

Twoway anova example

Each of 24 rabbits was given an injection of insulin and the percent reduction in blood sugar after a given time period was noted. Two different methods of preparing the insulin and three different dosage levels were used. The three dosage levels were 2.3, 3.6 and 6.5.

```
> Preparation<-gl(2,12,24)
> Preparation
[1] 1 1 1 1 1 1 1 1 1 1 1 1 2 2 2 2 2 2 2 2 2 2 2 2
Levels: 1 2
> Dose<-gl(3,4,24)
> Dose
[1] 1 1 1 1 2 2 2 2 3 3 3 3 1 1 1 1 2 2 2 2 3 3 3 3
Levels: 1 2 3
> Reduction
[1] 17 21 49 34 55 43 31 58 62 72 61 91
    23 37 40 51 46 69 38 69 56 62 57 72
> rabbit.aov<-aov(Reduction ~ Preparation*Dose)
> summary(rabbit.aov)
              Df Sum Sq Mean Sq F value    Pr(>F)
Preparation    1   28.2    28.2  0.1698 0.6851124
Dose            2 4261.1   2130.5 12.8475 0.0003416 ***
Preparation:Dose 2   427.6    213.8  1.2892 0.2997434
Residuals     18 2985.0    165.8
---
```

Next we find the means of Reduction for the 2x3=6 cells:

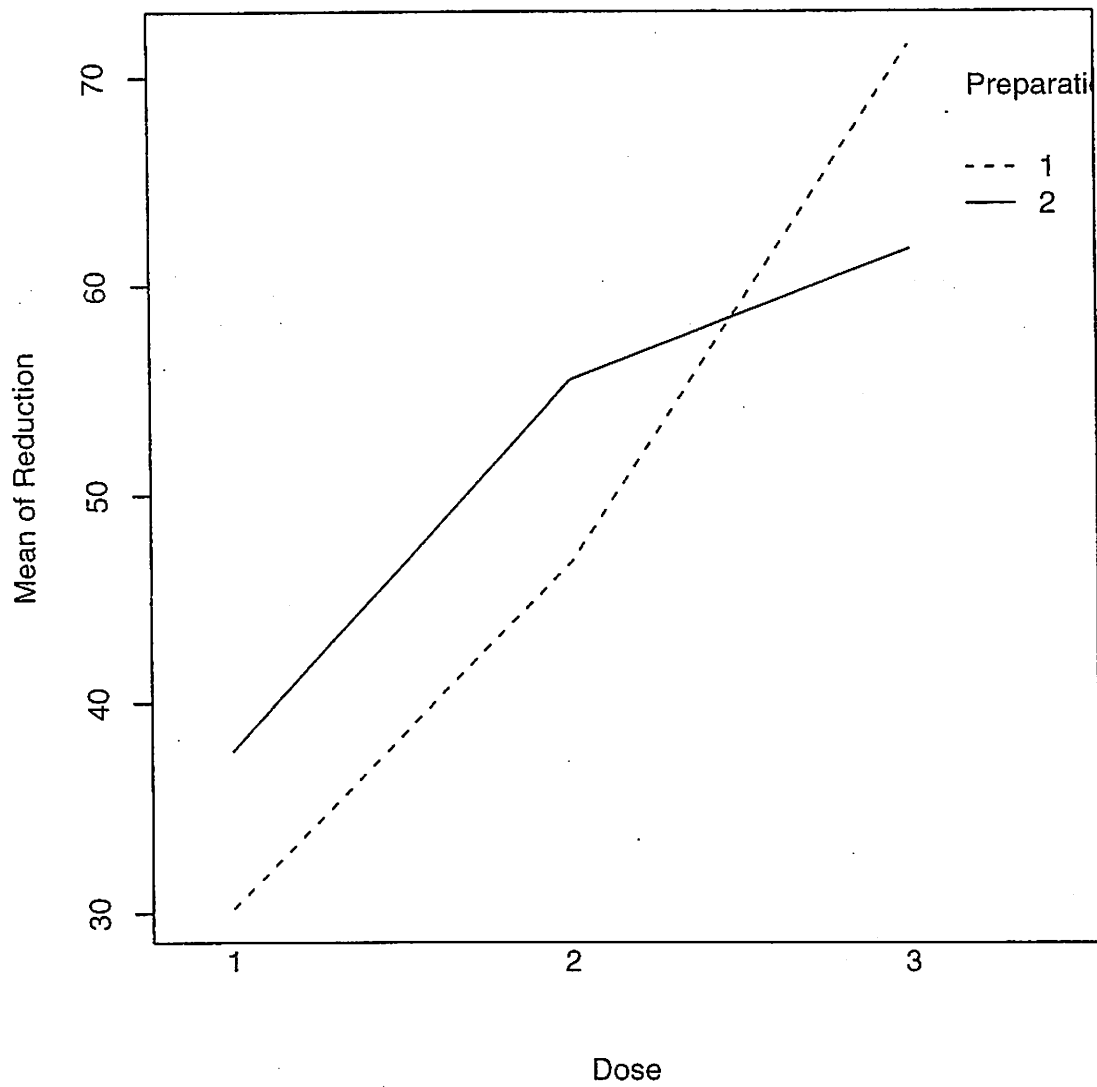
```
> sapply(split(Reduction,interaction(Preparation,Dose)),mean)
 1.1  2.1  1.2  2.2  1.3  2.3
30.25 37.75 46.75 55.50 71.50 61.75
```

Next we find the mean of Reduction for the 2 levels of preparation and the 3 levels of Dose:

```
> sapply(split(Reduction,Dose),mean)
 1      2      3
34.000 51.125 66.625
> sapply(split(Reduction,Preparation),mean)
 1      2
49.50000 51.66667
```

Next a plot that allows us to graphically check for interaction:

```
interaction.plot(Dose,Preparation,Reduction,,xlab="Dose",  
+ ylab="Mean of Reduction")
```



Randomized Block Example

Data were collected to determine the effect of treatments A, B, C and D on the yield of penicillin in a penicillin manufacturing process. There was a second factor, namely the blend factor, since a separate blend of the corn-steep liquor had to be made for each application of the treatments. The values of the response variable "yield" are given below along with the anova table and two plots.

	blend	treatment	yield
1	Blend 1	A	89
2	Blend 2	A	84
3	Blend 3	A	81
4	Blend 4	A	87
5	Blend 5	A	79
6	Blend 1	B	88
7	Blend 2	B	77
8	Blend 3	B	87
9	Blend 4	B	92
10	Blend 5	B	81
11	Blend 1	C	97
12	Blend 2	C	92
13	Blend 3	C	87
14	Blend 4	C	89
15	Blend 5	C	80
16	Blend 1	D	94
17	Blend 2	D	79
18	Blend 3	D	85
19	Blend 4	D	84
20	Blend 5	D	88

	Df	Sum of Sq	Mean Sq	F Value	Pr(F)
blend	4	264	66.00000	3.504425	0.0407462
treatment	3	70	23.33333	1.238938	0.3386581
Residuals	12	226	18.83333		

