CHAPTER 4

GRAPHIC ILLUSTRATIONS

After the descriptive analysis of the data is completed, it would be wise to illustrate the results by visual means. The best device to create graphic illustrations would be computers. They have excellent programs to draw all sorts of graphics once the raw data are supplied. In this chapter common graphic illustrations used in research will be explained, and some examples will be provided

Tables

Reasons for using tables are
- to see the relation between two or more sets of figures,
- to arrange the figures in tabular forms but still allowing space for a long title, and/or for other statements about the source data and other units,
- to clarify and emphasize points. William & Stevenson (1951, p. 101) and Turabian (1996) give examples to illustrate the process of planning and constructing of statistical tables (see Table Examples 4.1-4.5).

While Table Example 4.1 indicates the frequency of smokers as opposed to nonsmokers among two different sex groups (one independent variable), Table Example 4.2 indicates the same results in percentages. In Table Example 4.3, we see the distribution of smoking among adults by age and sex(two independent variables). Table Example 4.4 illustrates the use of a table indicating the results of a study with two independent variables (sex and age). Table Example 4.5, on the other hand, indicates the results of the proficiency scores obtained by graduate and undergraduate students at two different levels in terms of mean and standard deviation (SD) .

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Table Example 4.1

Table 4.1

The Distribution of Smokers and Nonsmokers, by Sex
among Students at the School of Agriculture
at Çukurova University for the 1995-96 Academic Year

	N	Smoker	Nonsmoker
Males	1,258	2.104	3,362
Females	1,194	2,752	3,946
Total	2,452	4,856	7,308

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Table Example 4.2

Table 4.2

The Distribution of Smokers and Nonsmokers by Sex
 among Çukurova University Students for the 1995-96
 Academic Year

	N	Smoker	Nonsmoker
Males	3,362	37. 4 %	62. 6 %
Females	3,946	30. 3 %	69. 7 %
Total	7,308	33 .6 %	66. 4 %

Table Example 4.3

Table 4.3

The Distribution of Smoking among Adults, by Age and Sex

Age and Sex	N	Smoker (%)	Nonsmoker (%)
Males			
18 - 32	792	30. 0	70. 0
33 - 47	926	44. 9	55, 1
48 - 62	886	34. 5	65. 5
63 +	758	39. 3	60. 7
Total (males)	3,362		
Females			
18 -32	930	31. 0	69. 0
33 - 47	1,086	30. 4	69. 0
48 - 62	1,042	35. 7	64. 3
63 +	888	23. 0	77. 0
Total (females)	3,946		
TOTAL (both)	7,308		

Table Example 4.4

Table 4. 5

Smoking among Adults by Age and Sex

Age	N		Smoker		Nonsmoker	
	F	M	F	M	F	M
18 - 32	930	792	31. 0	30. 0	69. 0	70. 0
33 - 47	1,086	926	30. 4	44. 9	69. 6	55. 1
48 - 62	1,042	886	35. 7	34. 5	64. 3	65. 5
63 +	888	758	23. 0	39. 3	77. 0	60. 7
Total	3,946	3,362				
TOTAL	(both) 7,308					

Table Example 4.5

Table 4.5

The Results of the Proficiency Test Given to Graduate
and Undergraduate Students at Two Different Levels

	Graduate		Undergraduate	
LEVELS	M	SD	M	SD
Intermediate	65	1.8	46	.71
Upper Intermediate	44	.68	40	.51

The information in Table 4.1 is useless because the numerical information is given in the format of raw data. Table 4.2 represents simple statistical information. Both the dependent and the independent variable consist of two categories. To indicate the total for each variable in each section, the symbol "$\underline{N}$" is used. Table 4.3 represents information for two independent variables and one dependent variable; therefore, it is more lengthy. Table 4.4 is an alternative form of Table 4.3 designed in a more concise way. In Table 4.5 we see the representation of statistical data.

Once the technique is acquired, it is easy for the researcher to prepare his own tables using his own creativity. Results of more elaborated statistical analysis can be illustrated by using the same format.

One main issue that needs to be indicated here is that in writing out the numbers in Turkish, we use a period to separate the hundreds from thousands and thousands from millions etc. (1.007.600 = One million, seven thousand and six hundred). In most English speaking countries, instead of periods, commas are used for the same purpose. In other words, the same number given above would be written in the following manner: 1,007,600. Numbers of more than four digits are punctuated in this manner.

Graphs

Graphs reflect trends over time, frequency of distribution, or relationships (Figure 4.1). For instance, how often messages are sent through BITNET in an office on weekdays, or the connection between the size of companies and the frequency of messages in each company can be investigated, and the results can be indicated on a single-curve graph (Figure

4.2). On the same graph, the distribution or frequency of two or more items can be indicated with different readings of lines to see the correlation between these items (Figure 4.3).
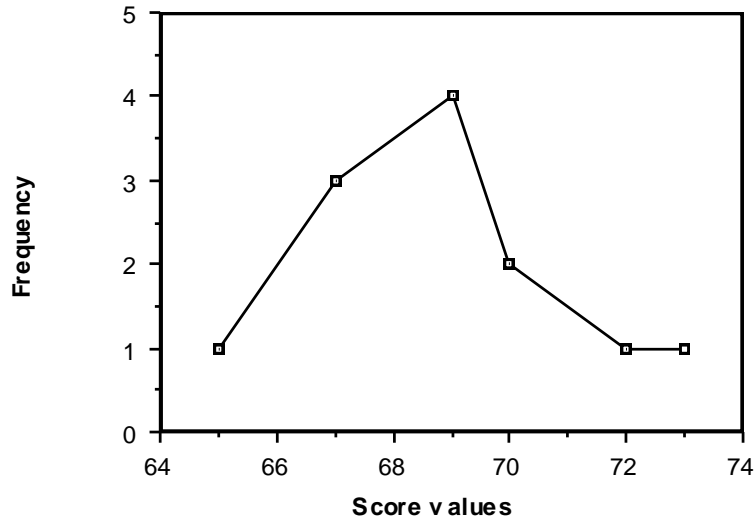

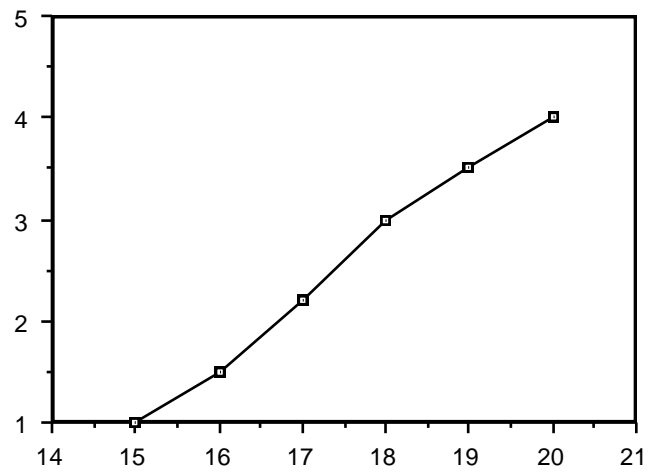Figure 4.1 Frequency distribution of one variable
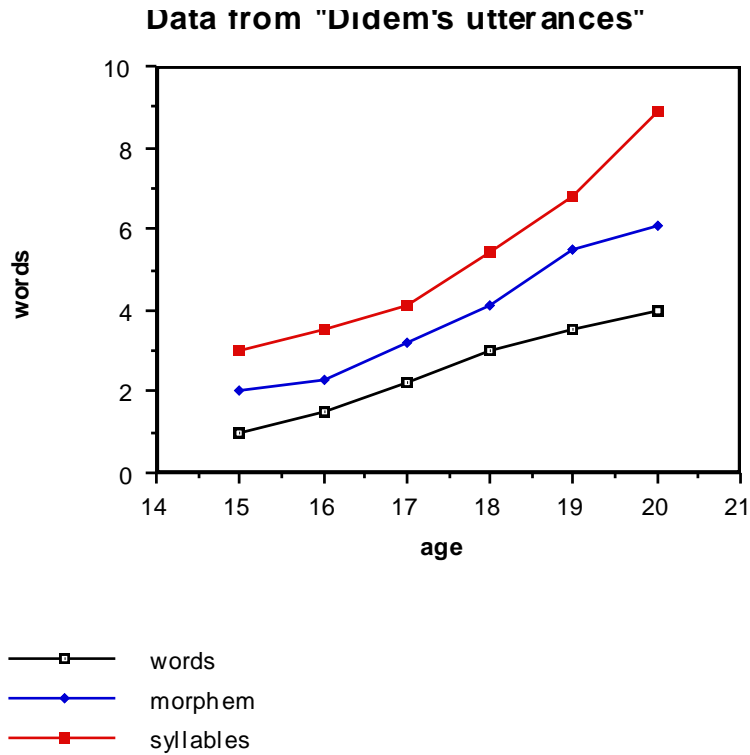
Figure 4.2 A single curve graph

Data from "Didem's utterances"

words

  - words
  - morphem
  - syllables

Figure 4.3   A multigraph

Charts

Bar charts and pie charts are the two common charts used in illustrating frequency distribution, percentages, and averages. Bar charts, which are also called column charts are used to indicate the size or quantity of different groups or items (Figure 4.4). Component bar charts are the ones in which one column is separated into multiple bar charts, so that a series of bars are compiled one on top of another (Figure 4.5) or side by side (Figure 4.6), to indicate not only the size of the group but also the components of each group.
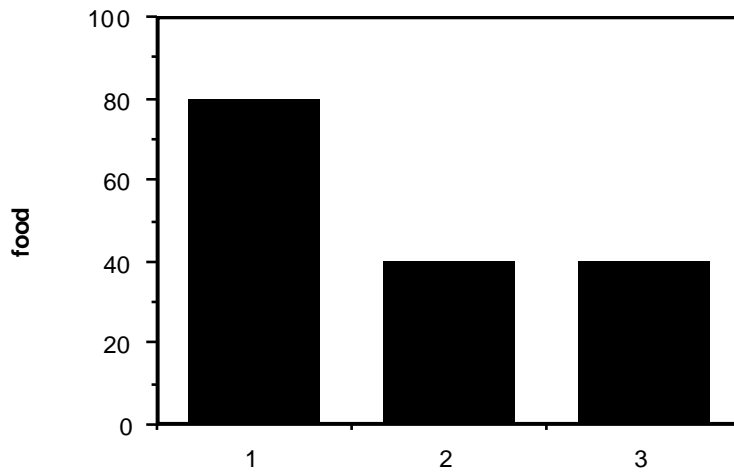
Figure 4.4   A bar (column chart) indicating the expenditure of three different families on food as compared to their income
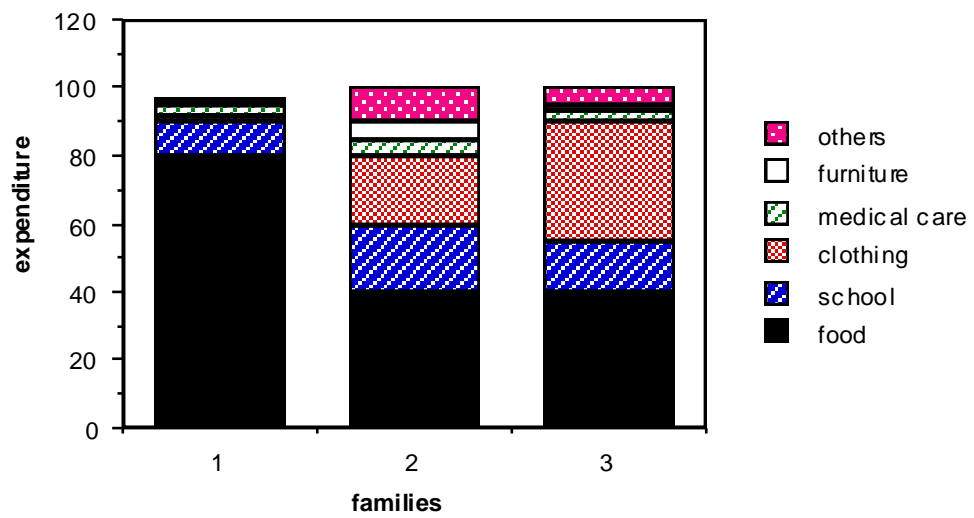

Figure 4.5   A component bar chart indicating the distribution of expenditure in different families
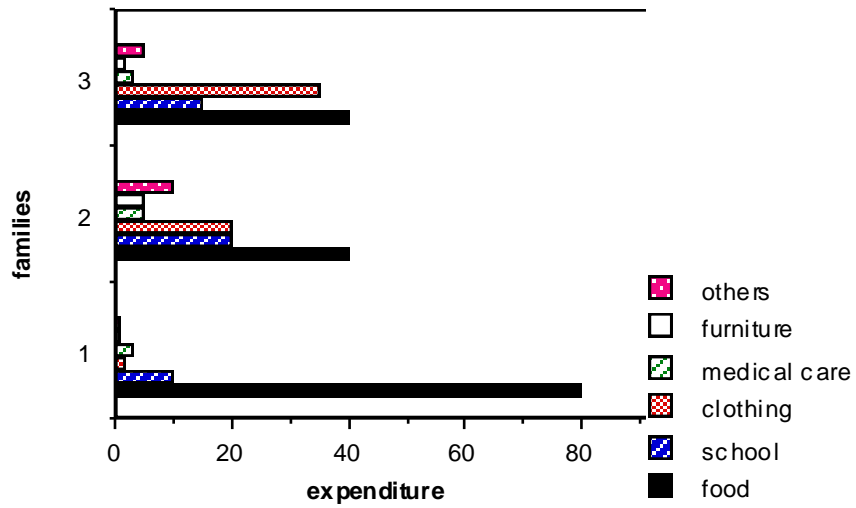
Figure 4.6   A multiple bar chart showing the distribution of expenditure in different families

"A pie chart is a circle divided into sections by radial lines. The area of each section is propositional to the relative size of the figure it represents" (Rowley & Turner 1978, p. 79). Pie charts are generally used to compare the relative sizes of component figures the number of which does not exceed eight (Figure 4.7).
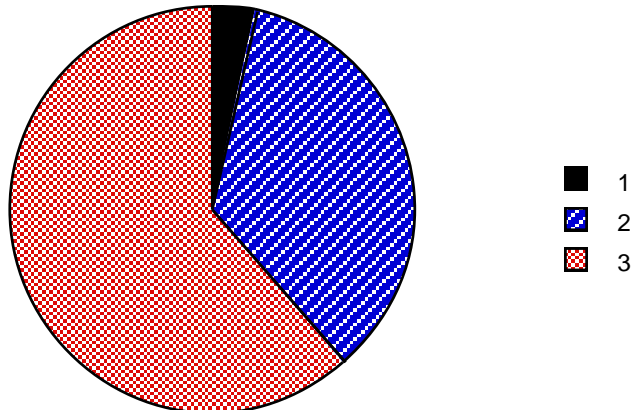
Data from "Families"

Figure 4.7   A pie chart indicating the proportion of the salary spent on clothing for different families

Map Graphs

Map graphs are used to indicate the distribution of natural resources or factory productions, populations sharing the same language, the same dialect, or any other variations such as different incomes or educational levels. Dots are usually used in map graphs to show distributions throughout a country or region of languages, dialects, crops, fruit trees, mineral and forest resources, factories, and many other similar issues related to that location. Large dots or closely arranged small dots indicate intensive distributions. As the dots become further apart from one another, they indicate that the distribution is less as compared to other locations. White areas indicate the nonexistence of that component in those areas. It may simply indicate the locations of important cities (Figure 4.8).
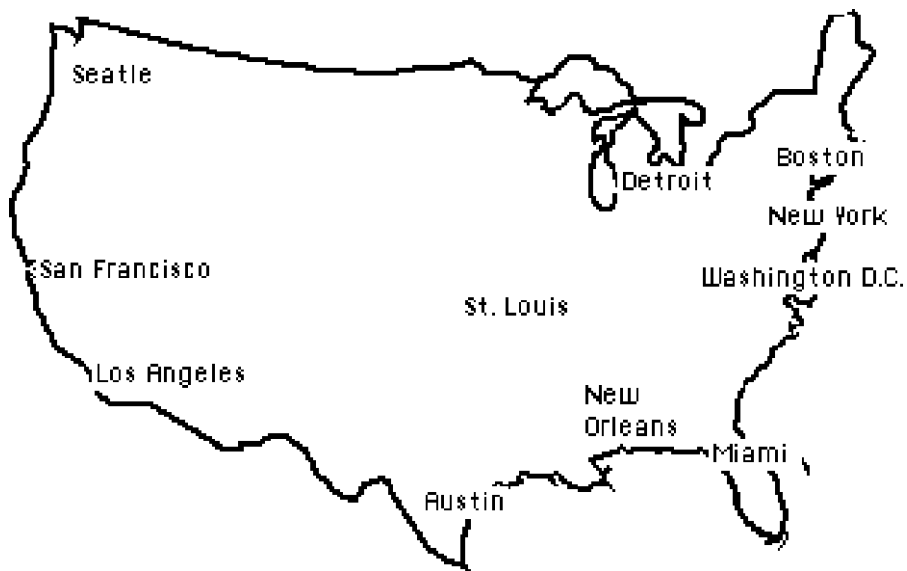
Figure 4.8 A map graph

Diagrams

Diagrams are used to explain how a machine or a device works or how a product is processed (Figure 4.9). The diagram showing the progress of a liquid or a current through a mechanism is called a "flowchart" or "flowsheet." By means of diagrams, we understand better how a radio or a television functions, how oil is refined, or how steel, synthetic rubber, and textile are made.

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┌──────────────────────────────────────────────┐
│ NEWS SOURCES: Press Association, original      │
│ original reporter's story, phone tips,         │
│ press releases, annual reporters,etc.          │
└──────────────────────────────────────────────┘
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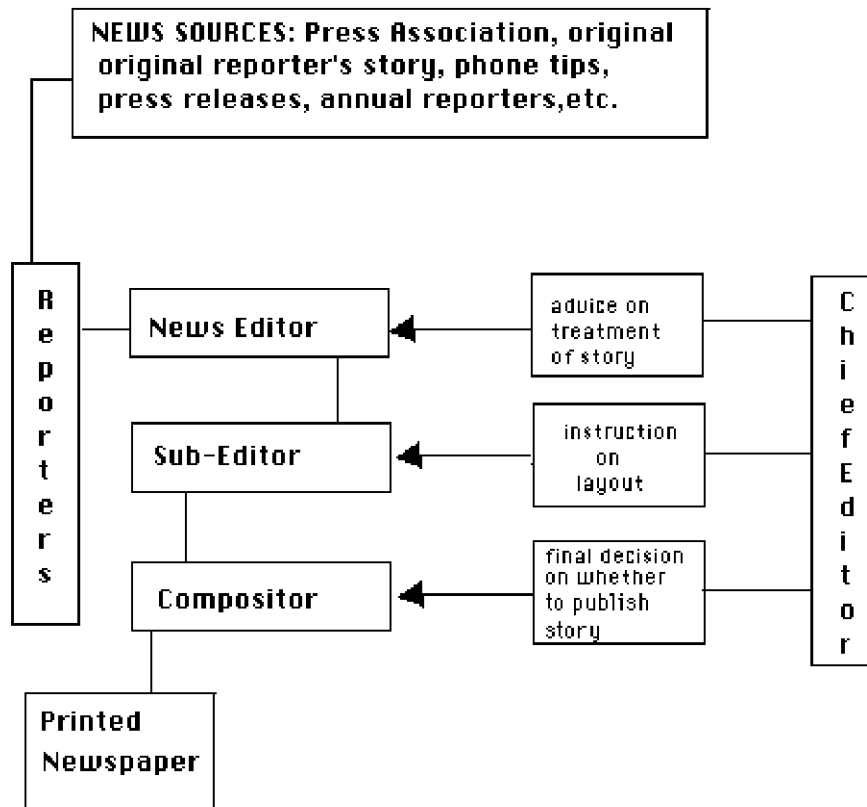
Figure 4.9 A diagram

Photographs

      Photographs are used to compare items of different nature or structure, such as
different architectural designs, different types of cells in living organisms, different features
of human beings, different school systems, or different cultures, etc. The examples can easily
be multiplied when attention is focused on different areas.

Commercial Illustrations, Cartoons and Other Visual Media

      All the advertisements in magazines and newspapers, and on billboards can give
excellent information. For instance, in research on how citrus fruit is marketed in Turkey and
in Germany, commercial illustrations can easily be made use of. Cartoons are excellent in
teaching foreign languages because they bring into class the cultural highlights of the foreign
language society. A creative person can make use of these a great deal in his/her research.
For instance, a high school boy has attempted to do a historical survey of his country by
making use of stamps. This boy, who had been collecting the stamps of his country for years,

decided to do a survey by indicating the important events that had taken place in his country with the stamps issued on those specific days.
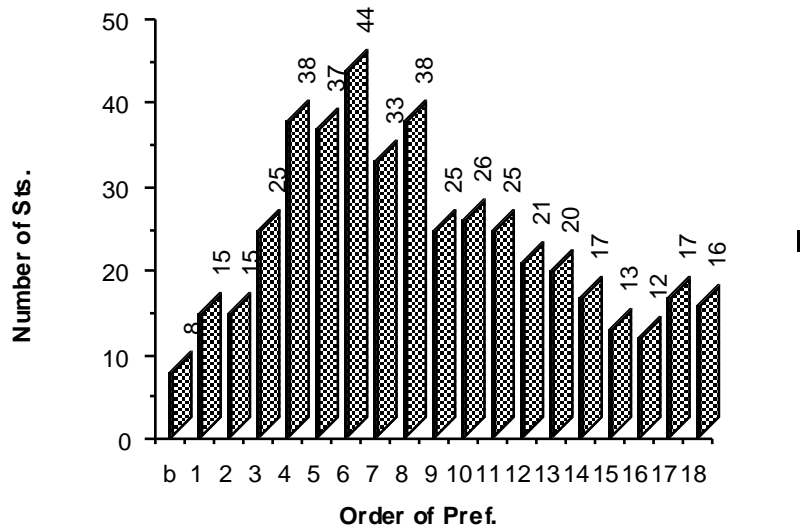
The illustrations cited above are among the common ones used in research. There may be others that can be put into use depending on the topic surveyed. One important issue that needs to be mentioned here is that these illustrations are not the end in themselves. In other words, **just inserting tables, graphs, and charts in the research paper does not make any sense unless the information packed into these illustrations is elaborated by explicit explanations.** Just a narrative account of the results is not appealing either. When the results are explained with reference to the graphic information indicated in the illustrations, the subject matter becomes more comprehensible to the reader. Suggestions as to what expressions to use in reporting the findings illustrated on graphs and tables are given in Chapter 8.

EXERCISES

A. The following graph shows the success of graduate and undergraduate students in the English preparatory class at Çukurova University. Transfer the given information into a table. (Total number indicates all the students who have registered, including the drop-outs.)
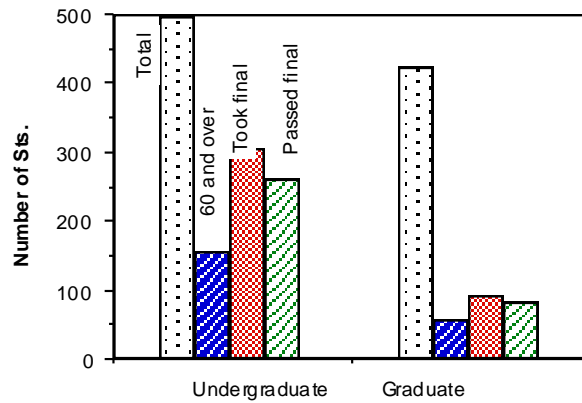

2. The graph illustrates the rank order of the students (mentioned in Exercise 1) in indicating their choice for Çukurova University in the university entrance examination:
    a. Comment on the data
    b. In what kind of research method can you use this information?
    c. What other information do you need?

The y-axis is labelled **Number of Sts.** with values 0, 10, 20, 30, 40, 50. The x-axis is labelled **Order of Pref.** with categories b, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18. Bar values: 8, 15, 15, 25, 38, 37, 44, 33, 38, 25, 26, 25, 21, 20, 17, 13, 12, 17, 16.

3. Transfer the following information on monthly temperature into linear graphs showing:

a. the trend in average monthly temperature,
b. the trend in the minimum and maximum temperatures.

Month	Average . (^{o}c)	Minimum .(^{o}c)	Maximum .(^{o}c)
January	8 _____	0 _____	12
February	1 2 _____	2 _____	15
March	15 _____	5 _____	20
April	20 _____	12 _____	25
May	25 _____	15 _____	29
June	8 _____	20 _____	30
July	32 _____	24 _____	35
August	35 _____	32 _____	38
September	33 _____	28 _____	35
October	27 _____	20 _____	32
November	18 _____	13 _____	22
December	10 _____	5 _____	14

4.   First study the graph below. Then describe it using the following expressions and
      structures:

SALES OF TV SETS
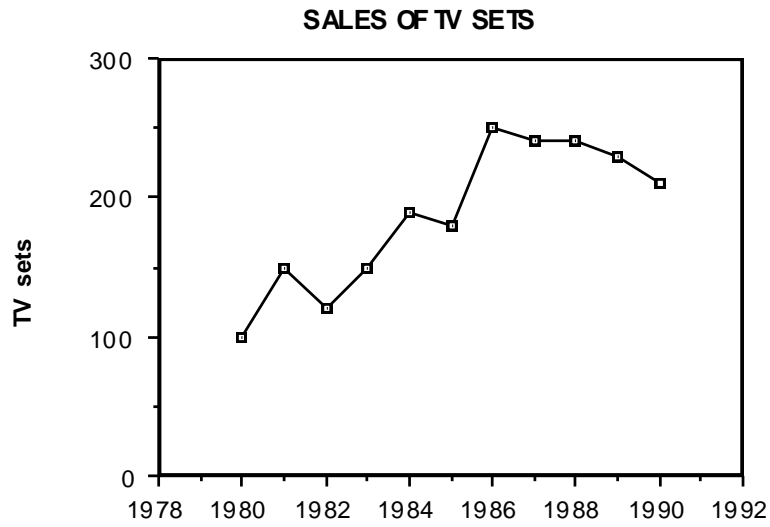
From .... to .... , sales fluctuated.
After reaching its peak in .... , ...
The dramatic increase in .... was due to ....
Sales declined in ....
Sales fell steadily ....
There was little growth................. .
The general trend was towards an increase ....

5. Using the information given in the pie chart, comment on the use of relativization by different age groups.

10.71%

17.86%

42.86%

Age Groups

☐ 6
▦ 5
▦ 4
▨ 3

28.57%
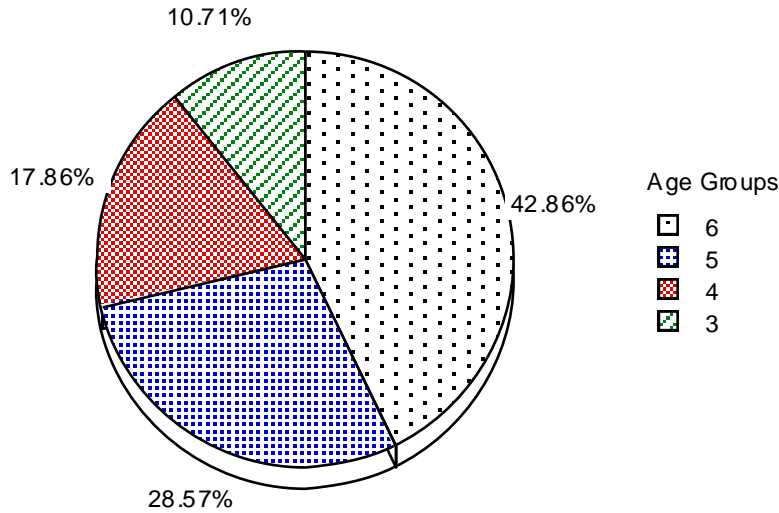
Use of relativization by different age groups

6.   200 graduate and 300 undergraduate students from different schools were asked if they were able to use the library regularly and the results obtained are indicated in the following table.
a. Study the table below and tell how many graduate and undergraduate students from different departments were able to use the library regularly.

student major	% undergraduate	% graduate
arts and hum.	65	85
science, medicine	60	75
social sciences	53	85
languages	50	60

     b. Complete the blanks in the following paragraph   using the information in the above table.

     A survey was conducted among _____ students at _____ . The purpose of the survey was to discover _____ of the students who regularly _____ and how graduate and undergraduate students _____ in the use of library facilities. _____ of the undergraduate students who use the library are fewer than graduate students. Students majoring in_____ , both graduate and undergraduate, tend to use library less than the others, whereas students majoring in _____ make the most use of the library.
   c. Transfer the information in the table into two   independent pie charts and a multi-bar graph.
7.   Make a column chart using the information given below.
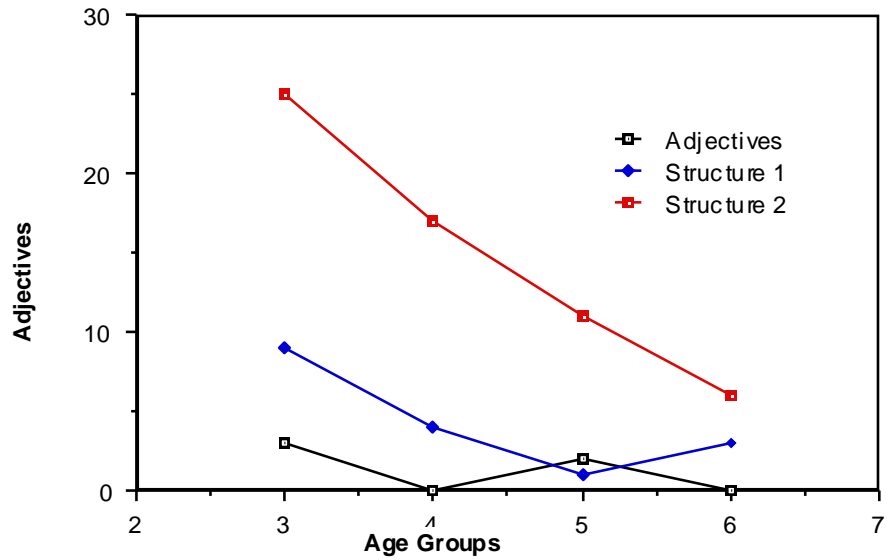
Comment on the graph. Before you write, study the structure and vocabulary examples given in this chapter.

8.   The graph below indicates the performance of subjects in the control group for both the pretest and the posttest. Explain the information given in the graph.

Results of the Control Groups
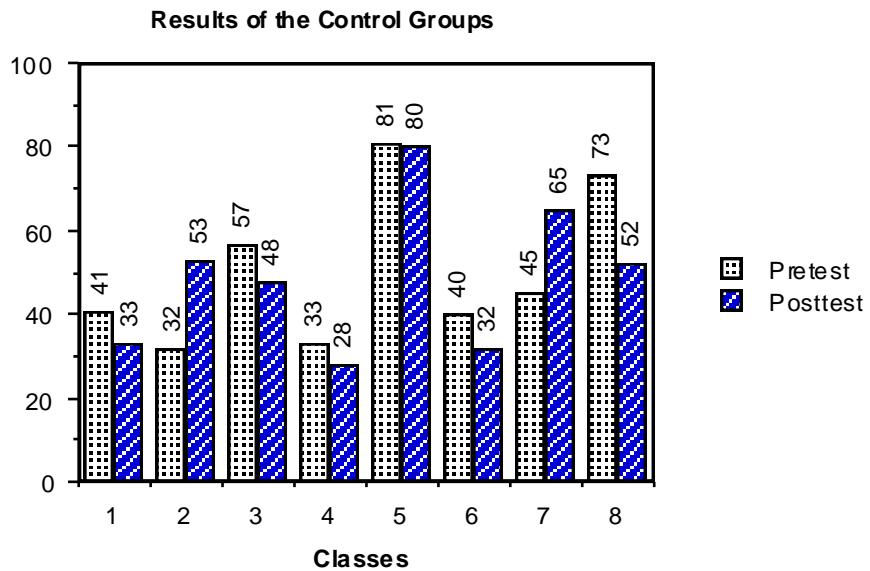
9. Prepare a survey on students' use of leisure time. Include sections to obtain information about their subject major, level (graduate or undergraduate) , age, sex, and types of lesisure activities.

10. The following graph gives information about the distribution of family spending in country x within the last three decades. Look at the information and write generalized comments.

FAMILY SPENDING WITHIN THE LAST THREE DECADES

1. Food
2. Housing
3. Clothing
4. Healthcare
5. Entertainment