Hello! We will start at 3:05.

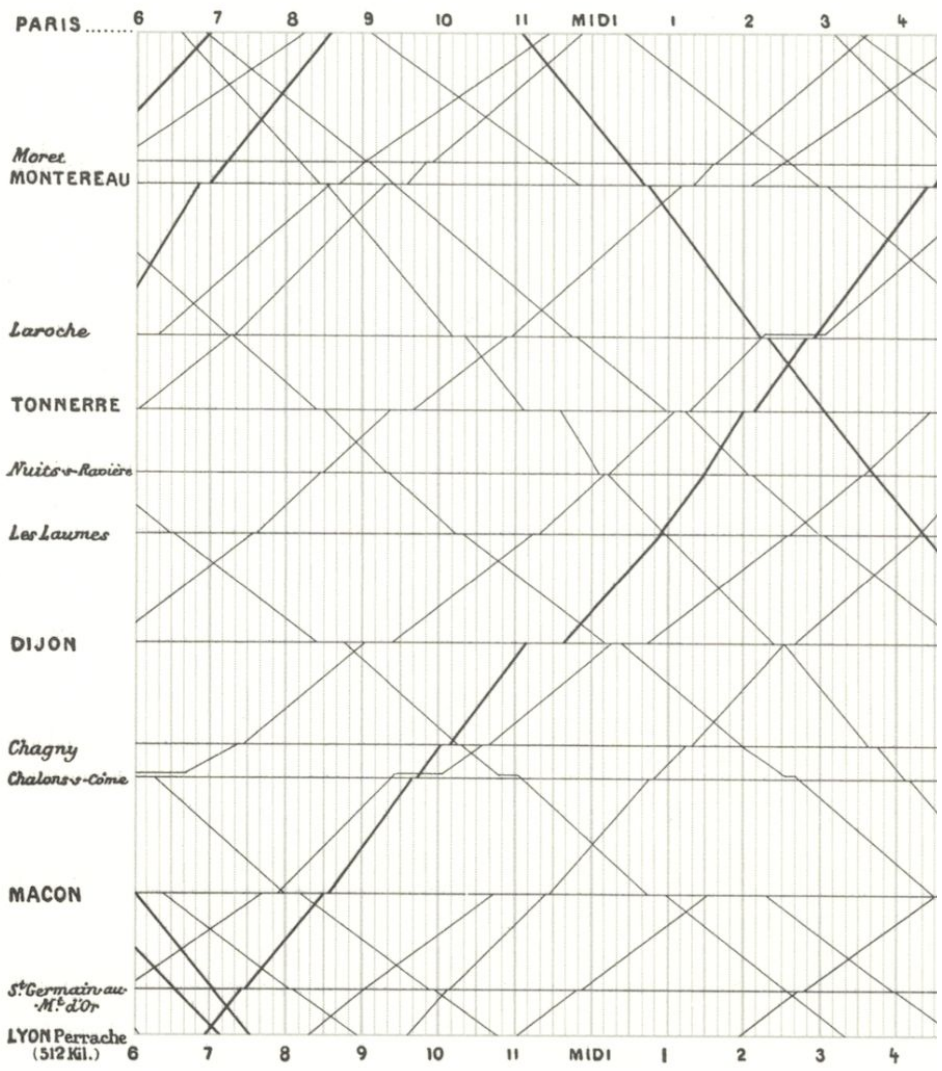
Are you caught up?

Please add a profile photo to Zulip if comfortable. This helps me get better with names!

Make sure #assign-2-ex-viz and #assign-3-four-persp are completed.

Get card access with @CourseBot #getKeycardAccess.

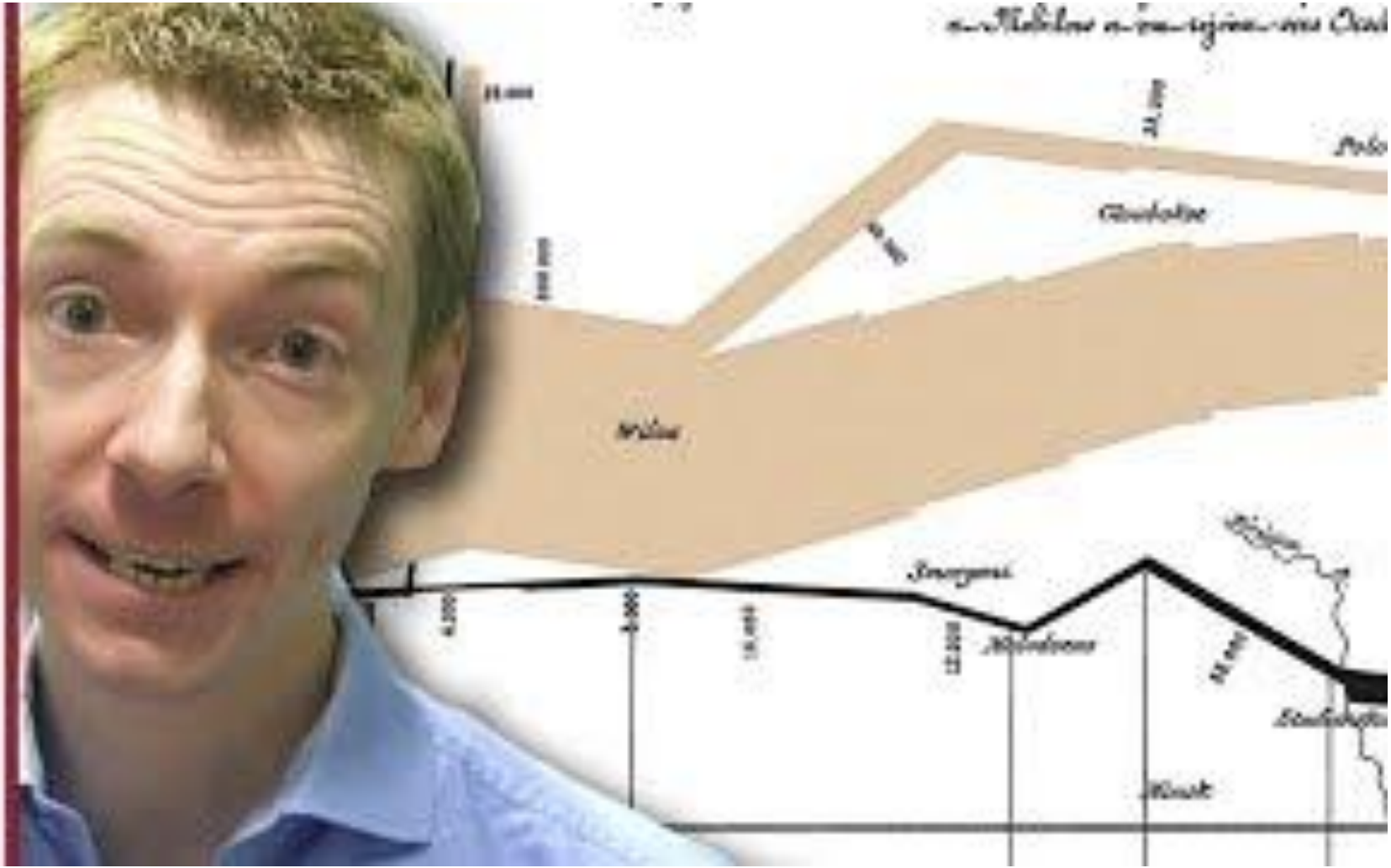
Did the reading? You can do #assign-4-ex-viz-2.



Visualization as Design

A Samuel Pottinger
Stat 198: IDSV
Feb 5, 2025

Numberphile



Overview of the second section.

Section 2:
Primitives

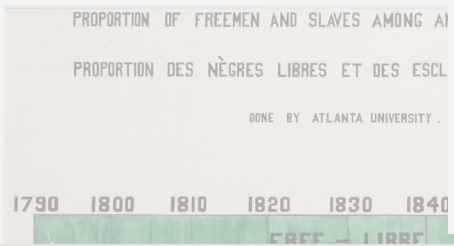
- Visualization as Design: Investigating some of the early design ideas that continue to shape data visualization and some information about how we got to now.
- Visualization as Science 1: Foundational cognitive and perception science principles and studies.
- Visualization as Science 2: What cog sci and perception principles say about data visualization.
- Skills Labs: Exploring the primitives available for drawing and how to draw with data.
- Formalizing Glyphs: Cleveland and McGill tie it all together: actionable visualization recommendations for using primitives.

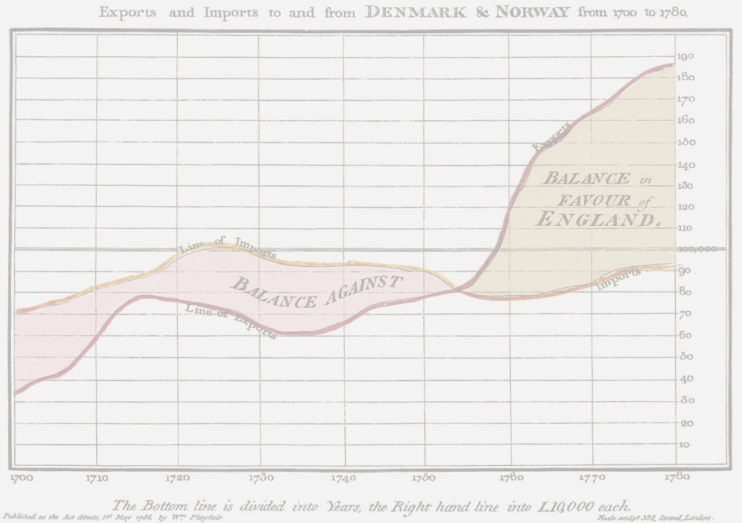
Today

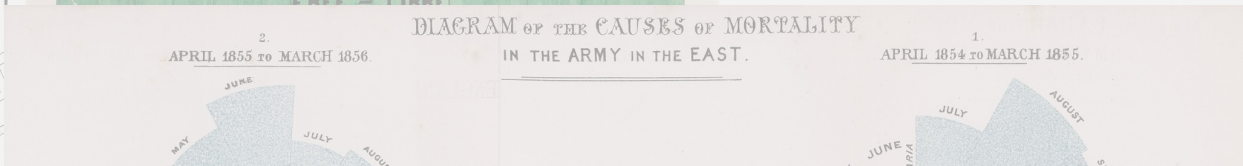
- **Pioneers of Data Visualization: Some of the important names and pieces you'll want to know.**
- Ideas of Tufte: An overview of key ideas given to us by pioneer Tufte.
- Problematic graphs: A look at some graphics that may have some issues.
- After Tufte: What has happened since Tufte and what set the stage for the 4 perspectives we are exploring.

How we got to now... **A Comment**

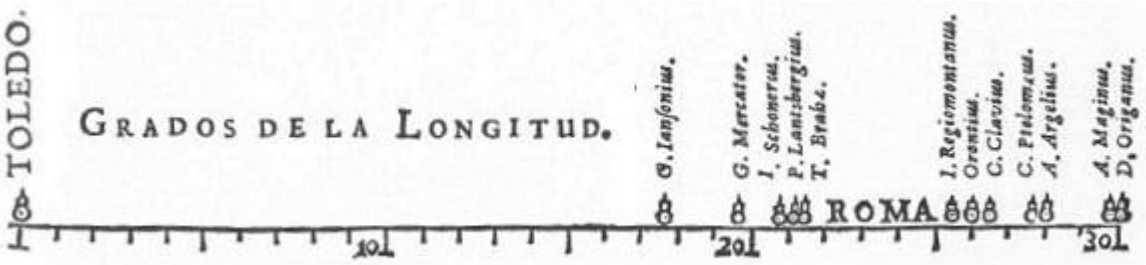
The fastest imaginable look at data visualization history. Just one person per century! I want to briefly pause to comment on **who is remembered and who is left out**. We will have another chance at history later.





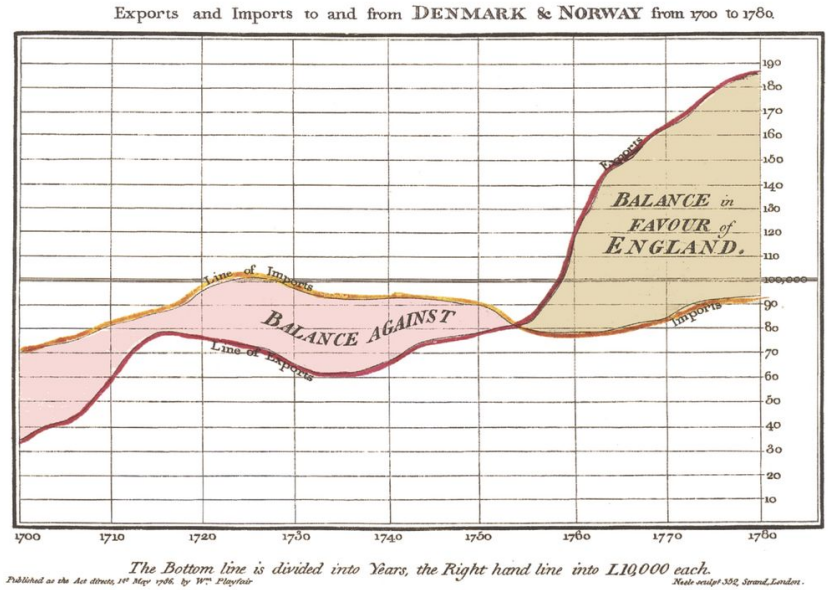


How we got to now... **Michael Florent van Langren** (1600s)



Though not as well known as some others, the **earliest known "statistical graphic"** (1644), this looks at different estimates of the distance from Toledo to Rome.

How we got to now... **William Playfair** (1700s)



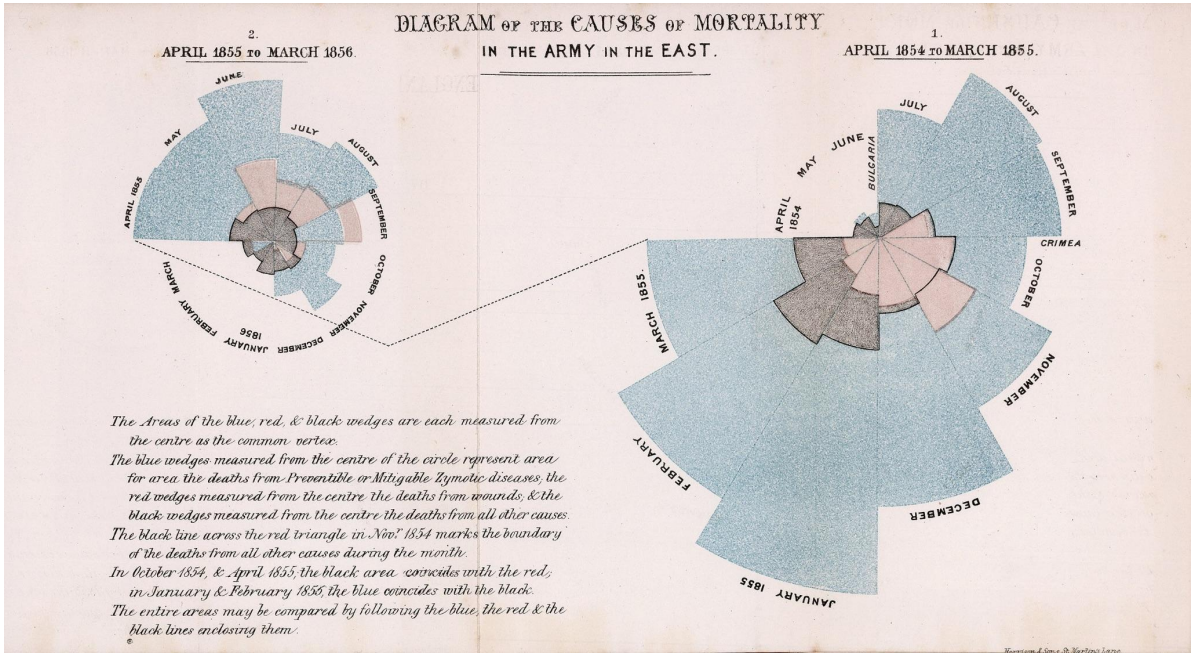
Often called the parent of **modern data visualization**.

Created common patterns we use today like the pie chart.

Popularized prior forms like the bar chart and area chart.

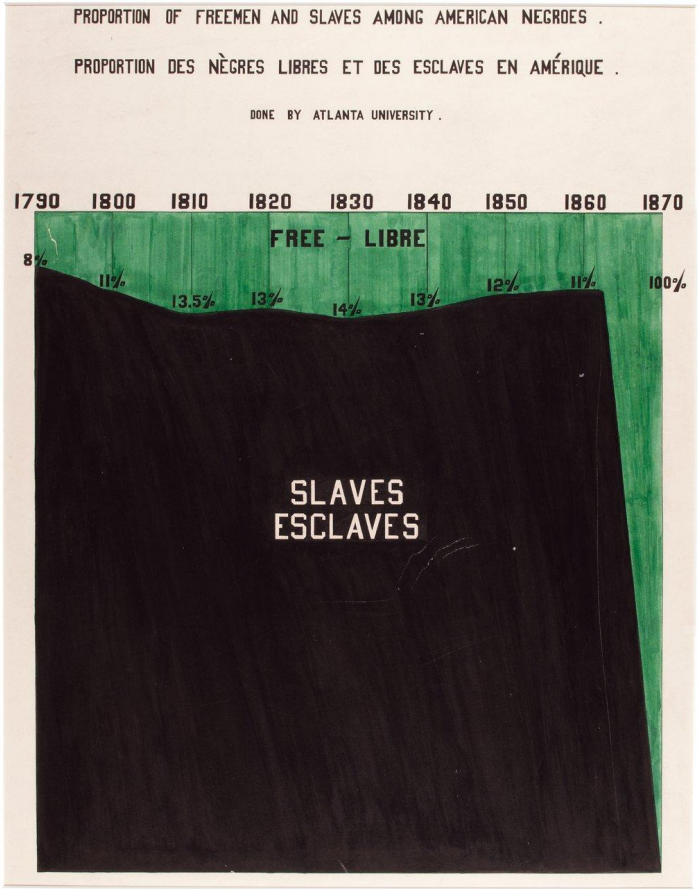
Piece to the left is from 1786.

How we got to now... **Florence Nightingale** (1800s)



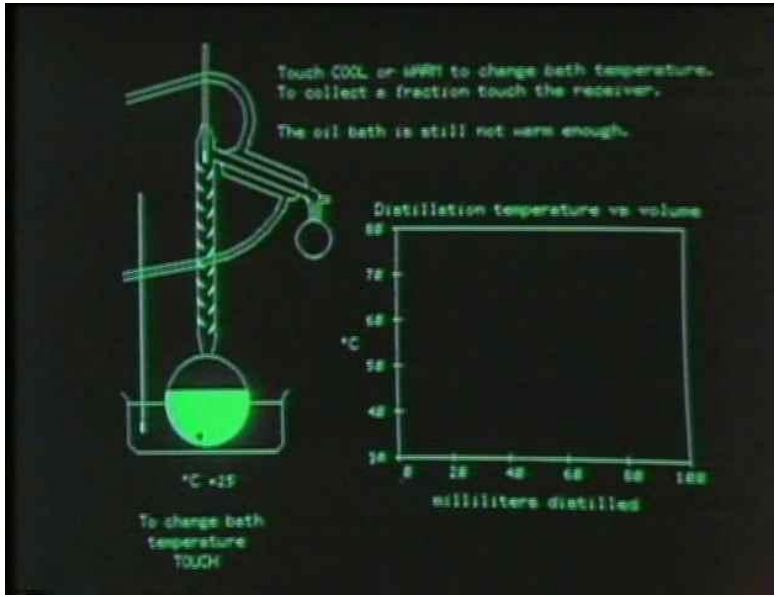
Causes of death (1858). Often known for pioneering **graphical storytelling**. Effective use of data visualization for change and argument. Epidemic diseases vs battlefield injury.

How we got to now... **W.E.B. Du Bois** (1900s)



Changed the way we think about data **visualization as message**. The design ideas and use in sociological settings continues to stem from this early work. Influential in data visualization at the start of the 20th century.

How we got to now... **Donald Blitzer** (today)



Pioneered ideas around interactive media and **explorable explanations**.

1960s precursor to the work we saw from Bret Victor.

Today

- Pioneers of Data Visualization: Some of the important names and pieces you'll want to know.
- **Ideas of Tufte: An overview of key ideas given to us by pioneer Tufte.**
- Problematic graphs: A look at some graphics that may have some issues.
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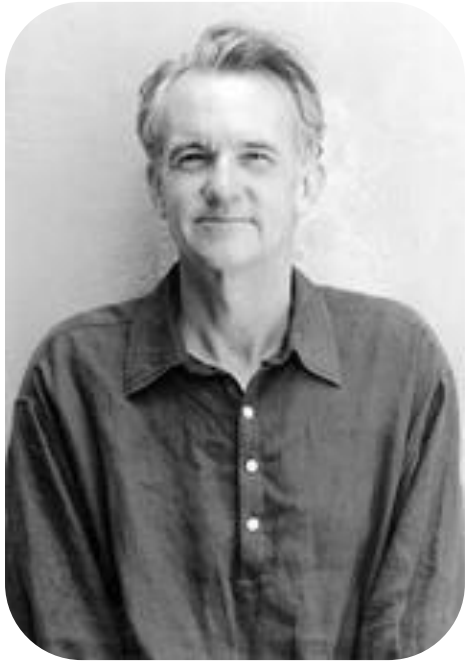
Introducing **Edward Tufte**



It's hard to describe just how influential Tufte has been. He brought a lot of people into information design through touring workshops and popular books.

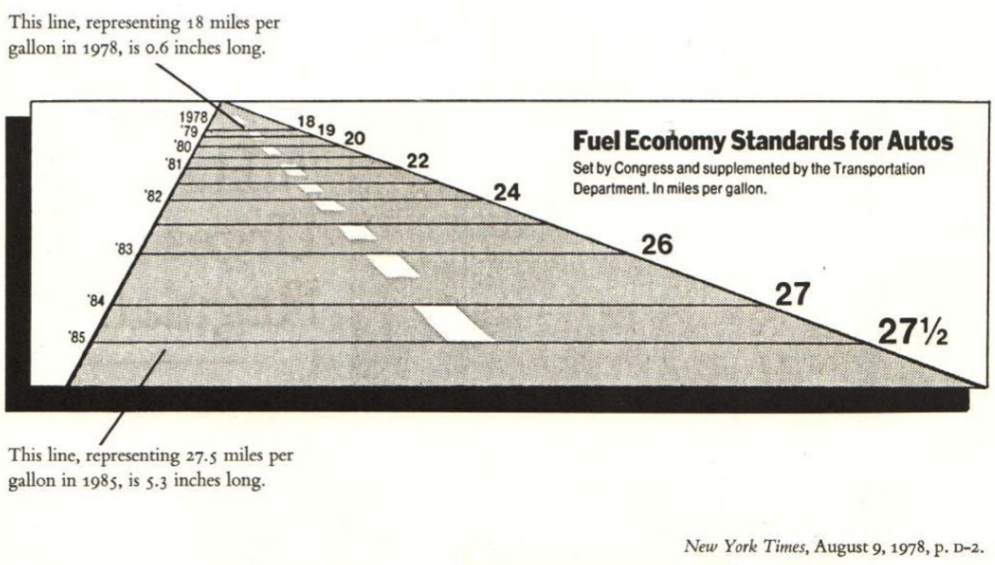
Many people disagree with some of his ideas now but his perspective has and continues to **fundamentally shape data visualization** today.

We discuss these ideas not as rules but as guidelines many follow as standard advice.

His ideas are readily applicable. I'll do all of the following charts in Google Sheets.

Tufte's ideas: **Lie-Factor**

$$\text{Lie Factor} = \frac{\text{size of effect shown in graphic}}{\text{size of effect in data}}$$



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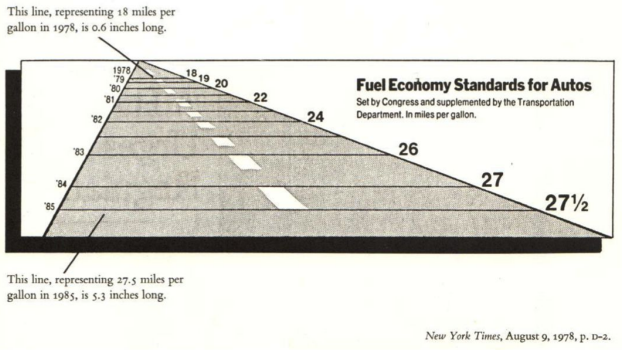
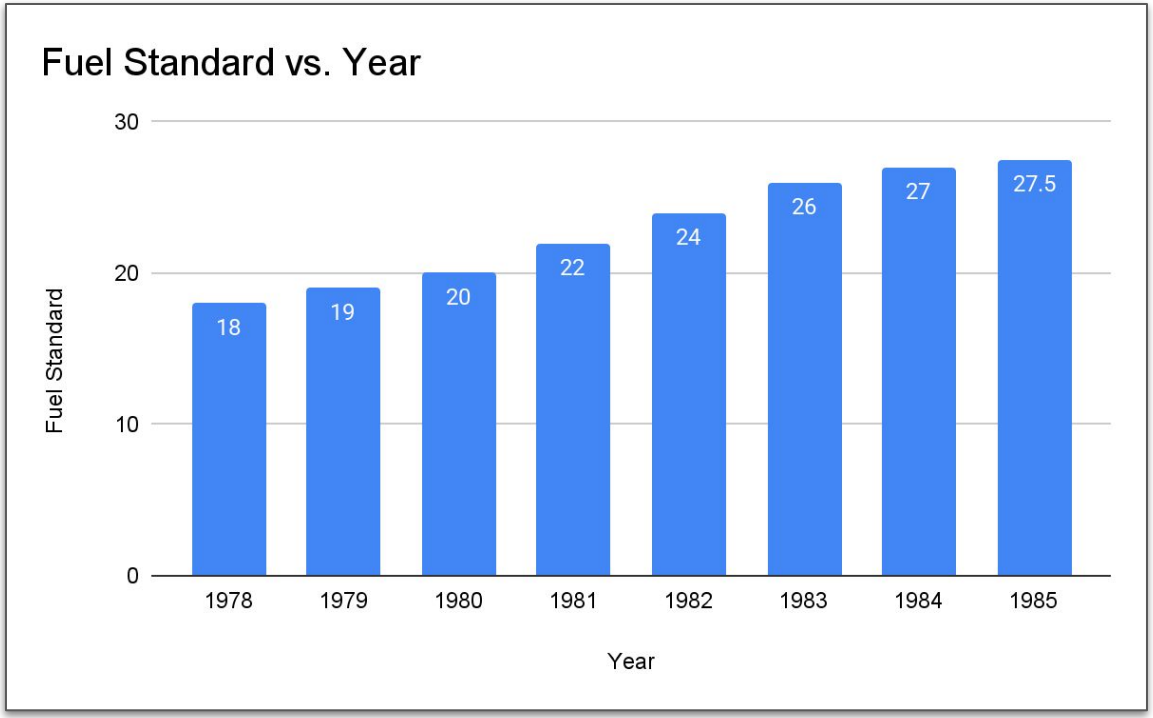
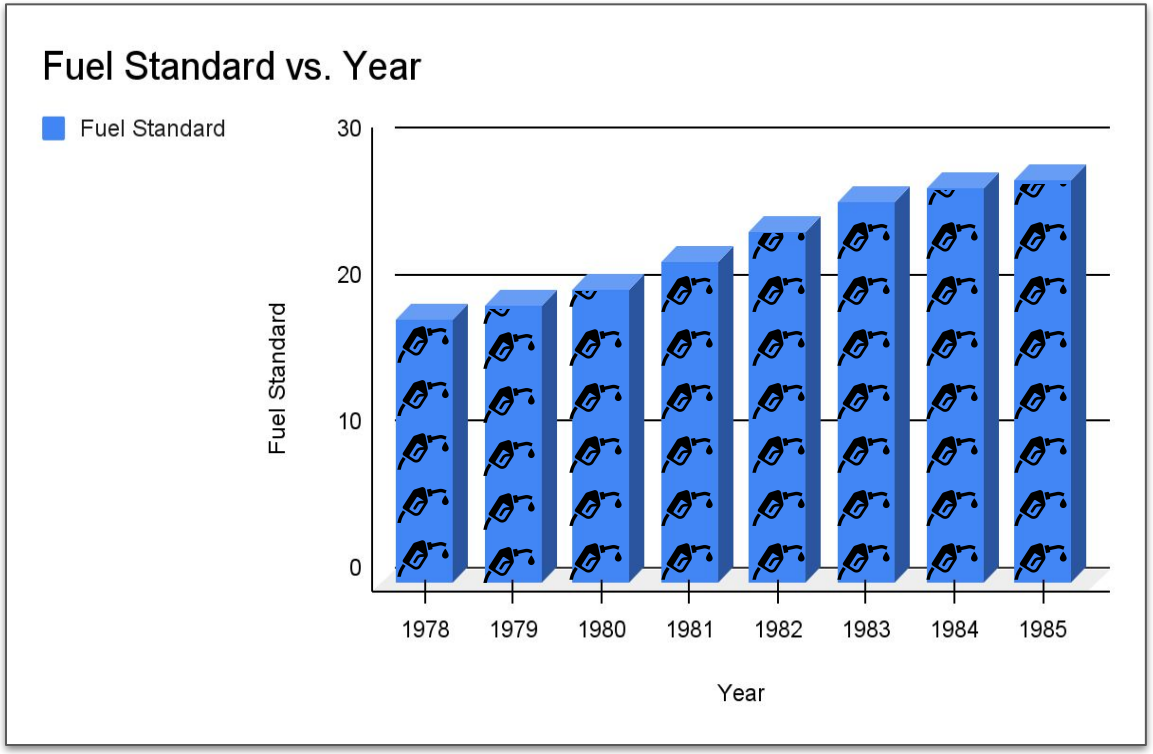
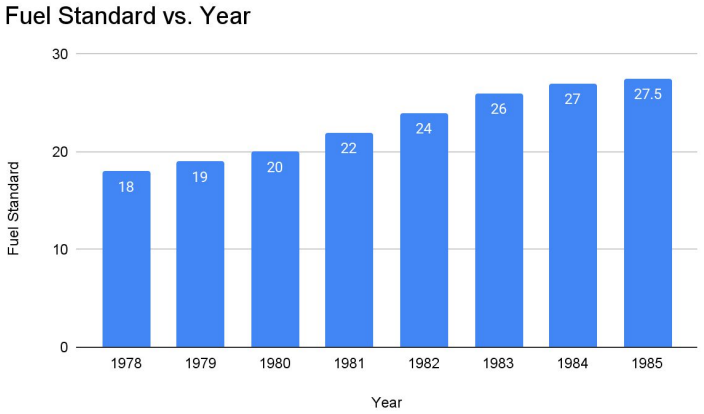


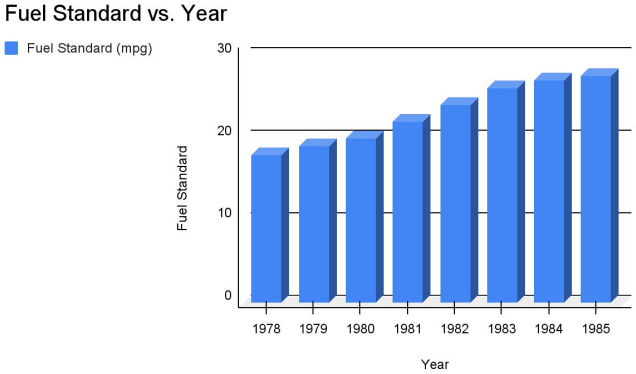


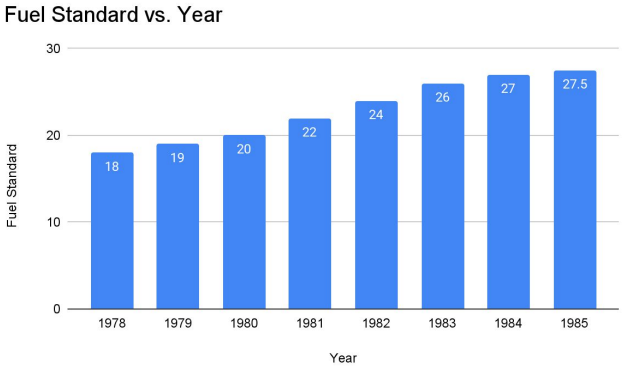
Tufte's ideas: **Chartjunk**





Tufte's ideas: **Data-Ink Ratio**





Fuel Standard Each Year (1978 - 1985)

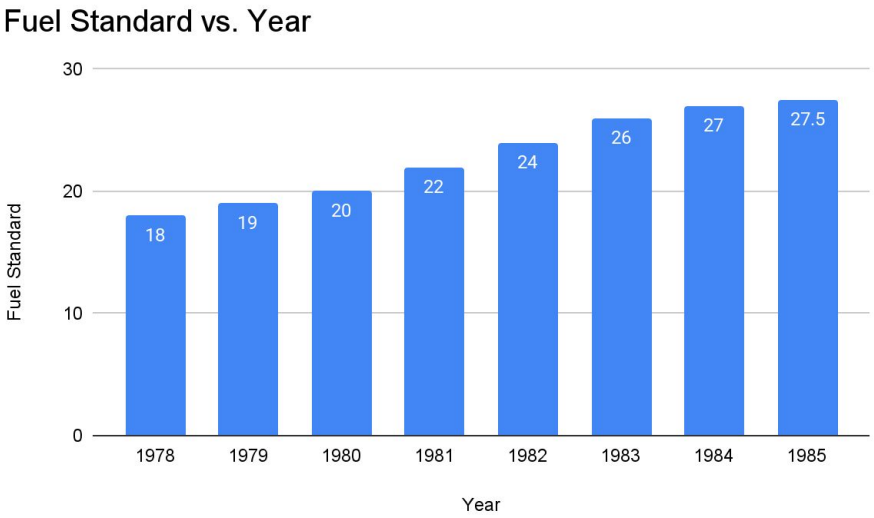
27.5 mpg target set by the ECPA

1978	1979	1980	1981	1982	1983	1984	1985
18	19	20	22	24	26	27	27.5

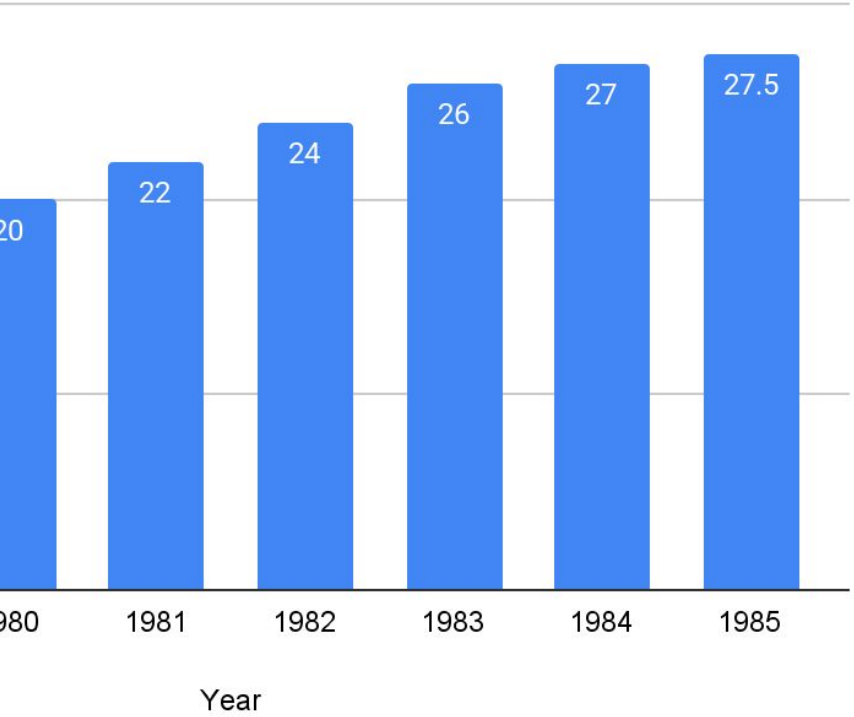
First year of standards saw 18 mpg

0 mpg

Tufte's ideas: **Data Density**



Tufte's ideas: **Data Density**



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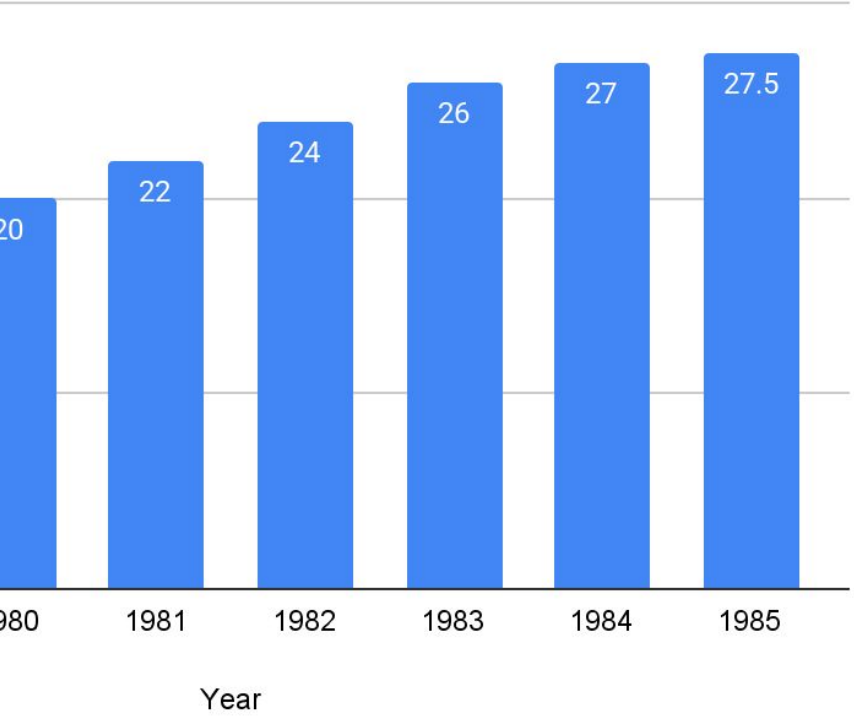

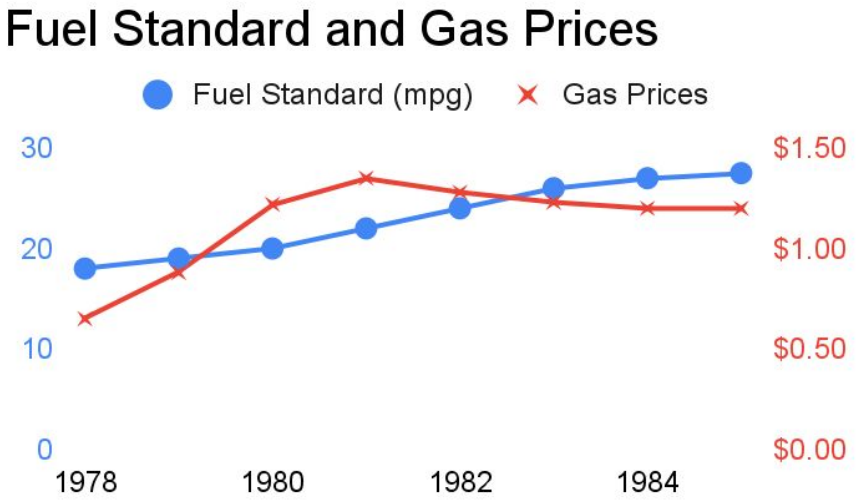

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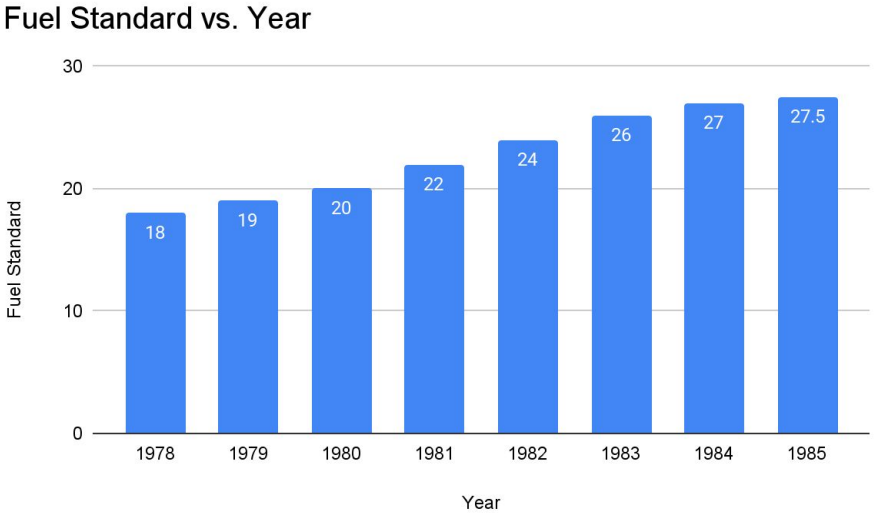
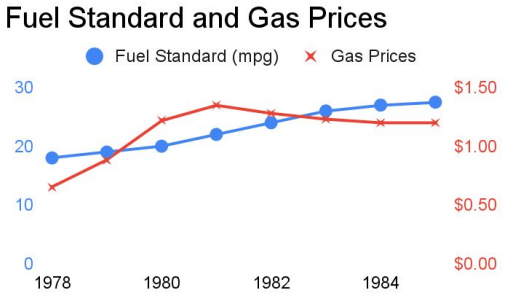
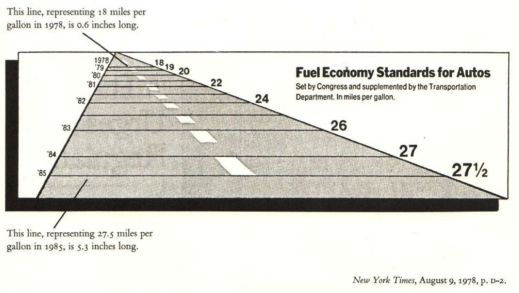




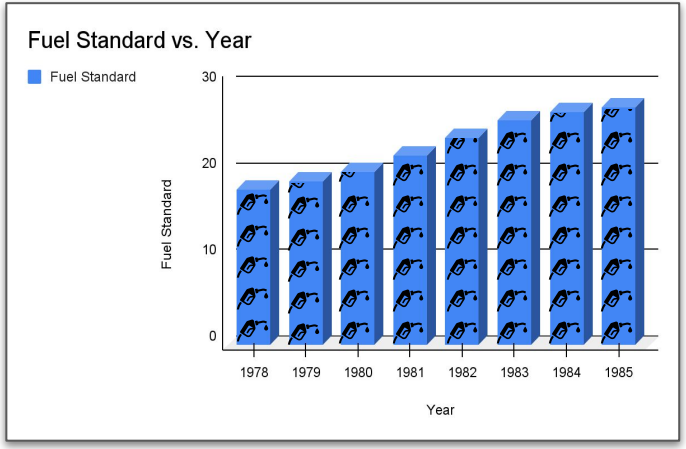
		1999.1.1	65 months	2004.4.28	low	high		2003.4.28	12 months	2004.4.28	low	high
Euro foreign exchange	$	1.1608		1.1907	.8252	1.2858	$	1.1025		1.1907	1.0783	1.2858
Euro foreign exchange	¥	121.32		130.17	89.30	140.31	¥	132.54		130.17	124.80	140.31
Euro foreign exchange	£	0.7111		0.6665	.5711	0.7235	£	0.6914		0.6665	0.6556	0.7235

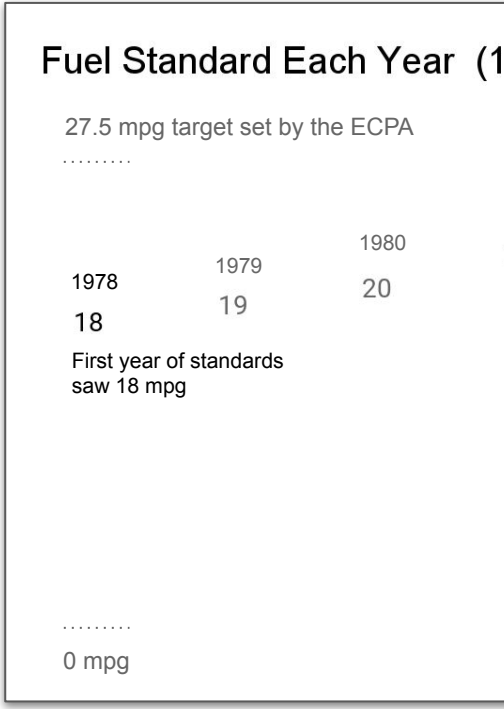
Tufte's ideas: **Summary**

Lie Factor

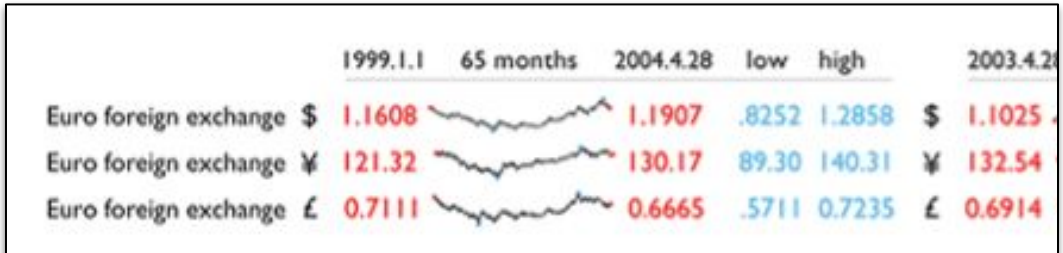


Chartjunk





Data Density



Data-Ink Ratio

Today

- Pioneers of Data Visualization: Some of the important names and pieces you'll want to know.
- Ideas of Tufte: An overview of key ideas given to us by pioneer Tufte.
- **Problematic graphs: A look at some graphics that may have some issues.**
- After Tufte: What has happened since Tufte and what set the stage for the 4 perspectives we are exploring.

Problematic graphics: **Group Activity**

We are going to look at some bad charts (“darts”) identified by Michael Friendly.

These were a motivation for Tufte, our next friend along this journey.

Break into groups and take a look at each section. Find a favorite and we will share with the class.

About 10 minutes to look through your section! Link in Zulip.

Today

- Pioneers of Data Visualization: Some of the important names and pieces you'll want to know.
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The **legacy** of Tufte

> “
>
> Specifically, it seems like he pulls some of his design principles out [of] thin air, and the design improvements they generate are **not scientifically validated**...
>
> ”

Matthew Dunnigan
Principal User Research Manager
Microsoft

Bringing in **empirical approaches.**

This lecture brought us to the doorstep of modern data visualization.

We cross the threshold in the next lecture where we will start to bring in scientific understanding of cognitive and perception science, exploring encoding devices.

All of this will culminate in bringing in one of the most important ideas: channel effectiveness.

A quick word from **Fung**

About your homework...

Have you finished your homework?

Make sure to complete #assign-2-ex-viz and #assign-3-four-persp.

Note that #assign-viz-4-ex-2 was just assigned.

Note that Assignment 2 can no longer be completed for full credit.

Do you need help?

We have double office hours this week. See #coffee-and-office-hours for options available on Friday.

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