

Graphical Excellence: Making Charts that Matter

Neev Ramani

About me



Accounting Platforms – Iselin, New Jersey



College & Major

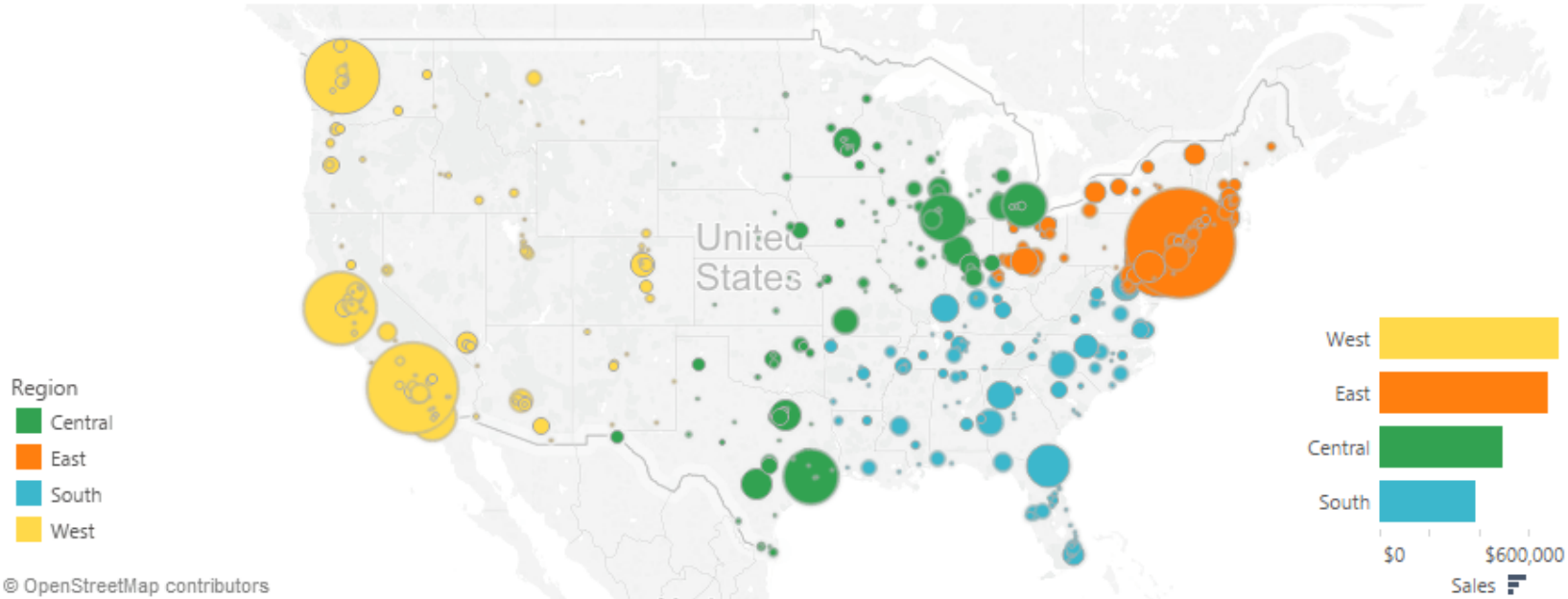
- Rutgers University '25
- BS in Finance



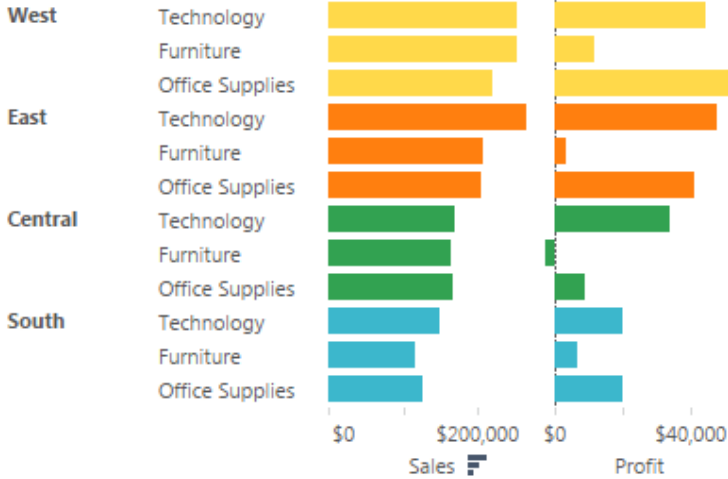
Primary Tasks

- Prepare and perform P/L reviews for ARE 4490/SPI
- Supporting Power BI transition
- FLDP Intern Project
- Researched data visualization tactics

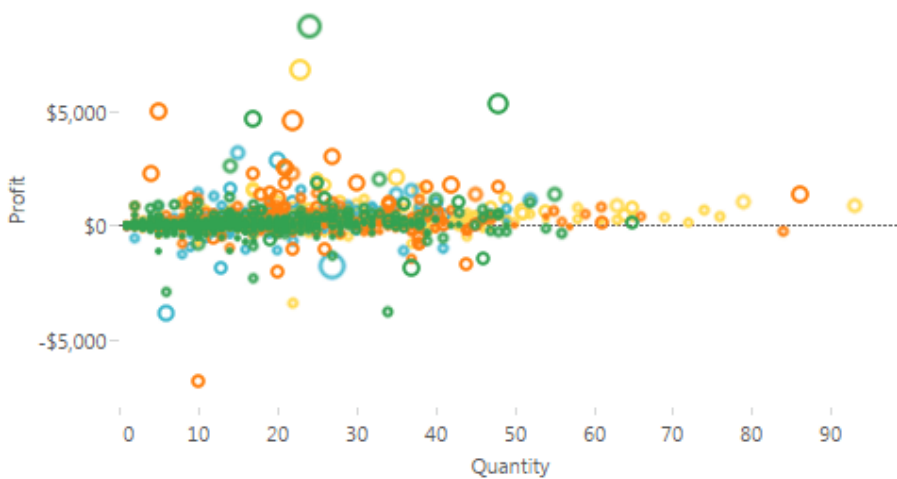
Sales Superstore Regional Dashboard: Single Color Palette



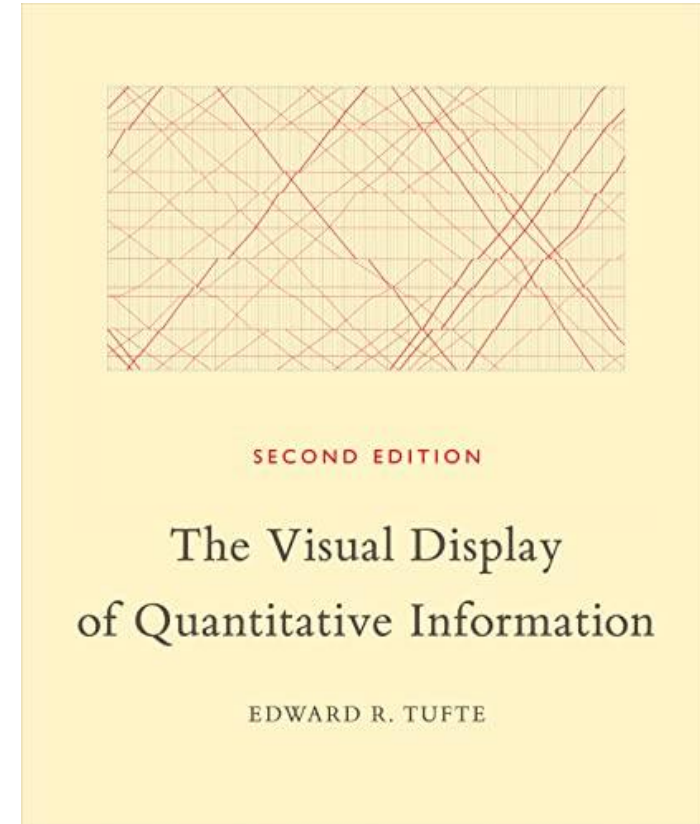
Sales by Product Category



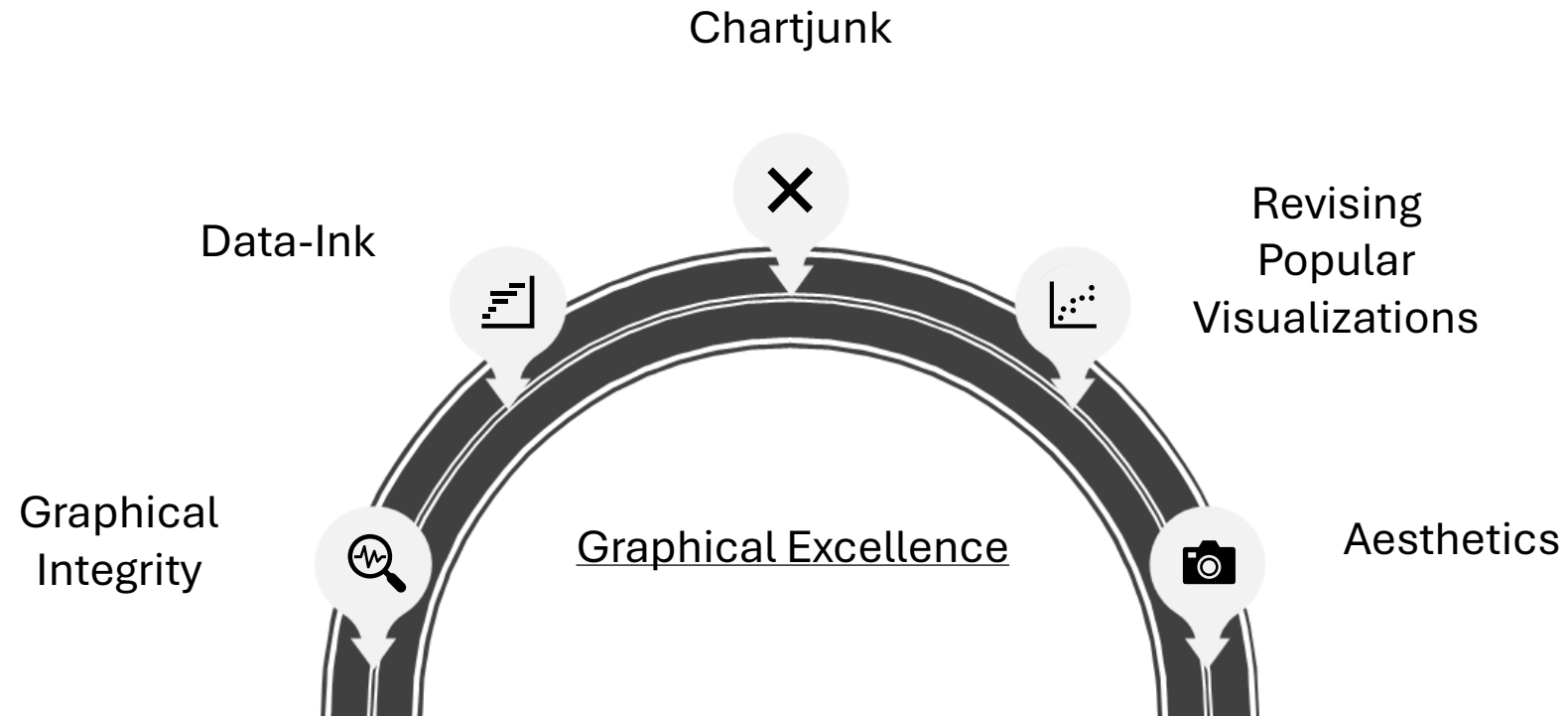
Quantity and Profit by Customer



Edward Tufte

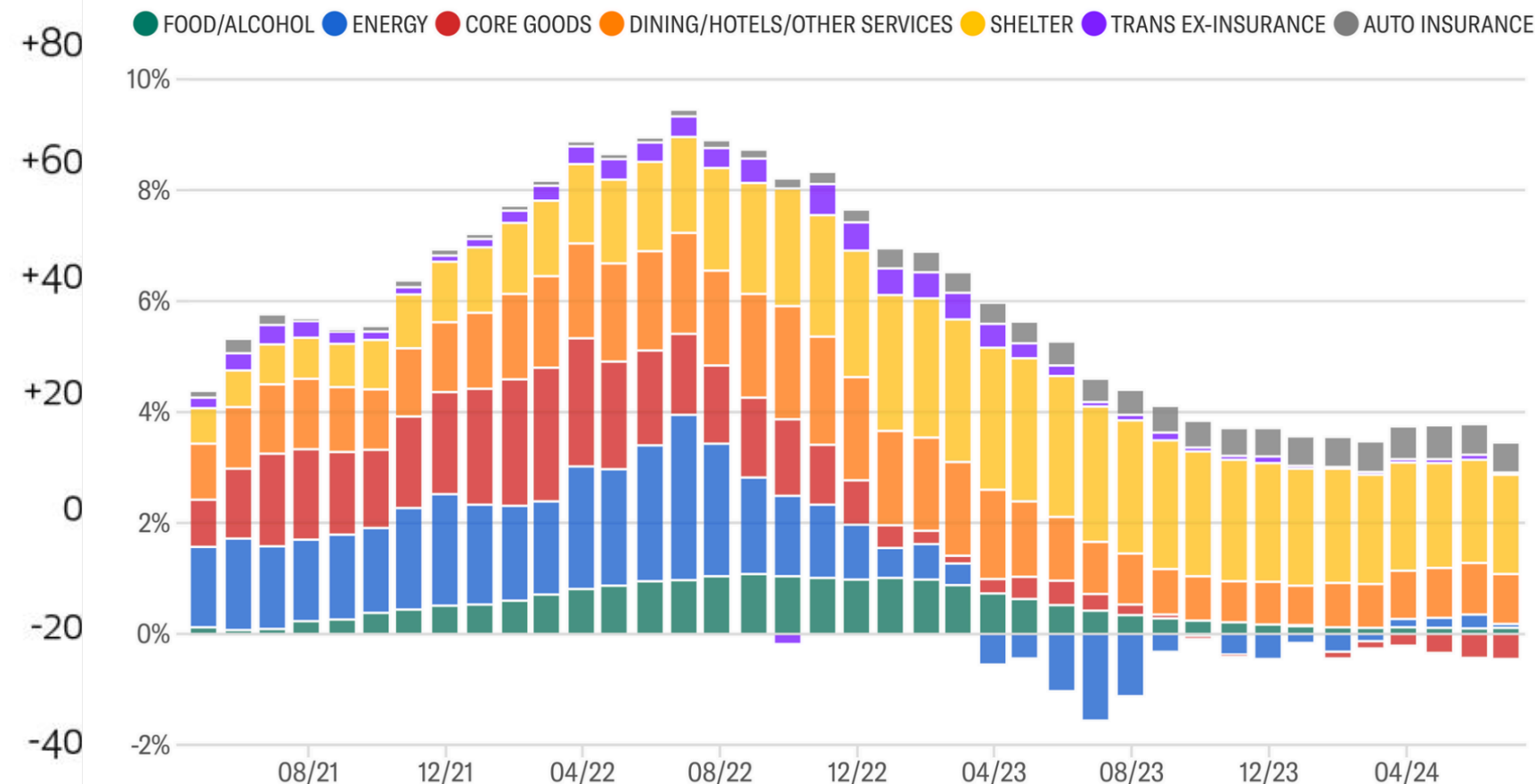


Roadmap



INFLATION CONTINUES SLOW DESCENT

Contribution to year-over-year change in CPI, non-seasonally adjusted



SOURCE: BUREAU OF LABOR STATISTICS; FACTSET; J.P. MORGAN ASSET MANAGEMENT

THE CASE FOR CUTTING RATES

EXPERT COMMENTARY

“Inflation should continue its slow descent and return to 2% by the middle of next year.

If, as expected, inflationary pressures ease through the summer, the Federal Reserve should feel comfortable cutting rates twice this year, delivering a first cut in September.”

DAVID KELLY
J.P. MORGAN ASSET
MANAGEMENT

Graphical Integrity

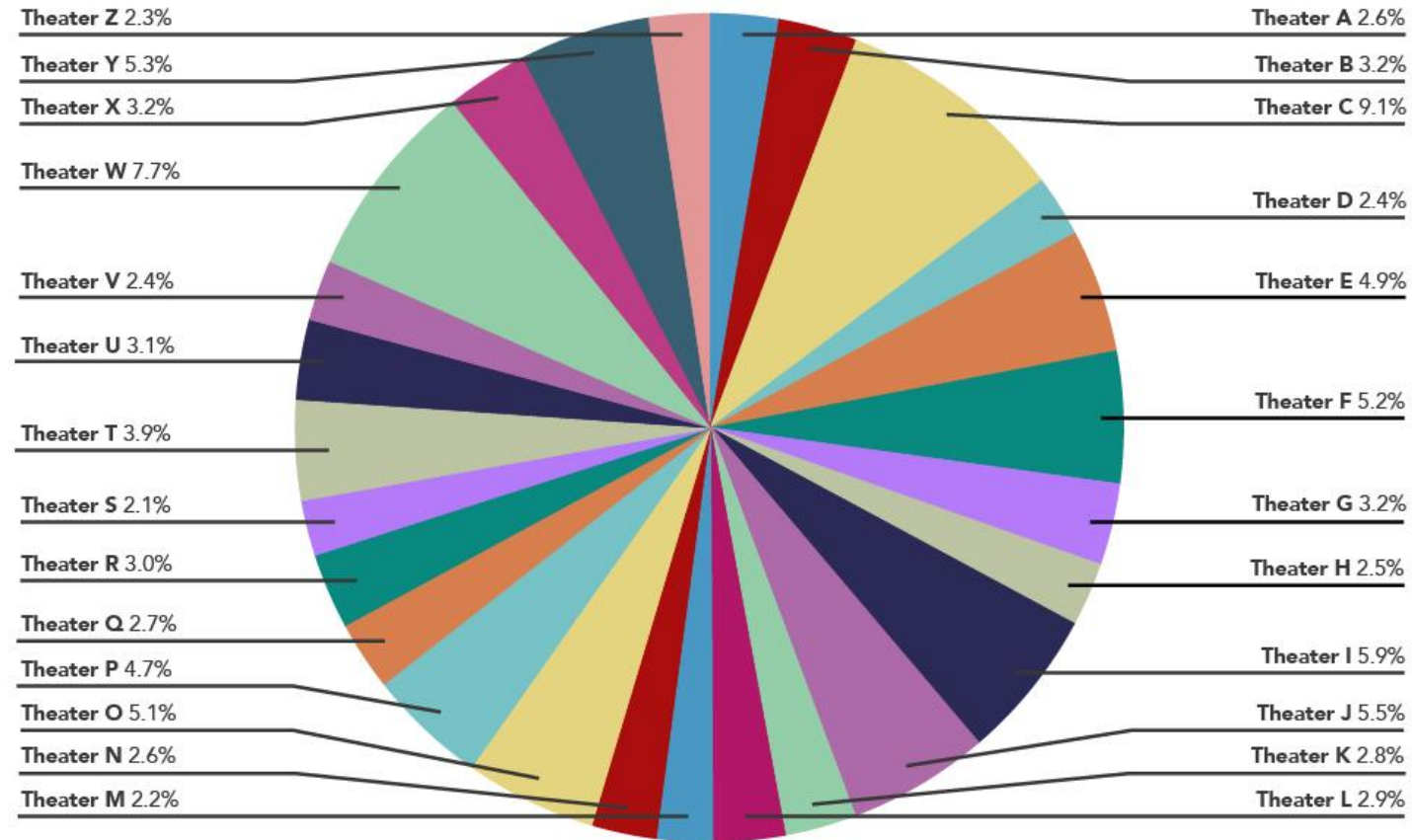
“Graphical excellence begins with us telling the truth about the data”

Graphical Integrity

4 Principles:

1. The representation of numbers physically measured on the surface of the graphic itself should be directly proportional to the numerical qualities represented
2. Clear, detailed, and thorough labeling should be used
3. Show data variation, not design variation
4. Graphics must not quote data out of context

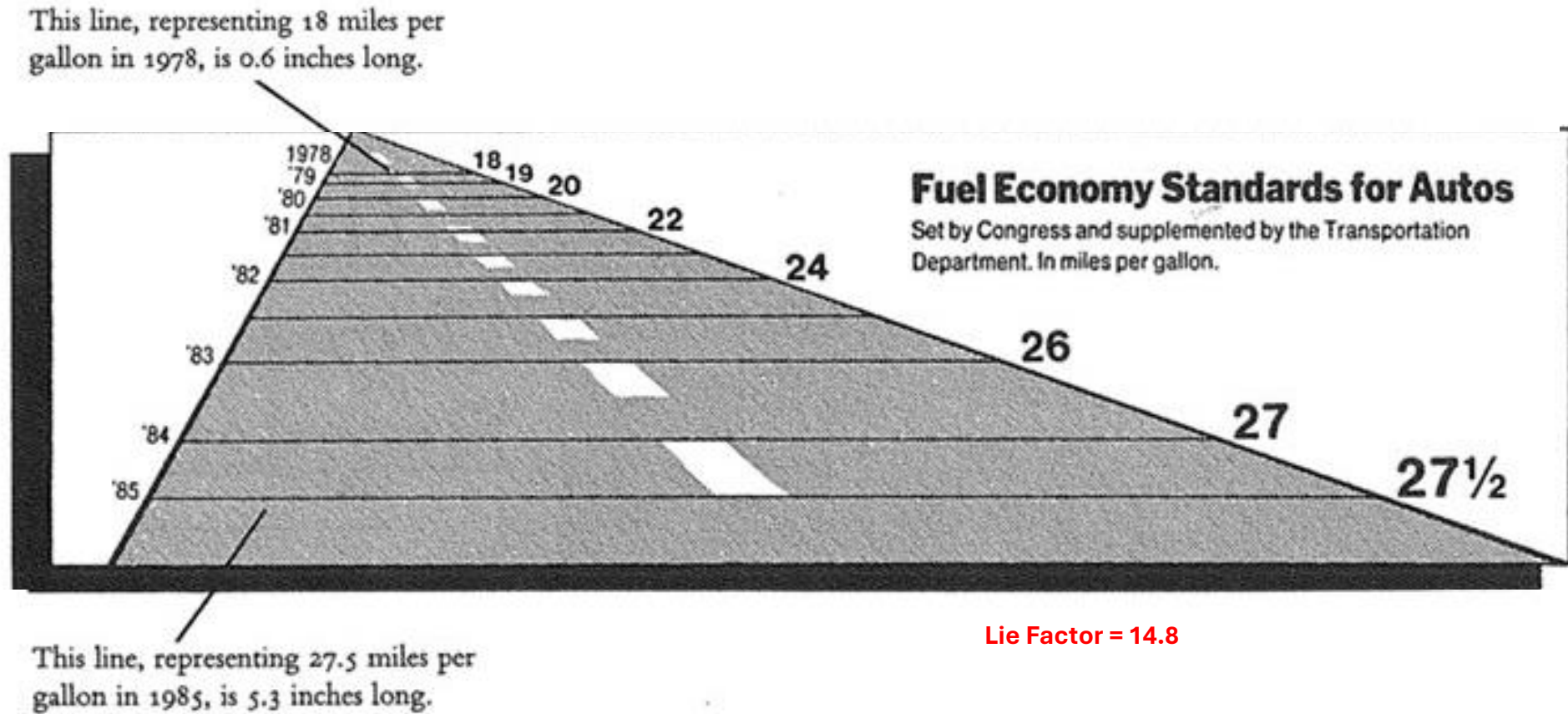
Data represented by objects



The Lie Factor

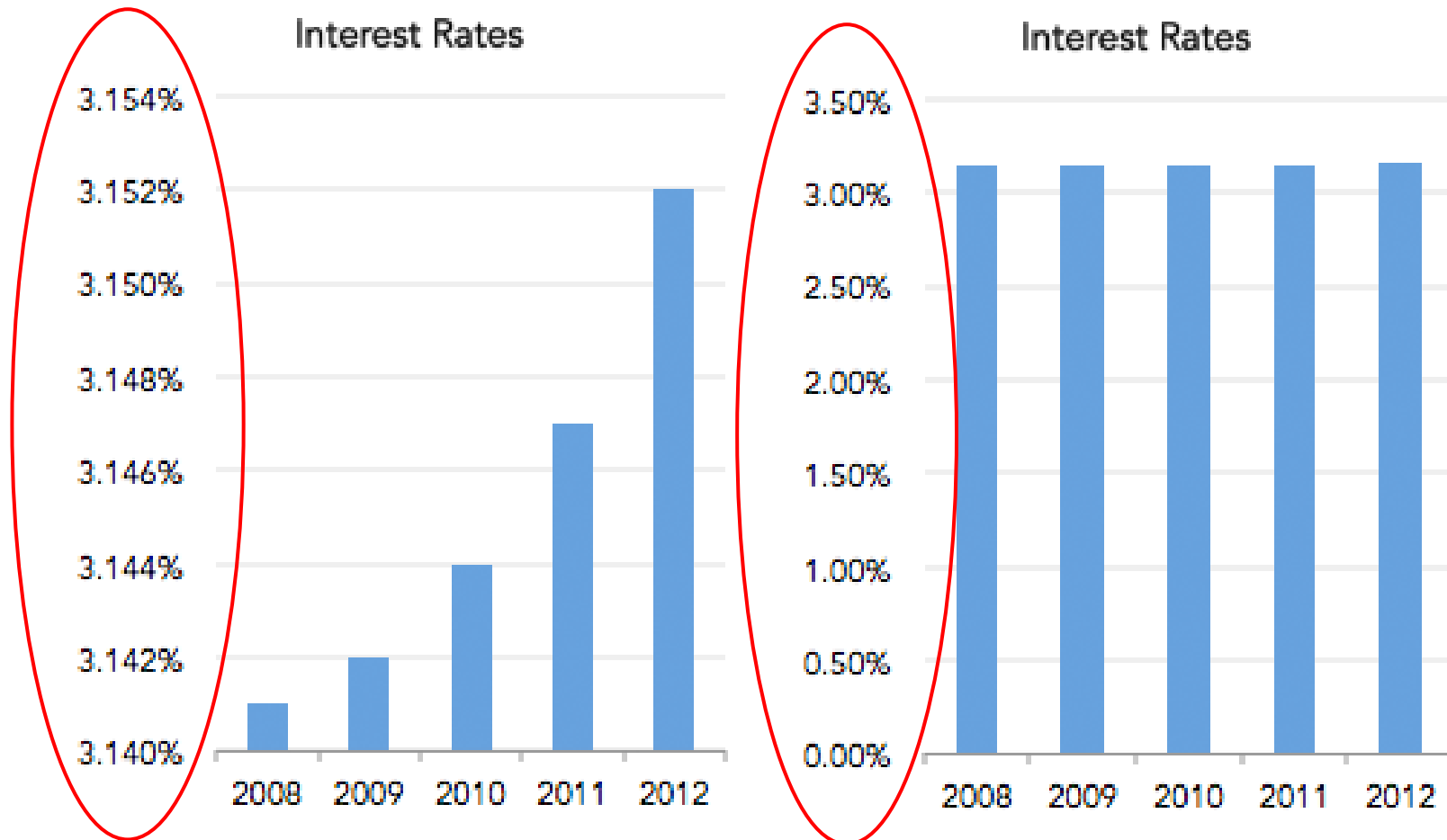
$$\text{Lie Factor} = \frac{\text{size of effect shown in graphic}}{\text{size of effect in data}}$$

A Lie Factor greater than 1.05, or less than 0.95 indicates substantial distortion

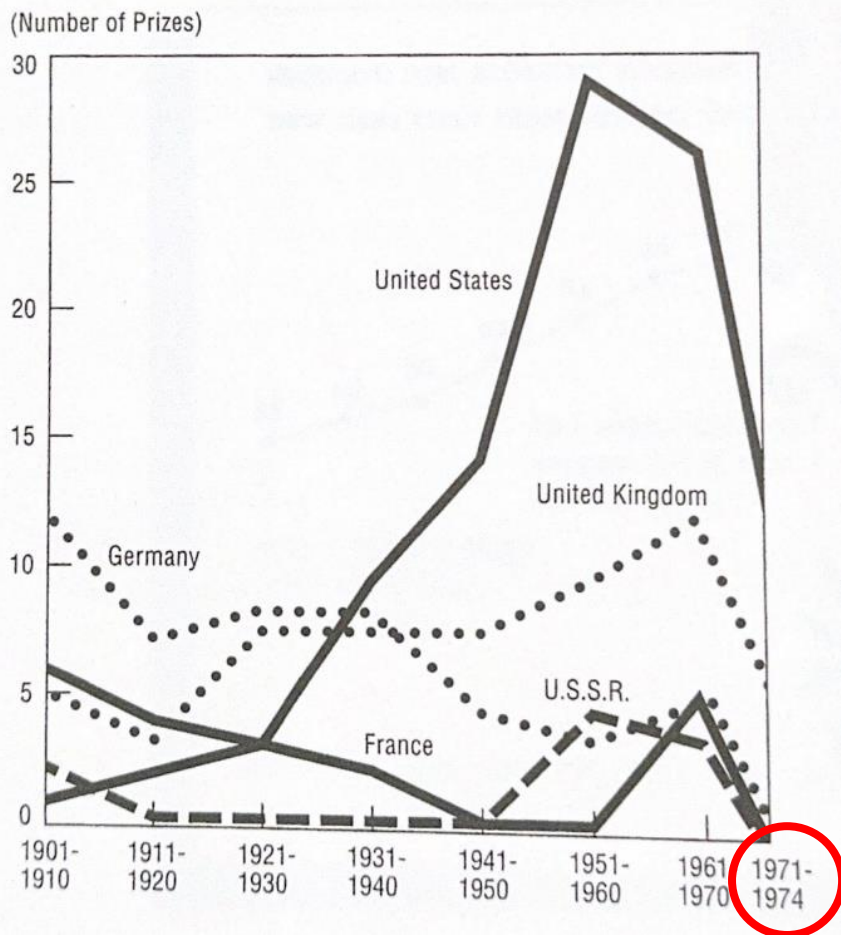


Deceptive Graphics

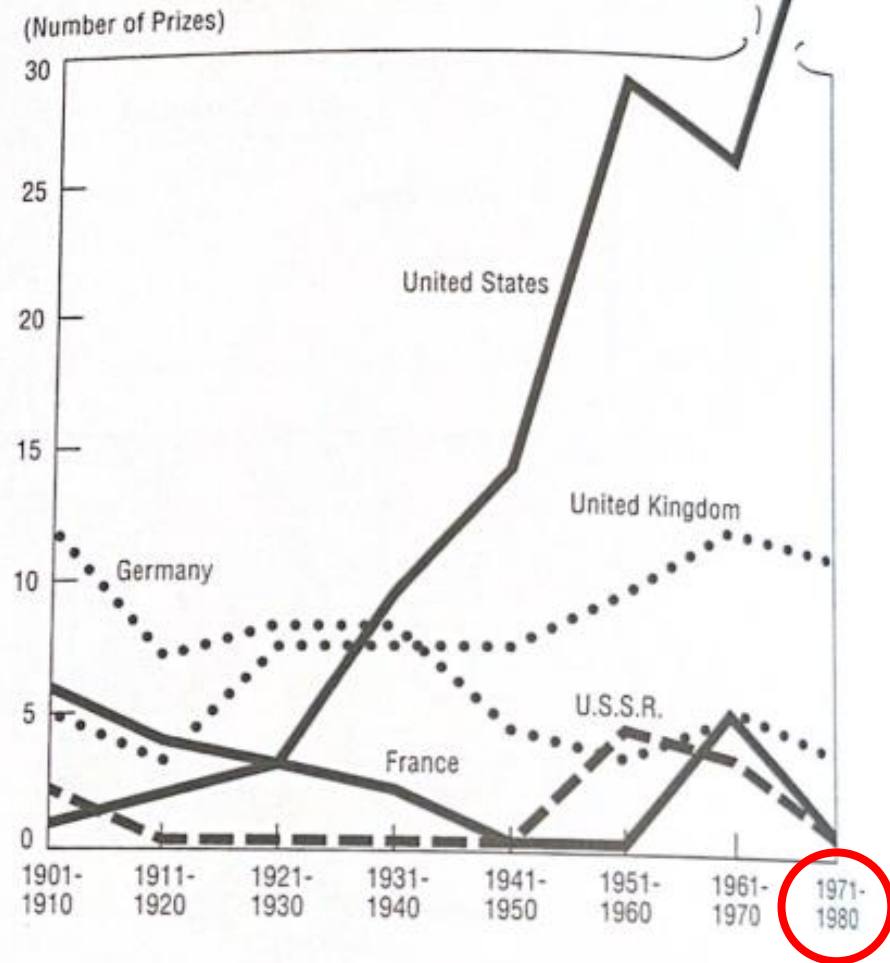
Same Data, Different Y-Axis

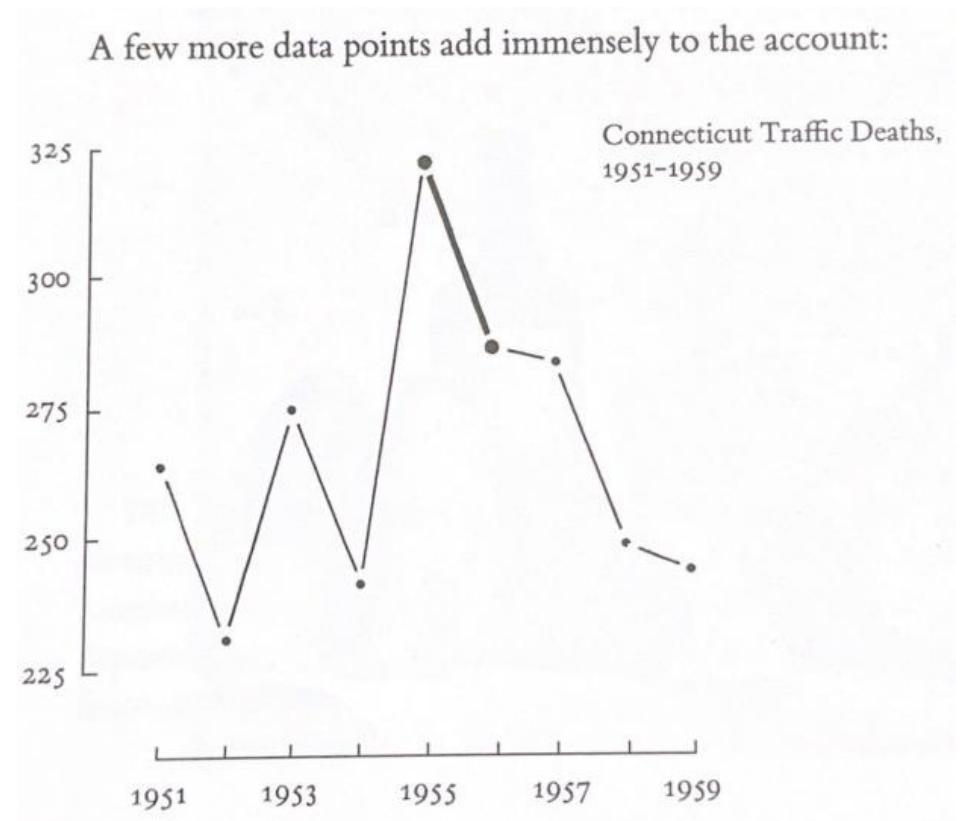
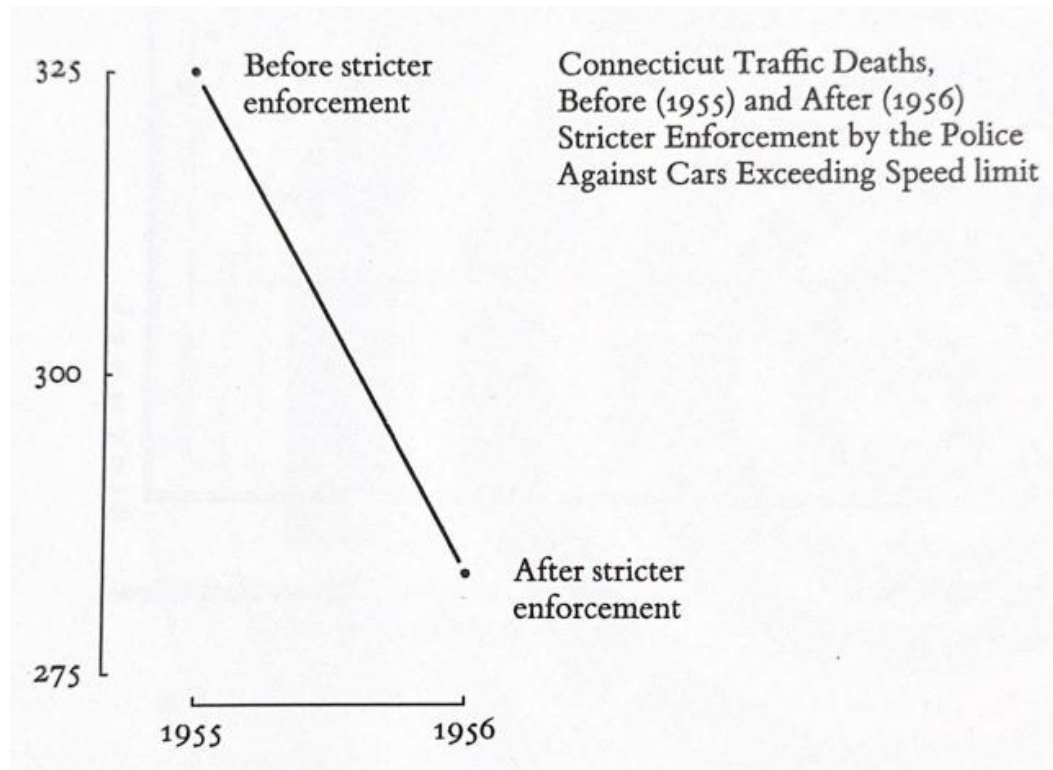


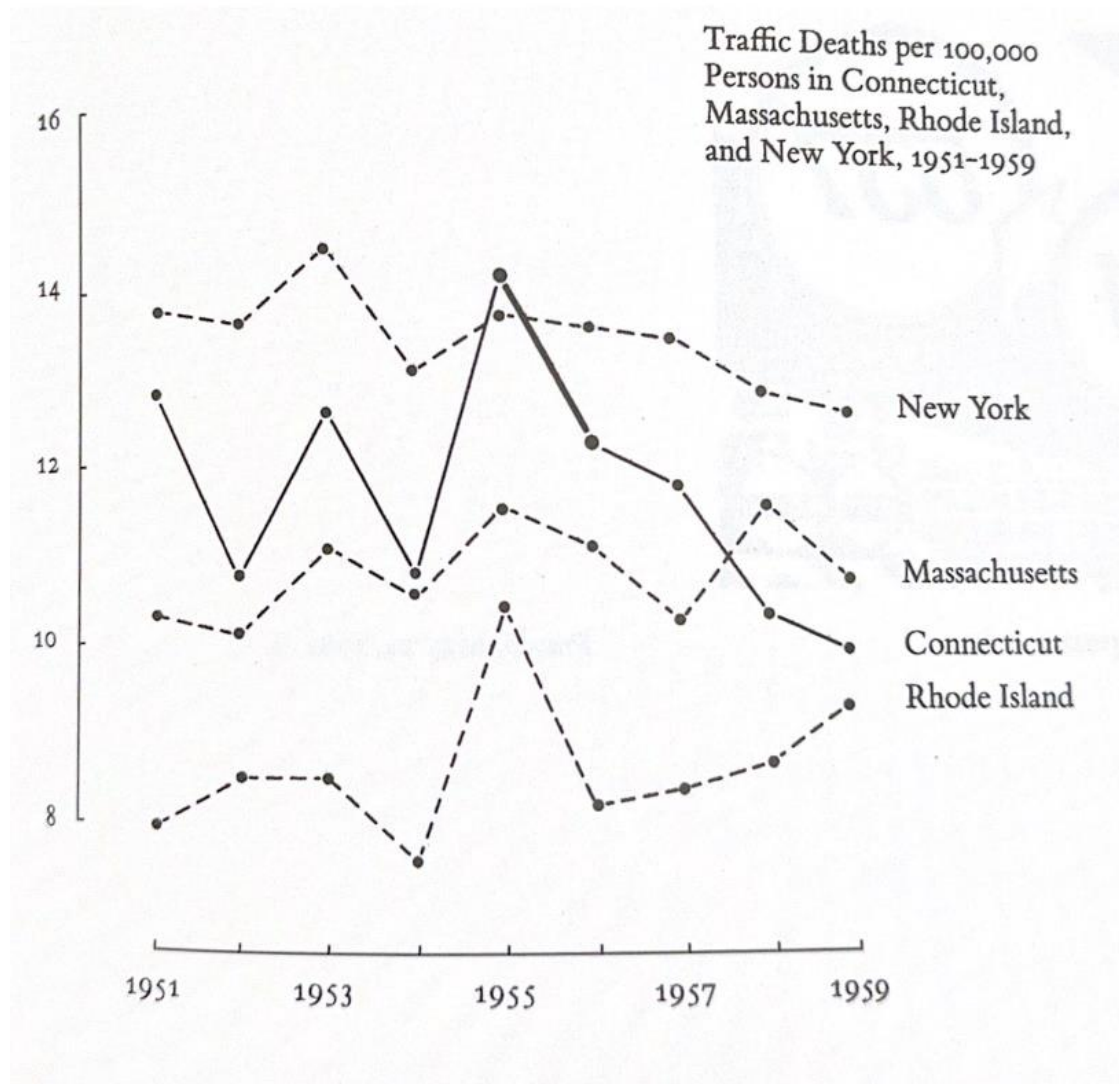
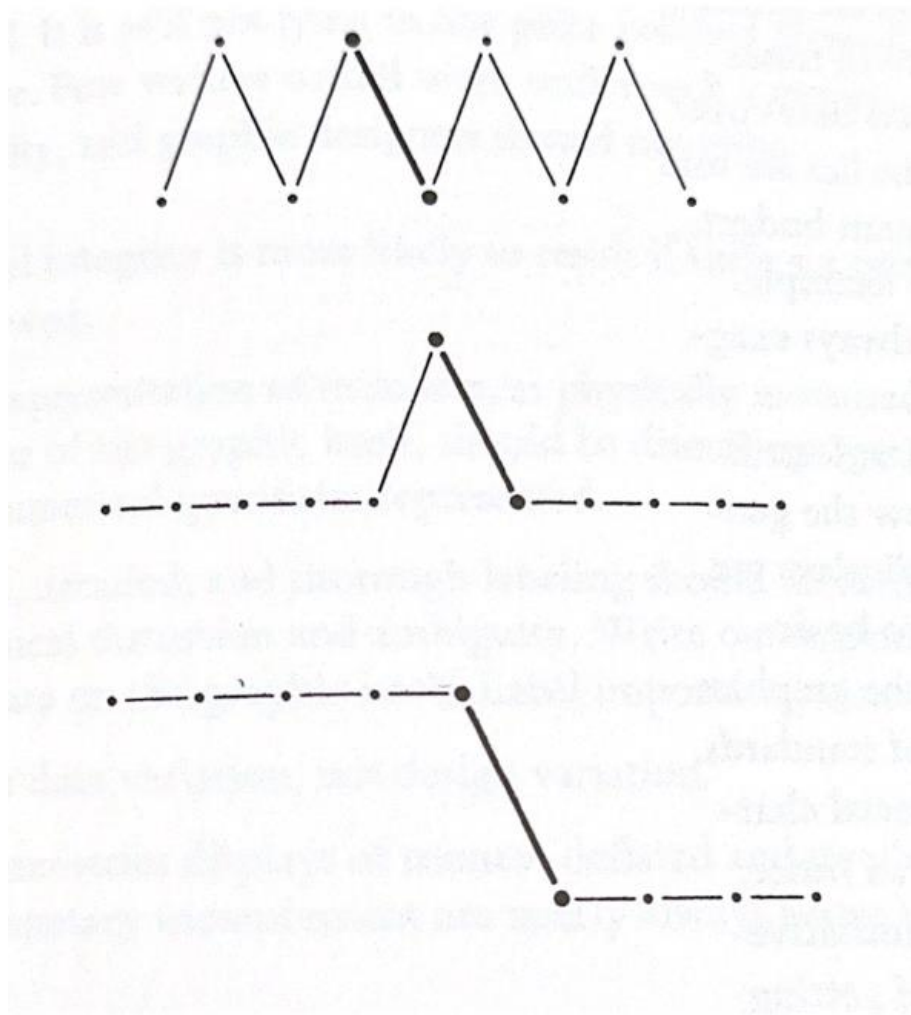
**Nobel Prizes Awarded in Science,
for Selected Countries, 1901-1974**



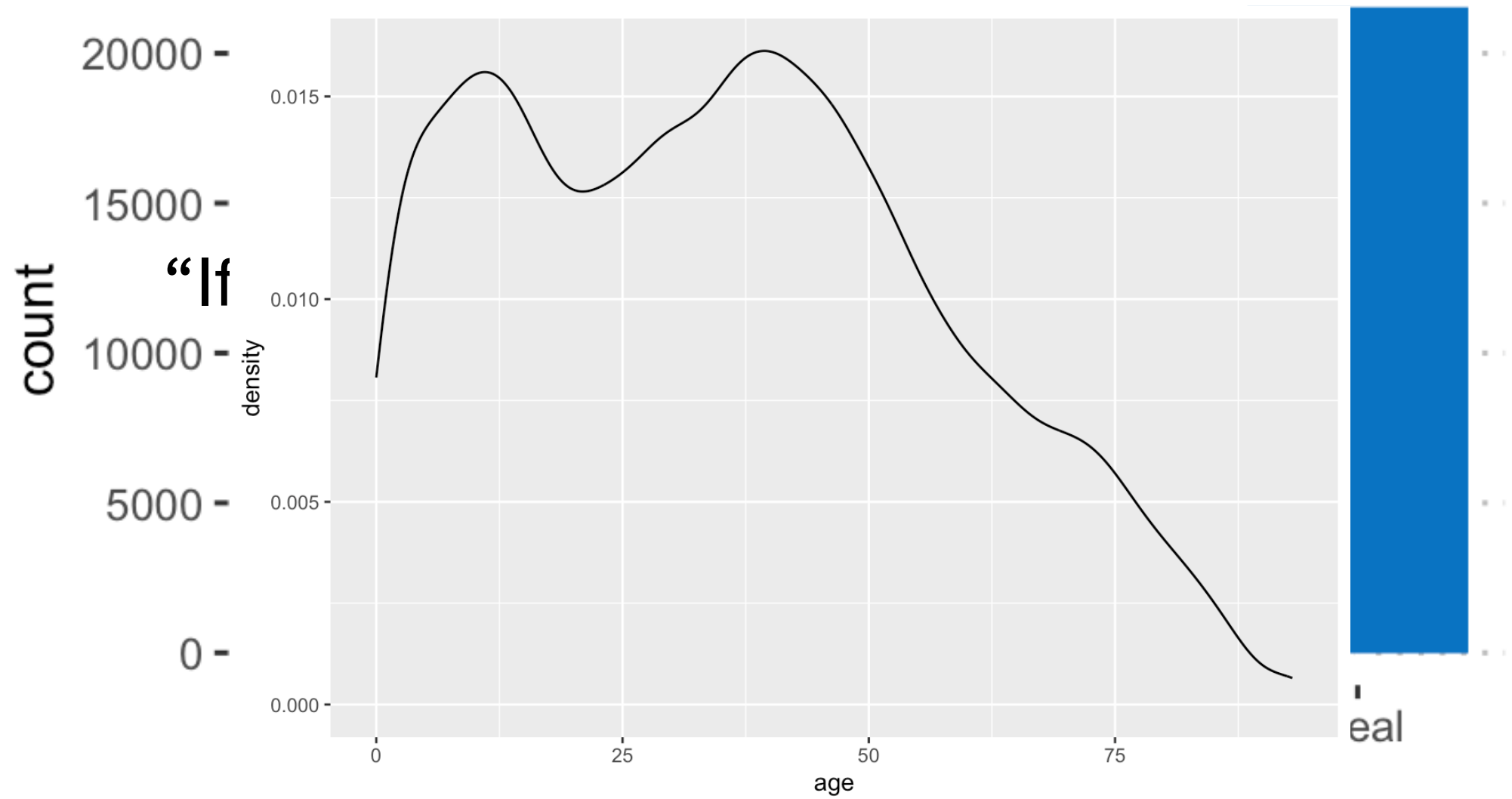
**Nobel Prizes Awarded in Science,
for Selected Countries, 1901-1980**



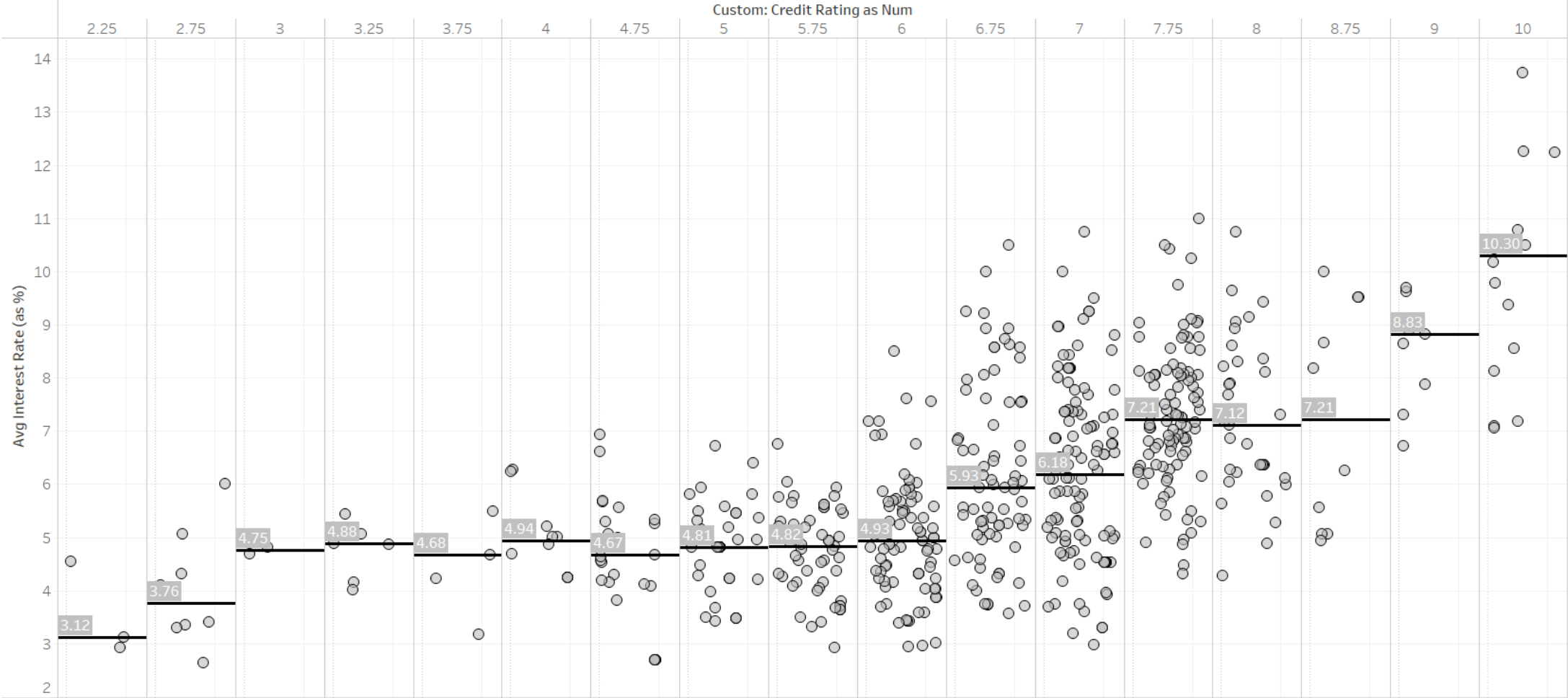




Misconception



Interest Rate (per facility) vs. Credit Rating



Data-Ink

“Data graphics should draw the viewer’s attention to the sense of substance in the data”

Data Ink

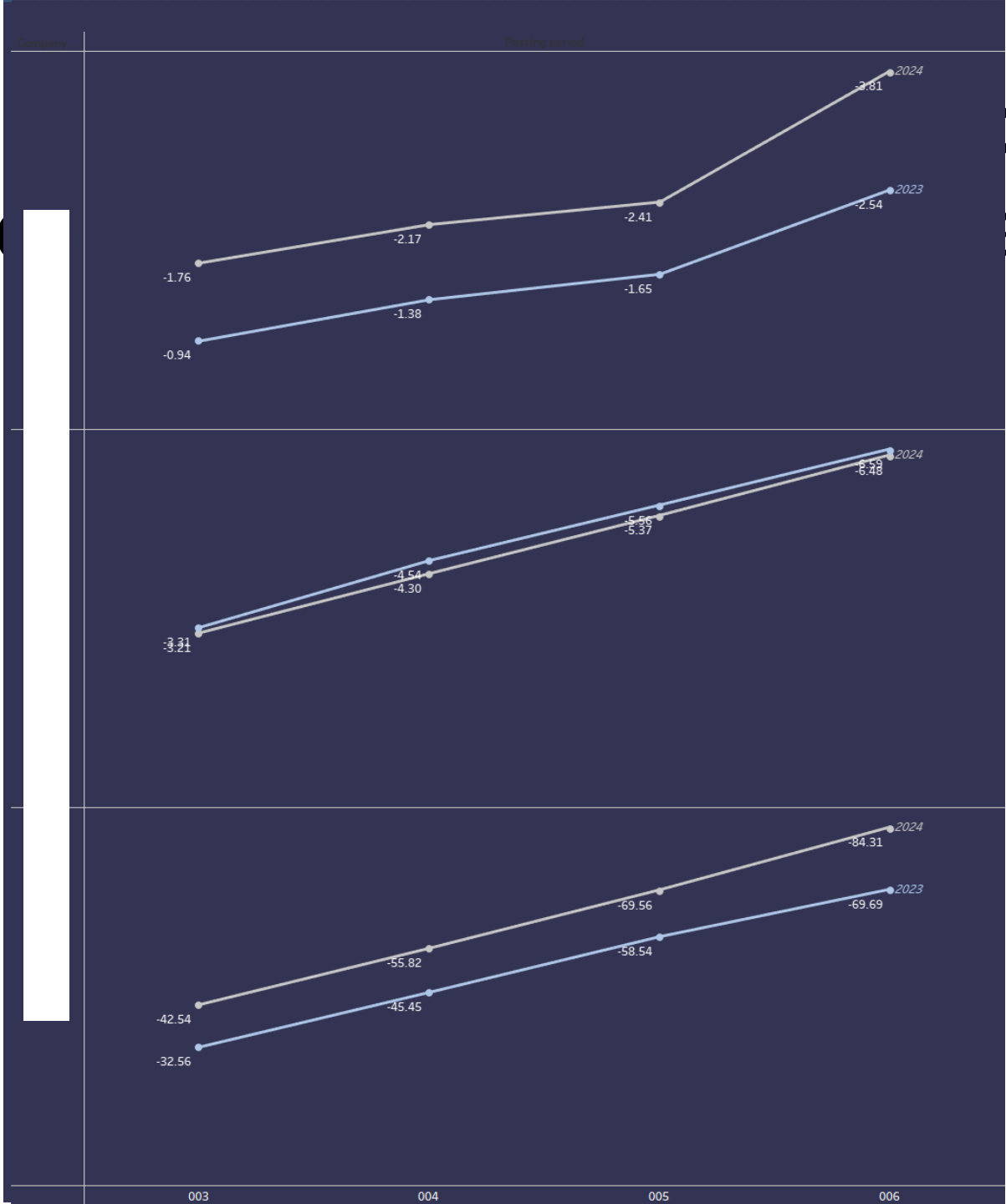
$$\begin{aligned}\text{Data-ink ratio} &= \frac{\text{Data-ink}}{\text{Total ink used to print the graphic}} \\ &= \text{proportion of a graphic's ink devoted to the} \\ &\quad \text{non-redundant display of data-information} \\ &= 1.0 - \text{proportion of a graphic that can be erased}\end{aligned}$$

4 Principles of Data-Ink

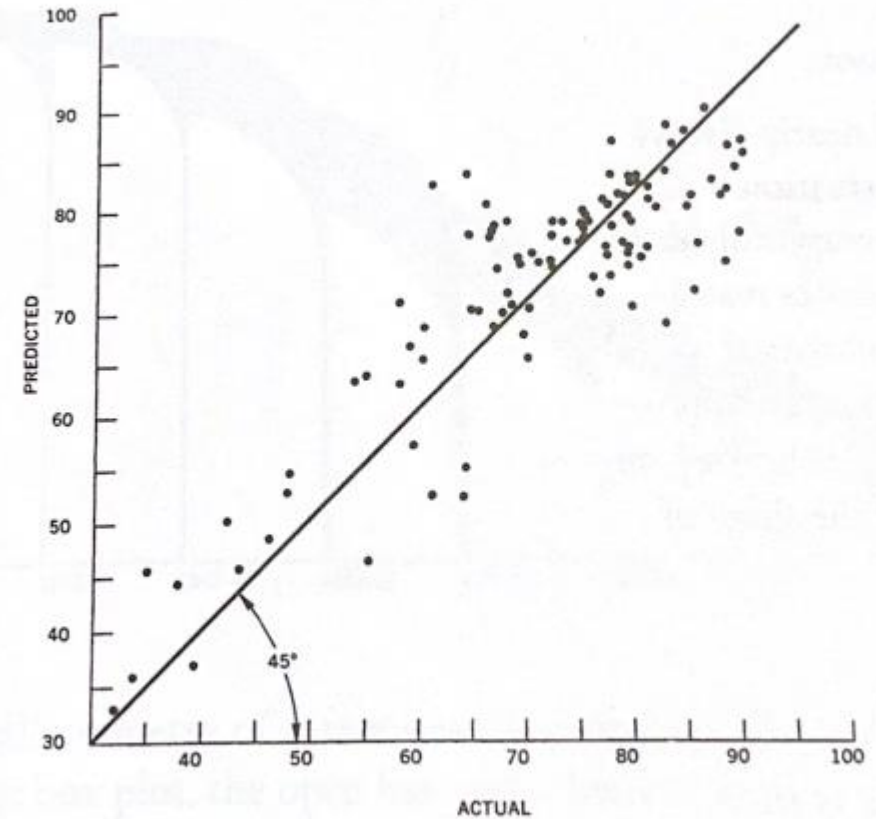
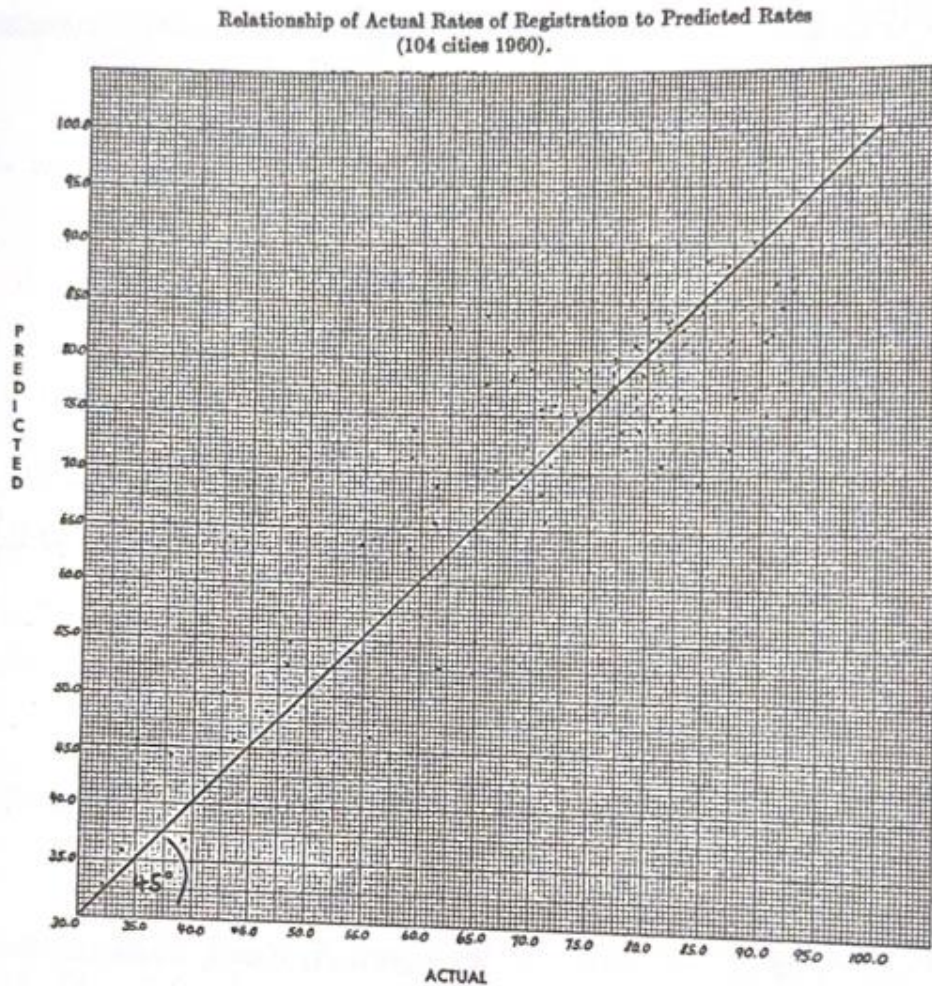
1. Above all else, show the data
2. Goal is to maximize the data-ink ratio
3. Erase non-data ink, within reason
4. Erase redundant data-ink, within reason

Show the

Ratio

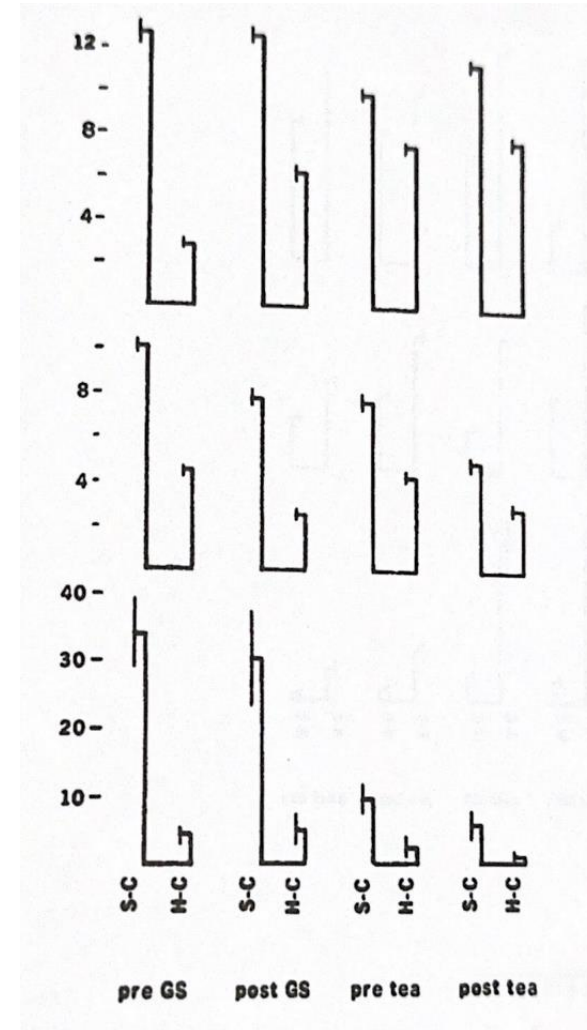
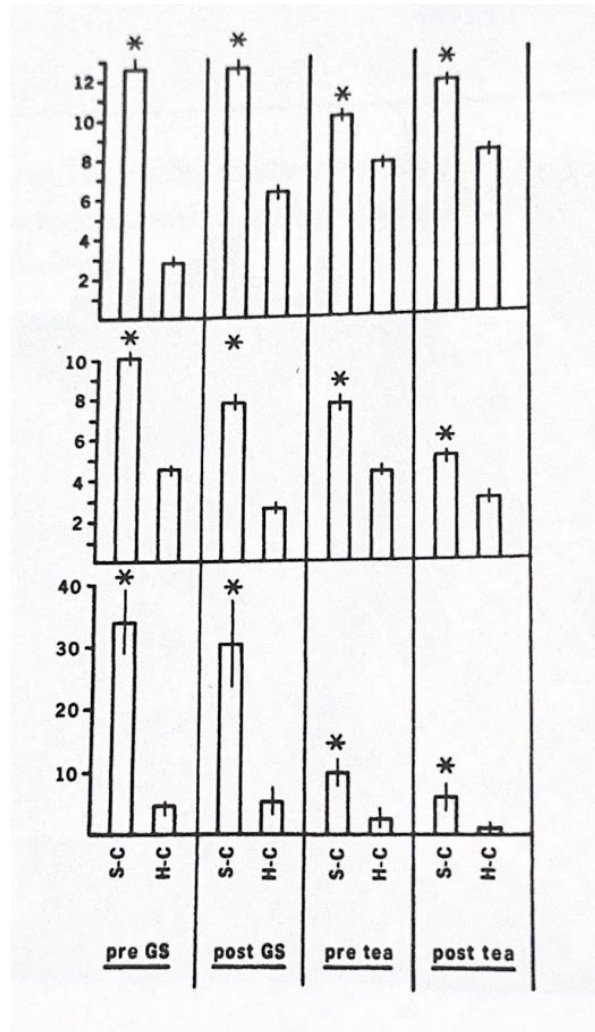


Data-Ink Principle 3: Erase Non-Data-Ink, Within Reason



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

Data-Ink Principle 4: Erase Redundant Data-Ink, Within Reason



Chartjunk

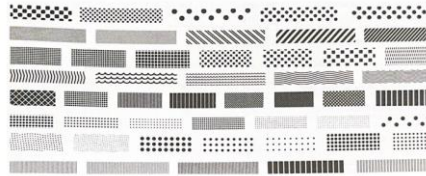
“Graphical decoration comes cheaper than the hard work required to produce intriguing numbers”

Chartjunk

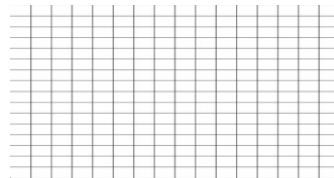
Graphical decorations that distract the viewer from the data itself

3 primary forms:

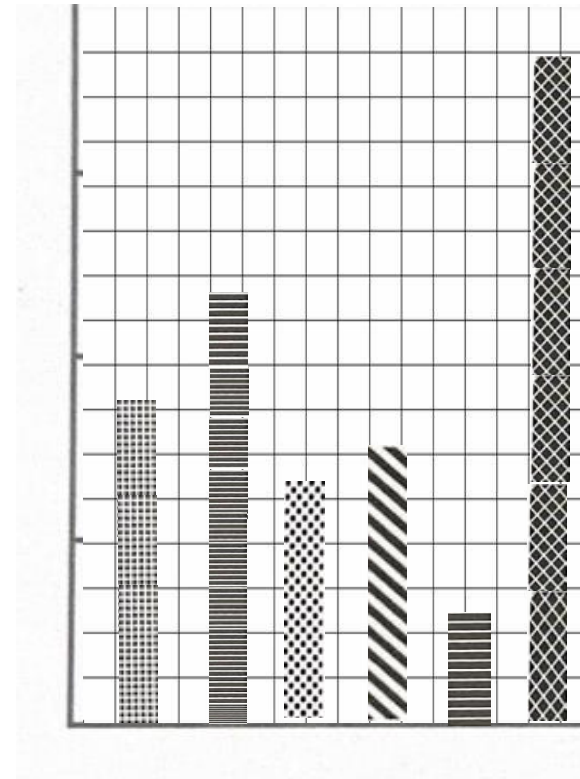
1. Moiré Patterns



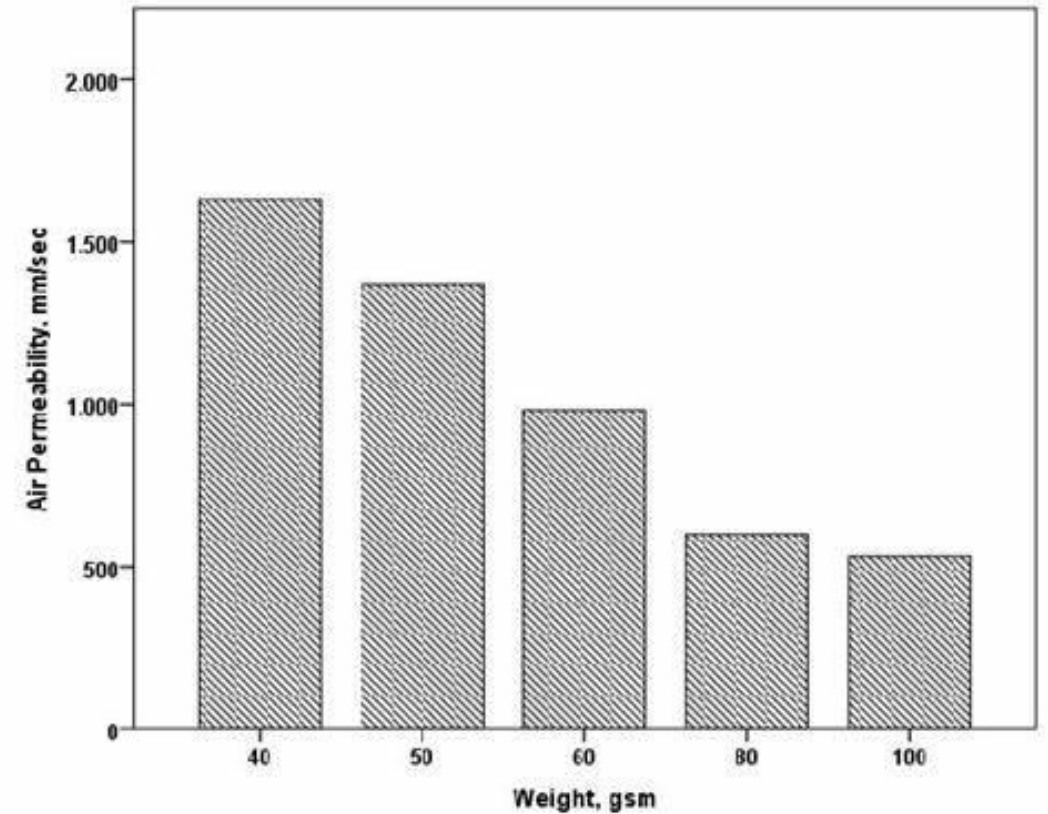
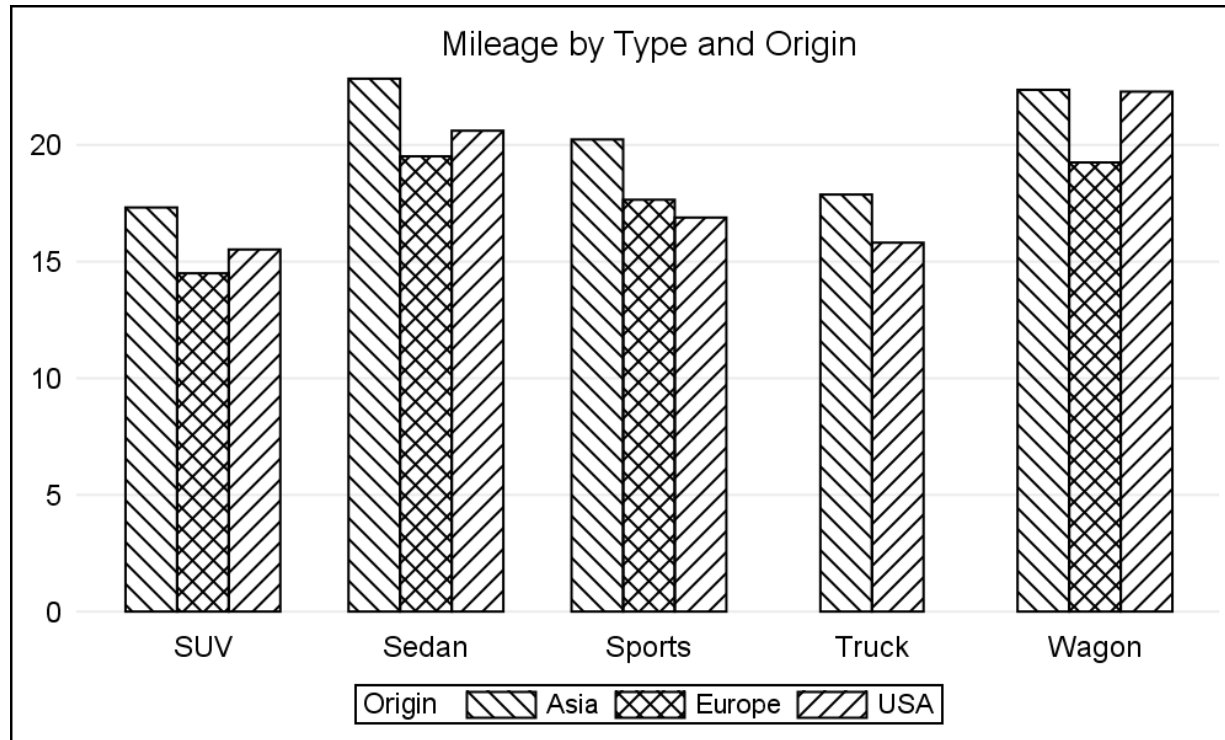
2. Gridlines



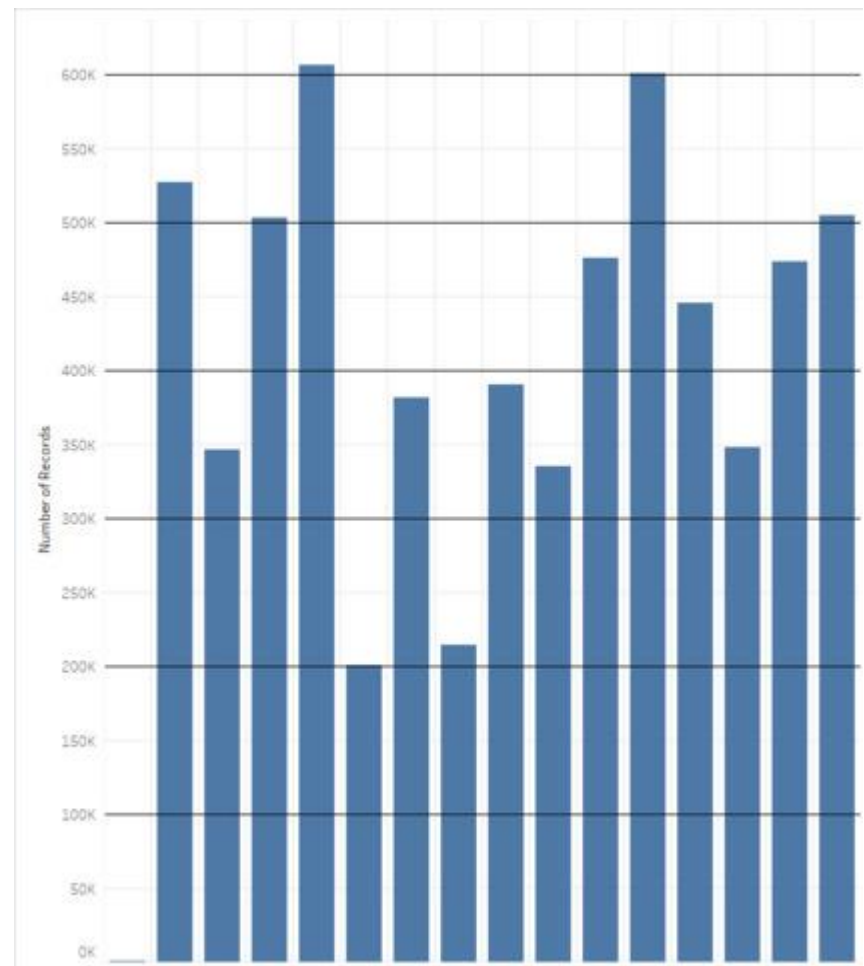
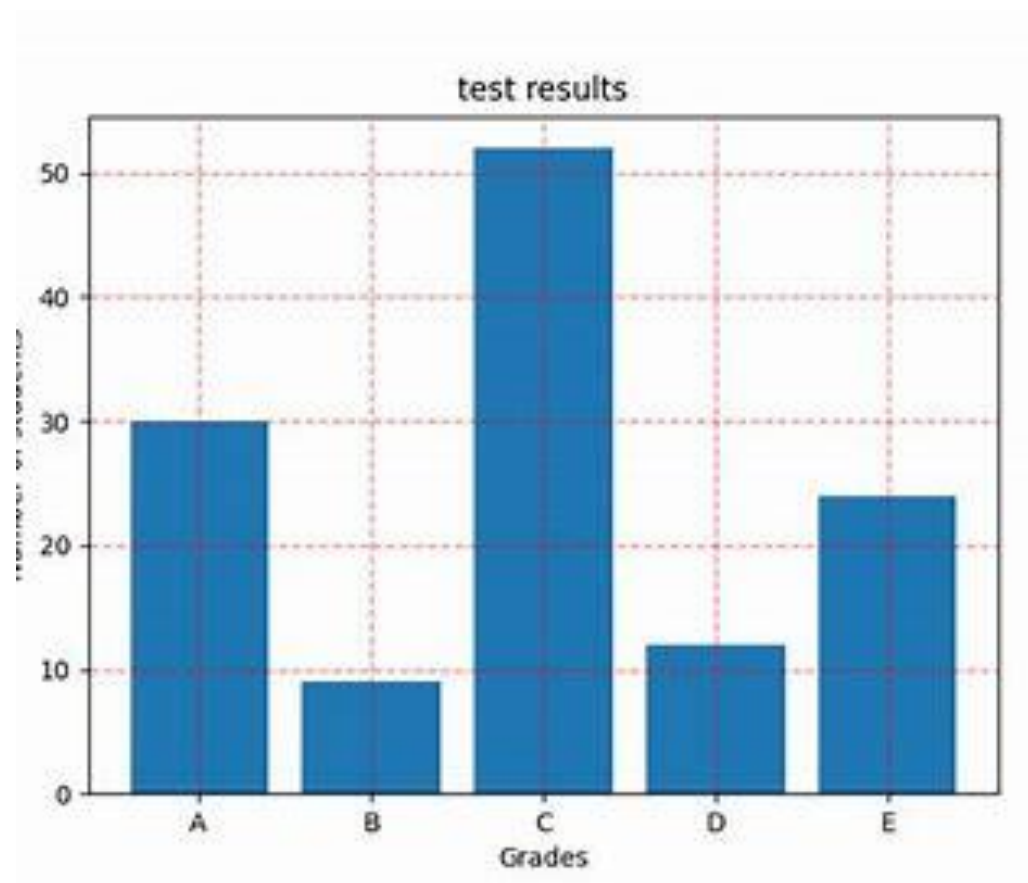
3. The Duck



Moiré Patterns



Gridlines



Gric'''

Employed

400000

350000

300000

250000

200000

150000

100000

50000

0

003

004

005

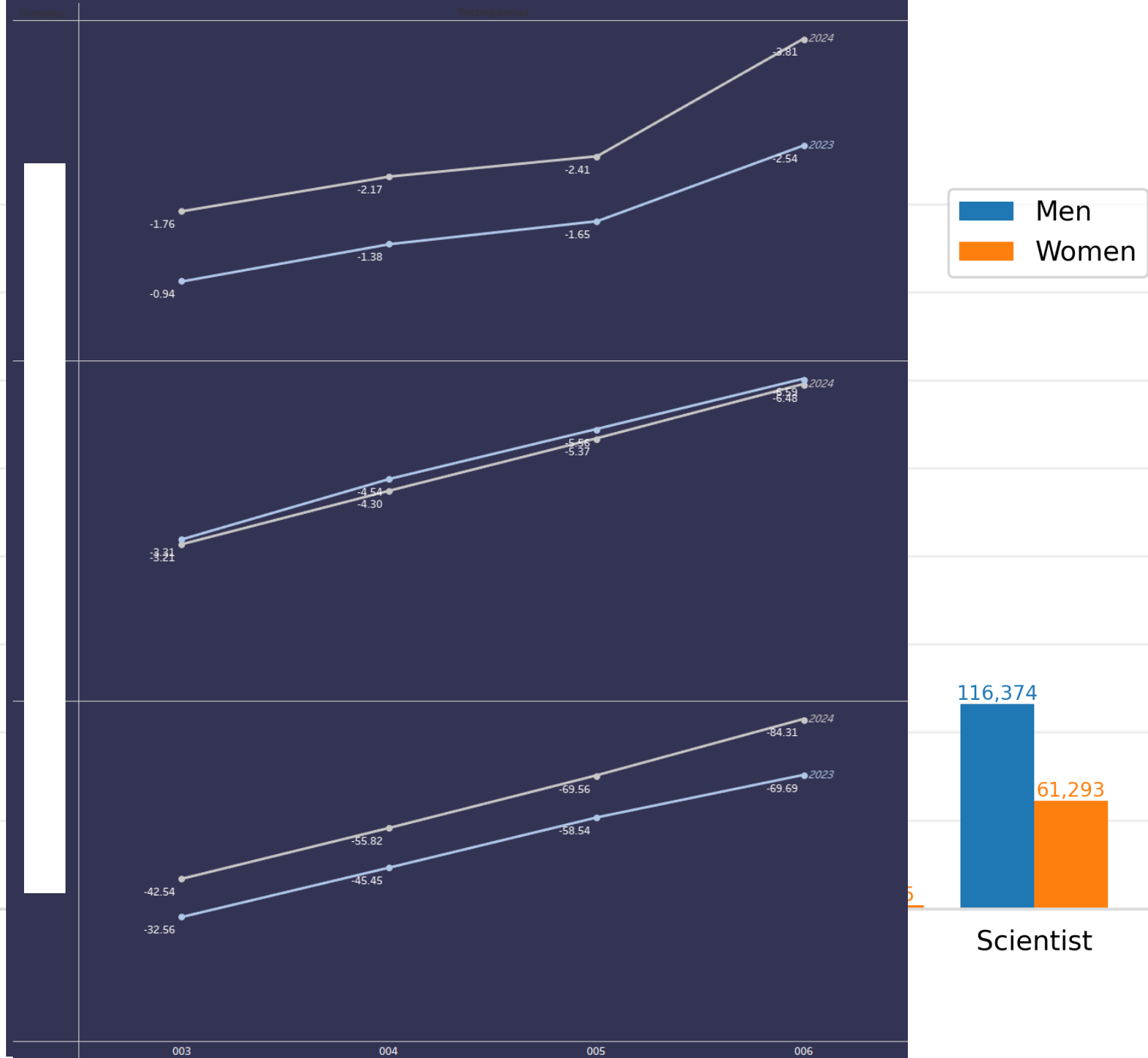
006



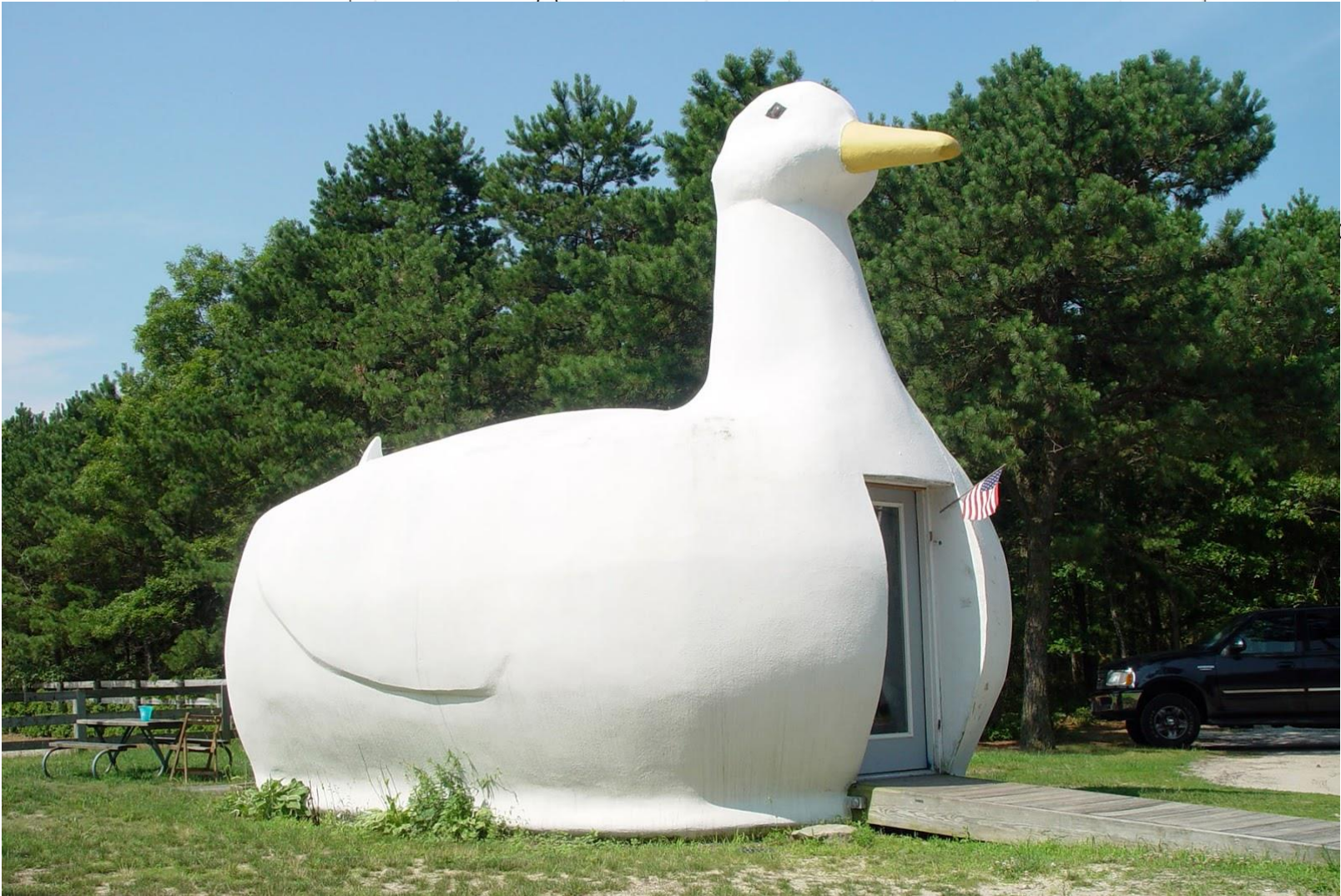
116,374

61,293

Scientist



The Duck



pr(cyl)

4

6

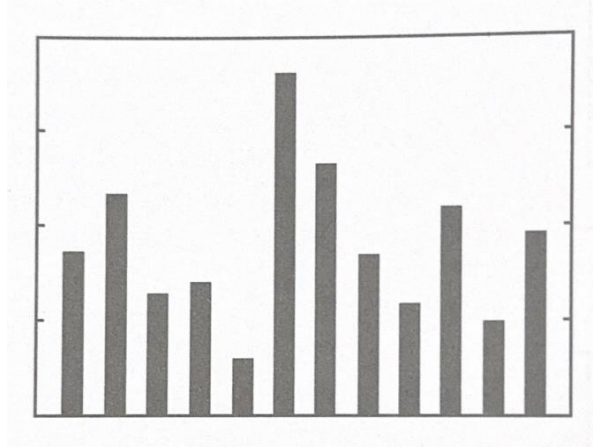
8

Revisiting Popular Visualizations

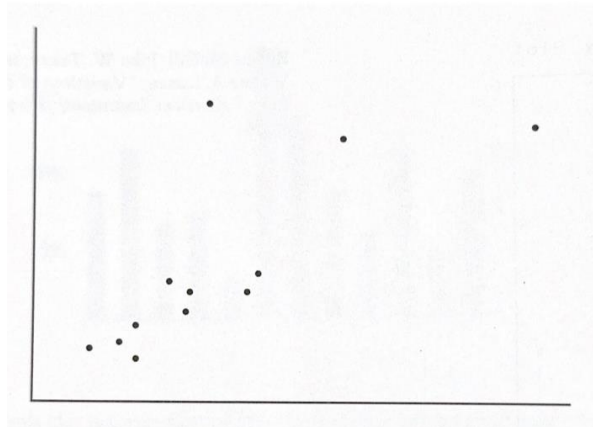
“Nothing is lost to those puzzled, and something is gained by those who do understand”

Revisiting Popular Visualizations

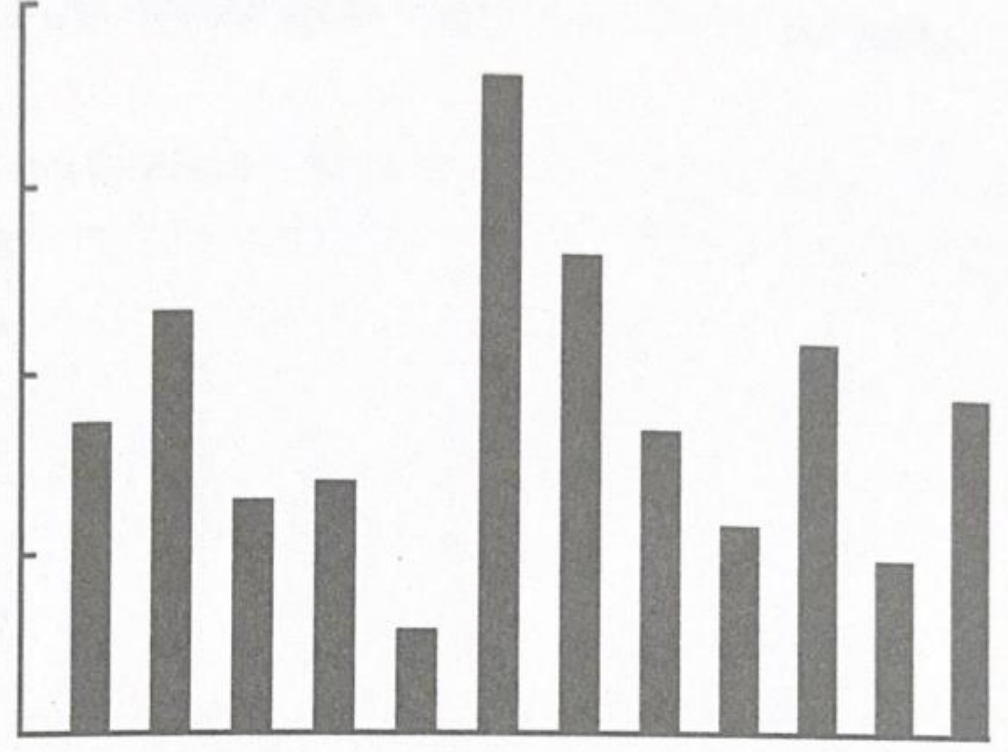
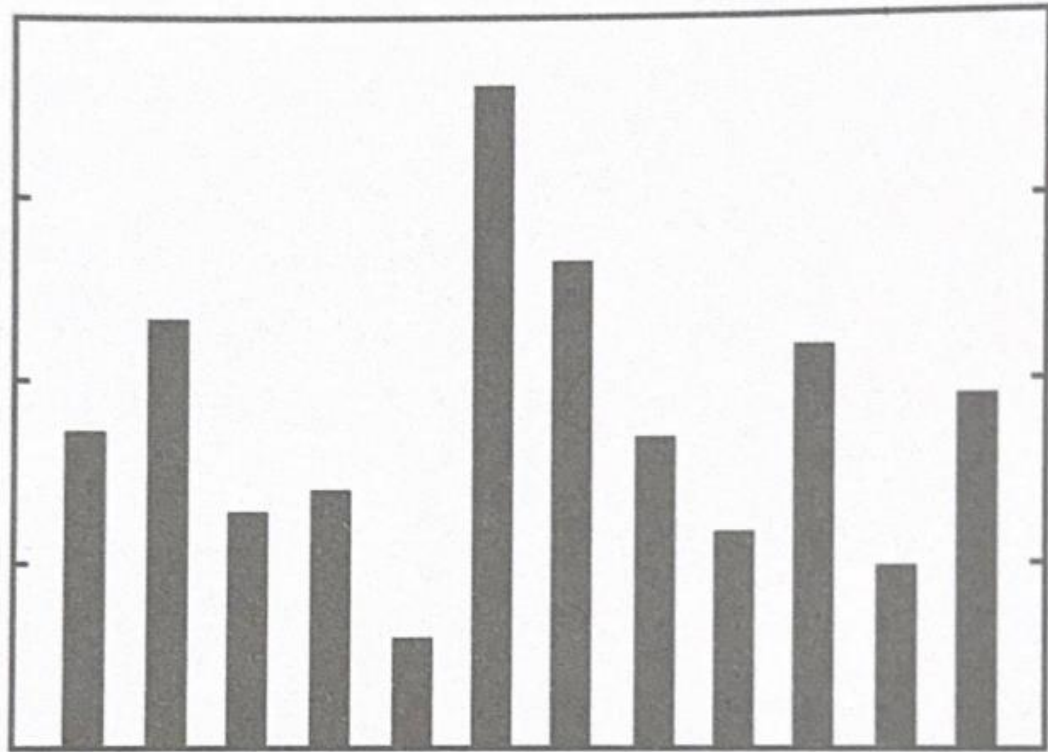
- Bar Graph

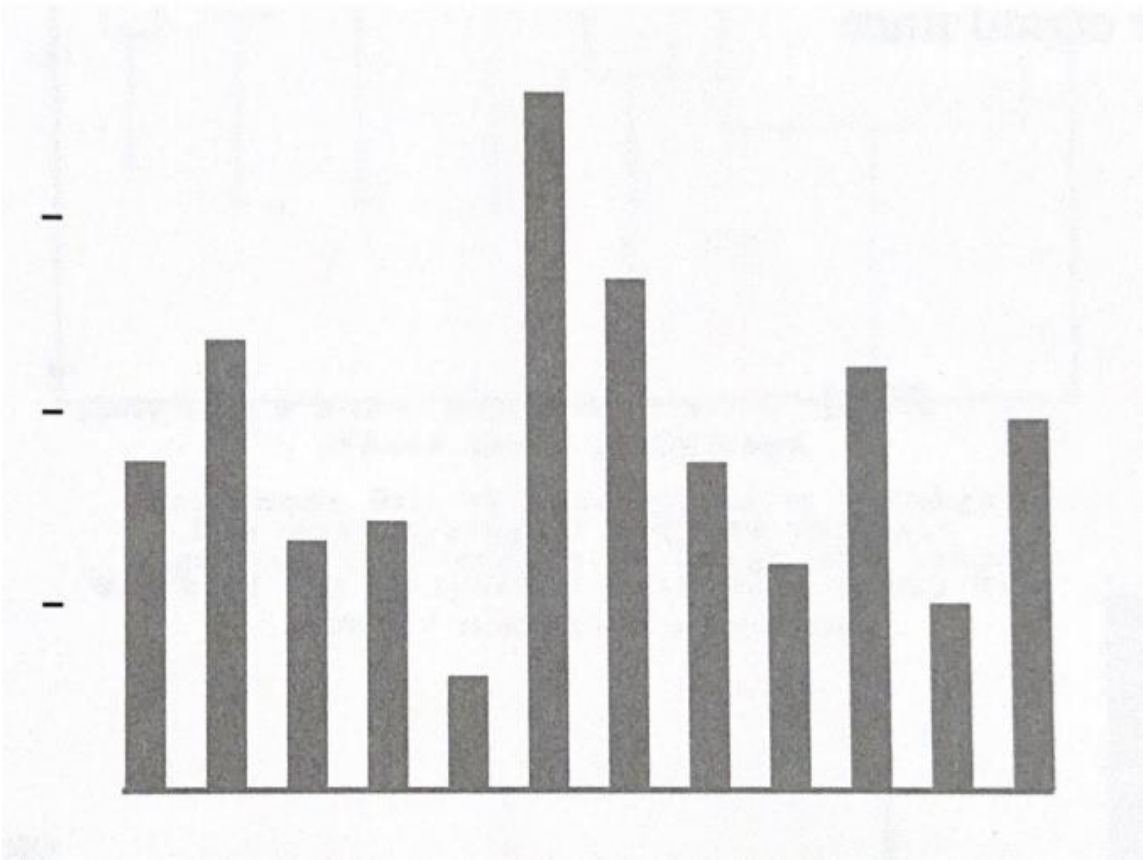
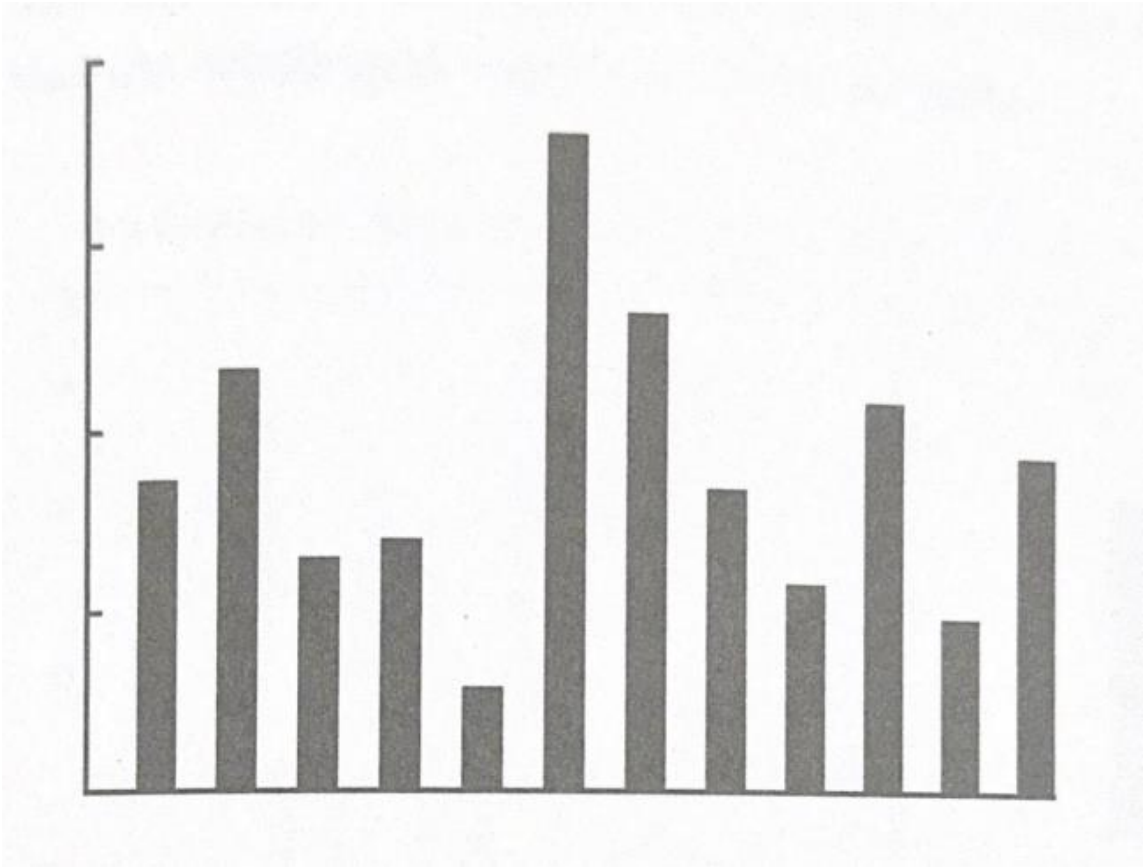


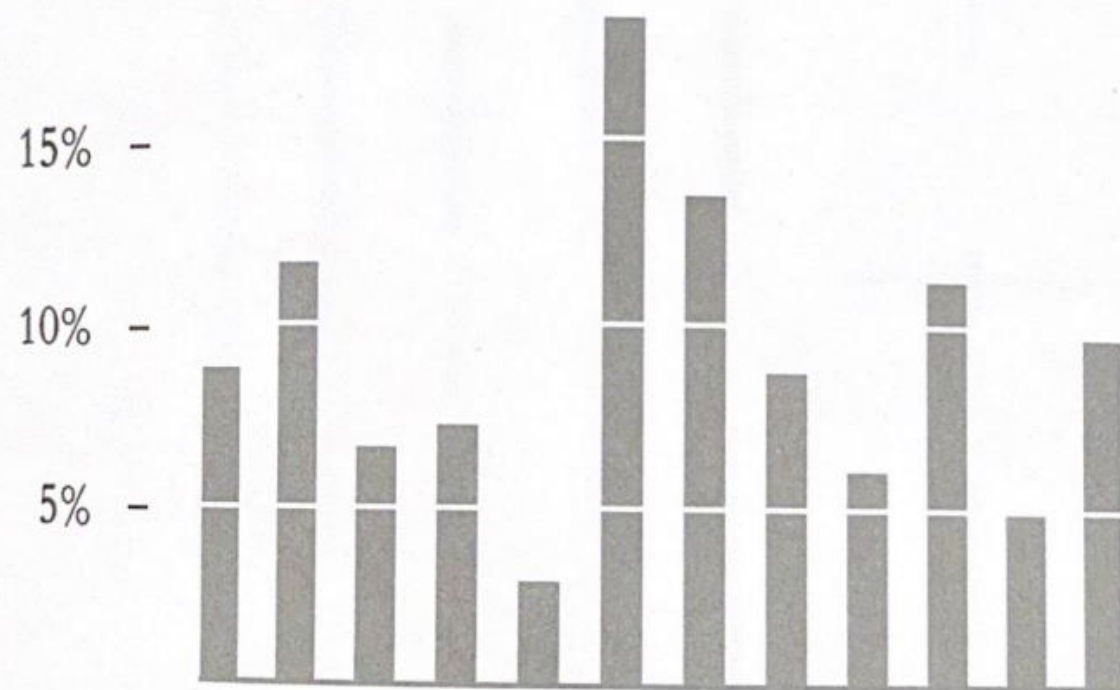
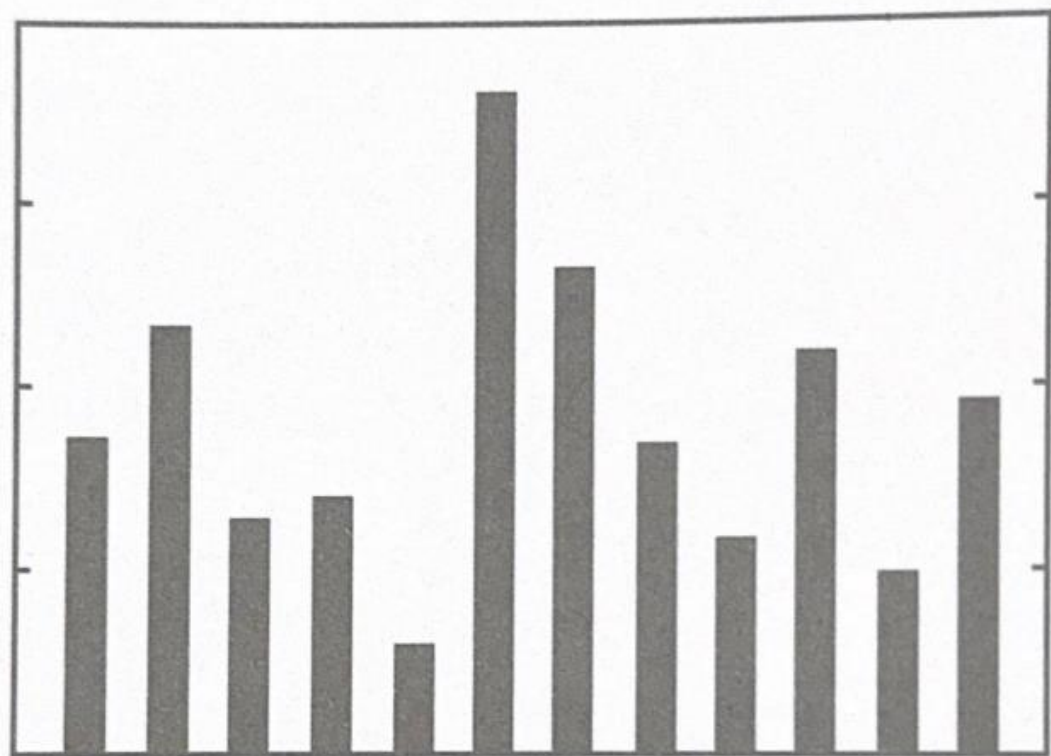
- Scatterplot



Bar Graph

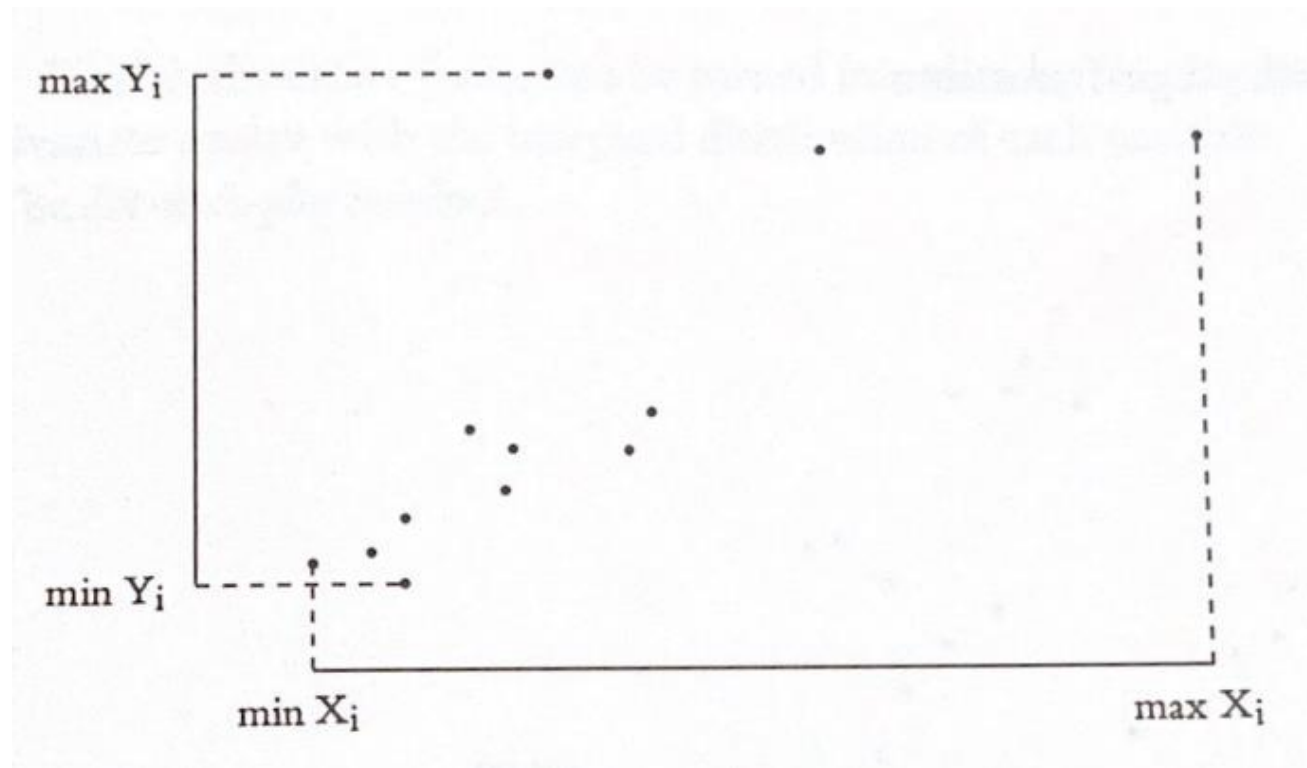


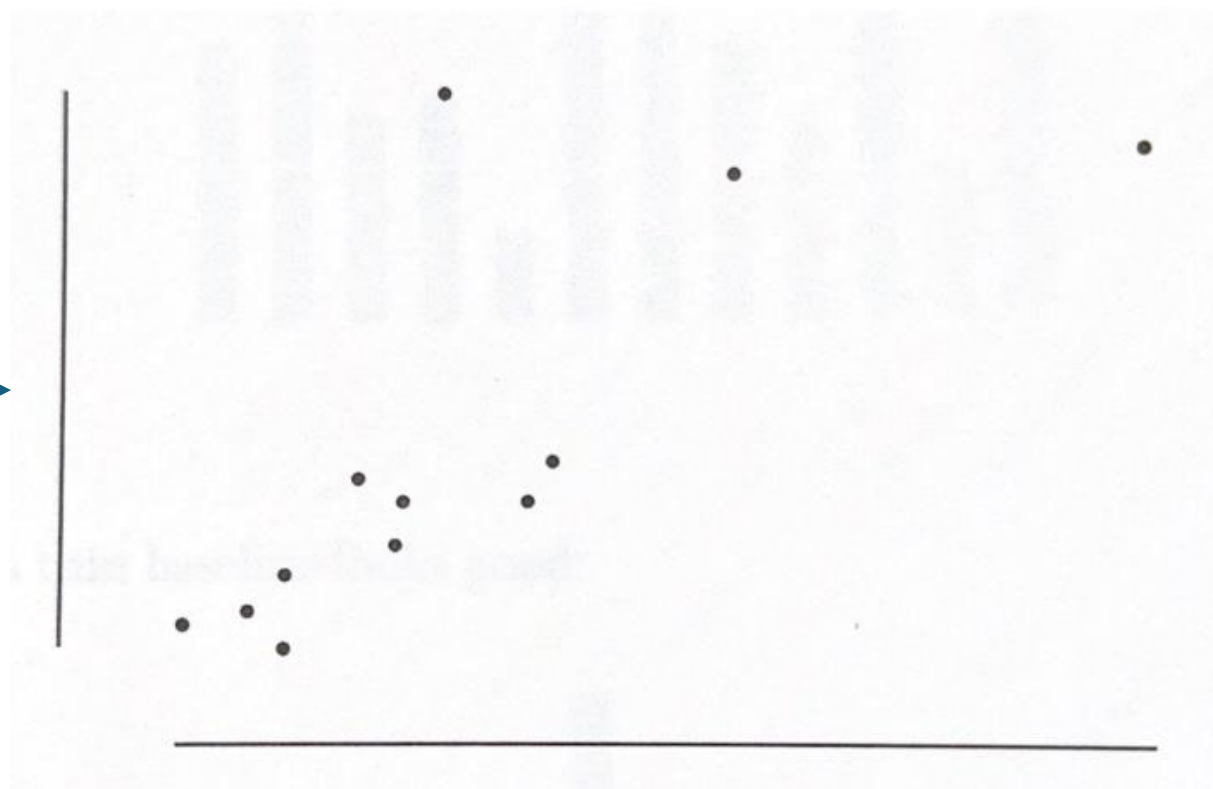
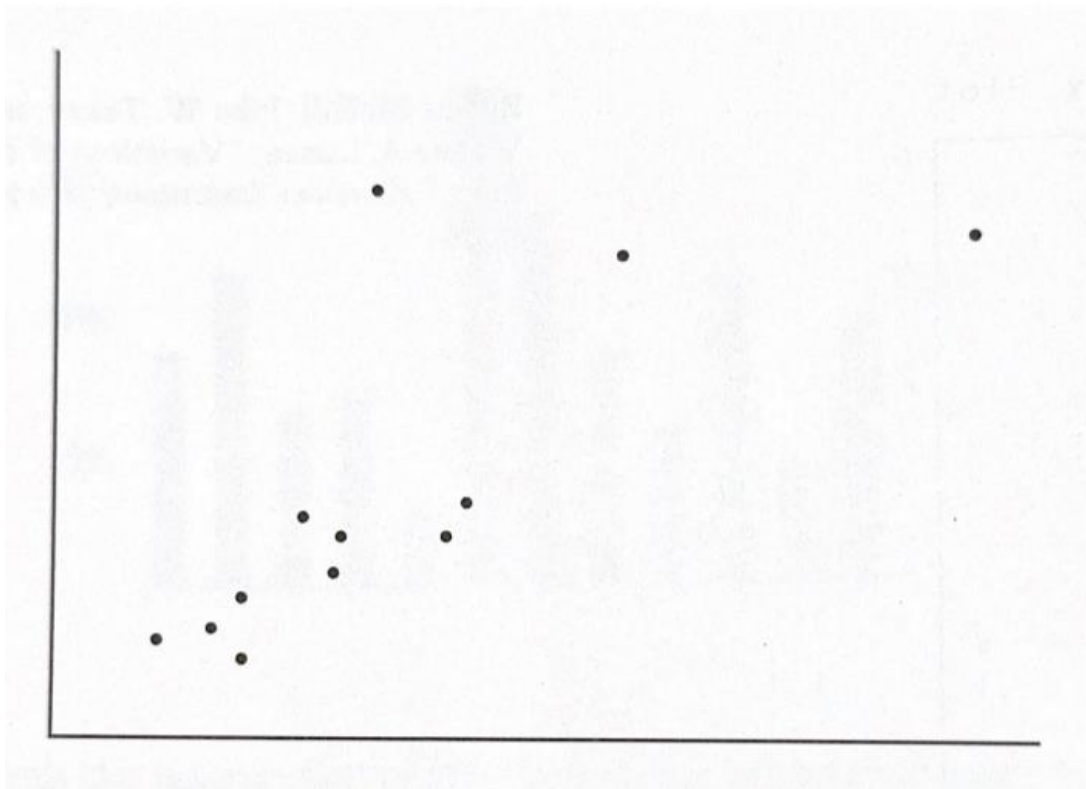


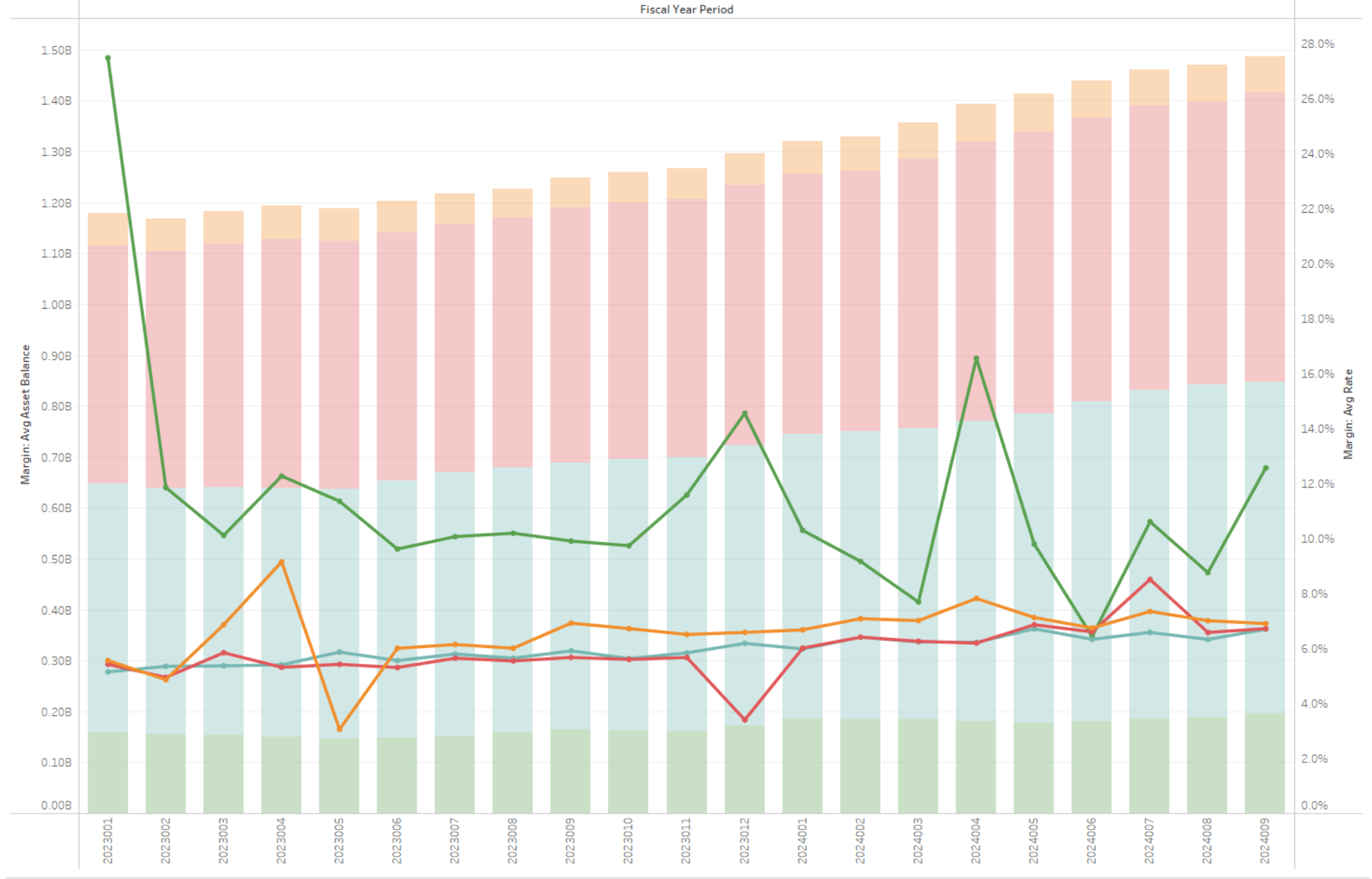


Scatterplot

- Range Frame
 - The axes of the graph only extend as far as the data does



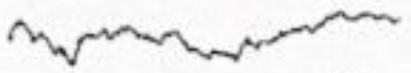
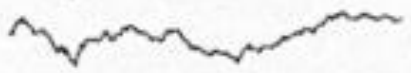
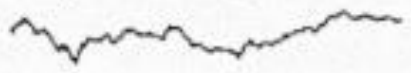
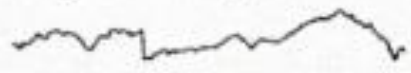
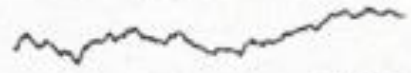
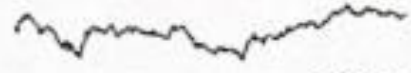
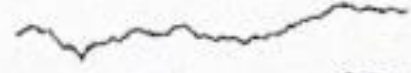
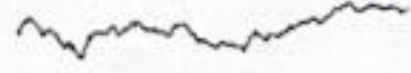




Sparklines

Region	Actual Sales (mn)		% to Goal
Alabama	\$4,916		107%
Alaska	\$3,916		65%
Arizona	\$4,916		103%
Idaho	\$5,916		101%
Illinois	\$4,916		92%
Indiana	\$5,916		89%
Ohio	\$5,916		113%
Oklahoma	\$4,916		81%
Oregon	\$6,916		92%
Vermont	\$4,916		118%
Virginia	\$7,916		192%
Washington	\$5,916		69%

Symbol	Chart	Value	Change
XP		24.54	-1.25
YSK		31.39	+0.54
ZFR		16.78	-0.14

	\$64,368	Vanguard 500 Index	-2.0%	+12.2%	-11.7%	-0.8%
	62,510	Fidelity Magellan	-2.1	+11.3	-12.9	-0.2
	50,329	Amer A Invest Co Am	-1.2	+09.4	-03.9	+4.0
	47,355	Amer A WA Mutual Inv	-1.5	+09.9	+00.8	+3.0
	40,500	PIMCO Instl Tot Return	-2.3	+02.4	+09.4	+7.6
	37,641	Amer A Grow Fd Amer	-2.9	+14.1	-11.0	+7.4
	31,161	Fidelity Contrafund	-1.0	+10.7	-06.5	+3.0
	28,296	Fidelity Growth & Inc	-1.8	+08.2	-08.7	-0.1
	25,314	Amer A Inc Fund Amer	-0.5	+09.9	+05.5	+5.4
	24,155	Vanguard Instl Index	-2.0	+12.3	-11.6	-0.7

Aesthetics

“Graphical elegance is often found in simplicity of design and complexity of data”

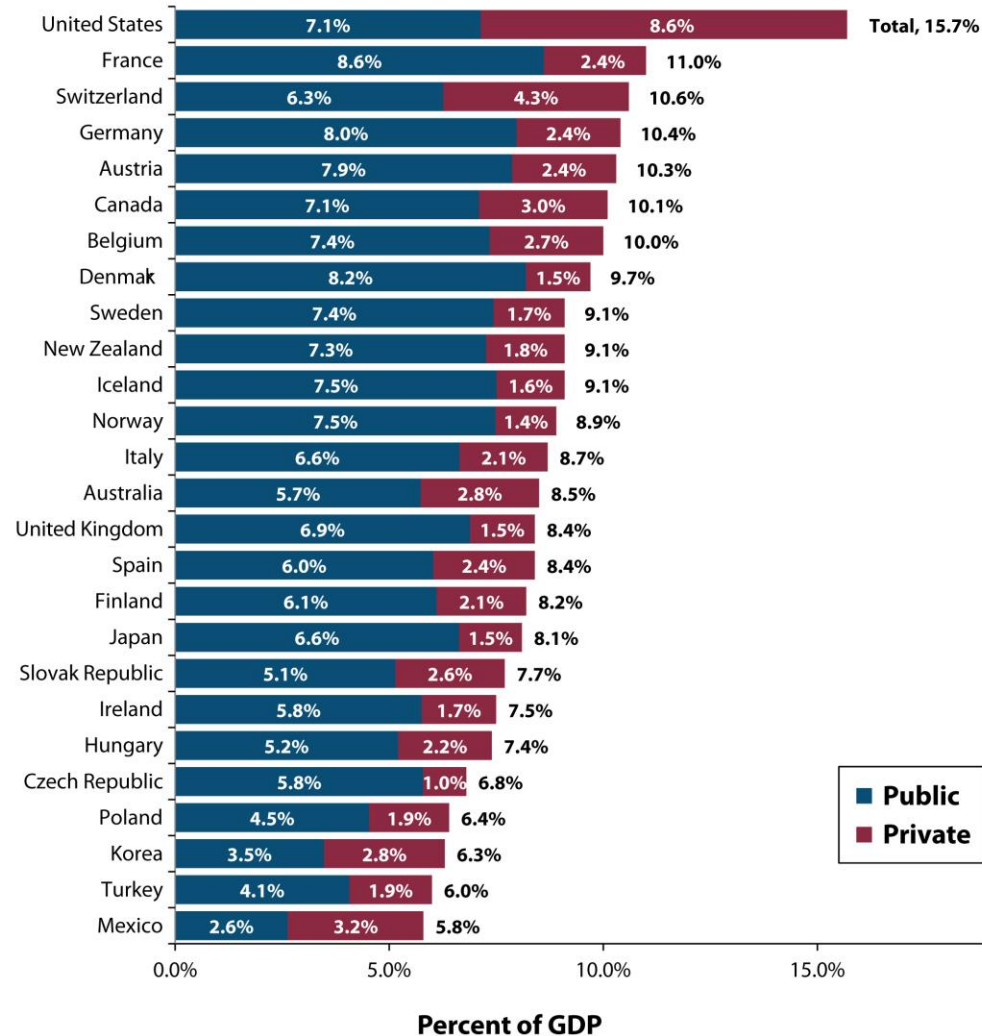
Aesthetics

4 Aspects of Aesthetic Statistical Visuals

1. Balanced proportion of line weight and lettering
2. More weight given to more meaningful aspects of the graphic
3. Graphics should tend towards the horizontal instead of vertical
4. Labels should be written from left to right

United States spends more than any other country on health care

Public and private expenditures on health care spending (as percent of GDP), 2007*

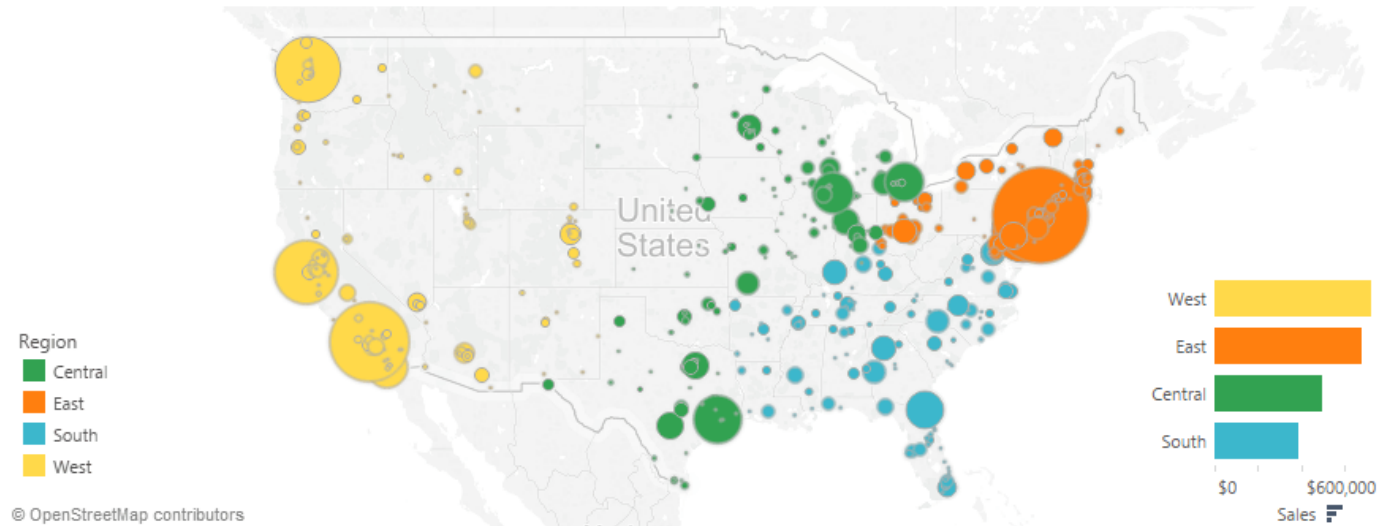


Note: Because of insufficient data, Chile, Greece, Luxembourg, Netherlands and Portugal not shown.

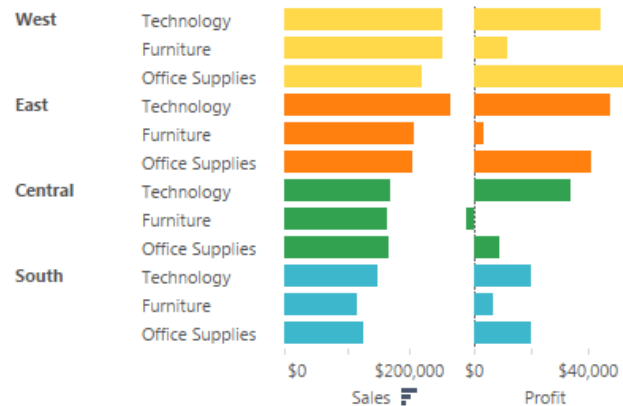
Source: EPI analysis of Organization for Economic Cooperation and Development Health Data.

Let's Take Another Look

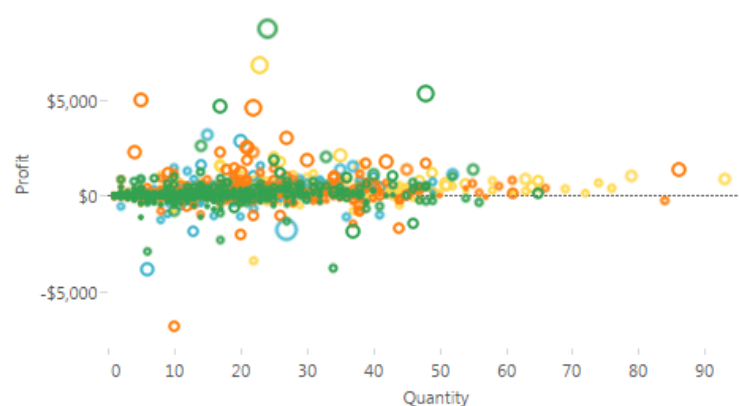
Sales Superstore Regional Dashboard: Single Color Palette



Sales by Product Category



Quantity and Profit by Customer



● meets target ● misses target
Select a KPI by clicking a bubble below.

SALES

\$37.1M

↑\$1.1M YoY

-\$0.3M

SALES VS. TARGET OVER TIME

SALES
TARGET

SALES MARGIN

\$7.4M

↑\$522.5K YoY

+\$2.9M

SALES MARGIN %

19.9%

↑0.9% YoY

+7.8%

TOTAL SALES COST

\$29.8M

↑\$539.2K YoY

-\$3.2M

TOP CUSTOMERS BY SALES

Batz and Sons			\$1.3M ↑\$15.5K
Runolfsson-Rogahn			\$1.2M ↑\$6.7K
Bernhard and Sons			\$1.1M ↓\$5.1K
Ruecker, Runolfsdottir and Roberts			\$1.1M ↑\$14.8K
Rogahn, Crist and Gulowski			\$1.0M ↑\$6.8K
DuBuque LLC			\$1.0M ↑\$4.0K
Pacific West Enterprises			\$0.9M ↓\$14.8K
Greenfelder-Schneider			\$0.9M ↓\$35.0K

TOP LINES BY SALES

Office Supplies		\$19.1M ↓\$9.7K
Technology		\$10.8M ↓\$3.5K
Furniture		\$7.2M ↓\$302.1K

TOP PRODUCT GROUP BY SALES

Phones		\$7.8M ↓\$25.7K
Storage		\$6.7M ↑\$348.5K
Chairs		\$6.0M ↓\$250.4K
Paper		\$5.8M ↓\$289.4K
Art		\$3.6M ↓\$7.7K
Machines		\$2.1M ↑\$58.8K
Supplies		\$1.4M ↓\$3.1K
Labels		\$0.8M ↓\$44.0K
Bookcases		\$0.7M ↓\$58.9K
Accessories		\$0.6M ↓\$22.9K

Key Takeaways

1. Maintain graphical integrity/tell the truth
2. Maximize data-ink and eliminate chartjunk
3. Create sophisticated designs (make your audience smarter!)
4. Apply aesthetic principles with purpose

Closing