Technical Support Document

Analyzing a Repeated Measures Design in Minitab

You can use **Stat > ANOVA > General Linear Model** to analyze a repeated measures design in Minitab.

In all cases, you must arrange the data in the Minitab worksheet so the response values are in one column, subject IDs are in another column, and each factor has its own separate column.

The examples below illustrate analyses of several different repeated measures designs. You can find more information about each example on the page numbers specified below in Neter, Kutner, Nachtsheim, and Wasserman (1996).

Single-factor experiment with repeated measures on all treatments (p. 1166, model 29.1)

In this experimental design each subject receives each treatment in succession. Create three columns in the Minitab worksheet: one column for the measurements, one column indicating which subject corresponds to that measurement, and one column indicating the treatment applied to that subject. Each row represents a single measurement.

Single-factor experiment with repeated measures on all treatments *

↓	C1-T	C2-T	C3	C4	C5
	Subject	Dosage	Measurement		
1	A	low	1.33		
2	A	medium	0.27		
3	B	medium	0.49		
4	B	low	0.99		
5	C	medium	0.41		
6	C	low	1.12		
7					

1. Choose **Stat > ANOVA > General Linear Model**.
2. In **Responses**, enter the Measurement column.
3. In **Model**, enter the Subject column and the Treatment column.
4. In **Random factors**, enter the Subject column.
5. Click **OK**.

Two-factor experiment with repeated measures on both factors (p. 1177, model 29.10)

In this experimental design each subject is measured after receiving, successively, every combination of the levels of the two factors A and B. For example, suppose there are three subjects, and factors A and B each have two levels. The experimental design proceeds as follows:

	Chronological Order of Treatments			
	1	2	3	4
Subject 1	A_1B_2	A_2B_2	A_1B_1	A_2B_1
Subject 2	A_2B_1	A_1B_2	A_2B_2	A_1B_1
Subject 3	A_1B_1	A_2B_1	A_1B_2	A_2B_2

Create four columns in the Minitab worksheet: one column for the measurements, one column indicating which subject corresponds to that measurement, one column for Factor A, and one column for Factor B.

Two-factor experiment with repeated measures on both factors *

↓	C1-T	C2-T	C3-T	C4
	Subject	Temperature	Fabric	Measurement
1	A	High	Old	10.4
2	A	High	New	9.5
3	A	Low	New	7.6
4	A	Low	Old	6.9
5	B	High	New	9.1
6	B	High	Old	7.9
7	B	Low	New	10.0
8	B	Low	Old	8.1

1. Choose **Stat > ANOVA > General Linear Model**.
2. In **Responses**, enter the Measurement column.
3. In **Model**, enter the Subject column, the Factor columns, and interactions between all factor columns. For example, you could enter *Subject Temperature Fabric Temperature*Fabric*
4. In **Random factors**, enter the Subject column.
5. Click **OK**.

Two-factor experiment with repeated measures on one factor (p. 1186, model 29.16)

In this experimental design each subject is measured after receiving, successively, all levels of Factor B in combination with only one level of Factor A. This experimental design proceeds as follows:

		Treatment Order	
Factor A	Subject	1	2
A_1	1 … n	A_1B_1 … A_1B_2	A_1B_2 … A_1B_1
A_2	n+1 … 2n	A_2B_2 … A_2B_1	A_2B_1 … A_2B_2

Create four columns in the Minitab worksheet: one column for the measurement, one column indicating which subject corresponds to that measurement, one column for Factor A, and one column for Factor B.

Two-factor experiment with repeated measures on one factor ***

↓	C1-T	C2-T	C3-T	C4
	Subject	Temperature	Fabric	Measurement
1	A	High	Old	1.1
2	A	High	New	2.2
3	B	High	New	1.9
4	B	High	Old	1.2
5	C	Low	Old	0.8
6	C	Low	New	1.1
7	D	Low	Old	0.9
8	D	Low	New	1.3

1. Choose **Stat > ANOVA > General Linear Model**.
2. In **Responses**, enter the Measurement column.
3. In **Model**, enter the following columns:
   - the subject column nested within Factor A
   - Factor A
   - Factor B
   - The interaction between A and B
     For example: *Subject(Temperature) Temperature Fabric Temperature*Fabric*
4. In **Random factors**, enter the Subject column.
5. Click **OK**.

Note: In the examples above, if any factors besides Subject are random, remember to enter them in **Random factors** in the dialog box, along with the Subject column.

Reference:

J. Neter, M.H. Kutner, C.J. Nachtsheim, and W. Wasserman (1996). *Applied Linear Statistical Models*, 4th edition. WCB/McGraw-Hill.