Describing Variables Graphically

Overview

- Imagine that you have collected data in relation to a given research question
- There is now a need to effectively communicate the key characteristics of this data to your audience
- These messages should be communicated in the simplest and most effective way
- This can be achieved graphically through the use of tables, graphs or charts

Key Concepts

- A variable is something which varies
- Nominal variables are those where cases are placed into groups (e.g. gender, eye colour)
- Score variables are those in which cases are given a numerical value (e.g. age, income)
- Raw data are the actual measures taken from the sample (e.g. gender = female, age = 19)
- Descriptive statistics are visual and numerical techniques for presenting the major features of one's raw data

Prevalence

- It is very likely that you already know more than you realise about describing variables
- Many of you will have covered these concepts within maths classes at school
- Many examples can be found of the use of the techniques discussed in this lecture, in the real world
  - Tables (e.g. the Premier League in football; the league tables within education)
  - Graphs (e.g. to show the distribution of votes at an election; the ‘ask the audience’ lifeline on Who wants to be a millionaire?)

Presenting Nominal Variables

- Here we are generally trying to display the number of cases which fall into each category
- In a frequency table you should present the different groups along with the number and percentage in each category
- A pie chart shows the relative size of each group based on percentages
- A bar chart represents the size of groups based on the height of bars on a graph

Frequency Table: Student Accommodation

Category	Frequency	Percentage (%)
Pearson Hall	600	25
Spearman Tower	360	15
Levene Court	240	10
Newton Hall	1200	50
Total	2400	100

Example of a Pie Chart

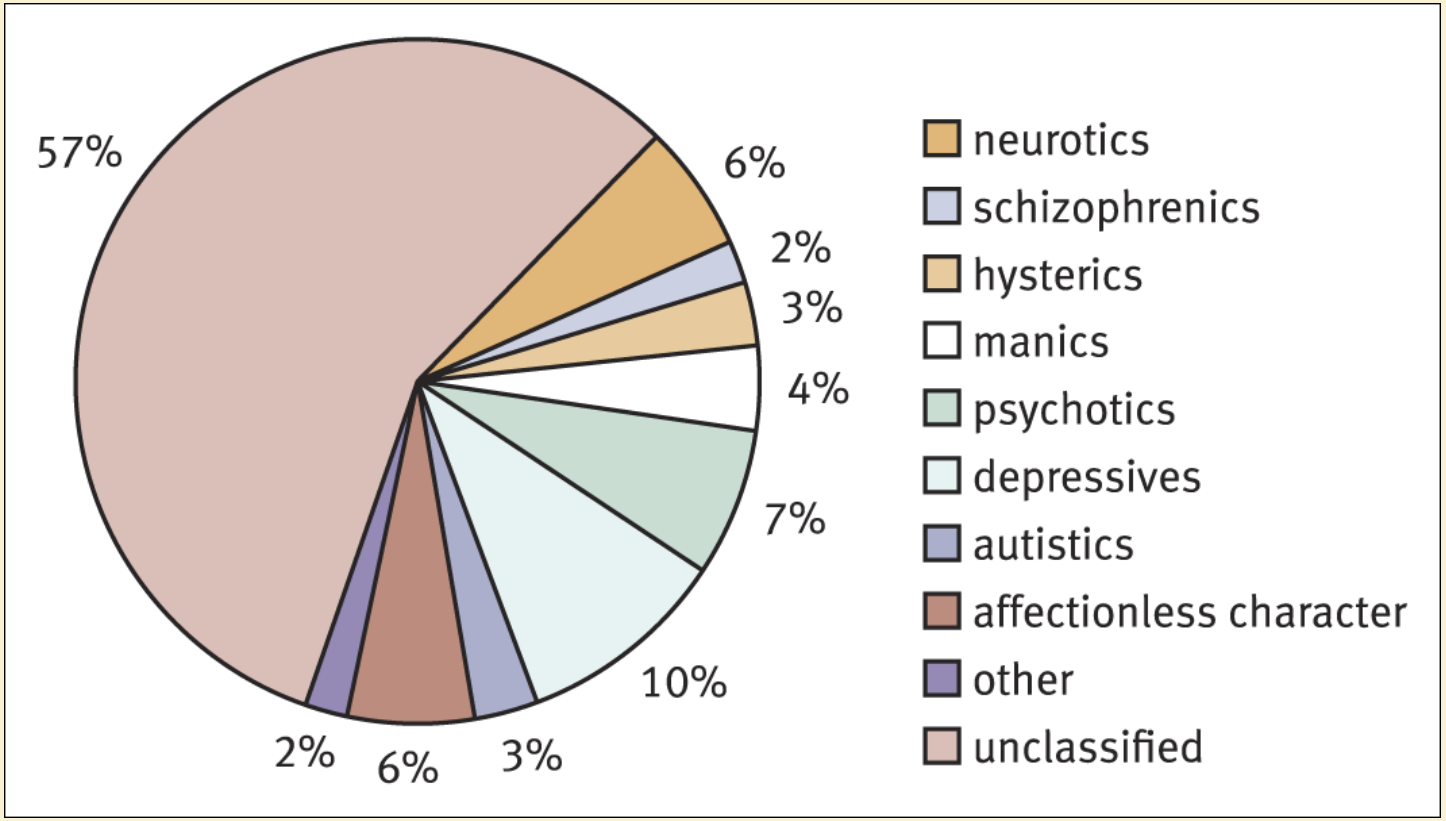

Figure 2.3 A poor pie diagram

Example of a Bar Chart

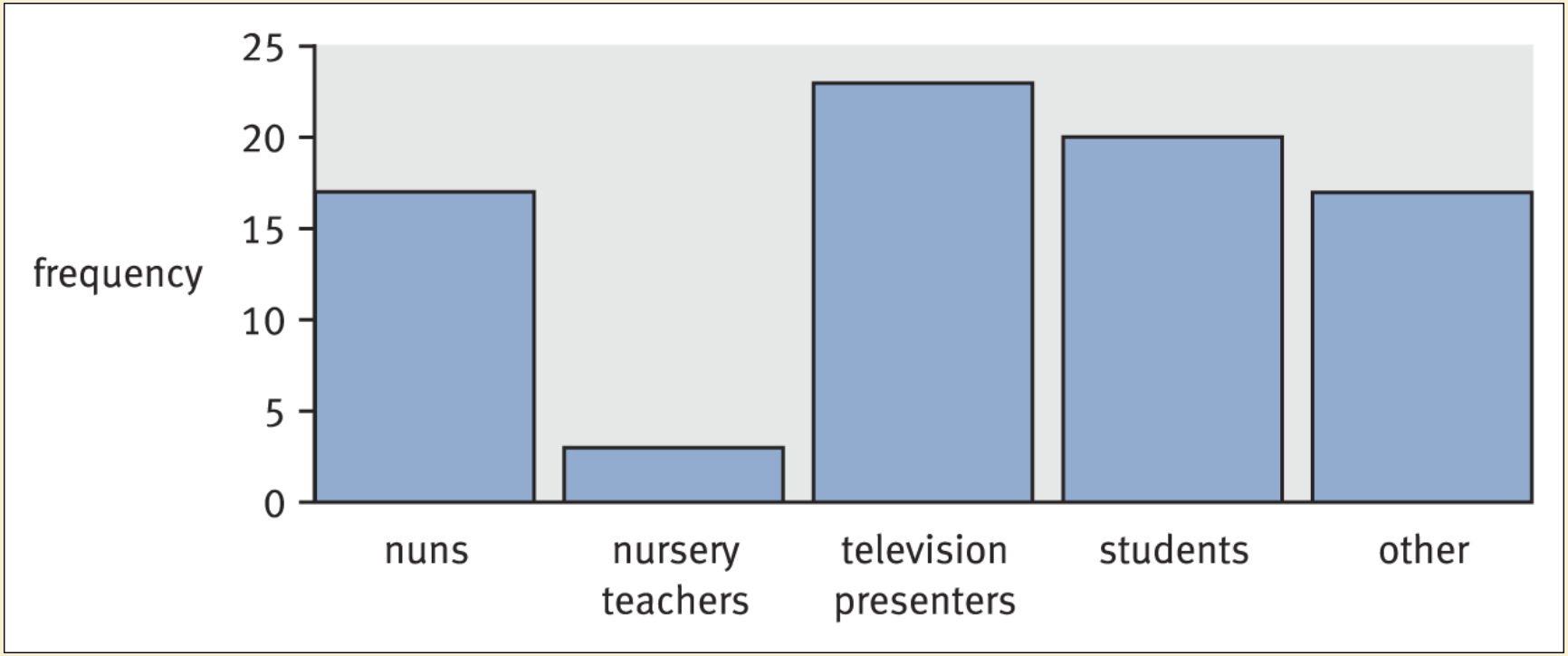

Figure 2.4 Bar chart showing occupational categories in Table 2.1

Presenting Score Variables

- In contrast to nominal variables, score variables gain data which falls on a continuum
- Some variables have a limited number of possible values (e.g. Likert scales)
- Other variables have a wide range of possible values (e.g. age, income); in such cases you need to consider how best to group your data
- Generally, these groups should be equally sized, although this can prove difficult at the extreme ends of the scale

Frequency Table: I like statistics...

Response	Value	Frequency	Percentage (%)
Strongly agree	1	17	42.5
Agree	2	14	35
Not sure	3	6	15
Disagree	4	2	5
Strongly disagree	5	1	2.5

Example of a Histogram

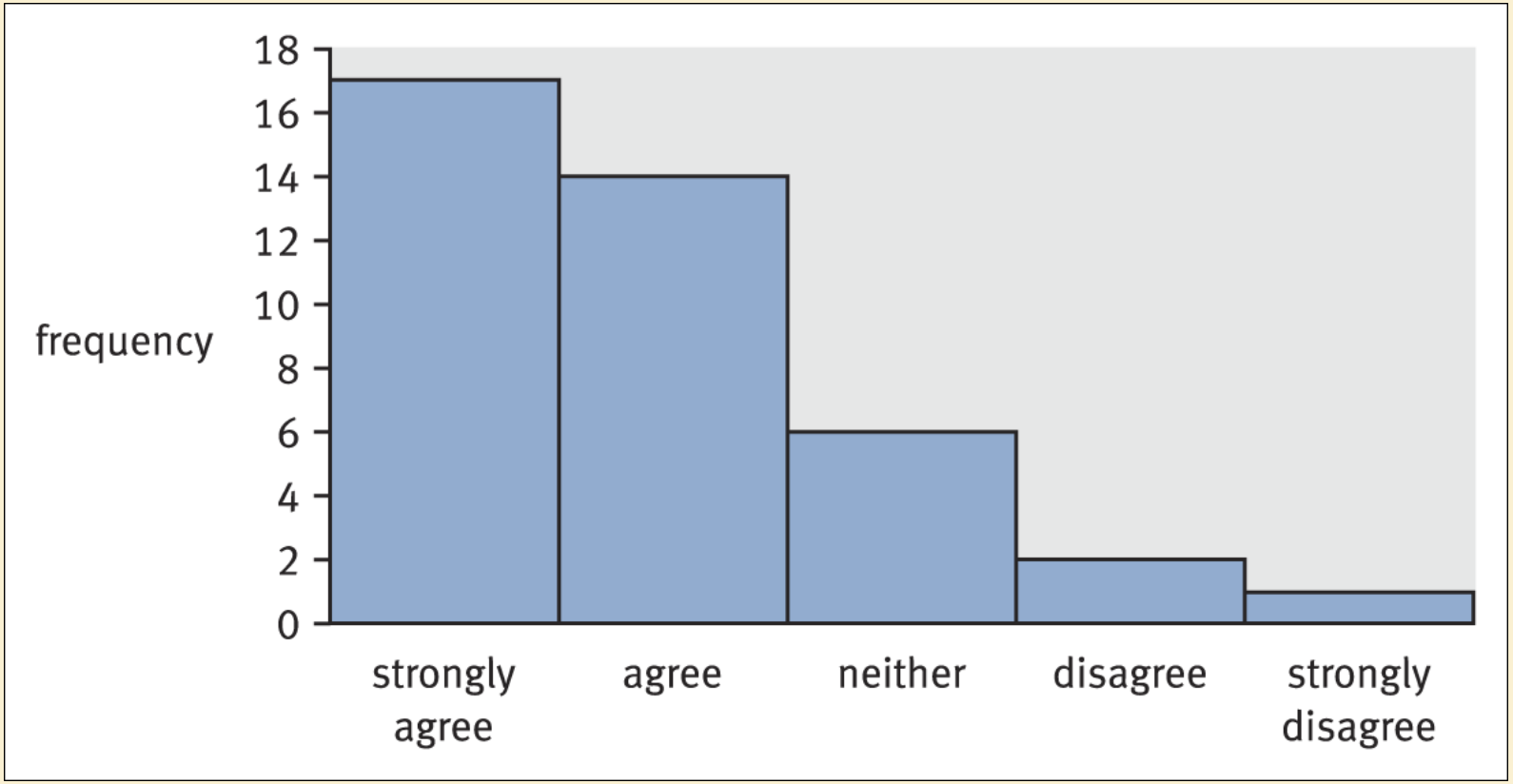

Figure 2.5 Histogram of students' attitudes towards statistics

Key Steps

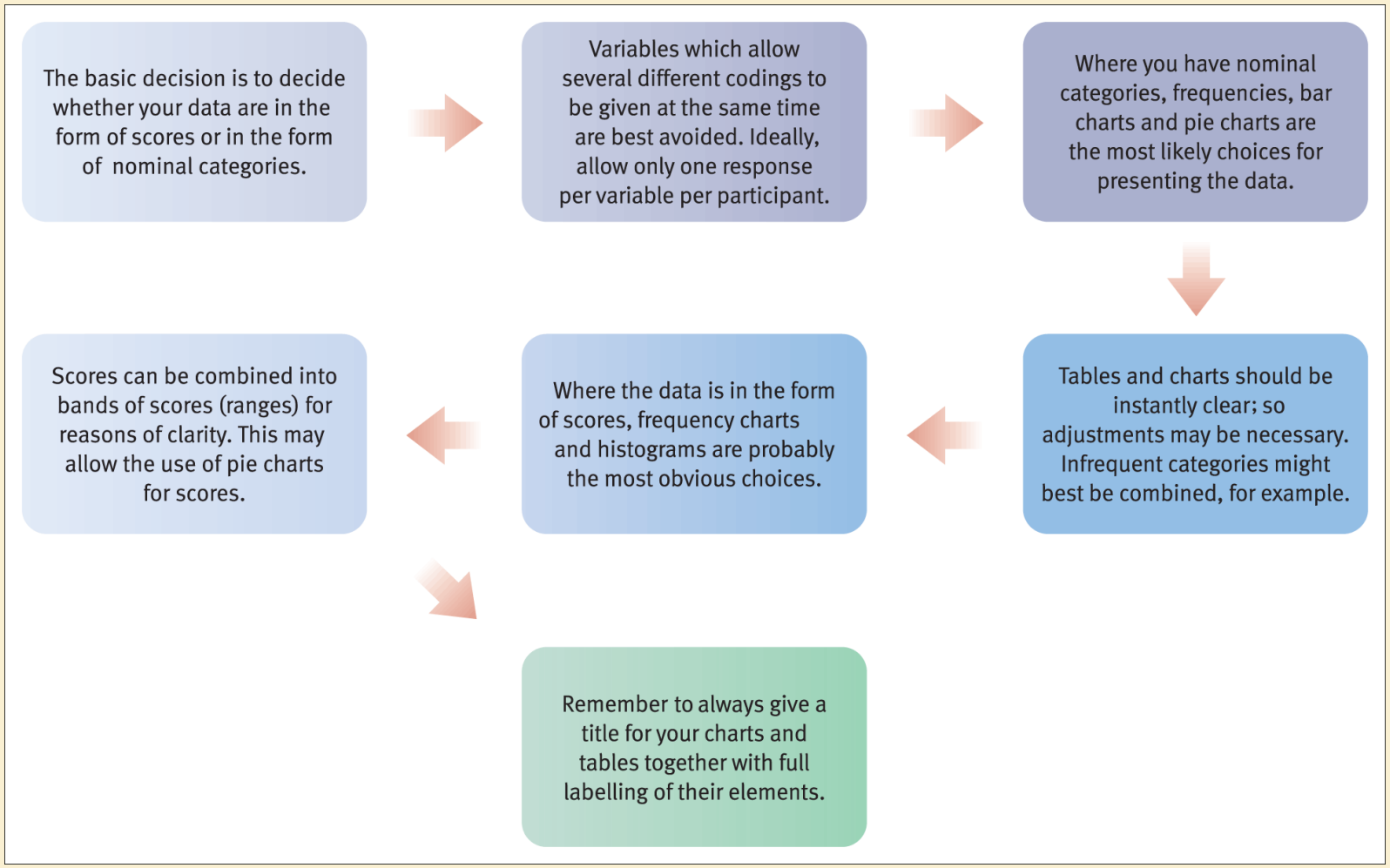

Figure 2.1 Conceptual steps for understanding tables and diagrams

Errors to Avoid

- There are some key points that you must keep in mind when presenting your data using tables, charts or graphs:

1. Make sure that you provide clear headings that succinctly describe the contents
2. Clearly label all the key elements
3. Make the diagrams as simple as possible
4. Check with other people that they can understand the diagrams and that they convey the key messages as intended

Conclusion

- Present data collected on a single variable
- Nominal variables can be presented using tables, pie charts or bar charts
- Score variables can be presented using tables or a histogram
- It is important that the diagram is simple while communicating the key message effectively
- There are a number of possible errors which you should avoid when creating diagrams