

1 Introduction

This document describes how to start using SilverR, including data importing, data manipulation, generating results and exporting results to other software.

Once installed SilverR can be accessed from the Windows Start Menu:

Start → All programs → IVS → SilverR

2 Data import

Data is imported into SilverR from Excel (using .xls file format) or from a text editor using .csv (comma delimited) format. Data can also be imported from Excel 2007 (.xlsx format) however this import has not been fully verified and should be 100% checked once imported. Although some basic data editing can be done in SilverR, it is recommended that the user first create the final dataset in Excel, including all data manipulations, before importing into SilverR. If the Excel file has multiple worksheets present, then the user is prompted to select one of the worksheets to import.

Warning – datasets cannot contain commas in either the variable names or the data itself. Variable names cannot also contain the symbols ~ (tilde), + (plus) or * (asterisk) as these characters are used internally by SilverR. Users will not be able to load files that have such characters present.

There are at least three different ways to organise your raw data, depending on the experimental design, before importing into SilverR. We shall go through them individually.

As a general rule:

- the results of each parameter measured in the experiment should be placed in a single column of the dataset
- variable names should be placed in the first row of the dataset
- missing data should be left as empty cells in Excel
- no text should be placed in numerical response columns (other than the variable name)

2.1 Single measures

In this dataset type each animal is assessed once and once only for each parameter measured. Many different parameters can be measured but each one is “different” and will be analysed separately. Each row of the dataset corresponds to the results generated from an animal. The results from each parameter are placed in a column of the dataset. Other columns to be included are the so-called “Indicator columns” defining, for example, the animal ID, the treatment factor(s), gender and also any blocking factors.

Consider a study assessing three treatments that involves transgenic and wildtype animals of both sexes. In the experiment the measurements recorded include bodyweight, locomotor activity, latency and a covariate. The dataset contains a separate variable for each of these parameters, along with indicator variables for Animal, Sex, Strain and Treatment (along with two nuisance blocking variables Block1 and Block2).

	A	B	C	D	E	F	G	H	I	J
1	Animal	Activity	Latency	Bodyweight	Covariate	Treatment	Sex	Strain	Block1	Block2
2	1	1.170	0.690	0.925	0.251	D0	F	TG	Bk1	Bk3
3	2	1.302	0.206	0.962	0.410	D0	F	TG	Bk1	Bk1
4	3	1.717	0.352	0.131	0.679	D0	F	TG	Bk2	Bk1
5	4	1.170	0.741	0.302	0.396	D0	F	TG	Bk2	Bk2
6	5	1.386	0.992	0.695	0.605	D0	F	WT	Bk1	Bk2
7	6	1.441	0.089	0.004	0.992	D0	F	WT	Bk1	Bk3
8	7	1.601	0.121	0.229	0.685	D0	F	WT	Bk2	Bk3
9	8	1.571	0.802	0.331	0.082	D0	F	WT	Bk2	Bk1
10	9	1.333	0.097	0.206	0.414	D0	M	TG	Bk1	Bk1
11	10	1.570	0.367	0.729	0.068	D0	M	TG	Bk1	Bk2
12	11	1.657	0.043	0.477	0.422	D0	M	TG	Bk1	Bk3
13	12	1.474	0.517	0.096	0.290	D0	M	TG	Bk2	Bk2
14	13	1.717	0.292	0.508	0.515	D0	M	TG	Bk2	Bk3
15	14	1.170	0.416	0.983	0.854	D0	M	TG	Bk2	Bk1
16	15	1.064	0.313	0.511	0.914	D0	M	WT	Bk1	Bk1
17	16	1.244	0.841	0.965	0.770	D0	M	WT	Bk1	Bk2
18	17	1.601	0.291	0.207	0.642	D0	M	WT	Bk2	Bk2
19	18	0.987	0.018	0.107	0.310	D0	M	WT	Bk2	Bk3
20	19	1.370	0.409	0.657	0.591	D1	F	TG	Bk1	Bk1
21	20	1.502	0.112	0.824	0.023	D1	F	TG	Bk1	Bk2
22	21	1.586	0.190	0.243	0.229	D1	F	TG	Bk1	Bk3
23	22	1.370	0.796	0.075	0.834	D1	F	TG	Bk2	Bk2
24	23	1.502	0.195	0.939	0.717	D1	F	TG	Bk2	Bk3
25	24	1.370	0.580	0.644	0.080	D1	F	TG	Bk2	Bk1
26	25	1.641	0.529	0.118	0.776	D1	F	WT	Bk1	Bk1
27	26	1.533	0.433	0.453	0.831	D1	F	WT	Bk1	Bk2
28	27	1.502	0.992	0.105	0.071	D1	F	WT	Bk2	Bk2
29	28	1.586	0.562	0.696	0.097	D1	F	WT	Bk2	Bk3

2.2 Repeated measures

If a parameter is measured repeatedly on each animal, for example over time, then the dataset must be formatted in a slightly different way to that described above. In this case the responses recorded for each parameter are still placed in a single column of the dataset, but in this case each animal is present in multiple rows of the dataset. An extra column is included in the dataset to identify the levels of the repeated factor. Indicator variables can be added to the dataset as before and covariates can also be included as extra columns of the dataset. The dataset can be described as “long and thin”.

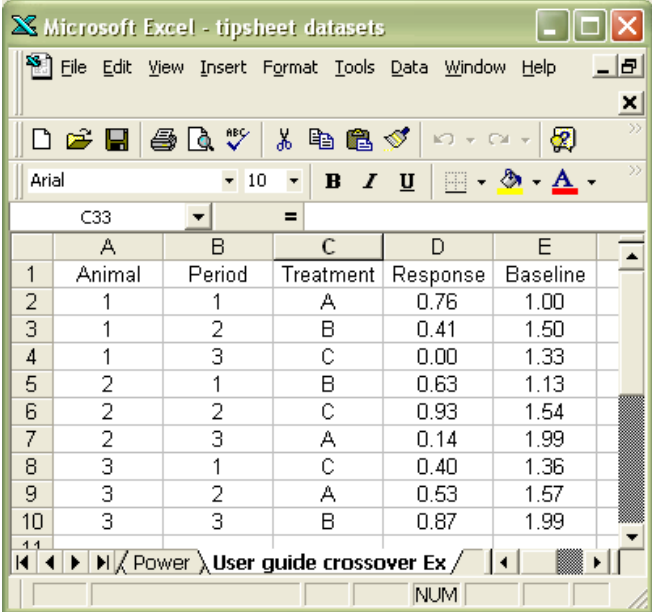
For example, consider an experiment where the response of the animals was measured pre-treatment (the covariate) and on Days 1, 2, 3 and 4. Treatments are labelled A, B and C. The dataset should be set up as follows:

	A	B	C	D	E
1	Response	Covariate	Treatment1	Animal	Day
2	0.379	1.200	A	A1	D1
3	0.044	0.489	A	A1	D2
4	0.837	0.414	A	A1	D3
5	0.933	0.277	A	A1	D4
6	0.497	0.026	A	A10	D1
7	0.435	0.797	A	A10	D2
8	0.432	0.676	A	A10	D3
9	0.446	0.667	A	A10	D4
10	0.264	0.390	B	A11	D1
11	0.445	0.504	B	A11	D2
12	0.791	0.113	B	A11	D3
13	0.611	0.374	B	A11	D4
14	0.496	0.535	C	A12	D1
15	0.578	0.675	C	A12	D2
16	0.639	0.057	C	A12	D3
17	0.083	0.587	C	A12	D4
18	0.243	0.035	A	A13	D1
19	0.719	0.718	A	A13	D2
20	0.533	0.022	A	A13	D3

2.3 Cross-over studies

With cross-over studies each animal is measured over several time periods. However unlike the repeated measures example discussed above, each animal receives a different treatment in each time period. The responses are placed in a single column of the dataset. Indicator columns for Animal, Treatment and Time period are also required to allow SilverR to carry out a valid analysis.

For example, consider a cross-over study involving three animals administered three treatments in three treatment periods, one treatment per animal per period. A single parameter was measured in each treatment period both pre- and post-dosing. The dataset would be created in Excel as follows:



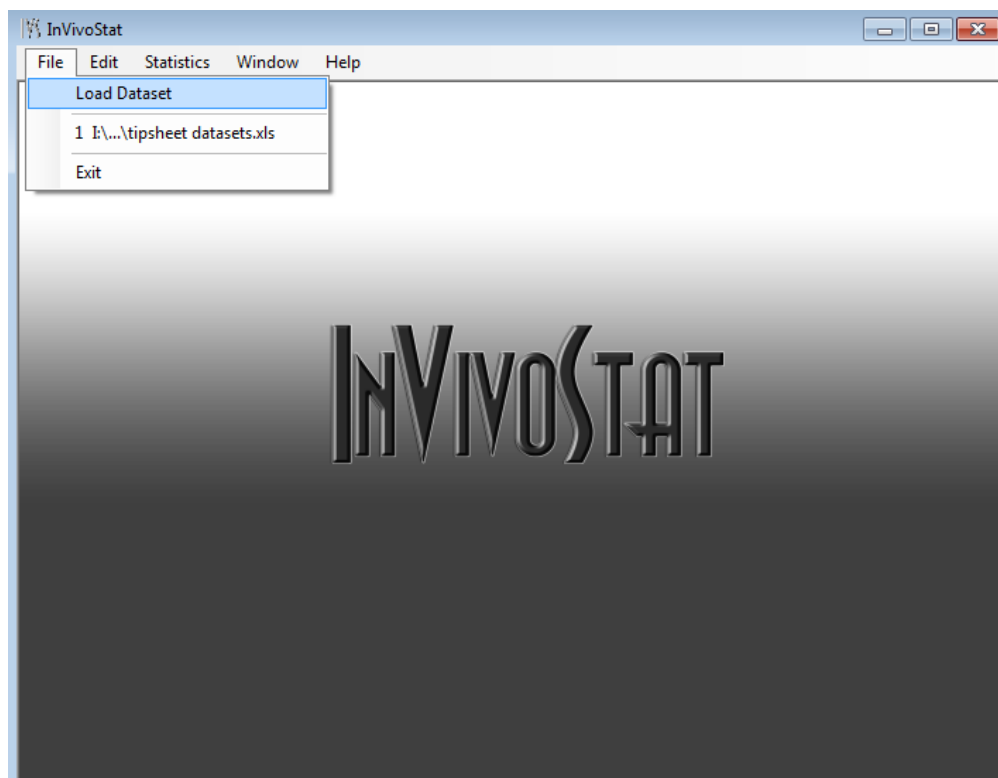
	A	B	C	D	E
1	Animal	Period	Treatment	Response	Baseline
2	1	1	A	0.76	1.00
3	1	2	B	0.41	1.50
4	1	3	C	0.00	1.33
5	2	1	B	0.63	1.13
6	2	2	C	0.93	1.54
7	2	3	A	0.14	1.99
8	3	1	C	0.40	1.36
9	3	2	A	0.53	1.57
10	3	3	B	0.87	1.99

2.4 Importing a dataset into SilverR – Excel import

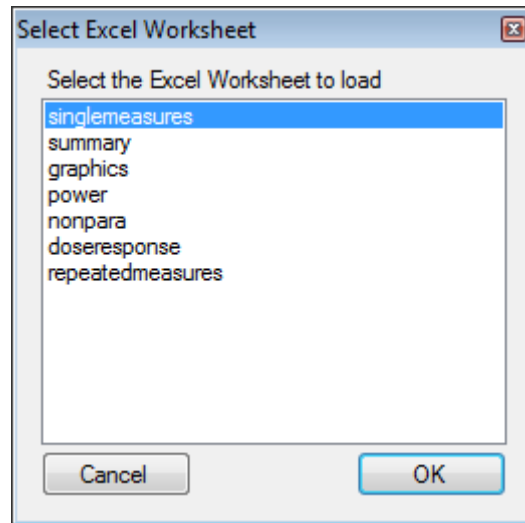
Open the SilverR user interface

Start → All Programmes → IVS → SilverR

The dataset can be loaded from the File menu



Once the Excel file is selected, in the usual Windows interface, then if the file has multiple worksheets the user is prompted to select one of the worksheets.



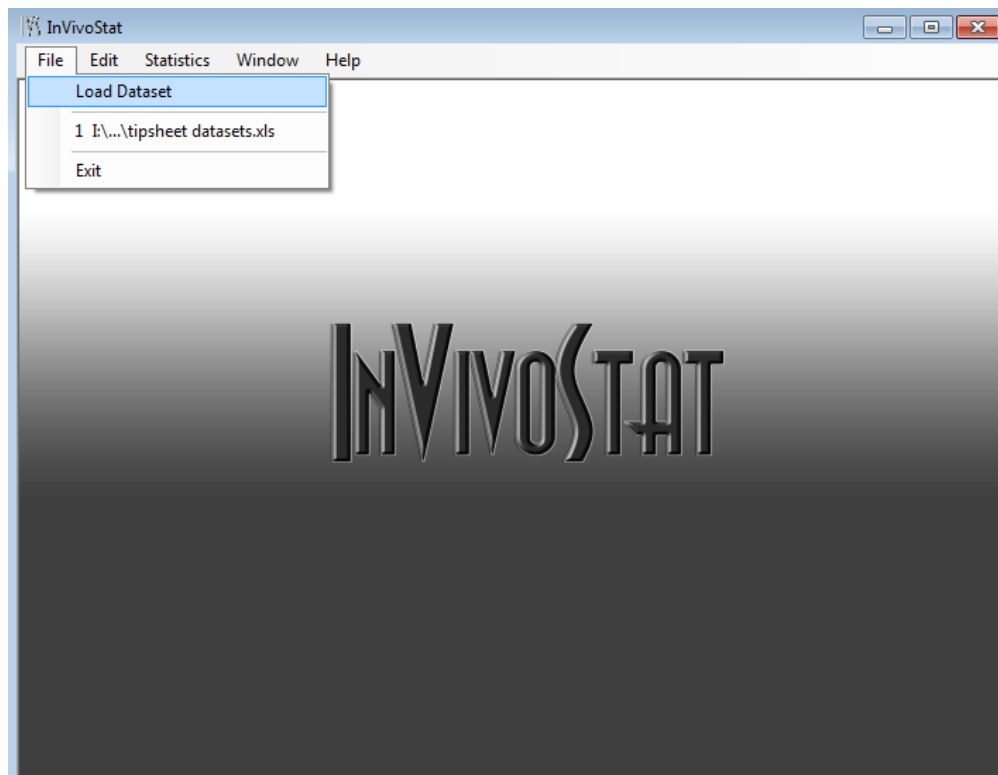
2.5 Importing a dataset into SilverR – text file import

The .csv version of the dataset can be opened directly in SilverR.

Open the SilverR user interface

Start → All Programmes → IVS → SilverR

The dataset can be loaded as before from the File menu.



3 Data management

While it is recommended that most of the data manipulation should be made in Excel prior to importing into SilveR, there are a few operations that can be carried out within SilveR itself.

- Clicking on the column header (variable name) will sort the dataset by that variable.

The dataset can be edited if the “Allow editing of data” option is selected prior to opening the dataset in SilveR.

Statistics → Options → (select) Allow editing of data

- Individual observations can be deleted from the dataset by highlighting the cell and pressing delete.
- Individual observations can also be changed if required.

Note that any edits to the data must be completed and finalised before running any analysis!

4 Running an analysis

Once the dataset has been loaded into SilveR the user is in a position to run the analysis of their choice. The analysis modules available include:

- Summary Statistics
- Single Measure Parametric Analysis (including t-test, ANOVA and ANCOVA)
- Repeated Measures Parametric Analysis
- Non-Parametric Analysis (Kruskal-Wallis and Mann-Whitney)
- Power Analysis (sample size calculation)
- Dose-Response
- Graphics
- P-value Adjustment (adjustments for multiple comparisons)

A full description of the specific analysis options is given in the individual tipsheets; however a few general rules apply to all analyses.

Each module can be accessed by selecting the appropriate option from the Statistics drop-down menu.

Each module window contains two tabs and they need to be selected in this order:

- Settings

On this tab the user selects all options required for the analysis. This includes the dataset to analyse, the variables to be selected and the analysis output options.

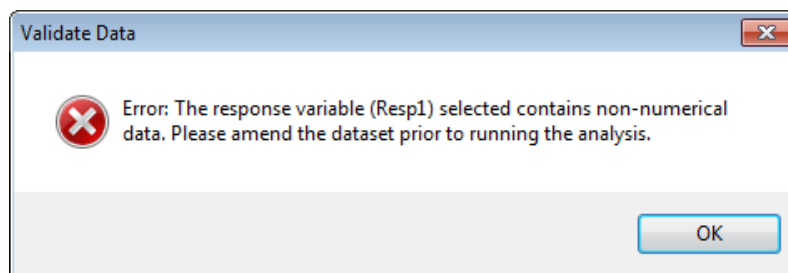
- Results

Once the options have been selected the user must click on the Results tab. The results tab contains the results of the analysis, including suitable comments, warnings and useful references.

5 Warning and error messages

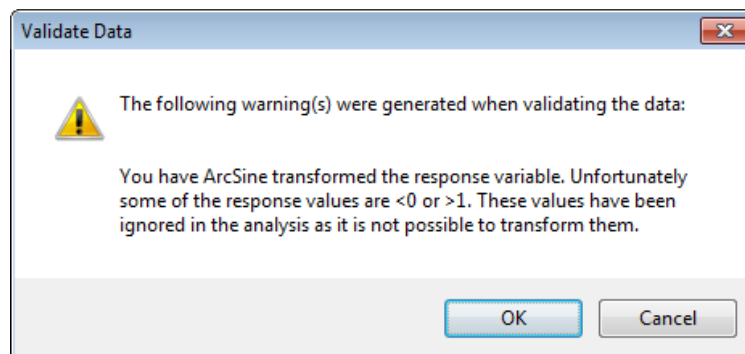
When running an analysis SilverR performs several checks of the data. These fall into two categories “Errors and “Warnings”.

Errors are differentiated from Warnings by a red cross. An example of an Error message is:



Once an Error message has been produced the analysis will not proceed. The user must return to the dataset and make any changes necessary to address the Error message.

Warning messages are more for information and are identified by a yellow triangle. They may highlight the need for user intervention, but in most cases they merely inform the user of a possible issue with the dataset. The analysis can proceed following a Warning message.



6 Log file

Once the analysis has been completed, the user can view a log file containing other information about the analysis. The log is available by clicking on the “View Log” button next to the Report URL information at the top of the Results window. The log should also be viewed if SilverR produces no output. It may give the user some valuable information explaining why the analysis did not complete.

7 Exporting results

Once the results have been generated then they can be exported in a number of different formats.

All results can be cut and pasted into other packages by either right clicking on the plots (then select copy) or highlighting the text/tables and right clicking.

Note plots can only be pasted into other packages using the “Paste Special” command and then “Paste as Bitmap”.

The output file itself is stored as a html file on the user’s computer. The address of this file can be found at the top of the output window.

InVivoStat - [Summary Statistics]

File Edit Statistics Window Help

Settings Results

Report URL: AppData/Roaming/IVS/App_Data/4d252278-6e92-47bc-a892-9731d653fdcf.html View Log

InVivoStat Summary Statistics

Summary statistics for Resp2

	Mean	N	StErr	Lower 95% CI	Upper 95% CI
Resp2	0.7595	32	0.0732	0.6102	0.9089

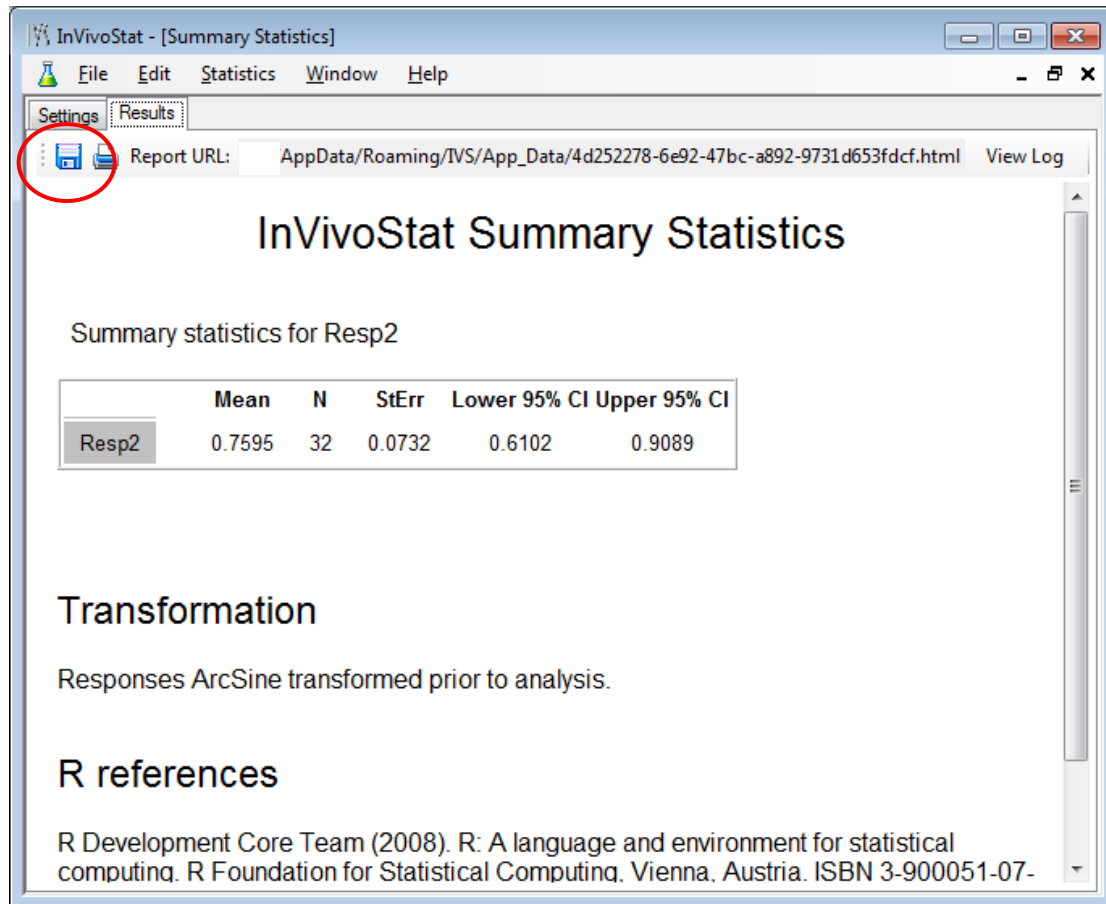
Transformation

Responses ArcSine transformed prior to analysis.

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-

Clicking on the save icon (see below) allows the user to save the output as a number of different formats including .html, .mht and text.



We recommend using .mht as this will save text, tables and figures in a single file. Once created the .mht file can be opened in a web browser and the individual results and figures can be cut and pasted into other programmes.

The following were added to this text by a) highlighting the text and copying it b) right clicking on the figure and selecting Copy from the menu.

Summary data

	Minimum	Q1	Median	Q3	Maximum
Group					
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

