Chapter Three

Art and Science of Graphical Presentations

Minard's Famous Napoleonic Chart…

Refer to the reprint of Minard's chart in your text.

Many consider Charles Joseph Minard's original time series chart to be the best statistical graphic ever drawn. Why?

He took a ***two dimensional space*** and managed to accurate depict ***five data variables***: size of invading army, size of retreating army, geogaphic location, temperature, and of course, time. The ***multivariate*** data is presented in such a way as to provide an intriguing narrative as to the fate of Napoleon's army.

Graphical Excellence…

Graphical Excellence is achieved when…

1) large data sets are presented concisely and coherently.
2) the message being presented by the chart is clear.
3) the comparison of two or more variables is aided.
4) the substance of the data, not the form of the graph is prominent.
5) there is no distortion of the data and findings.

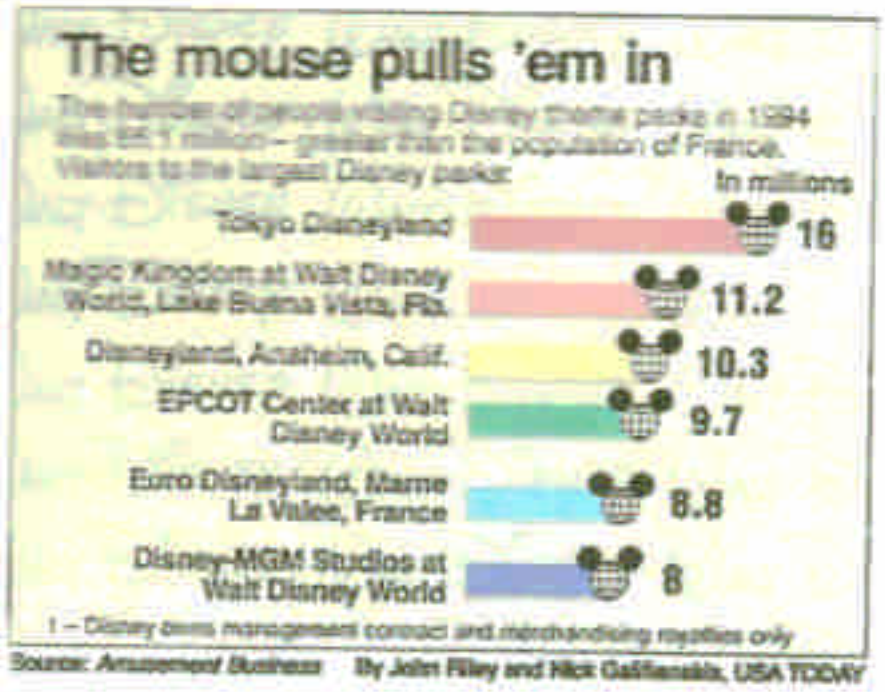
Graphical Excellence…

Edward Tufte of Yale describes ***graphical excellence*** as…

1. The well-designed presentation of interesting data – a matter of substance, of statistics, and of design.
2. That which gives the viewer the greatest number of ideas in the shortest time with the least ink in the smallest space.
3. Nearly always multivariate, and
4. Graphical excellence requires telling the truth about the data.

Figure 3.1

Graphical techniques should be used when there is a **large amount** of data…

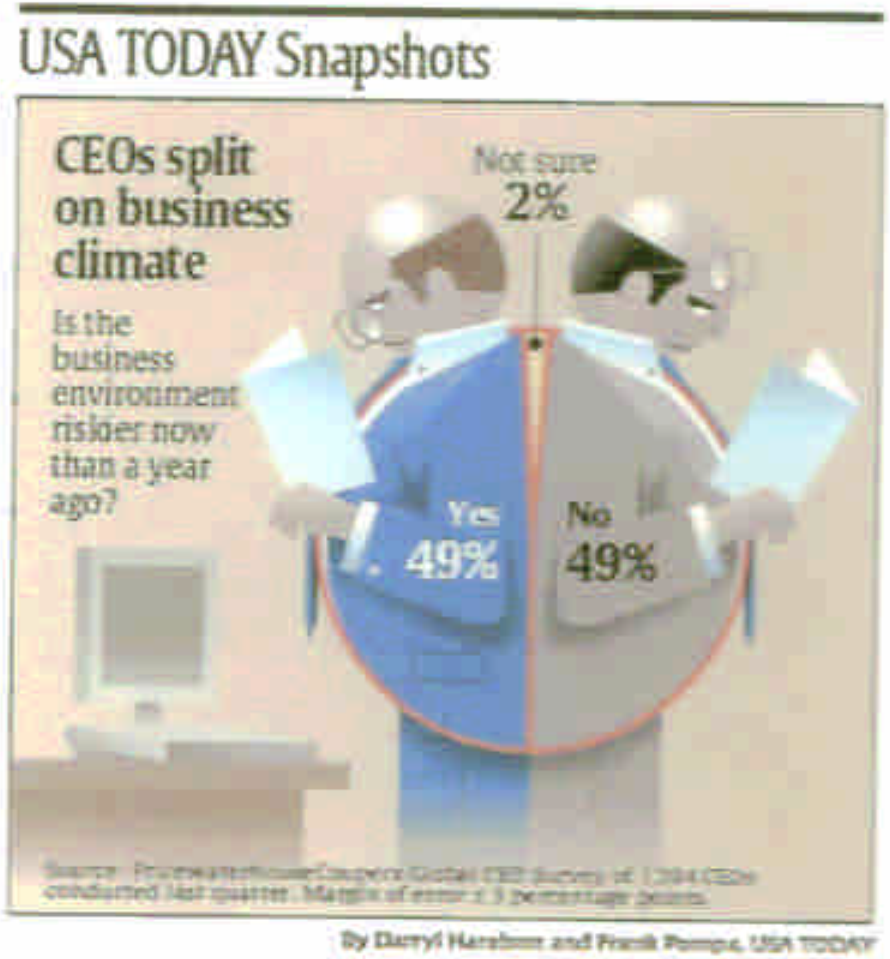


This bar chart is completely unnecessary because:

- only six numbers are represented.
- there is no analysis associated with the data.

Figure 3.2

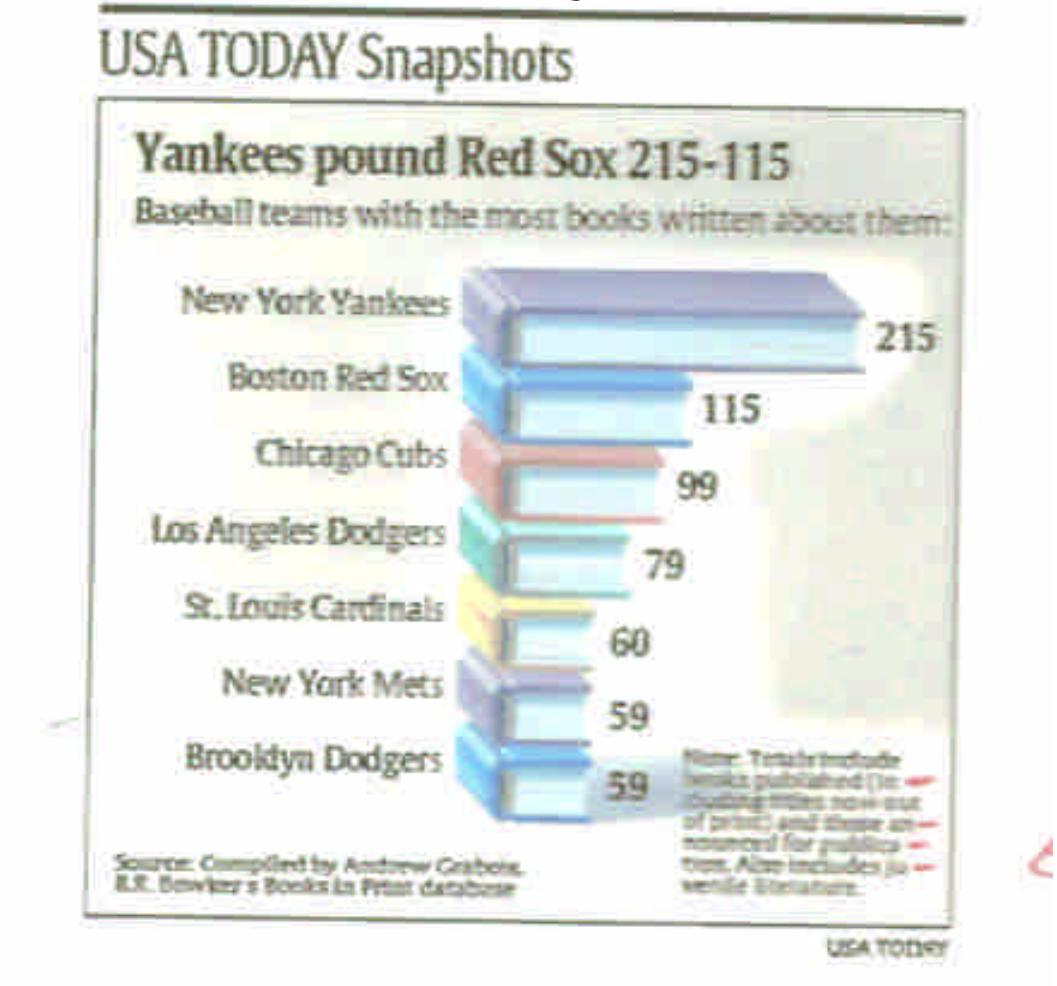
Here is pie chart that contains only 3 numbers…



…it catches your eye but provides no useful information

Figure 3.3

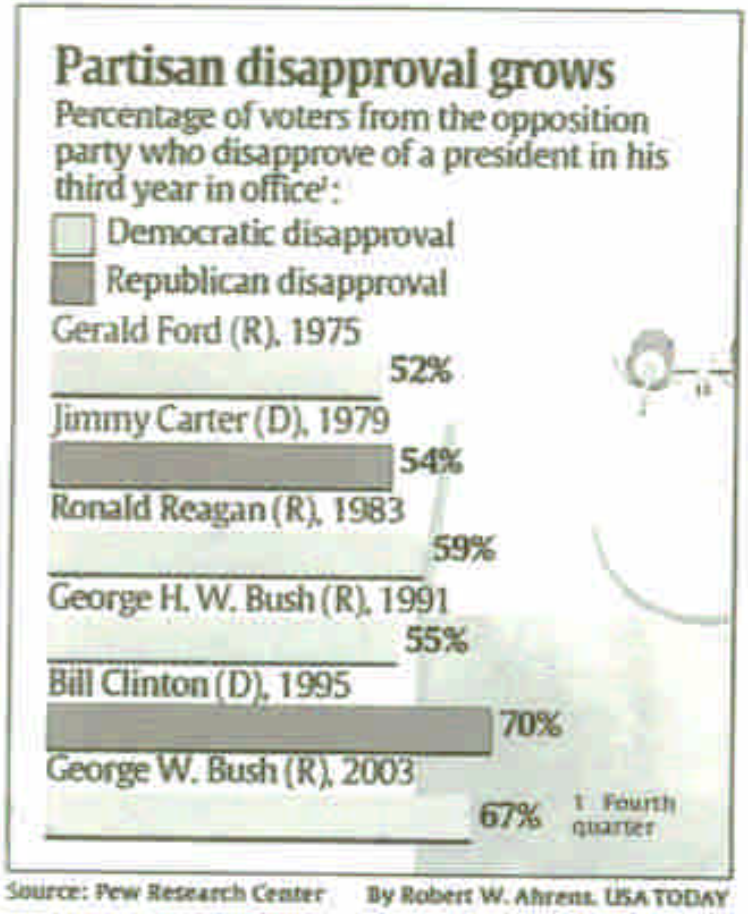
This is a chart that contains only 7 numbers…



…here a table would easily suffice.

Figure 3.4

This bar chart that contains only 6 numbers…



Remove the numbers and its difficult to understand the bars on the chart.

Remove the graph, and the numbers speak for themselves.

Graphical Deception…

Graphical techniques create a visual impression, which is easy to distort, therefore…

It is more important than ever to be able to critically evaluate the graphically presented information.

- Be wary of graphs without a scale on one axis.
- Understand the information being presented: absolute values? relative values (e.g. percentages, deltas)?
- Are the horizontal or vertical axes distorted in any way?

Written Reports…

Here is one suggested method for structuring a report that presents statistical information & analysis to others:

1) Objective statement
2) Experiment description
3) Results
   - Described using words, tables, and charts.
4) Discussion of limitations
   - Discuss problems with the analysis
   - Include violations of required conditions, assumptions, etc.

Oral Presentation…

Again, here are some general guidelines for presenting your statistical findings to others in a presentation setting…

1) Know your audience
   - What kind of information they will be expecting?
   - What is their level of statistical knowledge?
2) Restrict your points to the main study objectives
   - Don't go into the details of your analysis
3) Stay within time limits
   - Respect your audience
4) Use graphs
   - Use the graphical excellence ideas here to explain complex ideas
5) Provide handouts.