Great Graphics Using Proc Sgplot, Proc Sgscatter, and ODS Graphics for SAS®/Stat Procedures

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MSUG Meeting, Tuesday April 27, 2010

What we will Cover

- Introduction to Statistical Graphics Procedures
  - Proc Sgplot
  - Proc Sgscatter
  - Proc Sgpanel
- Editing ODS graphics files
- Examples of ODS graphics with Statistical Procedures
  - Proc ttest
  - Proc Reg
  - Proc GLM
  - Proc Logistic

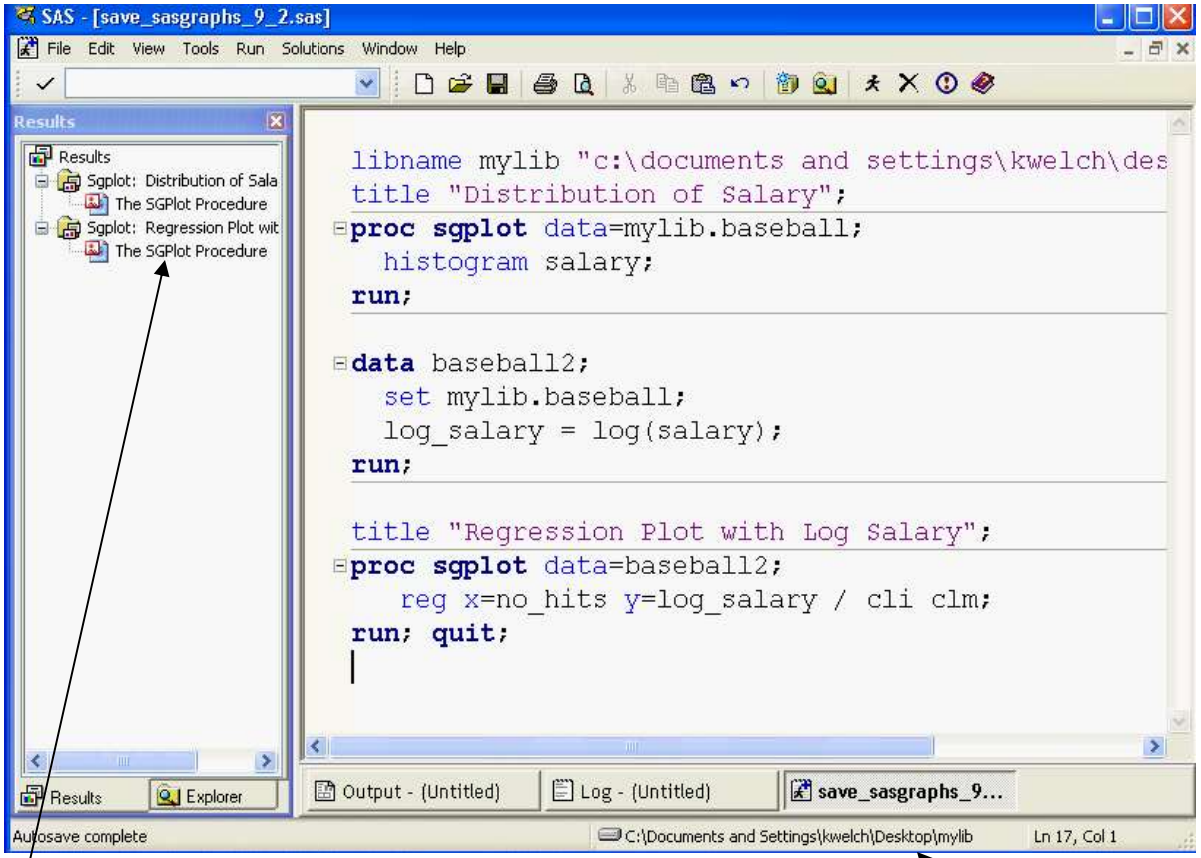
Statistical Graphics Using Proc Sgplot, Proc Sgscatter and Proc Sgpanel

- Statistical graphics plots use ODS (output delivery system) graphics
- Statistical graphics are easy to produce, look nice, and are more intuitive than traditional SAS/Graph graphics
- Statistical Graphics can be edited (to some extent) interactively

Where are my graphs?

- Graphs created with ODS graphics will be in Results Window, not in Graph Window
- Double-click on the graphics icon to view the file, using local windows graphics viewer.
- Graphs will be automatically be saved as .png files in current SAS folder
- png (portable network graphics) files are
  - Raster graphics
  - Compact format
  - Usable in most windows applications

Getting Started

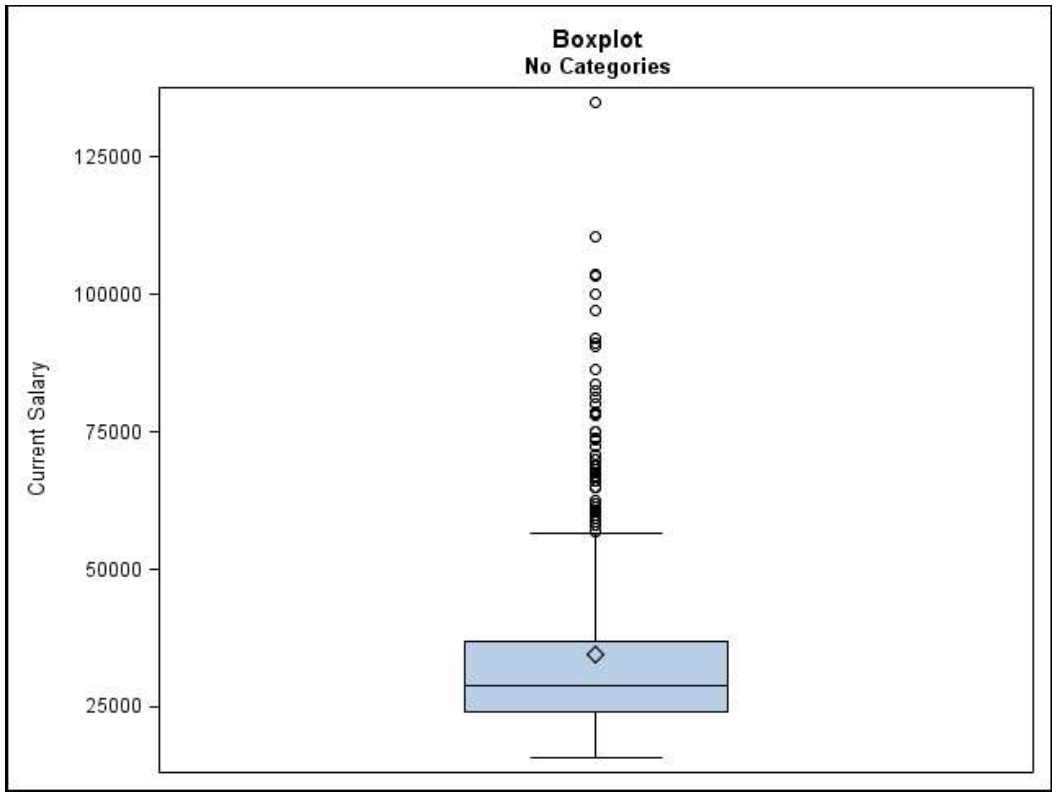


2. Double-click on graphics file icon to view graph

1. Set the current folder

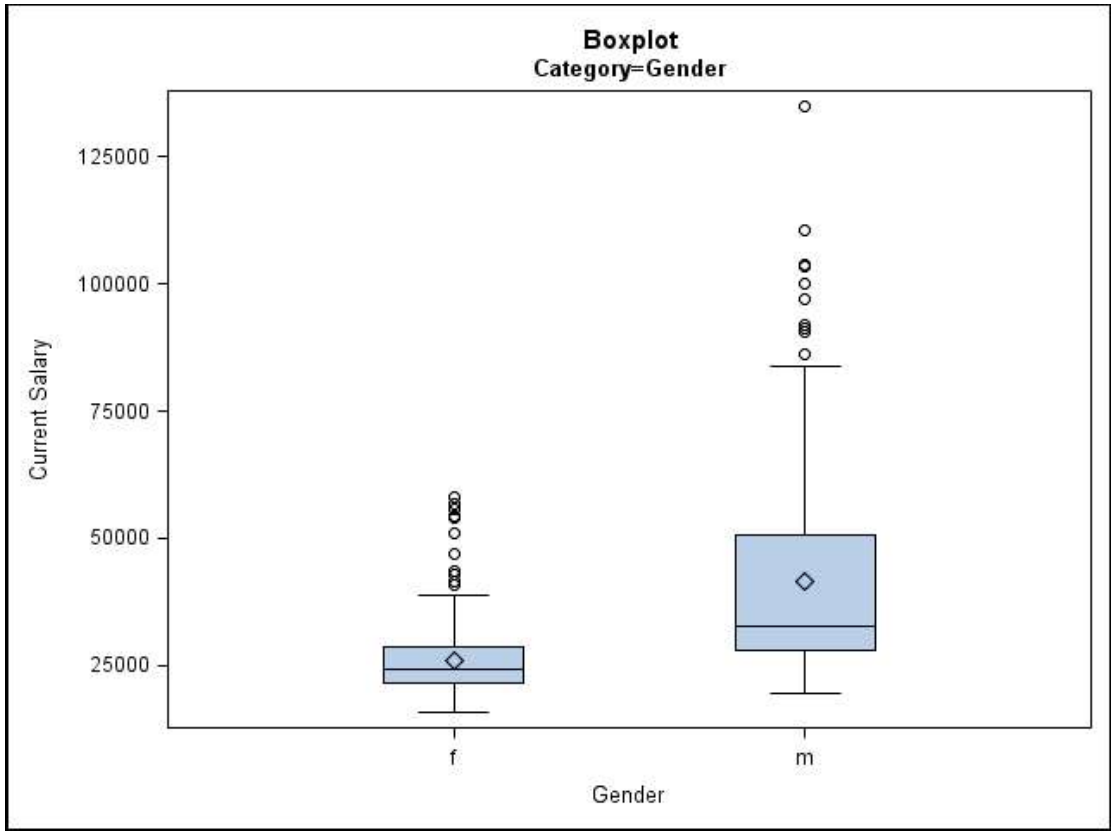
Boxplots

```
proc sgplot data=mylib.employee;
   vbox salary; run;
```



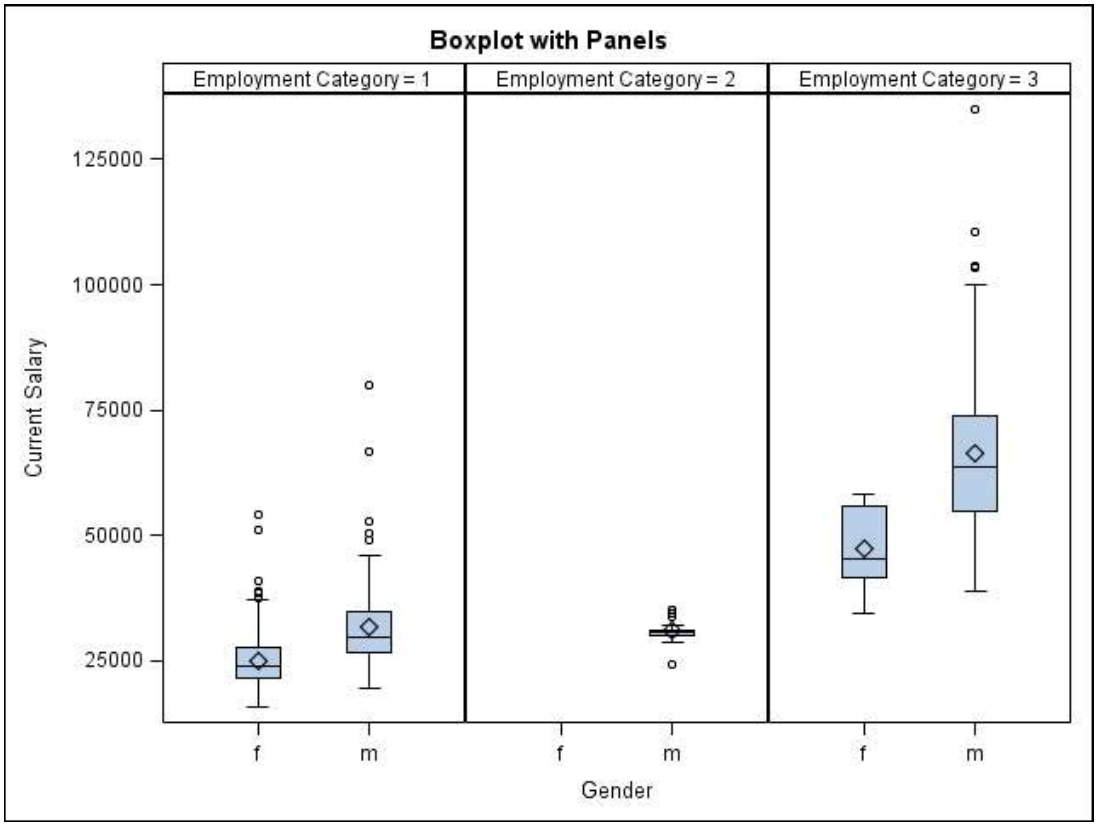
Boxplots for Categories

```
proc sgplot data=mylib.employee;
  vbox salary/ category=gender; run;
```



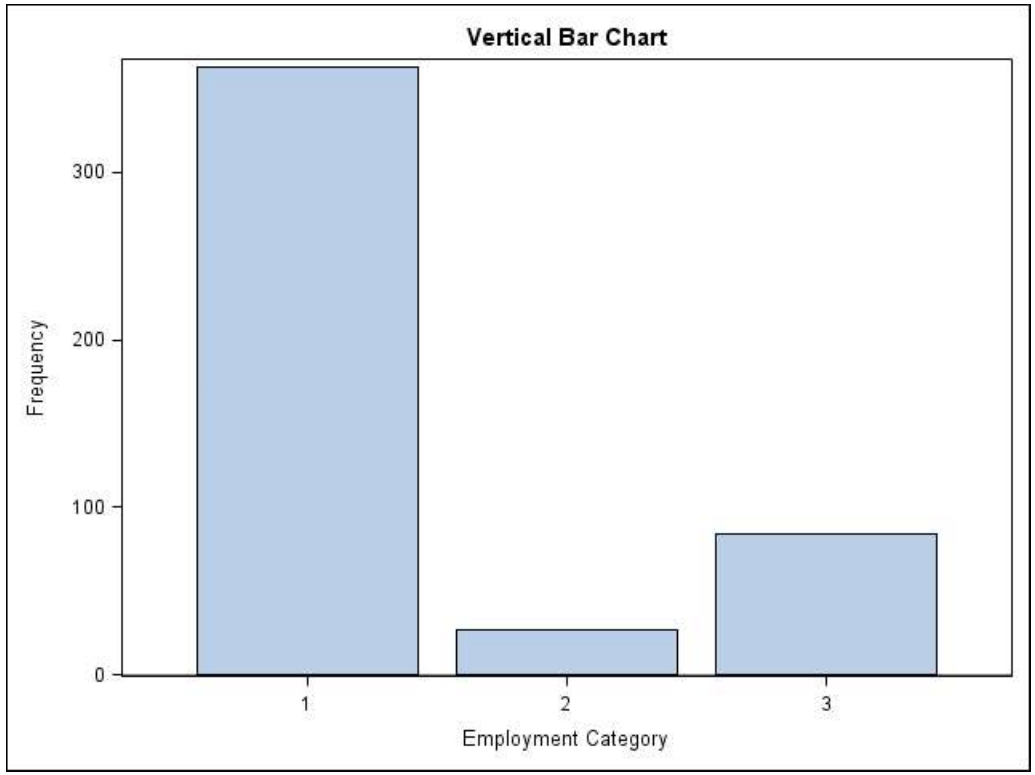
Paneled Boxplots

```
proc sgpanel data=mylib.employee;
  panelby jobcat / rows=1 columns=3 ;
  vbox salary / category= gender; run;
```



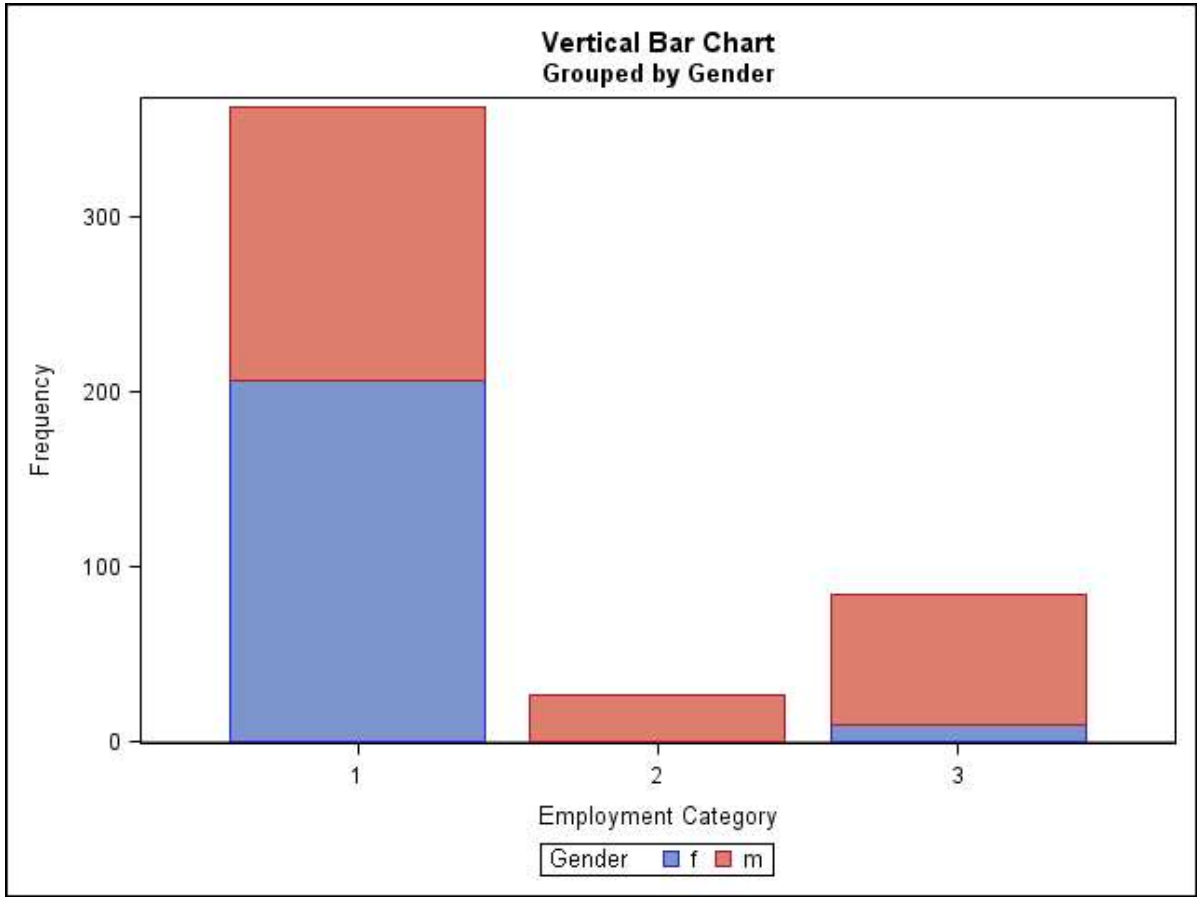
Barcharts

```
proc sgplot data=mylib.employee;
  vbar jobcat ; run;
```



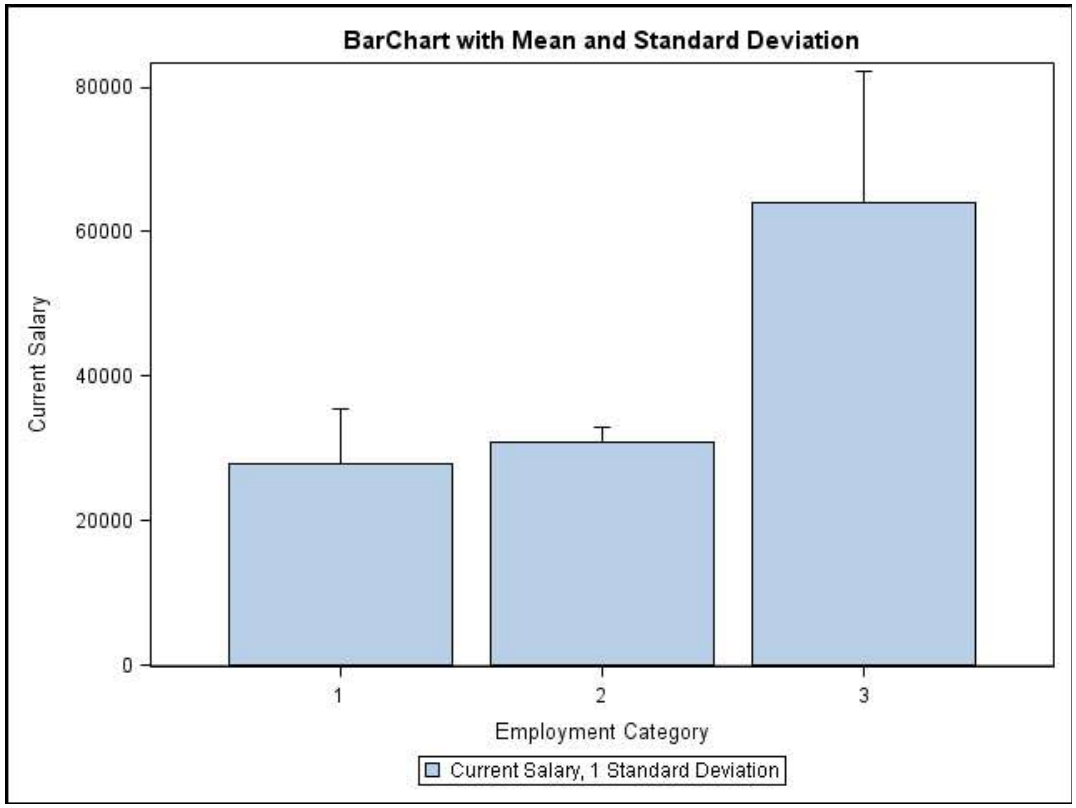
Stacked Barcharts

```
proc sgplot data=mylib.employee;
  vbar jobcat /group=Gender; run;
```



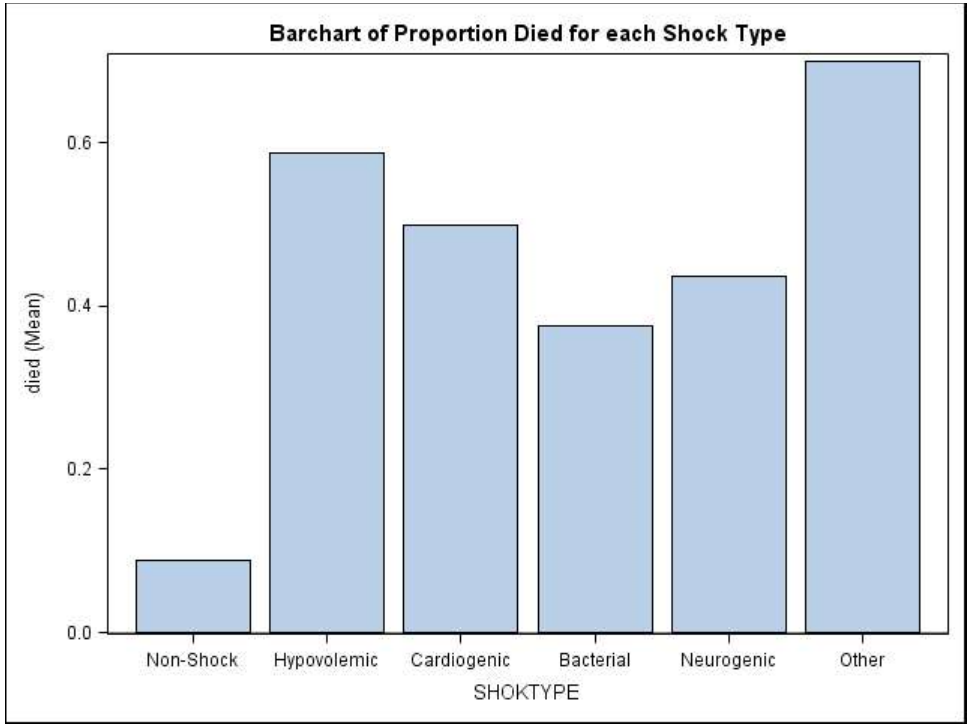
Barcharts with Means and Error Bars

```
proc sgplot data=mylib.employee;
  vbar jobcat / response=salary limitstat = stddev
  limits = upper stat=mean; run;
```



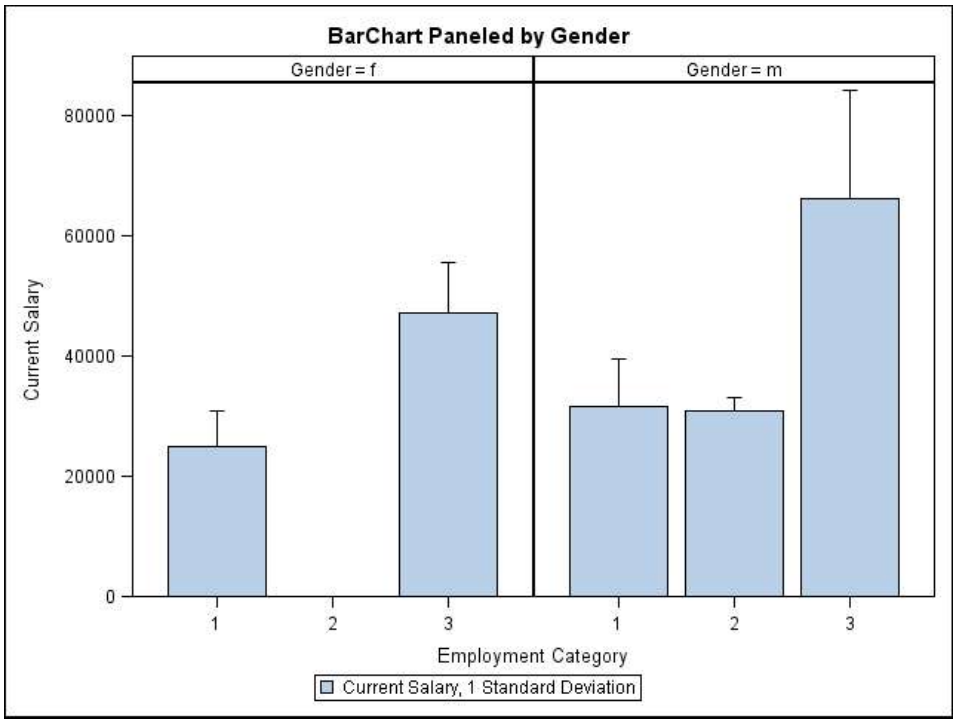
Barcharts of Proportions

```
proc sgplot data=afifi;
  vbar shoktype / response=died stat=mean;
  format shoktype shokfmt.; run;
```



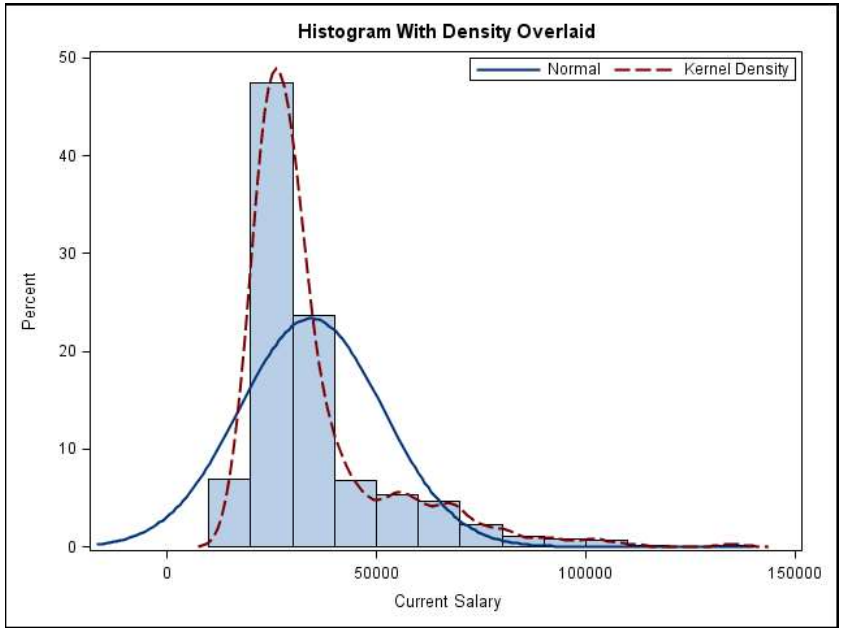
Paneled Barcharts

```
proc sgpanel data=mylib.employee;
   panelby gender ;
   vbar jobcat / response=salary limitstat = stddev
      limits = upper stat=mean; run;
```



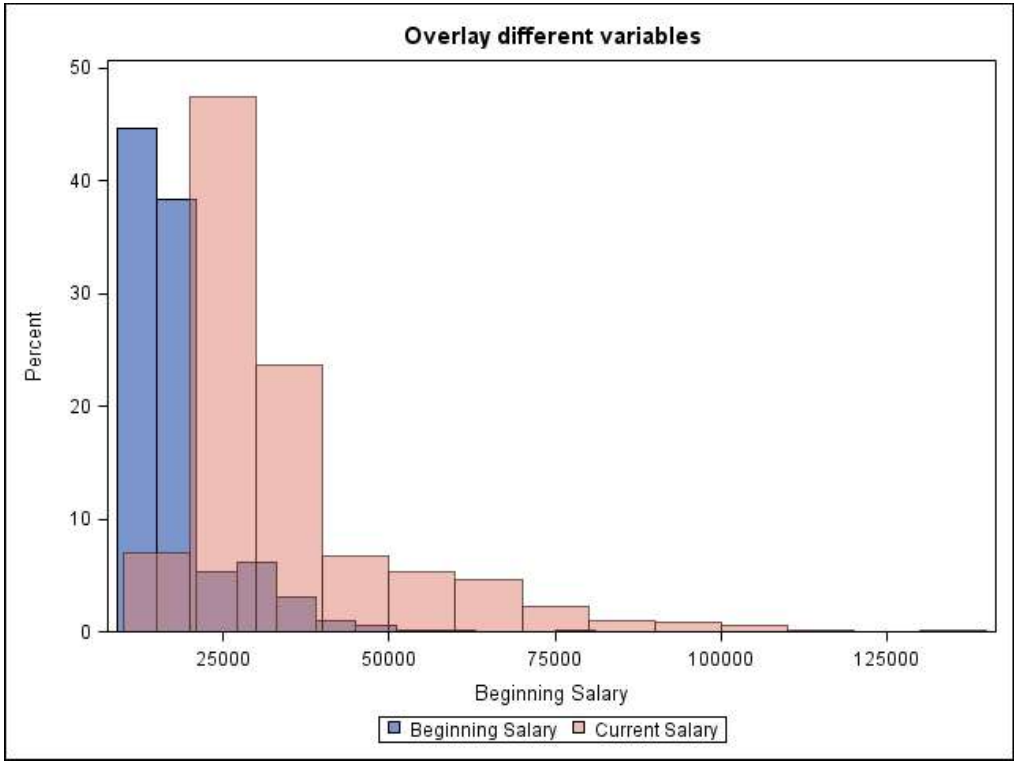
Histograms

```
proc sgplot data=mylib.employee;
  histogram salary ;
  density salary;
  density salary / type=kernel;
  keylegend / location=inside position=topright;
```



Overlaid Histograms

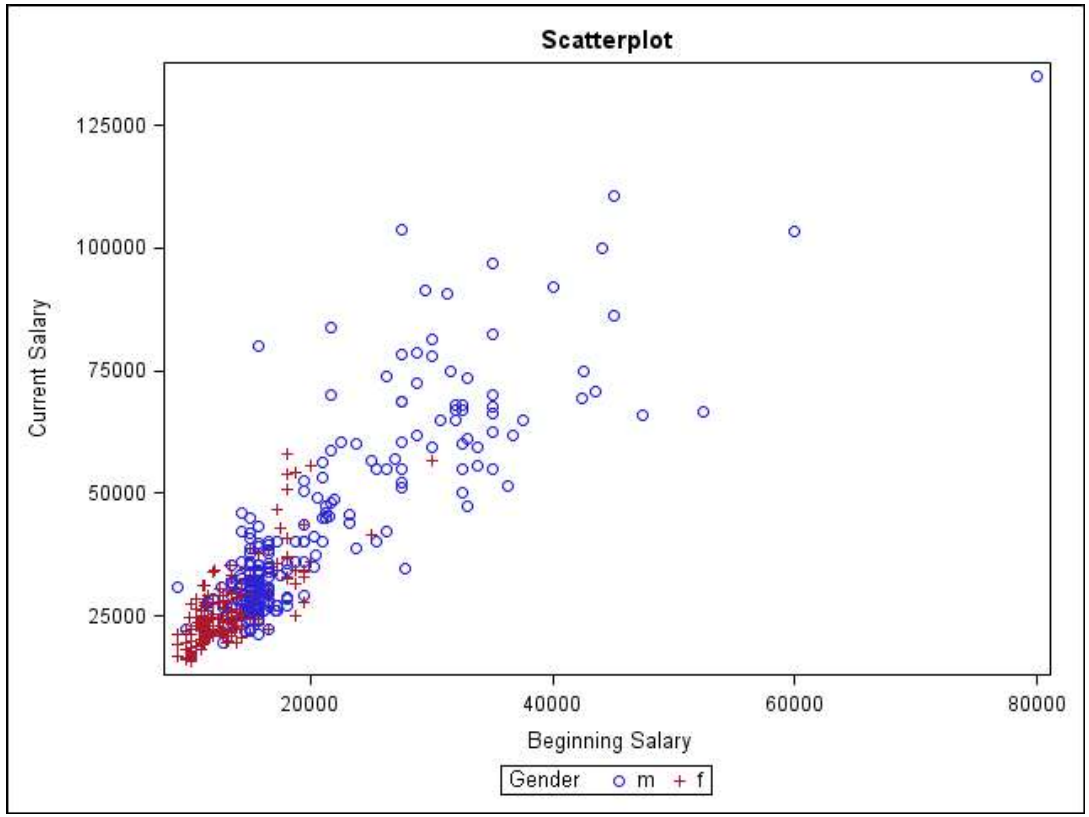
```
proc sgplot data=mylib.employee;
  histogram salbegin ;
  histogram salary / transparency = .5; run;
```



Note: Transparency = 0 is opaque. Transparency = 1.0 is fully transparent.

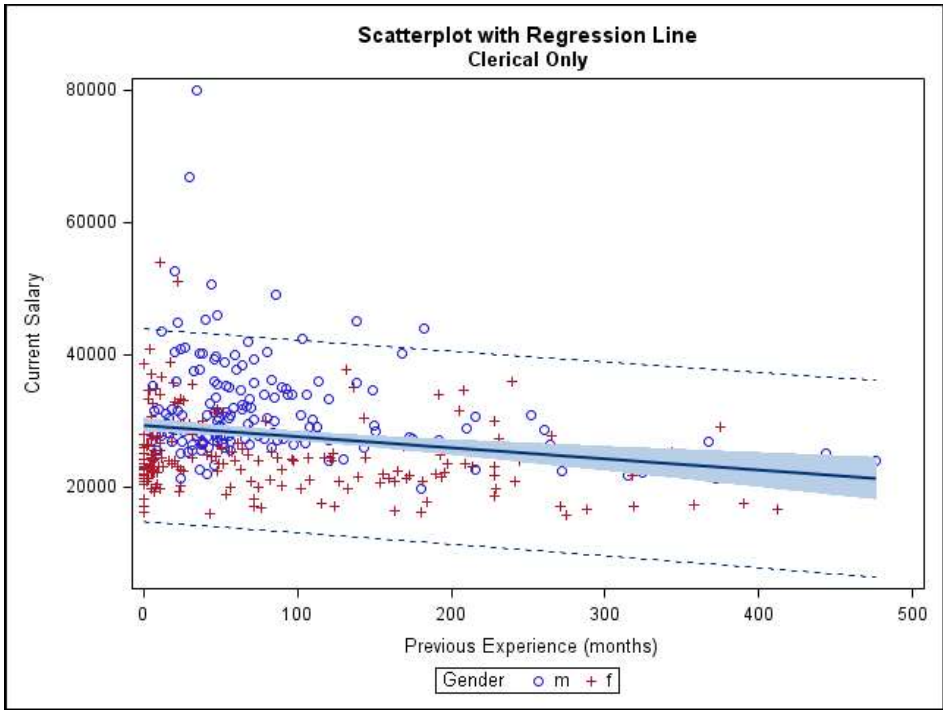
Scatterplots

```
proc sgplot data=mylib.employee;
  scatter x=salbegin y=salary /
                group=gender; run;
```



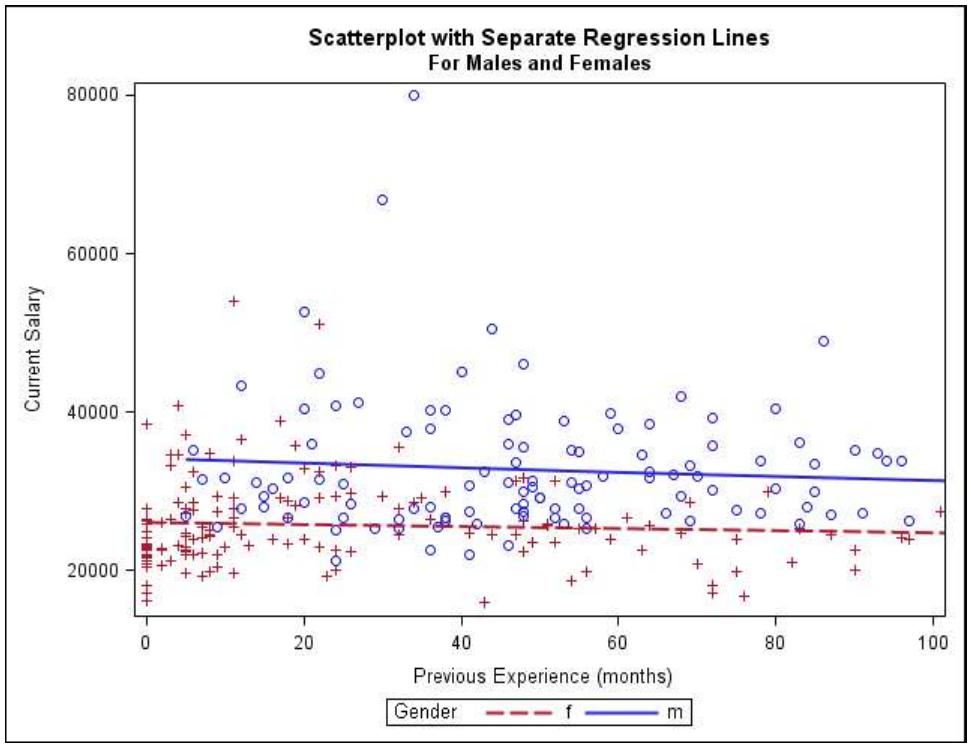
Scatterplot with Regression Line

```
proc sgplot data=mylib.employee;
  where jobcat=1;
  scatter x=prevexp y=salary / group=gender ;
  reg x=prevexp y=salary / cli clm nomarkers;  run;
```



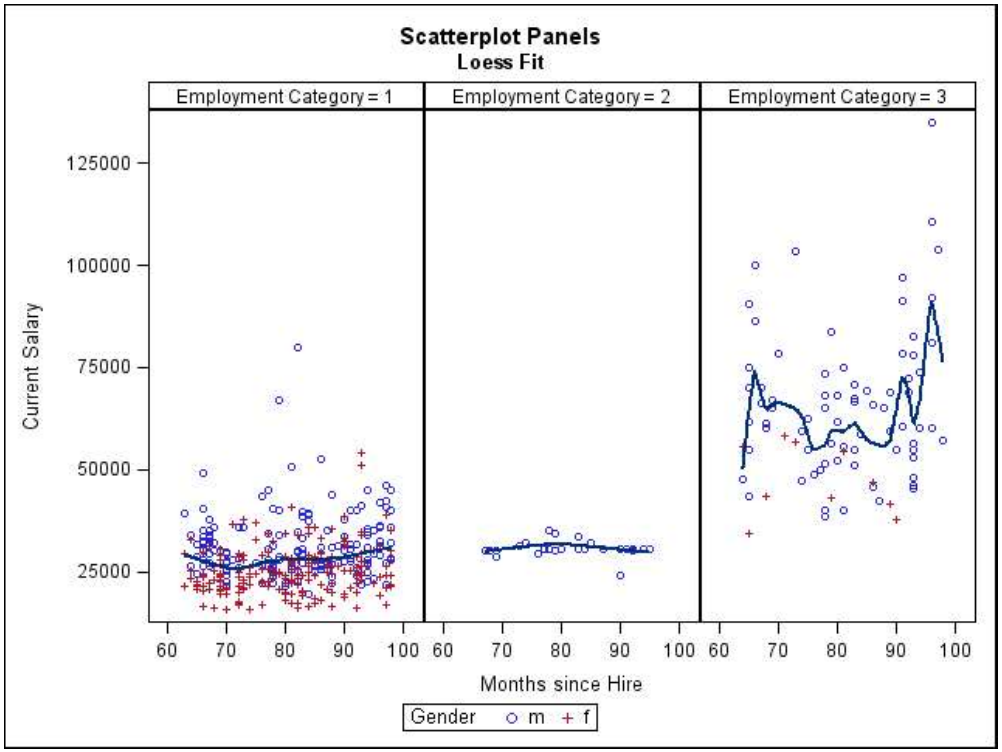
Regression Lines for Subgroups

```
proc sgplot data=mylib.employee;
  where jobcat=1;
  reg x=prevexp y=salary / group=gender; run;
```



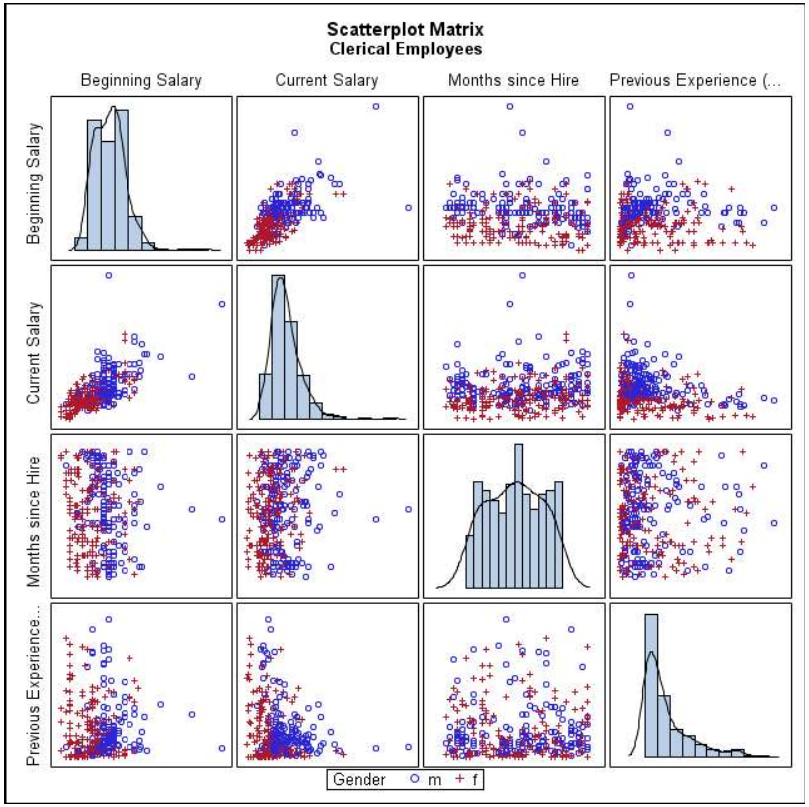
Paneled Scatterplot with Loess Fit

```
proc sgpanel data=mylib.employee;
   panelby jobcat / columns=3;
   scatter x=jobtime y=salary / group=gender;
   loess x=jobtime y=salary nomarkers; run;
```



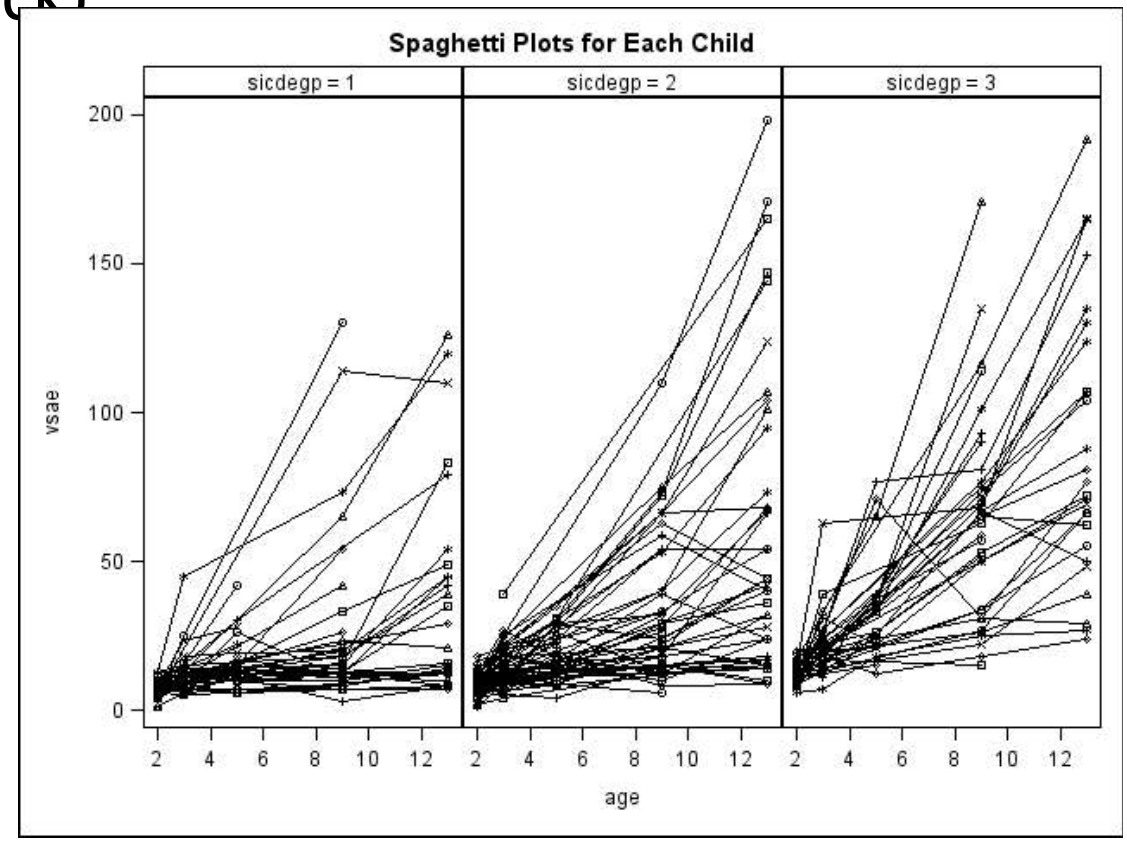
Scatterplot Matrix

```
proc sgscatter data=mylib.employee;
 where jobcat=1;
 matrix salbegin salary jobtime prevexp / group=gender
                diagonal=(histogram kernel); run;
```



Series Plots

```
proc sgpanel data=autism;
  panelby sicdegp /columns=3;
  series x=age y=vsae / group=Childid
  markers  legendlabel=" " lineattrs=(pattern=1
color=black);
```

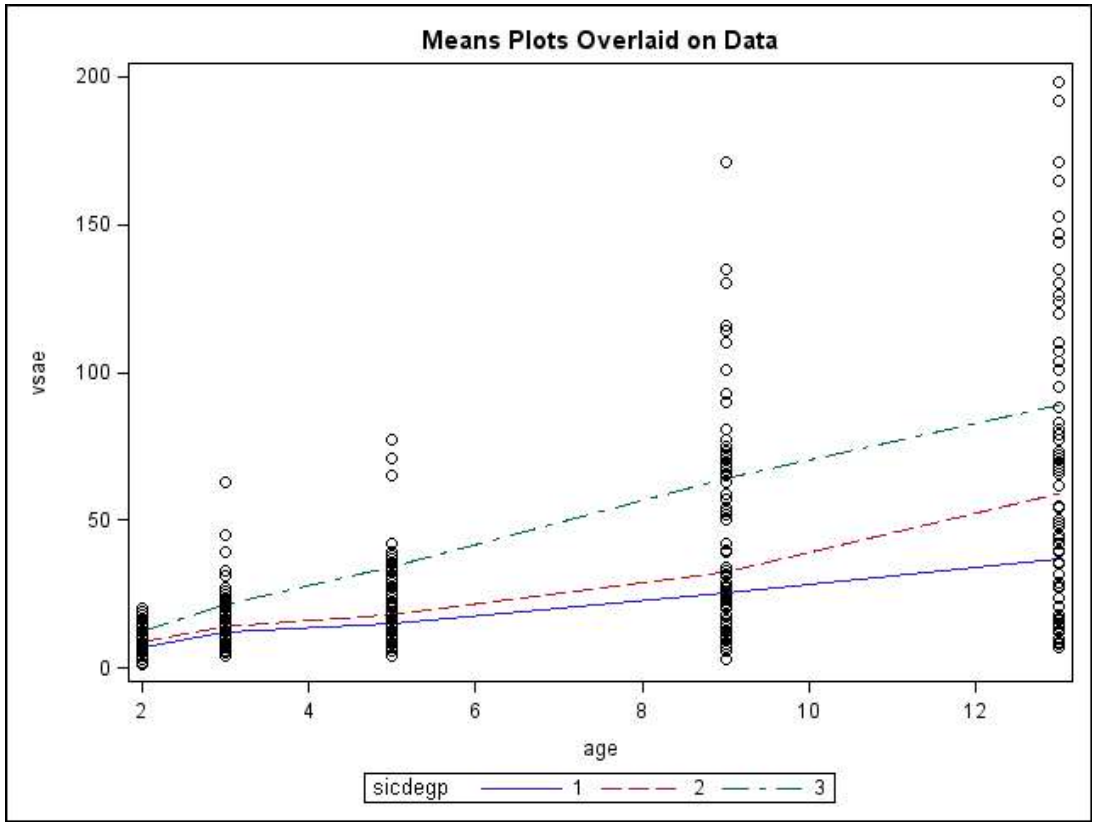


Generate Means

```
proc sort data=autism;
by sicdegp age;
run;
proc means data=autism noprint;
  by sicdegp age;
  output out=meandat mean(VSAE)=mean_VSAE;
run;
data autism2;
  merge autism meandat(drop=_type_ _freq_);
  by sicdegp age;
run;
```

Mean Plots Overlaid on Raw Data

```
proc sgplot data=autism2;
  series x=age y=mean_VSAE / group=SICDEGP;
  scatter x=age y=VSAE ;  run;
```

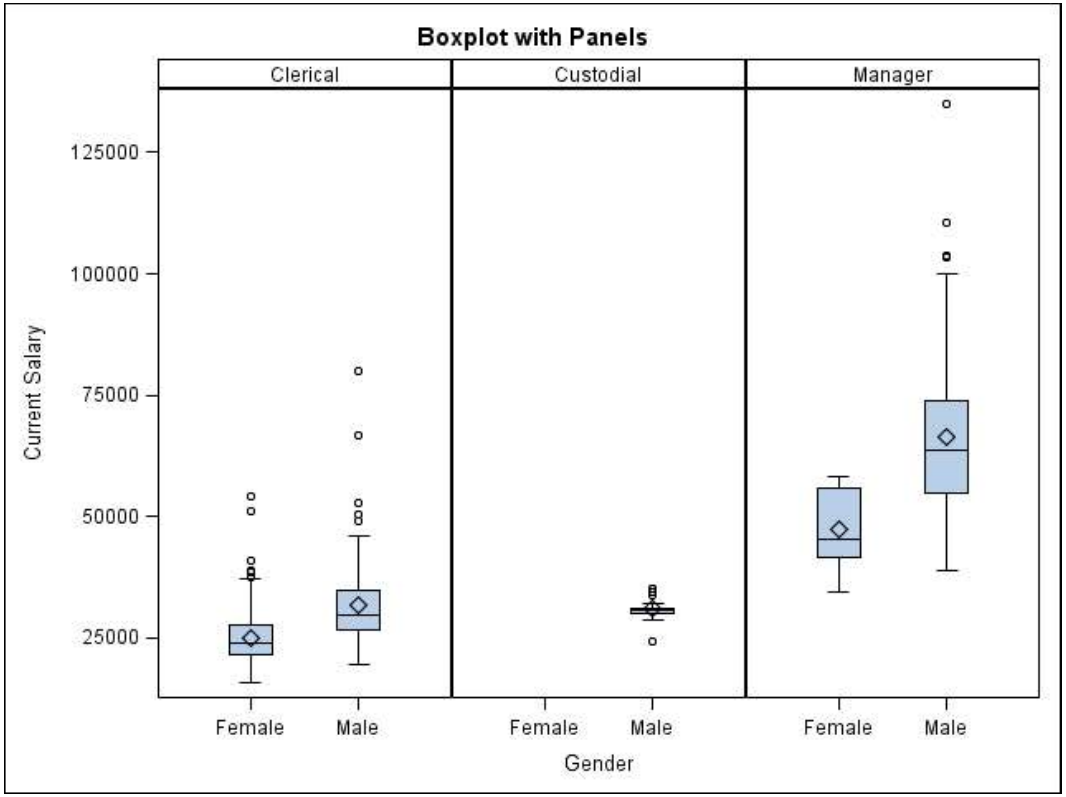


Formats Make Graphs More Readable

```
proc format;
   value jobcat 1="Clerical"
                2="Custodial"
                3="Manager";
   value $Gender "f"="Female"
                 "m"="Male";
run;
```

Formats Make Graphs More Readable2

```
proc sgpanel data=mylib.employee;
  panelby jobcat / rows=1 columns=3 novarname;
  vbox salary / category= gender ;
  format gender $gender. jobcat jobcat; run;
```



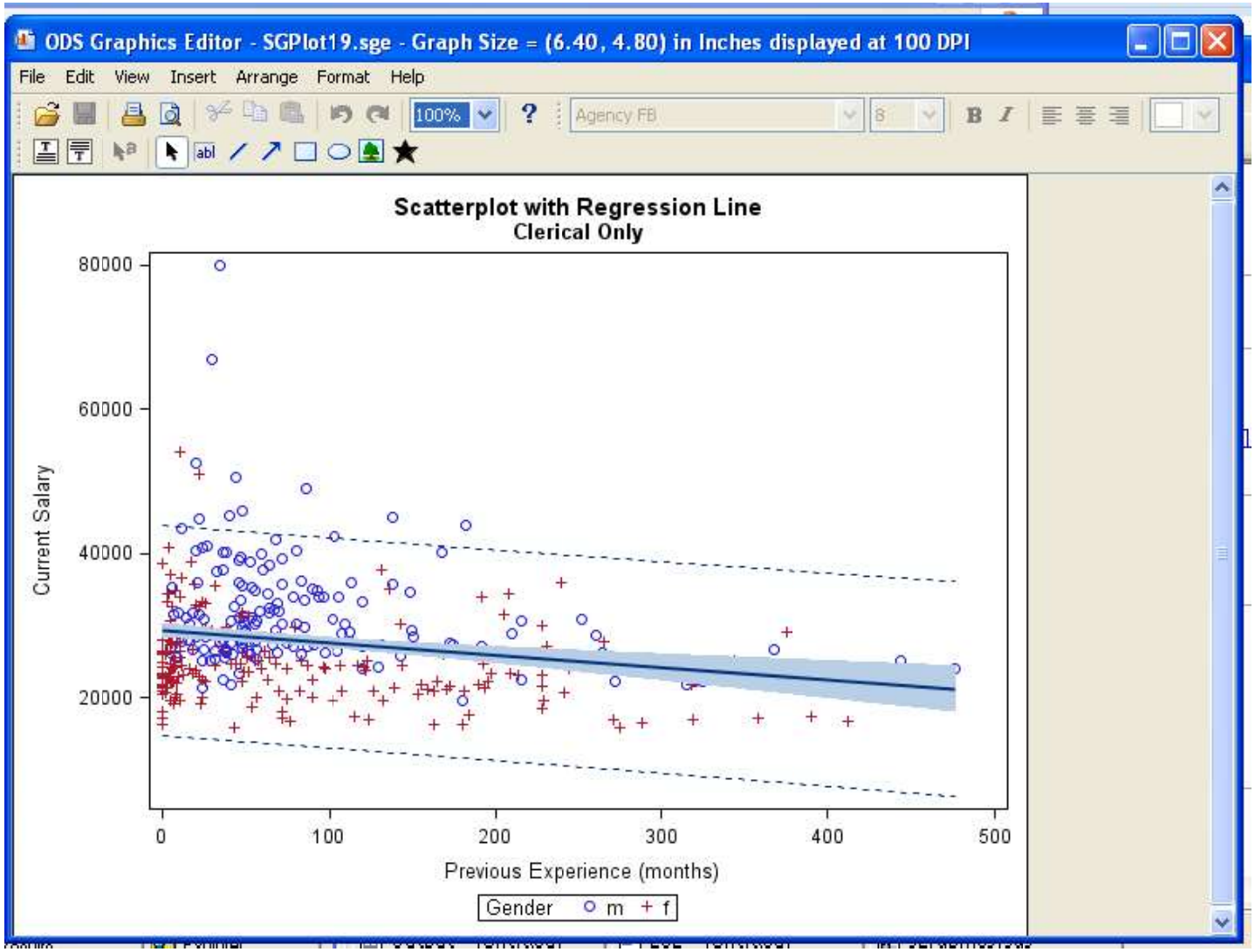
Editing ODS Graphics

- Use “sgedit”, or “sgedit on” to enable ODS graphics editor
  - Submit in command dialog box
- Two outputs will be created for each graph.
  - .png file
  - .sge (SAS Graphics Editor) file
- Edit the .sge file, and save as a .png to use in other applications.

Some of the Things you can Edit with the ODS Graphics Editor

- Title, footnote
- Axis labels, colors, fonts, symbols, text boxes
- Graph Style (Try them)
  - Listing (the default, colors)
  - Analysis (color scheme)
  - Journal (grayscale)
  - Journal2 (black and white)
  - Statistical (color scheme)

SAS Graphics Editor Window

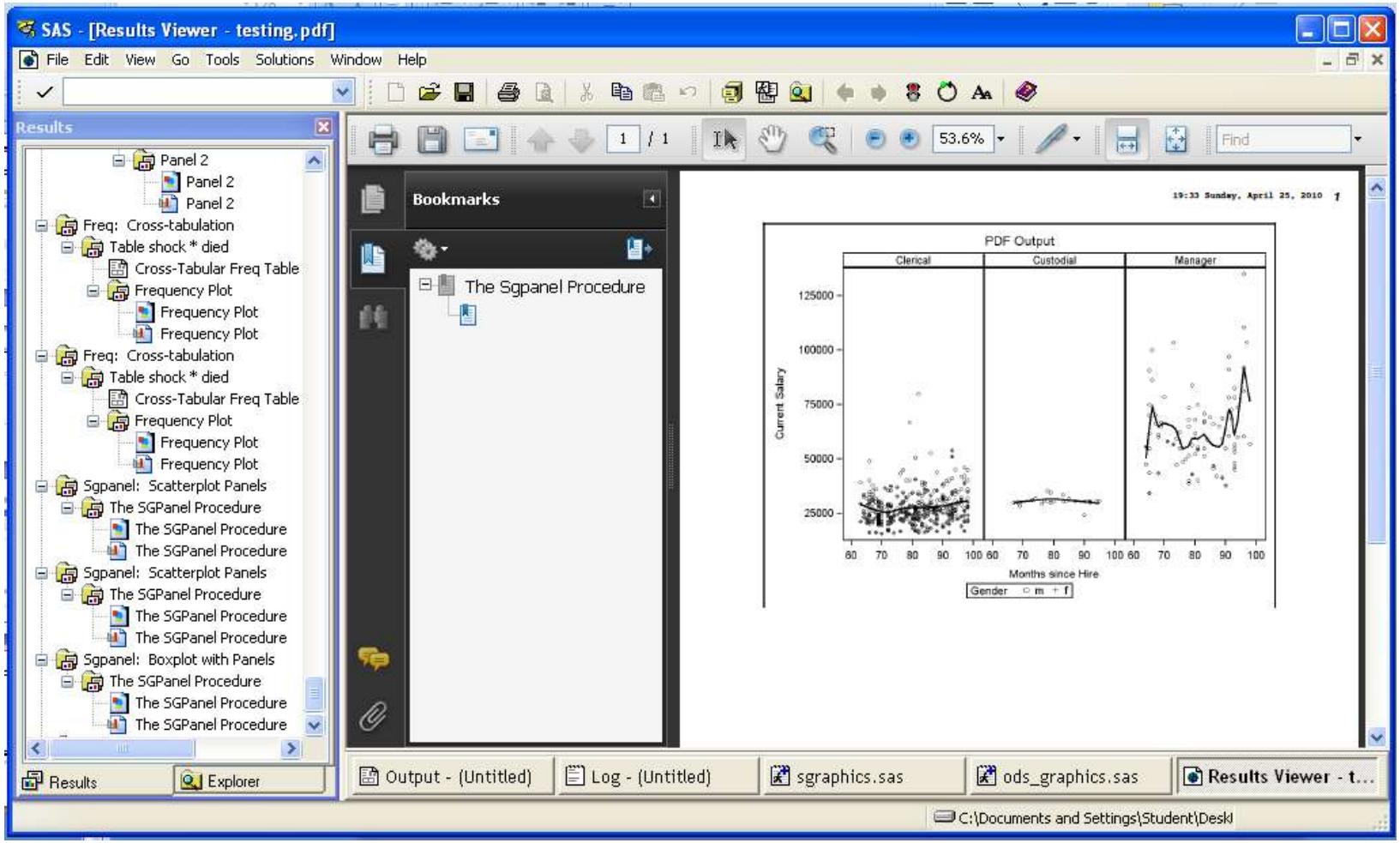


Creating PDF Output

- Send output to a pdf file
- Similar for HTML or rtf file output

```
ods pdf style=journal2;
ods pdf file = "testing.pdf";
ods listing close;
title "PDF Output";
proc sgpanel data=mylib.employee;
   panelby jobcat;
   scatter x=jobtime y=salary / group=gender;
   loess x=jobtime y=salary / nomarkers ; run;
ods pdf close;
ods listing;
```

PDF Output will be in the Results Viewer Window



Where to Get Help for Statistical Graphics Procedures

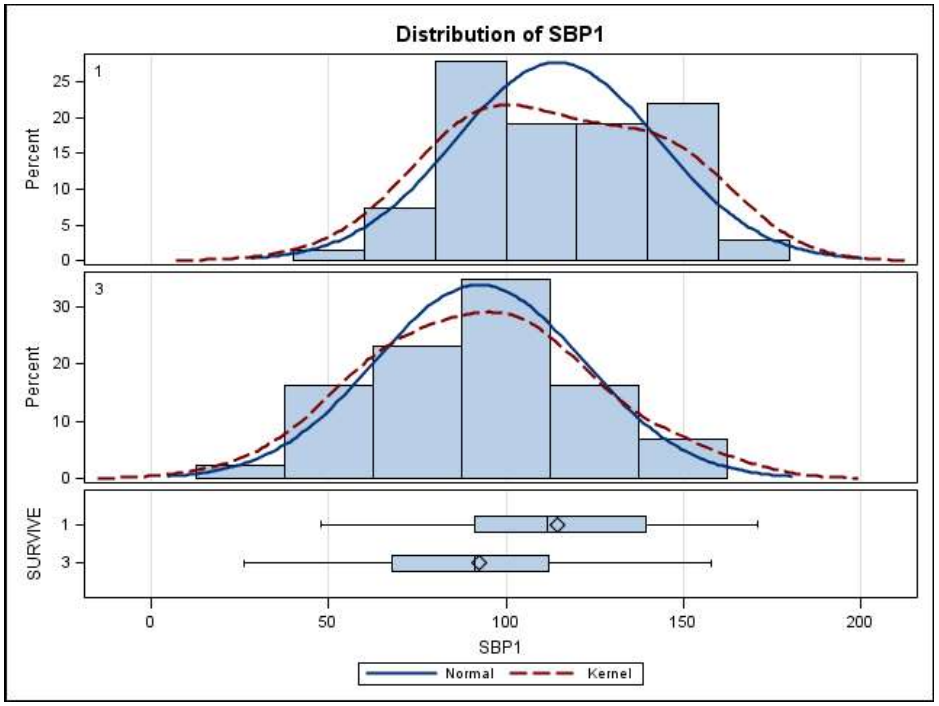
- SAS Help and Documentation > Contents > SAS Products > SAS/Graph > SAS/Graph 9.2 Statistical Procedures Guide > SAS/Graph Statistical Graphics Procedures
- Once you find it, it's really helpful.

ODS Graphics in SAS/Stat Procedures

- ODS graphics are available for statistical procedures
- Submit “ods graphics on;” before the procedure
- Submit “ods graphics off;” after the procedure
- Graphs are .png files, as for Proc Sgplot, Sgscatter and Sgpanel.
- ODS graphics show up after “drilling down” in the Results window for the procedure.
- Check SAS documentation for available ODS graphics for each procedure

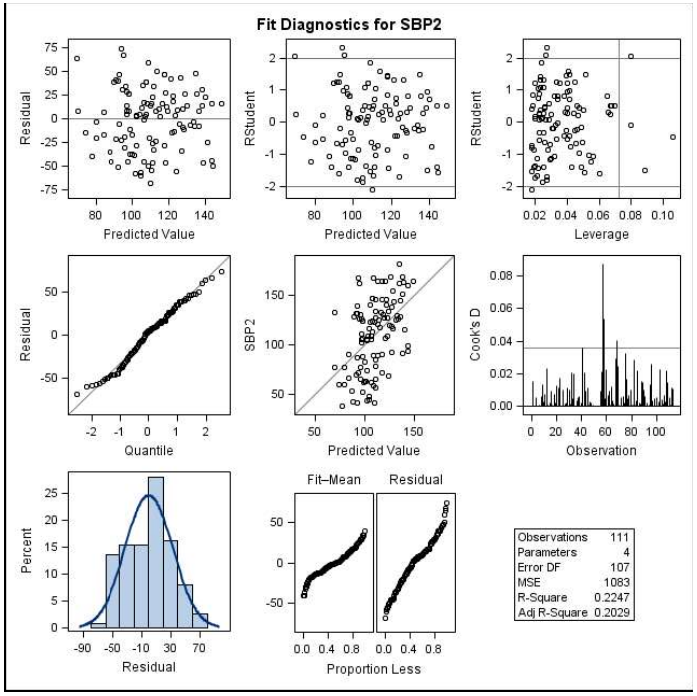
Proc ttest

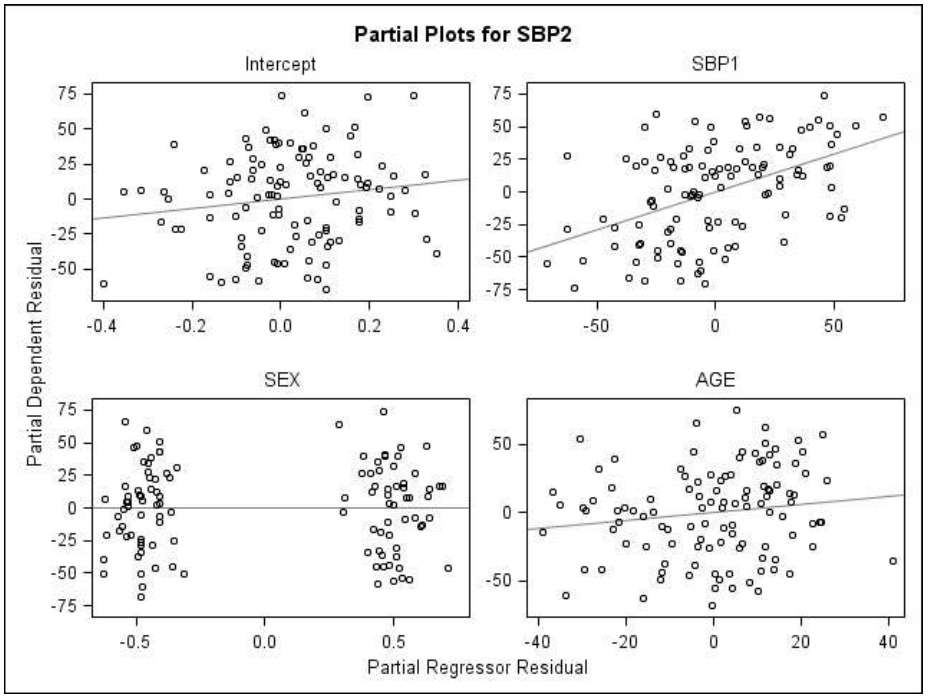
```
ods graphics on;
proc ttest data=mylib.afifi;
  class survive;
  var sbp1;
run;
ods graphics off;
```



Proc Reg

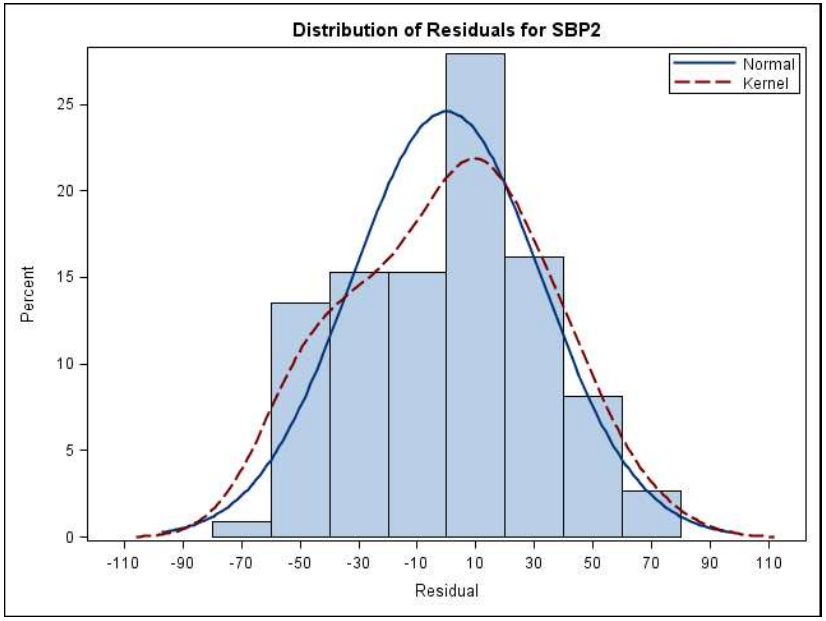
```
ods graphics on;
title "Regression with Default Plots";
proc reg data=mylib.afifi;
  model sbp2 = sbp1 sex age/partial;
run; quit;
ods graphics off;
```

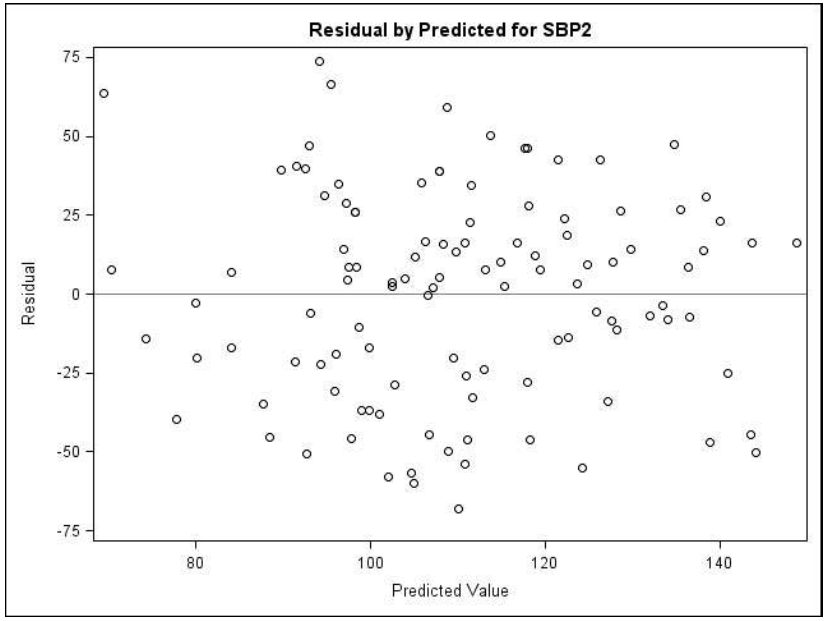




Proc Reg Unpack Graphics

proc reg plots(only)=DiagnosticsPanel(unpack);

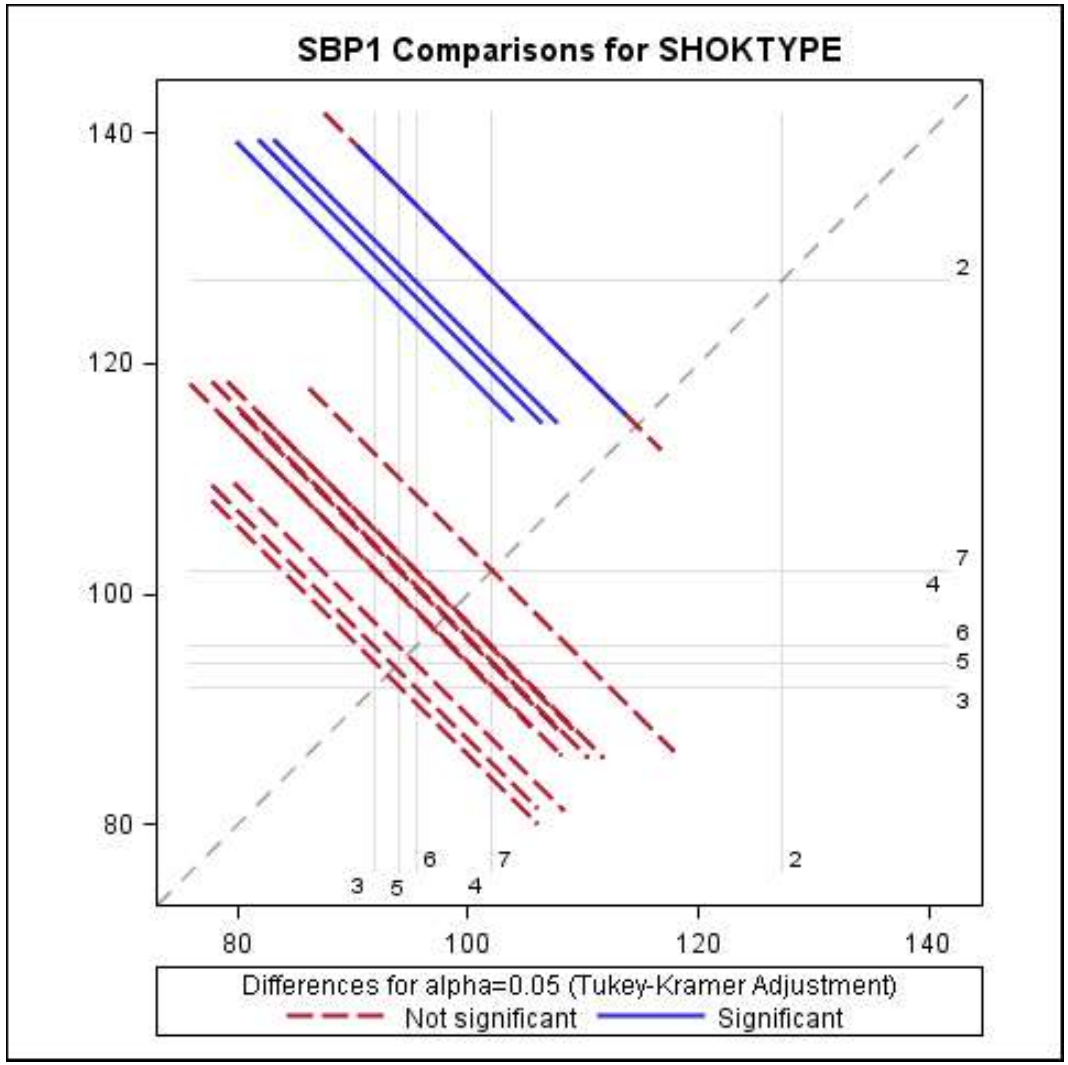




Proc GLM

```
ods graphics on;
title "Anova with Plots";
proc glm data=mylib.afifi;
  class shoktype ;
  model sbp1 = shoktype;
  lsmeans shoktype / pdiff adjust=tukey;
run; quit;
ods graphics off;
```

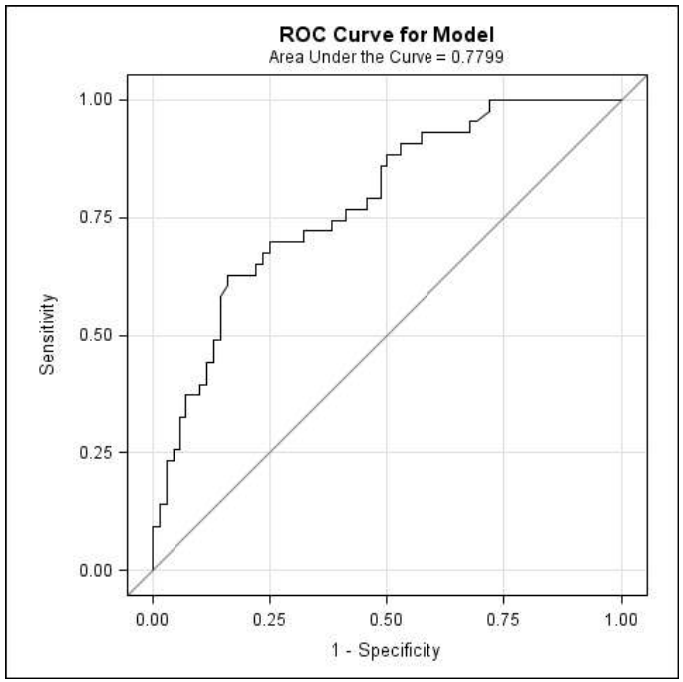
Proc GLM DiffPlot

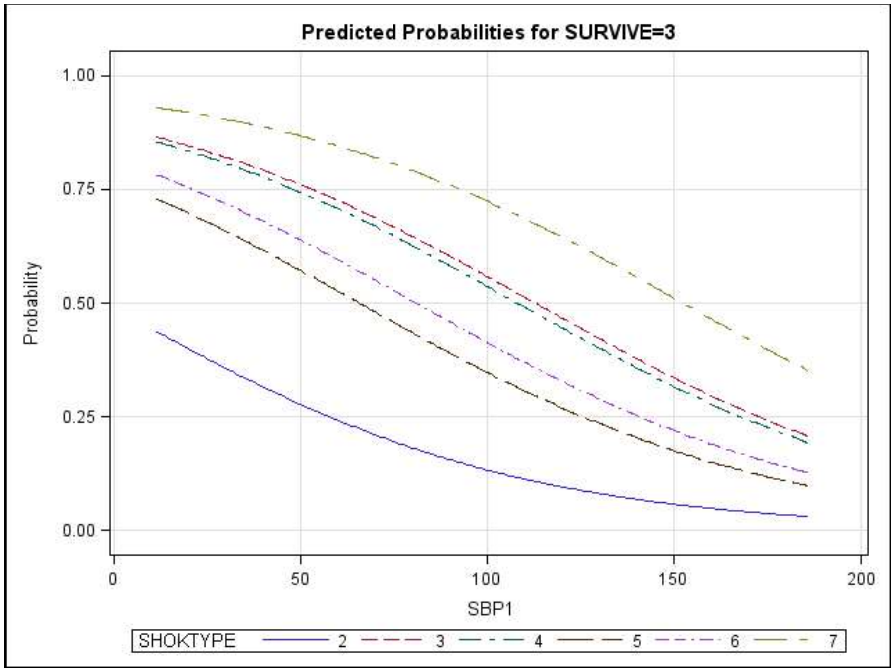


Proc Logistic

```
ods graphics on;
proc logistic data = mylib.afifi descending
plots(only)=(effect roccurve) ;
  class shoktype;
   model survive = sbp1 shoktype;
   output out=preddat p=predict reschi=rchi
resdev=rdev
         h=leverage;
run; quit;
ods graphics off;
```

Proc Logistic ROC Curve and Effect Plot





Thank you!

- Try some of these graphs using your data.
- They’re easy and fun!