

5

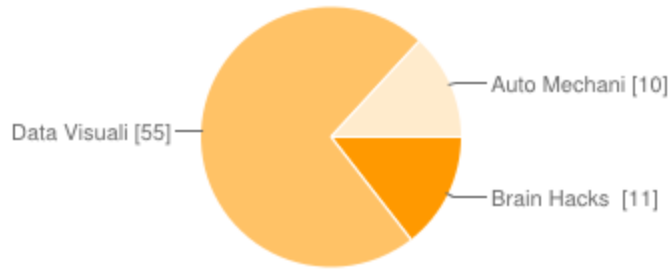
Data Ink

Brevity and the soul of visualization

Semester opening survey results

(yes they are anonymous)

Which class are you in?

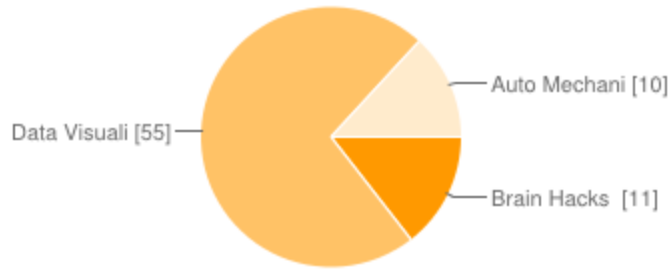


Brain Hacks (Mondays)	11	14%
Data Visualization (Tuesdays)	55	72%
Auto Mechanics (Wednesdays)	10	13%

Semester opening survey results

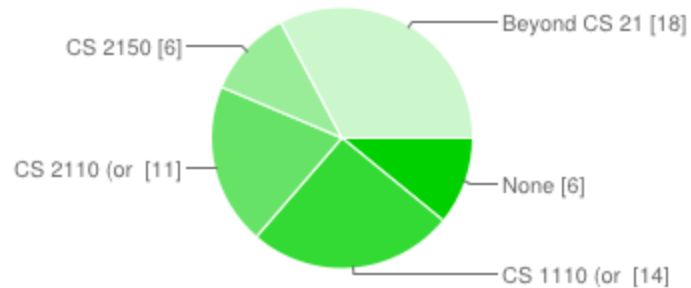
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Which class are you in?



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Describe your level of CS education at UVa

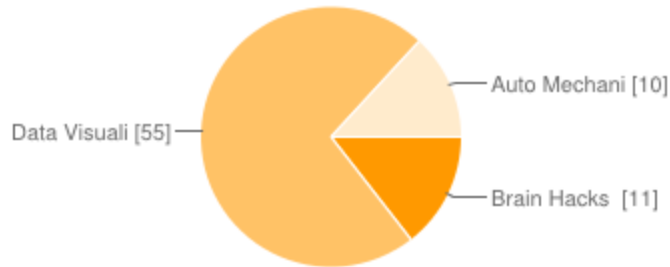


None	6	11%
CS 1110 (or equivalent)	14	25%
CS 2110 (or equivalent)	11	20%
CS 2150	6	11%
Beyond CS 2150	18	33%

Semester opening survey results

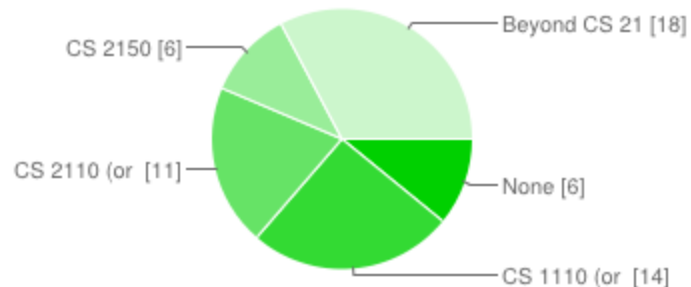
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Teach us software!! Hard skillz.

I think it'd be good to have a few short readings or examples posted online of great data visualizations.

Make it a two credit class and add more material

I also love Kevin <3

Before we start, let's get in pairs...

Graphical Excellence

“Complex ideas communicated with clarity, precision, and efficiency.”

- Show the data
- Induce the viewer to think of substance, not methodology
- Avoid distorting the data
- Present many numbers in a small place
- Make large data sets coherent
- Encourage the eye to compare data
- Reveal the data at multiple levels of detail
- Serve a reasonably clear purpose

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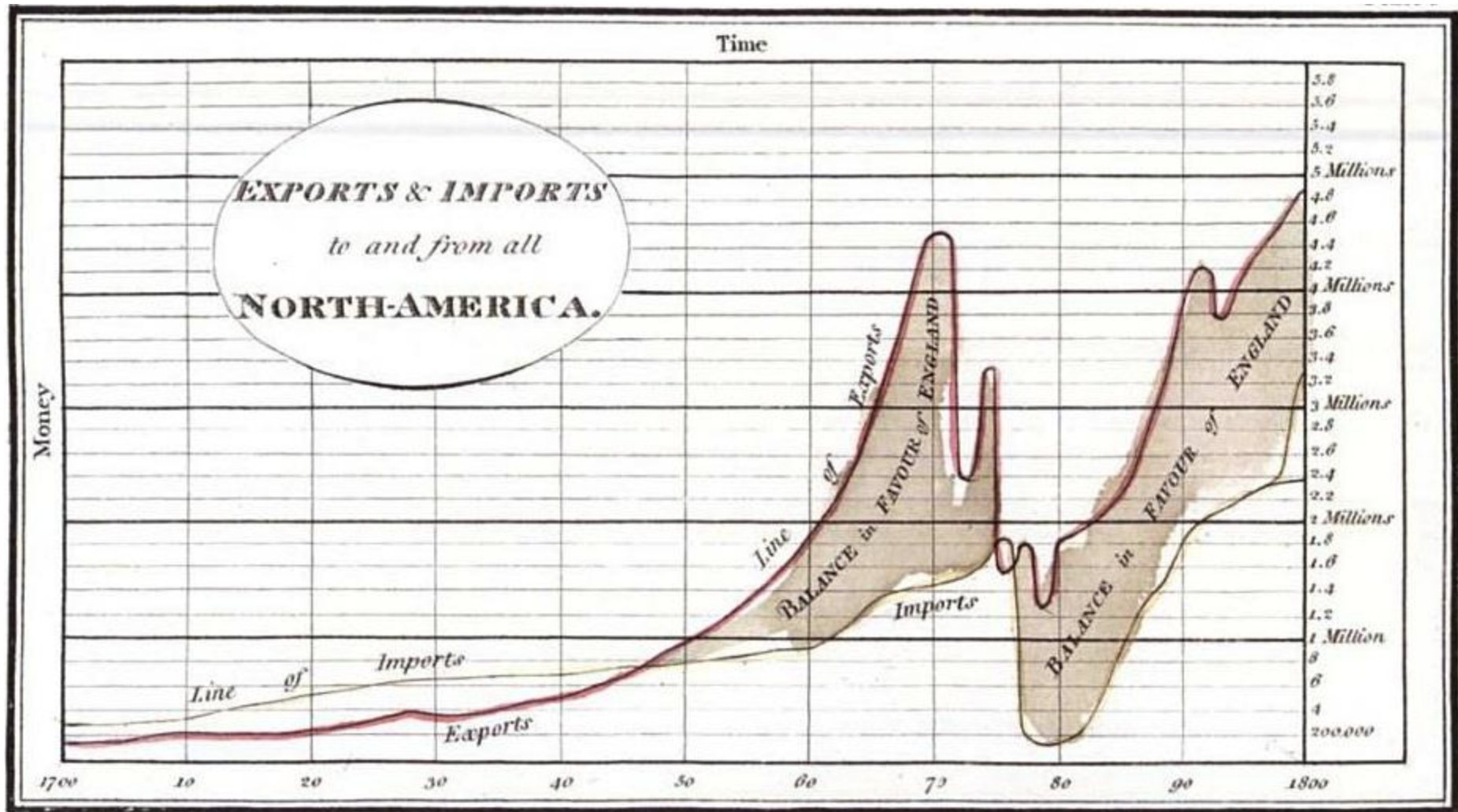
What is **Data Ink**?

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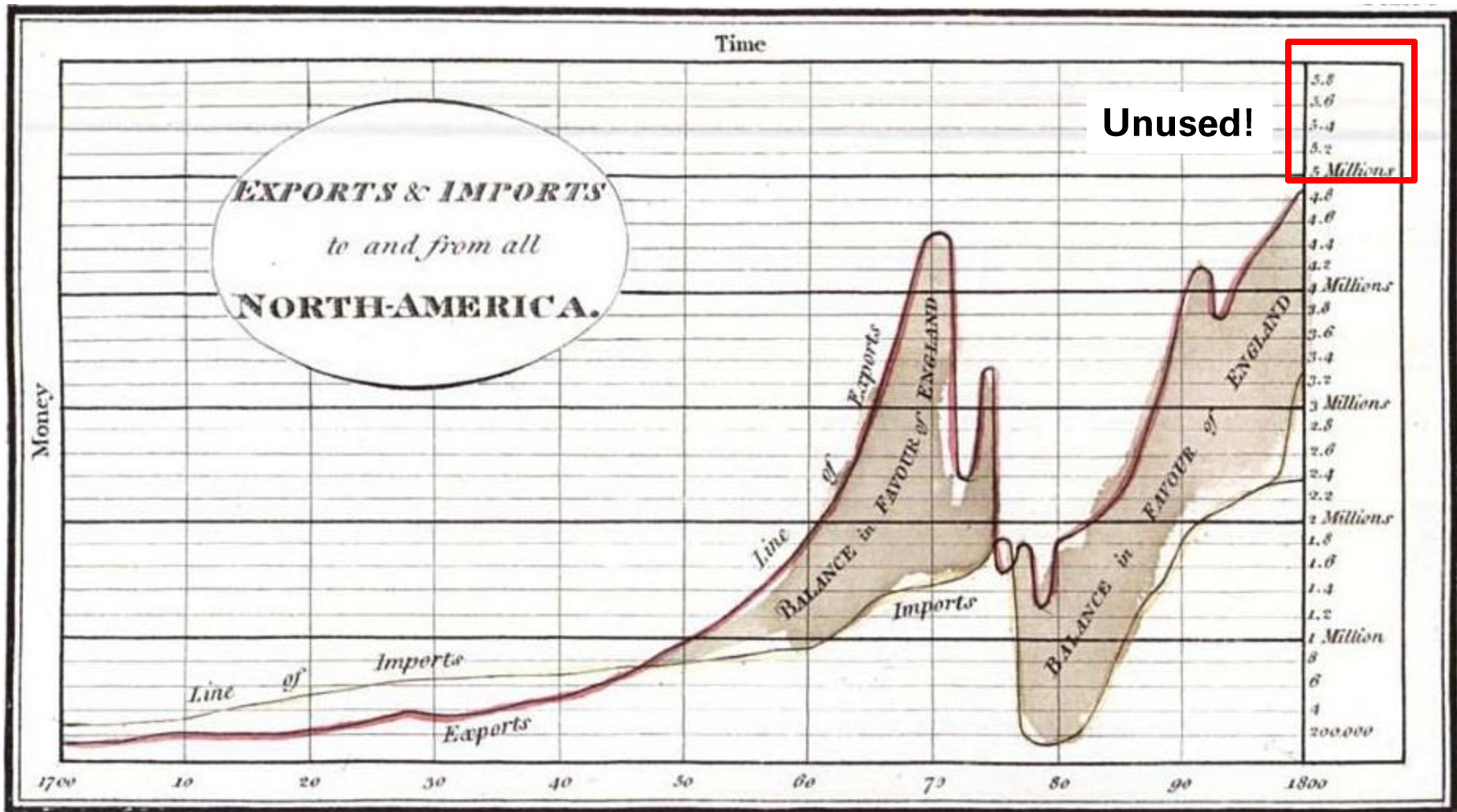
“ *Data-ink is the non-erasable core of a graphic, the non-redundant ink arranged in response to variation in the numbers represented.* ”

What is Data Ink?

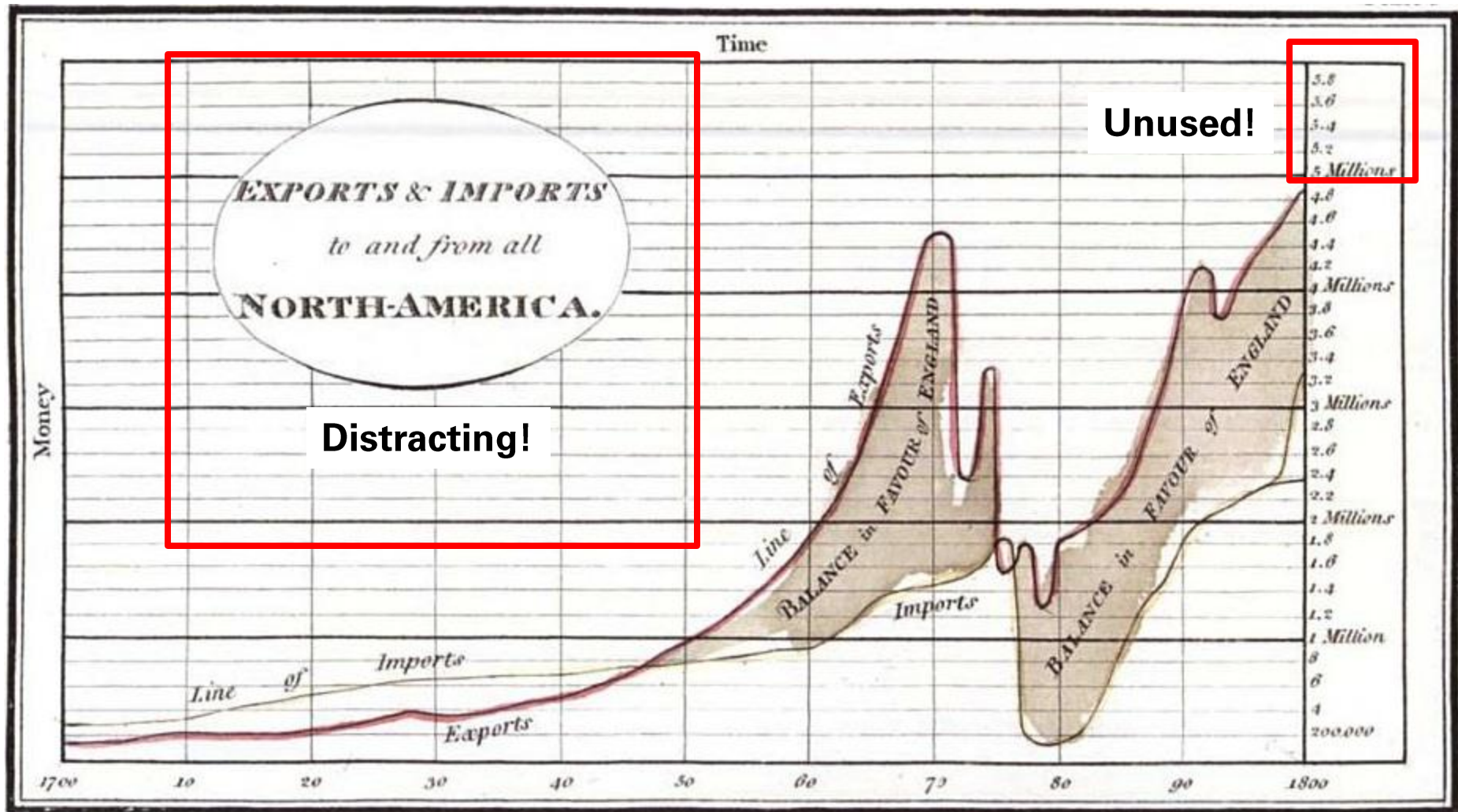
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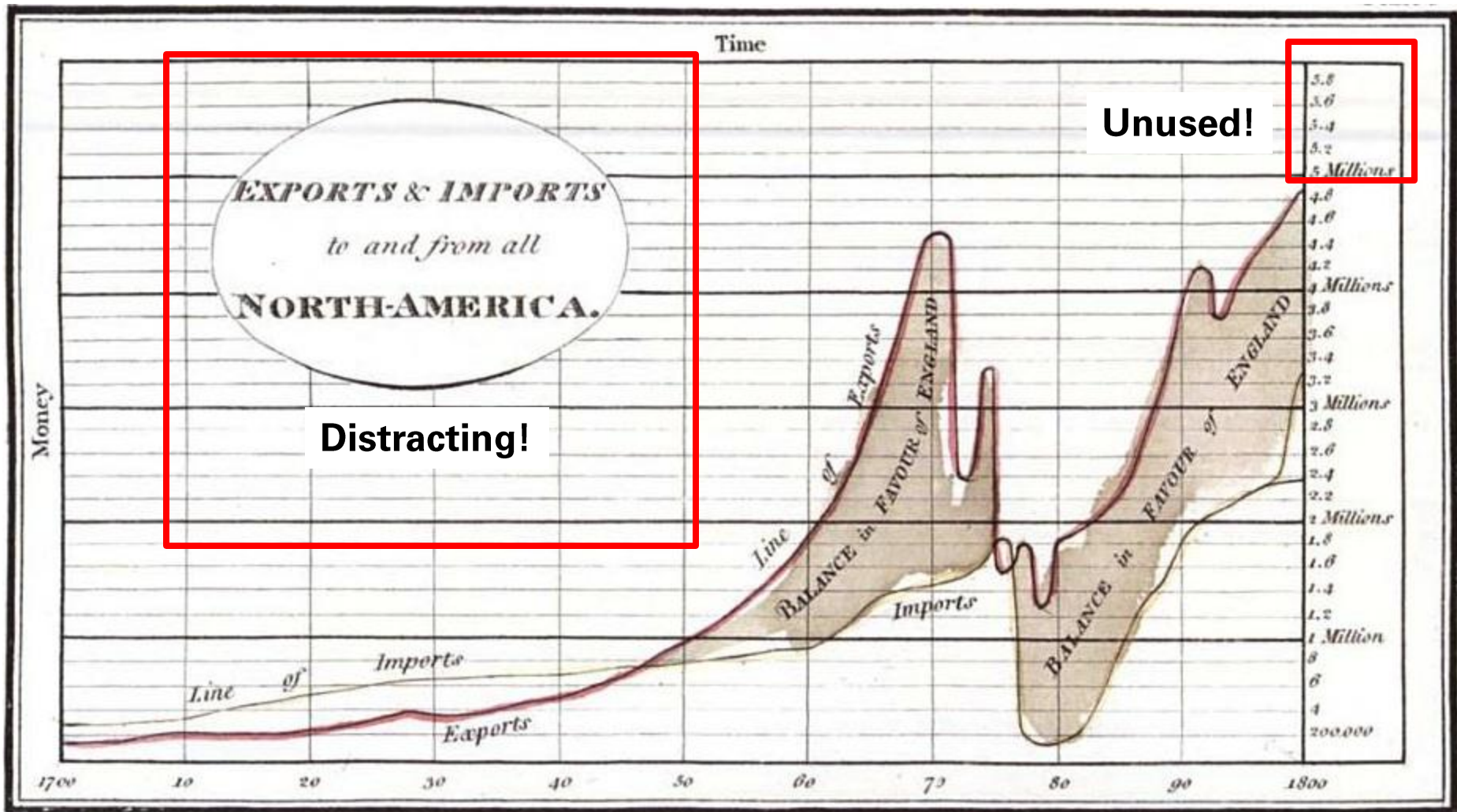
- William Playfair



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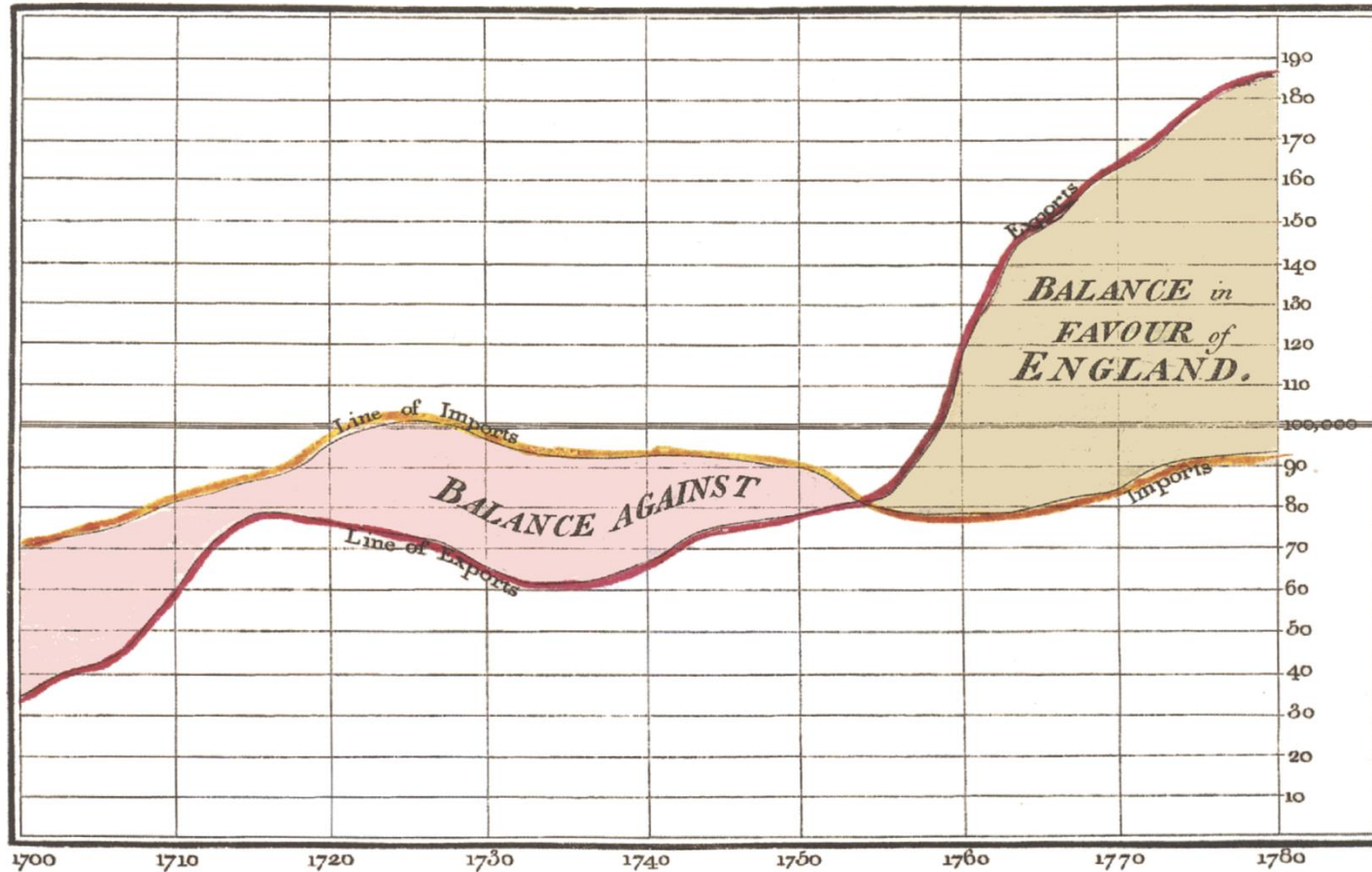
- William Playfair



- William Playfair

Notice how the eye is drawn away from the data
 This can be improved with a better data ink ratio

Exports and Imports to and from DENMARK & NORWAY from 1700 to 1780.



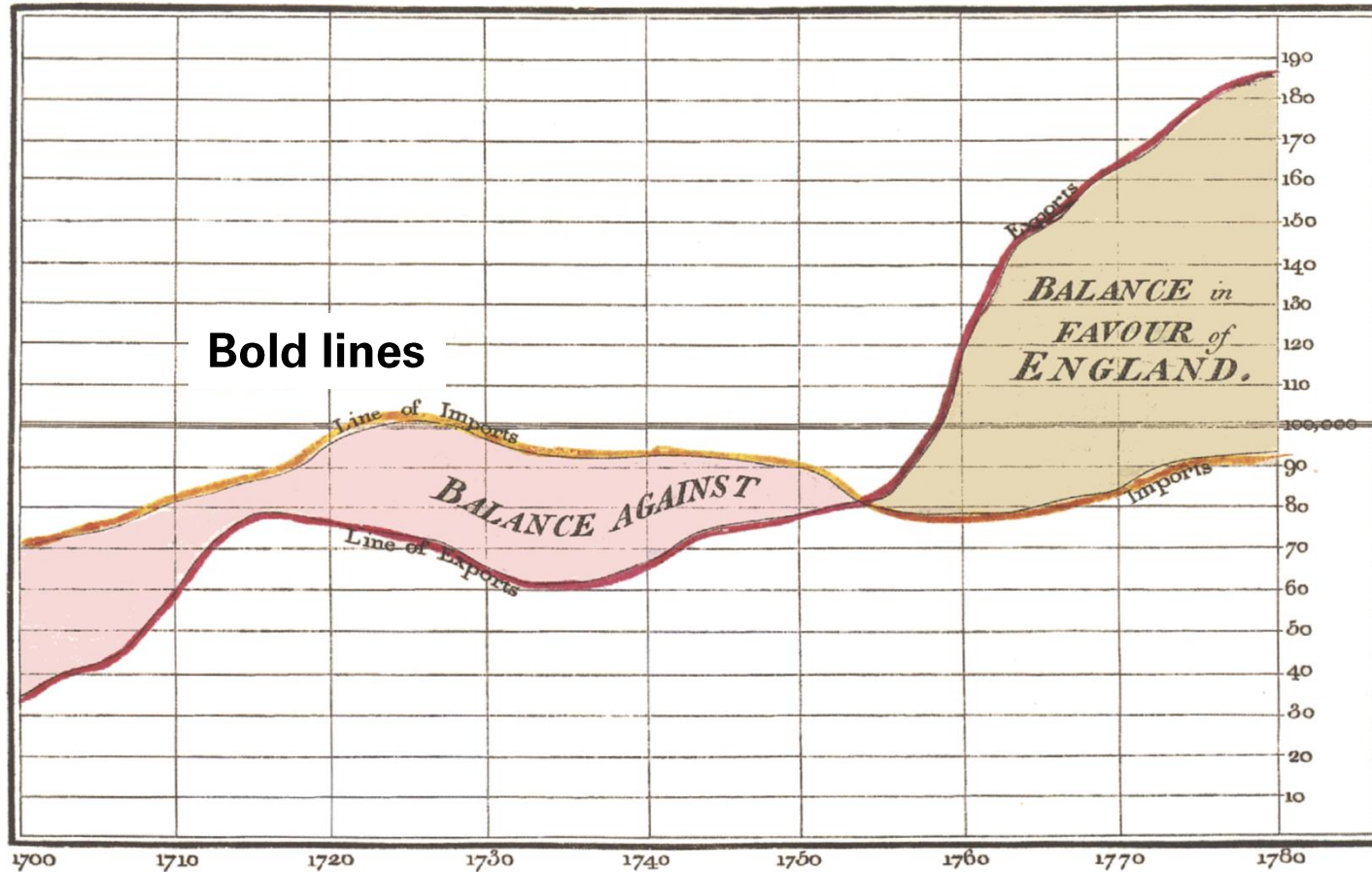
The Bottom line is divided into Years, the Right hand line into L10,000 each.

Published as the Act direct, 14th May 1786, by W^m Playfair

Neale sculp^t 352, Strand, London.

- William Playfair

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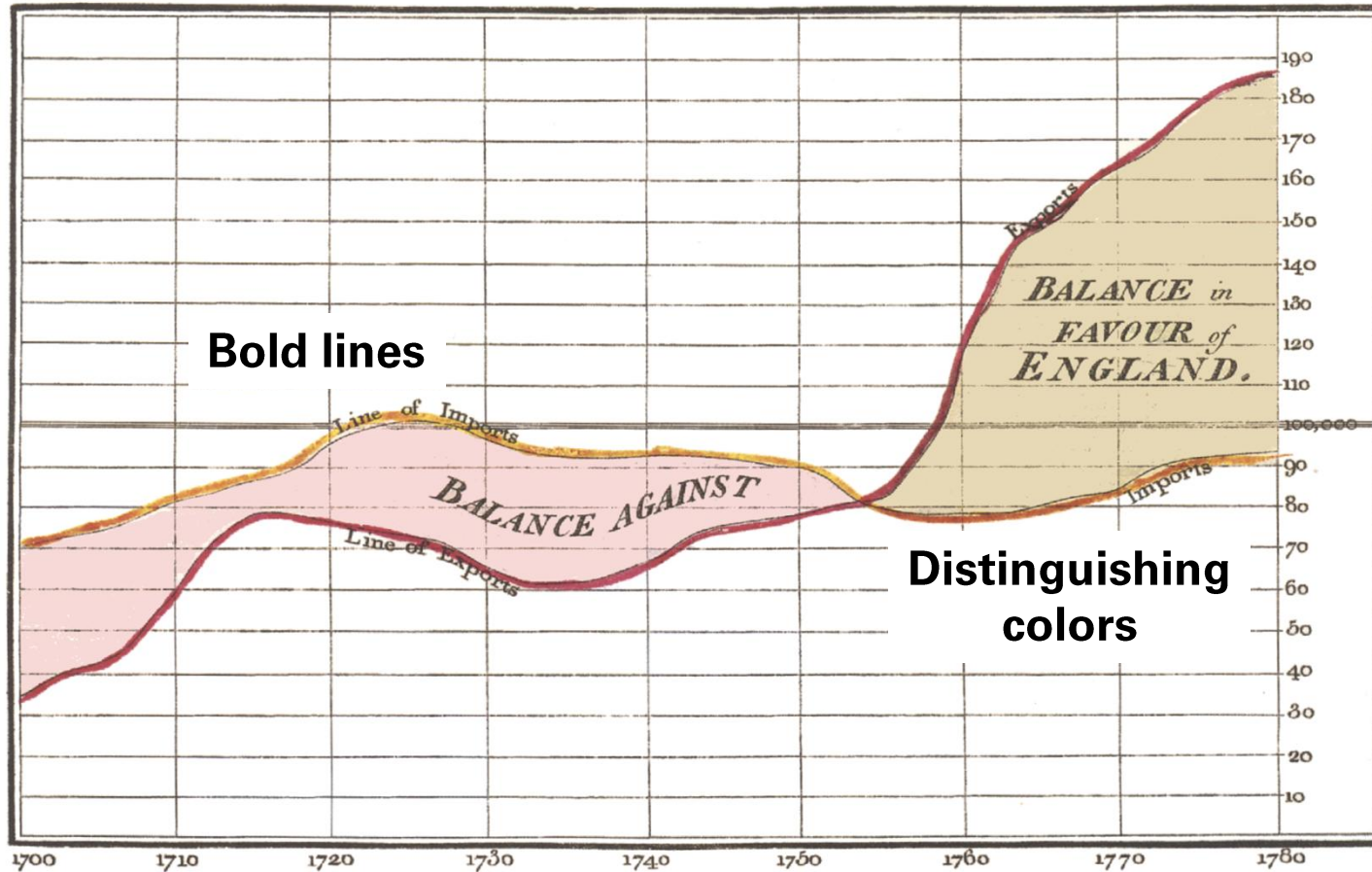
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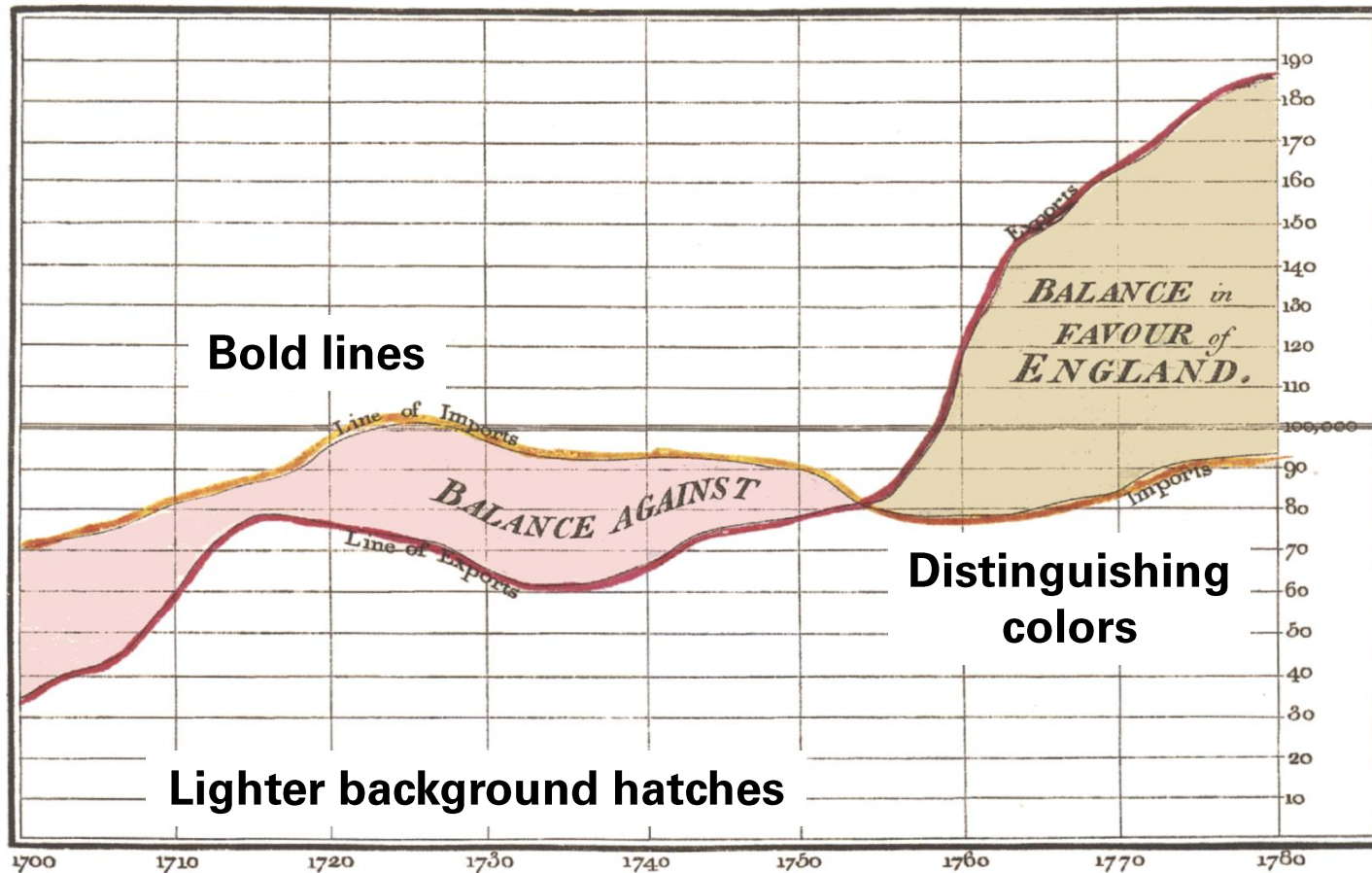
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Bold lines

Distinguishing colors

Lighter background hatches

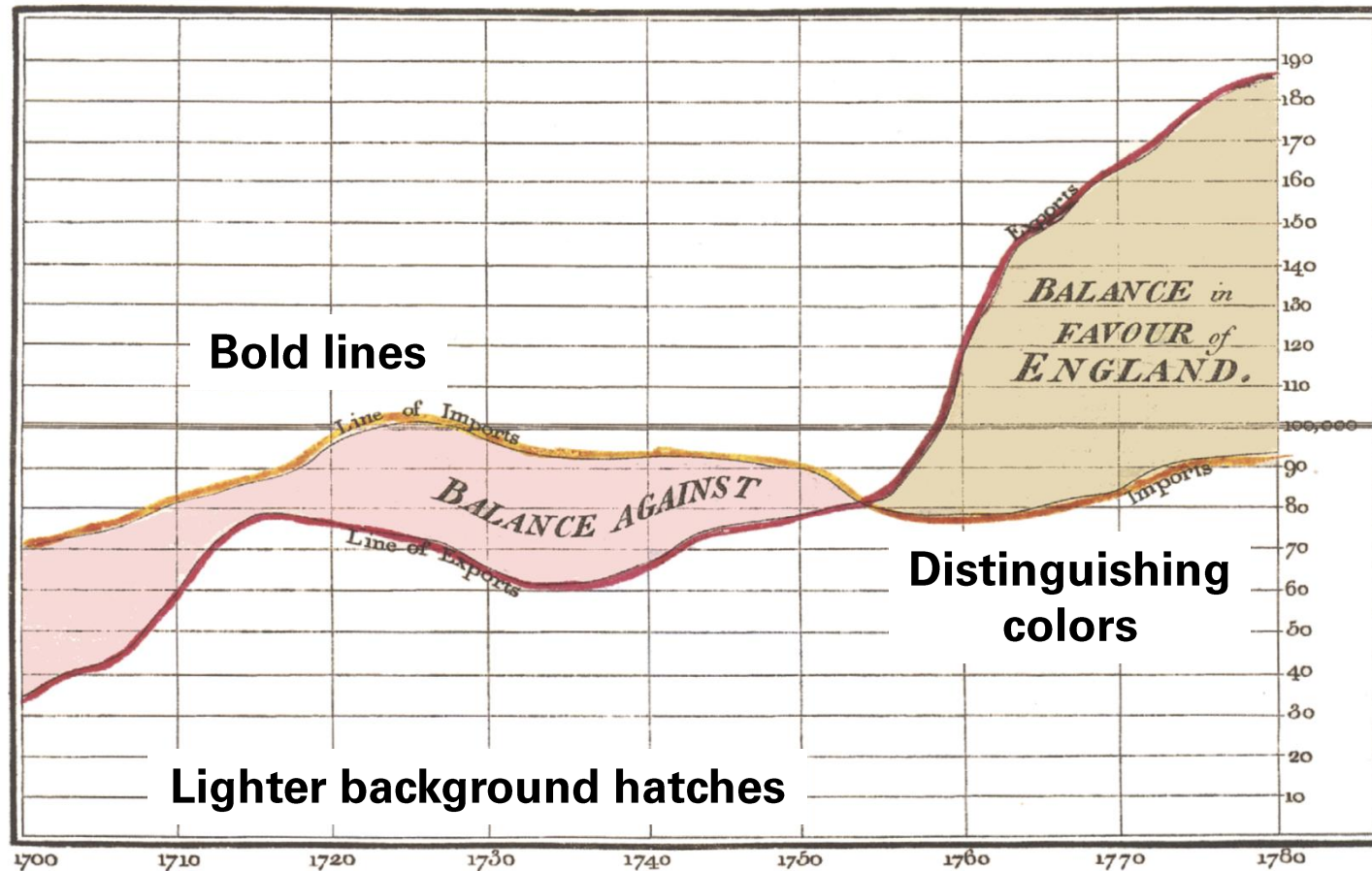
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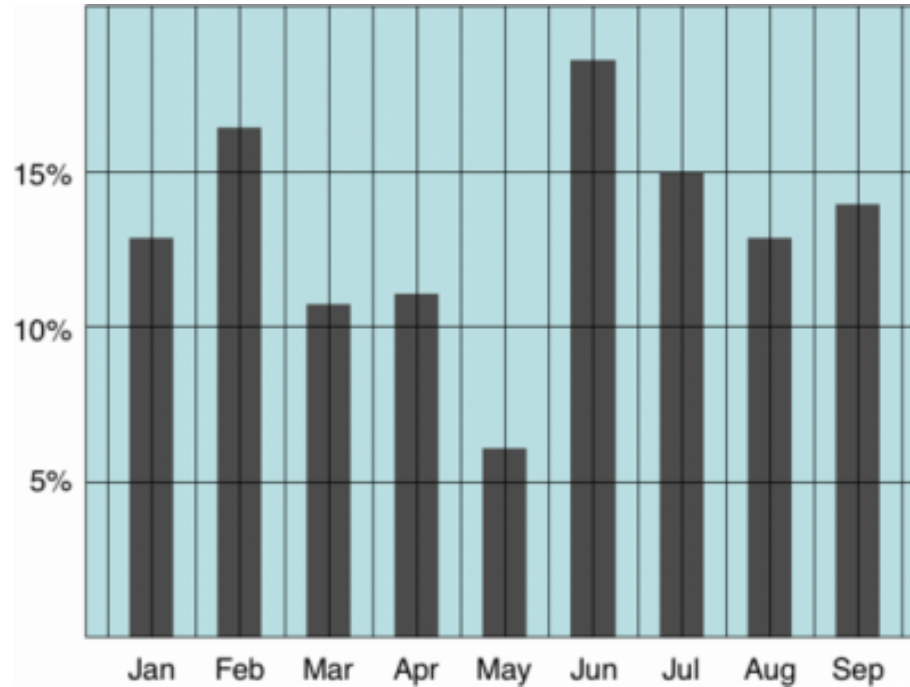
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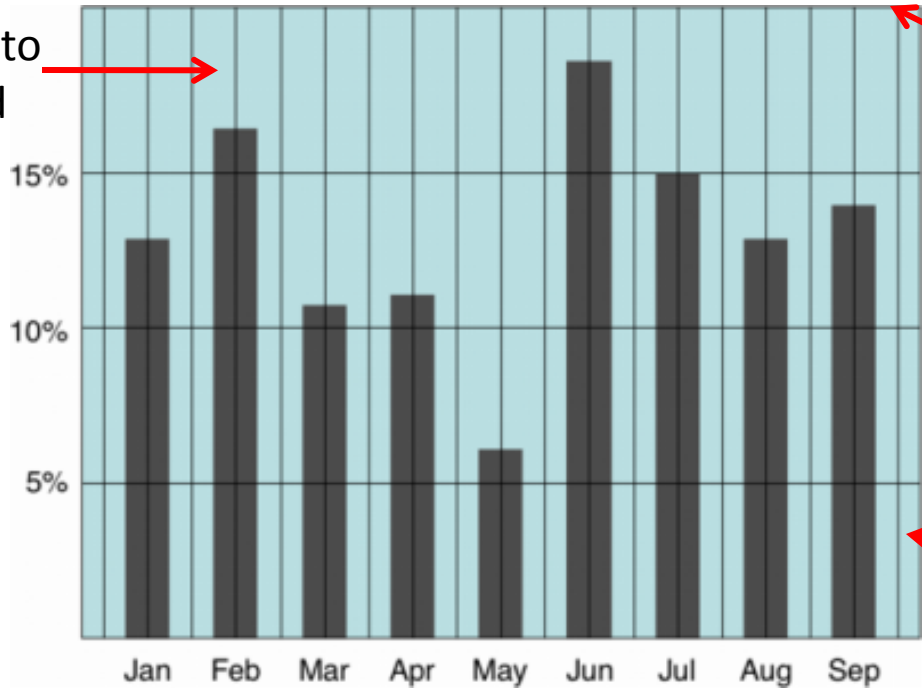
- William Playfair

The eye is drawn directly to the data and the chart affords being read.



What could be done to make this better?

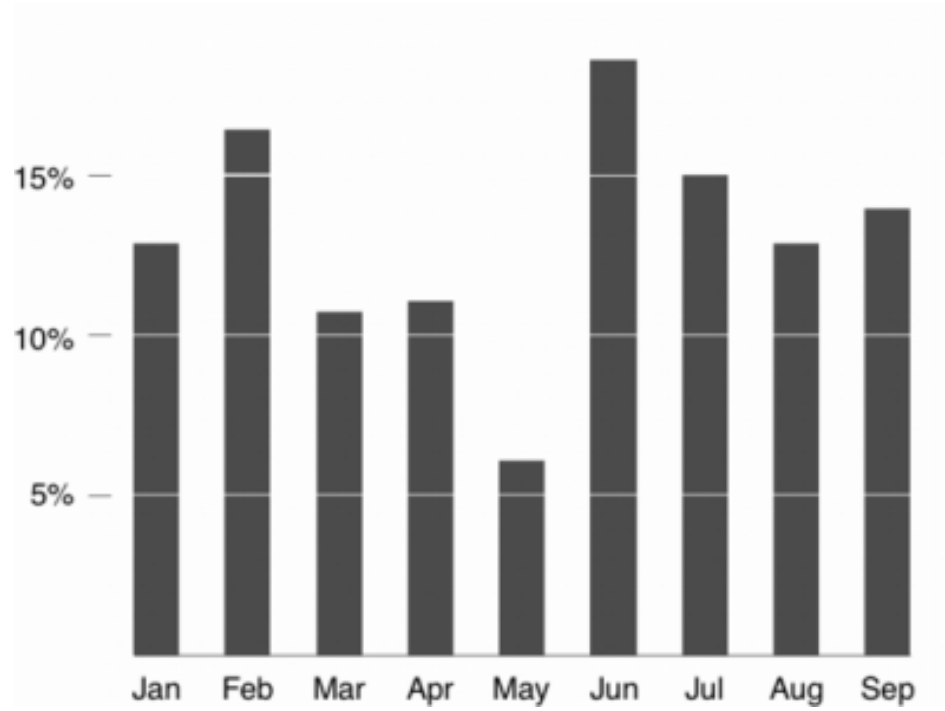
Use the background to make the bars bold



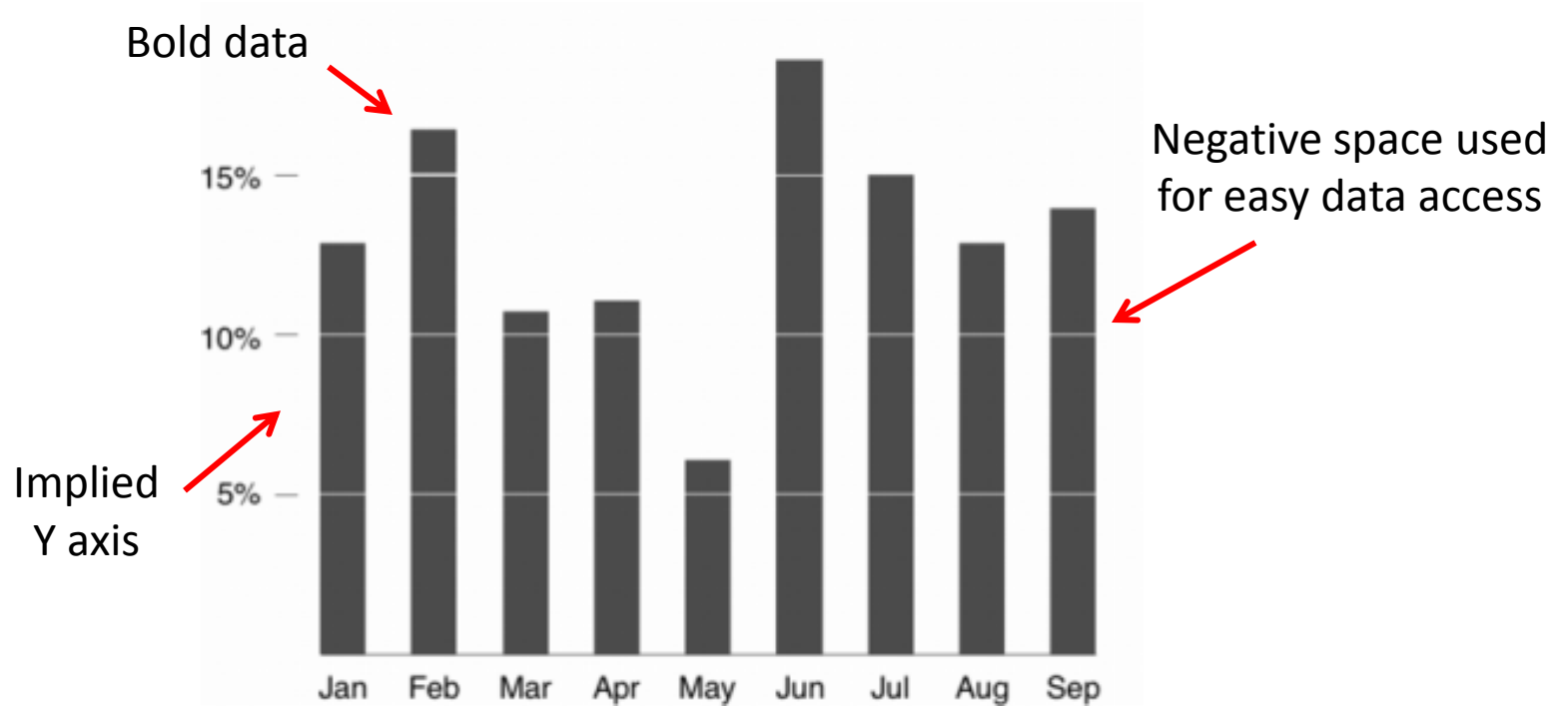
Remove unnecessary borders

Remove unused vertical lines

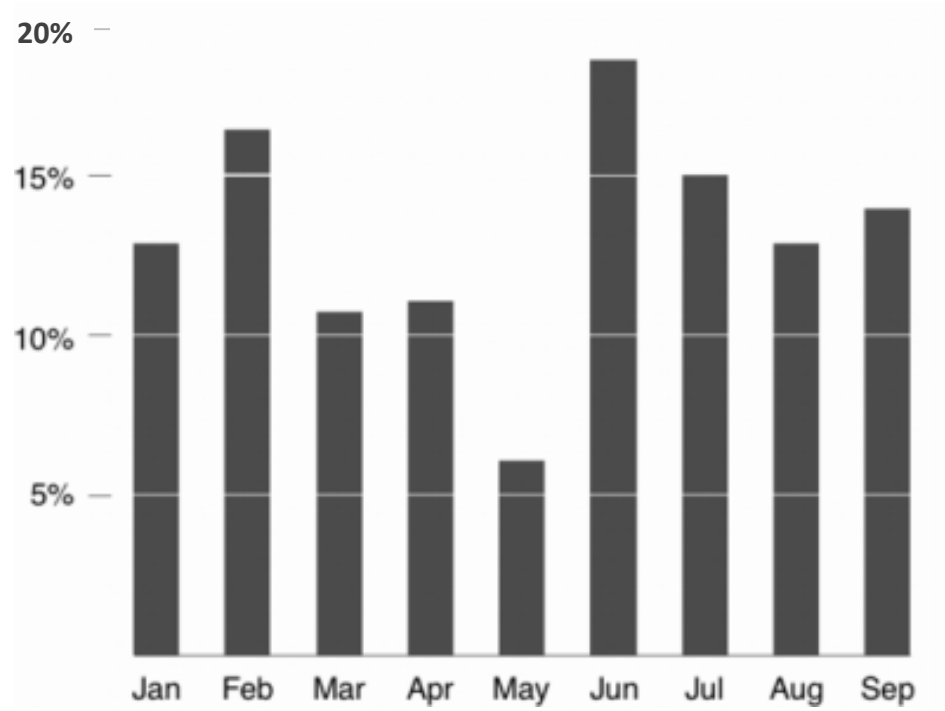
What could be done to make this better?



How does this version compare?



How does this version compare?



How does this version compare?

Data-Ink Ratio

The ratio of nonremovable
To removable parts of a chart

=

Data-Ink Ratio

The ratio of nonremovable
To removable parts of a chart

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data-ink

total ink used to print the graphic

Data-Ink Ratio

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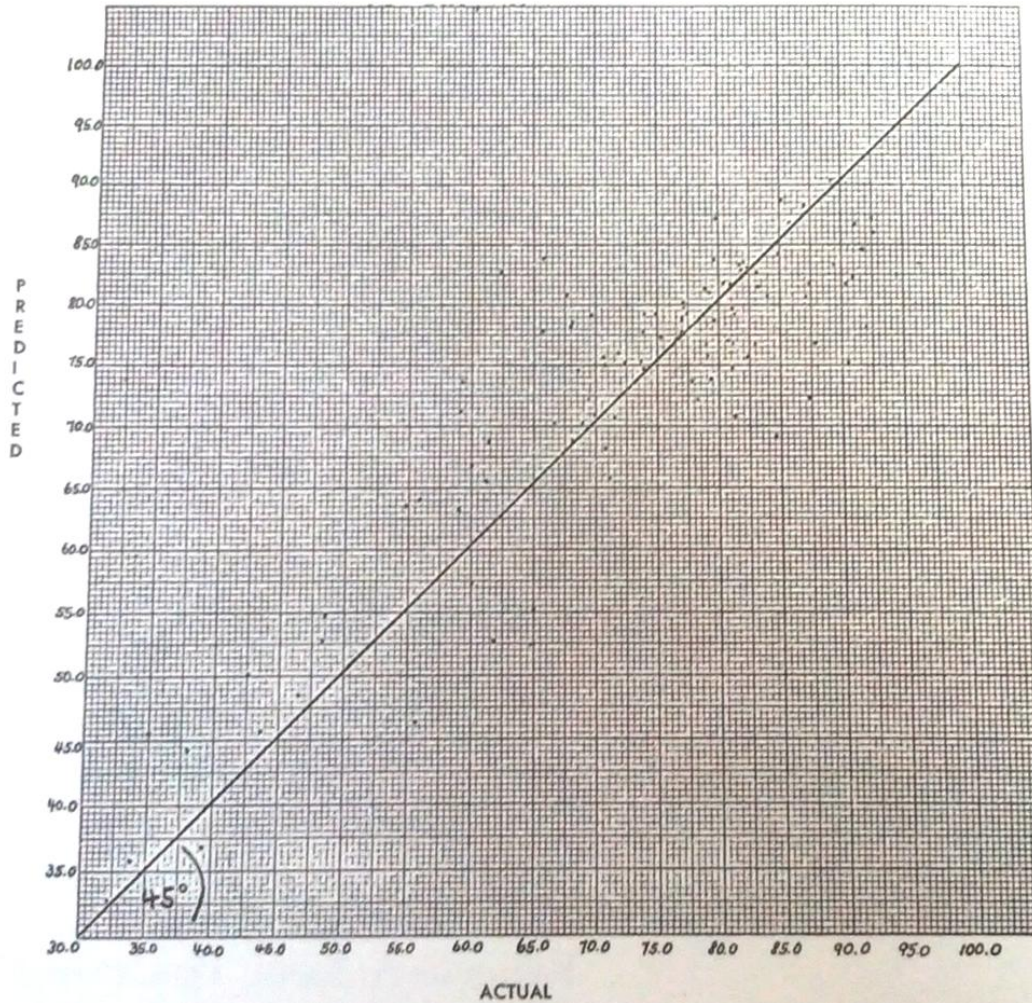
data-ink

total ink used to print the graphic

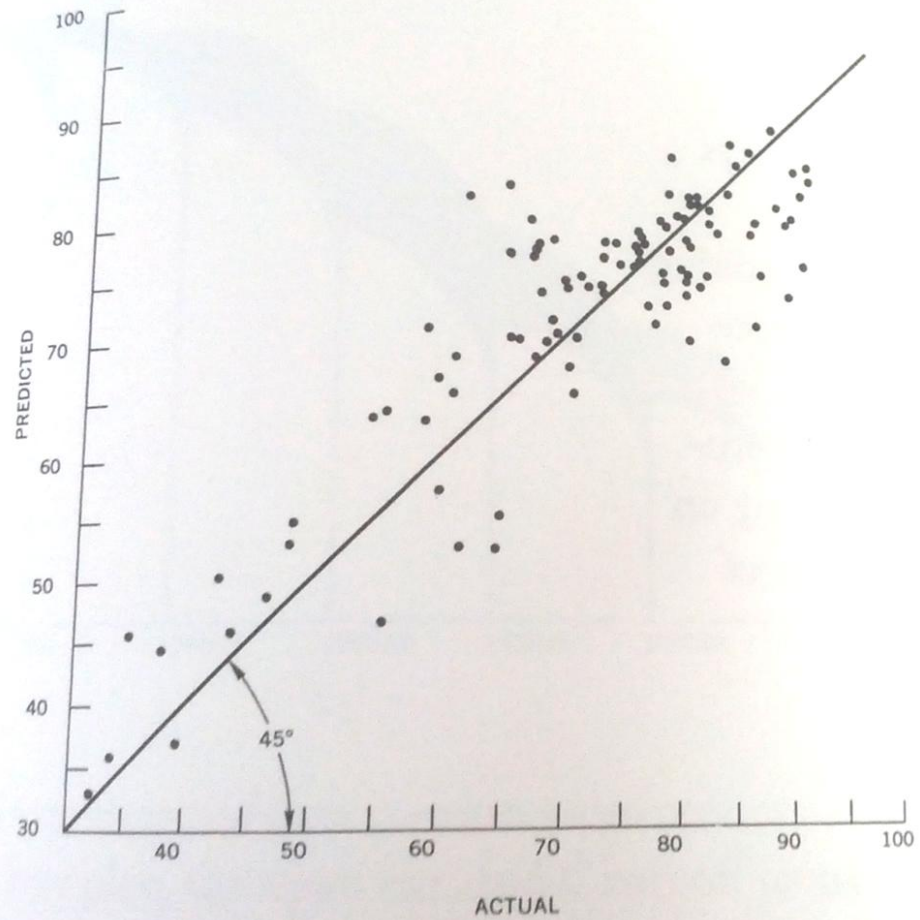
=

1.0 – proportion of a graphic that can be
erased without any loss of data

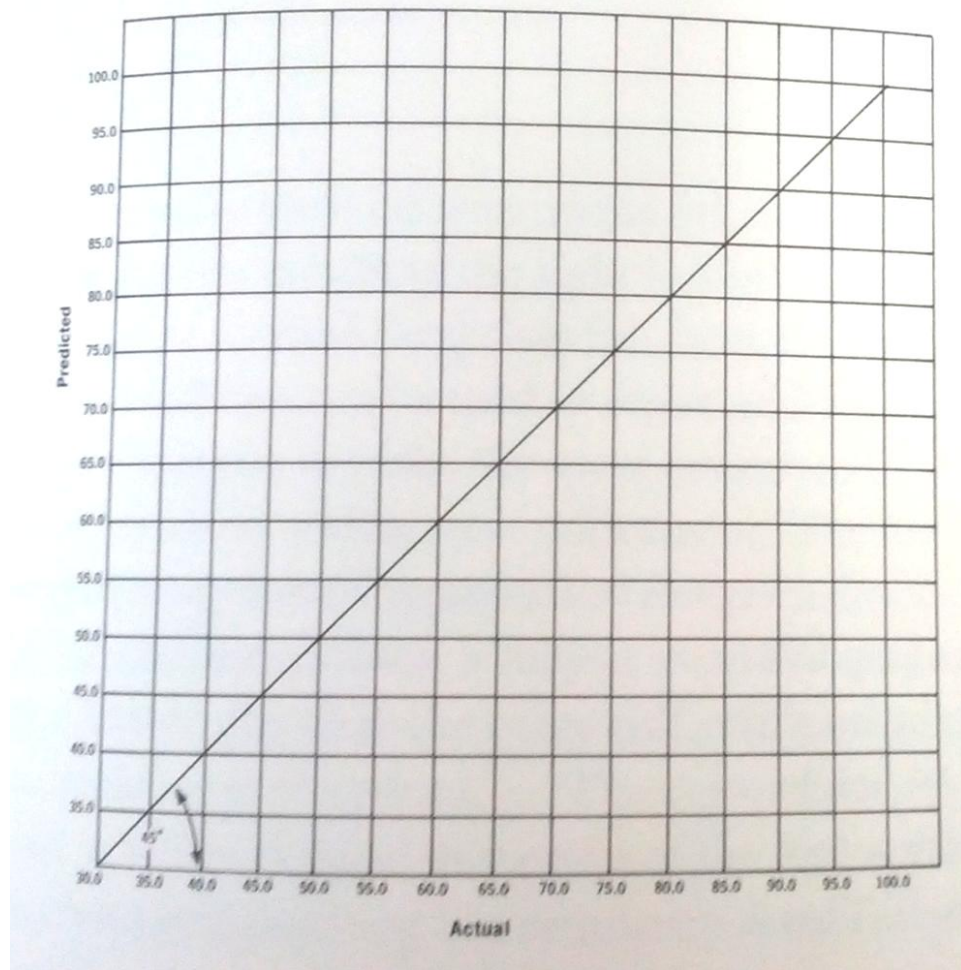
Relationship of Actual Rates of Registration to Predicted Rates
(104 cities 1960).



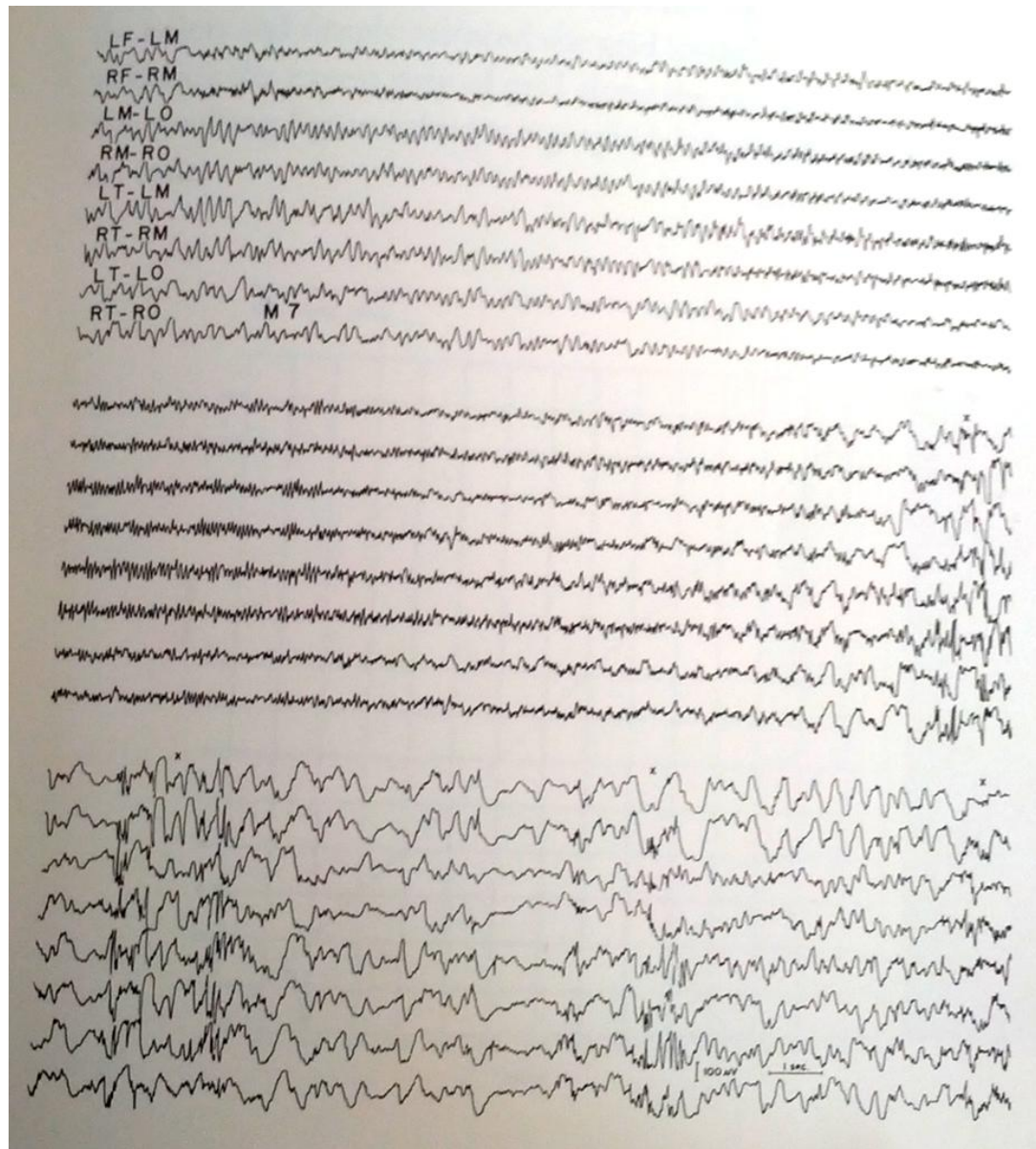
Data-ink ratio: < 0.1



Data-ink ratio: 0.7



Data-ink ratio: 0.0



Data-ink ratio: 1.0



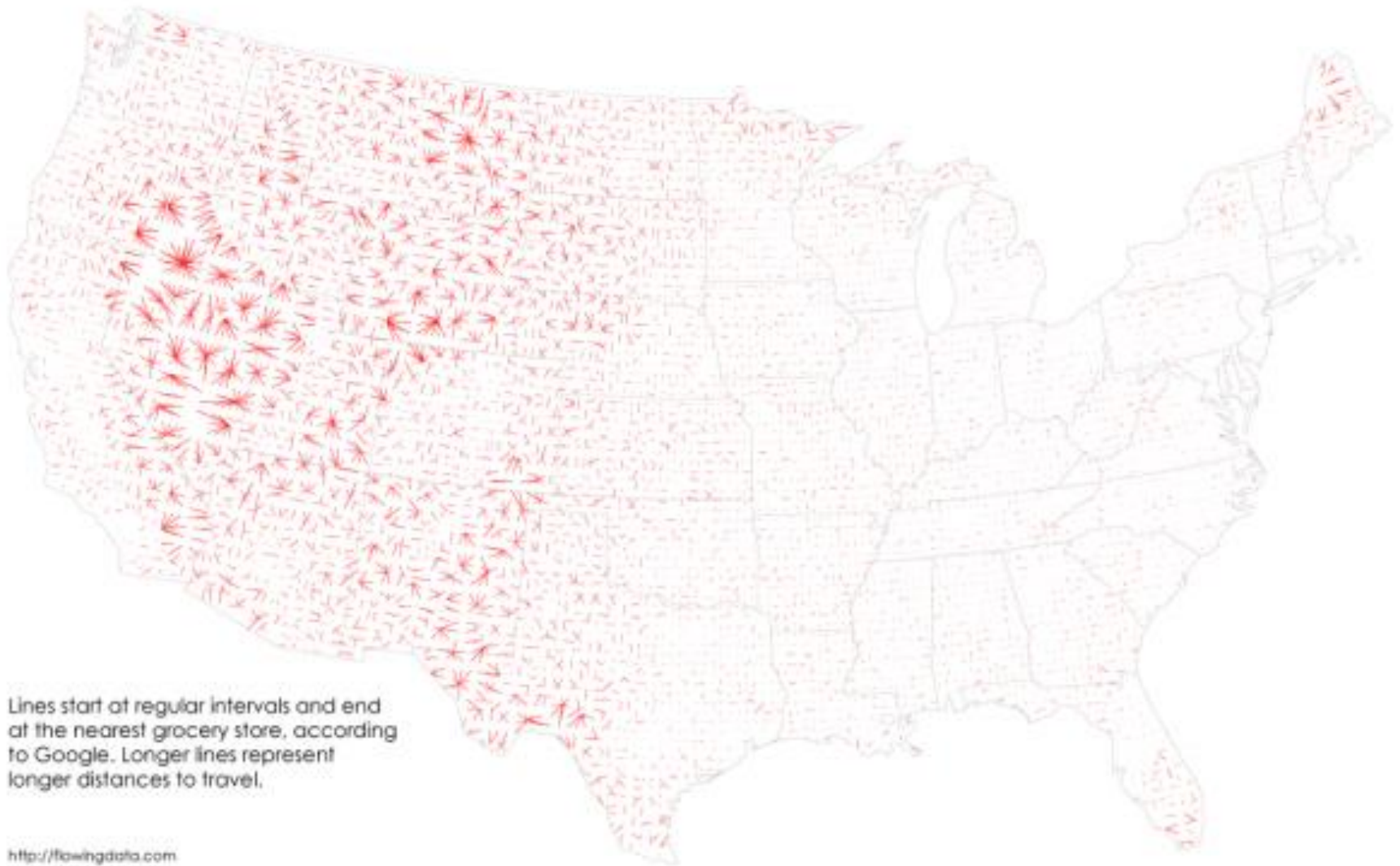
Data-ink ratio: 1.0



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Data ink can even be multivariate

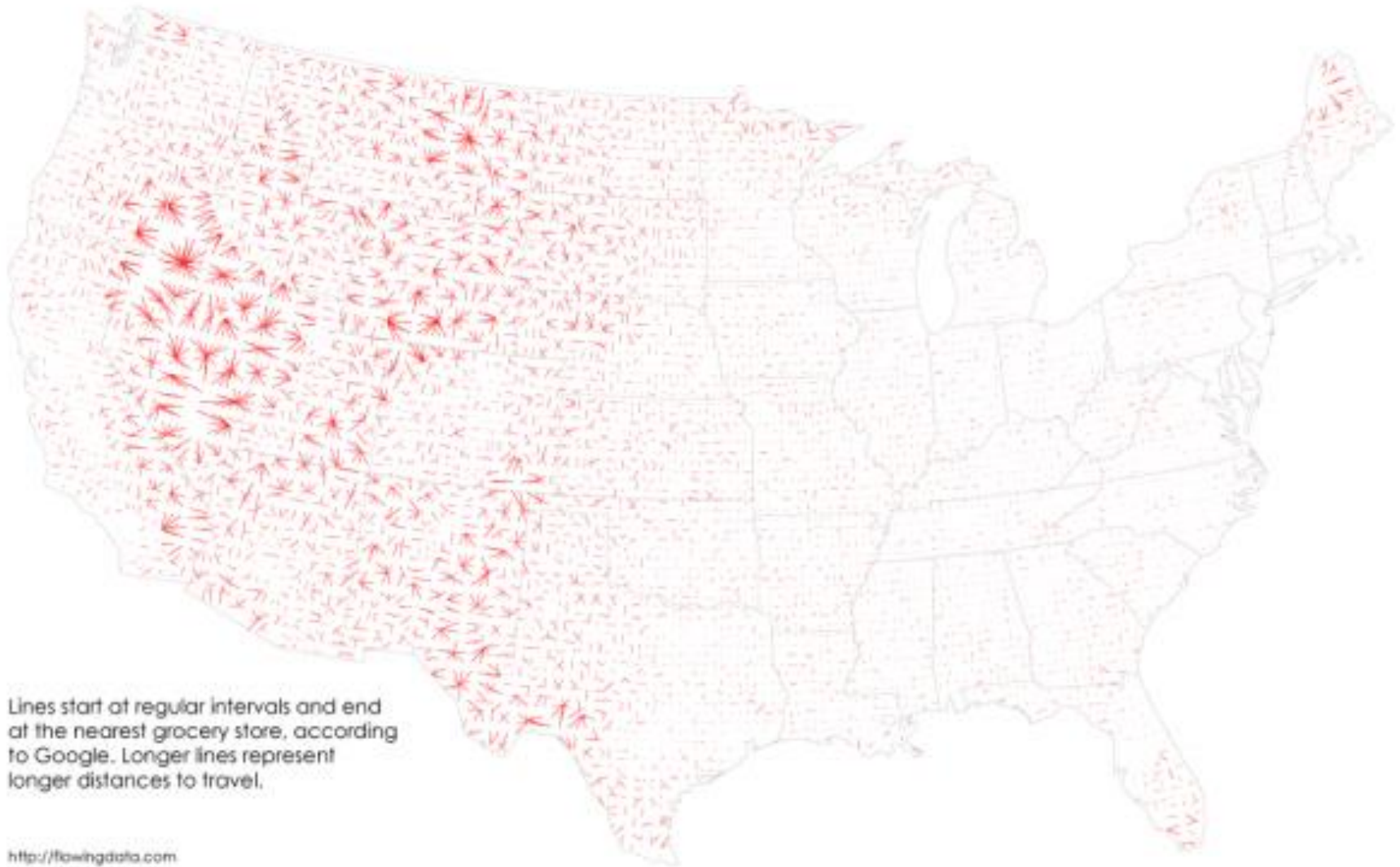
$$2 + 2 = 5$$



Lines start at regular intervals and end at the nearest grocery store, according to Google. Longer lines represent longer distances to travel.

<http://flowingdata.com>

Data-ink ratio: 1.0

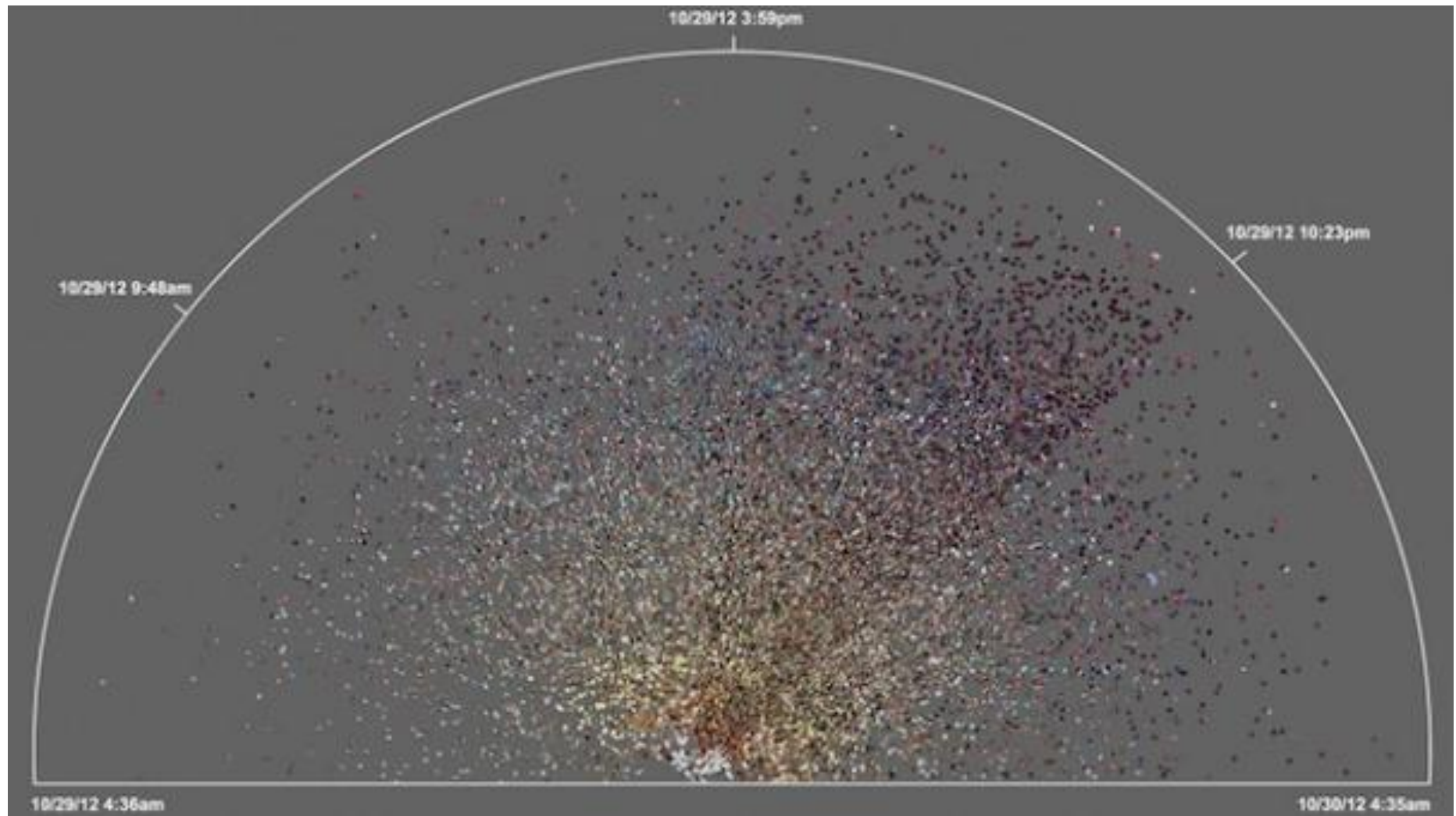


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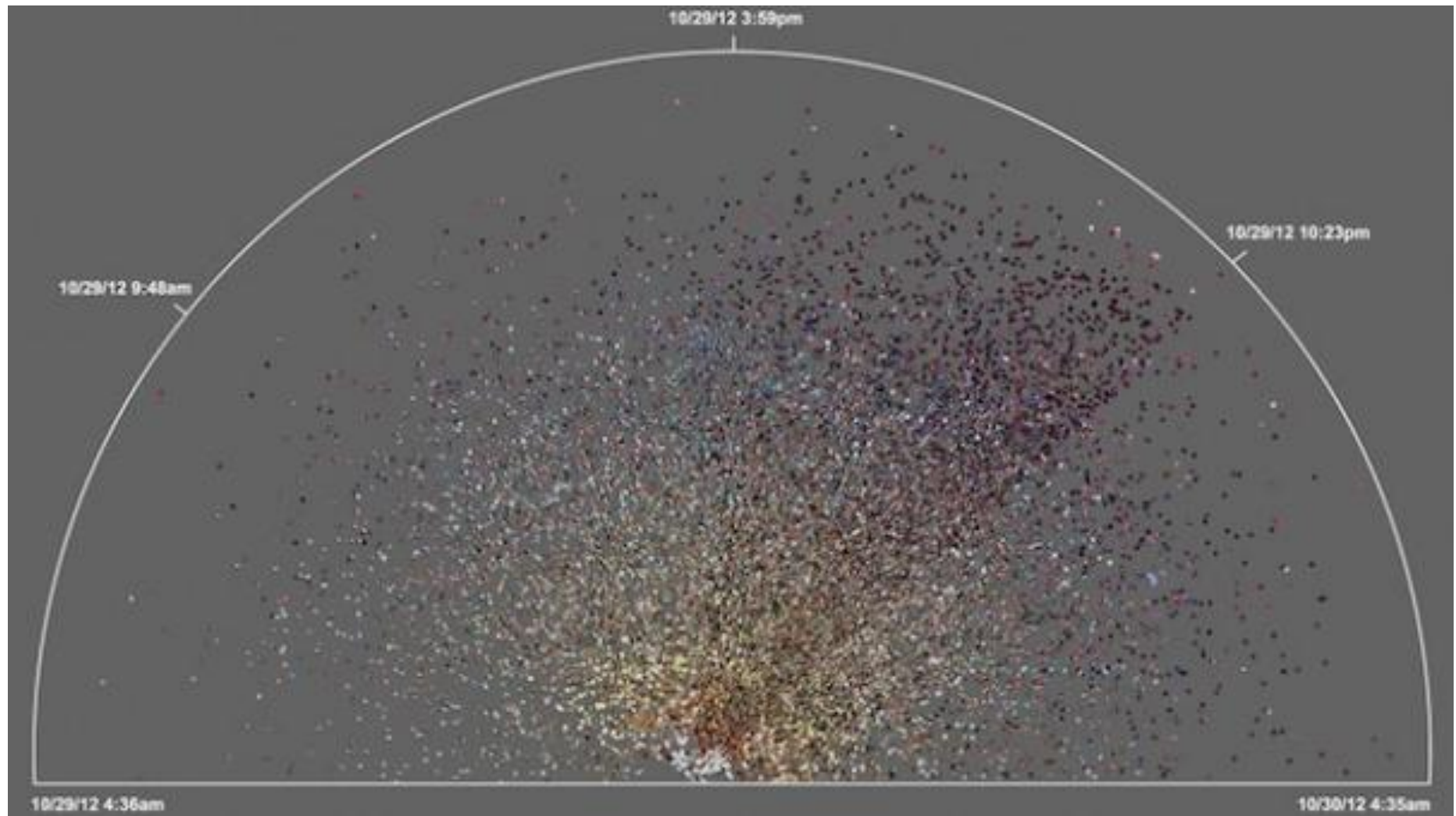
<http://flowingdata.com>

Data-ink ratio: 1.0

Showing just the data makes a complex statement simple.

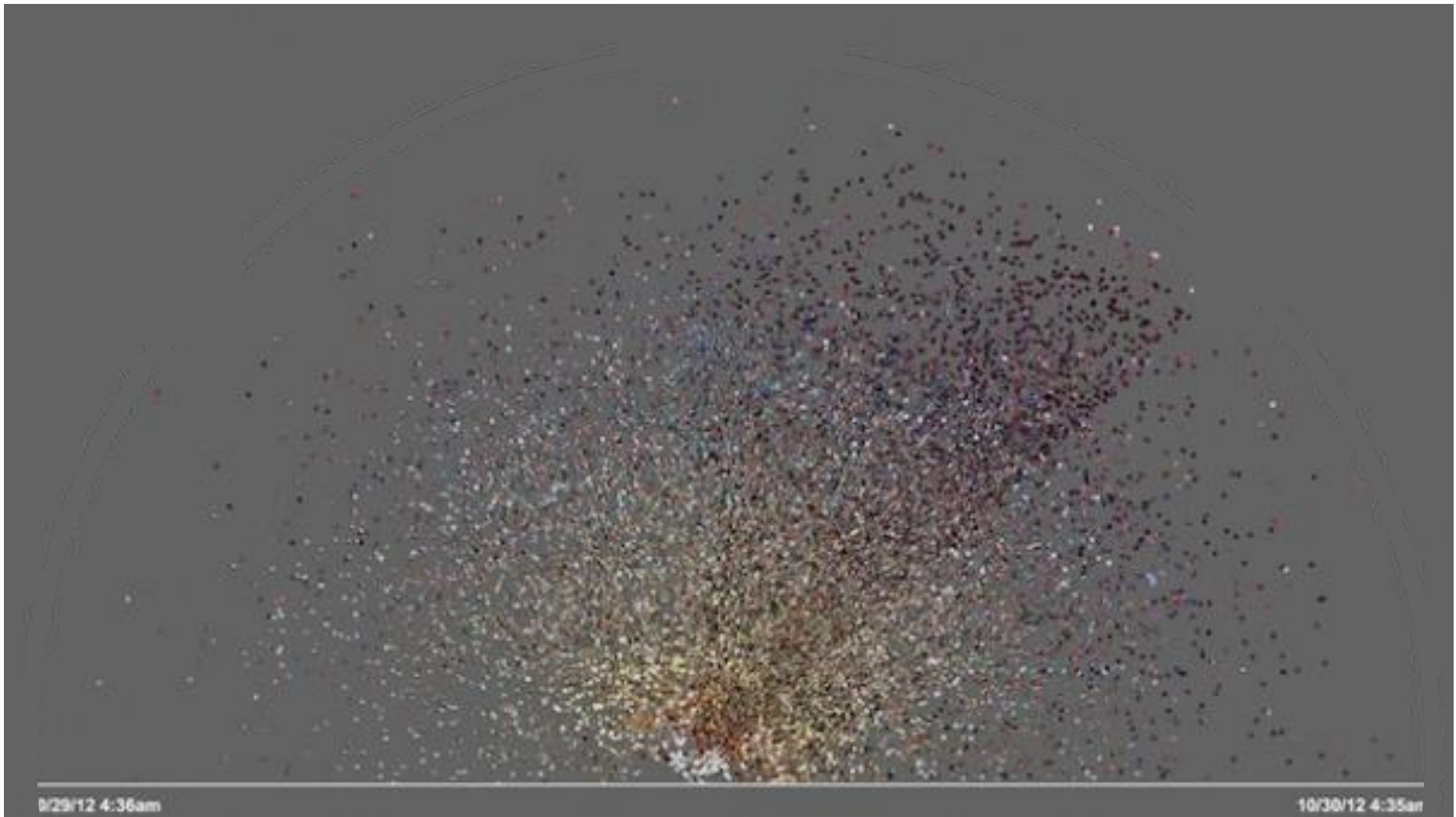


Data-ink ratio: > 0.9



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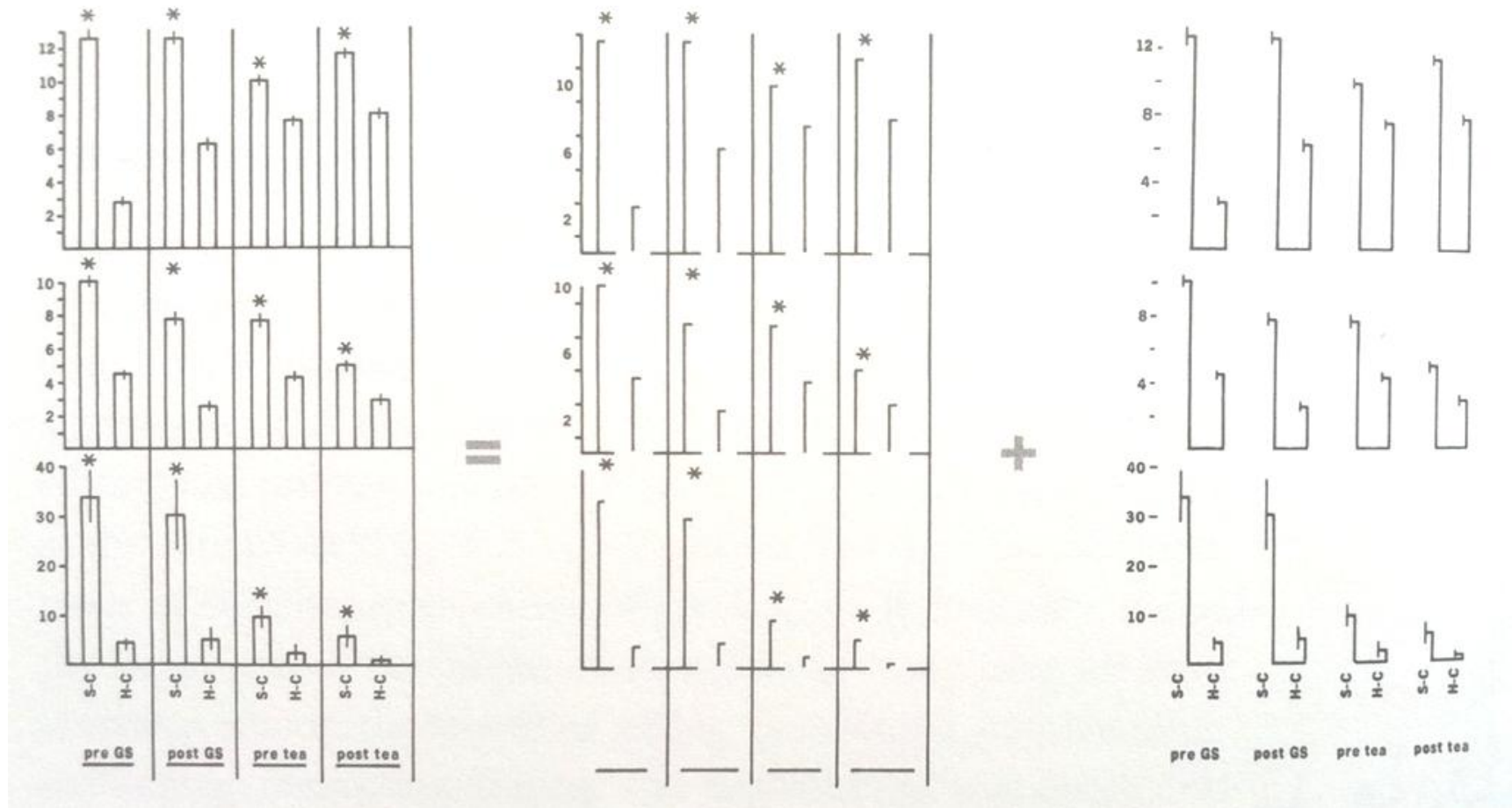
“Eliminate non-data ink within reason”



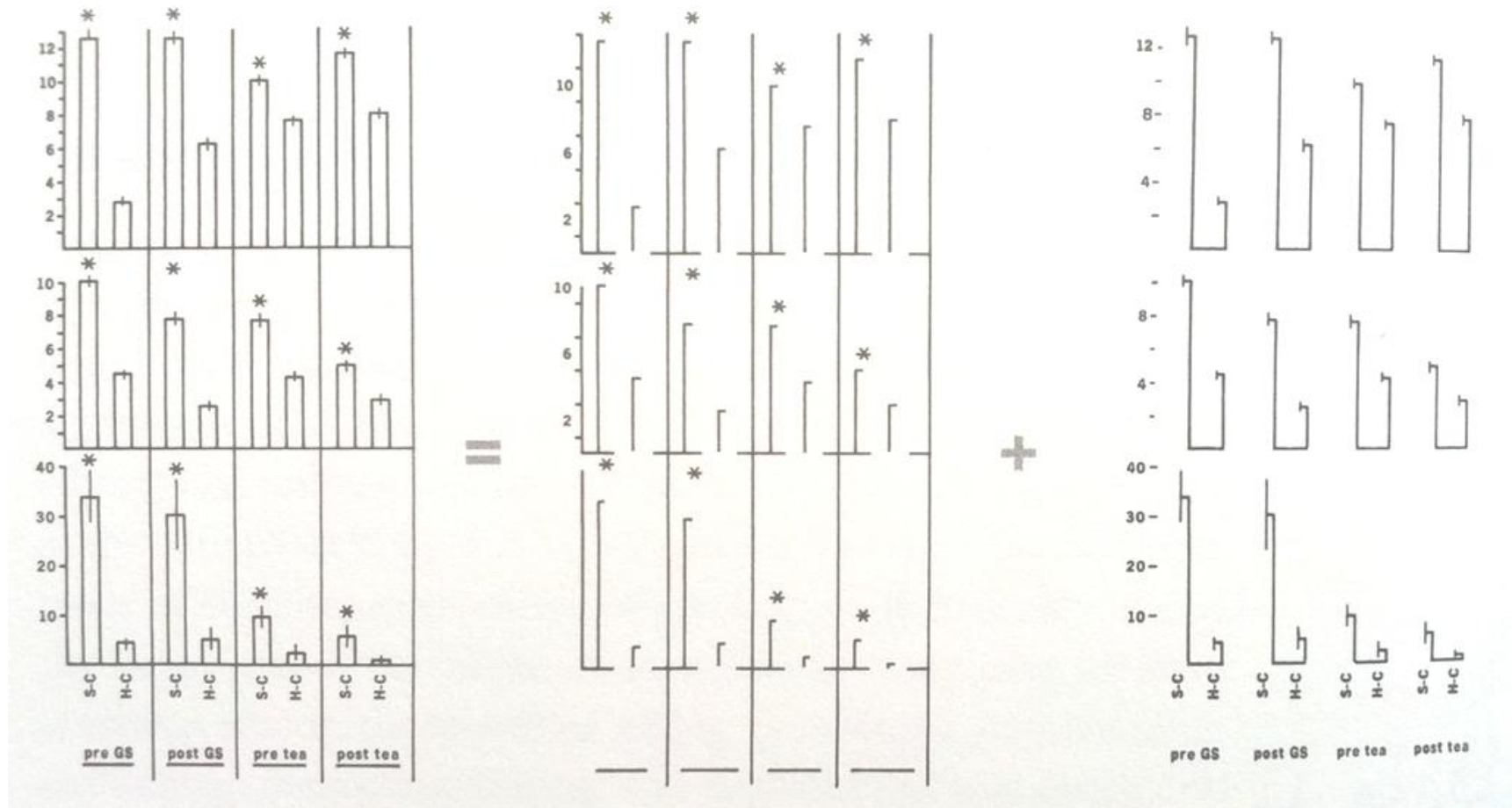
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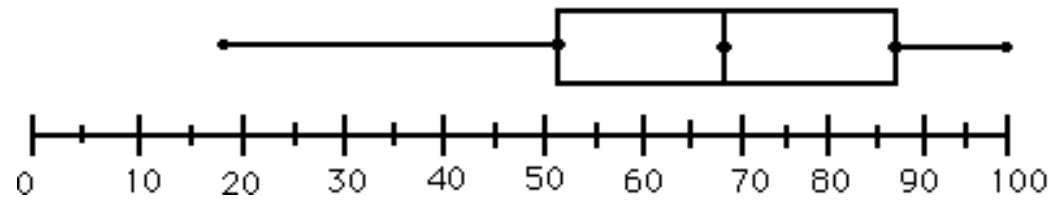
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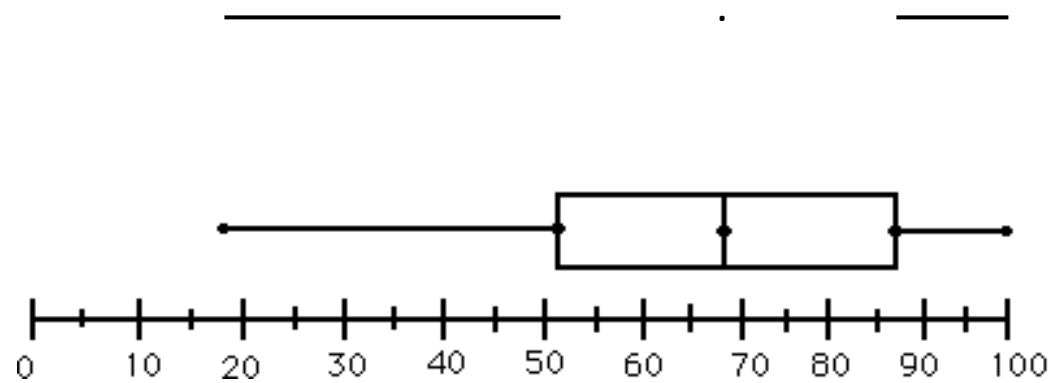


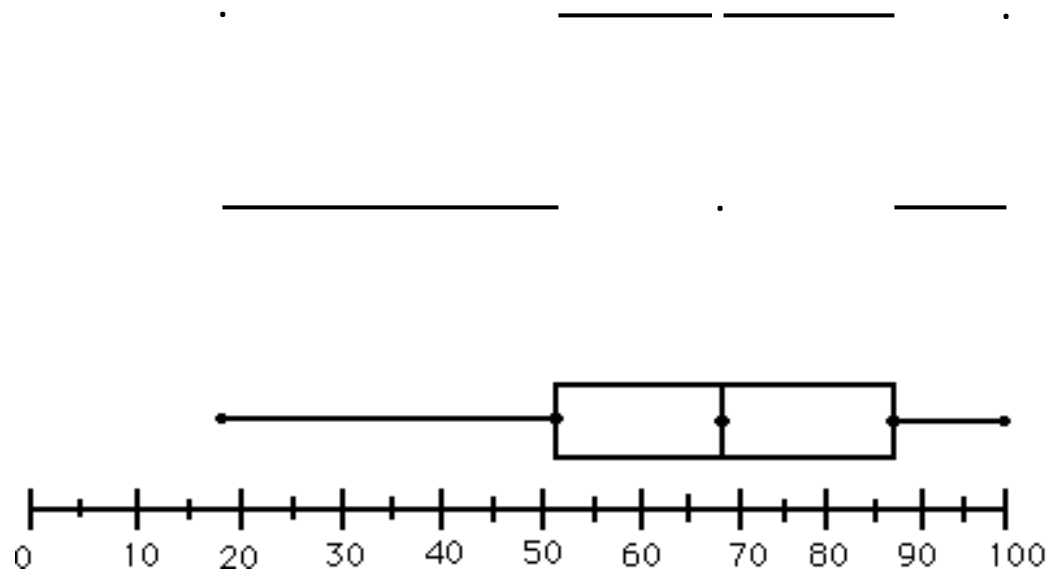
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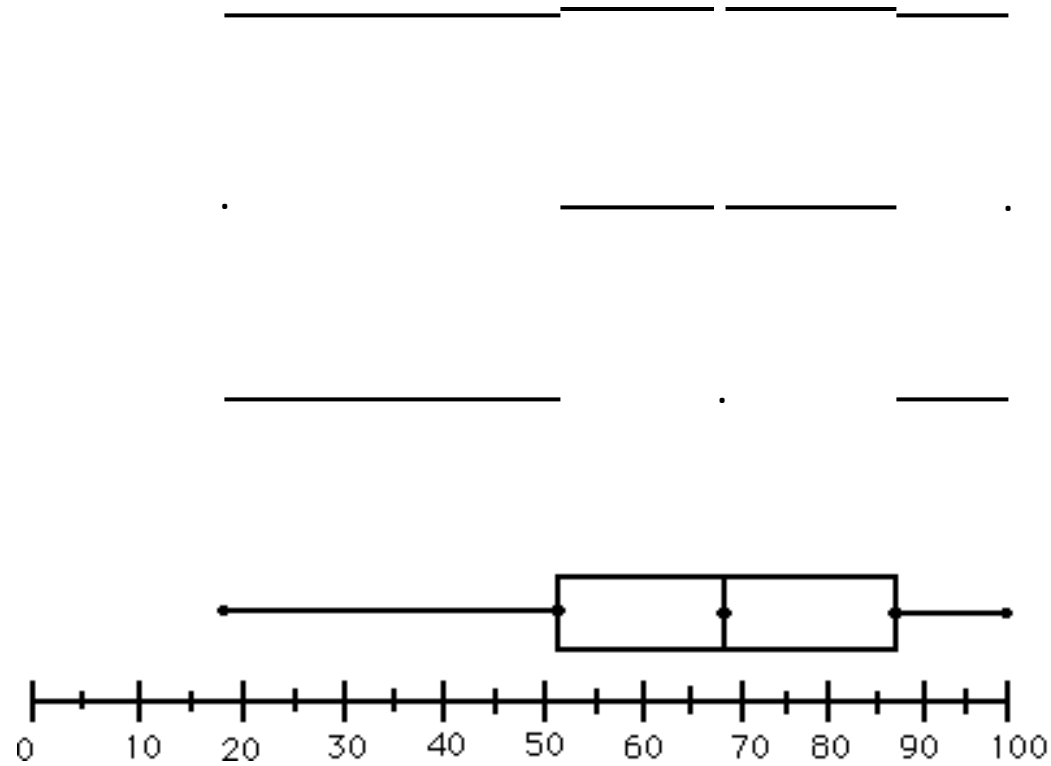


There is no formula for success, just be aware of readability.

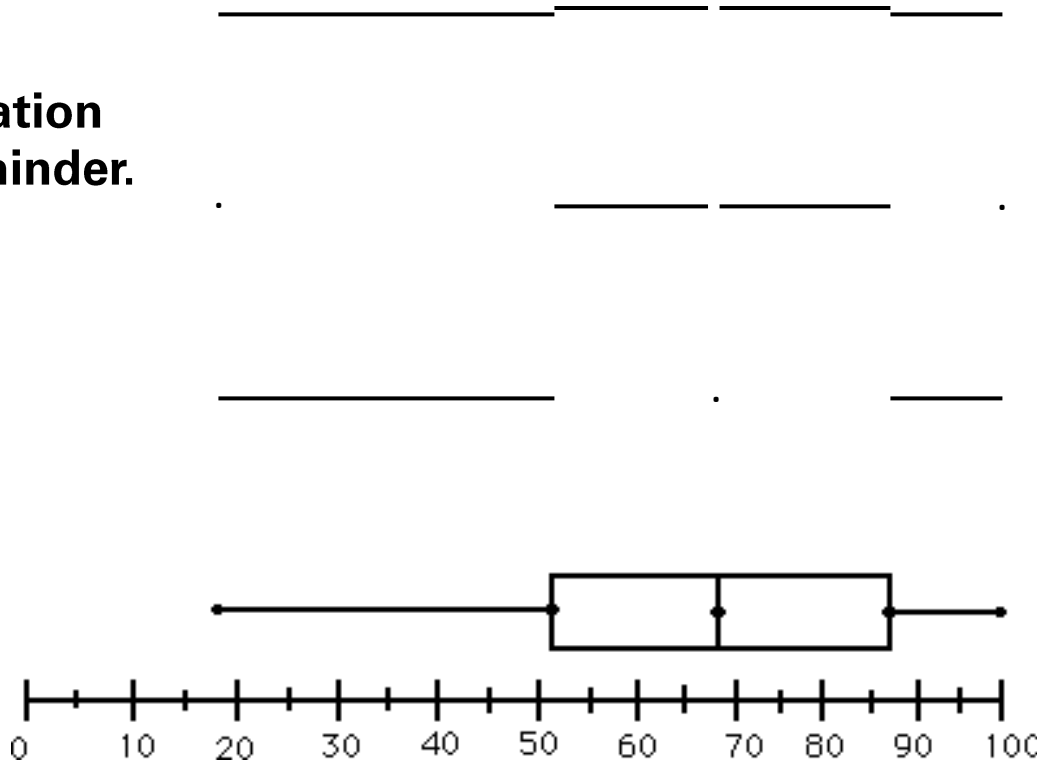


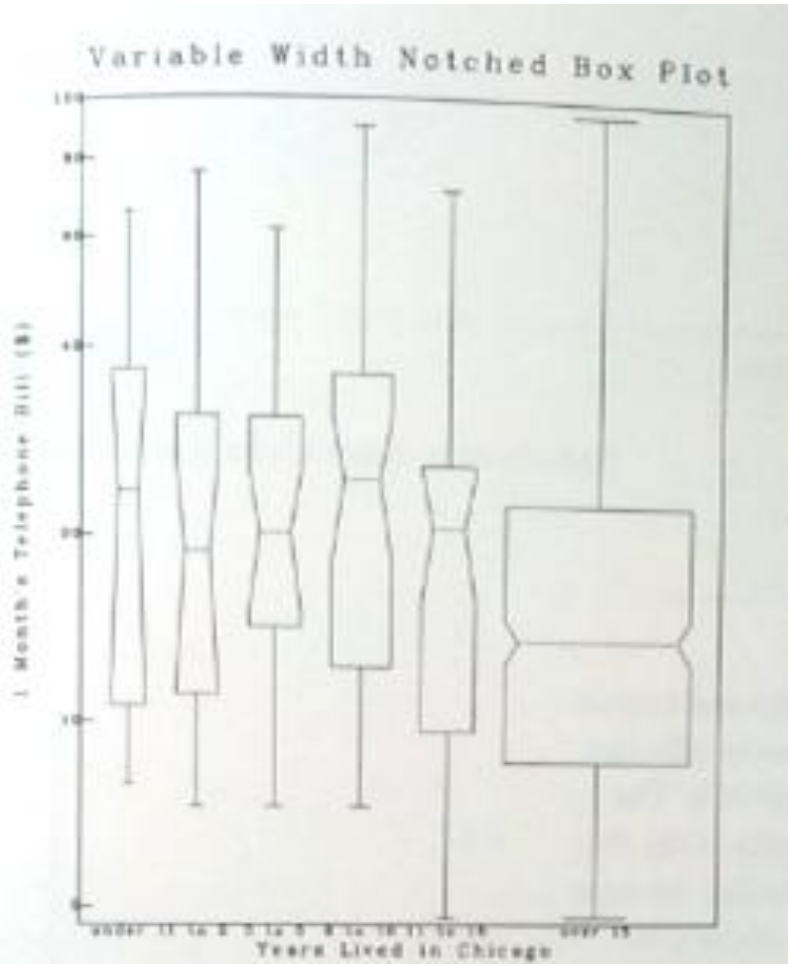


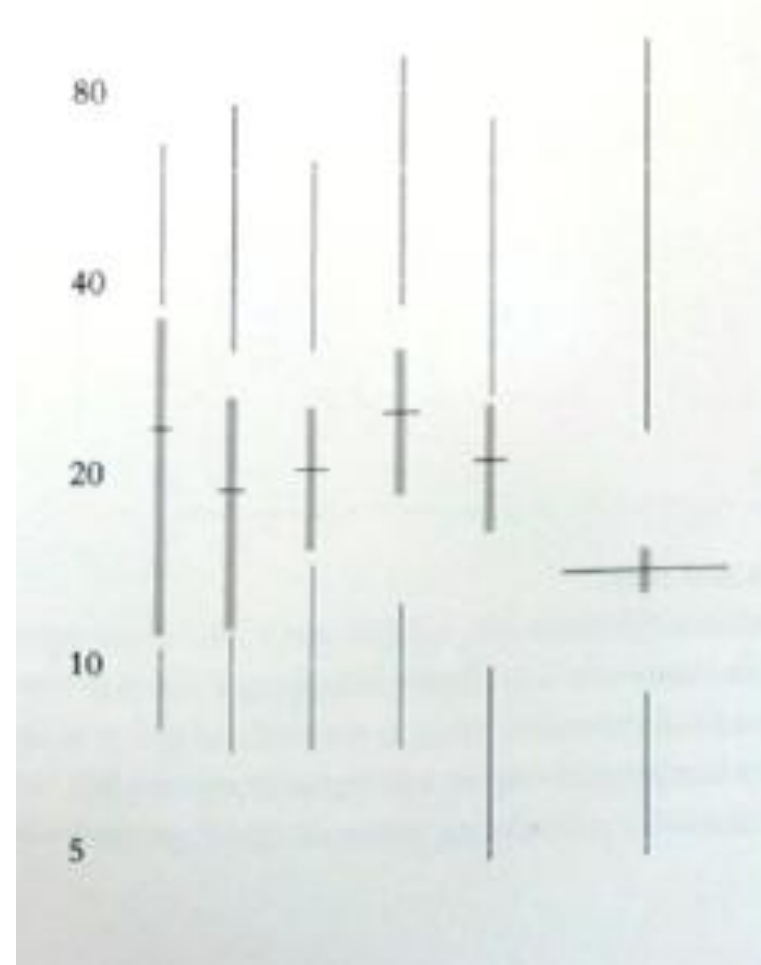
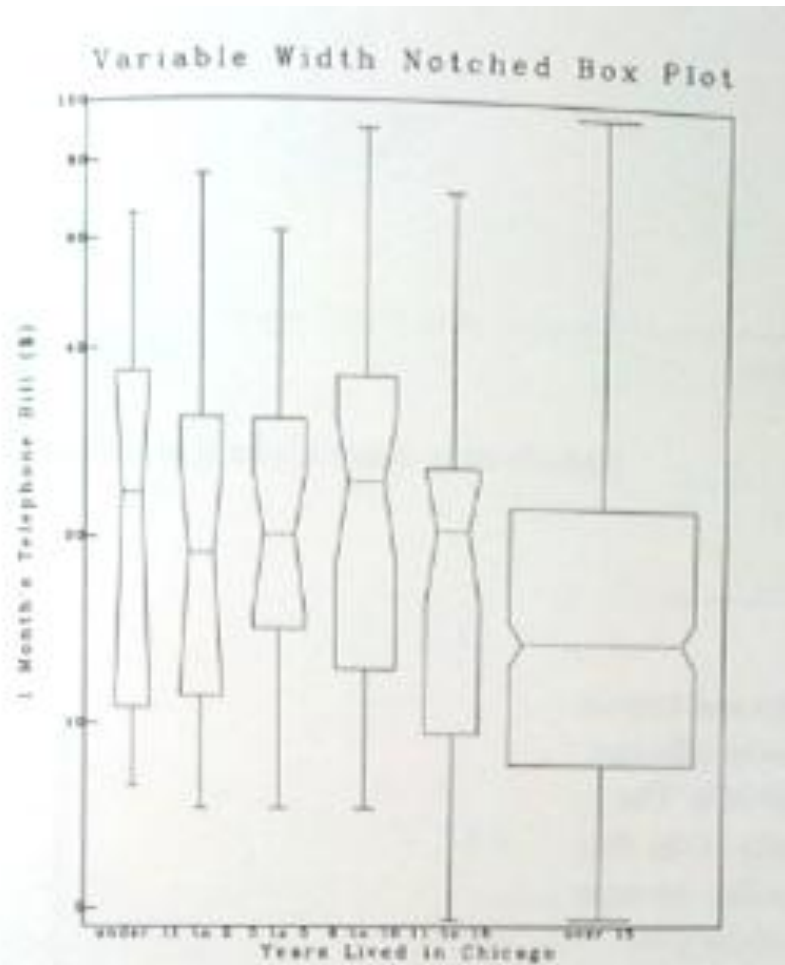


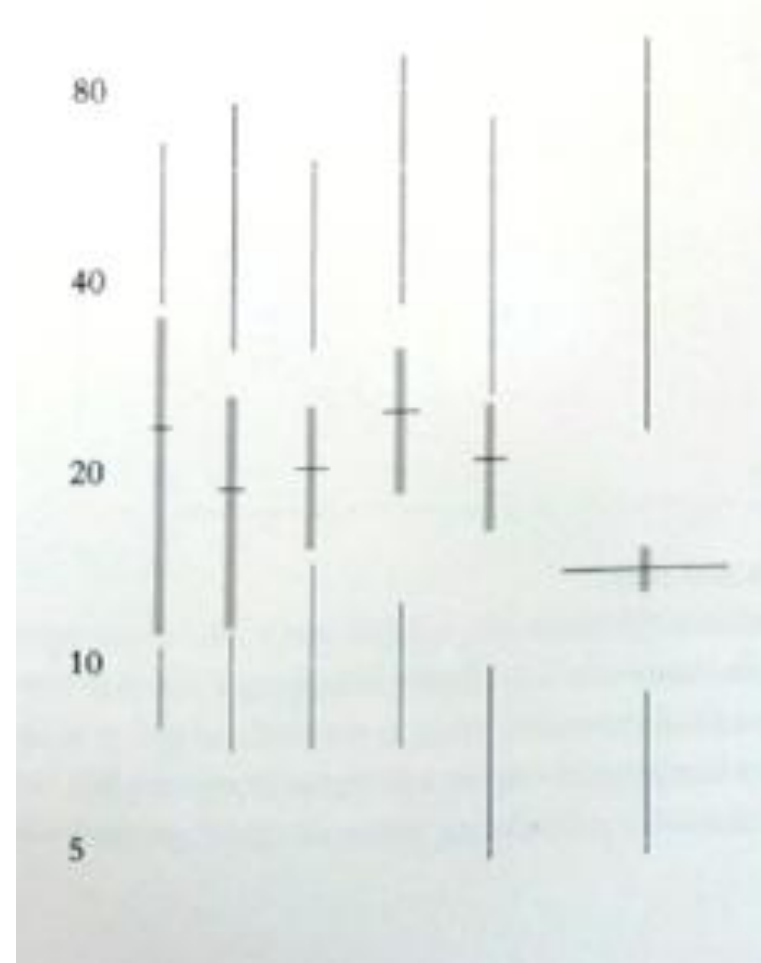
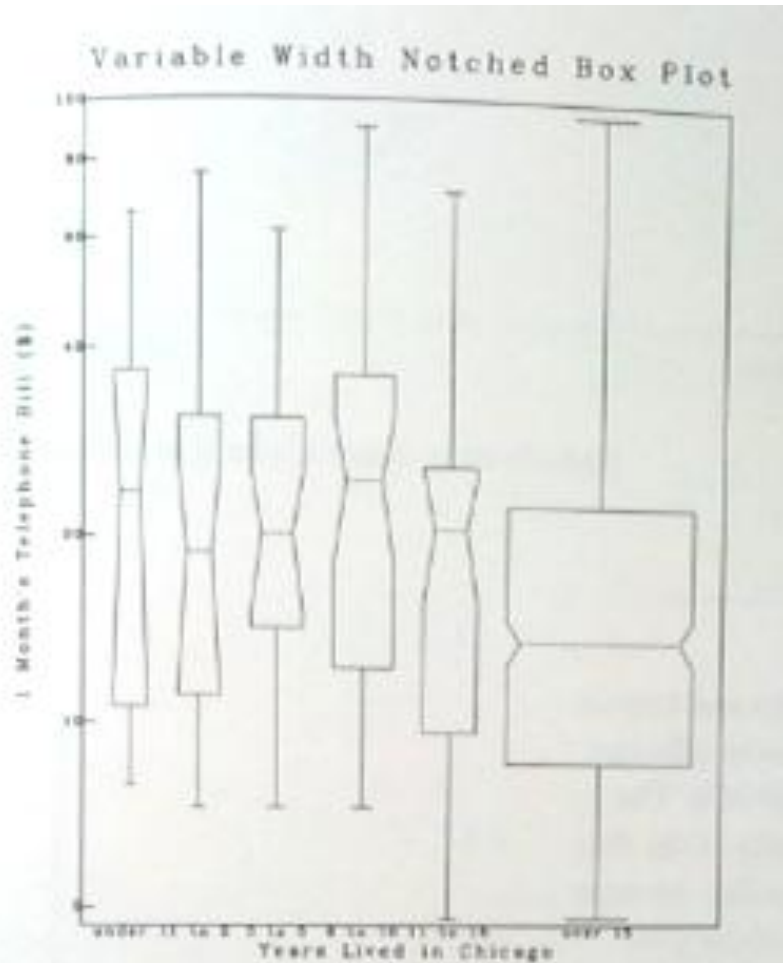


**Data ink maximization
can both help and hinder.**

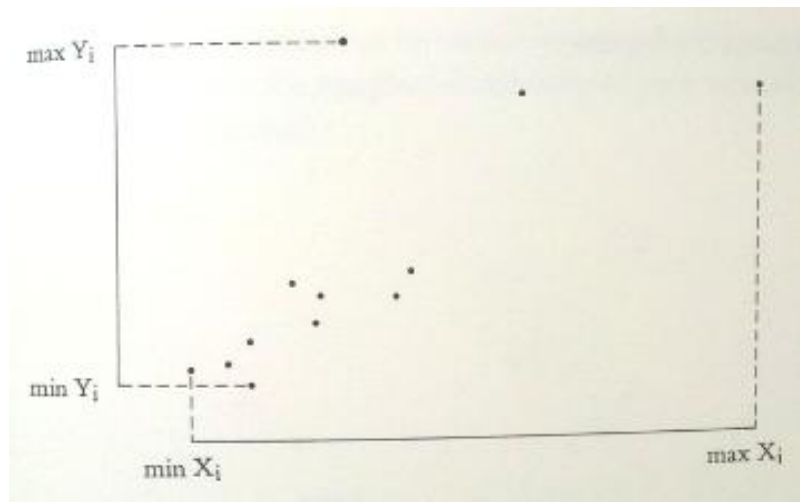


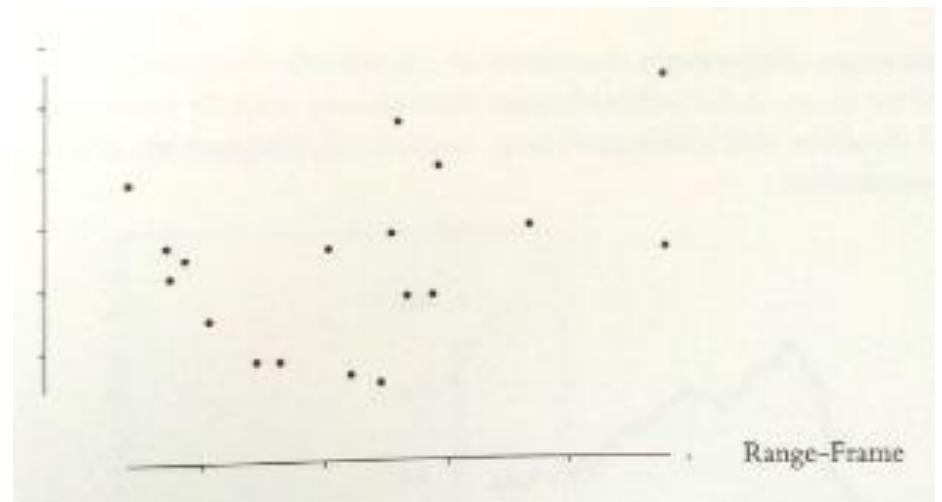
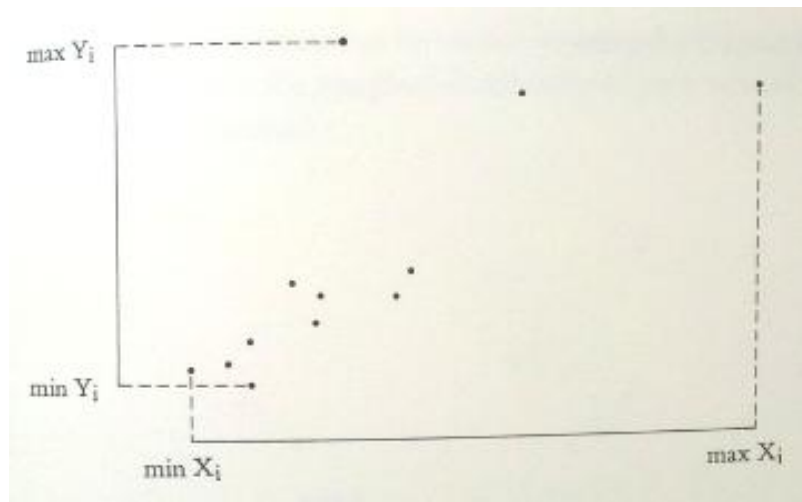


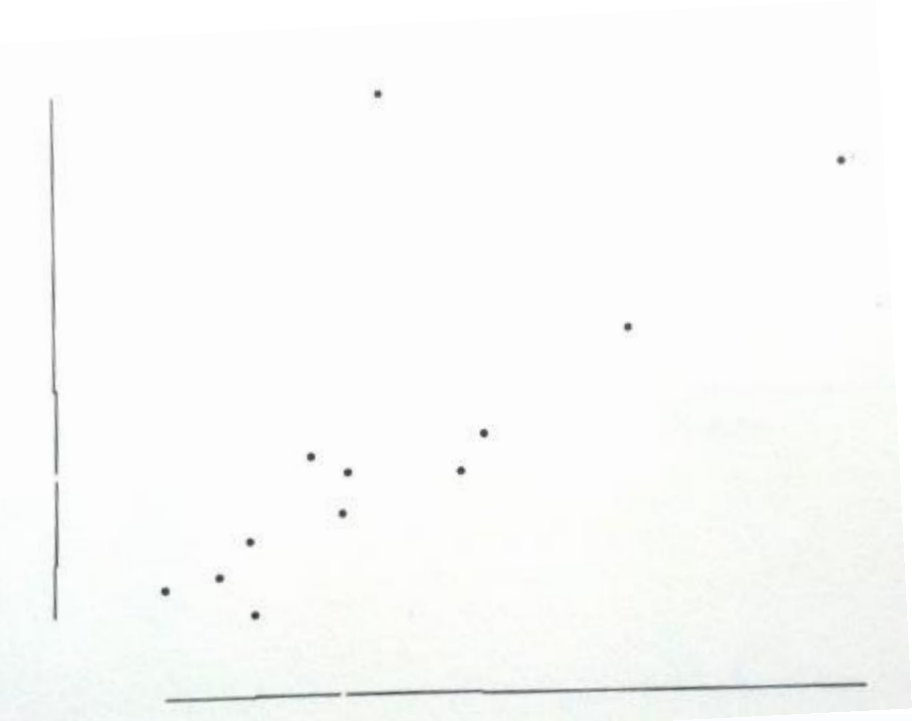
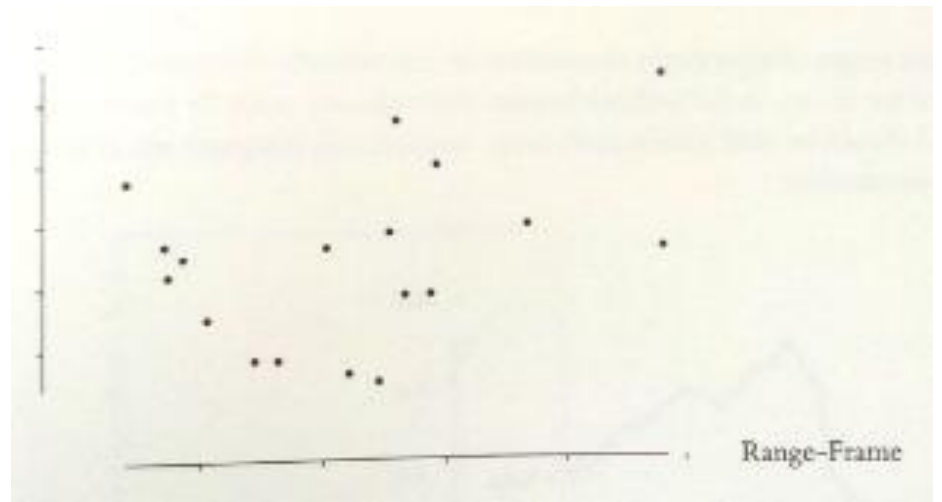
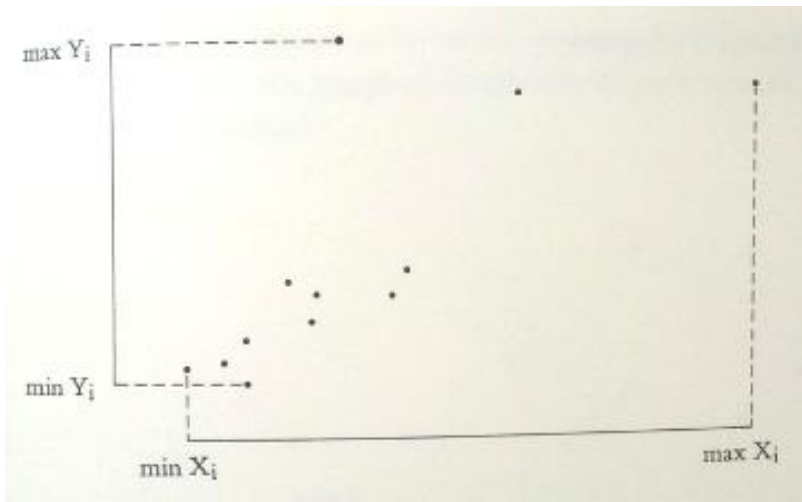


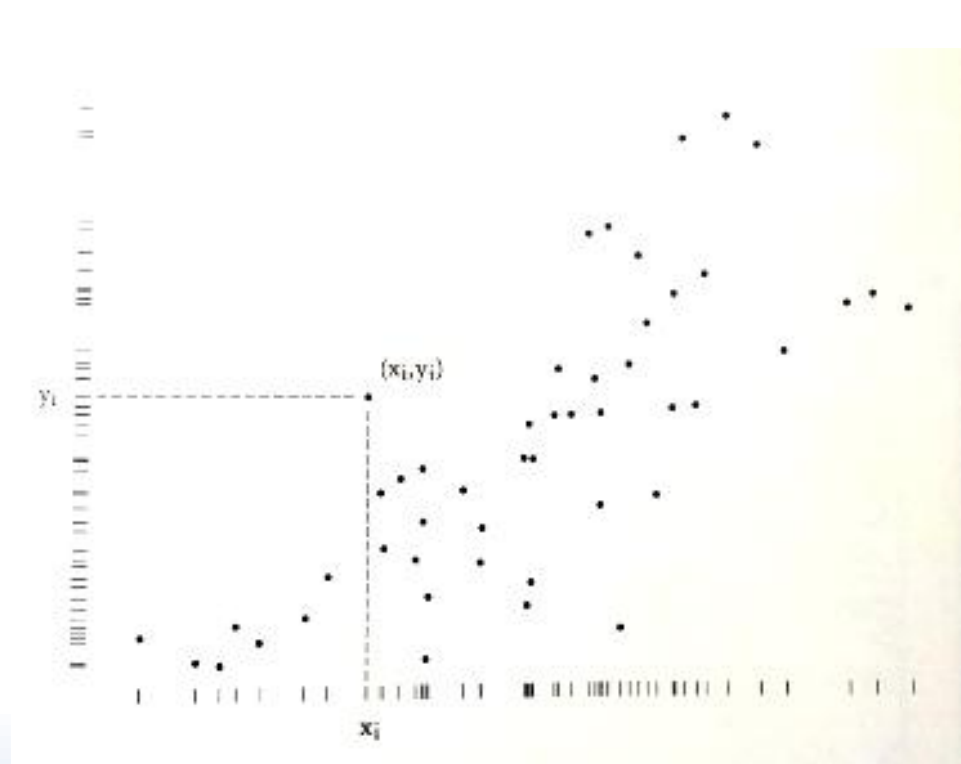
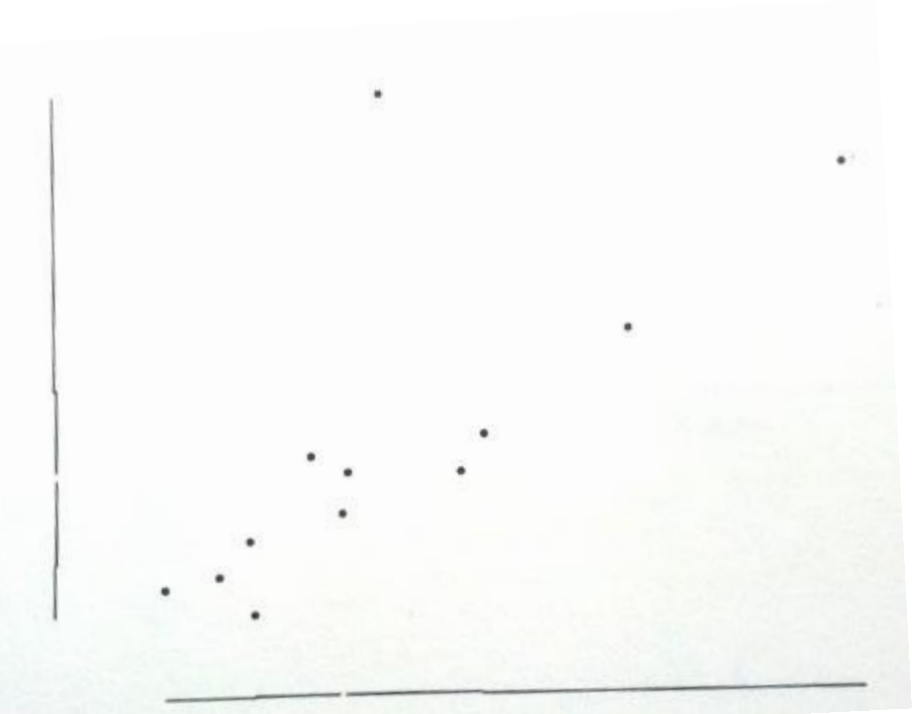
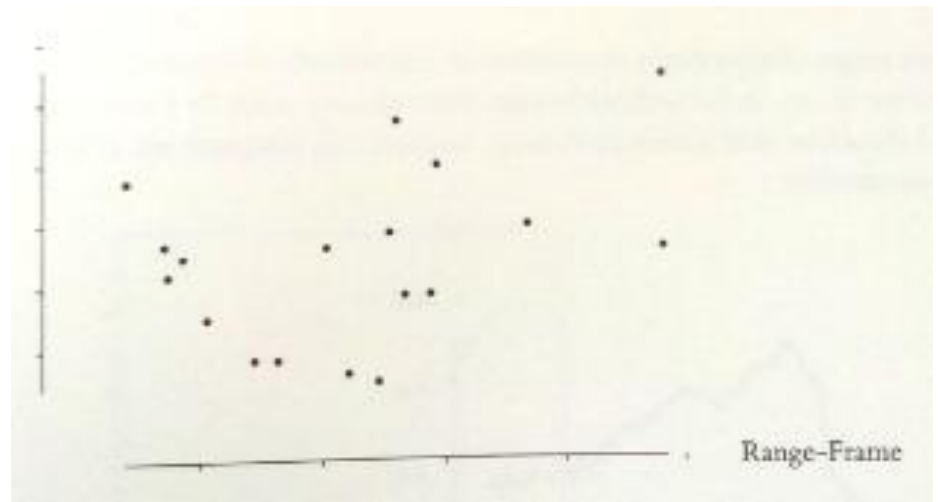
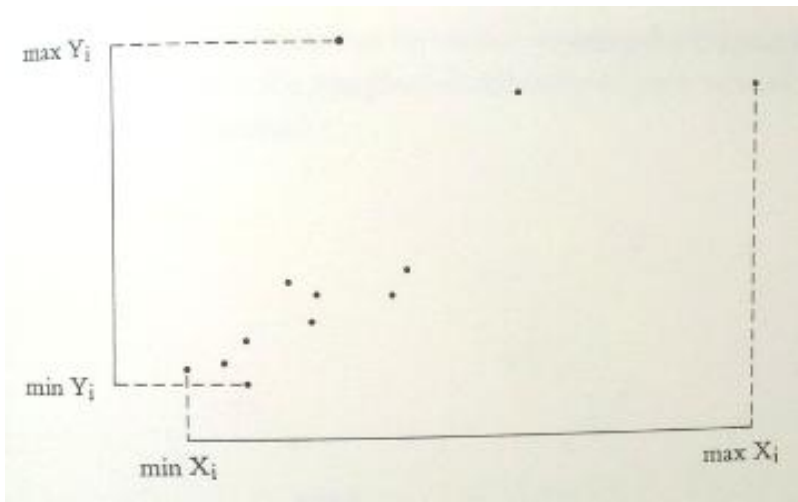


**Consider the depth that you wish to present.
High optimization may lower depth but increase readability.**









**Know what you want to say
And then say it.**

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And then say it.**

“Above all else, show the data.”

-Edward Tufte