



Eight steps to successful data analysis

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This is a very simple sequence that, if you follow it, will integrate the statistics you use into the process of scientific investigation. As I make clear here, statistical tests should be considered *very early* in the process and not left until the end.

- 1 Decide what you are interested in.
- 2 Formulate a hypothesis or several hypotheses (see Chapters 2 and 3 for guidance).
- 3 Design the experiment, manipulation or sampling routine that will allow you to test the hypotheses (see Chapters 2 and 4 for some hints on how to go about this).
- 4 *Collect dummy data* (i.e. make up approximate values based on what you expect to obtain). The collection of 'dummy data' may seem strange but it will convert the proposed experimental design or sampling routine into something more tangible. The process can often expose flaws or weaknesses in the data collection routine that will save a huge amount of time and effort.
- 5 Use the key (presented in Chapter 3) to guide you towards the appropriate test or tests.
- 6 Carry out the test(s) using the dummy data. (Chapters 6–9 will show you how to input the data, use the statistical packages and interpret the output.)
- 7 If there are problems go back to step 3 (or 2), otherwise proceed to the collection of the real data.
- 8 Carry out the test(s) using the real data. Report the findings and/or return to step 2.

I implore you to use this sequence. I have seen countless students who have spent a long time and a lot of effort collecting data only to find that the experimental or sampling design was not quite right. The test they are forced to use is much less powerful than one they could have used with only a slight change in the experimental design. This sort of experience tends to turn people away from statistics and become 'scared' of them. This is a great shame as statistics are a hugely useful and vital tool in science.

The rest of the book follows this eight step process but you should use it for guidance and advice when you become unsure of what to do.