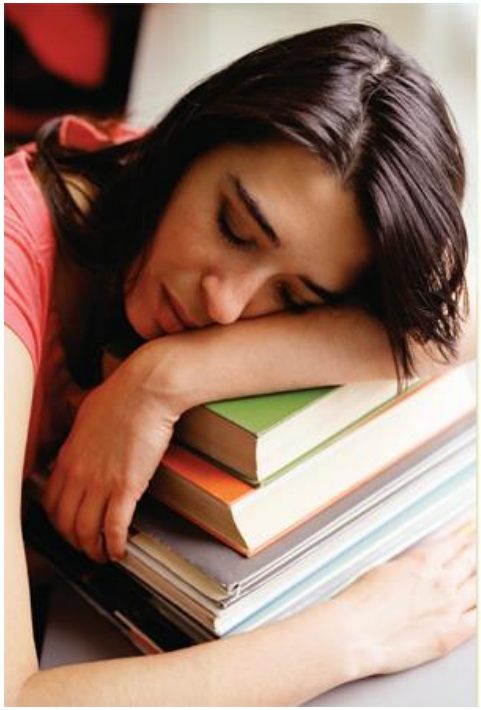
2 Descriptive Analysis and Presentation of Single-Variable Data



2.7 The Art of Statistical Deception

The Art of Statistical Deception

"There are three kinds of lies—lies, damned lies, and statistics."

These remarkable words spoken by Benjamin Disraeli (19th-century British prime minister) represent the cynical view of statistics held by many people.

Most people are on the consumer end of statistics and therefore have to "swallow" them.

Good Arithmetic, Bad Statistics

Good Arithmetic, Bad Statistics

Let's explore an outright statistical lie. Suppose a small business employs eight people who earn between $300 and $350 per week.

The owner of the business pays himself $1250 per week. He reports to the general public that the average wage paid to the employees of his firm is $430 per week.

Good Arithmetic, Bad Statistics

That may be an example of good arithmetic, but it is bad statistics. It is a misrepresentation of the situation because only one employee, the owner, receives more than the mean salary.

The public will think that most of the employees earn about $430 per week.

Graphic Deception

Graphic Deception

Graphic representations can be tricky and misleading. The frequency scale (which is usually the vertical axis) should start at zero in order to present a total picture.

Usually, graphs that do not start at zero are used to save space.

Nevertheless, this can be deceptive. Graphs in which the frequency scale starts at zero tend to emphasize the size of the numbers involved, whereas graphs that are chopped off may tend to emphasize the variation in the numbers without regard to the actual size of the numbers.

Graphic Deception

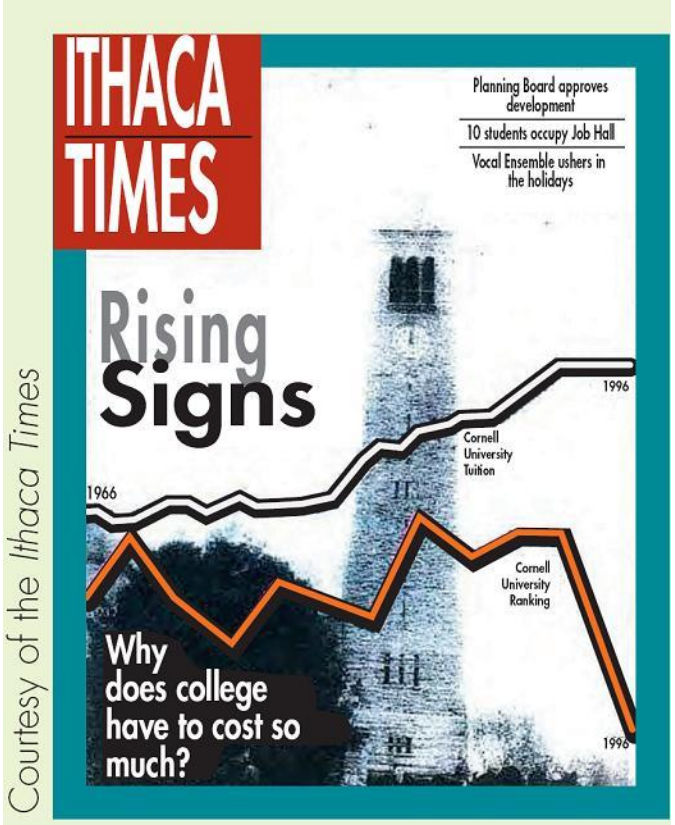
The labeling of the horizontal scale can be misleading also. You need to inspect graphic presentations very carefully before you draw any conclusions from the “story being told.”

Superimposed Misrepresentation

Applied Example 16 – *Claiming What the Reader Expects/Anticipated Bad News*

This “clever” graphic overlay, from the *Ithaca Times* (December 7, 2000), has to be the worst graph ever to make a front page.

The cover story, “Why does college have to cost so much?” pictures two graphs superimposed on a Cornell University campus scene.



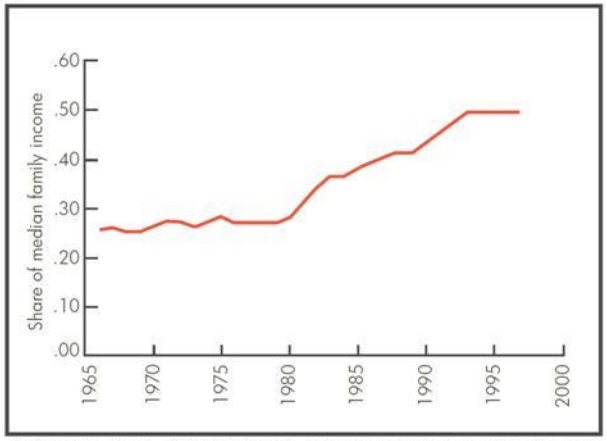
Courtesy of the *Ithaca Times*

Source:
http://www.math.yorku.ca/SCS/Gallery/context.html

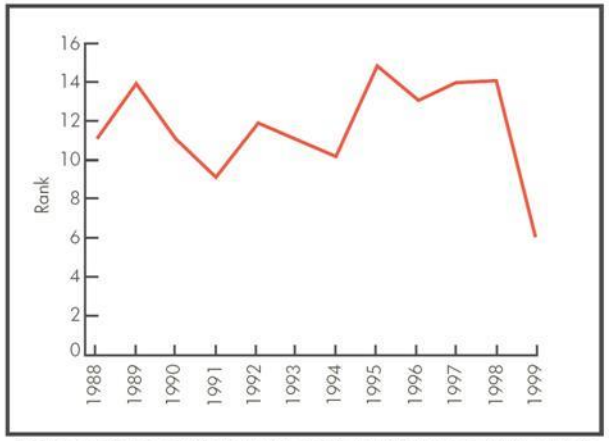
Applied Example 16 – *Claiming What the Reader Expects/Anticipated Bad News* cont'd

The two broken lines represent "Cornell's Tuition" and "Cornell's Ranking," with the tuition steadily increasing and the ranking staggering and falling. A very clear image is created: Students get less, pay more!

Now view the two graphs separately.



BY THE NUMBERS: OVER 35 YEARS, CORNELL'S TUITION HAS TAKEN AN INCREASINGLY LARGER SHARE OF ITS MEDIAN STUDENT FAMILY INCOME



PECKING ORDER: OVER 12 YEARS, CORNELL'S RANKING IN *US NEWS & WORLD REPORT* HAS RISEN AND FALLEN ERRATICALLY.

Source: http://www.math.yorku.ca/SCS/Gallery/context.html

Applied Example 16 – *Claiming What the Reader Expects/Anticipated Bad News* cont'd

Notice:

(1) The graphs cover two different time periods.

(2) The vertical scales differ.

(3) The "best" misrepresentation comes from the impression that a "drop in rank" represents a lower quality of education. Wouldn't a rank of 6 be better than a rank of 15?

Superimposed Misrepresentation

What it all comes down to is that statistics, like all languages, can be and is abused.

In the hands of the careless, the unknowledgeable, or the unscrupulous, statistical information can be as false as “damned lies.”