

# The Use and Misuse of Graphs

JIN, ICK HOON

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- Graph become an efficient way of providing information.
- Graph can be used to mislead as well as inform.

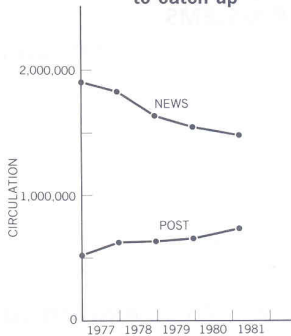
### The soaraway Post — the daily paper New Yorkers trust



**FIGURE 2-9**

The *Post*'s spectacular climb from obscurity.  
(*New York Post*, 1981, via Wainer, 1984.)

### The Post struggles to catch up



**FIGURE 2-10**

Restoring the complete y-axis in Figure 2-9 shows a much more modest performance for the *Post*, with the *News* still well in the lead.

- The left figure seems to illustrate what its headline trumpets - the “soaraway” Post, climbing from obscurity. However, did the Post really increase from next-to-nothing?
- A close look at the vertical scale shows a “disappearing baseline”: the Post started out not near 0, but instead near 500,000.
- A close look at the middle of the vertical scale uncovers a really cheap trick. All the numbers from 900,000 to 1,400,000 were cut out in order to close the gap.
- When the numbers are plotted on a complete vertical axis, without any distortion in the right figure, we see that the Post still had a long way to go.

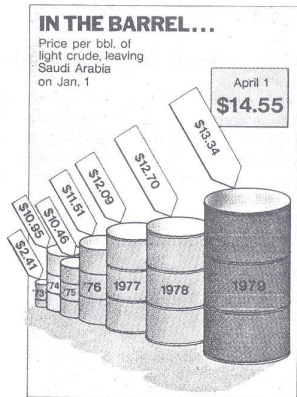


FIGURE 2-11

The spectacular rise of oil prices. (*Time*, April 9, 1979, p. 57—via Tufte 1983, p. 62.)

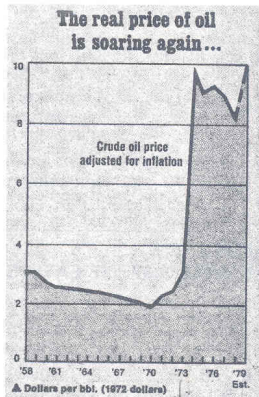
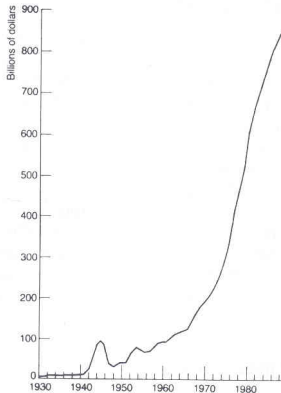


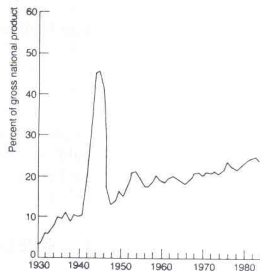
FIGURE 2-12

The real rise of oil prices. Just look at the years 1973–79 and compare to Figure 2-11. (*Business Week*, April 9, 1979, p. 99—via Tufte 1983, p. 63.)

- The left figure shows the spectacular rise in the price of oil after 1973. Since the final price of \$ 13.34 is about 6 times as high as the initial price of \$ 2.41, the artist made the final oil drum about 6 times as high as the first.
- However, it is 6 times as wide too and we imagine it 6 times as deep. Accounting for all 3 dimensions, that big drum holds about  $6^3 = 216$  times as much as the little one.
- Also, the left figure is misleading more subtle way. Much of the increase in oil price was offset by inflation; a near doubling of the cost of living index between 1973 and 1979. The increase in constant buying power, its increase is not 6 times but only  $3\frac{1}{2}$ .
- The right figure is a much more accurate picture.

**FIGURE 2-13**

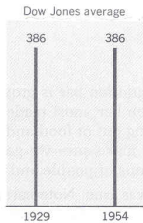
U.S. Government Expenditures, 1930–80.

**FIGURE 2-14**

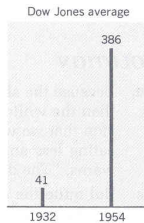
Relative U.S. Government Expenditures (as a % of GNP), 1930–80 (Wonnacott 1986, p. 24.)

- The left figure shows what happens if we naively graph U.S. government expenditures over time. This shows government expenditures skyrocketing to levels that dwarf the little wartime blip in 1941 - 1945.
- However this graph does not mean much because of inflation and the growth of population and income.
- The right figure shows the reasonable graph. This graph shows the relative US government expenditures as a % of GNP.

(a) Did the market go nowhere? . . .

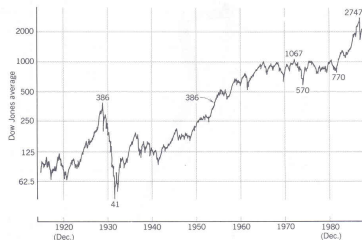


(b) . . . or was it a strong, rising market?



**FIGURE 2-17**

How the New York Stock Market compared in 1954 with earlier years.



**FIGURE 2-18**

The full story of the Stock Market: A rapid collapse, followed by a long recovery.

- Missing comparisons over time often occur because of the selection of a nontypical base year.
- Both panels in the left figure provide a technically accurate, but highly misleading answer. Panel (a) shows that the market was going nowhere; panel (b) shows that the market shot way up.
- The right figure shows the full story that the stock market collapsed rapidly and followed by a long recovery.