Live Session 3 Iron Content Data

Lack of iron in a diet can lead to many health issues. Researchers wanted to know whether the iron content in various types of food (meat, legumes, and vegetables) is affected by the type of pot in which the food is cooked. The types of pots examined were clay, iron, and aluminum.

The data for this study is in the file ironcontent.txt, available in the file “liveSession3Data.zip” in the Files folder on the course website. Use the data to analyze the iron content level for various foods and types of pots.

Analysis Questions for Spruce Moth Data

1. What are the factors (or factor) and their (its) levels?
   1. The factors are food (meat, legumes, veg) and pots (clay, iron, aluminum)
2. Is there a block variable? If so, name it and its levels.
   1. Yes, food on meat, legumes and veg
3. Run an analysis of variance. Which effects are significant? Explain what the significant effects mean in plain English.

/\* Example ANOVA Code: You supply names of Fac1, Fac2, and Response \*/

**proc** **glm** data=anova;

class Fac1 Fac2;

model Response = Fac1 | Fac2;

output out=resids p=yhat r=resid;

**run**;

**quit**;

On the normal data, all effects are significant, including the interaction. However, residual plots show that the model has non-additive features and should likely be transformed. The residuals also show a slight funnel shape, indicating that a lack of constant variance that should be taken care of via a log transformation of the response.

1. How many sources of error are there for the model? Name them.
   1. Four sources. The overall bw group sum of squares, the food sum of squares, the pot sum of squares and the error (w/in group) sum of squares
2. Examine the residuals. Interpret what you see. Do we need to transform the data? Explain. If so, go ahead and transform the data. Use the transformed data for the rest of the exercise. Check the residuals for the transformed model before making your choice!
   1. Yes, there is evidence of non-additivity and a slight funnel shape in the residuals.
3. With either the transformed or untransformed data (your pick based on residual analysis), is the interaction effect statistically significant? Explain. What do we do next?
   1. No, under the natural log, the interaction is NOT significant. We can analyze main effects safely next.
4. Create an interaction plot for the data you have chosen to use. To do this, we will need the means for each of the 9 combinations of the factors. Paste your plot below and interpret it.
   1. Interaction plots attached
5. If your data are balanced, create a data set in which one or more of the cells has a different number of observations, then run an analysis of variance like we did previously. If your data is already unbalanced, then just examine the Type I and Type III sums of squares. The procedure is the same as far as SAS is concerned. SAS automatically reports both Type I and Type III sums of squares. Explain the different interpretations of Type I and Type III sums of squares.
   1. Type I sums of squares are used for balanced studies while type III are used for unbalanced studies. Type III is based on the weighted squares of means given the number of observations for that mean and thus gives a more accurate representation of error for factors in an unbalanced design.