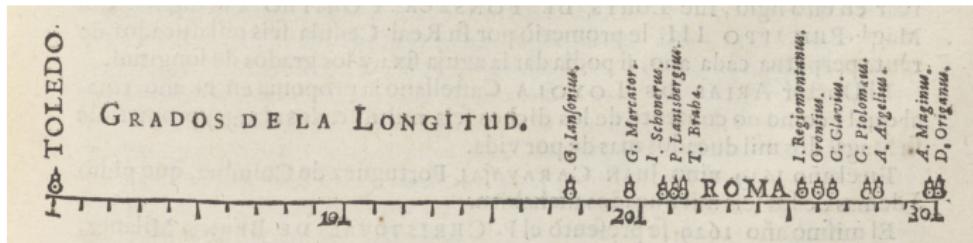


DATA VISUALIZATION

Data Analysis for Journalism and Political Communication
(Fall 2024)

Prof. Bell

MICHEL FLORENT VAN LANGREN (1644)



MICHEL FLORENT VAN LANGREN (1644)



FRY, "WHEN CHARTS ARE A MATTER OF LIFE AND DEATH"

"Data visualization has progressed from a means of making things tractable and comprehensible on the page to an automated hunt for clusters and connections, with trained machines to do the searching. Patterns still emerge and drive our understanding of the world forward, even if they are no longer visible to the human eye."

JOB LOSSES SOAR; U.S. VIRUS CASES TOP WORLD



Since the coronavirus descended on Brooklyn Hospital Center three weeks ago, the city has handled over 800 patients.

Under Trump, Underfunded Posts Hinder Action

BY JONATHAN SCHAFFER *Editor-in-Chief, Washington Post* — Of the 17 new cases of the novel coronavirus that have been reported in the United States since Wednesday, all but one were diagnosed in New York City, where the disease has spread most rapidly.

The National Park Service

closed its 400-plus parks

to the public last Friday,

and the Centers for Disease

Control and Prevention

last week issued a

travel advisory

for Americans

abroad.

But the government

has done little else.

On Tuesday, the

White House

announced a

\$2 trillion stimulus

package, but it

had no specific

provisions for

the virus.

And the president

has remained

quietly silent

on the issue.

“It’s been a

disastrous

first week,”

Rep. John Yarmuth

(D-Ky.) told me.

He was referring

to the lack of

action from the

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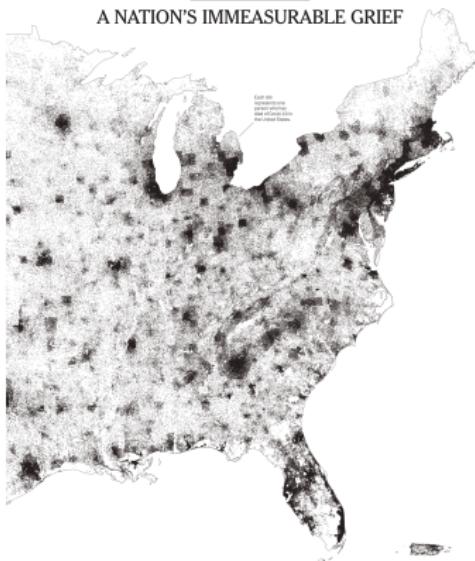
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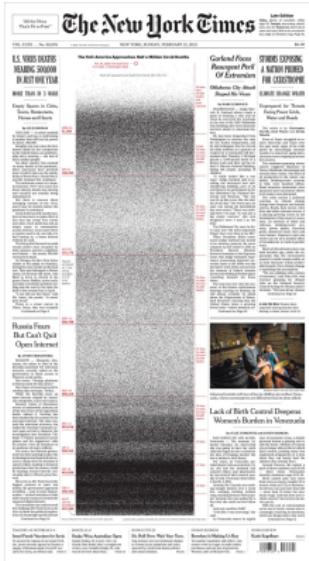
ONE MILLION

A NATION'S IMMEASURABLE GRIEF

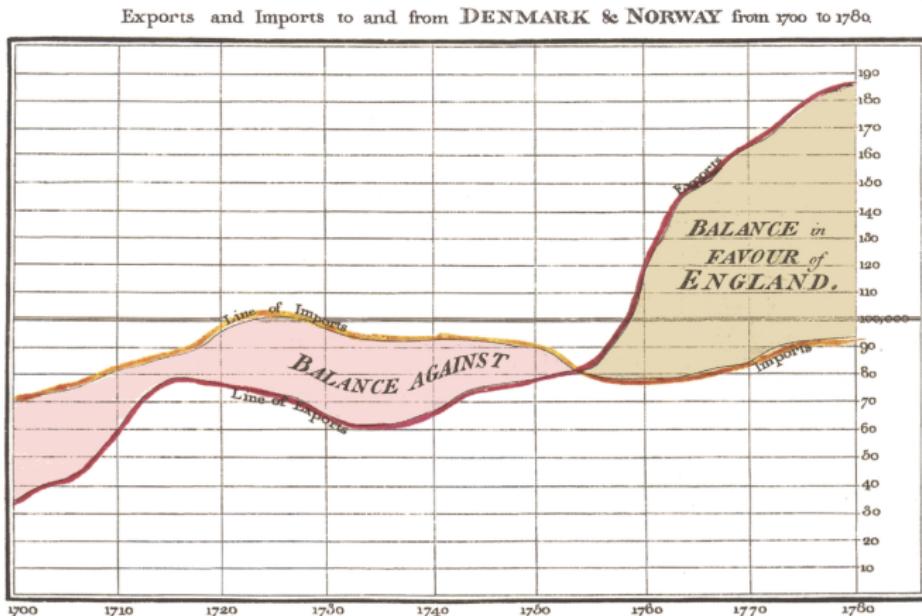


They were mothers and fathers, sisters and brothers, daughters and sons. More Americans have died in the pandemic now than in two decades of our country's war on battlefields in all of the country's wars combined — a death rate higher than almost any other wealthy nation. Each dot on this map represents a person who died of Covid, a reckoning of the toll the virus has taken in the 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



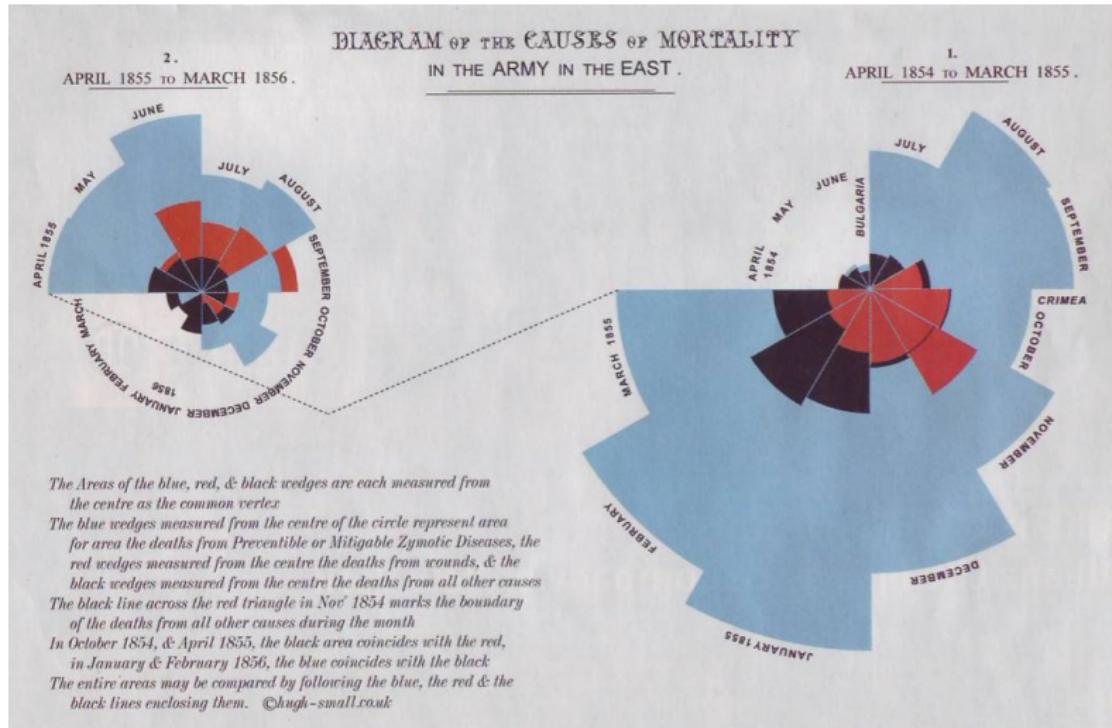


EARLY DATA VISUALIZATION



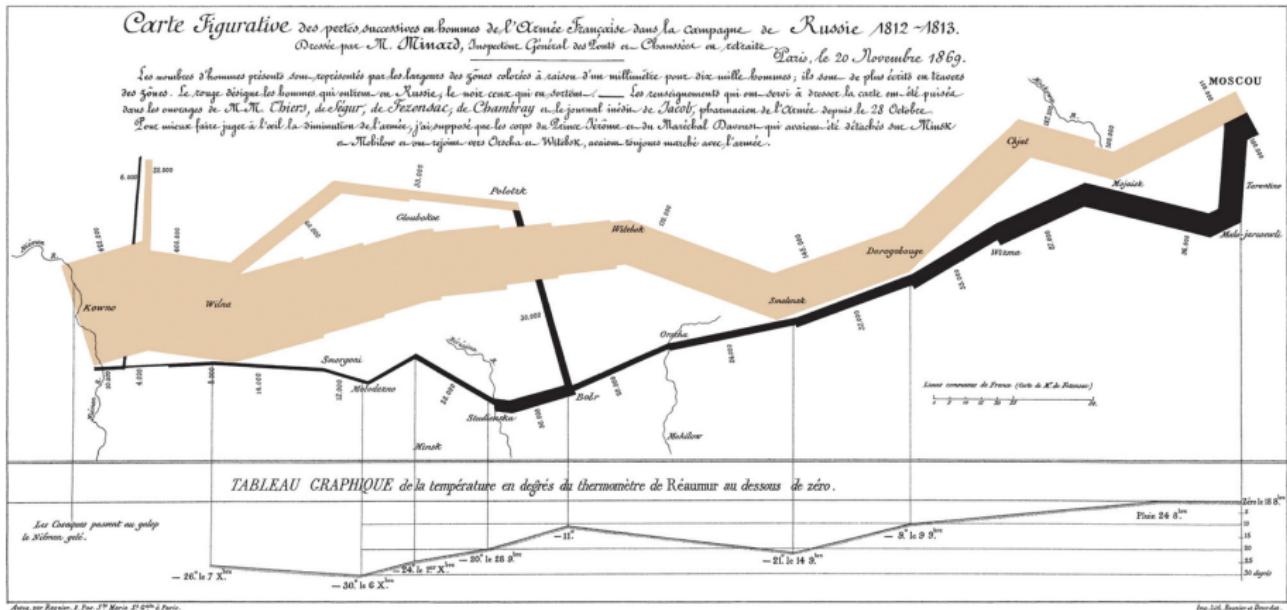
William Playfair (late 1700s)

EARLY DATA VISUALIZATION



Florence Nightingale (1858)

EARLY DATA VISUALIZATION



Charles Minard (1861)

EDWARD TUFTE

Published *The Visual Display of Quantitative Information* in 1983

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Published *The Visual Display of Quantitative Information* in 1983

- ① “Above all else, show the data.”

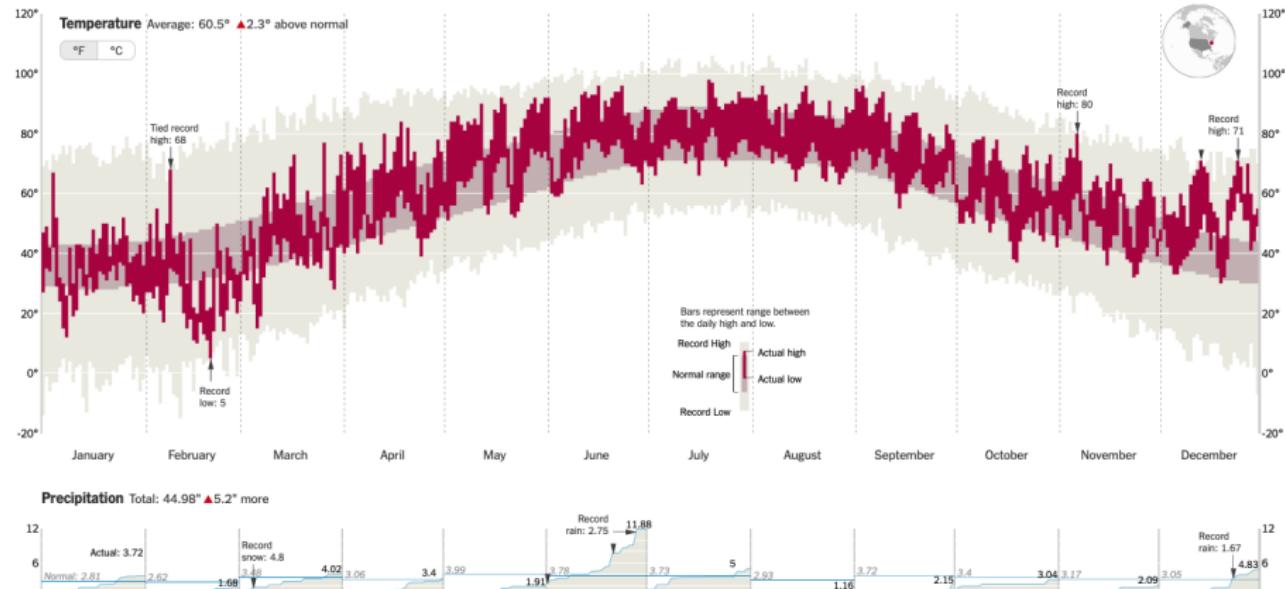
EDWARD TUFTE

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

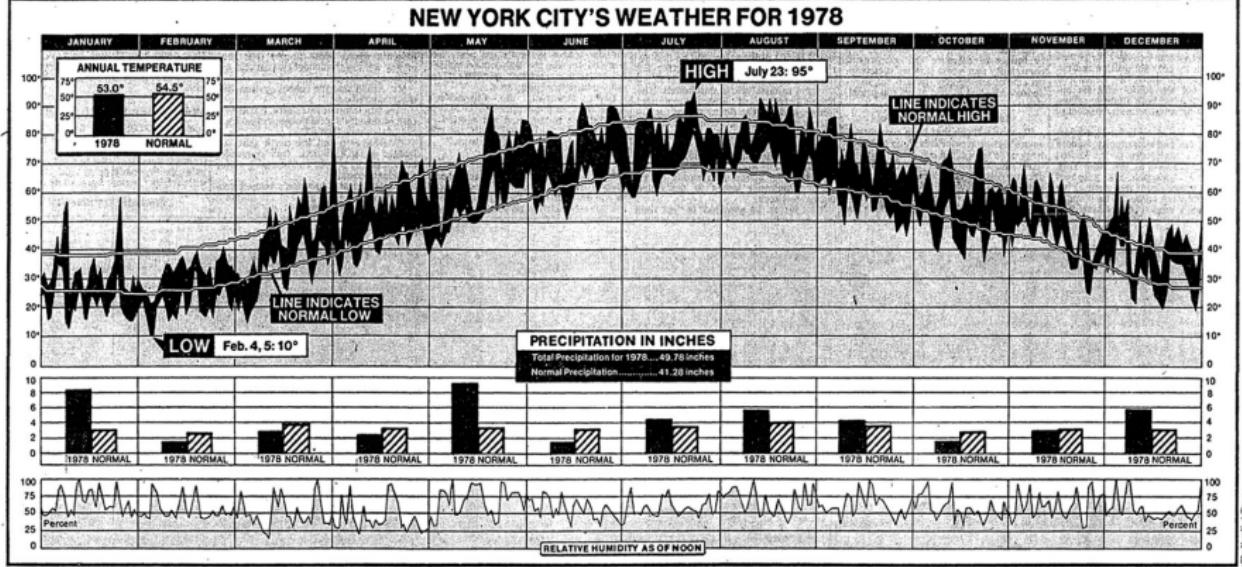
EDWARD TUFTE

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

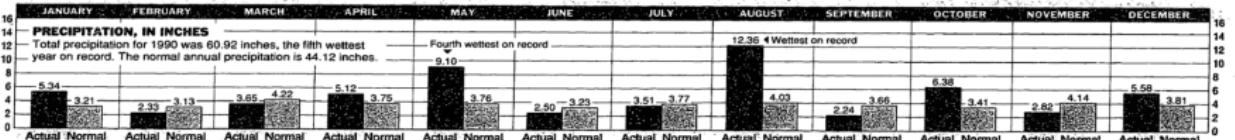
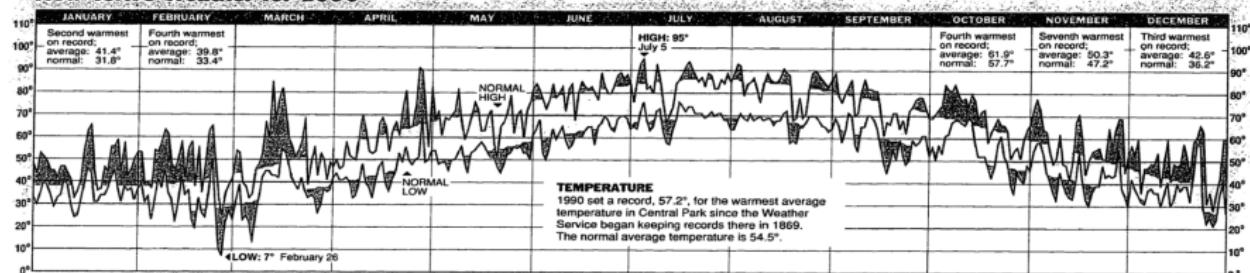


EDWARD TUFTE

THE NEW YORK TIMES WEATHER SUNDAY, JANUARY 6, 1991

L+ 23

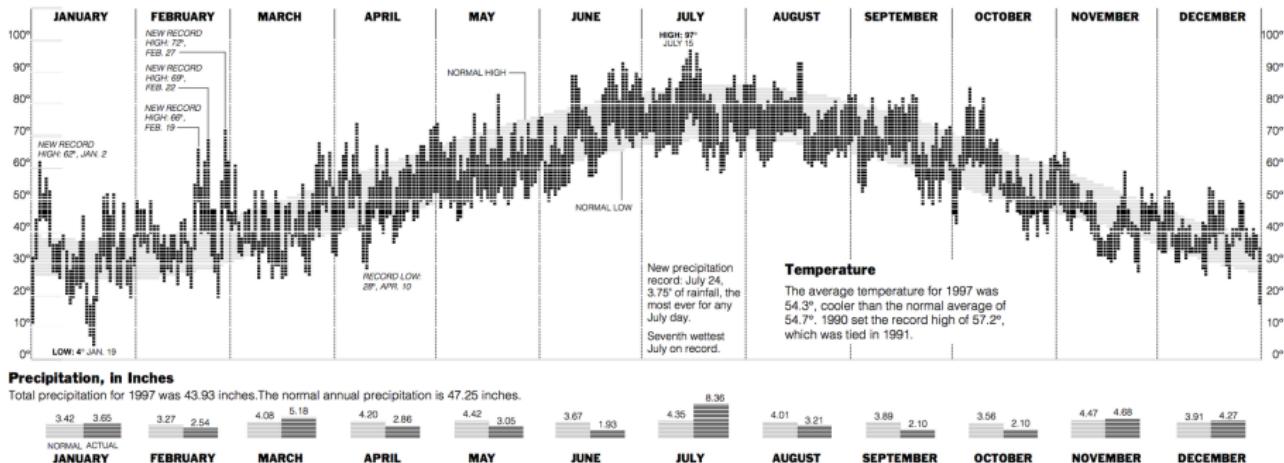
New York's Weather for 1990



Source: National Weather Service

EDWARD TUFTE

New York City's Weather for 1997



Source: National Weather Service

The New York Times

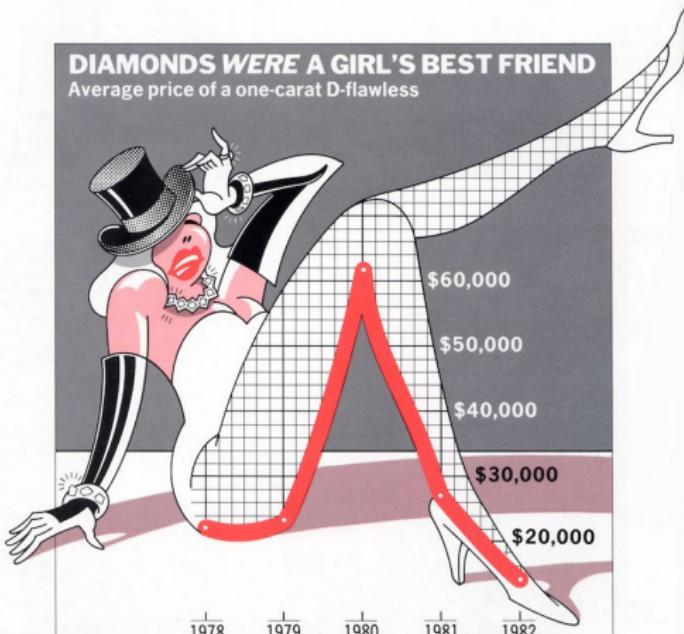
EDWARD TUFTE

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”)

DIAMONDS WERE A GIRL'S BEST FRIEND

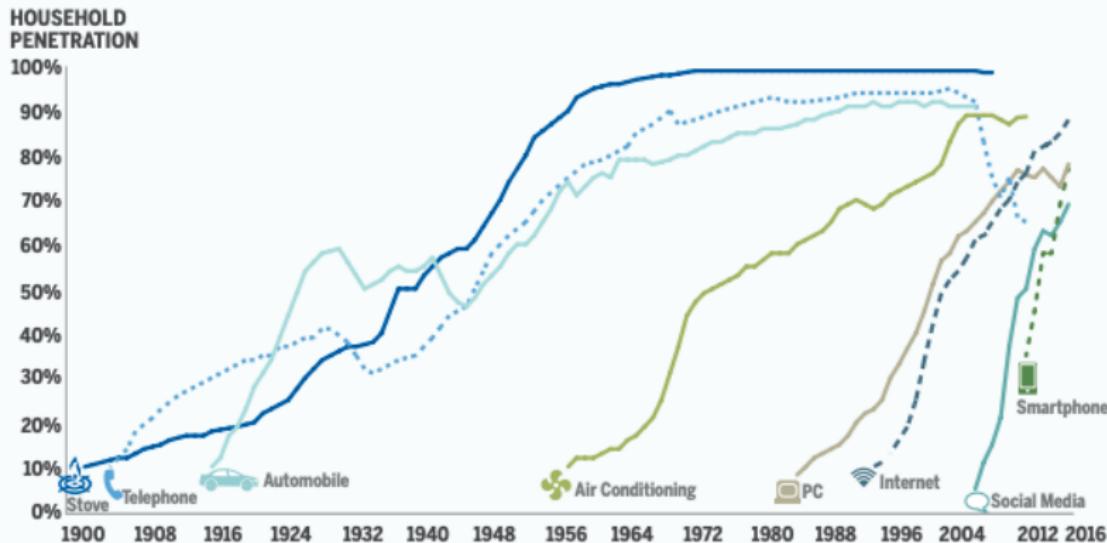
Average price of a one-carat D-flawless



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

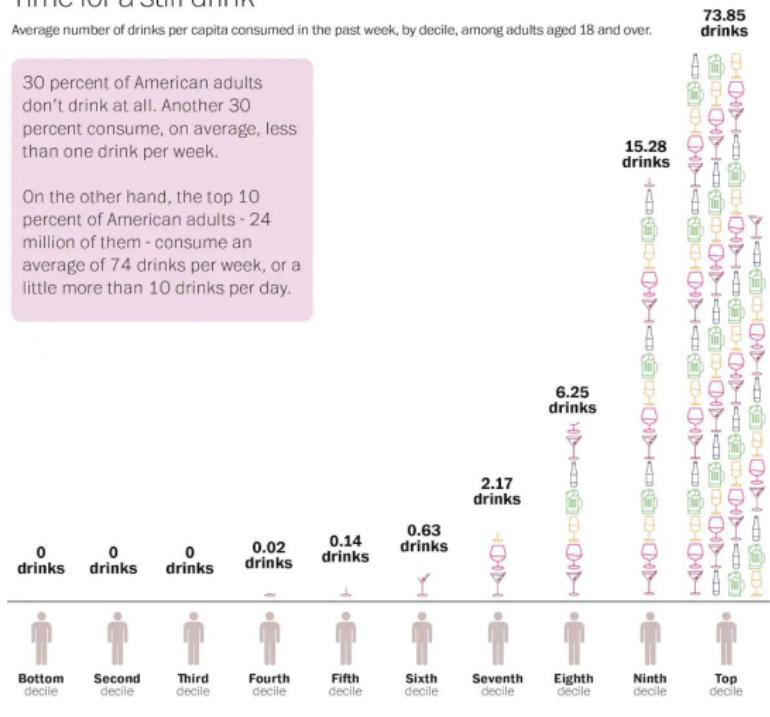
ENGINEERS VS. DESIGNERS

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

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

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)

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

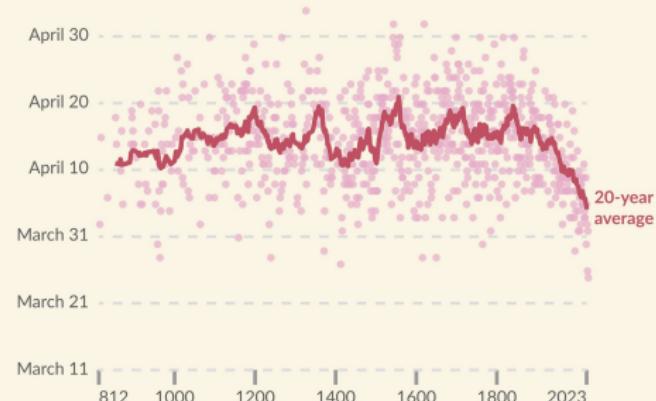
- Known as “preattentive features”
- The brain is optimized to quickly identify contrasts in color and recognize groups

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 | CC BY

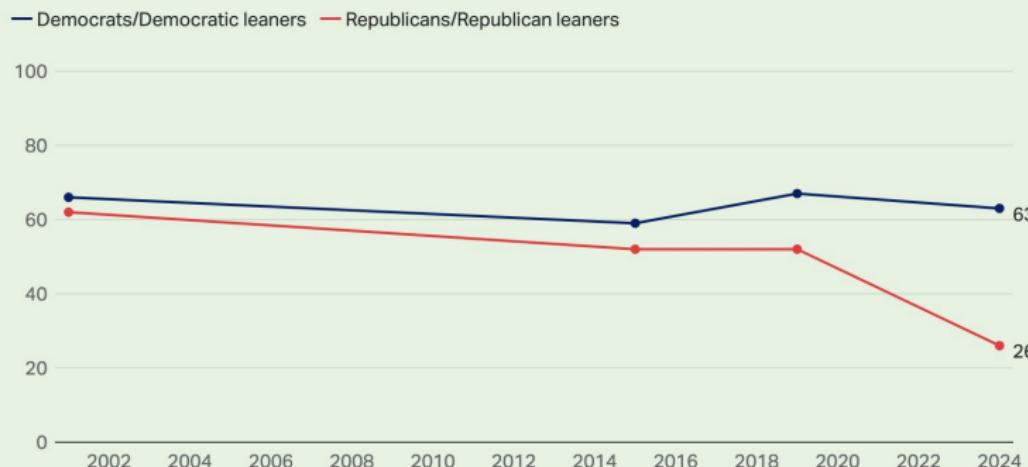
Our World
in Data

SCIENCE OF DATA VISUALIZATION

Proximity

How important is it that parents get their children vaccinated -- extremely important, very important, somewhat important, not very important or not at all important?

% Extremely important



[Get the data](#) • [Download image](#)

GALLUP

SCIENCE OF DATA VISUALIZATION

Proximity

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

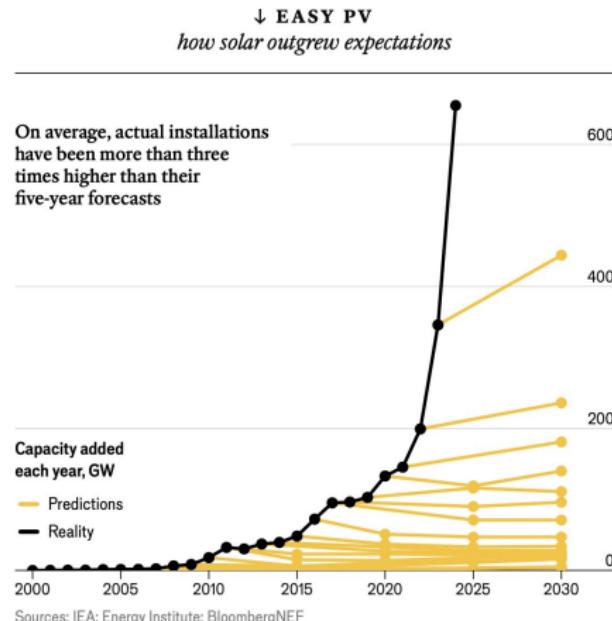


Sources: FT analysis of British Election Study, US General Social Survey, American National Election Studies and Cooperative Election Study
FT graphic by John Burn-Murdoch / @jburnmurdoch

© FT

SCIENCE OF DATA VISUALIZATION

Similarity

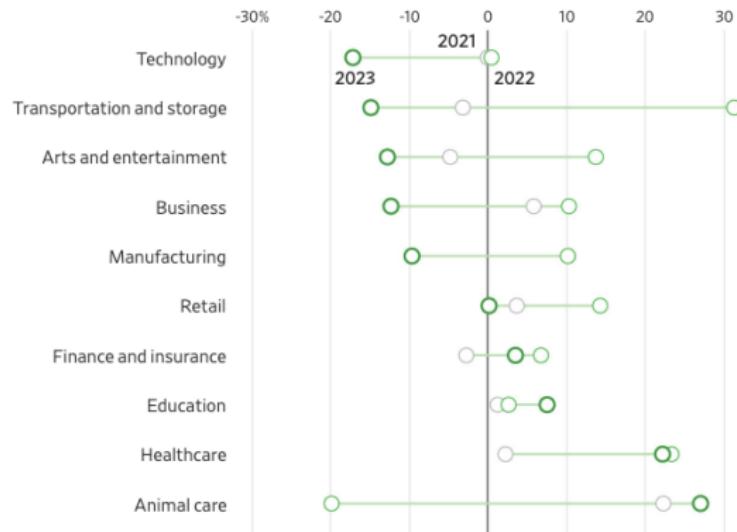


SCIENCE OF DATA VISUALIZATION

Connectedness

Pay Cut

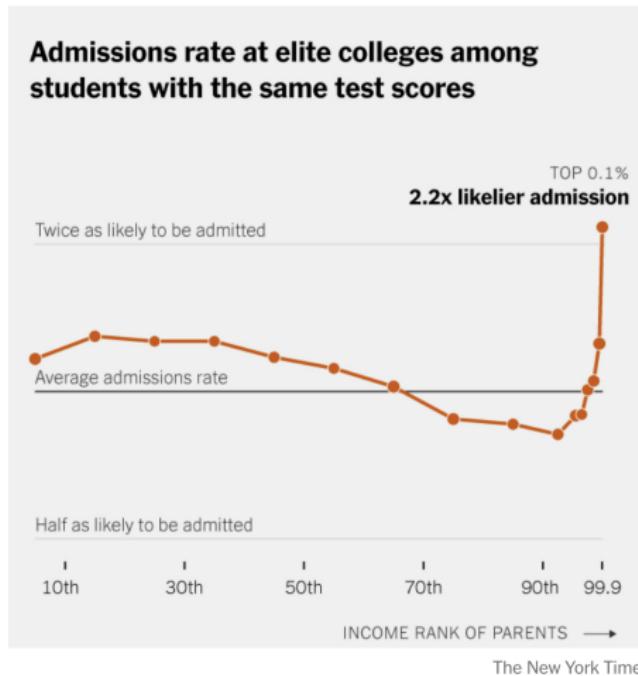
Companies in a range of industries are offering less pay for the same roles than they did last year



Source: ZipRecruiter

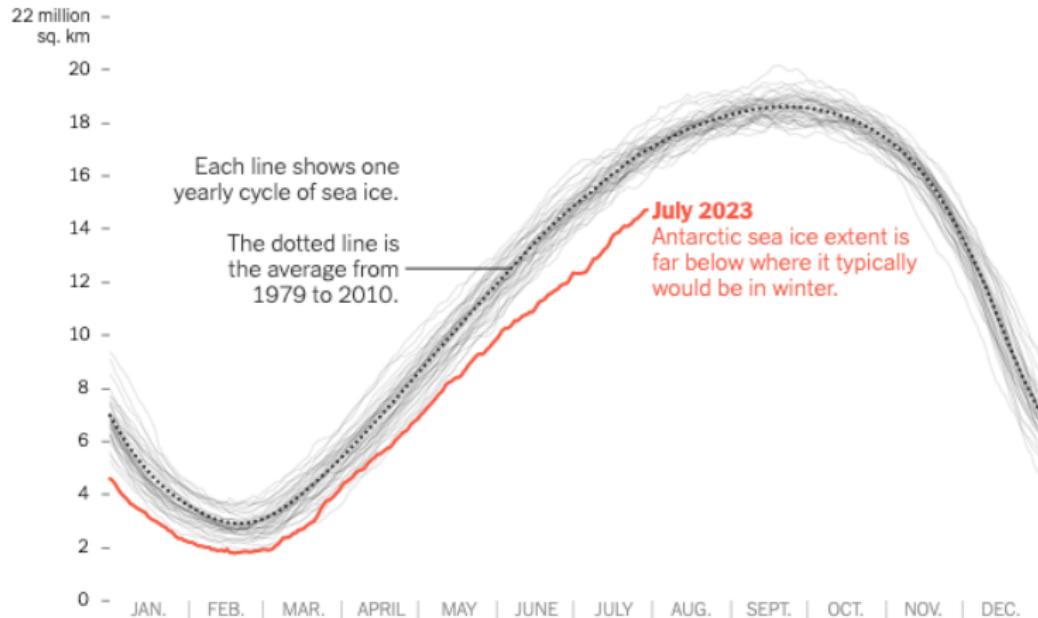
SCIENCE OF DATA VISUALIZATION

Connectedness



SCIENCE OF DATA VISUALIZATION

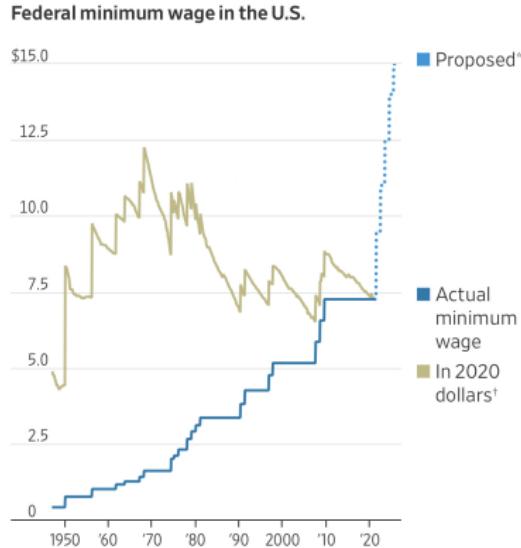
Continuity



National Snow and Ice Data Center • Leanne Abraham

SCIENCE OF DATA VISUALIZATION

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

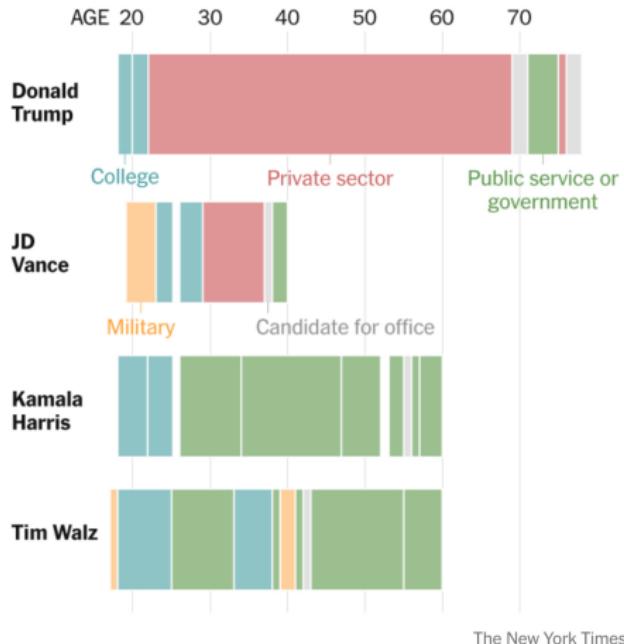
Sources: Ipsos Issues Index; FT analysis of Factiva. Based on prior work by Geoff Evans and Jon Mellon

FT graphic by John Burn-Murdoch / @jburnmurdoch

© FT

SCIENCE OF DATA VISUALIZATION

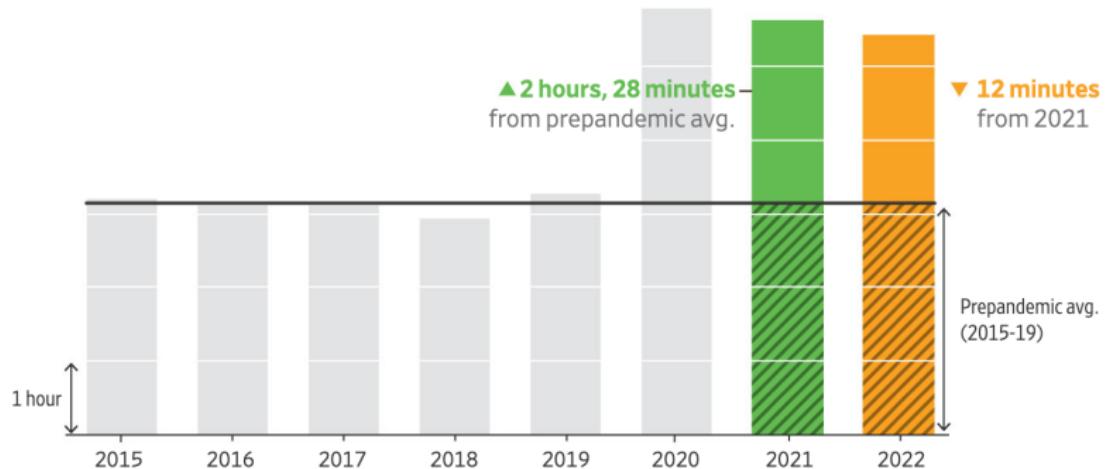
Closure



SCIENCE OF DATA VISUALIZATION

Closure

Average number of hours employees spent working at home per day



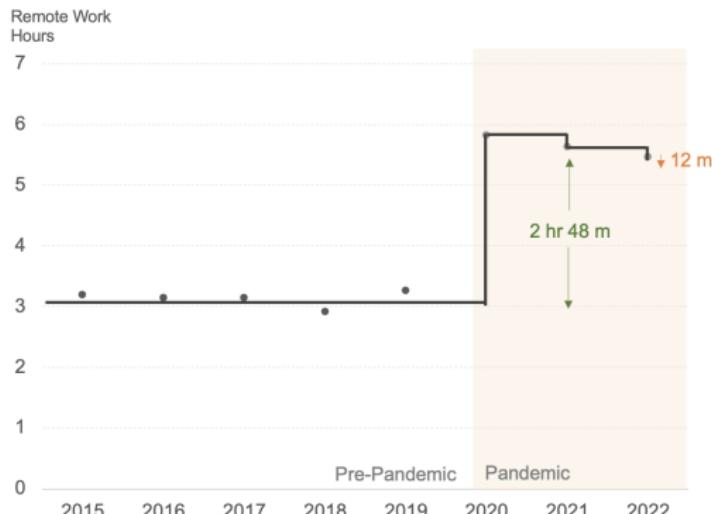
Note: 2020 survey data is for May through December. Data represent people ages 15 years and older. Includes all employed Americans who spent at least some time working from home.

Source: Labor Department

SCIENCE OF DATA VISUALIZATION

Closure

Remote work spiked at the start of the pandemic, and have slightly moderated since



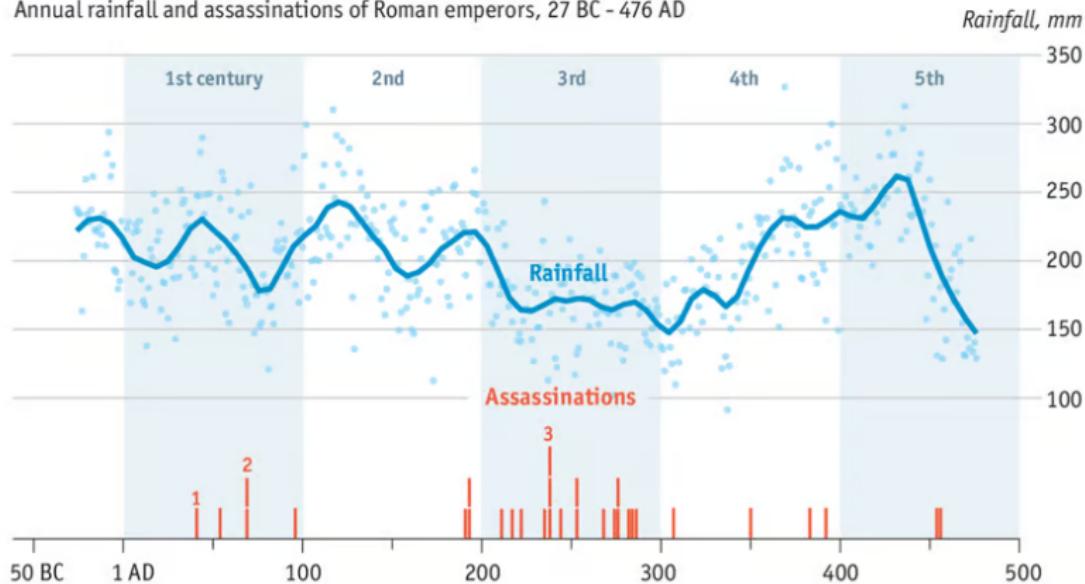
Perception

- 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?

SCIENCE OF DATA VISUALIZATION

Reign falls

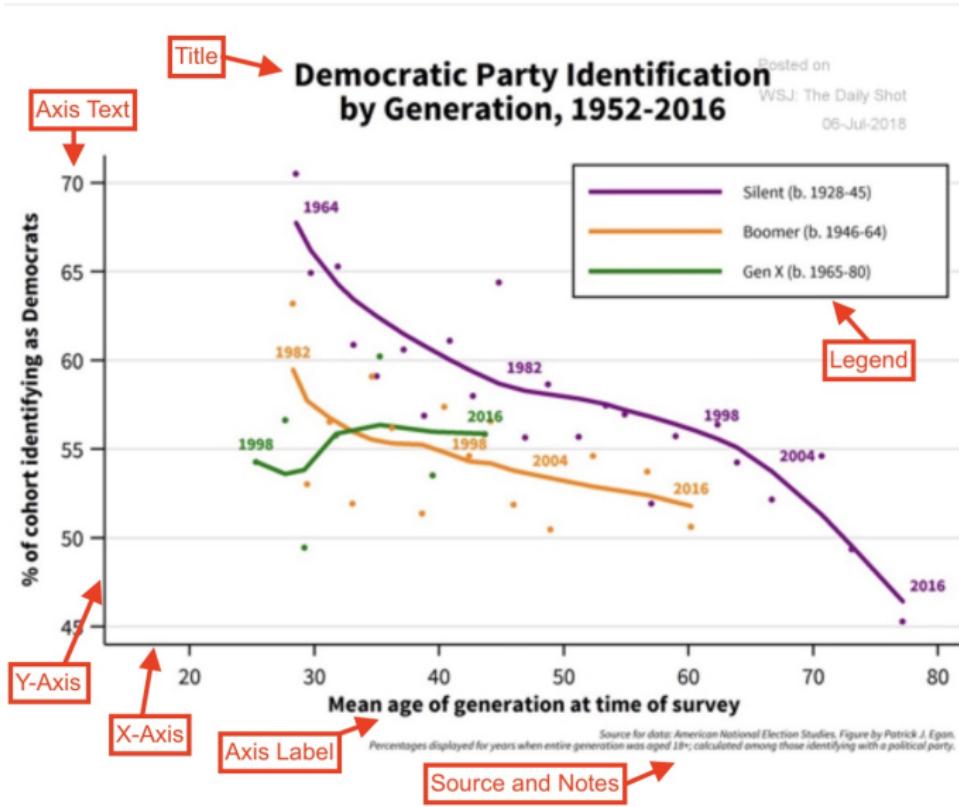
Annual rainfall and assassinations of Roman emperors, 27 BC - 476 AD



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

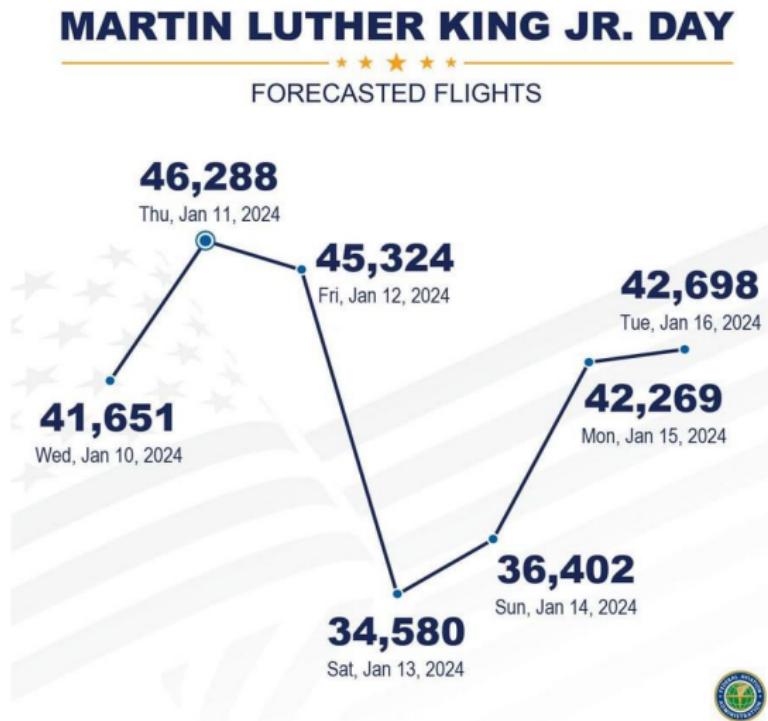
The Economist

PARTS OF A GRAPH



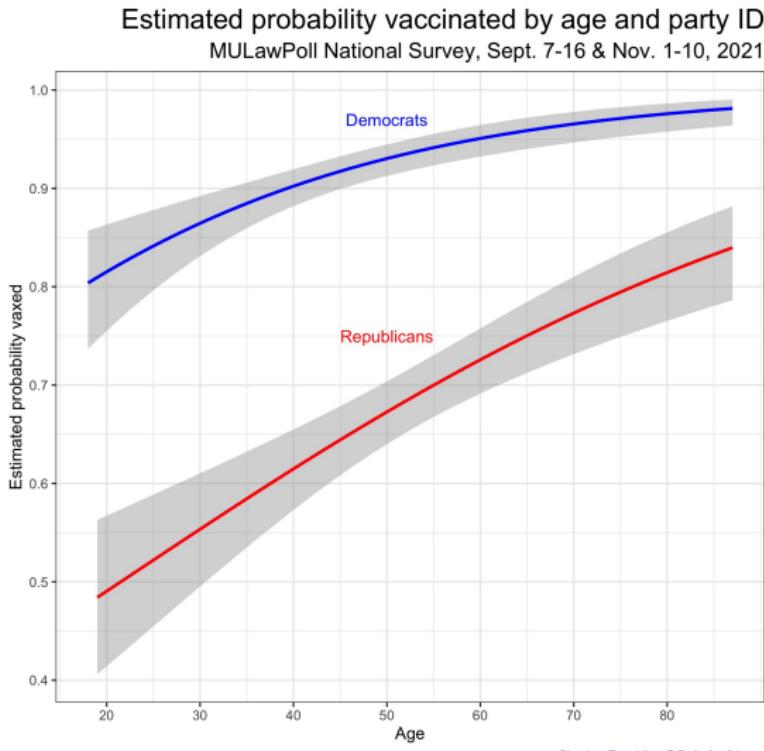
DESIGNING FOR STATISTICS

- 1 Show the context of the data



DESIGNING FOR STATISTICS

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



Charles Franklin: @PollsAndVotes

DESIGNING FOR STATISTICS

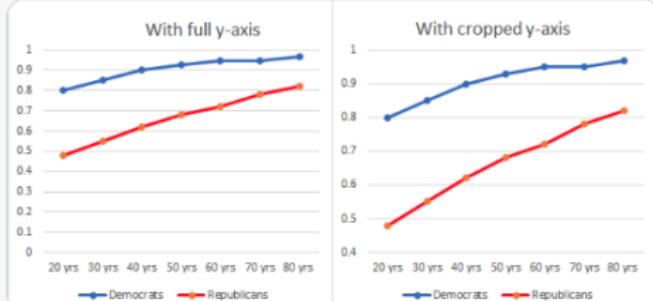
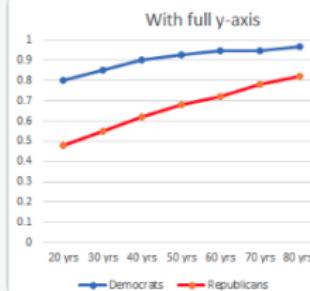
- 1 Show the context of the data
- 2 The main axis should show the scale of the data



Samara Klar 💪💊 @SamaraKlar · Nov 28

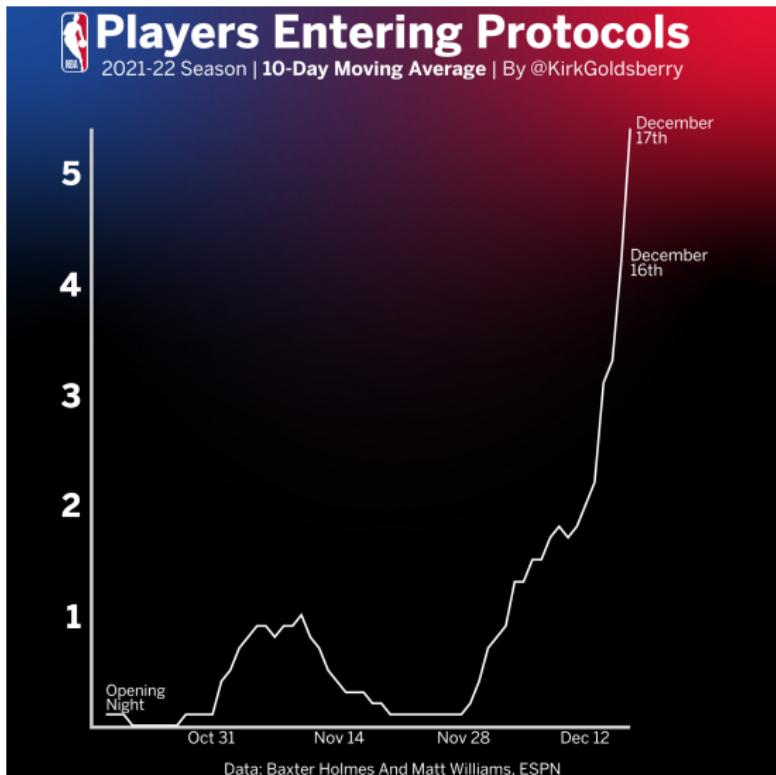
Replying to @MattGrossmann

i gotta say, though, that cropping the y-axis to magnify the partisan difference and to exaggerate vaccine hesitancy is one of my pet peeves. see below how things look with the full y-axis.



DESIGNING FOR STATISTICS

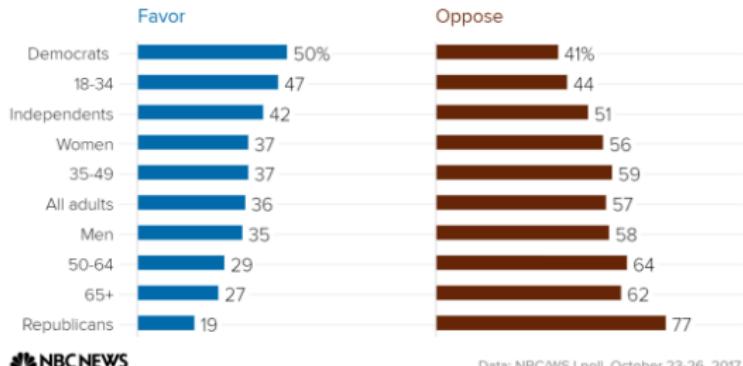
- ① Show the context of the data
- ② The main axis should show the scale of the data



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

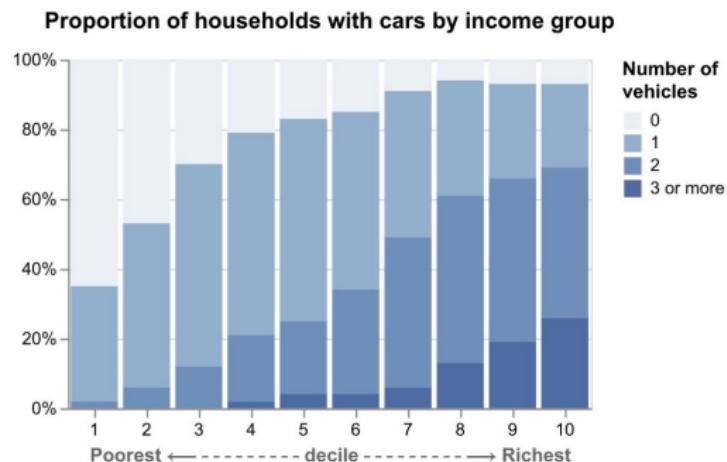
Favor or oppose the Boy Scouts admitting girls?



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

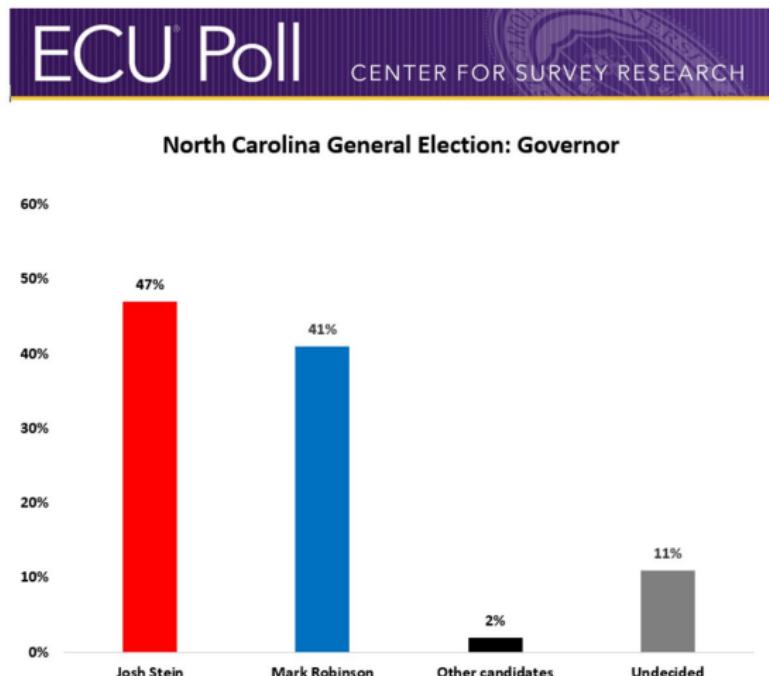
DESIGNING FOR STATISTICS

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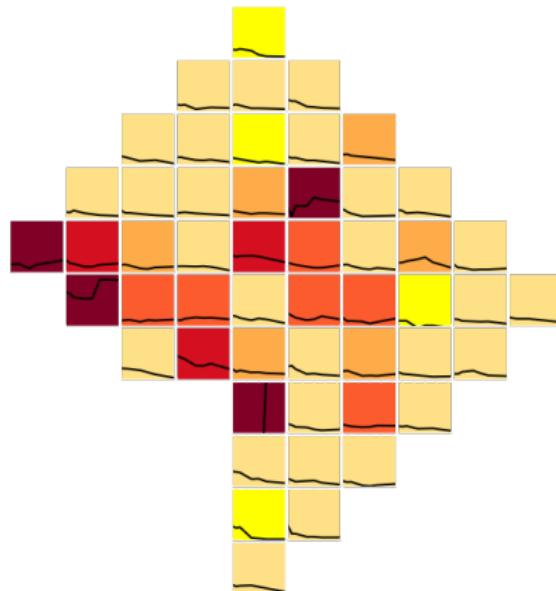


Note: Other candidates receiving support (all individually at 1% or less) include Mike Ross (Libertarian Party), Wayne Turner (Green Party), and Walter Vinny Smith (Constitution Party).

DESIGNING FOR STATISTICS

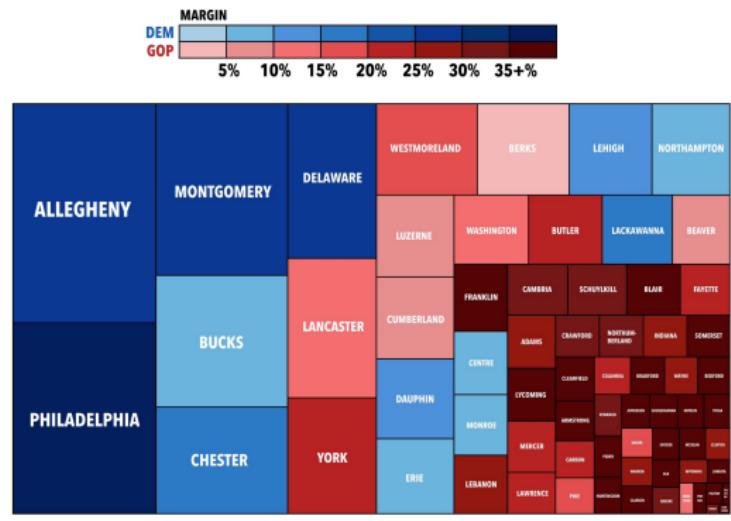
- ① Show the context of the data
- ② The main axis should show the scale of the data
- ③ Use conventional ordering and meanings

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

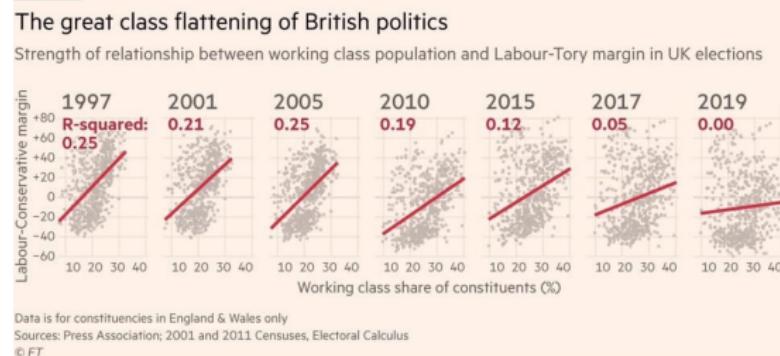


Source: Pennsylvania Department of State

@maxtmcc

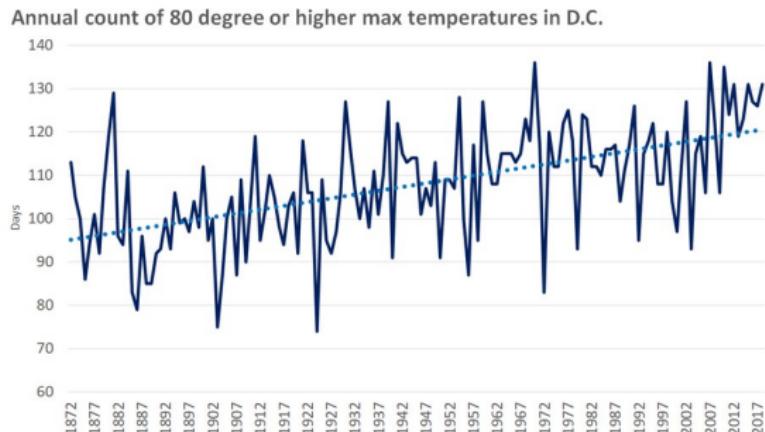
DESIGNING FOR STATISTICS

- 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



DESIGNING FOR STATISTICS

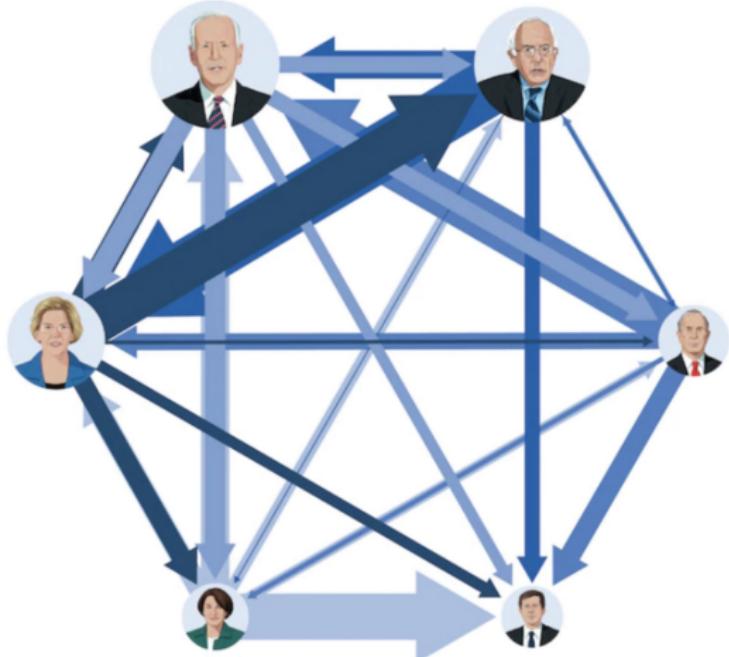
- ① Show the context of the data
- ② The main axis should show the scale of the data
- ③ Use conventional ordering and meanings
- ④ Data visualizations are paragraphs about data



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

Where second-choice support goes



Source: Quinnipiac University polling, January 2020

Quinnipiac poll of second choices. (Philip Bump)

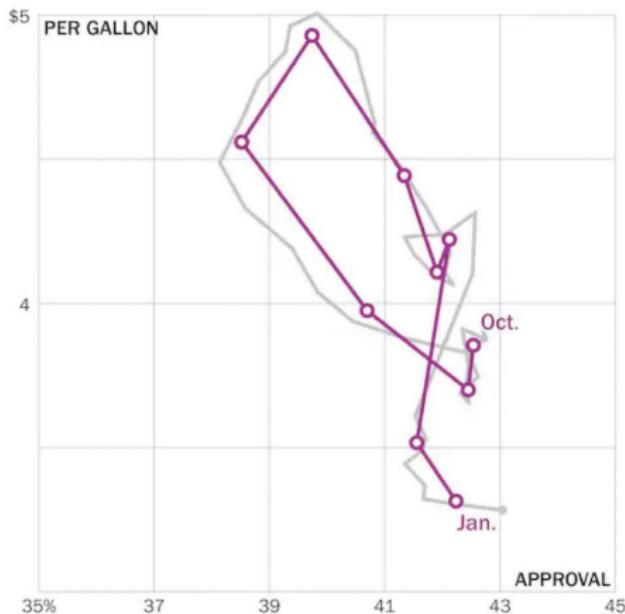
THE WASHINGTON POST

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

Gas prices vs. Biden approval

From the beginning of the year to mid-October.

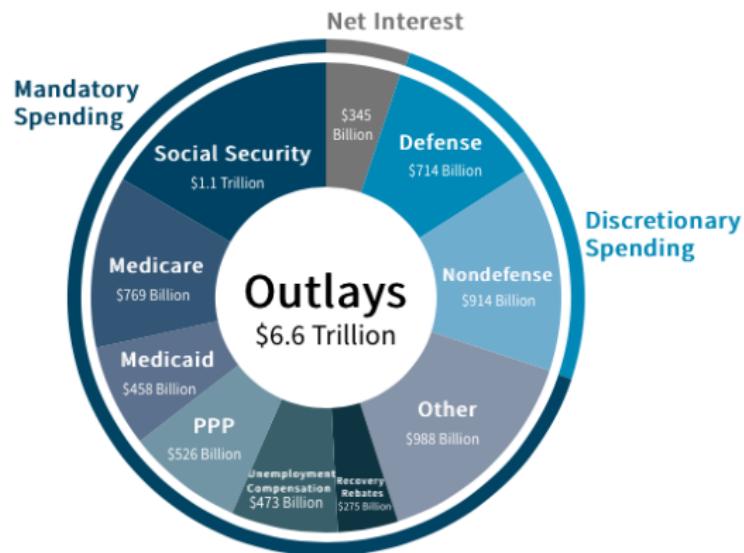


Sources: FiveThirtyEight, Energy Information Administration

THE WASHINGTON POST

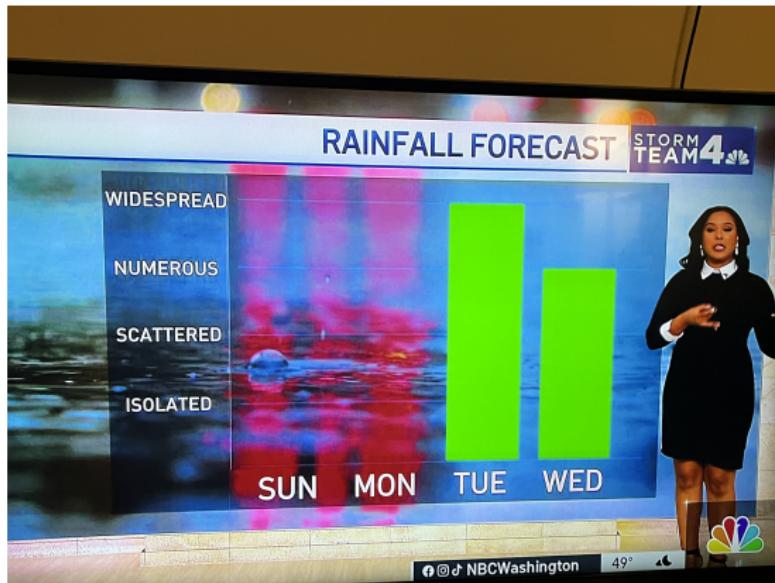
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- ⑥ Pie charts should have no more than two slices
- ⑦ Not all data should

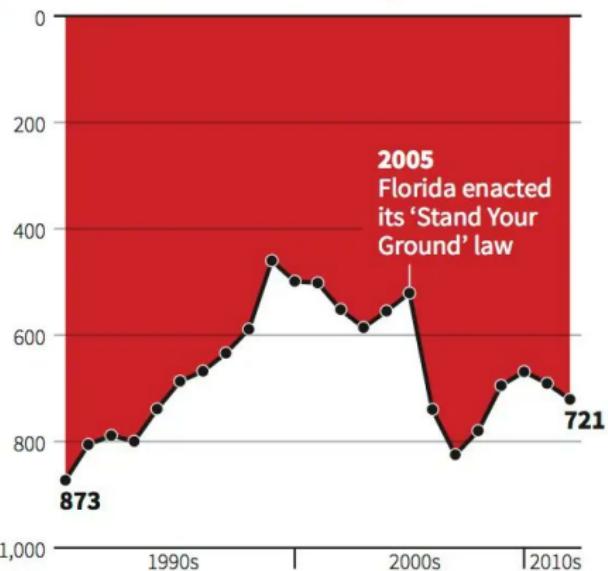


EVALUATING A GRAPH

- 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