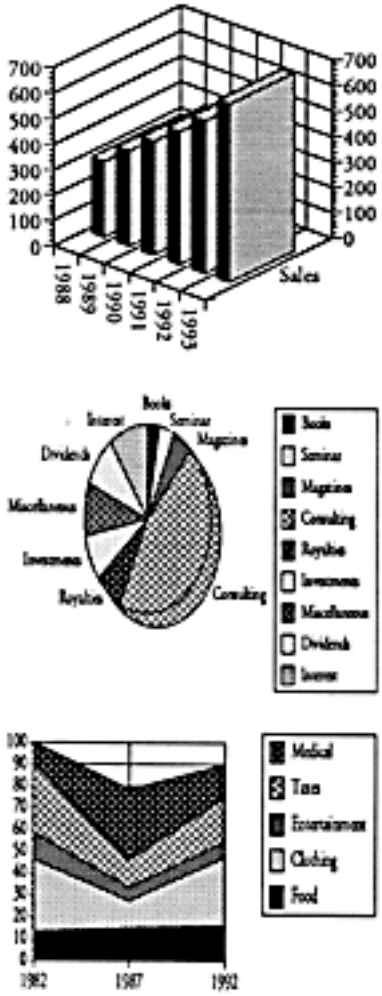
## Visual Presentations · 1
# Three principles of visual literacy

Chuck Chakrapani

**There is less to this than meets the eye**



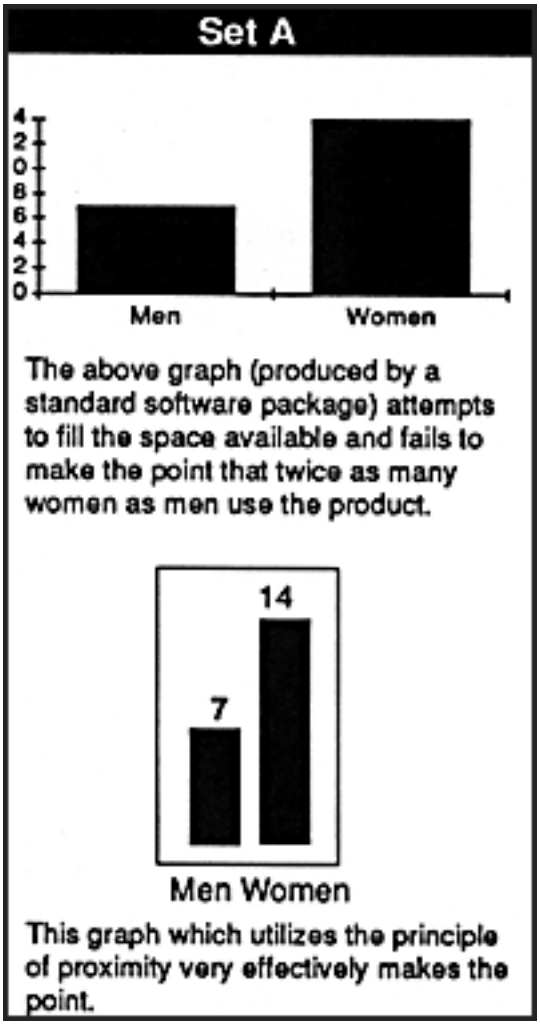

The availability of computer software h.as taken graphs from the realm of specialists and put them into the hands of any one who has access to a computer. This has many positive benefits. For instance, one can produce a very effective presentation or an attractive report on short notice. However, even a cursory review of routinely produced graphs show that many authors pay scant attention to what message the graph is conveying as long as it looks visually pleasing. But what is visually pleasing may not always make sense. In fact, a large number of graphs that appear in newspapers are visually attractive but fail to communicate. Unfortunately, visuals by themselves often do not communicate anything meaningful. Visuals become effective when we first decide what needs to be communicated and then choose the best type of visual to accomplish the task.

To make this discussion relevant, I will try to use graphs that we are likely to see in a newspaper or a research report. Whenever possible, I will use graphs that are generated by standard computer programs to illustrate why it is not always a good idea to assume that a standard package will automatically help you communicate effectively.

**Visual illiteracy**

Look at the graphs on the right. They are all from daily newspapers or from research reports that are currently on my desk. They all share one characteristic they ignore the principles of visual communication. The fact that they appeared

(and continue to appear) in newspapers and research reports indicate that the problem is not just with those who produce these graphs. Readers of reports do not seem to mind them either! It is as though we do not expect graphs to communicate anything in particular. It is there on the page, as an adornment, as an escape from the monotony of a printed page.

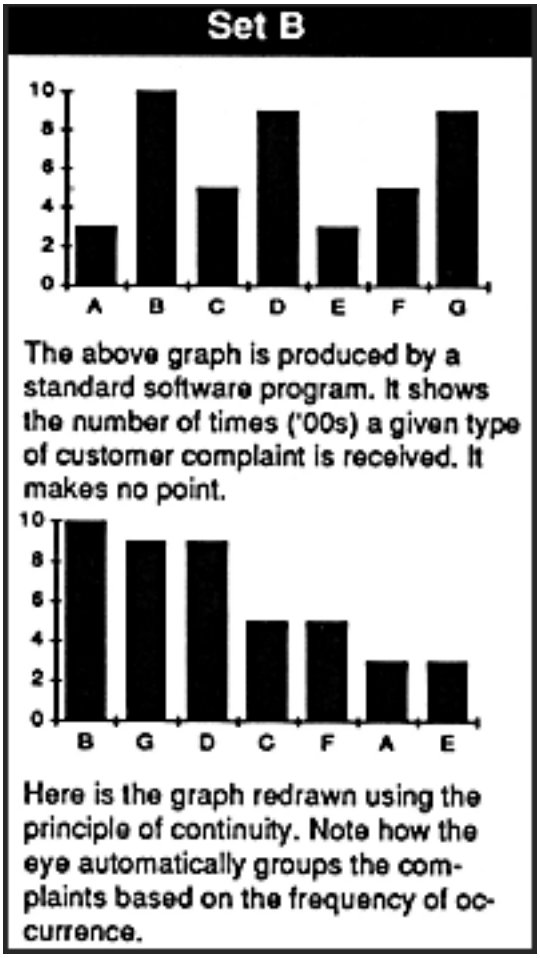



Such visual illiteracy is very disappointing. Graphs and illustrations can communicate very effectively. But for graphs to communicate effectively, there are two prerequisites:

1. Be clear about what one wants to communicate; and

2. Know which chart is best to accomplish the objective.

The advent of computers has given us excellent tools to communicate. However, most graphs are constructed in such a way as to make comprehension difficult. A considerable body of published work is available to help us in this area. Unfortunately, it is not readily available to a busy professional who needs to produce a presentation in a hurry. Modern presentations and research reports almost always include graphs and other visual aids. So in the rest of this article I will review the principles that result in impactful communication.




**Three basic principles of graphic design**
There are three basic principles we should bear in mind when we design a visual presentation (based on Kosslyn, 1994).

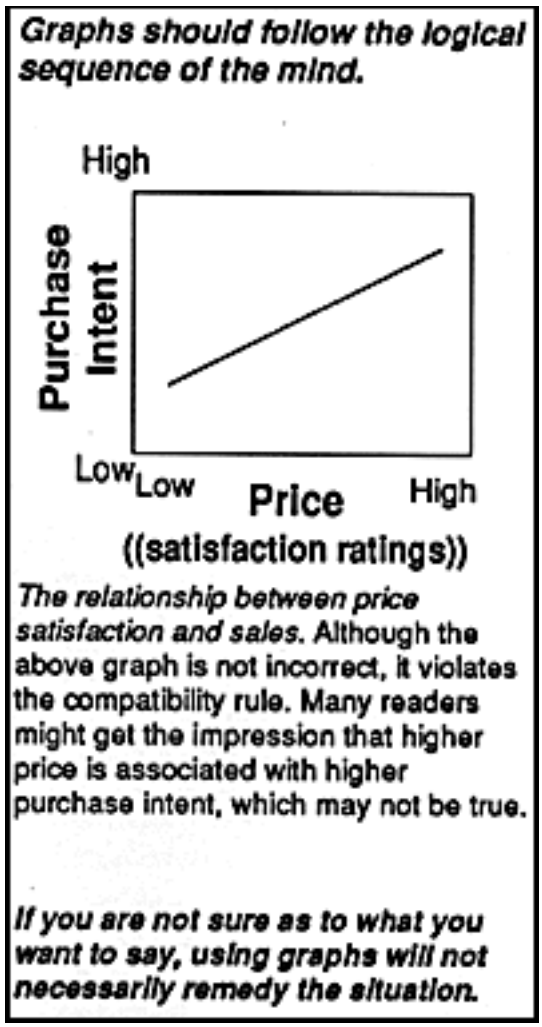
***1. Our mind is not a faithful recorder of objective information***
A camera faithfully records an image. The human eye, on the other hand, interprets what it sees. How the eye interprets what it sees depends on a number of factors:

***The mind is not a camera.***

| | A | B | C |
|---|---|---|---|
| Large | 17 | 69 | 18 |
| Medium | 68 | 16 | 19 |
| Small | 17 | 15 | 63 |

Most people will quickly spot the exceptional figures such as 68, 69 and 63 when the principle of proximity is followed in presenting the numbers

- ***Proximity*** . Objects that are close to one another are grouped together. Look at the exhibit above. The large numbers in each column- 68, 69 and 63 are easy to spot because of their proximity to other numbers in the same column.




Yet, these exceptional figures do not stand out effectively in the exhibit below, because the principle of proximity is violated. The eye is not guided to compare numbers, with the result that the exceptional figure in each column is not easily spotted.

This effect is even more pronounced when graphic presentation is involved. Some computer graphic packages tend to spread out the graphic elements to use up the available space. The first chart on the right (Set A, top) is drawn using a computer package. The built-in logic used by the package runs contrary to how we absorb information visually. The fact that product X is being used by twice as many women as by men is somewhat obscured by the graph. The second chart (Set A, bottom) illustrates how this point can be made effectively by the application of the proximity principle.

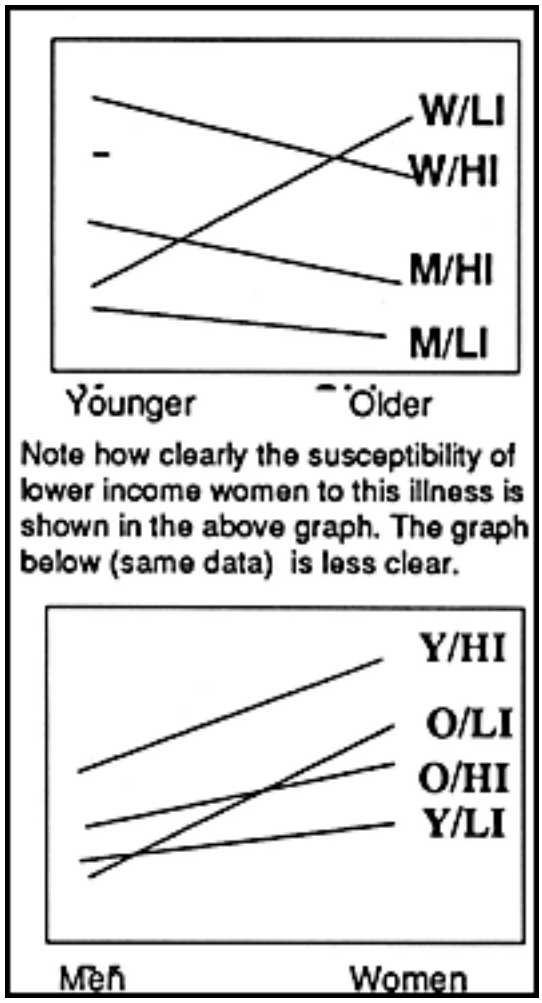
**This exhibit violates the principle of proximity. Most people tend to take longer to spot the exceptional figures when the principle of proximity is violated.**

| | A | B | C |
|---|---|---|---|
| Large | 15 | 69 | 18 |
| Medium | 68 | 16 | 19 |
| Small | 17 | 15 | 63 |

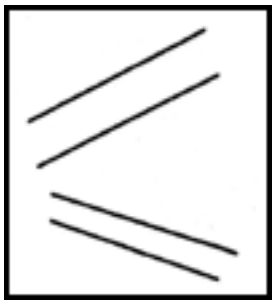
***- Continuation.*** The human eye tends to look at things as one group if there is a continuous theme. The top chart in Set B identifies different types of customer complaints received. This standard chart produced by a standard spreadsheet program does not convey anything specific. The ordered chart that is at the bottom makes it clear that:

1. Complaints can be grouped into three categories based on their frequency of occurrence;

2. The most frequently received complaints are B, G and D.




- ***Similarity.*** We tend to group objects that are similar. If we do not pay enough attention to elements in a graph which we want our readers to group together, they might end up grouping objects on the basis of unintended similarities. Suppose you use patterns (or colours) in your visual presentation and 'rotate' them with no specific meaning attached to the patterns themselves. The viewers might incorrectly group items of the same pattern, even though this is not what you intended.



- ***Commonality.*** Commonality or 'common fate' refers to the perceptual tendency to group lines or points which appear to be headed in the same direction. For example in the chart on the left, we may want the reader to compare the top line with the second line from the bottom. However, if we use the standard graphic format, our reader will not easily be able to see the main point of the graph.

- ***Form.*** Certain forms have meaning. For instance, anything that is placed between two brackets [ ] is seen as a unit. In visual presentations some symbols inadvertently tend to group objects unintentionally. Standard graphs produced by software packages do not automatically adjust for such unintentional effects.

All of the above indicates that the human eye is not a faithful recorder like a camera. It is not enough to simply transfer numbers into graphical formats. It is absolutely essential that we are aware of the effect these graphs will have on the audience. Without such effort on our part, the audience could take in nothing worthwhile or worse, makes an interpretation that is unintended by the analyst or even erroneous.

***2. Incompatibility distorts perceptions***

Suppose you have a car which turns left when steered right. One can safely assume (and there is evidence to support this) that this will result in a large number of accidents because actions and results are incompatible. Incompatibility can also occur in graphics. The resulting 'accident' is the misinterpretation of the graph by the audience.

While most of us will not intentionally create incompatibility, we create it unintentionally. This happens frequently when a positive attitude is created by the absence of a certain thing or phenomenon. For instance, low side effect is correlated with higher satisfaction with a drug. Consequently, if the extent of side effects are plotted with overall satisfaction it will show an downward slope; if satisfaction with side effects is plotted with overall satisfaction it will show a upward slope. The analyst should anticipate the possible misinterpretation by the audience and should assume the general responsibility for presenting unambiguous visual aids. Computer programs cannot spot incompatibility and, as a result, incompatible - hence potentially misleading - graphs are not uncommon.

***3. If we don't know what to communicate, graphs cannot do it for us***

Suppose you have the following information to present:

| | **Risk of contracting illness X among** | | | |
|---|---|---|---|---|
| | ***Younger Men*** | ***Older Men*** | ***Younger Women*** | ***Older Women*** |
| Low income | 25% | 20% | 38% | 55% |
| High income | 43 | 30 | 70 | 50 |

The first chart clearly indicates that the risk of illness decreases with age for all groups except for low income women for whom the risk increases. The pattern is clearly depicted in the graph only because the analyst has understood the meaning and attempted to convey it to the readers. The analyst could have simply fed the data into the computer and got a graph like the one presented on the right. This kind of graph, which is not uncommon, conveys nothing to most readers. More on this in the next *Imprints* .

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