Prof. Moore

Handout #10
Psych. 610

Trend Analysis -- Residual Tests

If the test of a residual from a trend component is significant, does that guarantee that one of the remaining trend components will be significant?

---Peter Kruley (a former TA for 610) constructed an example to show that the answer is "NO."

---From Handout #7 we have that the Residual from Linear is significant when tested with df = 4/54, F = 21.76/7.05 = 3.09.

---Suppose that SS_{Res} were evenly distributed across the remaining 4 trend components so that SS_{Trend} = 21.76 for each of the quadratic, cubic, quartic and quintic trend components. Then F = 3.09 for all 4 trend components, but df = 1/54. The table F(1, 54) is greater than 3.09, so all 4 trend tests will be nonsignificant!

If the residual is tested with df = 1,54 (instead of df = a-1 - number of trends previously extracted), it is still true that you can have a significant residual and no significant remaining trend component.

The significance or nonsignificance of the residual is used as a "stopping rule" for extracting further trend components. This saves the work of extracting more trend components if they are going to be nonsignificant. For this purpose, testing the residual with 1 df in the numerator is superior to using the sum of the remaining df numerator. You are guaranteed not to <u>overlook</u> a significant remaining trend component by using 1 df in the numerator, but you are <u>not</u> guaranteed to obtain one just because the residual is significant.

So, what good is it to test the residual? The residual tests whether there exists a contrast in the remaining SS that is significantly different from zero.

** If the F-test of the main effect of factor A (i.e., the regular omnibus F-test) is significant, then at least one contrast will be significant when tested by the Scheffé method (see Scheffé, 1959, pp. 70 ff.). Of course, the significant contrast need not be one of the orthogonal trends.