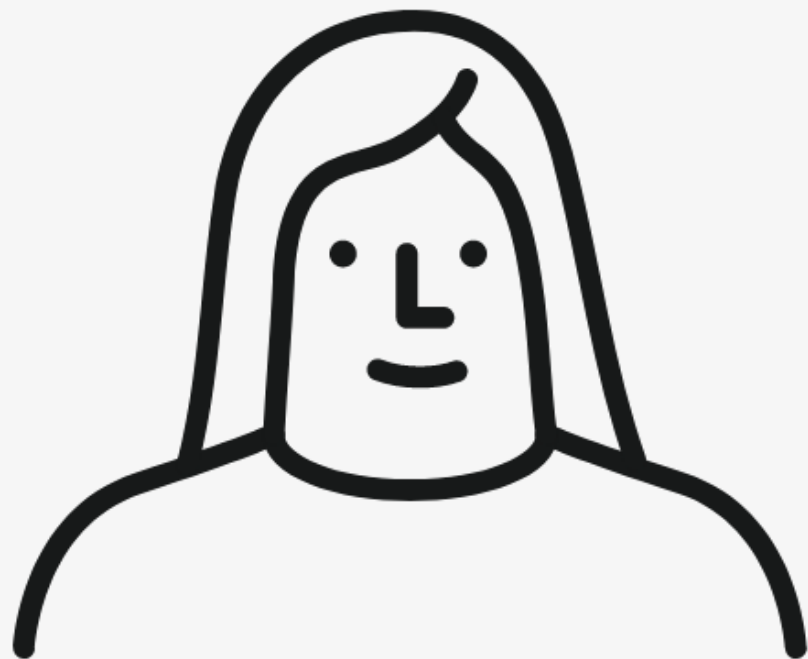
UNDERSTANDING

BEAUTY

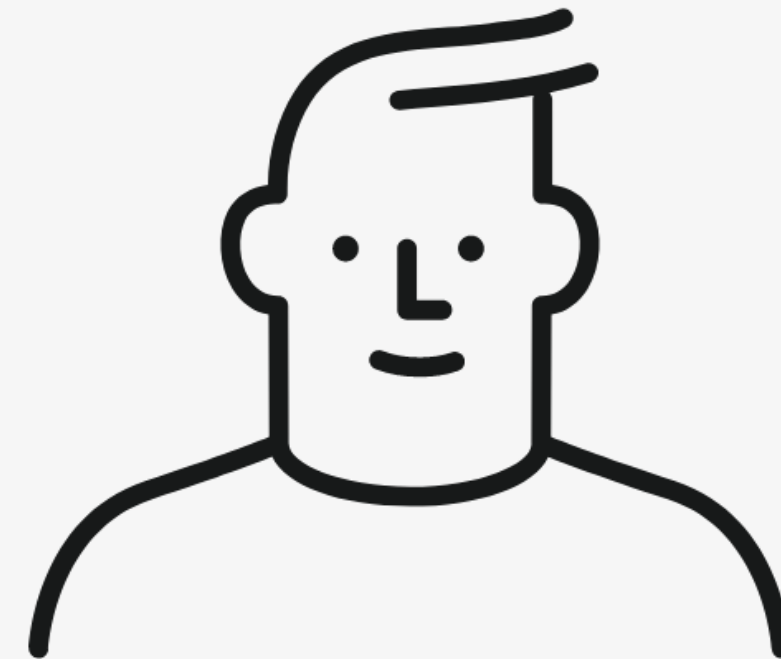
Business Data Visualization



PRACTITIONER



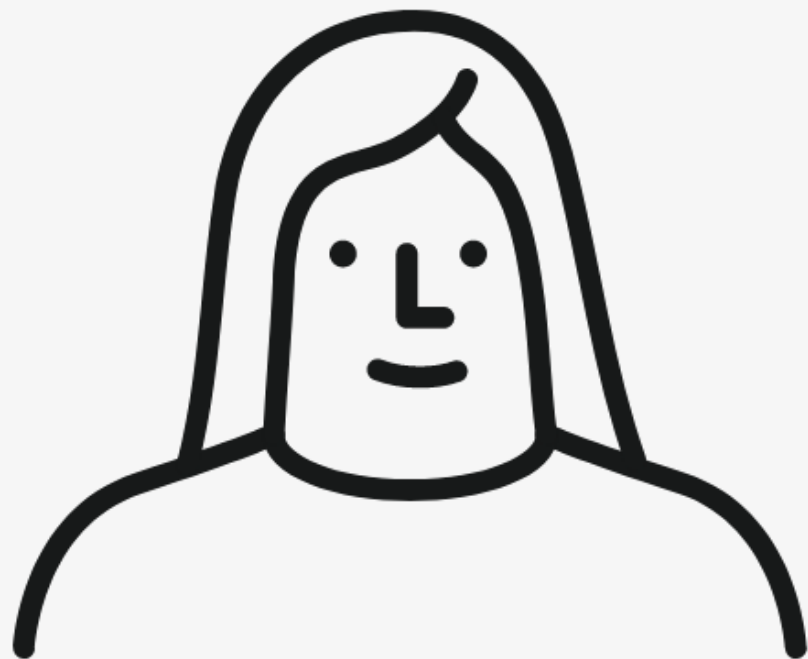
RESEARCHER



Business Data Visualization



PRACTITIONER



Data Visualization Practitioners



Stephen Few



Edward Tufte



Cole Knafllic



Stephanie Evergreen

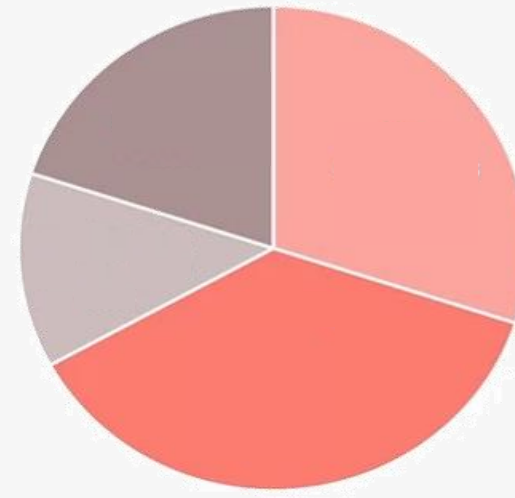


Andy Kirk



Andy Kriebel

Pie Charts



Stephen Few



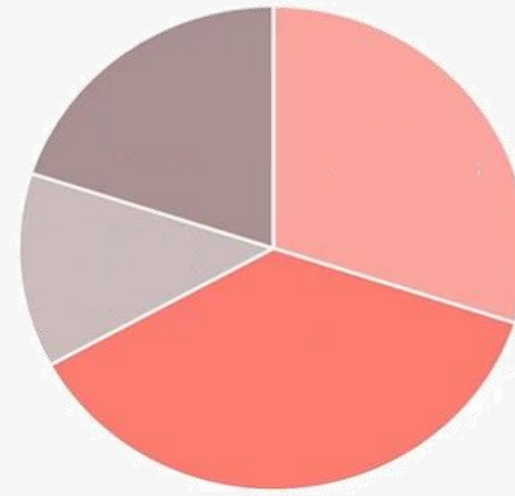
Edward Tufte

“Save the Pies for Dessert.

*Of all the graphs that play major roles in the lexicon of quantitative communication, however, **the pie chart is by far the least effective**. Its colorful voice is often heard, but rarely understood. It mumbles when it talks.”*

*“A table is nearly always better than a **dumb pie chart**; the only thing worse than a pie chart is several of them [....] Given their low data-density and failure to order numbers along a visual dimension, **pie charts should never be used.**”*

Pie Charts



Cole Knafllic

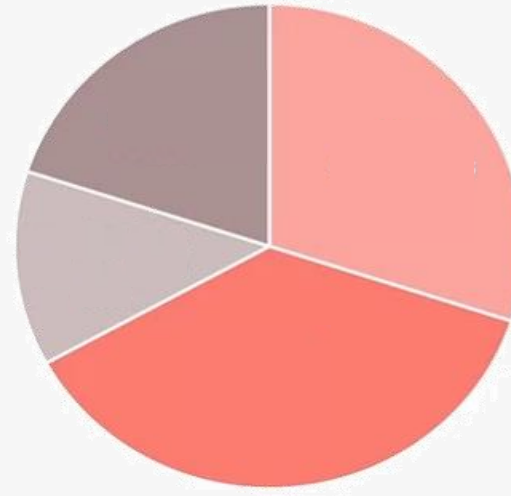
“death to pie charts.

I hate pie charts.

I mean, really hate them.

Those who have heard me speak on data visualization will have learned that the only thing I hate more than a pie chart is a 3D, exploding pie chart - they are the absolute worst - but the plain vanilla pie charts are pretty bad, too.”

Pie Charts



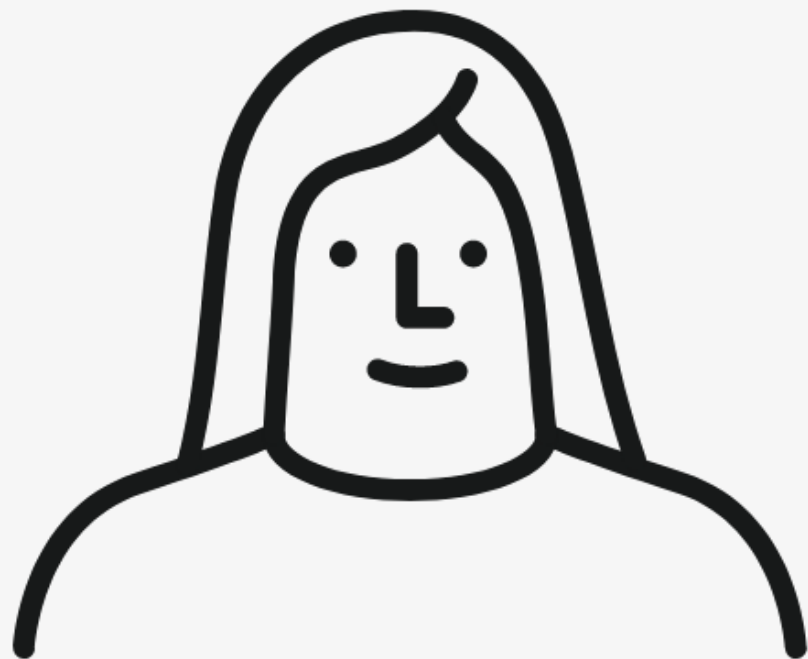
Google

- Search: pie charts are
- pie charts are **bad**
 - pie charts are **presented in textbooks and magazines as**
 - pie charts are **used for**
 - pie charts are **useful for representing**
 - pie charts are **best used for**
 - pie charts are **useful for quizlet**
 - pie charts are **the worst**
 - pie charts are **evil**
 - pie charts are **terrible**
 - pie charts are **useless**

Business Data Visualization



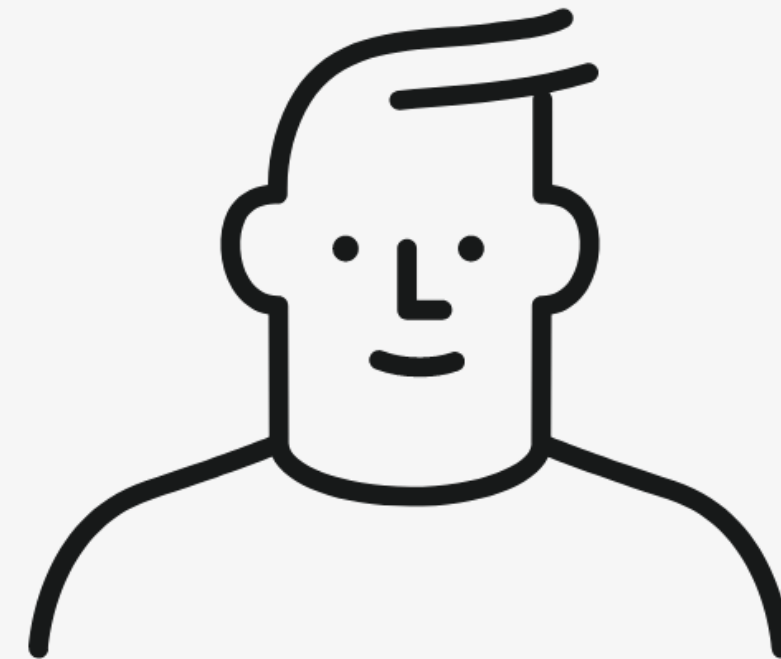
PRACTITIONER



Business Data Visualization



RESEARCHER



Pie Charts



(a) Pie chart.



(b) Donut chart.



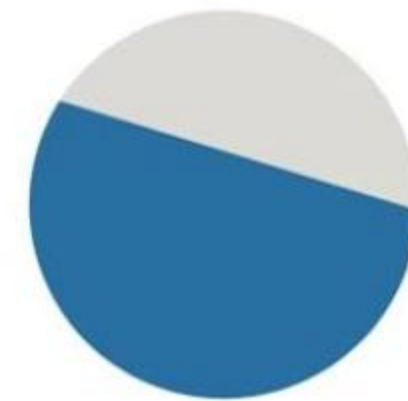
(c) Arc length chart.



(d) Angle pie chart.



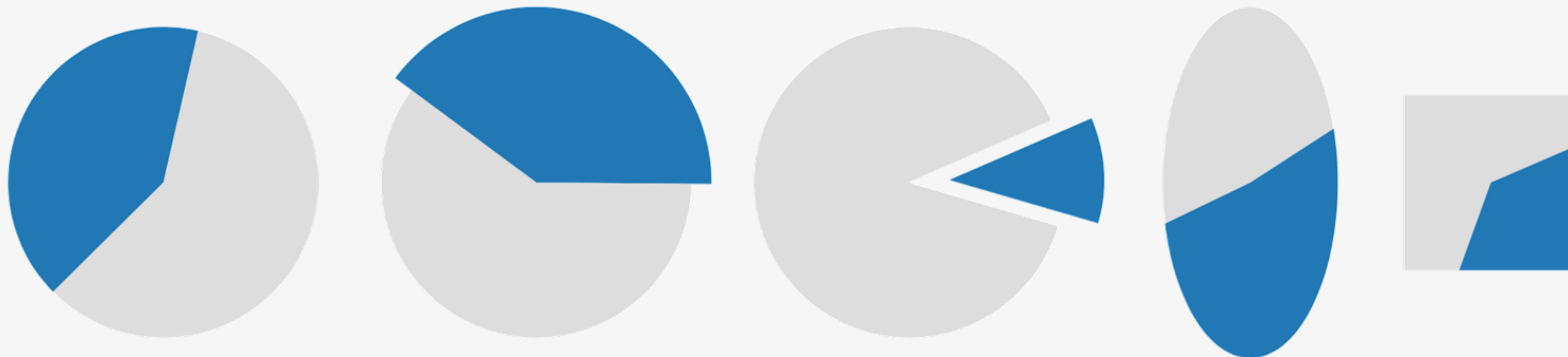
(e) Angle donut chart.



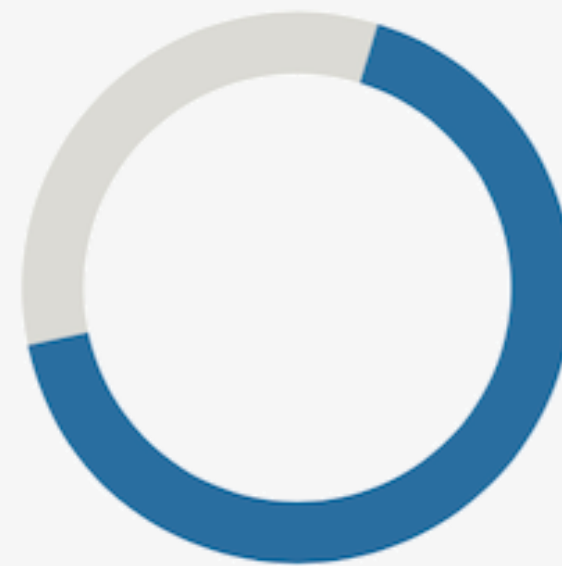
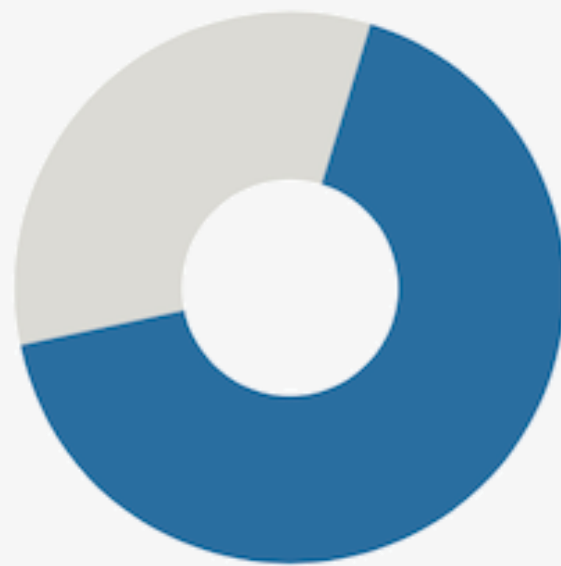
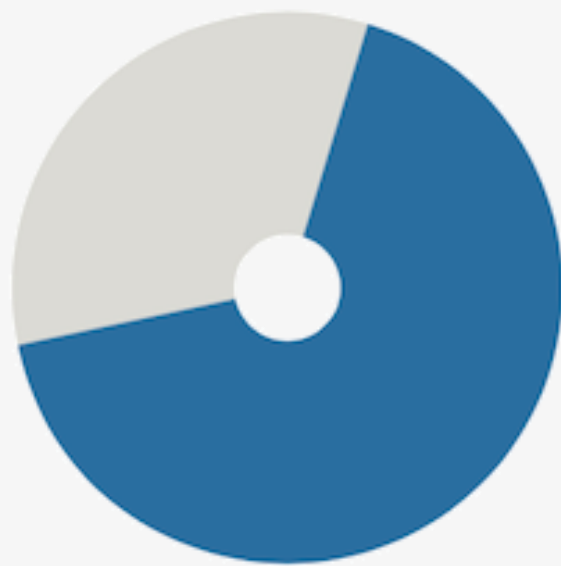
(f) Area chart.

Source: Drew Skau and Robert Kosara, *Arcs, Angles, or Areas: Individual Data Encodings in Pie and Donut Charts*, 2016

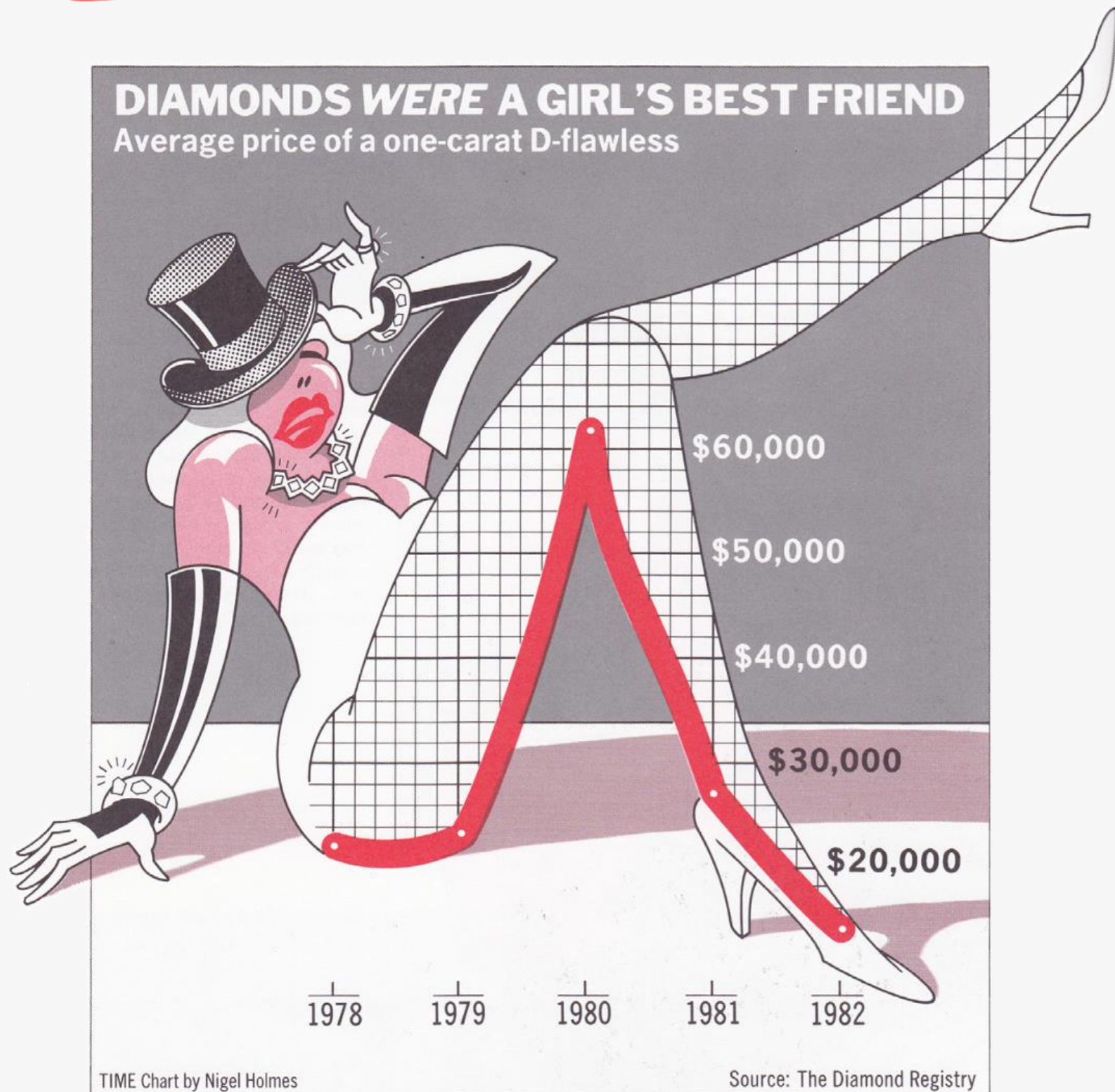
Pie Charts



Pie Charts



Chartjunk



Edward Tufte

*“Worse is contempt for our audience, designing as if readers were obtuse and uncaring. In fact, consumers of graphics are often more intelligent about the information at hand than those who fabricate the data decoration. [...] Disrespect for the audience will leak through, damaging communication. What E. B. White said of writing is equally true for information design: **‘No one can write decently who is distrustful of the reader’s intelligence, or whose attitude is patronizing.’**”*

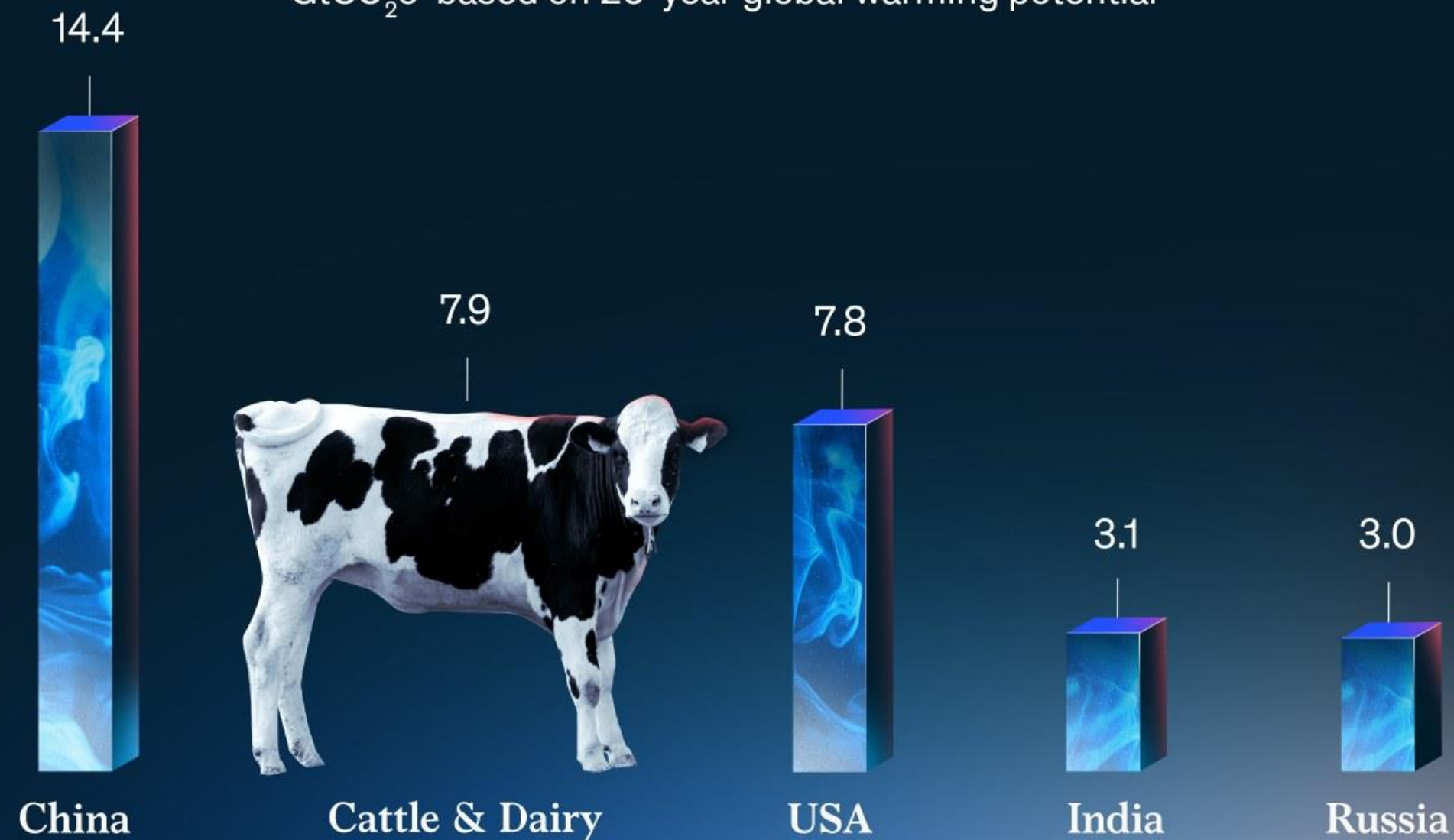
(Edward Tufte, Envisioning Information, Graphics Press, 1990, p.34-35)

Chartjunk



If cows were a country, they would be among the top greenhouse-gas emitters

GtCO₂e¹ based on 20-year global warming potential²



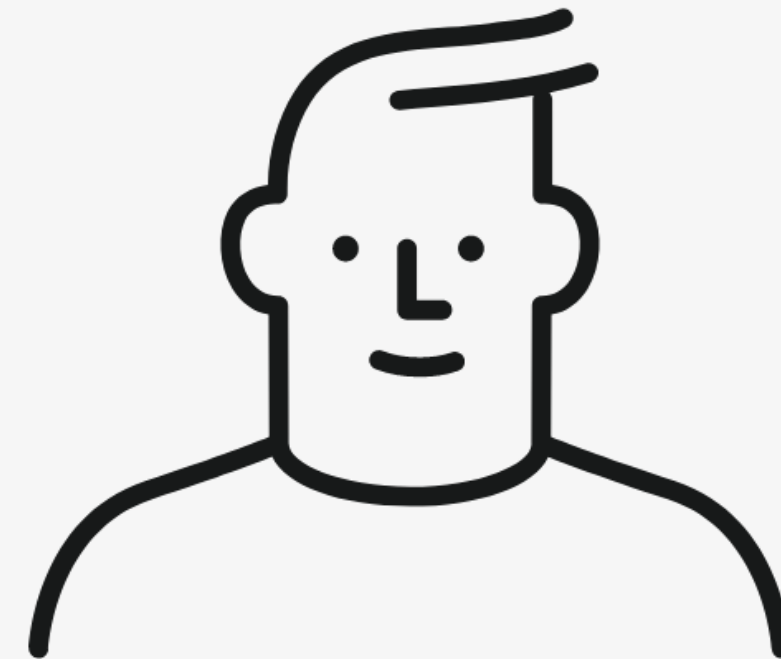
¹Billion metric tons of carbon dioxide equivalent.

²2016 data or most recent available; 20-year global-warming-potential values from IPCC's Fifth Assessment Report (AR5).

Business Data Visualization



RESEARCHER



Chartjunk

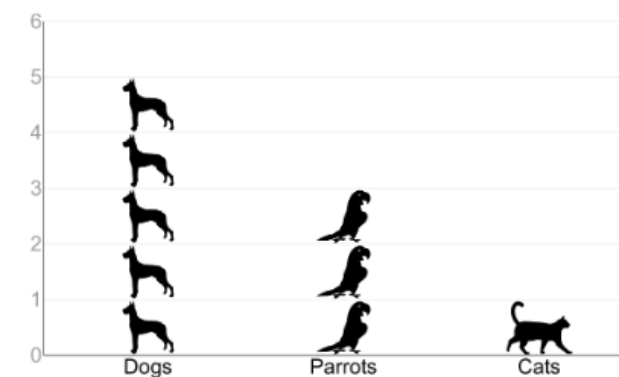
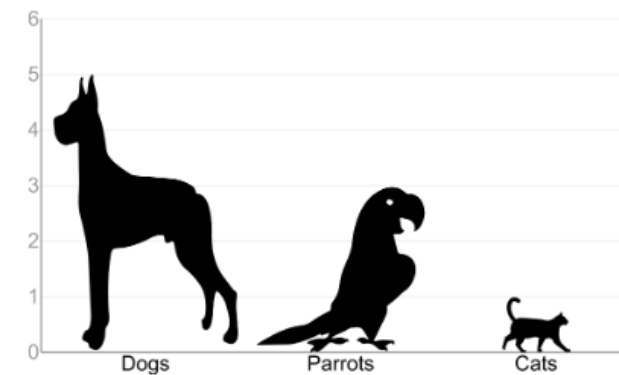
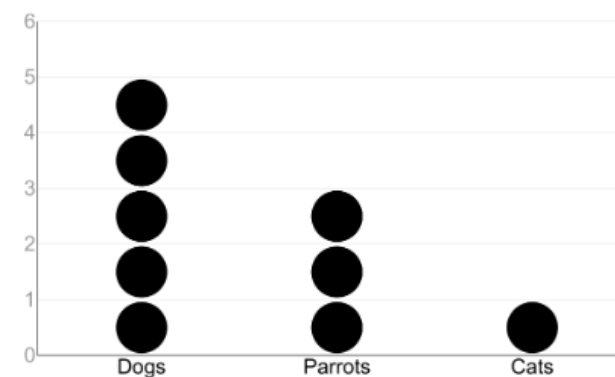
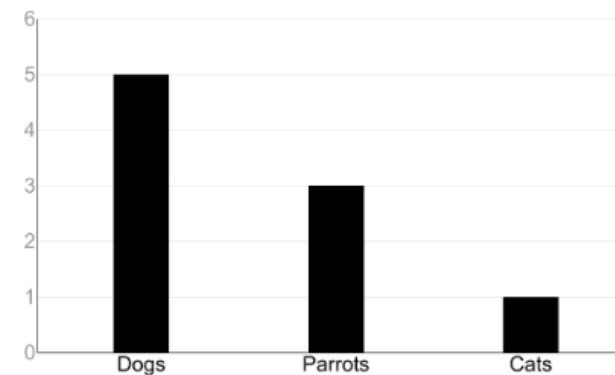


ISOTYPE Visualization – Working Memory, Performance, and Engagement with Pictographs

Steve Haroz
Northwestern University
isotype@steveharoz.com

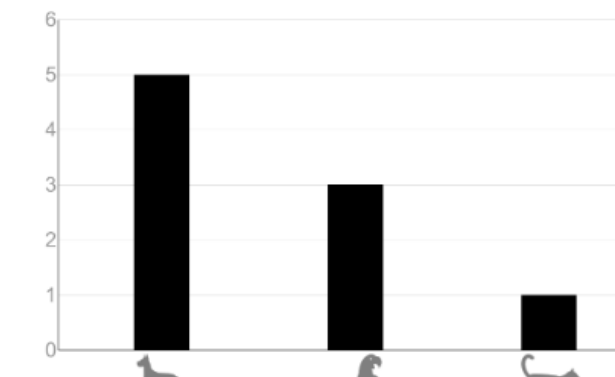
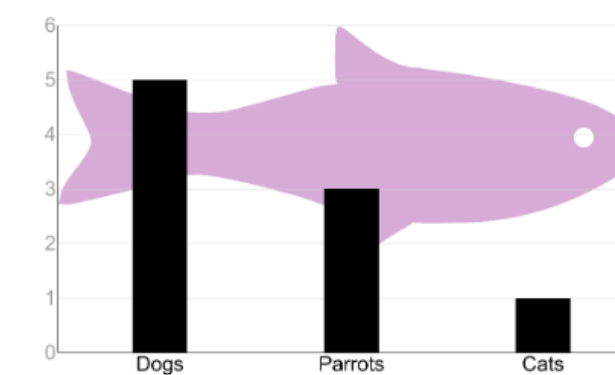
Robert Kosara
Tableau Research
rkosara@tableau.com

Steven L. Franconeri
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franconeri@northwestern.edu



(A)

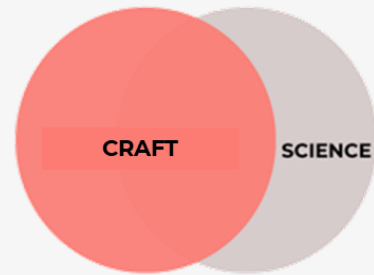
(B)



Rules in Data Visualization

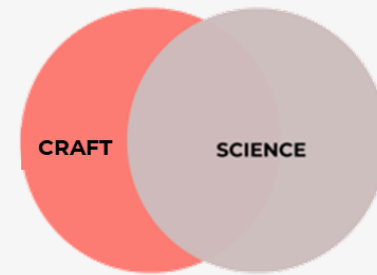


JOURNALISM



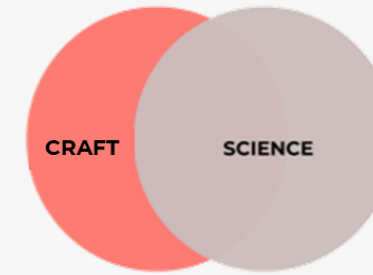
BEAUTY
UNDERSTANDING
IMPLICATION

BUSINESS DASHBOARDS (EXPLORATORY)



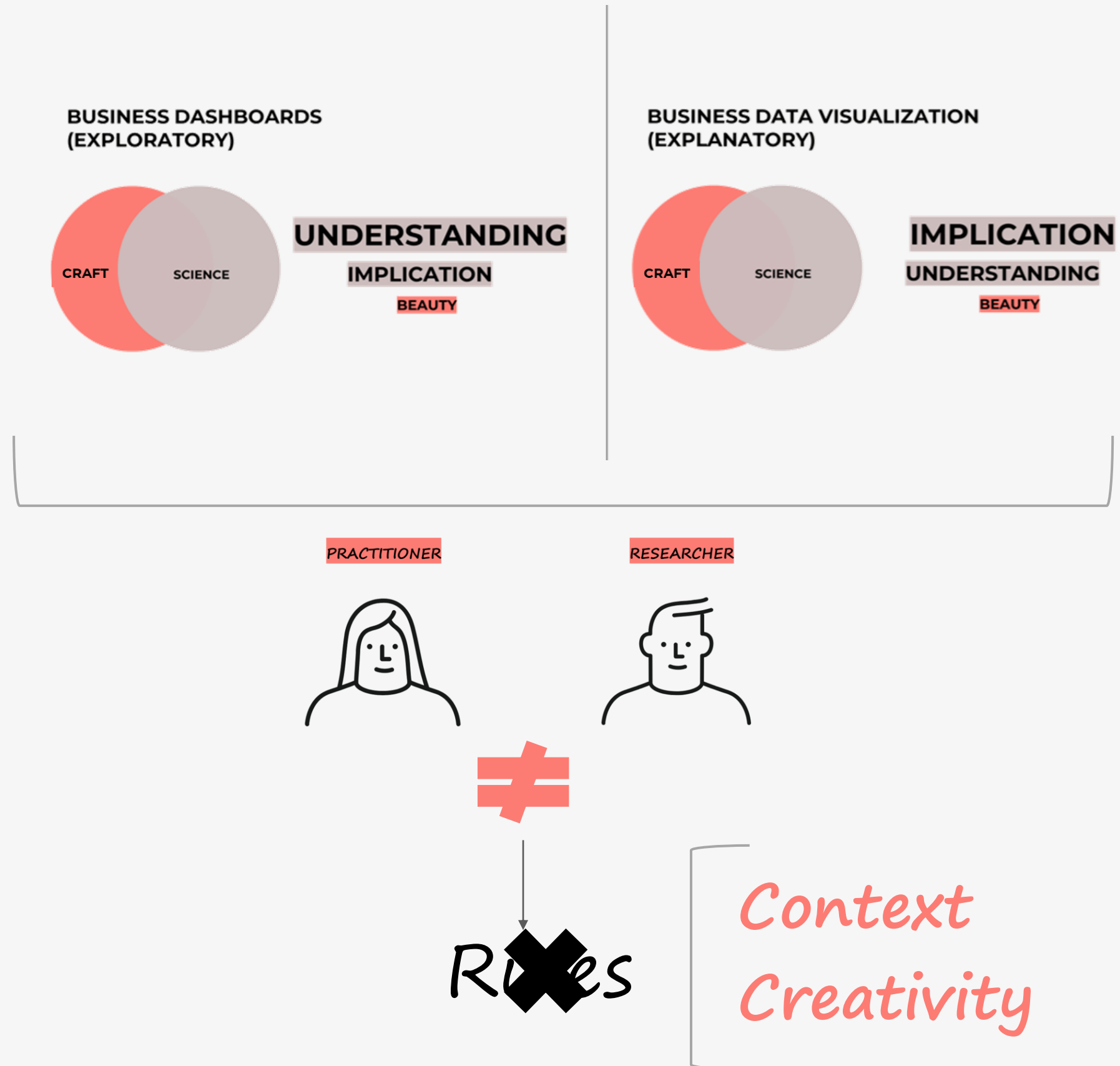
UNDERSTANDING
IMPLICATION
BEAUTY

BUSINESS DATA VISUALIZATION (EXPLANATORY)



IMPLICATION
UNDERSTANDING
BEAUTY

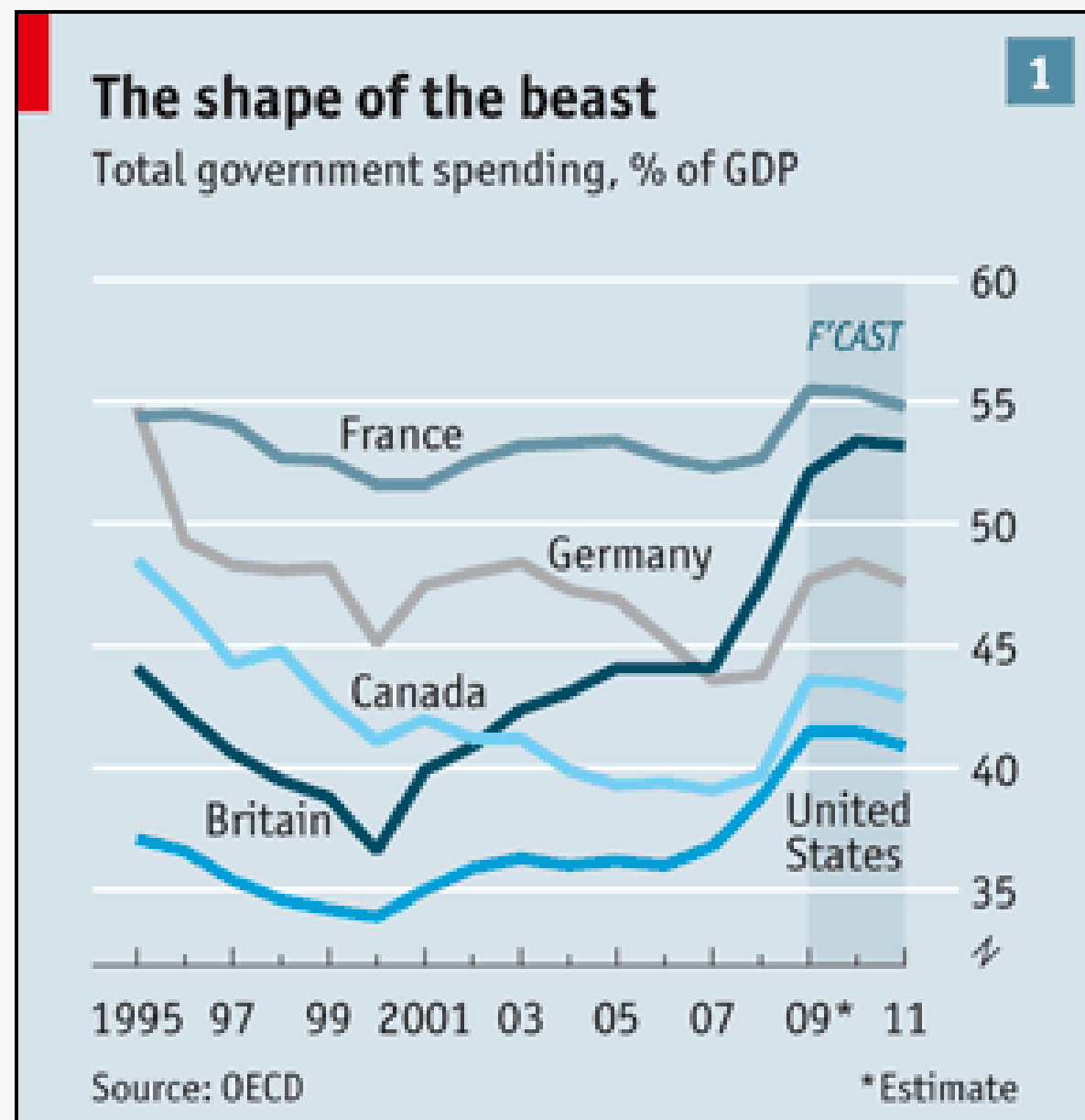
Rules in Data Visualization



Other Rules: Axes

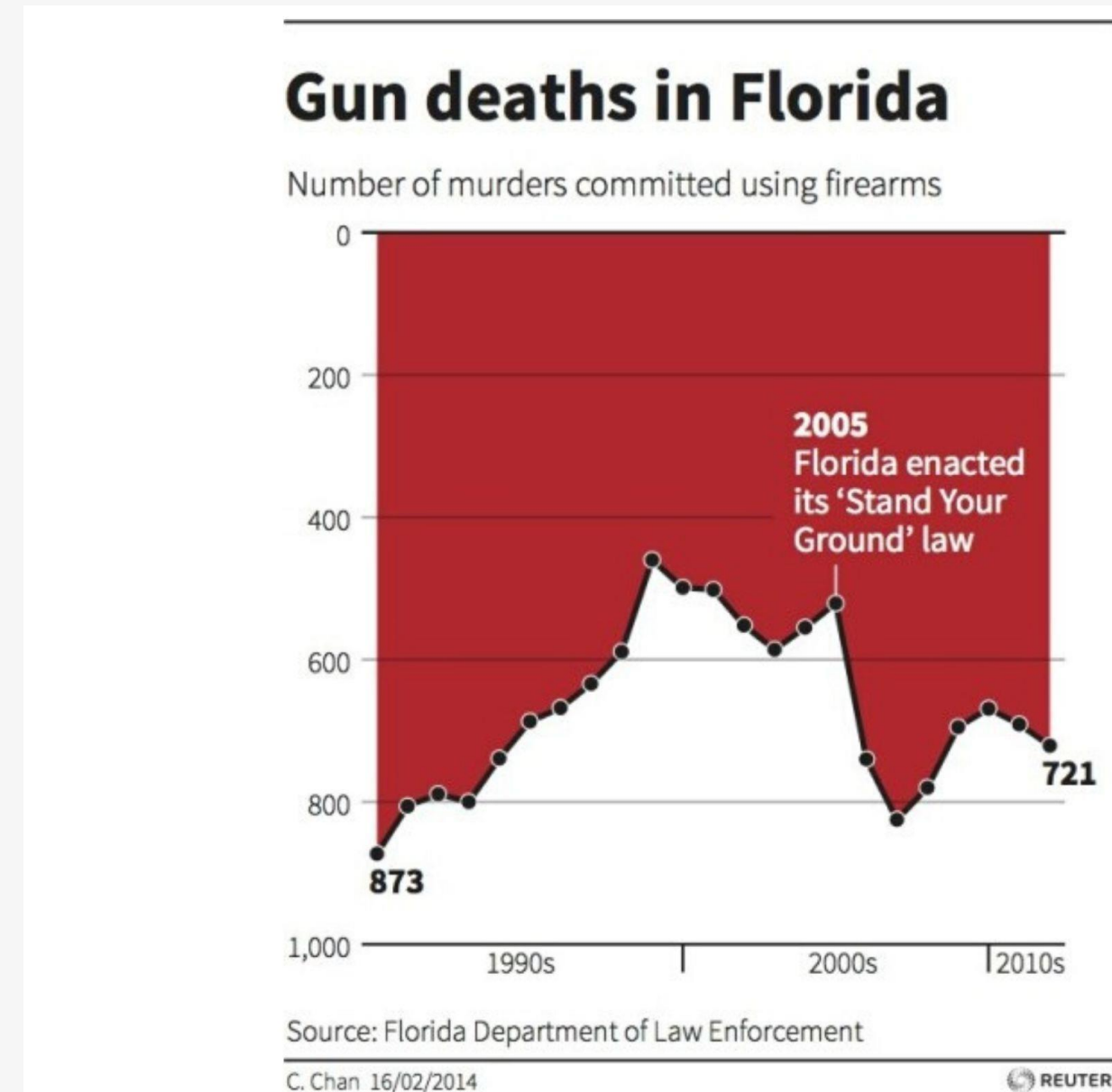


To truncate or not to truncate?



Source: The Economist

Direction



Source: Reuters



LEARN THE RULES



BREAK THE RULES

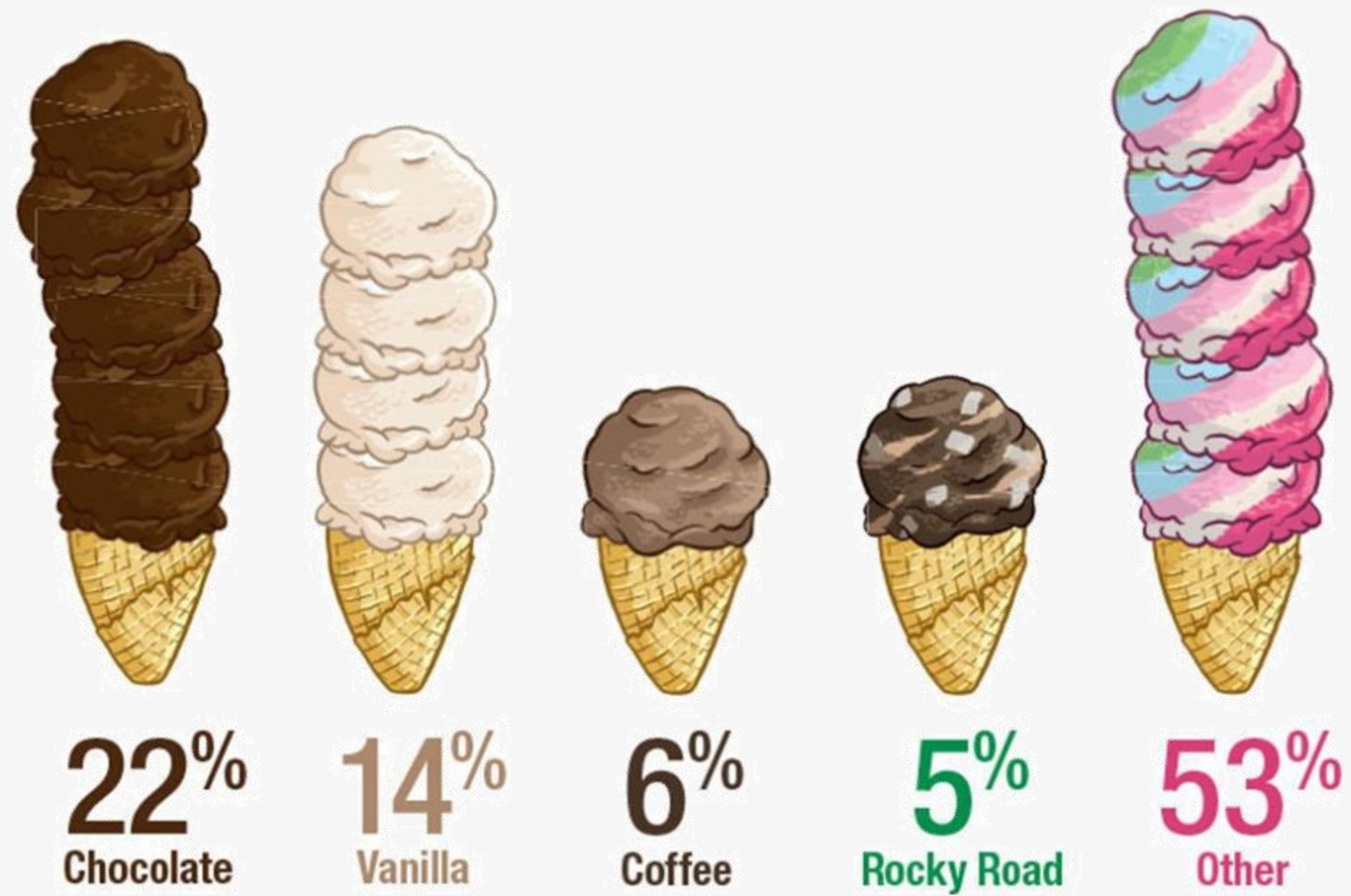


EXERCISE

Take a look at the ice cream chart on the next slide.

Is it accurate or misleading? Why?

Do you think there is a 'rule' in data viz that applies to this chart? Share your answer on Canvas.



Source: Costco flyer