Chapter 3 Selecting the broad design of your study

Additional self-test questions

Q3.1 Using newspaper articles on whale strandings from back issues kept in a university library, a researcher finds that there are on average 24 reported instances of whale strandings a year around the Scottish coastline from 2000 to the present, but only an average of 13 a year from 1990–1999. They conclude from this that this increase is likely to be caused by increasing numbers of whales using Scottish waters due to climate change. Comment on the plausibility of this explanation in comparison to alternatives.

Q3.2 Ecologists commonly use measures such as clutch size, feeding rate, and mass per unit length as indirect measures of fitness. What are the limitations of this, and why do ecologists persist in using these indirect measures in the face of these limitations?

Q3.3 Can you think of a scientific study where ethical considerations might drive you to using indirect measurements?

Q3.4 Imagine that a study did find that people who preferred butter were better drivers than those that preferred margarine. Can you think of any hypotheses that could explain this finding? Which of these do you consider most plausible?

Q3.5 How would you the measure driving ability in a study like the one described above?

Q3.6 In the tail length experiment discussed in the book, we want to have a control group in which tail length is unaltered. Why then do we bother to cut the tails off then glue them back on in exactly the same position?

Q3.7 Discuss how you would test the hypothesis ‘women find blue eyes more attractive than brown’ by correlational and manipulative means. Discuss the advantages and disadvantages of each and which you would adopt to address this question.

Q3.8 The book suggests that women who go to university are less likely to marry than those who do not. However, the book argues that we should not conclude from this that studying at university in itself causes a reduction in a woman’s propensity to get married. Explain this reasoning in your own words.

Q3.9 Imagine a student is exploring the question of whether or not more or less birds are seen on rainy days in a public park than on sunny days. Their definition of a rainy day is ‘if during my period of observation I see anyone in the park with an umbrella

raised, then it's a rainy day; otherwise it is dry'. Discuss the appropriateness of this rule, and see if you can come up with an alternative which you feel is better.

Q3.10 A driver in their twenties is three times as likely to be involved in a road traffic accident as a driver in their sixties. One explanation for this could be that people become safer drivers as they get older. Can you think of any likely third variable effects that could provide an alternative explanation for this observation?

Q3.11 Can you think of an alternative explanation for the observation of **Q3.10** in terms of reverse causation?

Q3.12 Which of the explanations above do you think is the most important factor explaining the three-fold difference in accident rates between these age groups?

Q3.13 The book discusses the interpretation of a negative correlation between badger weight and number of parasites. The conventional interpretation is that the parasites lead to a reduction in body weight. Is a reverse causation explanation where low body weight leads to increased parasite burden plausible to you?

Q3.14 If a carefully performed study using samples of sparrows caught around Edinburgh (where Nick lives) suggested that males had higher parasite loads than females, how far would you be comfortable generalizing from this sample? That is, to what extent would you expect the results from the sample to generalize to sparrows in Edinburgh, urban sparrows, UK urban sparrows, or UK urban birds?

Q3.15 A major scientific journal reported that school pupils who play a musical instrument performed better in a general test of memory power than those who do not. From this they concluded that playing a musical instrument improves memory power. Do you consider their conclusion premature, and if so how would you go about collecting more data to test this hypothesis?