SuperANOVA Demo Documentation

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Contents

1. Introduction

Welcome to your SuperANOVA™ demonstration. After you use this program, we are sure that you will find that SuperANOVA is by far the most versatile and easy-to-use, comprehensive general linear modeling package available on any computer.

This document explains how to use SuperANOVA

demonstration software. Its purpose is to show how quickly and easily you can create datasets, construct models, analyze results and create presentations. The disk you received contains a fully functional version of SuperANOVA with the following limitations:

- You cannot save a document
- You cannot print a

document

- You cannot paste from the Clipboard into either the Scrapbook or another application
- You cannot open StatView files
- Imported text files are limited to 100 rows and 25 columns

If you have any questions, please feel free to call Abacus Concepts Technical Support at **(510) 540-**

1949.

If you decide to purchase SuperANOVA, please use the order form enclosed with this package or call your order in over the telephone between 8:30 am and 4:00 pm Pacific Standard Time. You can also send us orders by FAX at (510) 540-0260. Orders can be paid using purchase orders,

MasterCard/Visa, or check. Site licenses and educational discounts are also available.

If you know of other people who would like to see first-hand how our software performs, you may copy your demonstration diskette and this document for them. The SuperANOVA demonstration program and this document are *not*

in the public domain. However, we allow you to copy them for non-commercial use.

System requirements

SuperANOVA runs on the Macintosh Plus and later Macintoshes that meet the following requirements:

- a hard disk
- Macintosh Operating System Version 6.0.2 or later

- a minimum of 1 megabyte of main memory (RAM)

There are two versions of SuperANOVA. The difference between the two is related to the kind of Macintosh you use. Make sure you order the correct version.

The **FPU version** of SuperANOVA requires a floating-point math coprocessor (or FPU) and consequently will operate only on the following Macintosh systems:

- a Macintosh II, IIx, IIcx, IIci, IIfx, SE/30 or IIsi. The IIsi must contain the optional FPU available from Apple.
- a Macintosh SE, Macintosh Plus,

Macintosh Portable, or any Macintosh with a 3rd party accelerator board containing a 68020 (or later) CPU and 68881 (or later) floating-point math coprocessor.

The **non-FPU version** of SuperANOVA does not require a floating-point math coprocessor. It is designed for the following Macintosh systems:

- a Macintosh Classic,

Plus, SE, Portable or LC. It will also run on the IIsi if you have not purchased the optional FPU

- a Macintosh 512k enhanced with 1 or more megabyte of RAM

Installing SuperANOVA

To install the software:

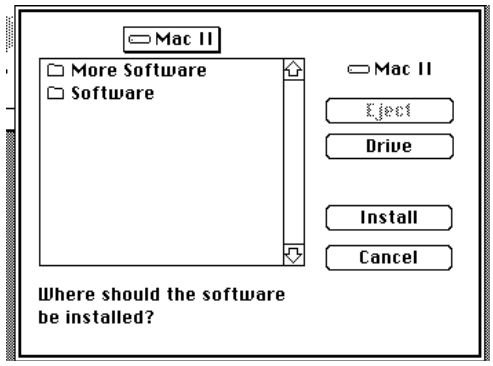
- Write-protect the SuperANOVA demonstration disk by exposing the hole in the upper right corner of the

disk.

- Insert the disk in your disk drive. You will see a single icon. This application contains the compacted SuperANOVA demonstration and all related documents.
- Double-click on the SuperANOVA Installer application or select it and choose Open from the File menu. Click the Continue button in the

dialog box that appears.

- The program puts up the following standard Macintosh “save” dialog:



Installation dialog

- Click on the Drive button to select the drive and folder where you want to put the demonstration files. When you have selected

the target folder, click the Install button. A folder titled “SuperANOVA v1.11 Folder” will appear at this location on your hard disk. It will contain the SuperANOVA demonstration application and all related files.

2. SuperANOVA Features

SuperANOVA is a complete solution for general linear modeling. It has been carefully designed for ease of use, with an intuitive approach to model-building. It minimizes unnecessary or repetitive steps in building models, and provides great flexibility in analyzing and managing data. With SuperANOVA you can

easily produce attractive and informative presentations.

By streamlining the process of solving ANOVA models, SuperANOVA lets you concentrate on producing results, exploring their significance, and presenting your tables and graphs. SuperANOVA accomplishes all this by means of its complete

graphic interface, an array of canned models, access to powerful tools such as contrasts, extensive drawing capabilities, and other features described in the rest of this chapter.

SuperANOVA's graphic interface focuses on your ANOVA table as the one format for both input and output. This makes the entire model-building process intuitive and

visually easy to follow. There is no need to master complex syntax or esoteric notation in order to create a model, and you are certain of what model you are studying as you proceed with your analysis.

Datasets and models

There are two basic SuperANOVA document types: datasets and models.

A **dataset** holds your data

in a standard row-and-column format, similar to a spreadsheet. A dataset can contain up to 32,765 variables with 500 million cases. You can import data from other programs or enter it yourself. You can specify variable types (integer, long integer, real, category, string, currency, or date/time), source of data (user entered or formula), class (nominal,

continuous, or informative), display format, and number of decimal places to show. You can also specify selection criteria in the dataset. Specifying the characteristics of a SuperANOVA dataset, like entering and editing data, is extremely easy.

A **model** is where you create your ANOVA tables, means tables, post-hoc

tests, contrasts, and all output from the program; it is also where you view your graphs. SuperANOVA models are like documents in drawing programs; you can move and modify the tables and graphs (as well as any graphics and text you add) by clicking and dragging. Your model begins with an empty ANOVA table. You build your model by building the

ANOVA table, specifying the factors, dependent variables, and regressors. You can add graphics and text at any time.

Unlike other programs, SuperANOVA does not limit you to a single model for a dataset. You can have many different models (in separate documents) associated with a single dataset, and these models can all be open at the same

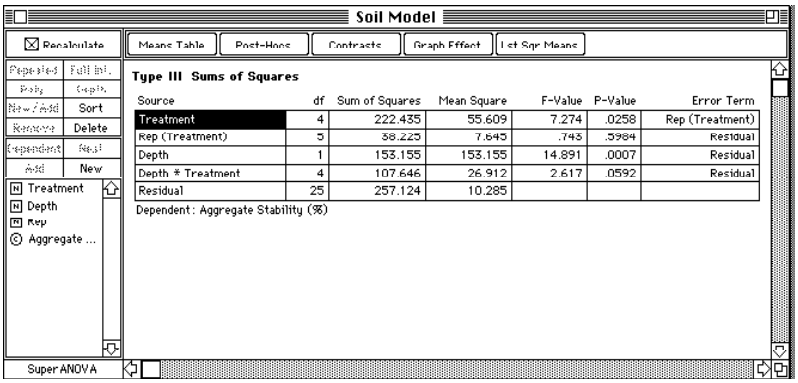
time. You can also have

many different datasets associated with a model. For example, if you have a set of tables and graphs that you generate for every dataset you construct, you can use a single SuperANOVA model. When you open the model, you choose the dataset to apply it to.

Your datasets and models are kept in separate windows. A typical dataset window looks like:

Typical dataset window

You type data in the rows and columns or use the Paste command to enter data from the Clipboard. In addition, you can import text files created by other applications and read datasets created by any member of the StatView family. The Criteria pop-up menu lets you define a subset of the records for use in a model. A typical model window looks like:



Typical model window

The list at the lower left of the window displays the variables (or columns) in your dataset. The buttons above the variable list move selected variables into your ANOVA table. The effect display buttons along the top of the window allow you to

display further information about your model.

SuperANOVA’s highlights

The best way to understand the power of SuperANOVA’s features is to explore the demonstration program. Since SuperANOVA is an interactive, graphics-based program, using it is the easiest way to get a feel for its power. The rest of this manual shows you step-by-step how to explore SuperANOVA’s

main features which include:

Models

SuperANOVA can solve models containing an unlimited number of factors, each with up to 32,765 levels. Models supported include ANOVA, MANOVA, ANCOVA, MANCOVA, and regression. You can solve any design including various split-plot designs,

nested designs, block and incomplete block designs, confounded factorial designs and latin and greco-latin squares. It handles unbalanced designs, missing cells, and repeated measures designs with up to twelve within factors. Repeated measures designs can be solved using multivariate or univariate methods. SuperANOVA also displays

type I, type II, type III and type IV sums of squares. Models can either include or exclude the intercept.

Contrasts

A contrast is a specialized type of hypothesis test which compares the means of selected levels of a factor or combination of factors. SuperANOVA gives you quick access to contrasts, one of the most powerful tools in ANOVA,

and makes it easy to both define and verify them. Choose from orthogonal polynomials, Helmhert, and any means/regression coefficient comparison.

Means tables

SuperANOVA can generate means tables for any nominal effect, providing counts, means, standard deviations, and standard errors, as well as confidence intervals.

Post-hoc tests

Available post-hoc tests include Fisher Protected LSD, Duncan New Multiple Range, Student-Newman-Keuls, Tukey Compromise, Tukey-Kramer, Spjotvoll-Stoline, Scheffé’s S, Bonferroni/Dunn (All Means and Control), Dunnett (One-tailed and Two-tailed) and Games-Howell. All come with multiple-display formats.

Graphs

SuperANOVA gives you interaction plots; scattergrams of cell means; Y versus fitted Y, residuals versus fitted Y; residuals versus Y; residuals vs. covariates; Y versus covariates and fitted Y versus covariates plots.

Least squares means tables

You can generate least

squares (adjusted) means tables for any nominal effect, providing cell names, counts, adjusted means, standard deviations, and standard errors.

Table formatting

You can easily format your table to match the style used in professional publications. You can also change the fonts and sizes, add a border, change the background colors, and so on.

Large array of canned models

SuperANOVA comes with many canned models which solve most

experimental designs. These are called Do-It™ files. Simply choose the appropriate model for a given experimental design from the “Canned Models” dialog. The canned models shipped with the full working version of SuperANOVA include one-factor and two-factor ANOVA, randomized complete block, Latin square, split plot, repeated

measures (with multiple “between” and “within” factors), ANCOVA, and regression models. You are not limited to just these models; with SuperANOVA, you can easily create and add your own canned models, even custom designs, for yourself or for your co-workers. Any model you design can be saved for later use with different sets of data.

Informational tables

In addition to the above, you can display model summary tables, model coefficients, coefficient correlations, residual summaries, eigenvalues and eigenvectors. You can also save residuals, fitted values, and predicted values to a dataset, and display summary descriptive statistics for any column in a dataset.

Model validity checking

SuperANOVA checks each model for validity before recalculating results. This helps prevent making mistakes that would yield misleading results.

Dataset handling

Data can be entered by hand or imported from other programs. You can specify exactly how data appears in dataset windows and describe the

format for each variable. All format and structure changes are made in the single dataset window and your view is updated instantly. You can recode data, create columns with distributions of random numbers, do multi-key sorts, and use the standard Cut/Copy/Paste functions. In addition, you can use compact variables to organize your data. Using

criteria, you can partition data into groups for inclusion or exclusion from analysis.

Data formulae

With SuperANOVA's powerful formula generator, you can create new columns using simple or complex expressions. If your original data columns change, the formula columns change or not, according to your choice.

Selection criteria

You can change the selection criteria for the records in your data that are used in a model easily. You can create complex criteria (such as “all males over 65 who weigh less

than 130 pounds”) and save those criteria with the dataset. You can also specify random criteria.

Interactivity

Like all Abacus Concepts software, SuperANOVA is fully interactive. Any changes to your data are automatically reflected in the results. This feature makes it easy to perform “what-if’s” on data. It also means that once you’ve

defined your model, there is no need to repeat the whole process if you find a data error. Simply correct it, and SuperANOVA automatically recalculates your model. If it is more convenient, you can turn off the recalculation function while you make changes, then easily cause a complete recalculation at any time.

Presentation graphics

SuperANOVA combines powerful statistical capabilities with sophisticated presentation graphics. After generating your analysis output, you can customize it using SuperANOVA's extensive drawing and presentation capabilities, which include complete control of color and the ability to insert and manipulate text and

graphics anywhere on the screen. Your output can be customized for slide shows, posters, reports or on-line presentations. You can add lines, arrows, circles, squares, arcs, and polygons; control line width; insert text anywhere on the screen; add rulers to control alignment; and fill drawn objects.

Color

You can control the color of any selected object on the screen. On a color system, 16.8 million colors are available. With a black-and-white system, you can assign any of eight colors for display at printing time. There is no need to customize your system because SuperANOVA automatically adjusts to either environment.

Documentation

As you would expect, the manual that comes with SuperANOVA has a complete description of all of SuperANOVA's features. In addition, the documentation covers in detail statistical topics such as hypothesis testing and the uses for all of the multivariate tests found in SuperANOVA. It also gives the formulae on which

SuperANOVA’s tests are based.

Using SuperANOVA

The following chapters detail step-by-step hypothetical analyses to solve with SuperANOVA. By following the steps, you can see how easy it is to start a new dataset and produce a complete model including ANOVA tables, charts, and so on. The examples are:

- Generate an advanced analysis of a soil dataset, including the use of SuperANOVA’s presentation tools to produce a high-quality report

- Modify a sample dataset and apply a canned repeated measures model to it

These examples cover many of the features listed above. If you want to see how to use a particular feature, use the following table to find the page on which the feature is shown.

3. Building a Model

This example shows you how to perform an ANOVA on your data by actually building an ANOVA table, which SuperANOVA will then solve. The dataset in this example, “Soil Data,” contains information about the aggregate stability of soil in an experimental corn field exposed to two levels of nitrogen fertilizer and two winter cover

crops. In addition, the dataset contains information about the aggregate stability at two depths in the soil. For each treatment/depth combination, two repetitions of the measurement were taken to reduce errors. You want to analyze the data to find out if any of the four management practices in the experiment

significantly affect aggregate stability. Stable soil aggregates allow air, water, and plant shoots and roots to move through the soil.

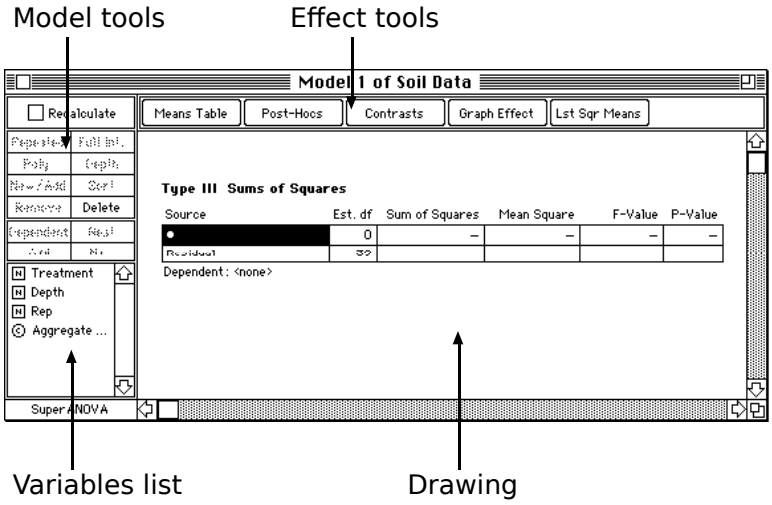
Starting a new model

- Choose Open from the File menu. In the Sample Data folder, select the Soil Data file and open it. You will see:

Soil Data dataset

You can scroll around the dataset using the scroll bars.

- Choose New Model from the Model menu. This creates a new, empty model:



New model window

Every new model window contains an empty ANOVA table. You will fill in the first column of this table, the Source column, with names of the effects you want to explore. The window has five areas:

Area	**Description**
Drawing	Your tables, text, charts, and graphics.

	This area is much like a document in a drawing program like MacDraw.
Variables list	The names of each column in your dataset. The controls to the left of the name indicate the class of the variable Nominal Continuous Compact You use these controls to change a variable from one class to another
Model tools	Buttons for adding and changing effects in your ANOVA table
Effect tools	Buttons to add tables that provide information on particular effects in your model
Recalculate button	Control for whether or not SuperANOVA will automatically recalculate results

For this experiment, make Aggregate Stability (%) the dependent variable.

- Click on Aggregate Stability (%) in the variables list by clicking

directly on it in the variable list. You should not click on the indicators to the left of the names.

Aggregate Stability (%) selected

- Click on the Dependent button in the model tools. This makes Aggregate Stability (%) a dependent variable as indicated at the bottom of the table:

Aggregate Stability (%) as the dependent variable

The first desired effect to be tested is Treatment.

- Click on Treatment in the variables list, then click Add in the model tools. The Add button adds the selected variable to the selected effect in the ANOVA table. You have just made Treatment a main effect.

Treatment as a main effect

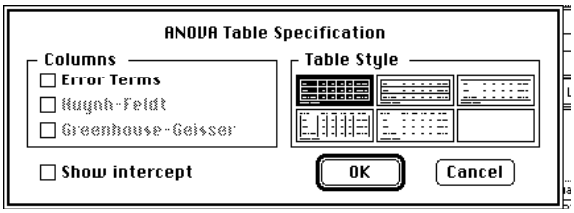
That’s all there is to creating an effect!

Changing the table style

SuperANOVA lets you display your ANOVA tables in five different styles. You can also change the formatting of the text in the table with the commands in the Text menu. The default style has boxes around each effect and result.

- Double-click anywhere on the table. Alternatively, click once

on the table to select it and choose Open Item in the Layout menu. This opens the following dialog:



Open Item dialog for ANOVA table

- Choose one of the table styles from the choices on the right and click OK. For instance, if you choose the item with just

vertical lines, your table would look like:

ANOVA table with only vertical lines

The rest of this manual uses the default table style (both horizontal and vertical lines).

Extending the ANOVA table

So far, your table only tests for Treatment. In this experimental design, you also want to test Rep nested within Treatment,

Depth, and the interaction between Depth and Treatment. Adding these effects to your ANOVA table are as easy as creating the first effect.

The New button opens up a space in the ANOVA table for an effect. If you have a variable selected in the variable list, the New/Add button opens up a space and adds the selected variable to the

new effect.

- Select Rep in the variables list and click the New/Add button.

Rep added to table

To create a nested effect, you select the effect in the table, select the variable in the variables list within which the effect is nested, and click the Nest button.

- Rep is already selected in the ANOVA table.

Select Treatment in the variables list and click the Nest button.

Rep nested within Treatment

- To add the Depth main effect, select Depth in the variables list and click the New/Add button.

Depth effect added to table

To create an interaction,

select the variables you want to cross with the selected effect and click Add.

- To create an interaction between Depth and Treatment, select Depth in the variables list and click the New/Add button.
- Select Treatment in the variables list and click the Add button. SuperANOVA creates an interaction between Depth and Treatment.

*Table with Depth * Treatment interaction effect*

Error terms

By default, SuperANOVA uses the residual error as the denominators of F tests for calculating the significance of the effects in your model. This is appropriate for a wide range of models. If you are

studying a model where a different error term is appropriate, you can change the error term of any of effect in your ANOVA table from “Residual” to any other effect in the table.

- Double-click anywhere in the table to bring up the Open Item dialog again. In the Columns section, select Error Terms. This adds a new

column to your table:

Error terms added

The default error term is the Residual. You can change the error term for any effect. For this model, you want the error term for Treatment to be Rep(Treatment).

- Select the table so that there is a dotted border around it:

Table selected

- Move the cursor over the error term for the Treatment effect. The cursor becomes a picture of a pop-up menu. This indicates that clicking here will bring up a pop-up list.

Pop-up cursor

- Click the mouse button to bring up the list of choices for the error term:

List of choices for error term

- While holding down the mouse button, drag down to Rep(Treatment) and release the mouse button. This changes the error term:

New error term

Calculating the model

Notice that this table does not contain any values for the Sum of Squares, Mean Square, F-Value, or P-Value. This is because recalculation is turned off (the Recalculate box in the upper left corner of the model window is not checked). SuperANOVA

models normally start with recalculation turned off so that you can build your models without waiting for SuperANOVA to give you results at each step. In this case, however, you want to turn recalculation on so that you can see the results of your ANOVA table.

SuperANOVA will not recalculate your table if you have made an obvious

mistake in setting it up. For example, if you have not specified a dependent variable, SuperANOVA will alert you when you try to recalculate.

- Click the Recalculate button so that it is checked.

Recalculate button checked

The cursor changes to a rotating yin-yang symbol

while SuperANOVA performs the calculation. The table's values are then filled in:

The table with results

Notice how little time it took to build your model and how easy it would be to change the model to handle different designs.

Means table

To examine the means of the different treatment levels, you can request a means table for this effect.

- Select the Treatment effect by clicking on the first cell in the first line of the ANOVA table.
- Click the Means Table effect tool at the top of the window. The following table appears:

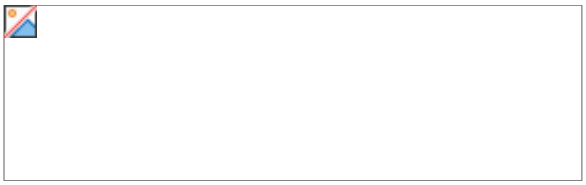
Means table for Treatment

This table shows the means for each level of the treatment. You can see that the means for four of the treatments are quite close (ranging from 74.2 for 150 lb/ac to 76.8 for oats), while one treatment (Vetch) stands out from the others with a mean of 81.0.

You can expand the means

table to also display confidence intervals.

- Double-click on the means table or select the table and choose Open Item from the Layout menu. In the dialog, specify a 99% confidence interval. The table changes to:



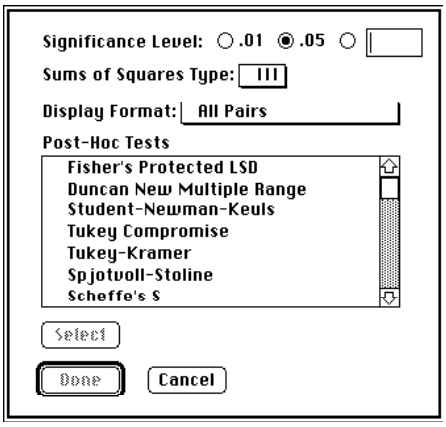
Means table with 99% confidence interval

Post-hoc tests

To determine which differences among the treatment means are significant, you may want to examine the post-hoc tests using the Post-Hocs button at the top of the model window.

- Select Treatment in the ANOVA table.
- Click the Post-Hocs button at the top of the window. You see the

following dialog:



Post-hocs dialog

- Click on the Display Format pop-up menu and drag to Group Letters.
- Select Fisher’s Protected LSD from the scrolling list.
- Click the Select button to select it, then click Done. The table is shown

in the model:

Fisher's Protected LSD post-hoc

You can see that the four similar means form one group (denoted by the letter "a"), while the higher value for Vetch is in a separate group (letter "b"). Thus, at the 0.05 significance level, the treatment mean for Vetch

is significantly different from the other four treatments, but there was no significant difference detected among the other four treatment means.

Interaction plot

You can create an interaction plot to compare the means of the cells formed by the Depth*Treatment interaction. The plot gives you a visual sense of which

treatments differ for various depths.

- Select the Depth*Treatment effect in the ANOVA table.
- Click the Graph Effect button at the top of the model window. Choose Interaction Plot from the dialog. SuperANOVA displays the plot.

*Interaction plot for Depth*Treatment*

You can see that the means for 150 lb/ac at the two different levels of depth differ widely and may be a candidate for further analysis. You might want to contrast the two depths for that treatment. First, however, it would be useful

to highlight that difference in the graph.

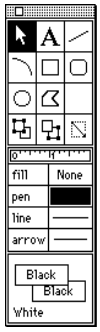
Presentation graphics

If you want to show these results to someone else, you may want to add notes to your model about your assumptions and conclusions. These notes, in the form of graphics, arrows, and text, are saved with your model. For example, you can highlight the wide difference

between the means illustrated by the interaction plot.

- Click on the Draw menu to see the tools. These are just like the tools you see in a regular drawing program. You can “tear off” this menu by holding down the mouse button and moving the cursor down and away from the menu. This leaves the drawing tools

on the screen so that you don’t have to keep going back to the Draw menu.



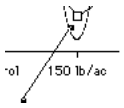
Draw menu

- Click on the ellipse tool, the first tool in the third row. The cursor becomes a cross-hair.
- Click above and to the left of the “150 lb/ac” label on the horizontal

axis and drag up so that both points are surrounded:

Ellipse drawn around points

- Click on the line tool, the third tool in the first row.
- Click near the bottom of the ellipse and drag left and below the table.



Line drawn

- Click on the line to the

right of the word “arrow” and drag down to the second choice, an arrow at the right end of the line. When you release the mouse, this becomes the selected arrow type and an arrow is added to the end of the line.

Arrow type chosen

- Click on the text tool, the second tool in the first row.

- Click the cursor below the arrow that you drew. A text box appears:

Text entry box

- Type in “Means are very different”. Click the arrow tool, the first tool in the first row, click on the new text, and drag it so that it aligns well with the arrow.

Text moved over arrow

You can change the font, size, or style of the selected text with the commands in the Text menu. You can also use the other tools in the Draw menu to add highlighting and/or other effects to your model.

Means comparison

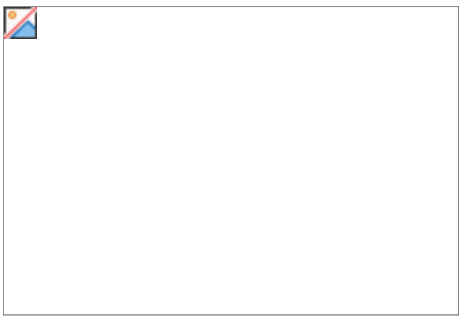
To create a contrast table, select an effect you want to examine and click the Contrasts button at the top of the model window. SuperANOVA gives you a dialog which helps you to easily specify the type of contrast to create. In this case, you want to create a means comparison that tests whether there is a significant difference

between the “surface, 150 lb/ac” cell and the “subsurface, 150 lb/ac” cell in order to determine whether the application of 150 lb/ac nitrogen fertilizer produces a significant difference between surface and subsurface aggregate stability as suggested by the interaction plot.

- Scroll up to the ANOVA table and be sure that the

Depth*Treatment effect is selected.

- Click the Contrasts button. SuperANOVA shows you the following dialog:



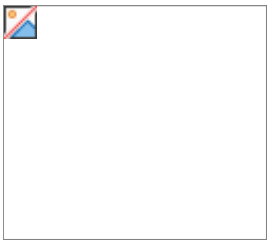
Contrasts dialog

- Select Means comparisons and click OK. SuperANOVA displays the “pie” dialog:

Pie dialog

- Change the contrast name to “Contrast of 150 lb/ac”.
- Select “surface, 150 lb/ac” and click Add Plus. Select “subsurface, 150 lb/ac” and click Add Minus. Click Done. Your table appears in the

model window.



Means comparison

Contrasts such as these, which are suggested by examining the data, must be interpreted with caution. In practice, the probability levels of these contrasts are only accurate when the contrast is specified before viewing the data. In the current example, the very low P-

value of 0.008 strongly suggests that there is a significant difference between the two means.

Residuals plot

To help you examine the model results, you can display a plot of residuals versus fitted values. Residual plots help point out whether there are any violations of the assumptions upon which your model is based. If the

assumptions of the general linear model are met, a Residual versus Fitted Y plot should show a band of constant width independent of the fitted value.

- Choose Residuals versus Fitted Y from the Display menu. The following graph appears.

Plot of Residuals versus Y

Notice that the spread of residuals is not constant in width; the residuals are narrower for larger fitted values. This behavior is not unusual for data such as aggregate stability which is expressed as a percentage. An arcsin transformation of the square root of the percent divided by 100 often stabilizes the variance in

these cases. You can create a second dependent variable based on this transformation and use it for a second set of results.

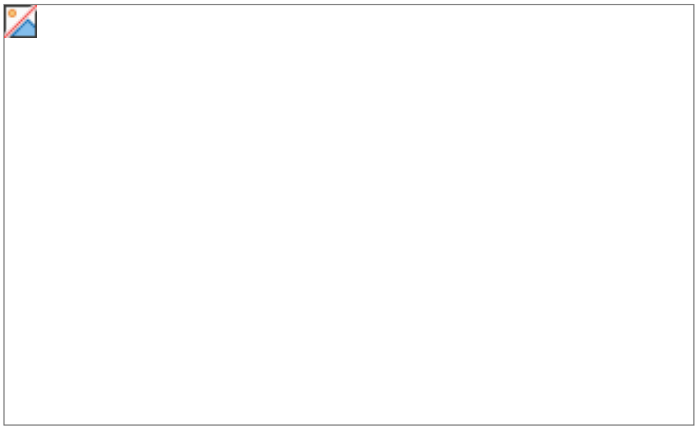
Using a formula to transform a variable

SuperANOVA lets you create columns in your dataset that are based on transformations of other columns. For instance, you might want a column that is the product of two columns plus a third column. The formulas that you can use to create your transformations include standard math,

trigonometry, logical comparisons, and advanced statistical functions.

- Bring the dataset to the front by clicking on it. You can also double-click in the white area at the top of the model window or select the dataset from the Window (or “∑”) menu.
- Select Formula command from the

Manage menu. This opens the Formula dialog:



Formula dialog

You want to create the formula “arcsin(Sqrt(”Aggregate Stability (%)”/100))”. You can type this formula directly in the large box at

the top right of the dialog. You can also enter parts of the formula by selecting them from the list of column names, list of functions, or clicking on the keypad. For example, to enter this formula with the mouse you would click the INV button, the sin button, double-click Sqrt from the Functions list, double-click Aggregate Stability (%) from the

Columns list, and click the /, 1, 0, and 0 buttons.

- Enter the formula and click Compute. SuperANOVA creates a new column.
- Select the column by clicking on the column name and type Transformed Aggregate to give the column a new name. This column will be a new dependent variable in the model.

Adding another dependent variable

When you add a second dependent variable to a model, SuperANOVA generates a new ANOVA table for that dependent variable and makes duplicates of all the additional tables and charts for that second dependent variable.

- Activate the model window by clicking in it or selecting it from the Window or $\sum$ menu.
- Select Transformed Aggregate from the variable list. and click the Dependent button. Because the Recalculate button is checked, the model automatically recalculates.

Now you can examine the residual plot for

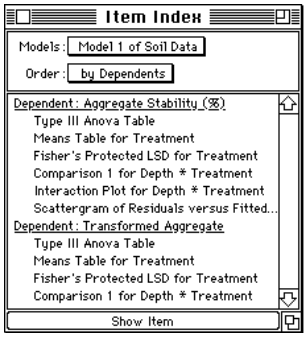
Transformed Aggregate to see how the transformation has changed it.

Model index

You have probably noticed that your model document now has many tables and charts, especially after adding the second dependent variable. To find a specific table or chart, you can use SuperANOVA's item index.

- Select Show Item Index

from the Layout menu.



Item index

This window lists all items in your model by each dependent variable. The Order pop-up menu allows you to view the items by Effect or by Name also. To scroll directly to a particular item in the model window, simply

double-click on it in the index. Scroll the item index list down until Scattergram of Residuals versus Fitted Y appears under Dependent: Transformed Aggregate. Double-click on the residual plot for Transformed Aggregate. The item index window moves behind the model window and the model window scrolls to the location of the residual

plot.

Residual plot for Transformed Aggregate

The transformation has lessened the problem of unequal variances, but it has not eliminated it. Examination of the ANOVA table for the transformed variable indicates that the conclusions for the transformed variable are

similar to those for the untransformed variable.

SuperANOVA also has a feature that rearranges the items in your model window. This is useful if some of your tables fall across page boundaries. The Clean Up Items command in the Layout menu automatically moves your items and places them as close or as far from each other as you

specify.

If this were a full working version of SuperANOVA, you could now save this model window for later examination or for use on another set of soil data. Since this demonstration version does not allow you to save datasets or models, close the dataset and model windows and indicate that you do not want to save changes

before continuing.

4. Using a Canned Model

This example shows you how to solve a repeated measures ANOVA. In the process, you will create a compact variable and apply a canned model.

The model you are solving involves an experiment where eight music critics are tested to see if consumption of alcohol affects their rating of musical recording. The

critics are asked to rate three different recordings on a scale of 1 to 100 after ingesting one, two, and four ounces of alcohol. Their age groups are also recorded. This is a repeated measures model with two within factors, “Recording” and “Alcohol consumption”.

Creating a compact variable

- Choose Open from the

File menu. In the Sample Data folder open the file named Music Critics.

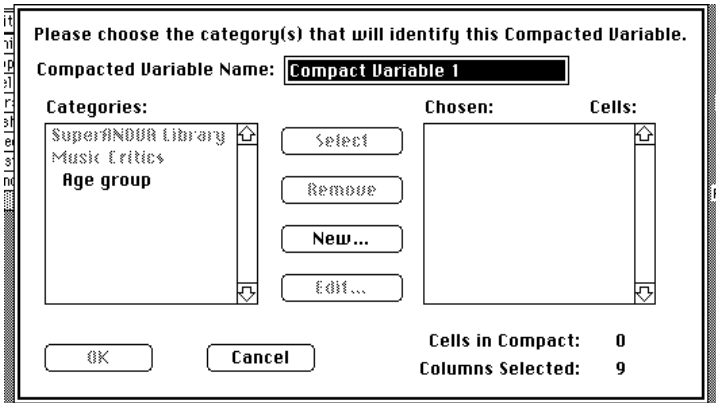
The nine columns named r1 through r9 contain the ratings information which represent the Repeated Measurements for this experiment. By making these nine columns a compact variable, you allow SuperANOVA to look at this data as the within factors of a repeated

measures model.

Ratings								
Record 1			Record 2			Record 3		
one oz.	two oz.	four oz.	one oz.	two oz.	four oz.	one oz.	two oz.	four oz.

Layout of ratings columns

- Select the nine new columns and click the Compact button in the upper left corner of the dataset window. You see the following dialog:



Compact dialog

- Enter Ratings as the compact variable name.
- Click New. The “Create a new category” dialog appears.

New category dialog

- Enter Recording as the category name and add three elements to the category: Record 1, Record 2, Record 3. After you enter each element’s name, click Add. When you have added all three, click Done.

The right-hand scrolling

list in the Compact dialog contains the newly created category and indicates that it has three elements. In addition, the Cells in Compact field displays 3. The Columns Selected field displays 9, indicating that you will need to define another category.

- Click New again to create the second category. Enter Drinks as the category name and

add three elements to the category: One oz., Two oz., and Four oz. Click Done.

Now the right-hand scrolling list contains both categories. The Cells in Compact field now displays 9 (levels of Recordings x levels of Drinks), as does the Columns Selected field. The smiling face indicates that you have the right number of elements for the

compact variable.

- Click OK. The column headings of the nine selected columns have updated to show the structure of the compact variable you just created.

The complete dataset should look like:

	Critic	Age	Ratings								
			Record 1			Record 2			Record 3		
			One oz.	Two oz.	Four oz.	One oz.	Two oz.	Four oz.	One oz.	Two oz.	Four oz.
1	J. Smith	Young	77	79	90	45	51	55	66	70	75
2	B. Hope	Old	78	82	87	56	65	69	76	80	85
3	M. Feld	Young	56	65	68	44	60	65	56	66	71
4	G. Gersh	Old	77	80	85	33	50	56	77	81	86
5	J. Fish	Old	44	56	61	56	70	72	62	67	77
6	S. Reed	Young	65	67	72	53	68	73	60	68	74
7	Q. Rosie	Young	44	49	51	39	53	57	44	58	68
8	L. Finch	Old	67	78	83	75	73	77	83	87	93

Complete dataset

Using a canned model

In the example in Chapter 3, you built the model by selecting the variables from the variables list and using the model building tools. In this example, you will use a **canned model** to solve the experiment. A canned model is simply a saved model that has been

placed in the Canned Models folder. Using a canned model saves you the need to build the model one step at a time; instead, you specify the names of the variables in the model and SuperANOVA uses this information to build the model for you.

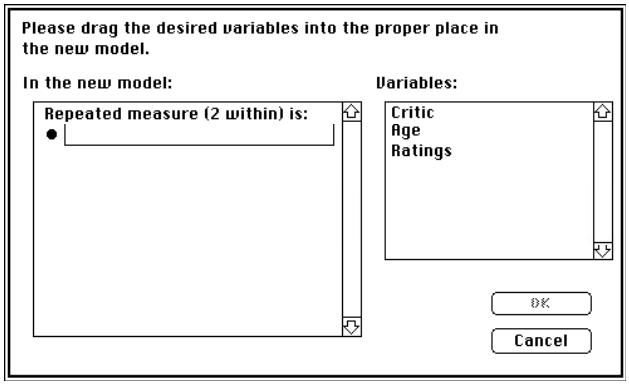
We provide canned models for most common linear modeling designs. With the

full version of SuperANOVA you are free to create your own models and put them in the Canned Models folder. You might want to do this for your most commonly-used models.

- Choose Canned Model from the Model menu.
- Select the “Repeated - 2 within, 0 between” model from the scrolling list. Click the “Apply to

dataset” button. You then see a standard Macintosh dialog allowing you to select the dataset. Use the Drive and folder buttons to find the Music Critics dataset that you opened earlier in this chapter. Click the Open button, and SuperANOVA uses your updated dataset even though you have not saved changes to disk. You see the

following dialog:



Variable matching dialog

The scrolling list on the right contains the names of the columns in your dataset. The scrolling list on the left shows the information needed for the model. For this design, you need to specify which variable in

the dataset represents the repeated measurement.

- Select “Ratings” in the right list. Drag it across the dialog to the open slot in the left list. This is the method you use to specify which columns in your dataset match variables saved in models.
- Click OK. SuperANOVA opens a model window,

solves the model, and displays the results of your experiment:

Model calculated

You can now see the power of saved models (Do-It files). Any model that you create (not just ones in the Canned Models folder) can be applied to any dataset. If you create a model that you like and want to use it with a completely different set of data, simply open

the model, ask SuperANOVA to apply it to the new dataset, and specify which columns in the dataset correspond to variables in the model. Remember, these models can contain any additional text and graphics that you need to better present your results.

Try another canned model. To see if the Age group plays a role in ratings,

choose the “Repeated - 2 within, 1 between” model. This time make Ratings the within factor and Age the between factor (designated as Factor 1).

Remember, you can apply a Do-It file to any set of data. If you plan to use a particular Do-It file often, add it to your Canned Models folder so that you can quickly access it from the Model menu. Do-It files

provide tremendous power and flexibility in working with models. You can use them:

- to save work in progress, as you would a document in a word processing or drawing program
- as a prefabricated model and its dataset (just enter your data into the predefined dataset structure, and compute

the associated model)

- to save a model and results display that you have designed, and apply them to different datasets

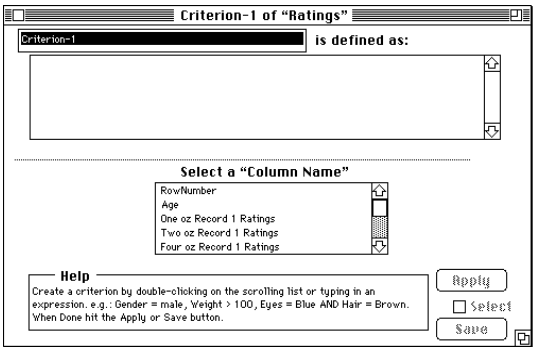
Creating a selection criterion

The dataset also contains information concerning the age of the music critic. SuperANOVA makes it easy to set up dataset criteria so you can quickly view your model on a

subset of the data. Notice how the model recalculates. You create rules for the criteria (such as “all young critics” or “ratings between 65 and 85”) and save those rules with your dataset. This allows you to use these subsets whenever you want.

- Select the Music Critics dataset. Click the pop-up menu next to the word

“Criteria:” at the top of the dataset and drag to select New. You see:



Criteria dialog

- Change the name of the criterion to Young.

You enter the formula for the criterion in the choices list below the criterion name. You can type the formula in this box or you can have SuperANOVA help you by clicking in the box under the dotted line.

The formula you want to enter is “Age = Young”.

- Double-click on Age in the Select box. The Select box becomes a list of logical operators. Double-click on "? = ?". The Select box becomes a list of the levels of the Age group. Double-click on Young.
- Click Apply. This saves the criterion and applies it to your dataset.

You can see that records 2, 4, 5, and 8 are not included; their record numbers are now gray.

When you click on the model window, you see that the model has been recalculated using only the included rows.

Criteria are automatically saved with the dataset. If you have many criteria in one dataset, you can apply any one simply by pulling

down the Criteria pop-up and selecting the criteria name. To select all records, select “No criteria” in the pop-up.

Using the column summary pane

It is often useful to see summary information regarding a dataset. For this example, you may want to know the maximum and minimum ratings for each critic for

each recording and drink level. Each dataset has a **column summary pane** which holds the descriptive summaries for each column. Click on the icon at the top of the vertical scroll bar in the dataset window and drag downwards. The icon is ▾ if the column attributes are not shown and ▪ if they are. The column summary pane is updated instantly when

any data in the column changes.

The column summary pane shows 12 descriptive statistics: mean, standard deviation, standard error, variance, coefficient of variation, minimum, maximum, range, count, number of missing cells, sum, and sum of squares.

5. Additional Information

This document covers only a sample of the variety of features you will find in SuperANOVA. Play around with the demonstration version to see the many capabilities of the program.

Importing to SuperANOVA

SuperANOVA can import data from text files. SuperANOVA's import mechanism makes

intelligent choices about how to place data into columns and how to fill in missing values. This is described in detail in the manual for the full version. One of the ways to try out SuperANOVA's features is to import data that you have saved in text format. This demonstration version restricts importing to 100 records and 25 columns of your dataset.

Features disabled in this demonstration

The demonstration version you have does not allow you to save or print your datasets or models and does not let you export your results to other programs. Also, you cannot read StatView files. In the full version of SuperANOVA, you can easily perform all these tasks. It is important to

remember that the full SuperANOVA will do these things since they are often vital to your work.

Using Canned Models

The Canned Models folder contains several different model designs. As you saw earlier in this document, you can add your own models to the list of canned models and the the Model menu itself. To explore the power of

canned models, apply any of the models shipped with this demonstration to the Lipid Experiment data in the Sample Data folder. Note that in this dataset, Gender and Lipid Type are the factors of interest. You can also try SuperANOVA on your own data after importing your data into this demonstration version.

Looking at Additional Examples

The Example Models folder contains several example models and associated datasets. Please feel free to open these models and examine the results. The SuperANOVA manual contains an in-depth discussion of all these examples. To look at a particular model:

- Choose Open from the File menu. In the dialog, open the Example Models folder, then open the Do-It Files folder within the Example Models folder.
- Select the file with the title for that example. For example, the Do-It file for the one-factor ANOVA is called “One-factor ANOVA.” Click Open.
- When the Do-It file dialog box appears,

notice that “Open original dataset” is the default. Click OK to apply the model to the original dataset.

- When the Do-It file opens, click the Recalculate box to calculate the model.

Where to Buy

If you have any questions regarding this demonstration, the complete version of

SuperANOVA, or any other software from Abacus Concepts, please call us at (510) 540-1949.

In Australia and New Zealand, please call PICA Software Pty., Ltd. at 61-3-3265255.

In Japan, please call HULINKS INC. +81-3-3590-2311.