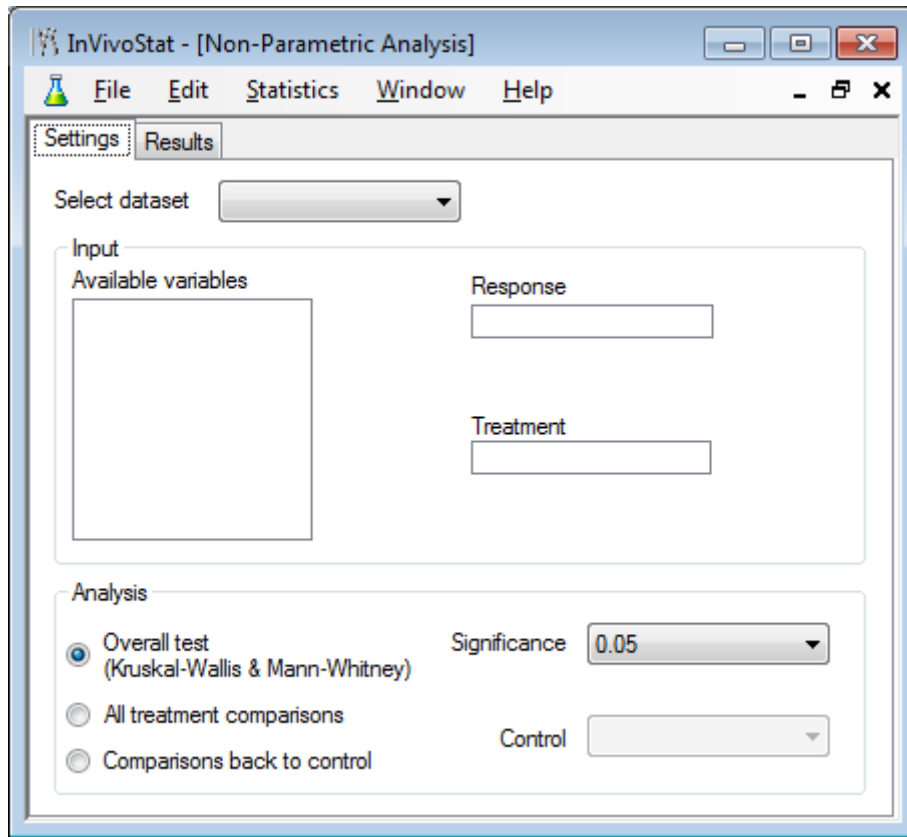The Non-Parametric Analysis module in SilveR is available from the Statistics drop down menu entitled "Non-Parametric Analysis".

The Non-Parametric Analysis module performs the Kruskal–Wallis test, the Mann-Whitney test (also known as Wilcoxon Rank Sum Test), Steel's all comparisons back to one test and the Behrens-Fisher all pairwise tests.

1   Input selections

To begin with the user selects the dataset.
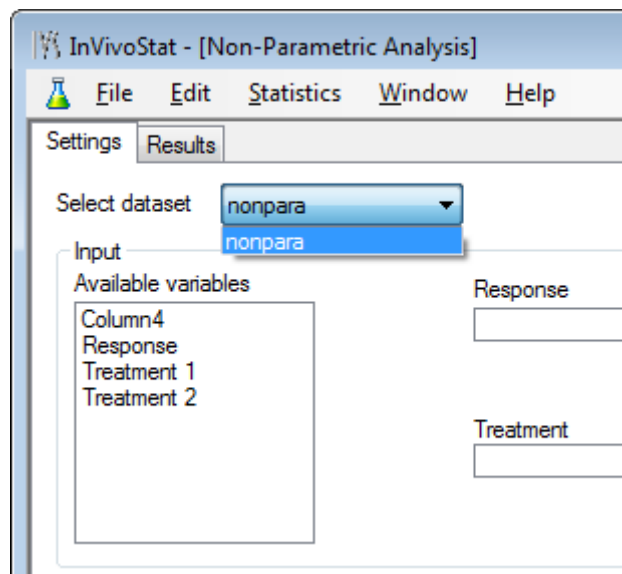
The response and the treatment factor are then selected from the list of available variables by drag and dropping the relevant variables onto the Response and Treatment boxes.

Finally the user selects either:

- The overall test between the treatment levels (either the Mann-Whitney test if there are only two levels of the treatment factor, or the Kruskal-Wallis test otherwise)

- All treatment comparisons (SilveR calculates the Behrens-Fisher all pairwise tests and also all pairwise Mann-Whitney tests). Behrens-Fisher tests are recommended in many texts, although the results generated within SilveR have not been independently verified

- Comparisons back to control (SilveR performs the Steel's all comparison back to one test). The user is also required to select the control group from a drop down menu

- the user can also choose the significance level for the tests, the default being 0.05 or 5%

2 Output details

The output consists of a series of non-parametric statistics and figures, including:

1) A table of summary statistics including the median, the interquartile range (Q1 and Q3, the minimum and maximum observation. Each row of the table corresponds to a treatment group.

2) A box-plot of the data, again categorised by the treatment factor.

3) A table of test results, depending on the option selected by the user. This can be either Kruskal-Wallis or Mann-Whitney Test, depending on the number of treatment factor levels, Behrens-Fisher and all pairwise Mann-Whitney tests or Steel's all comparisons back to one.

4) A summary of the analysis conclusions, at the selected level of significance

5) A description of the analysis performed

6) References of the tests employed.

3   Sample Output

SilveR Non-Parametric Analysis

Response
The Response response is currently being analysed by the Non-Parametric Analysis module, with Treatment 2 fitted as the treatment factor.

Summary data

Group	Minimum	Q1	Median	Q3	Maximum
A	0.05	0.23	0.66	0.96	1.00
B	0.28	0.36	0.50	0.78	0.99
C	0.35	0.55	0.81	0.89	0.90
D	0.02	0.20	0.51	0.62	0.89

Box-plot
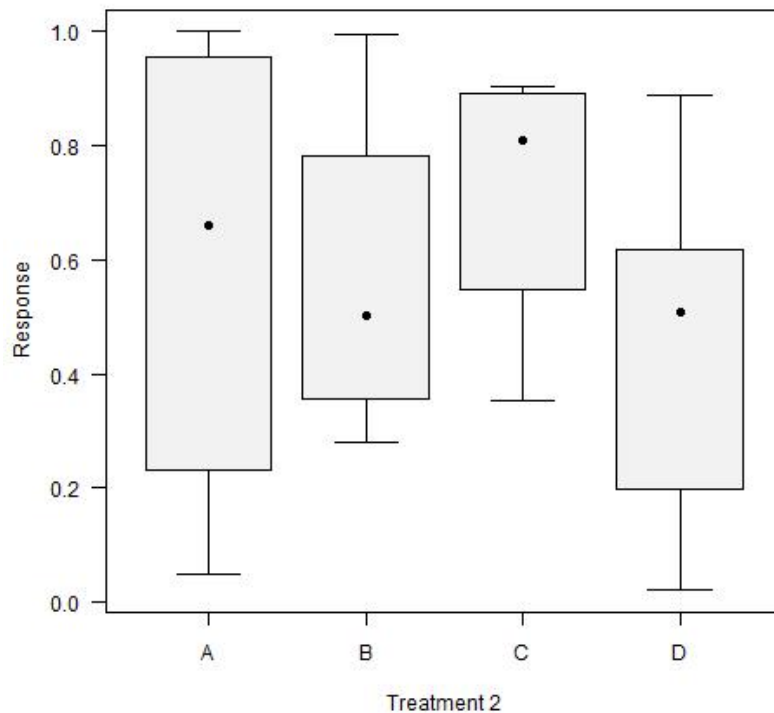
Kruskal-Wallis test

	Test statistic	DF	p-value
Result	1.16	3	0.7617

Analysis conclusions

The overall difference between the treatment groups is not statistically significant at the 5% level of significance as the p-value is greater than 0.05 (Kruskal-Wallis test).

Analysis description

The overall treatment effect was assessed using the non-parametric Kruskal-Wallis test, see Kruskal and Wallis (1952, 1953).
Non-parametric tests should be used if the data is non-normally distributed, the variability is different between treatment groups or the responses are not continuous and numerical.

Statistical references

Kruskal, WH and Wallis, WA (1952). Use of ranks in one criterion variance analysis. JASA, 47, 583-621.

Kruskal, WH and Wallis, WA (1953). Errata for Kruskal-Wallis (1952). JASA, 48, 907-911.

R references

R Development Core Team (2008). R: A language and environment for statistical computing. R Foundation for Statistical Computing, Vienna, Austria. ISBN 3-900051-07-0, URL http://www.R-project.org.

Alan Genz, Frank Bretz, Torsten Hothorn with contributions by Tetsuhisa Miwa, Xuefei Mi, Friedrich Leisch and Fabian Scheipl (2008). mvtnorm: Multivariate Normal and t Distributions. R package version 0.9-0.

Joerg Helms and Ullrich Munzel (2008). NPMC: Nonparametric Multiple Comparisons. R package version 1.0-7.

Lecoutre, Eric (2003). The R2HTML Package. R News, Vol 3. N. 3, Vienna, Austria.