



Wine Tasting Ratings

The purpose of this research paper is to provide a comprehensive, step-by-step guide for conducting a **Repeated Measures Analysis of Variance (RM-ANOVA)** using the Isalos Analytics Platform. RM-ANOVA is used when the same subjects (judges) are measured under multiple conditions (wines). This design allows us to test whether there are significant differences in the mean ratings among the four wines, while accounting for the natural variability among judges.

This methodology is particularly valuable in sensory evaluation, where each judge tastes every wine, and we want to determine if wine types are perceived differently, while controlling for individual judge effects.

Isalos version used: 2.1.5

The dataset used in this analysis is the **Wine Tasting Ratings dataset (stacked)**, sourced from a JMP software example.

Source: [JMP Academic – One-Factor Repeated Measures](#)

This dataset simulates a typical wine tasting experiment. Each judge gives a rating to each of four wines. The variables are:

- **Dependent Variable (Response):**
 - *Rating* – the score given by a judge to a wine (continuous, 0–100).
- **Within-Subjects Factor (Categorical Predictor):**
 - *Wine* – the wine type (Wine 1, Wine 2, Wine 3, Wine 4).
- **Subject Identifier (Random Factor):**
 - *Judge* – the individual judge (1 to 15). This is not a predictor of interest but is used to account for repeated measures.

Step 1: Import Data from file

Firstly, launch the Isalos Analytics Platform (version 2.1.2). Then, in the left spreadsheet panel, create a new tab by clicking **File** and choose **Open** to load the wine tasting dataset (or simply copy-paste the data from your spreadsheet – stacked file).

Judge	Wine	Rating
1	Wine 1	51
1	Wine 2	52
1	Wine 3	68
1	Wine 4	55
2	Wine 1	38
2	Wine 2	46
2	Wine 3	62
2	Wine 4	38
3	Wine 1	94
3	Wine 2	86
3	Wine 3	85
3	Wine 4	79
4	Wine 1	71
4	Wine 2	91
4	Wine 3	68
4	Wine 4	58

Step 2: Access the MANOVA function

Navigate to the RM - ANOVA analysis module through the main menu by choosing the following path:

Statistics → Analysis of (Co)Variance → Repeated Measures ANOVA

Then, you will see the RM - ANOVA configuration window:


Repeated Measures ANOVA
?
×

Confidence Level (%)

Double (0,100), Default: -

Sum of Squares for Tests

Adjusted (Type III) ▼

Subject Column

▼

Within Column

▼

Dependent Variable

▼

Execute

Cancel

Step 3: Configure RM - ANOVA parameters

The model for this analysis is:

$$\text{Rating} = \mu + \text{Wine}_i + \text{Judge}_j + \varepsilon_{ij}$$

Where:

- *Wine* is the within-subjects factor (4 levels).
- *Judge* is the subject identifier (random factor) – we do not test its effect directly, but it is used to partition variance.

[Steps in Isalos Analytics Platform:](#)

In the RM - ANOVA configuration window, set the following parameters:

- **Confidence Level (%):** 95
- **Subject Column:** Select Col2 – Judge
- **Within Column:** Select Col3 – Wine
- **Dependent Variable:** Select Col4 – Rating

The formula preview will display the model structure as shown below:

 Repeated Measures ANOVA ? X

Confidence Level (%)	95
Sum of Squares for Tests	Adjusted (Type III) ▼
Subject Column	Col2 -- Judge ▼
Within Column	Col3 -- Wine ▼
Dependent Variable	Col4 -- Rating ▼

Execute

Cancel

After configuring all parameters:

- * Review all selections to ensure accuracy.
- * Click the **Execute** button to run the analysis.
- * Wait for the computation to complete (processing time depends on dataset size and the number of dependent variables).

Step 4: Results

The analysis results will be displayed in the right spreadsheet panel. The output typically includes the following components:

WITHIN-SUBJECTS EFFECTS							
Source	Wine	DF	Adj SS	Adj MS	F-Value	P-Value	Significant
Wine	Linear	1	3.8533333	3.8533333	0.0479847	0.8297692	No
Error(Wine)	Linear	14	1124.2466667	80.3033333			
Wine	Quadratic	1	806.6666667	806.6666667	7.3724296	0.0167496	Yes
Error(Wine)	Quadratic	14	1531.8333333	109.4166667			
Wine	Cubic	1	257.6133333	257.6133333	1.5319233	0.2361804	No
Error(Wine)	Cubic	14	2354.2866667	168.1633333			
BETWEEN-SUBJECTS EFFECTS							
Source	DF	Adj SS	Adj MS	F-Value	P-Value	Significant	
Intercept	1	289537.0666667	289537.0666667	461.3383815	0E-7	Yes	
Error	14	8786.4333333	627.6023810				

Step 5 : Residual Analysis & Assumption's checks

Choose

Statistics → Analysis of (Co)Variance → RM ANOVA

and choose

Residual Analysis & Assumption's Checks.

You get the following window:


Residual Analysis & Assumption's Checks
?
×

Normality of Residuals

Statistical Tests

☐ Shapiro-Wilk Test
 ☐ Anderson-Darling Test
 ☐ Kolmogorov-Smirnov Test

Plots

☐ Normal Q-Q Plots
 ☐ Histogram of Residuals
 ☐ Density Plot of Residuals

Residual Diagnostics

Plots

☐ Residuals vs Observation Order

Homogeneity of Variance (Homoscedasticity)

Statistical Tests

☐ Mauchly's Test

Plots

☐ Residuals vs Fitted Values
 ☐ Residuals vs Dependent Variable
 ☐ Boxplots by Group
 ☐ Violin Plot by Group

Model Adequacy

Plots

☐ Residuals vs Fitted values
 ☐ Residuals vs Each Factors

Save

Cancel

then choose the tests you want. For example, choose the following:


Residual Analysis & Assumption's Checks
?
×

Normality of Residuals

Statistical Tests

☒ Shapiro-Wilk Test
 ☒ Anderson-Darling Test
 ☒ Kolmogorov-Smirnov Test

Plots

☒ Normal Q-Q Plots
 ☒ Histogram of Residuals
 ☒ Density Plot of Residuals

Residual Diagnostics

Plots

☒ Residuals vs Observation Order

Homogeneity of Variance (Homoscedasticity)

Statistical Tests

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☒ Residuals vs Fitted Values
 ☒ Residuals vs Dependent Variable
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 ☒ Violin Plot by Group

Model Adequacy

Plots

☒ Residuals vs Fitted values
 ☒ Residuals vs Each Factors

Save

Cancel

After that, click execute and you get the results (some of them below):

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