

Instructions for carrying out statistical procedures and tests using SPSS

These instructions are closely linked to the author's book:

Essential Statistics for the Pharmaceutical Sciences
John Wiley & Sons Ltd <http://eu.wiley.com>
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For all references to chapters or tables, see the above book.

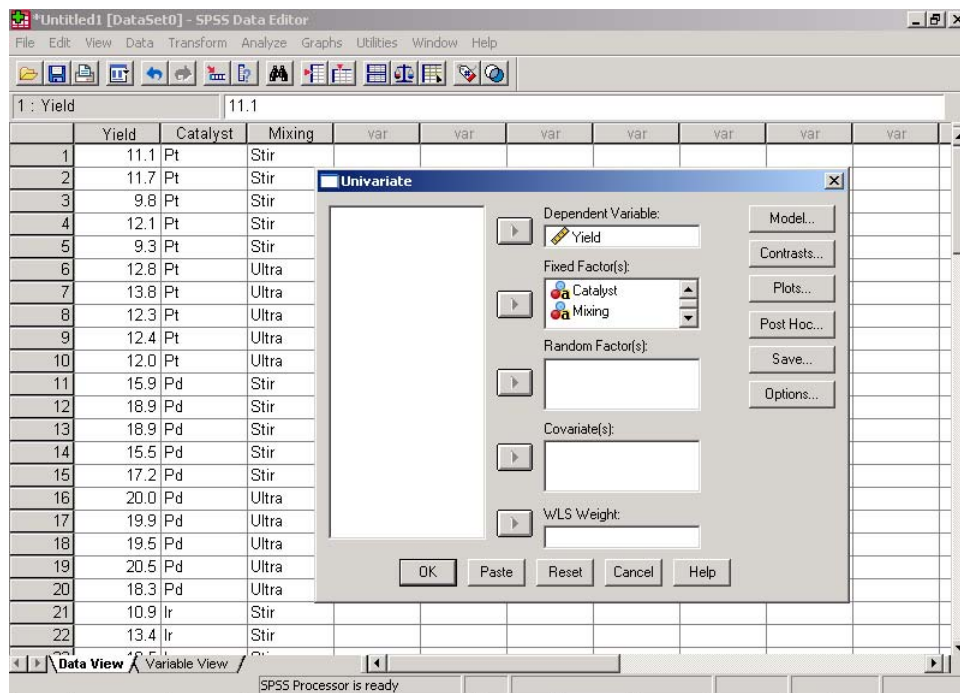
**Using SPSS to perform a
two-way analysis of variance**

Using SPSS to perform a two-way analysis of variance

Example: Table 13.7 Effects of catalyst and mixing method on yield (Percentage of theoretical maximum)

Label one column ('Yield') to hold the yields as a numeric variable and two others ('Catalyst' and 'Mixing') to hold labels (String variables) for the two factors.

Enter all the percentage yields into the relevant column and put suitable labels into the other two columns. The Data Editor should then look like this:



Follow the menus:

Analyze / General Linear Model / Univariate ...

Technically, the General Linear Model (GLM) routine uses a method of calculation that is different from the classical two way ANOVA, but the end result is exactly the same. One advantage of the GLM routine is that it is tolerant of imbalanced data sets, so if for example, a lab accident led to the loss of one of the samples, we could still go ahead with a GLM analysis, but not with a traditional ANOVA. (See Section 13.3.6)

Move 'Yield' into the 'Dependent Variable' box and 'Catalyst' and 'Mixing' into the 'Fixed Factors' box.

The routine could now be run, but it is useful to generate a plot of the data by clicking the 'Plots...' button and moving 'Catalyst' into the 'Separate Lines'

box and 'Mixing' into the 'Horizontal Axis' box. Click 'Add' and then 'Continue'.

The main output will be:

Tests of Between-Subjects Effects

Dependent Variable: Yield

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	365.962(a)	9	40.662	36.433	.000
Intercept	9971.544	1	9971.544	8934.275	.000
Catalyst	300.931	4	75.233	67.407	.000
Mixing	63.845	1	63.845	57.204	.000
Catalyst * Mixing	1.186	4	.297	.266	.898
Error	44.644	40	1.116		
Total	10382.150	50			
Corrected Total	410.606	49			

a R Squared = .891 (Adjusted R Squared = .867)

P values are presented in the final column. The key lines are those labelled 'Catalyst', 'Mixing' and 'Catalyst*Mixing'. The first two refer to the effects of the catalyst (yellow) and mixing (blue) and the final one (grey) is interaction between these. (See Chapter 13). Both factors are clearly significant (Results should be reported as $P < 0.001$). The evidence of interaction falls well short of significance ($P = 0.898$).

We also get the graph shown on the next page. This is similar to Figure 13.5.

Estimated Marginal Means of Yield

