12.4: Testing the Significance of the Carry-Over Effect

To test for the overall significance of carry-over effects, we can drop the carry-over covariates (x_1 and x_2 in our example) and re-run the ANOVA. Because the reduced model is a subset of the full model that includes the covariates, we can construct a likelihood ratio test.

$$\Delta G^2 = (-2\log L_{Reduced}) - (-2\log L_{Full}) \quad \text{with } df_{Reduced} - df_{Full} \text{ degrees of freedom} \tag{12.4.1}$$

The $-2\log L$ values are provided in the SAS Fit Statistics output for each model. For our example, the SAS output for the Full model with carry-over covariates is:

Fit Statistics	
-2 Res Log Likelihood	122.5
AIC (smaller is better)	130.5
AICC (smaller is better)	132.6
BIC (smaller is better)	132.5

And for the reduced model without the carry-over covariates is:

Fit Statistics	
-2 Res Log Likelihood	136.5
AIC (smaller is better)	144.5
AICC (smaller is better)	146.4
BIC (smaller is better)	146.4

So,

$$\Delta G^2 = 136.5 - 122.5 = 14$$

and with

$$\chi^2_{.05,2} = 5.991$$

we conclude that there are significant carry-over effects.