CHAPTER SEVEN

Hypothesis testing and statistical inference

II. Conceptual exercises

A. Matching

1. d
2. e
3. f
4. a
5. h
6. g
7. c
8. k
9. b

B. True or false

1. T
2. F
3. T
4. T
5. F
6. T
7. T
8. F.
9. T
10. F
11. T
12. F

C. For each of the following beliefs, hunches or questions, write a theoretical hypothesis, an operational hypothesis and a statistical research hypothesis.

1. 'The students in my two sections of the reading course chose these sections primarily on the basis of schedule. I wonder if they're at different levels of reading.'

   Theoretical hypothesis:

   The groups of students in the two sections differ in their levels of reading ability.

   Operational hypothesis:

   The students in the two sections will perform differently on a reading test.

   Statistical research hypothesis:

   The means of the two sections on the reading test will be different.

   ($\overline{X}_{1R} \neq \overline{X}_{2R}$)

2. 'I'd guess that the reason my students are such good readers is because they read a lot at home.'

   Theoretical hypothesis:

   Students who read a lot at home are good readers in school.

   OR:

   Reading at home and reading well at school are positively related to each other.

   Operational hypothesis:

   Students who read a lot at home will perform better on a test or academic reading than students who do not read a lot at home.

   OR:

There will be a positive relationship between the amount of time students read at home and scores on a test of academic reading.

Statistical research hypothesis:

The mean on the reading test of students who read a lot at home will be higher than the mean of students who do not read a lot at home ($\overline{X}_{RH} > \overline{X}_{NRH}$).

OR:

The correlation between the amount of time students read at home and their scores on a test of academic reading will be positive, or greater than zero ($r_{rh,t} > 0$).

3. 'The research in second language acquisition suggests that there is a strong relationship between motivation and language learning. I wonder if my students who are the most fluent speakers are also the ones who are the most highly motivated.'

Theoretical hypothesis:

Motivation and speaking fluency are positively related to each other.

Operational hypothesis:

Scores on a questionnaire of motivation and a test of speaking fluency will be positively correlated.

Statistical research hypothesis:

The correlation between scores on a questionnaire of motivation and a test of speaking fluency will be positive, or greater than zero ($r_{Q,S} > 0$).

4. 'I've always found that the students who perform the best on standardized multiple-choice tests are the ones who are not very good at writing.'

   Theoretical hypothesis:

   Students who are good at answering multiple-choice questions do not write as well as students who are not good at answering multiple-choice questions.

   OR:

   There is a negative relationship between the ability to answer multiple-choice questions correctly and the ability to write well.

   Operational hypothesis:

   Students who score high on a standardized multiple-choice exam will score lower on an essay exam than will students who perform poorly on a standardized multiple-choice exam.

   OR:

   Scores on a standardized multiple-choice exam will be inversely related to scores on an essay exam.

   Statistical research hypothesis:

   The mean on the essay exam of students who score high on the standardized multiple-choice exam will be lower than the essay exam mean of students who perform poorly on a standardized multiple-choice exam ($\overline{X}_{E_H} < \overline{X}_{E_L}$).

   OR:

   The correlation between the scores on the standardized multiple-choice exam and the essay exam will be negative, or less than zero ($r_{M\text{-}C,E} < 0$).

5. 'In my experience with teaching Chinese, students whose first language is an Asian language generally learn Chinese more quickly.'

   Theoretical hypothesis:

   Students whose first language is an Asian language learn Chinese more quickly.

   Operational hypothesis:

   Students whose native language is an Asian language will perform better on an end-of-course achievement test of Chinese.

   OR (stated in terms of time):

   The time required for students whose first language is an Asian language to reach Advanced level in a Chinese language course is shorter than that for the non-Asian L1 group.

   Statistical research hypothesis:

   The mean of the Asian L1 group will be higher than that of the non-Asian L1 group on the Chinese achievement test ($\overline{X}_A > \overline{X}_{nA}$).

   OR:

   The mean length of time, in number of hours, required for students whose first language is an Asian language to reach Advanced level in a Chinese language course is shorter than that for the non-Asian L1 group.

6. 'I've found that many of my former students who have not used their foreign language for a long time have forgotten much of their grammar.'

   Theoretical hypothesis:

   A long period of not using a language is negatively related to the knowledge of grammar.

   OR:

   Students who have not been using language recently will have less knowledge of grammar.

Operational hypothesis:

The length of time, in months, since students last used their foreign language will be inversely related to the difference between scores on a test of grammar given at the end of a course and after an extended period of time ($r_{t,\,dX} < 0$).

OR:

The differences between scores on a test of grammar given at the end of a course and again after an extended period of time will be smaller for students who have not used their foreign language for more than a year than for students who have been using their foreign language regularly ($(\overline{X}_2 - X_2)_{nU} < (\overline{X}_2 - X_2)_U$).

Statistical research hypothesis:

The correlation between the length of time, in months, since students last used their foreign language, and the difference between scores on a test of grammar given at the end of a course and after an extended period of time, will be negative, or less than zero.

OR:

The mean difference between scores on a test of grammar, given at the end of a course and again after an extended period of time, will be smaller (0 or negative) for students who have not used their foreign language for more than a year than that of students who have been using their foreign language regularly (expect a positive correlation for this group).

7. To what extent are differences in second language reading fluency related to first language literacy?

   Theoretical hypothesis:

   L2 reading fluency is positively related to L1 literacy.

Operational hypothesis:

Scores on tests of L2 reading fluency and L1 literacy will be positively related to each other.

Statistical research hypothesis:

The correlation between scores on tests of L2 reading fluency and L1 literacy will be positive, or greater than zero.

NB: Because no statistical procedures are discussed in this chapter in the book, there are no exercises with hand calculations or SPSS.