

# How do you perform a Repeated Measures ANOVA in SAS?

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## RECOMMENDED CITATION

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Repeated Measures ANOVA in SAS is a statistical method used to analyze data with multiple measurements taken from the same individuals or groups over time. This type of ANOVA allows for the comparison of means between the repeated measurements, taking into account the correlation between them. To perform a Repeated Measures ANOVA in SAS, the data must be structured in a specific format, with each repeated measurement as a separate variable. The PROC GLM procedure is then used to run the analysis, specifying the repeated measures design and appropriate error structure. This allows for the calculation of within-subject and between-subject effects, as well as any interaction effects. The resulting output provides information on the significance of the effects and allows for comparisons between the different levels of the repeated measures. Overall, Repeated Measures ANOVA in SAS is a powerful tool for analyzing longitudinal data and can provide valuable insights into the changes and patterns over time.

## Perform a Repeated Measures ANOVA in SAS

**A repeated measures ANOVA is used to determine whether or not there is a statistically significant difference between the means of three or more groups in which the same subjects show up in each group.**

**This tutorial provides a step-by-step example of how to perform a repeated measures ANOVA in SAS.**

### Step 1: Create the Data

**Suppose a researcher want to know if four different drugs lead to different reaction times. To test this, he measures the reaction time of five patients on the four different drugs.**

**The reaction times are shown below:**

Patient	Drug 1	Drug 2	Drug 3	Drug 4
Patient 1	30	28	16	34
Patient 2	14	18	10	22
Patient 3	24	20	18	30
Patient 4	38	34	20	44
Patient 5	26	28	14	30

**We can use the following code to create this dataset in SAS:**

```
/*create dataset*/  
data my_data;  
input Subject Drug Value;  
datalines;  
1 1 30  
1 2 28  
1 3 16  
1 4 34  
2 1 14  
2 2 18  
2 3 10  
2 4 22  
3 1 24  
3 2 20  
3 3 18  
3 4 30
```

```
4 1 38  
4 2 34  
4 3 20  
4 4 44  
5 1 26  
5 2 28  
5 3 14  
5 4 30  
;  
run;
```

**Step 2: Perform the Repeated Measures ANOVA**

**Next, we'll use proc glm to perform the repeated measures ANOVA:**

```
/*perform repeated measures ANOVA*/  
proc glm data=my_data;  
class Subject Drug;  
model Value = Subject Drug;  
run;
```

**Step 3: Interpret the Results**

**We can analyze the ANOVA table in the output:**

**The GLM Procedure**

**Dependent Variable: Value**

Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Model	7	1379.000000	197.000000	20.96	<.0001
Error	12	112.800000	9.400000		
Corrected Total	19	1491.800000			

  

R-Square	Coeff Var	Root MSE	Value Mean
0.924387	12.31302	3.065942	24.90000

  

Source	DF	Type I SS	Mean Square	F Value	Pr > F
Subject	4	680.8000000	170.2000000	18.11	<.0001
Drug	3	698.2000000	232.7333333	24.76	<.0001

  

Source	DF	Type III SS	Mean Square	F Value	Pr > F
Subject	4	680.8000000	170.2000000	18.11	<.0001
Drug	3	698.2000000	232.7333333	24.76	<.0001

The only value we're interested in is the F value and corresponding p-value for Drug since we want to know if the four different drugs lead to different reaction times.

From the output we can see:

The F Value for Drug: 24.76  
 The p-value for Drug: <.0001  
 H<sub>0</sub>: All group means are equal.  
 H<sub>A</sub>: At least one group mean is different from the rest.

Since the p-value for Drug (<.0001) is less than  $\alpha = .05$ ,

**we reject the null hypothesis.**

**This means we have sufficient evidence to say that the mean response time is not equal among the four different drugs.**

#### **Additional Resources**

**The following tutorials provide additional information about repeated measures ANOVAs:**

ARABPSYCHOLOGY.COM