15.4: One-Way Demo

Learning Objectives

- State how the sums of squares are divided among sources of variation
- State the components of an ANOVA summary table and how they relate to each other

Instructions

This simulation demonstrates the partitioning of sums of squares in analysis of variance (ANOVA). Initially, you see a display of the first sample dataset. There are three groups of subjects and four subjects per group. Each score is represented by a small black rectangle; the mean is represented as a red horizontal line. The values range from 0 to 10. The Y-axis ticks represent values of 0, 2.25, 5, 7.75, and 10. The means of the three groups are 2.50, 5.50, and 8.50.

The table in the lower left-hand portion of the window displays, for each group, the sample size, the mean, the sum of squared deviations of individual scores from the mean, and the squared difference between the group mean and the grand mean multiplied by the sample size. The bottom row shows the sums of these quantities. The sum of the last column is the sums of squares between while the sum of the second-to-last column is the sum of squares within. The ANOVA summary table based on these values is shown to the right. The sum of squares between and within are depicted graphically above the ANOVA summary table.

You can choose other datasets using the pop-up menu. You can also enter your own data by clicking on the data display. If you click in a blank area, an new data point is created (if you hold the mouse down after you click you can position the point by moving the mouse). You can modify the data by clicking on a point and moving it to another location. Finally, you can delete a data point by dragging it outside the colored region.

1. Notice how the sum of squares total is divided up into the sum of squared differences of each score from its group mean and the sum of squared differences of the group mean from the grand mean (GM: the mean of all data). Keep in mind that differences of group means from the grand mean have to be multiplied by the sample size.
2. Add a few data points by clicking and note the effects on the sums of squares. Notice that if the points are far from the group mean then the sum of squares within increases greatly.
3. Choose dataset 2. Notice that the means are very different and the data points are all near their group mean. This results in a large sum of squares between and a msall sum of squares within.
4. Look at dataset 4 which is similar but has more subjects.
5. Look at dataset 6 for which the group means are all the same. Note the value of the sum of squares between.
6. Choose "blank dataset" and enter your own data.

Illustrated Instructions

Video Demo

The video demonstration increases the mean of group 1 by dragging the individual points in the group. Notice how the statistics update as the points are moved.