Repeated Measures Analysis (Mixed Model)

This guide provides instructions on the analysis of repeated measures data using a mixed model (random and fixed effects) with nesting. The term *repeated measures* refers to data with multiple measurements taken on the same subjects, often taken over a period of time.

This example involves six animal subjects randomly selected from two species. The miles traveled by each animal were measured over time. Since this data is in a tall format (stacked), a mixed model analysis is used.

Analysis of Repeated Measures: Mixed Model
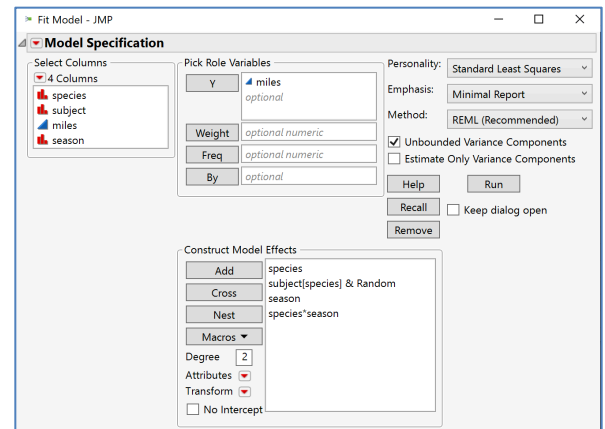
Example: Animals.jmp (Help > Sample Data Folder)

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

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 the nesting structure: Here, subject is nested within species. Select '*subject*' from **Construct Model Effects**, select '*species*' from **Select Columns**, and click **Nest**. (If the subject ID is uniquely valued, skip this step.)

5. Specify random effect(s): Select a model effect, then select **Random** from the **red triangle** next to **Attributes**. Here, "subject[species]" is specified as a random effect.

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

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

Interpretation:

1. Variance Components Estimates: Show the estimated variances for random effects and the residual error. In this example, the estimated variation between animals is 0.76, or 38% of the total variation.

2. Fixed Effect Tests: Show the F-test results for the fixed effects using the appropriate variance component estimate as an error term in the denominator. Here, species and season are both significant at alpha = 0.05, while the interaction is not.

See the **Repeated Measures Analysis (ANOVA)** Guide to learn how to analyze repeated measures data using the MANOVA platform.

Visit **Fitting Linear Models > Mixed Models** in **JMP Help** to learn more.