1 The Scheffe test

The F test and criterion used in analysis of variance for a completely randomized design are

\[ F = \frac{SS_{T_{rt}}/(g - 1)}{MSE} \text{ and } F_{\alpha,g-1,\nu}. \]

The F test and criterion used to test a single contrast, \( L \), for a completely randomized design are

\[ F = \frac{SS_L/1}{MSE} \text{ and } F_{\alpha,1,\nu}. \]

The F test and criterion used for Scheffe’s test of a single contrast, \( L \), for a completely randomized design are

\[ F = \frac{SS_L/(g - 1)}{MSE} \text{ and } F_{\alpha,g-1,\nu}. \]

A comparison of these expressions shows that for Scheffe’s test the sum of squares for the contrast \( SS_L \), must exceed the same criterion as \( SS_{T_{rt}} \) (the entire treatment sum of squares) to be declared significant. This shows why the Scheffe test cannot reject \( H_0 \) unless the overall ANOVA test is also significant, and it shows why the Scheffe method is conservative.