

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.

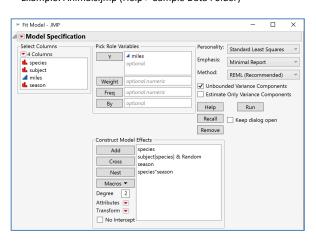
Analysis of Repeated Measures: Mixed Model

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



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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.

Example: Animals.jmp (Help > Sample Data Folder)