	Daily Paper Type		
Region	***Broadsheet***	***Tabloid***	***None***
South East	15	65	55
West	10	38	24
North	6	33	23
All	31	136	82

Table 1: *Frequency of daily paper readership by type and region*

To illustrate the possibilities, consider the data from a market research question about 'which daily paper do you usually read?' The answers were re-categorised into a type classification (Broadsheet, Tabloid or None); the frequencies of response are given in Table 1. Notice that the 'All' figures only make sense if the size of the sample from each region mirrors the proportion of people living in each region. The sub-samples are equally weighted in calculating the 'All' figures. But this isn't so here. Additional data on regional populations would be needed to apply the correct weighting in combining the figures, for 'All' to represent the three regions together.

	Daily Paper Type		
Region	***Broadsheet***	***Tabloid***	***None***
South East	11	48	41
West	14	53	33
North	10	53	37

Table 2: *Percentage within region of daily paper readership by type and region*

If these data are to be presented as relative frequencies or percentages a decision has to be made: a percentage of what? As I have suggested there might be some misinformation if you used the total sample size. Here, using each region as a sub-sample and finding the percentages within the region gives a sensible comparison between regions. The percentages (rounded to whole numbers) are shown in Table 2.

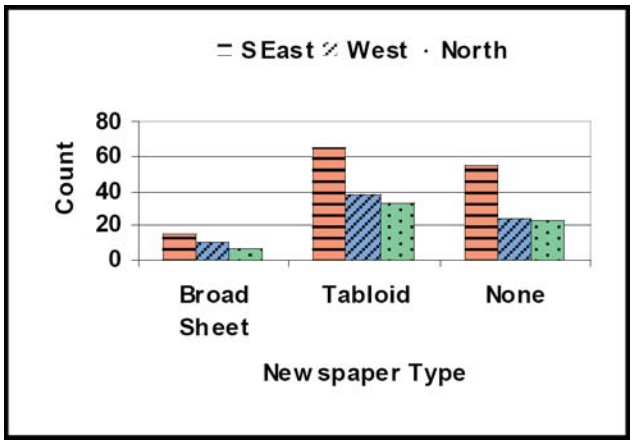

Figure 1: *Frequencies, column chart, 2D, clustered*

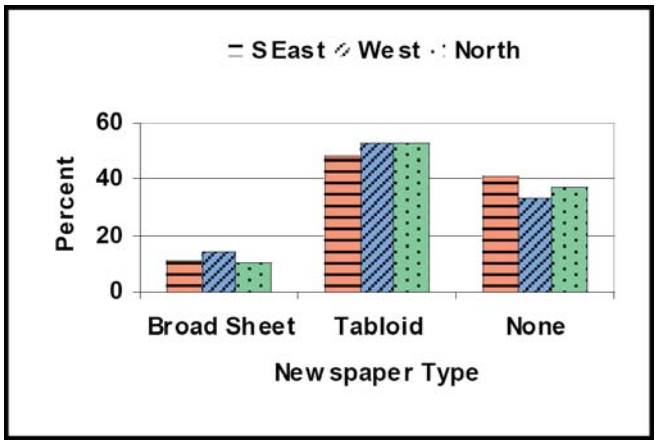

Figure 2: *Percentages, column chart, 2D, clustered*

One of the commonest ways of displaying this kind of nominal data is to use a **bar chart**. Microsoft call vertical bars **Column Charts** and horizontal bars **Bar Charts**. Some examples are illustrated in Figures 1 to 3.

Consider the different effect the two charts in Figures 1 and 2 will have on your audience, and the information they may convey. Remember that people tend to be influenced by the broad shape without paying too much attention to the detailed content of a chart. Figure 1, for example, suggests that Tabloid readers are more common in the South East if you glance at the chart without too much care, while Figure 2 suggests that they are slightly less common within the region.

In a report or a presentation (as printed copies, for example), you may wish to provide a chart as a means to extract detailed information about values for those interested.

Perhaps a table would be a better choice. This bar chart in Figure 3 gives an example where the 3D effect plus the 'cone' facility can make this difficult. Read the percentage for Broadsheet readers in the North in Figure 3 (looks about 7%) and compare with Table 2 and Figure 2. Consider carefully how you use enhanced technology in word processors and spreadsheets etc.!

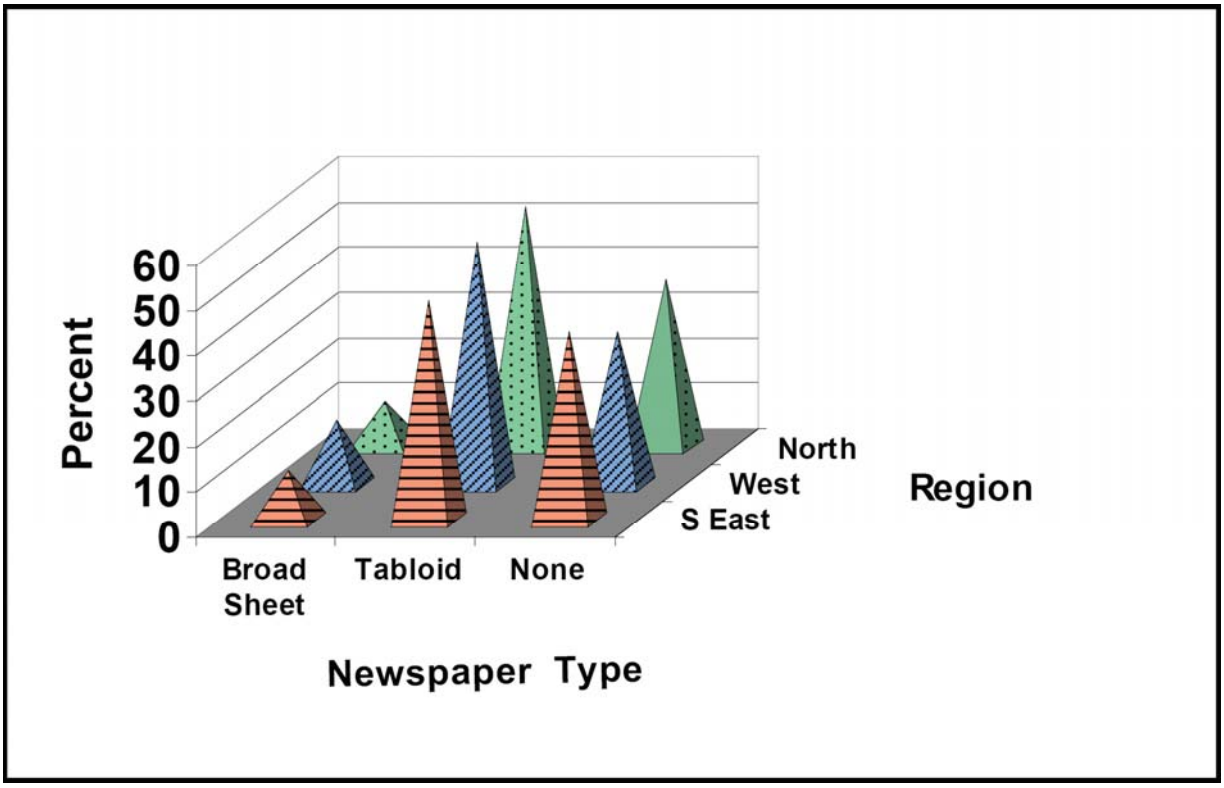

Figure 3: *Percentages, column, cones, 3D, two category axes*

If you want to use the MS Word charting facility, it works like this. In Word 97, place your cursor where you want the chart in a document. Then in the window menus use **[Insert + Object]**. Scroll through the list which appears to find 'Microsoft Graph 97 Chart' and select this (i.e. click on it). You'll see a default chart appear with (probably) an example data table. If you can't find it you may need to install this facility from your Office 97 CD. You can change the data, the labels and edit the chart from the window menus in chart edit mode. Clicking outside the chart or data sheet will turn this off. The chart will appear in the document. To return to chart edit mode double click the chart. To change the type of chart you're using use menu item **[Chart + Chart Type]** in chart edit mode. As you select each chart type MS Word provides a brief indication of what the chart is and what it might do.

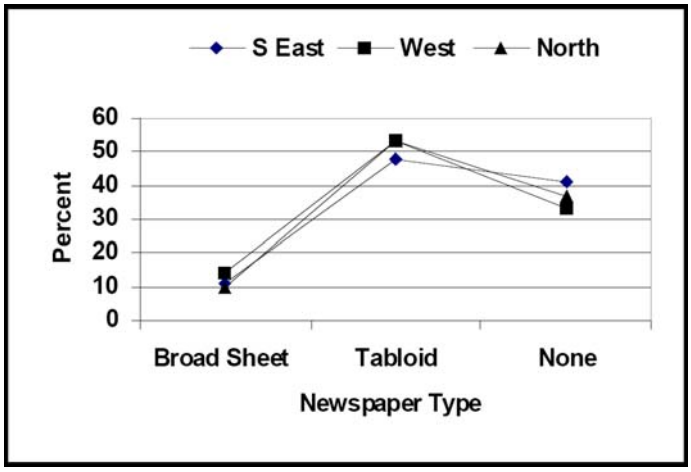

Figure 4: *Frequencies, line chart, markers, 2D*

Bar charts are ubiquitous so there may be some advantage in sometimes using charts involving lines. Vary your approach to avoid boredom and sameness. Here are some examples with the same data. Compare their effects on the way you understand the data. Figure 4 would be called a **frequency polygon**. But do the lines suggest any perceptions that aren't accurate? One thing that is clearly emphasised is the similar breakdown in each region.

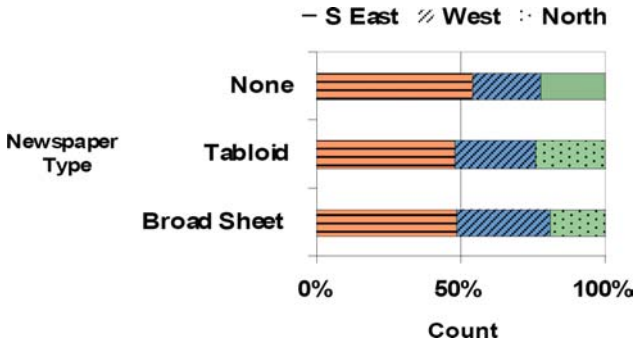

Figure 5: *Bar chart, 2D, 100% stacked*

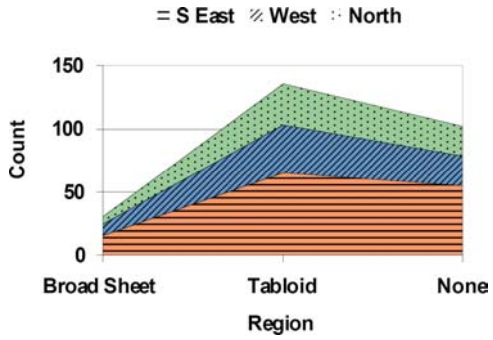

Figure 6: *Area line chart, 2D, frequencies*

Figure 5 gives another example of a line chart and in Figure 6 is a bar chart. They are both 'stacked' charts where each new count (frequency) is added on to the previous one. They are different in that Figure 6 shows these cumulative counts as percents of 100% (the whole sample). Figure 5 incorporates the wrong assumption about combining regions we mentioned earlier as an implicit feature of the chart type. The impression of readers about the overall position isn't correct since the samples weren't in proportion to the population of those regions. Changing the Figure 5 chart's 'Chart Type' formed the chart in Figure 6. The information it will convey seems confused and inaccurate.

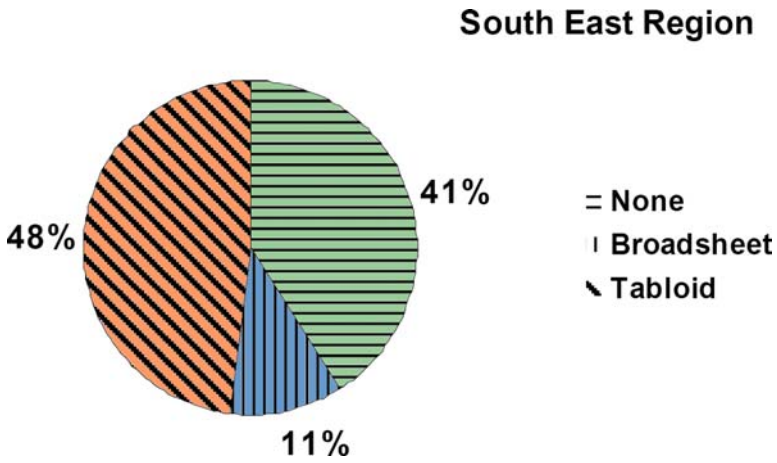

Figure 7: *Frequencies data, pie chart, 2D, percents, titled with region*

A common and useful chart type is the **pie chart**. Figure 7 shows an example. It is used to display the contribution of each category to the total. Here, however, this means a separate pie for each region. This is helpful for comparisons of paper type read within a region, however, the 'between regions' comparison is harder because separate pies are required.

Other more complex pie charts are available in most software, including exploded segments, pie of pie, stacked bar of pie, 2 or 3D. If you want to look into this area and charting generally, many basic textbooks on quantitative methods or statistics for business have detailed discussions. For example, you will find a good range of discussion and material for consideration in:

Wisniewski M (1997) *Quantitative Methods for Decision Makers*, London: Pitman.

DISPLAYING QUANTITATIVE DATA

Amount paid £	Number of people
Under 300	2
300 & under 340	11
340 & under 345	31
345 & under 350	8
350 or over	4
Don't know/Can't remember	7
Total	**63**

Table 0.1: *Amount paid for appliance during 1997*