Mixed Model Analysis

Use a Mixed Model for an ANOVA or regression model with at least one factor specified as a random variable. Additional options for fitting mixed models are available in JMP Pro®. The example below is an unbalanced design involving six people chosen at random to take measurements on three different machines.

Analysis of Linear Mixed Models

1. From an open JMP data table, select Analyze > Fit Model.

   In JMP Pro, select the Mixed platform from the Personality list to fit mixed models. The remainder of these instructions are for fitting mixed models in JMP.

2. Add the response: From Select Columns, select a continuous variable (continuous variables have blue triangles), and click Y.

3. Add model effects: Select variables and click Add (under Construct Model Effects). To specify an interaction term, select multiple columns, then click Cross.

4. Specify random effect(s): Select a model effect, then select Random from the red triangle next to Attribute. Here, “person” is specified as a random effect, so the “person*machine” interaction is also a random effect.

5. Accept the defaults (the REML Method with Unbounded Variance Components selected), and click Run.

By default, JMP will display the Summary of Fit table, REML Variance Components Estimates, and more. Additional options are available under the top red triangle.

Interpretation:

1. Variance Components Estimates: The total estimated variance is 37.56, which can be decomposed into three sources: person (22.46, or 59.8%), person*machine (14.23, or 37.9%) and residual (0.87, or 2.3%).

2. Fixed Effect Tests: The p-value for the fixed effect (machine) is 0.0003. Kenward-Roger F tests are used.

Tips:

- **REML** (restricted maximum likelihood) is the preferred estimation method over EMS (Method of Moments). REML estimates are properly shrunk and the standard errors are properly scaled.

- **Unbounded Variance Components** is the default method for estimating the variance components. Unchecking this box will restrict the variance estimates to be non-negative.

- JMP assumes a simple correlation matrix with compound symmetry (i.e., correlation is constant).

Notes: For additional details on fitting mixed models in JMP and JMP Pro, search for “Mixed” in the JMP Help or in the book *Fitting Linear Models* (under Help > Books).