

## Lab Handout

## Lab 3.2: Working for Scale

**CORRECTION:** In the text, the study you will undertake for this lab is called a controlled experiment. However, it is really an observational study. In your report, tell why this is so.

Even though the study is not a controlled experiment, the point made about blocking is still valid.

The instructions below are keyed to the lab instructions found on pp. 127-129 of the text. Note that these instructions differ in some aspects from those in the text. Where they differ, follow these instructions.

## Experimental Procedure

### Data Collection

The TA will collect two measurements from you as explained in Steps 1-4 of the lab instructions in the text. The only difference is that instead of recording the measurement as being from the left or right hand, it will be recorded as being from the **dominant** or **non-dominant** hand.

Your TA will collect the data from all MA 2611 students and combine it into two data sets whose names will be given to you. In term B, 2000, they were named SASDATA.LAB32A\_B00 and SASDATA.LAB32B\_B00, and we will use these names here. You will be told the names of your data sets when they have been created (probably in one or two days).

SASDATA.LAB32A\_B00 will contain three variables: STUDENT (the student's name), D (the pressure measurement for the dominant hand) and N (the pressure measurement for the non-dominant hand).

SASDATA.LAB32B\_B00 will contain the same data in a different format. It will have three variables: STUDENT (the student's name), HAND (D or N for dominant and non-dominant hand respectively) and PRESS (pressure exerted on the scale).

### Analysis

#### 1. Randomized Complete Block Design (paired comparison).

- (a) Access the data set SASDATA.LAB32B\_B00 from SAS/INSIGHT, and draw a scatter plot of PRESS versus STUDENT. Describe the between-within pattern of variation, as outlined in the lab instructions in the text. Note that on the plot, the points for the dominant hand will have a different color and a different plotting symbol than points for the non-dominant hand. This can give you an idea of whether the dominant or non-dominant hand is generally stronger.
- (b) Find out how many students have a stronger dominant hand.
  - i. First, access the data set SASDATA.LAB32A\_B00 from SAS/INSIGHT.
  - ii. Now for each student compute the difference between the dominant and non-dominant reading. To do this, choose *Edit:Variables:Other....* In the dialog box, select the transformation  $Y - X$  and choose  $d$  for the  $Y$  variable and  $n$  for the  $X$  variable. Choose a name for the result (we will choose DIFF), and click on *OK*.
  - iii. Do a distribution analysis on the variable DIFF. From the distribution window, choose *Tables:Frequency Counts*. From the resulting table, you can find out the number of students who have a stronger dominant hand.

#### 2. Completely Randomized Design

To construct a proper CRD (complete randomized design), we should randomize the combination of student and hand. This can be done by dividing the class randomly into two groups of equal (or nearly equal) sizes, and measuring only dominant hand strength in one group and only non-dominant hand strength in the other. Clearly, this was not how the data were collected, but in this section of the lab, you will perform the analysis as if they were. This should still give you an idea of the advantage of blocking.

- (a) Using the SASDATA.LAB32B\_B00 data, draw a scatter plot of PRESS versus HAND, i.e. a stratified plot.
- (b) Does this plot support the conclusion that you drew from the RCBD?
- (c) Which design better shows the difference between the dominant and non-dominant hand?