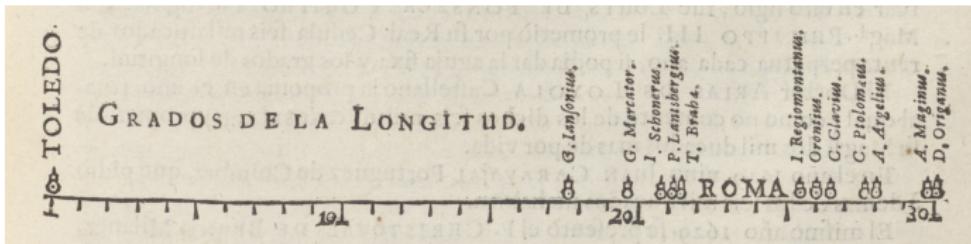


# DATA VISUALIZATION

Data Analysis for Journalism and Political Communication  
(Fall 2025)

Prof. Bell

# MICHEL FLORENT VAN LANGREN (1644)



# MICHEL FLORENT VAN LANGREN (1644)

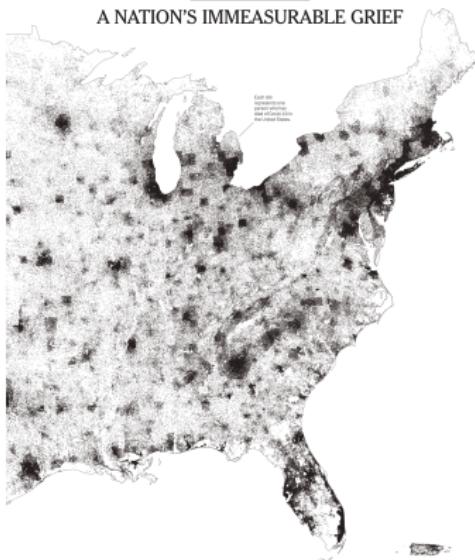






# ONE MILLION

## A NATION'S IMMEASURABLE GRIEF



They were mothers and fathers, sisters and brothers, daughters and sons. More Americans have died in the pandemic now than in two decades of our enemies or on battlefields in all of the country's wars combined — a death rate higher than almost any other wealthy nation. Each dot on this map represents a person who died of Covid, a reckoning of the toll it has taken on the entire United States. Their families have been left behind, fading in and out of memory, and the very that their loved ones will be forgotten is a nation determined to move on. PAGES 10-12



## **U.S. DEATHS NEAR 100,000, AN INCALCULABLE LOSS**

They Were Not Sin  
Nor were on a List  
They Were Us.

Nonetheless, often cancer patients require the capacity of their relatives and friends, whether the number of patients — particularly aged or terminally ill — for the complete exercise of the rights of the patients and the rights of the others. The following sections discuss different ways of improving the care of the patients. The concepts are based on personal

**Destituted**, 17, 18, 19, 20,  
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244, 245, 246, 247, 248,  
249, 250.

restitution or removal of the  
B. Raynor, Mrs. B. Johnson,  
the chairman of the City Tax  
Assessment Committee; Mrs. Mary  
T. Lewis, of many years, and  
the author of the original  
Waukegan, W. G. Garrison  
and the Waukegan  
High School Board to have  
a unanimous present of their  
respective organizations.  
**Local Government.** — The largest  
meeting of a Chicago organization  
at Garfield Park, Chicago, was held  
yesterday morning to protest  
against Anti-Suffrage. It  
was presided over by Mrs. Mary  
T. Lewis, of Waukegan, who  
read the following resolution:  
"We, the Chicago suffragists,  
do hereby protest against  
the Anti-Suffrage movement  
in our city, and we call  
upon all our friends to do  
all in their power to  
overthrow it."

his father's background as an attorney, he was born in May 1938 in New Haven, Connecticut, and grew up in West Haven and Hamden. At Yale, he was a member of the Darden Society, a literary group that composed *Chesapeake*, a book of poems published in 1963. From 1963 to 1965, he taught English at the University of Michigan. He then taught English at the University of Massachusetts at Amherst, where he met his first American wife, the poet Diane Johnson. In 1968, he moved to the college he had helped found—Yale University, in New Haven, Connecticut, where he taught English until 1973. In 1973, he became a professor of English at the University of California at Berkeley, where he taught until 1980. Since then he has taught at the University of California at Berkeley, at the University of Florida, and at the University of Texas at Austin, where he currently resides.

**\$40** to Bradenton, Va., carrying  
two men - Brad L. Engle  
Baptist Gulf, under contract  
as minister at White Bird, Idaho.  
**\$100** to Stevensville, Wash.  
for two men - The Youngblood  
group of six girls - Josephine  
McGinnis, Anna Gandy, Anna  
Cobb, Mrs. June Williams, con-  
tinued for three weeks working  
at the new church - St. George Wash.  
Engle, Va., evangelist  
to his flock - Asaph  
Baptist, Idaho, under  
contract to the First Baptist  
Church of Texico, Texico, Idaho.  
**\$100**, March 20, Bellvue, Wash.,  
carrying two men - Eddie  
Hill, pastor to the First Baptist  
Church of Bellvue, Wash.

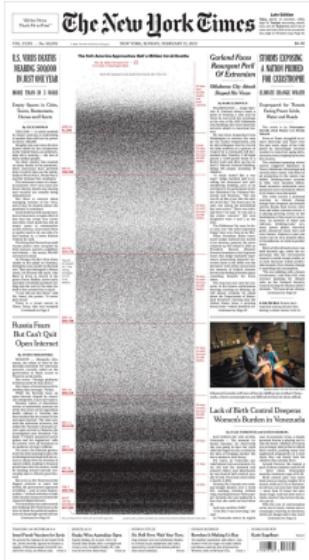
all based on the same language model, being 100% accurate. Students had the opportunity to practice for 10 minutes. Students had the opportunity to practice for 10 minutes. Students had the opportunity to practice for 10 minutes. Students had the opportunity to practice for 10 minutes. Students had the opportunity to practice for 10 minutes.

- **Health Spreads**: If the patient gets sick, all other patients in the **Health** phase are sick as well. This is organized and planned by children with **Health** roles. **Health** roles are assigned every 4 weeks.

Wood - Loring Biogeosciences, 40, 10  
Circa, St. Olaf College  
Wiegert, William, et al., One  
creased air density gradient -  
Loring St. Olaf, 20, 10

the U.S. and Canada. The first edition of *How to Write a Book* was published in 1976. Since then, it has sold over 1.5 million copies worldwide. In 1990, the book was updated and republished as *How to Write a Book, Second Edition*. This new edition, *How to Write a Book, Third Edition*, is the most comprehensive and up-to-date guide to writing books ever published.





## ONE MILLION

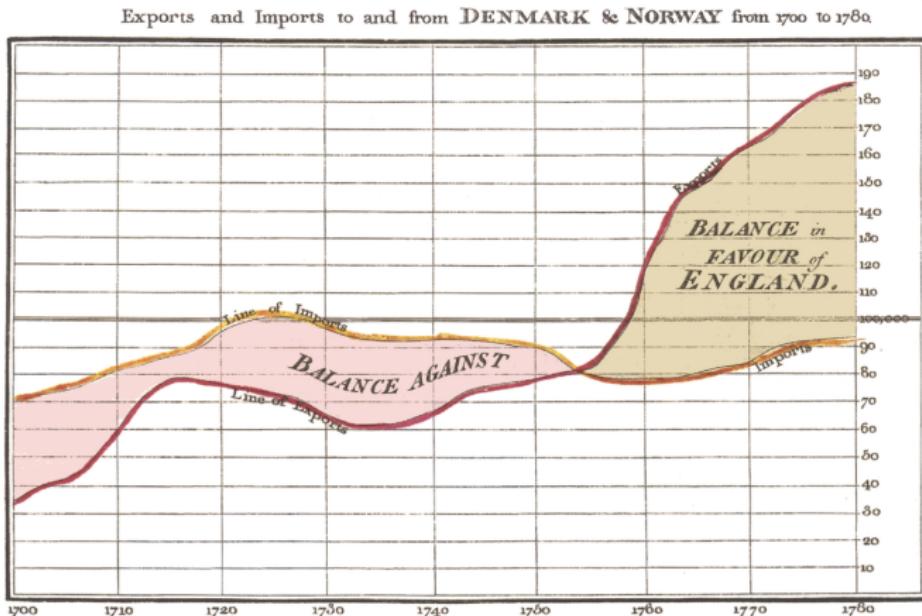
A NATION'S IMMEASURABLE GRIEF



They came mothers and fathers, sisters and brothers, daughters and sons. Many Americans from across the pandemic's first two dozen of its victims' households in all of the country's states survived — a death rate higher than any other modern nation. Each die earliest, though, was a loss of a life, a loss of a family, a loss of a friend, a loss of a loved one. Their families have been left behind as leading experts say the worst may still come.

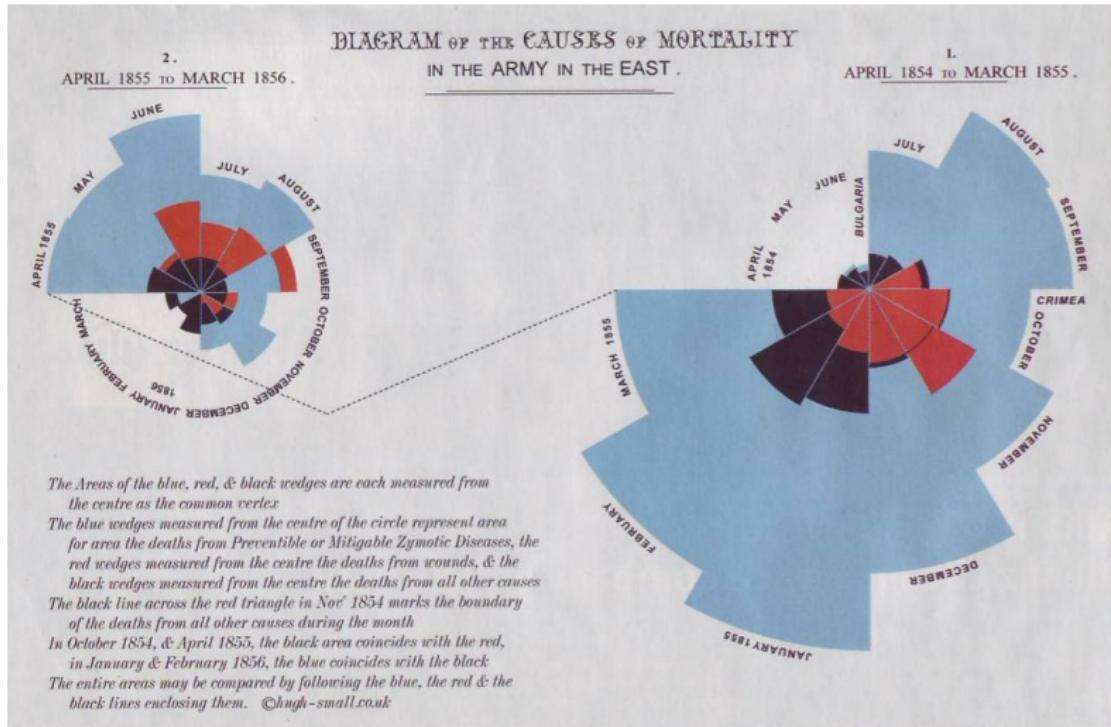


# EARLY DATA VISUALIZATION



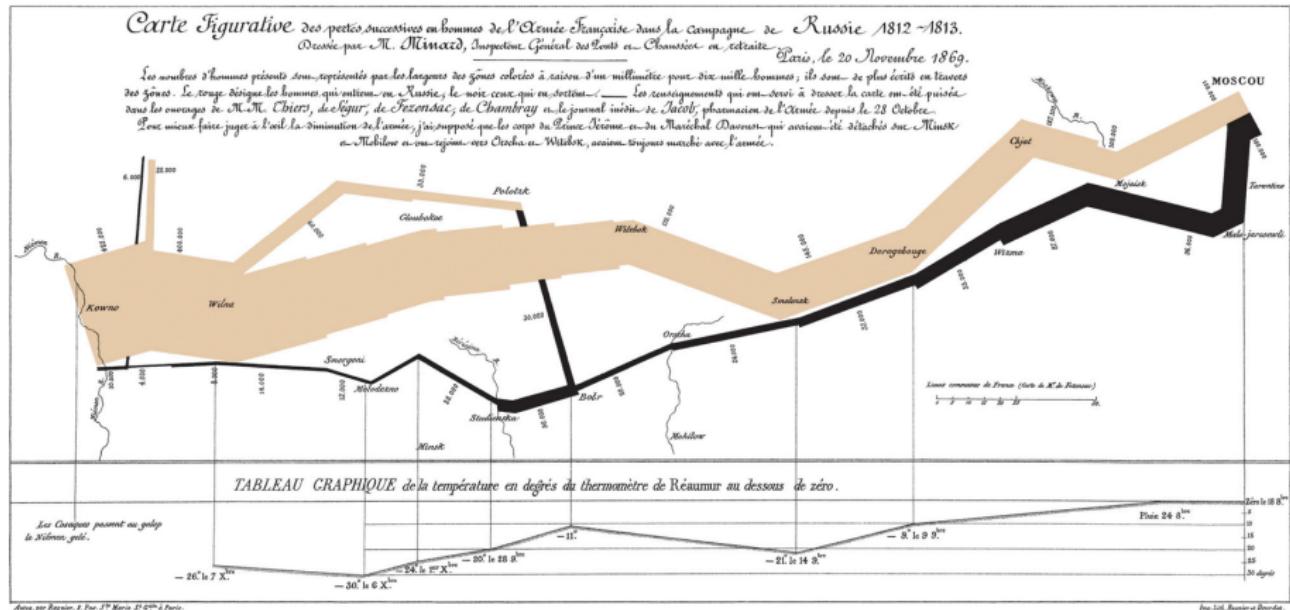
William Playfair (late 1700s)

# EARLY DATA VISUALIZATION



Florence Nightingale (1858)

# EARLY DATA VISUALIZATION



Charles Minard (1861)

# EDWARD TUFTE

Published *The Visual Display of Quantitative Information* in 1983

# EDWARD TUFTE

Published *The Visual Display of Quantitative Information* in 1983

- ① “Above all else, show the data.”

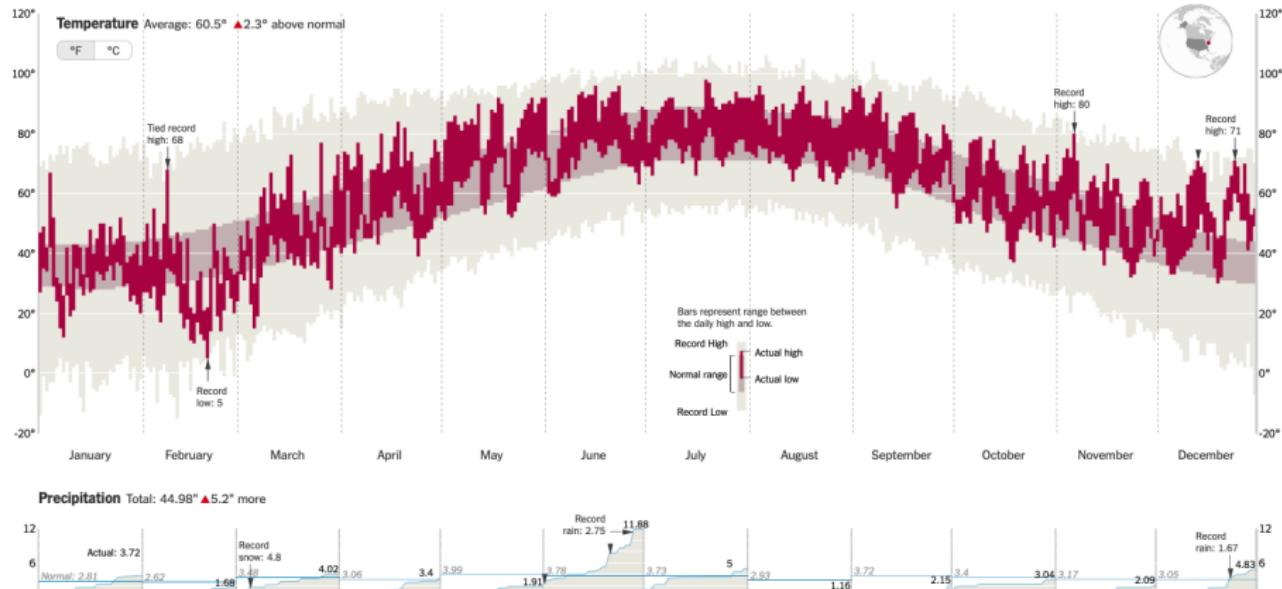
# EDWARD TUFTE

Published *The Visual Display of Quantitative Information* in 1983

- ① “Above all else, show the data.”
- ② Maximize the amount of data and minimize the amount of ink

# EDWARD TUFTE

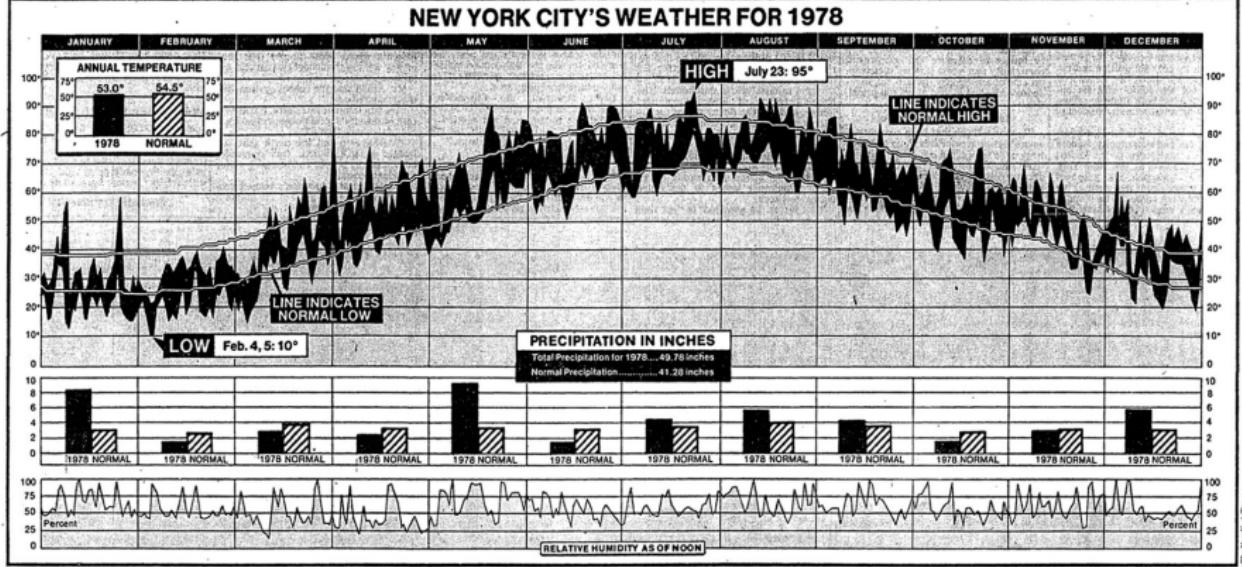
Washington, D.C.



Cumulative monthly precipitation, in inches, compared with normal. Precipitation totals are rainfall plus the liquid equivalent of any frozen precipitation.



## NEW YORK CITY'S WEATHER FOR 1978

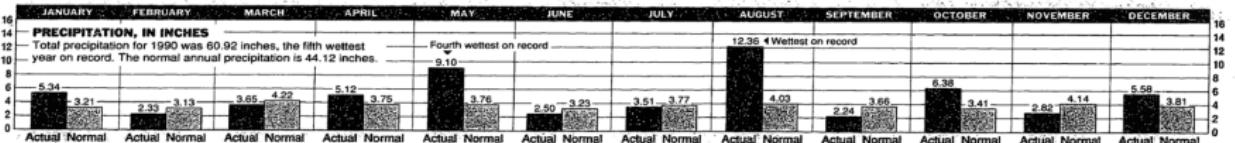
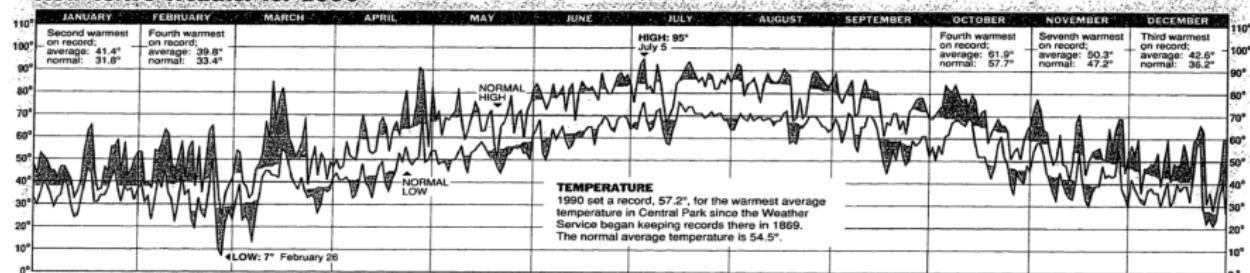


# EDWARD TUFTE

THE NEW YORK TIMES WEATHER SUNDAY, JANUARY 6, 1991

L+ 23

## New York's Weather for 1990

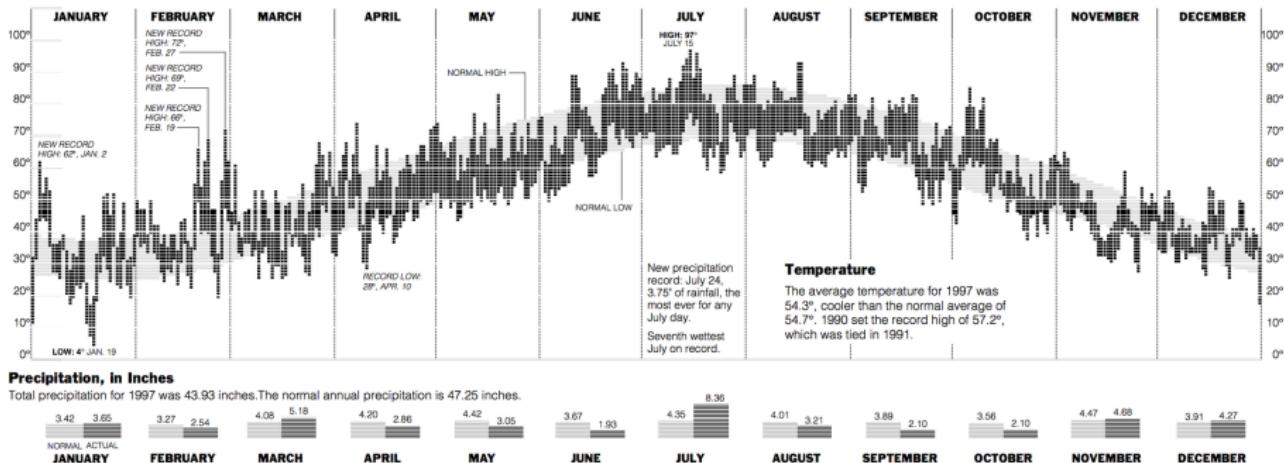


Source: National Weather Service



# EDWARD TUFTE

## New York City's Weather for 1997



Source: National Weather Service

The New York Times

# EDWARD TUFTE

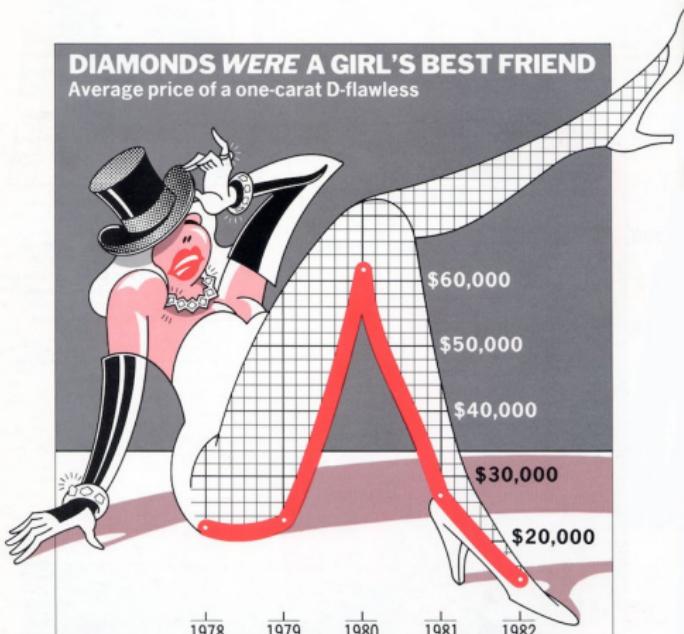
Published *The Visual Display of Quantitative Information* in 1983

- ① “Above all else, show the data.”
- ② Maximize the amount of data and minimize the amount of ink
- ③ Opponent of unnecessary graphical design (“chartjunk”)

# EDWARD TUFTE

## DIAMONDS WERE A GIRL'S BEST FRIEND

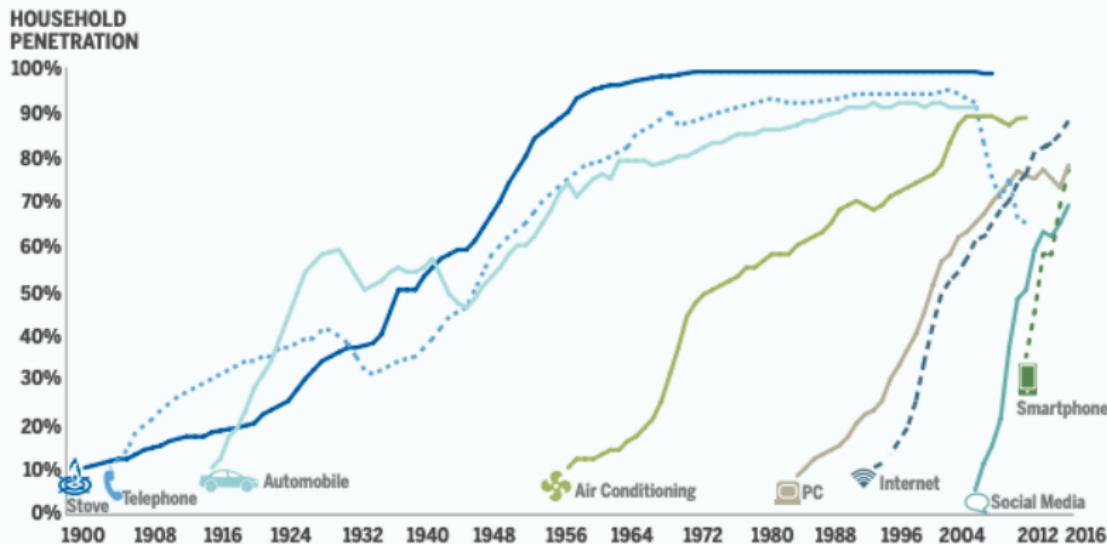
Average price of a one-carat D-flawless



TIME Chart by Nigel Holmes

Source: The Diamond Registry

## Adoption of Innovations among U.S. Households



Source: Comin and Hobijn and OurWorldinData.com.

Source: Fred Alger & Co., Inc.

# ENGINEERS vs. DESIGNERS

Engineers	Designers
<ul style="list-style-type: none"><li>• Simplicity of design</li><li>• Maximize the data</li><li>• Assumes the viewer is alert and interested</li><li>• Form follows function</li></ul>	<ul style="list-style-type: none"><li>• Artistic expression</li><li>• Express only a few ideas</li><li>• Assumes the viewer is inattentive</li><li>• Many forms can convey the same data</li></ul>

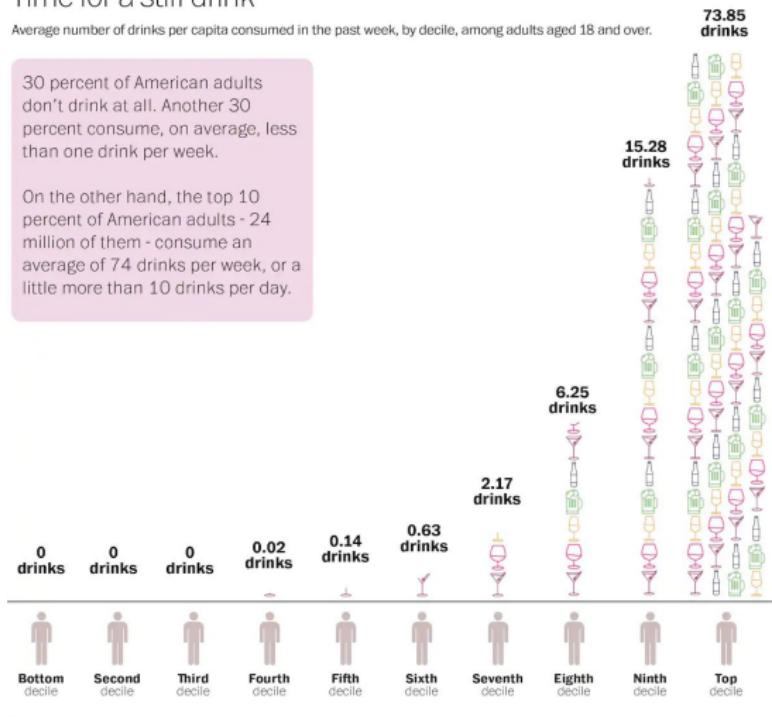
# ENGINEERS VS. DESIGNERS

## Time for a stiff drink

Average number of drinks per capita consumed in the past week, by decile, among adults aged 18 and over.

30 percent of American adults don't drink at all. Another 30 percent consume, on average, less than one drink per week.

On the other hand, the top 10 percent of American adults - 24 million of them - consume an average of 74 drinks per week, or a little more than 10 drinks per day.



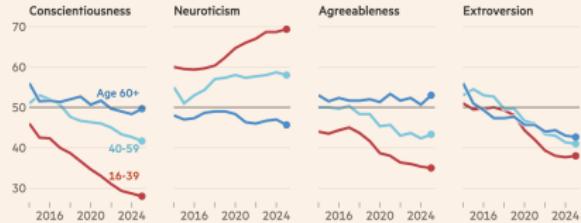
WASHINGTONPOST.COM/WONKBLOG

Source: "Paying the Tab," by Philip J. Cook

# LEARNINGS FROM READINGS

## Young adults' personalities are changing, with conscientiousness in freefall

Relative change in strength of different personality traits (2014 average = 50) by age group

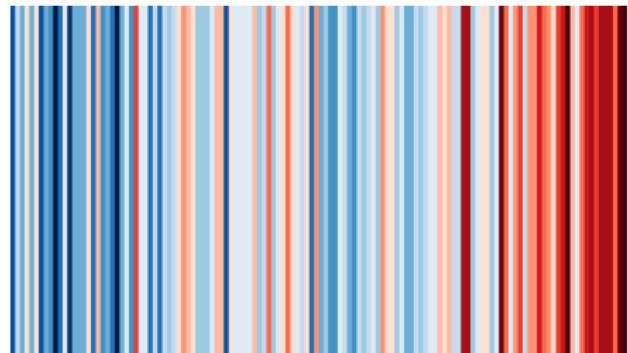


Values are expressed as percentiles of the full population distribution as it stood in 2014

Source: FT analysis of the Understanding America Study, based on prior work by Sutin et al.(2022)

FT graphic: John Burn-Murdoch / @jburnmurdock

©FT



Warming Stripes: Washington, DC

Creator: Ed Hawkins

# SCIENCE OF DATA VISUALIZATION

# Sight → Perception → Cognition

## Sight

- The eyes send small snapshots of high-resolution focus to the brain, which puts the snapshots together into a single image

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- The eyes send small snapshots of high-resolution focus to the brain, which puts the snapshots together into a single image
- The order in which the eyes take these snapshots is not random – it is optimized through evolution (i.e., moving objects, pure colors get attention first)

## Sight

- The eyes send small snapshots of high-resolution focus to the brain, which puts the snapshots together into a single image
- The order in which the eyes take these snapshots is not random – it is optimized through evolution (i.e., moving objects, pure colors get attention first)
- When we design data visualization, the first question to ask is: **where do my eyes go first?**

## Perception

- Known as “preattentive features”

## Perception

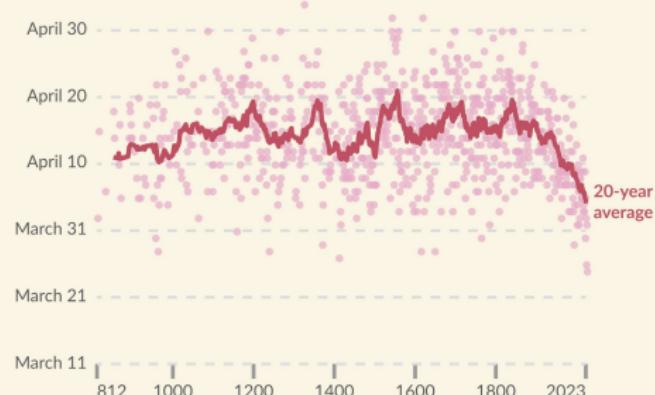
- Known as “preattentive features”
- The brain is optimized to quickly identify contrasts in color and recognize groups

# SCIENCE OF DATA VISUALIZATION

## Color Contrasts

### Cherry trees have been blossoming earlier due to warmer spring temperatures

Date of peak cherry tree (*Prunus jamasakura*) blossom in Kyoto, Japan



Data source: Yasuki Aono (2021; 2024)

Note: The 20-year average is calculated when there are at least five years with data in the 20-year window. The dates are off by one day on leap years.

[OurWorldInData.org/biodiversity](https://OurWorldInData.org/biodiversity) | CC BY

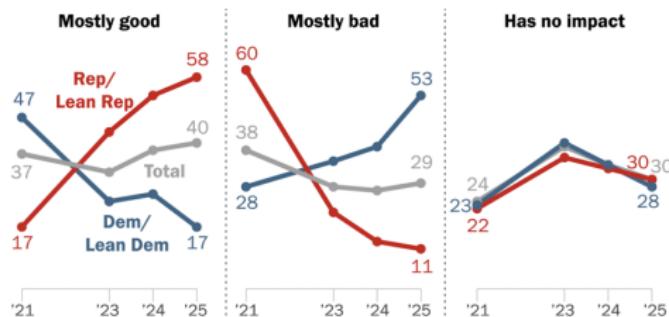


# SCIENCE OF DATA VISUALIZATION

## Proximity and Distance

**Steep increase in the share of Republican X users who say the platform is good for American democracy, decrease among Democrats since 2021**

% of U.S. X (formerly Twitter) users who say X (is) \_\_\_ for American democracy



Note: Question wording in 2021 and 2023 (fielded before the platform's name change) referenced "Twitter," while the question in 2024 and 2025 referenced "X (formerly Twitter)." Those who did not give an answer are not shown.

Source: Survey of U.S. adults conducted Feb. 24-March 2, 2025.

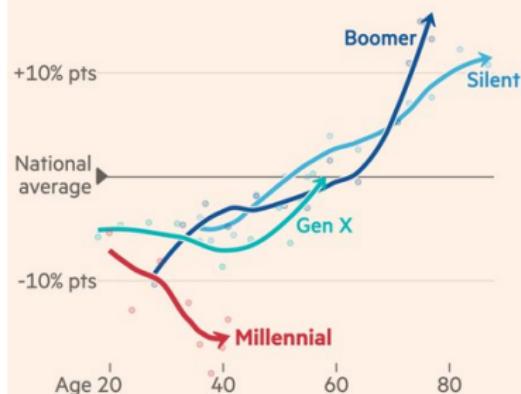
PEW RESEARCH CENTER

# SCIENCE OF DATA VISUALIZATION

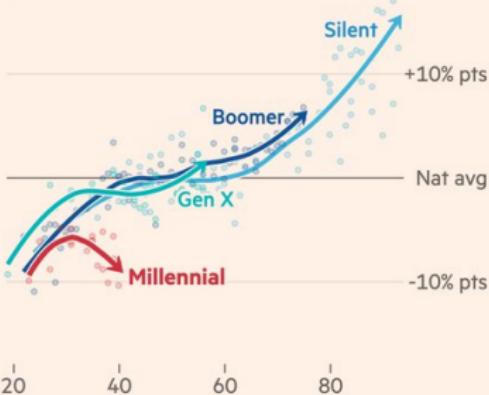
## Proximity and Distance

Millennial voters in the UK and US are not following the typical pattern of growing more conservative as they age

UK: Conservative vote share by age within each generation, relative to national average



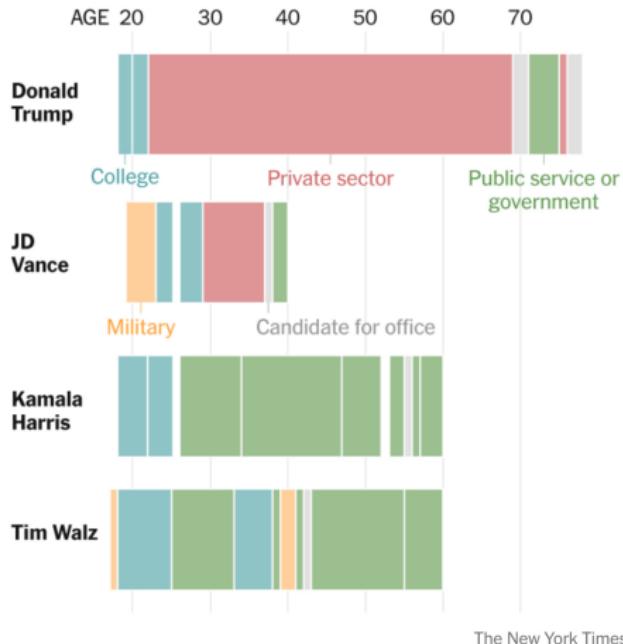
US: Republican vote share by age within each generation, relative to national average



Sources: FT analysis of British Election Study, US General Social Survey, American National Election Studies and Cooperative Election Study  
FT graphic by John Burn-Murdoch / @jburnmurdoch  
© FT

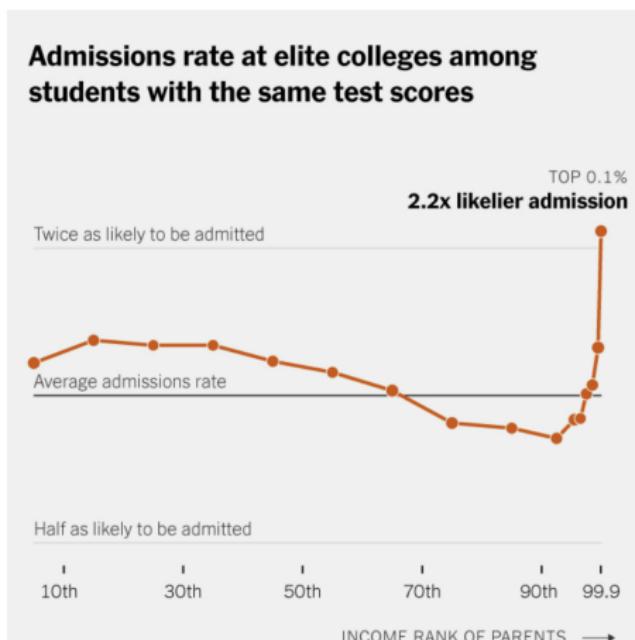
# SCIENCE OF DATA VISUALIZATION

## Similarity and Difference



# SCIENCE OF DATA VISUALIZATION

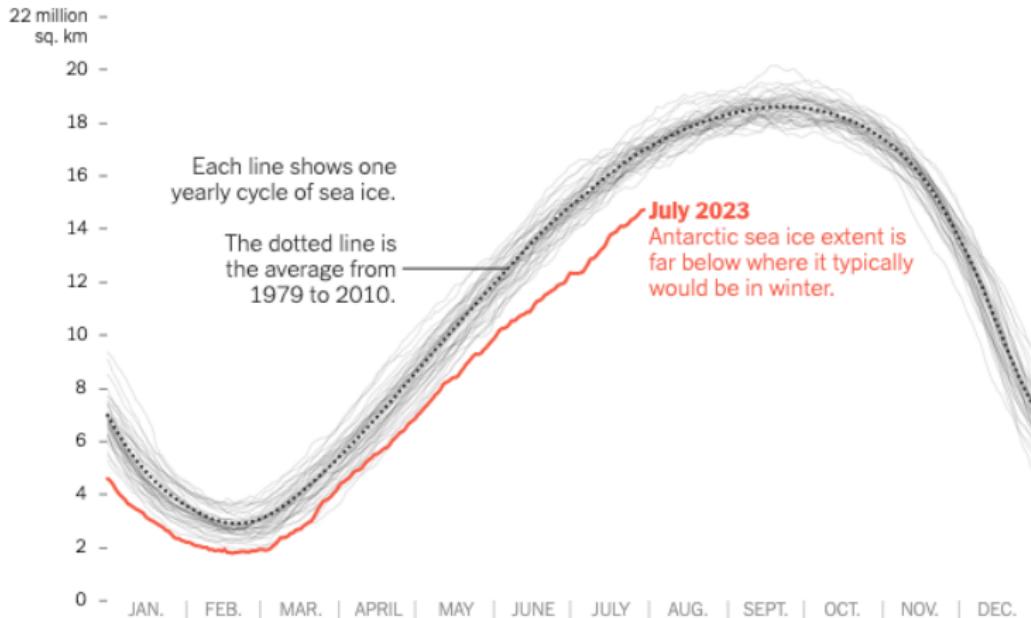
## Connectedness



The New York Times

# SCIENCE OF DATA VISUALIZATION

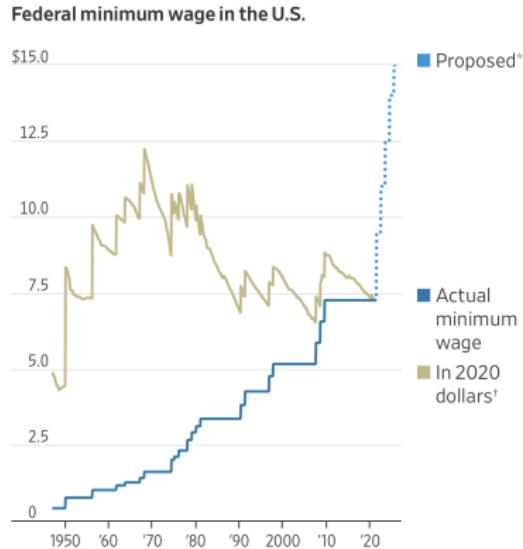
## (Dis)Continuity



National Snow and Ice Data Center • Leanne Abraham

# SCIENCE OF DATA VISUALIZATION

## (Dis)Continuity



\*Reflects if new law became effective June 1, 2021 †Inflation-adjusted to 2020 dollars using the consumer-price index

Sources: Labor Department via St. Louis Fed; House Committee on Education and Labor

# SCIENCE OF DATA VISUALIZATION

## Closure

Public concern with immigration has historically tracked tabloid newspapers' coverage even more closely than it tracks actual immigration levels



\*Includes mentions of immigration, refugees or asylum seekers, and all variations of wording/phrasing

Sources: Ipsos Issues Index; FT analysis of Factiva. Based on prior work by Geoff Evans and Jon Mellon

FT graphic by John Burn-Murdoch / @jburnmurdoch

© FT

# SCIENCE OF DATA VISUALIZATION

## Closure

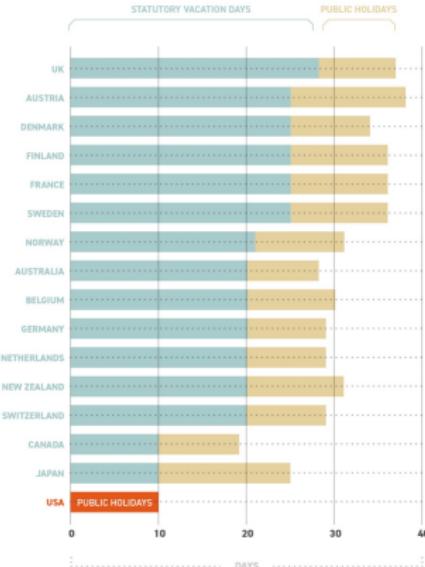


FIGURE 11 VACATION DAYS BY COUNTRY (2016)

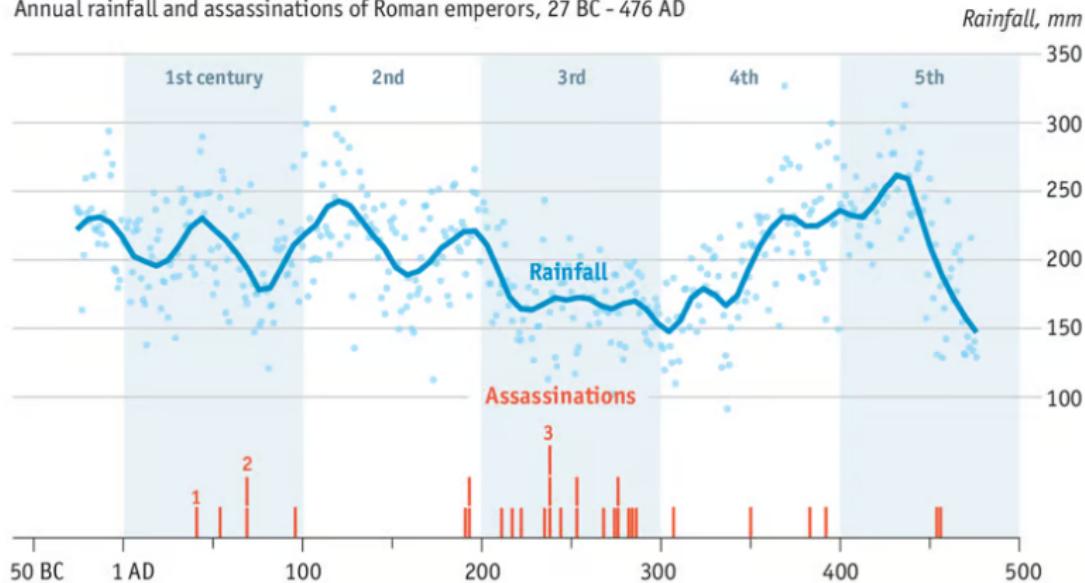
SOURCE: OECD

Source: People's Policy Project

# SCIENCE OF DATA VISUALIZATION

## Reign falls

Annual rainfall and assassinations of Roman emperors, 27 BC - 476 AD



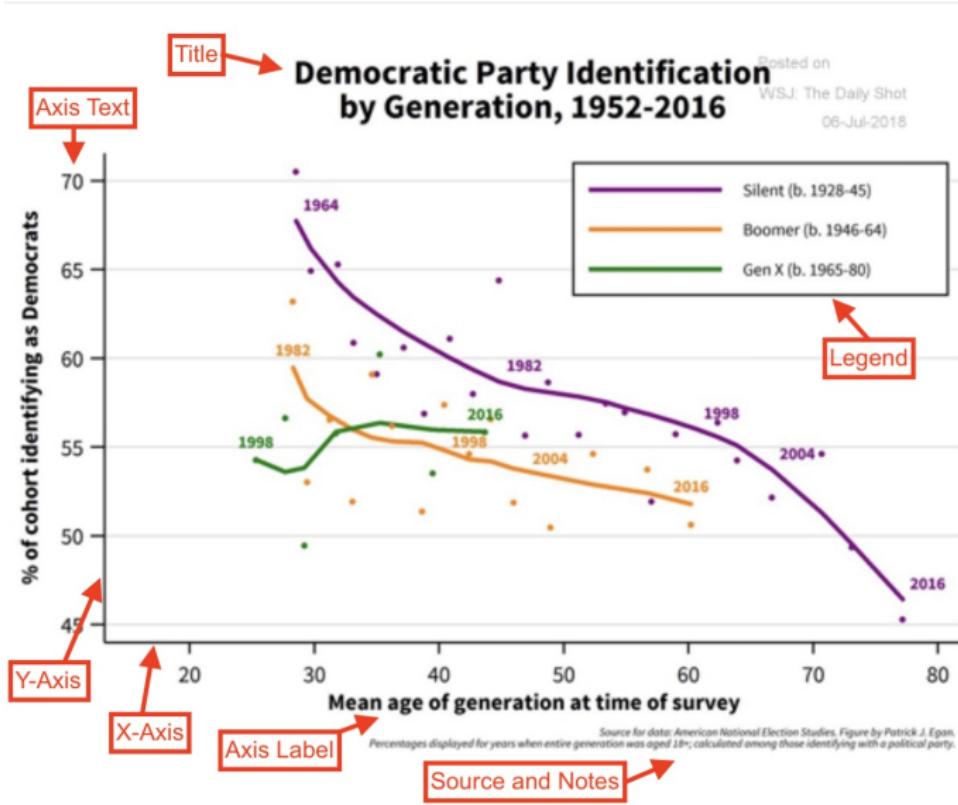
Source: "Shocks to military support and subsequent assassinations in Ancient Rome",  
by Cornelius Christian and Liam Elbourne, *Economics Letters*, 2018

The Economist

## Perception

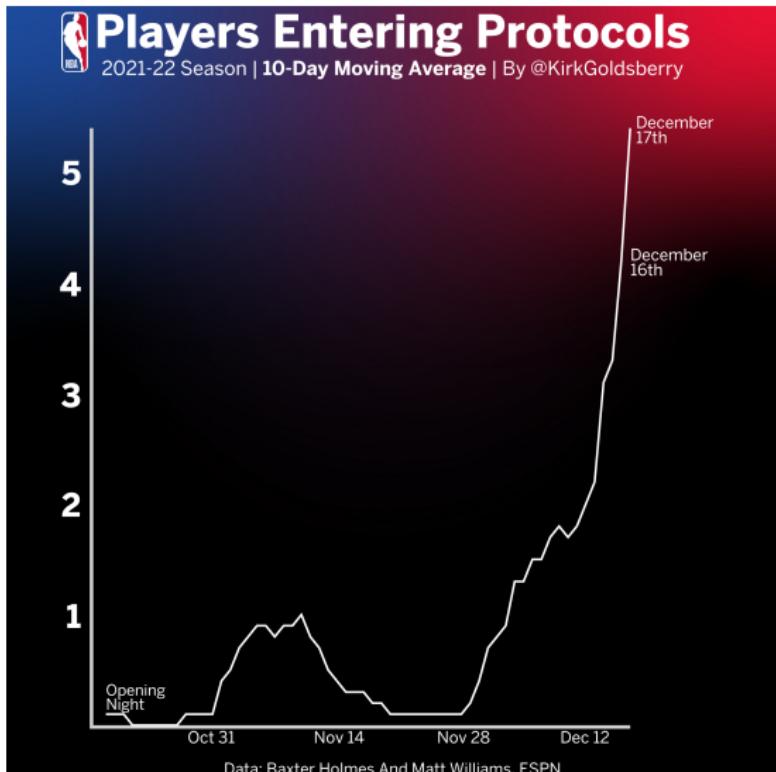
- Known as “preattentive features”
- The brain is optimized to quickly identify contrasts in color and recognize groups
- After “where do my eyes go first?”, the next question is:  
**what is the first idea that comes to mind?**

# PARTS OF A GRAPH



# DESIGNING FOR STATISTICS

- 1 Show the context of the data



# DESIGNING FOR STATISTICS

- 1 Show the context of the data

The Democrats' problems run deep, nearly everywhere.  
This is where voters shifted toward President Trump in each of the last three elections.



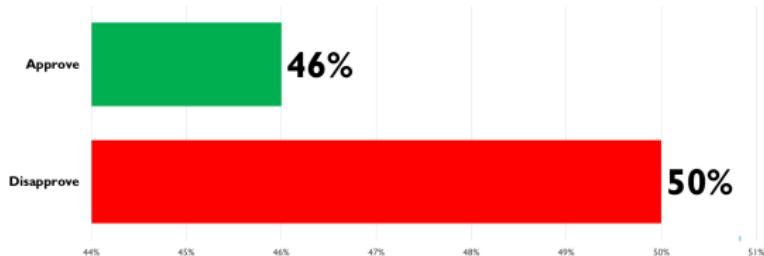
And this is where voters shifted toward Democrats.



# DESIGNING FOR STATISTICS

- ① Show the context of the data
- ② The main axis should show the scale of the data

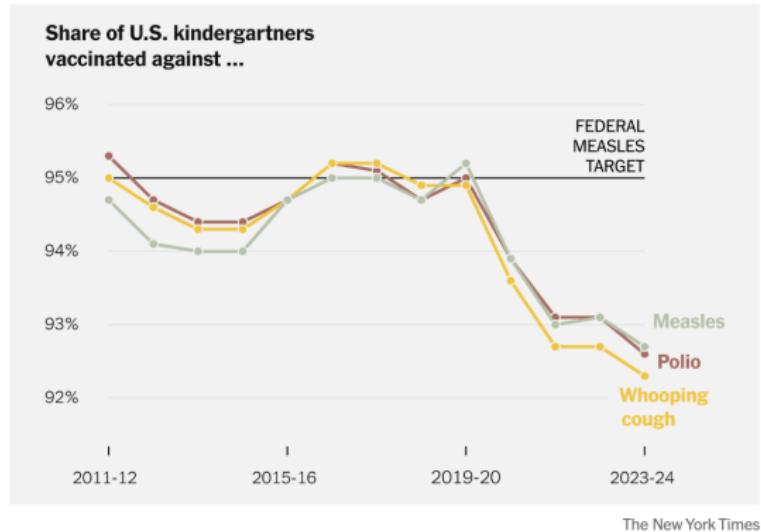
*Generally speaking, do you approve or disapprove of the job Donald Trump is doing as President?*



Source: Susquehanna Polling & Research

# DESIGNING FOR STATISTICS

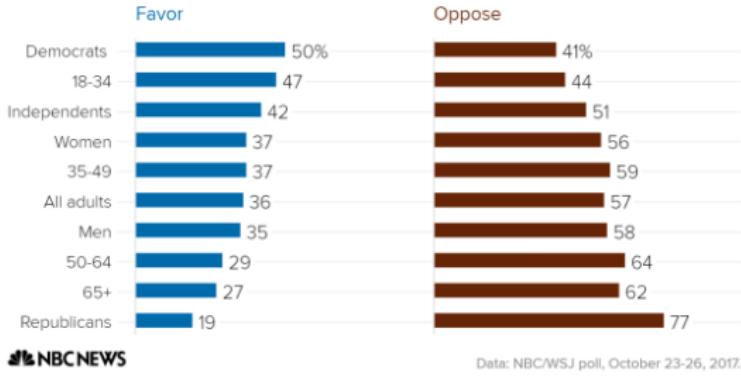
- 1 Show the context of the data
- 2 The main axis should show the scale of the data



# DESIGNING FOR STATISTICS

- 1 Show the context of the data
- 2 The main axis should show the scale of the data
- 3 Use conventional ordering and meanings

Favor or oppose the Boy Scouts admitting girls?



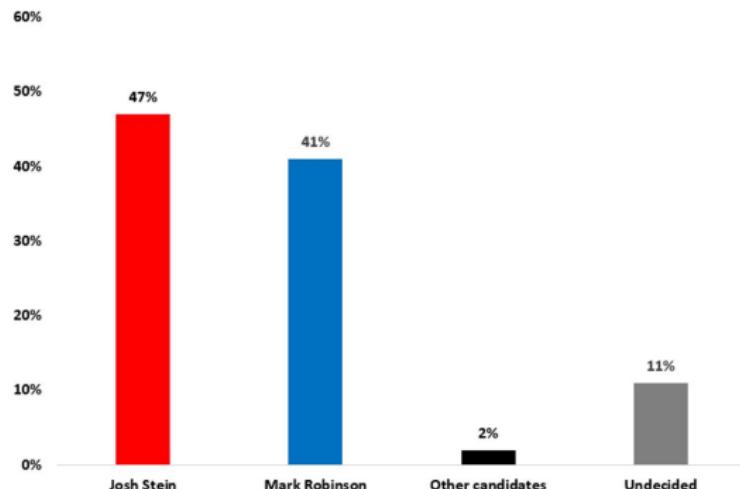
NBC NEWS

Data: NBC/WSJ poll, October 23-26, 2017.

# DESIGNING FOR STATISTICS

- ① Show the context of the data
- ② The main axis should show the scale of the data
- ③ Use conventional ordering and meanings

North Carolina General Election: Governor

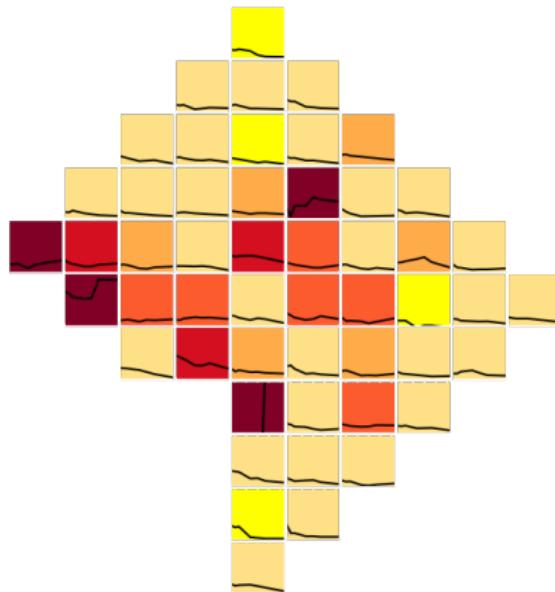


Note: Other candidates receiving support (all individually at 1% or less) include Mike Ross (Libertarian Party), Wayne Turner (Green Party), and Walter Vinny Smith (Constitution Party).

# DESIGNING FOR STATISTICS

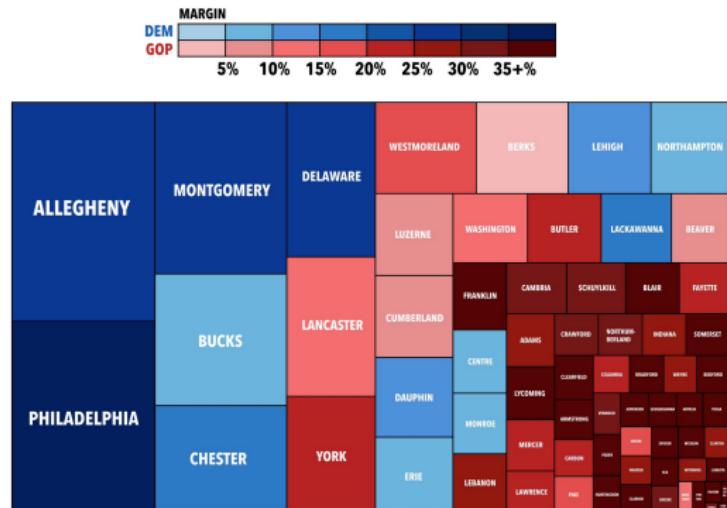
- ➊ Show the context of the data
- ➋ The main axis should show the scale of the data
- ➌ Use conventional ordering and meanings

7-Day Average Cases per 10,000 Residents (Last 2 Weeks)



# DESIGNING FOR STATISTICS

- 1 Show the context of the data
- 2 The main axis should show the scale of the data
- 3 Use conventional ordering and meanings



2022 US Senate election in Pennsylvania

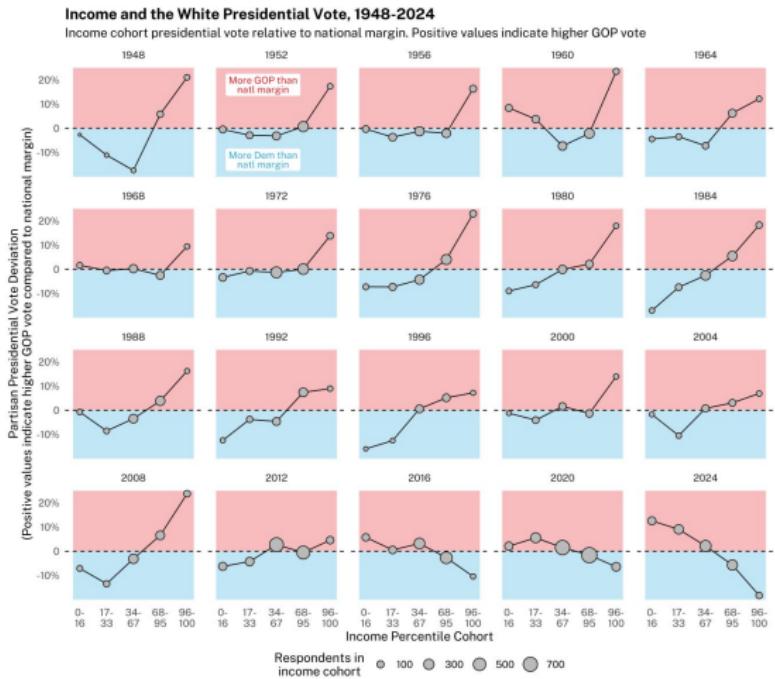
JOHN FETTERMAN	DEM	51.2%	+4.9%
MEHMET OZ	GOP	46.3%	

Source: Pennsylvania Department of State

@maxtmcc

# DESIGNING FOR STATISTICS

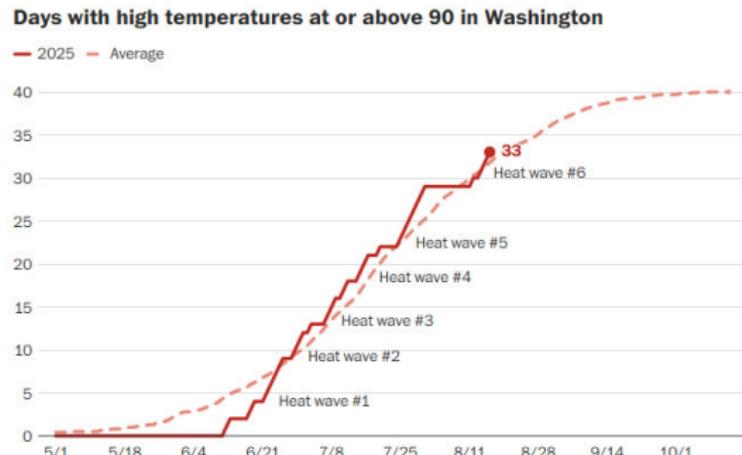
- 1 Show the context of the data
- 2 The main axis should show the scale of the data
- 3 Use conventional ordering and meanings
- 4 Data visualizations are paragraphs about data



Source: @thomasjwood

# DESIGNING FOR STATISTICS

- 1 Show the context of the data
- 2 The main axis should show the scale of the data
- 3 Use conventional ordering and meanings
- 4 Data visualizations are paragraphs about data



The 1991-2020 average for 90-degree days annually is 40. Current year count as of August 16

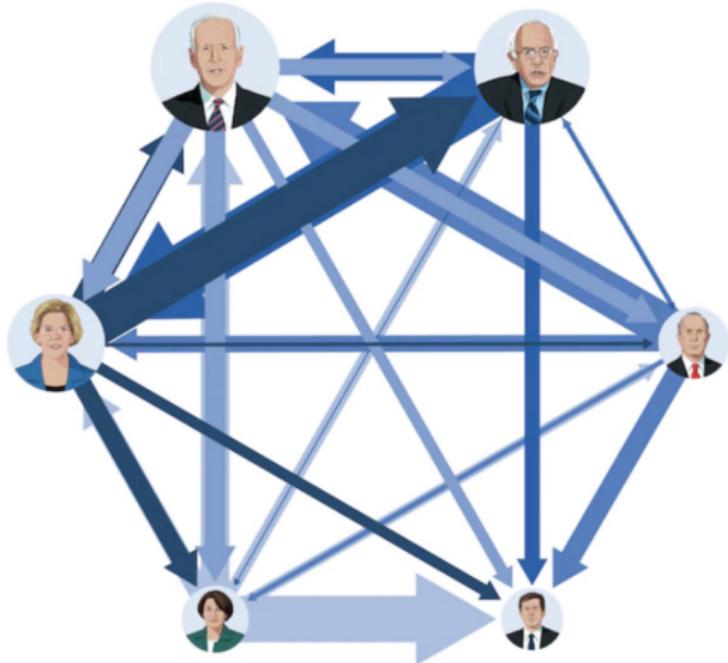
Source: [Applied Climate Information System](#)

IAN LIVINGSTON / THE WASHINGTON POST

# DESIGNING FOR STATISTICS

- ➊ Show the context of the data
- ➋ The main axis should show the scale of the data
- ➌ Use conventional ordering and meanings
- ➍ Data visualizations are paragraphs about data
- ➎ Limit cognitive load

Where second-choice support goes



Source: Quinnipiac University polling, January 2020

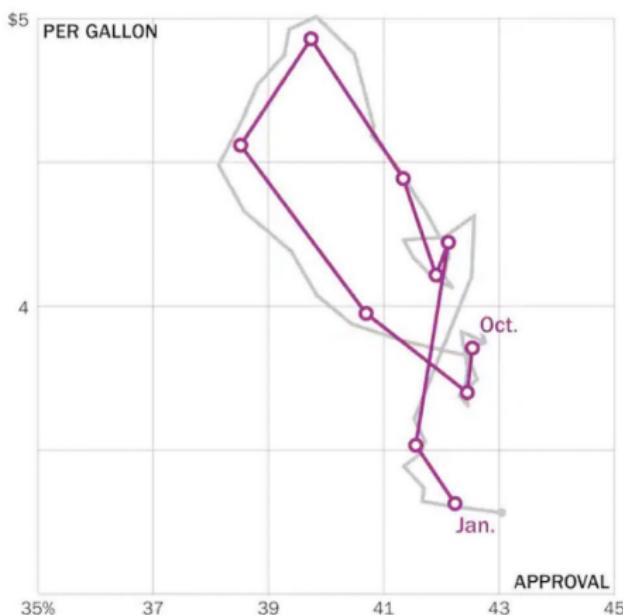
THE WASHINGTON POST

Quinnipiac poll of second choices. (Philip Bump)

# DESIGNING FOR STATISTICS

- 1 Show the context of the data
- 2 The main axis should show the scale of the data
- 3 Use conventional ordering and meanings
- 4 Data visualizations are paragraphs about data
- 5 Limit cognitive load

Gas prices vs. Biden approval  
From the beginning of the year to mid-October.



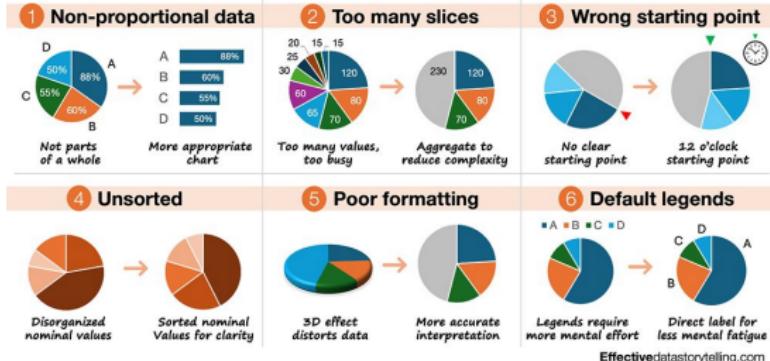
Sources: FiveThirtyEight, Energy Information Administration

THE WASHINGTON POST

# DESIGNING FOR STATISTICS

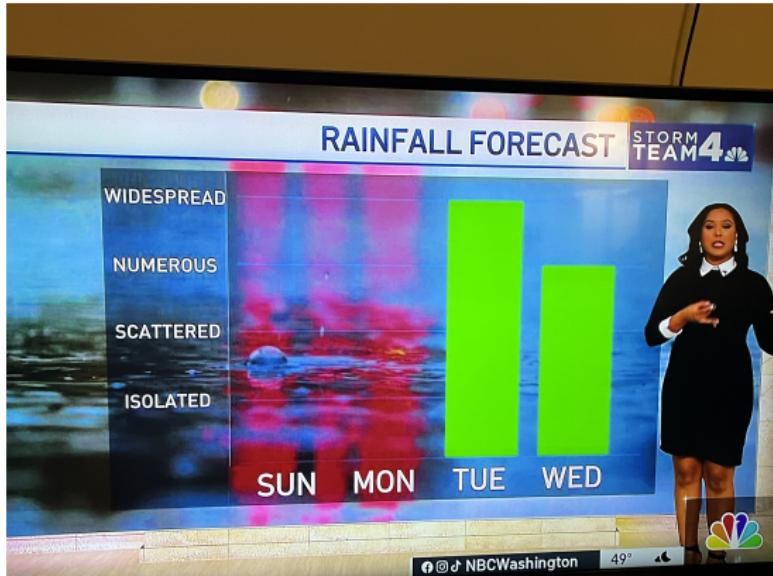
- 1 Show the context of the data
- 2 The main axis should show the scale of the data
- 3 Use conventional ordering and meanings
- 4 Data visualizations are paragraphs about data
- 5 Limit cognitive load
- 6 No pie charts

**Pie charts:** Don't ruin them with these 6 mistakes



# DESIGNING FOR STATISTICS

- ➊ Show the context of the data
- ➋ The main axis should show the scale of the data
- ➌ Use conventional ordering and meanings
- ➍ Data visualizations are paragraphs about data
- ➎ Limit cognitive load
- ➏ No pie charts
- ➐ Not all data should be in a chart

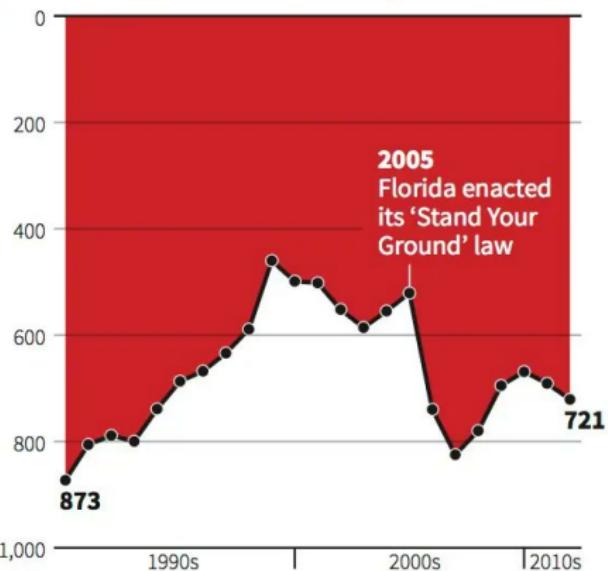


# EVALUATING A GRAPH

- ① Make a note of the first few things you see
- ② Make a note of the first idea that forms in your mind and then search for more
- ③ Make notes on likes, dislikes, and wish-I-saws
- ④ Find three things you'd change and briefly say why

## Gun deaths in Florida

Number of murders committed using firearms



Source: Florida Department of Law Enforcement

C. Chan 16/02/2014

REUTERS

## EXERCISE