

# Introduction to Telling Stories with Data

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# What are data?

## da·tum

/ˈdātəm, ˈdatəm/ ⓘ

*noun*

plural noun: *data*

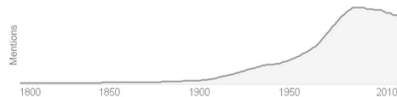
1. a piece of information.
  - an assumption or premise from which inferences may be drawn.
2. a fixed starting point of a scale or operation.

### Origin



mid 18th century: from Latin, literally 'something given,' neuter past participle of *dare* 'give.'

### Use over time for: data



## Data as building blocks

- ▶ Data are units of information, encoded for processing, e.g. “machine-readable”
- ▶ Data, like words, can be woven together to create new conceptual understanding
- ▶ Data are the raw material of the digital economy.

# What are models? (see Kaplan, Chapter 1)

A (simplified) representation of a system of inter-relationships.

- ▶ Models can be mathematical, physical, mental, visual, etc...
- ▶ In representing the world, models attempt to create an accurate representation of some aspect of reality, ideally based on data.
- ▶ Classic quote: "all models are wrong, some are useful."

Mathematically, we can think of models like functions

$$y = f(x_1, x_2, \dots) + \textit{error}$$

# Communicating ideas with evidence

## What is a narrative? [From the OED]

*An account of a series of events, facts, etc., given in order and with the establishing of connections between them; a narration, a story, an account.*

- ▶ A data-driven narrative communicates the results of a model.
- ▶ Important to let the data lead our belief, not the other way around!!

## Telling stories with data

- ▶ raw material: words, data
- ▶ tools: code, software, computers, statistical models
- ▶ finished product: visualization, explanations, inference

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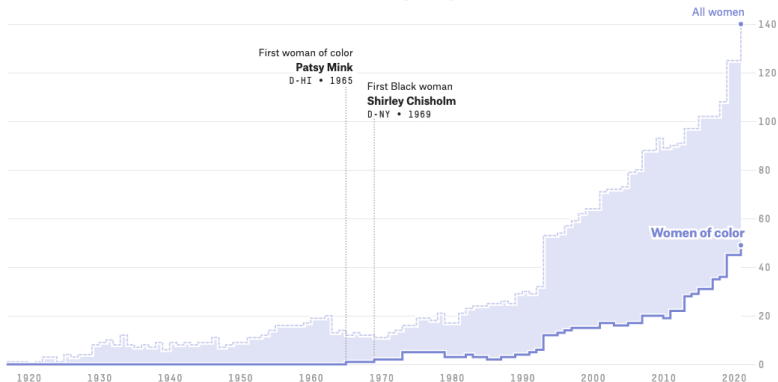
# Women of Color Were Shut Out of Congress For Decades. Now They're Transforming It.

By Meredith Conroy, Amelia Thomson-DeVeaux and Anna Wiederkehr

Illustration by Chelsea Alexander

**It wasn't until 1965 that a woman of color arrived in Congress**

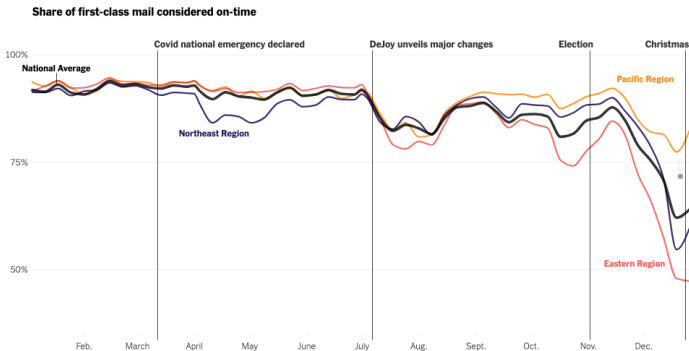
The number of women serving in Congress since 1917



<https://projects.fivethirtyeight.com/women-of-color-congress-2020/>

# The Postal Service Survived the Election. But It Was Crushed by Holiday Packages.

By Emily Badger, Quoctrung Bui and Margot Sanger-Katz Jan. 19, 2021

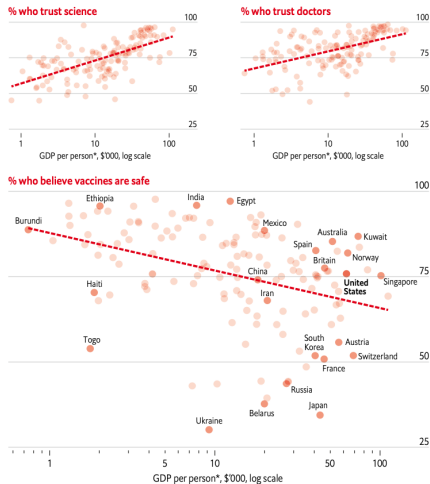


Note: Includes three of the seven Postal Service regions. Region definitions can be found [here](#). Source: United States Postal Service

<https://www.nytimes.com/interactive/2021/01/19/upshot/postal-service-survived-election-but-crushed-by-holidays.html>

## → Rich countries have more trust in science and doctors, but less in vaccines

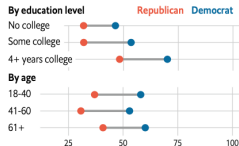
Trust v GDP per person\*, 2018, by country



United States, % responding "yes"

By political alignment, July-August 2020

"If and when a coronavirus vaccine becomes available, will you get vaccinated?"



"In general, do you think vaccines given to children for diseases like measles are safe?"



"Do you think parents should be required to have their children vaccinated?"



"If and when a coronavirus vaccine is available, will you get your school-aged children vaccinated?"



"Do you believe it would be safe for the country to fully reopen, before a vaccine became available?"



Sources: Wellcome Trust; World Bank; YouGov/The Economist

\*At purchasing-power parity

<https://www.economist.com/graphic-detail/2020/08/29/conspiracy-theories-about-covid-19-vaccines-may-prevent-herd-immunity>

# How to tell a story using data

Telling stories with data requires

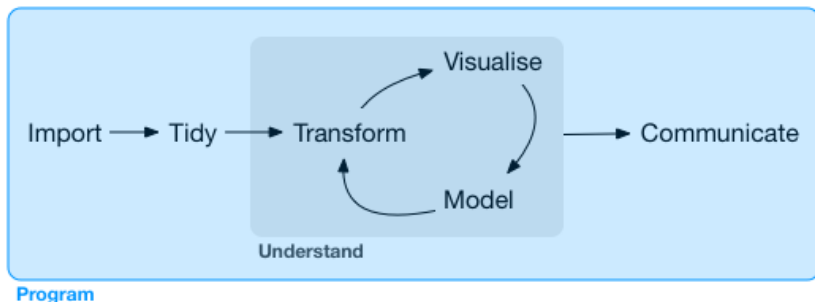
- ▶ a topic for the story you want to tell
- ▶ detective work
- ▶ creativity, both scientific and artistic
- ▶ experimentation with different storylines
- ▶ statistical literacy
- ▶ good data (good data does not necessarily equal “big data”)



# Common mistakes in data storytelling

- ▶ not knowing the audience
- ▶ making the story too complex too quickly
- ▶ trying to make it too complicated
- ▶ encouraging correlation to be seen as causation
- ▶ missing the little things (clear axis labels, plot annotations)

# A process for data analysis



This is where we are going to spend most of our time this semester. With a bit of a focus on public health applications.

Figure credits: <https://r4ds.had.co.nz/introduction.html>