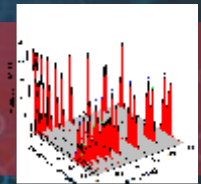
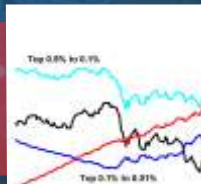
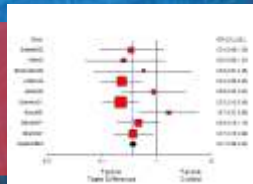
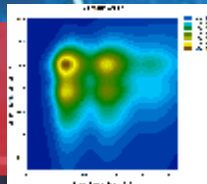
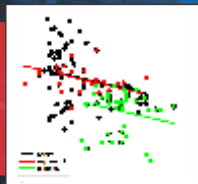
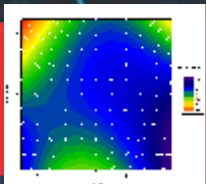


Principal Component Analysis

Regression

Global Curve Fit

ANCOVA



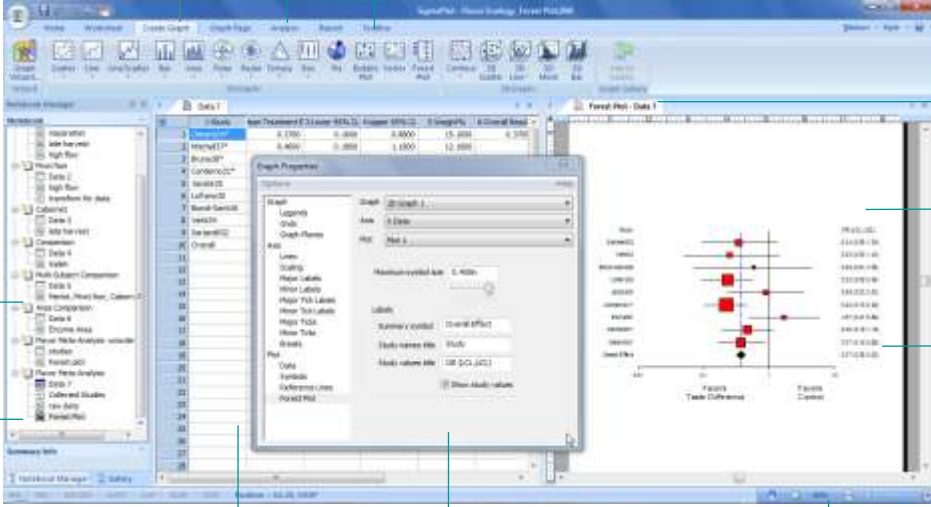
# SigmaPlot 13

*The Simplest Way to Analyze & Create Graphs*

# Analyze and Graph your Data with Unparalleled Ease and Precision

## Analyze and Create the Graph which Presents the Best Visual Representation of your Research

SigmaPlot® is a scientific data analysis and graphing software package with advanced curve fitting, a vector-based programming language, macro capability and over 50 frequently used statistical tests. SigmaPlot has the analytical features necessary to extract the important information from your research data. With over 100 graph types and a user interface which allows detailed manipulation of every graph object, you can create the exact graph to present your results.



**Complete Advisory Statistics with new ANCOVA and Principal Components Analysis**  
Over 50 tests with complete background statistical assumption testing and appropriate test suggestion.

**Create the Exact Graph for your research**  
Over 100 different 2D and 3D graph types with new Forest and Kernel Density Plots.

**Powerful Curve Fitting**  
Nonlinear - 155 built-in functions. Dynamic - is your fit the best fit? Global - fit shared data sets. New Akaike Information Criterion and weighting functions.

**Advanced Analysis Methods**  
Bland-Altman, Dot-Density, Enzyme Kinetics.

**Tabbed Groups**  
Collect related graphs in a tabbed group for easy relationship to a worksheet.

**Properties and Graph Interaction**  
Select Items on the page without leaving the Graph Properties dialog box.

**Work Directly on the Page**  
Almost every object is selectable. Mini-toolbars allow direct modification. Horizontal, vertical and rectangular legend shapes.

**Simple Direct Labeling New Color Schemes Line Thickness from column**  
Put legend labels immediately next to plots with flexible colors and precise line thickness.

**Notebook Manager**  
Save multiple notebooks, worksheets, graphs, reports, transforms, equations and macros.

**Rearrange Notebook and Legend Items by Dragging**  
Put notebook and legend items in a natural order. Reverse legend item order.

**Interactive Graph Wizard**  
A step-by-step graph creation process.

**Huge Worksheet and Associated Programming Language**  
32,000,000 rows and 32,000 columns. Vector Based computations.

**Graph Properties**  
New Graph Properties Panel with all graph categories displayed in a tree. The associated properties are displayed on the right.

**Multiple Methods for Zoom, Pan and Drag**  
Select or modify objects on the graph, or functions like zoom, while simultaneously using Graph Properties.

### Fine Tune Every Graph Detail

- The beauty and utility of SigmaPlot is its ability to modify each graph object to produce a graph that in total "tells the story" of your research.
- Numerous import/export capabilities for worksheets and graphs.

### Create Your Exact Graph in No Time

- Create compelling graphs for publications, presentations and reports.
- Let the Interactive Graph Wizard lead you through every step of graph creation
- Choose from over 100 different 2D and 3D graph types.
- Control and customize the properties of every graph element.
- Use Dynamic Update to draw your graph immediately after a property change.
- Make graph changes in Graph Properties, and on the graph page without closing the Graph Properties dialog box.

### Data Analysis Methods to Uncover Information in your Data

- Over 50 of the most frequently used statistical tests with step-by-step directions that do not require you to be a statistician.
- Now with ANCOVA and Principal Components Analysis (PCA).
- Fit your data easily and accurately with the Regression Wizard, Dynamic Fit Wizard and Global Fit Wizard. And now fit implicit functions.
- Plot mathematical functions with the Function Plotter.
- Use the Macro Recorder to automate repetitive and complex tasks.



# Generate the Graphs Quickly and Easily with the New Interface Features

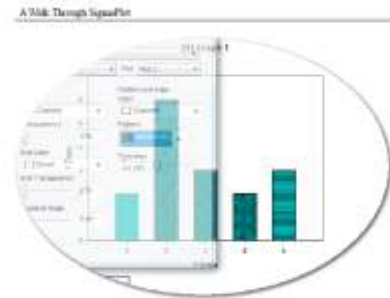
## Rearrange items in your notebook by dragging.

Objects in a notebook section are not necessarily created in a logical order. You can now drag items within a section to new positions to place them more logically. You can also rearrange sections.



## A new SigmaPlot tutorial

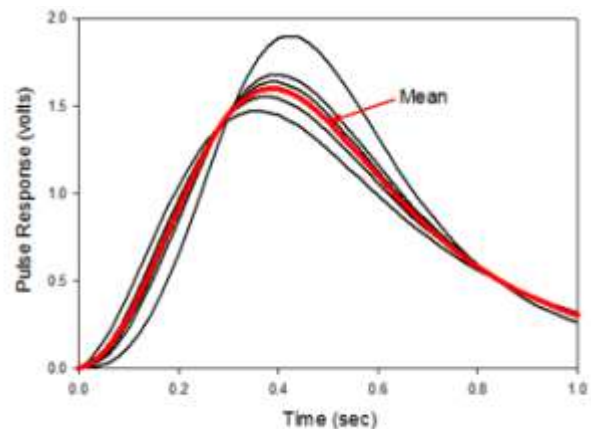
The new tutorial makes creating graphs for the first time easy. It starts with simple examples and gradually becomes more complex.



By default, Graph Properties is set to 40% transparency. You can make it even more or less transparent or turn the whole feature off. Here's how.

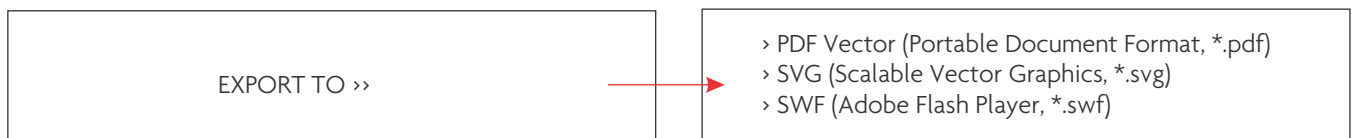
## Specify plot line widths from a worksheet column.

Line width values can now be entered in a worksheet column. These values may be used within a graph or across multiple graphs on the page.



## New Vector Export File Formats

SVG (Scalable Vector Graphics), SWF (Adobe Flash Player) and Vector PDF file formats have been added. These are scalable formats where no resolution is lost when zooming to different levels. SVG is the standard graphics format for the web and SWF can be used with Adobe Flash Player. Because pdf is used so frequently, the vector PDF format is now attached to the Create PDF button on the Home ribbon.



## Updated Application File Formats

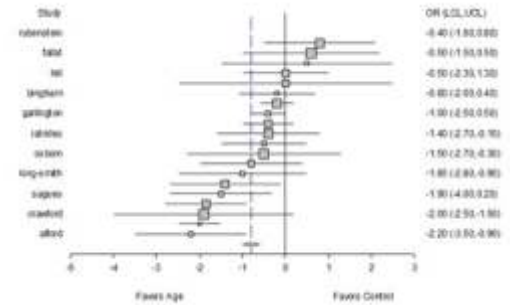
File import and export support has been updated to Versions 13 and 14 of Minitab, Version 9 of SAS and Version 19 of SPSS

# New Graphing Capabilities Enhance Your Ability to create Publication Quality Graphs

## New Graph Features

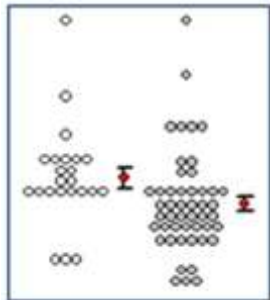
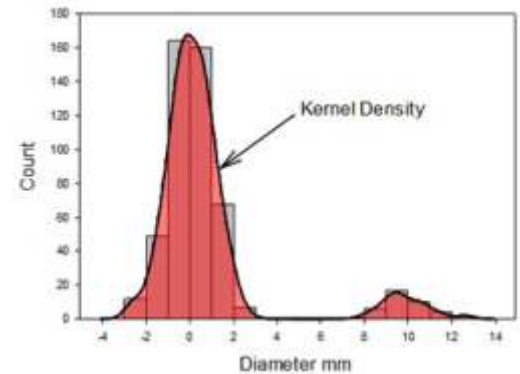
### Forest Plot

A forest plot is one form of “meta-analysis” which is used to combine multiple analyses addressing the same question. Meta-analysis statistically combines the samples of each contributing study to create an overall summary statistic that is more precise than the effect size in the individual studies. Individual study values and their 95% confidence intervals are shown as square symbols with horizontal error bars and the overall summary statistic as a diamond with width equal to its 95% confidence interval.



### Kernel Density

The kernel density feature will generate an estimate of the underlying data distribution. This should be compared to the step-like histogram. It has advantages (no bars) and disadvantages (loss of count information) over a histogram and should be used in conjunction with the histogram. They can be created simultaneously.



### Dot Density with Mean & Standard Error Bars

The mean plus standard error bar computation, symbol plus error bars, has been added to the Dot Density graph. This enhances the other possible dot density display statistics – mean, median, percentiles and boxplot.

### New Color Schemes

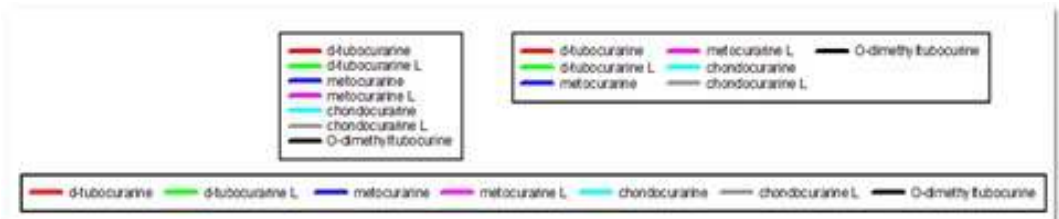
Ten new color schemes have been implemented. Three examples are:



## Legend Improvements

### Legend Shapes

Vertical, horizontal and rectangular legend shapes are now available.

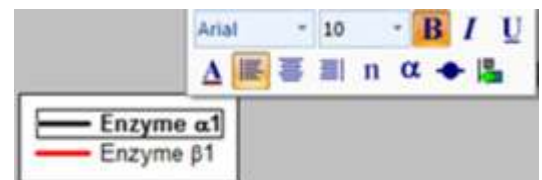


### Reverse Legend Order

You can now select to reverse the legend item order. This provides a more logical order for some graph types.

### Mini-Toolbar Editing of Legend Items

Legend items may now be edited by clicking on the item and using the mini-toolbar.



### Direct Labeling

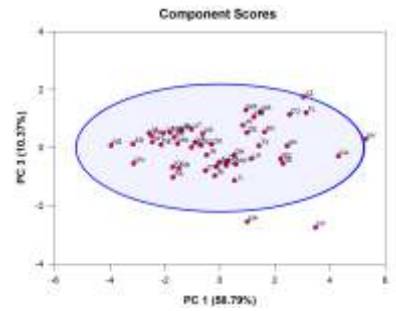
The legend can now be ungrouped and individual legend items placed adjacent to the appropriate plots. The labels will move with the graph to maintain position with respect to the graph. Since the label is adjacent to the plot, visual identification of each plot is now much easier.

# Increase SigmaPlot's Power with New Analysis Features

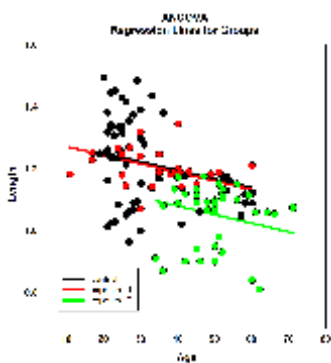
## Principal Components Analysis

Principal component analysis (PCA) is a technique for reducing the complexity of high-dimensional data by approximating the data with fewer dimensions. Each new dimension is called a principal component and represents a linear combination of the original variables. The first principal component accounts for as much variation in the data as possible. Each subsequent principal component accounts for as much of the remaining variation as possible and is orthogonal to all of the previous principal components.

You can examine principal components to understand the sources of variation in your data. You can also use them in forming predictive models. If most of the variation in your data exists in a low-dimensional subset, you might be able to model your response variable in terms of the principal components. You can use principal components to reduce the number of variables in regression, clustering, and other statistical techniques.



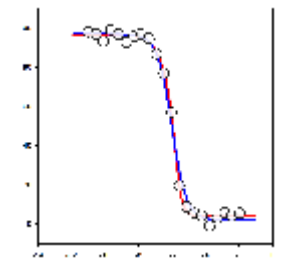
## Analysis of Covariance



ANCOVA (Analysis of Covariance) is an extension of ANOVA (Analysis of Variance) obtained by specifying one or more covariates as additional variables in the model. If you arrange ANCOVA data in a SigmaPlot worksheet using the indexed data format, one column will represent the factor and one column will represent the dependent variable (the observations) as in an ANOVA design. In addition, you will have one column for each covariate. When using a model that includes the effects of covariates, there is more explained variability in the value of the dependent variable. This generally reduces the unexplained variance that is attributed to random sampling variability, which increases the sensitivity of the ANCOVA as compared to the same model without covariates (the ANOVA model). Higher test sensitivity means that smaller mean differences between treatments will become significant as compared to a standard ANOVA model, thereby increasing statistical power.

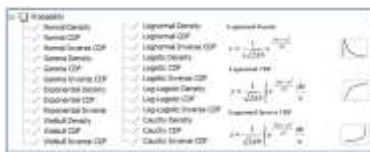
## Akaike Information Criterion (AICc)

The Akaike Information Criterion is now available in nonlinear regression reports. It is a goodness of fit criterion that also accounts for the number of parameters in the equation. It also is valid for non-nested equations that occur, for example, in enzyme kinetics analyses. Smaller AICc values are better and negative values will occur. The difference between the AICc values for two different equations is what is of interest. If you find a difference of 7 or more then the equations are significantly different. If the difference is greater than 2 then the equation with the smaller AICc value should be considered as a candidate for the best equation.



## New Probability Functions for Curve Fitting

A total of 24 probability functions have been added to the curve fit library. These functions will augment the variety of fit models that already exist. They also previously existed in the transform language where they can be used for computing the values of probability density functions, cumulative distribution functions and their inverses. They can be used to compute and verify a number of statistical measures such as significant probabilities, critical values of statistics, confidence intervals, histogram comparisons, et cetera. Graphs of these functions will be easily obtained using the Plot Equation facility. Equations involving these functions can be solved using the Solver facility that is available from both the macro language and the Plot Equation dialog.



## Nonlinear Regression Weighting

There are now seven different weighting functions built into each nonlinear regression equation (3D are slightly different). As shown in one regression equation these functions are reciprocal y, reciprocal y squared, reciprocal x, reciprocal x squared, reciprocal predicted, reciprocal predicted squared and Cauchy. The iteratively reweighted least squares algorithm is used to allow the weights to change during each nonlinear regression iteration. In this way "weighting by predicted", a commonly used method, can be obtained by selecting the reciprocal\_pred weighting option. Also, Cauchy weighting (select weight\_Cauchy) can be used to fit an equation to data that contains outliers and the effect of the outliers will be minimized. Users can create their own weighting methods in terms of residuals and/or parameters to implement other robust fitting methods.

```
f = a/(1+exp(-(x-x0)/b))
fit f to y
"fit f to y with weight reciprocal_y
"fit f to y with weight reciprocal_ysquare
"fit f to y with weight reciprocal_x
"fit f to y with weight reciprocal_xsquare
"fit f to y with weight reciprocal_pred
"fit f to y with weight reciprocal_predsqr
"fit f to y with weight weight_Cauchy
```

## Multiple Comparison Test Improvements

Two important improvements have been made. P values for the results of nonparametric ANOVA have been added. These did not exist before. Also, multiple comparison P values were limited to discrete choices (0.05, 0.01, etc.). This limitation no longer exists and any valid P value may be used.

