

From Novice to Intermediate in (Approximately) Sixty Minutes:  
III. Presentation  
AnnMaria De Mars, University of Southern California, Los Angeles, CA

## ABSTRACT

As you move from novice to intermediate, you'll expand your knowledge from just Base SAS® to Enterprise Guide, SAS/Graph, ODS or maybe even JMP®.

The session begins by improving the look of your printed documents with ODS. Once you have used the procedures from session II to format your data and create tables, ODS can produce those with a variety of styles and file types. The secret of keeping you and your clients happy is to give them 20 different formats and if they don't like the one you used, you can have another done this afternoon, no html or CSS required.

Presentation can really be enhanced with pictures. Great graphics will be demonstrated that require little or no knowledge of SAS/Graph but include a little bit of cheating using Enterprise Guide, modifying graphic examples or ODS Statistical Graphics. Because you never know what system you'll be working on, we'll end with a quick look back at Graph-N-Go and forward to JMP.

## Introduction

Let's talk about you. I'm going to assume that you are a fairly new programmer or someone who supervises, mentors or is otherwise responsible for junior programmers. It's certain type of people who are usually attracted to programming – analytical and interested in producing a useful product. If a manager asks you for a report with specific columns of data and you give her that report, she should be happy, especially if it took some sub-setting, merging datasets together, creating or recoding variables.

Now let's talk about your manager. She wants things to look 'professional', whatever that means. Well, to her, it means that the report is in a format she can share with and present to other people. That might mean a web page, a pdf file, a word-processing format or a jpeg file. It also means that there are titles, headings and footnotes that explain what the variables are.

When your view and your manager's view collide, things can get ugly. Like some people, you may take the attitude that "if people are working in this organization, they should *know* what var0001 is, and besides, I was hired as a programmer. Find a graphic designer if you want your output to be a web page with a peach-and-pink theme". Your other option is to do what I do and say, "Sure, no problem, I can have this in a pdf file with an accompanying chart, in the color blue, tomorrow morning."

I am now going to let you in on a deep, dark secret is not because of my sweetness and light personality. The reason I take this attitude is that it will probably take me 30 minutes to make all of the changes required, after which point I will stay up until 1 a.m. writing a blog and drinking Chardonnay, getting up in the morning just in time to email the requested file at 11:55, which is still, technically morning. So... let's take a look.

## PROC PRINT: From ugly to professional

The first several examples use data from the Monitoring the Future study, a national survey of over 2,500 high school sophomores. Our hypothetical manager is interested in recruiting students for the armed forces and it has come to his attention that some proportion of students answered on the survey that they were definitely going to enter the military after high school, maybe not even waiting to graduate. Since the crisis of the month is that someone has decided the low percentage of female recruits is a problem, he tells you to give him a report on all of the female high school students who plan to enter the armed forces. So you do.

16:01 Friday, September 24, 2010 32									
Obs	CASE ID1	RADIO_HR	TV_HRS	SEX	RACE	DADS_ED	MOMS_ED	MOM_WORK	GRADES
289	59	3	2	2	3	1	2	1	6
301	94	7	7	2	3	2	1	2	7
Obs	HRS_HMWO	WILL_GRA	VO_TECH	GO_COLLE	GO_4YR_C	WILL_JOI	THINKFUT	SMOKE_C1	
289	1	4	1	3	3	4	3	2	
301	3	4	4	4	3	4	4	1	
Obs	HOMEALON	SKIP_SCH	FAILGRAD	SUMMERSC	SUSPEND	TALKPARE	HRS_WORK		
289	1	1	1	0	1	1	7		
301	6	1	0	0	0	1	4		

The last page of your report is above and the code you used is shown below. You used a WHERE clause to select out only those with the correct gender and intention to join the military. You even had the good sense to look in your log and see that only 17 records out

of over 2,500 met this criteria, so your boss doesn't need to count the number of records.

```
63 proc print data = readin.recruits ;
64     where (sex = 2 and will_joi = 4) ;
NOTE: There were 17 observations read from the data set READIN.RECRUITS.
      WHERE (sex=2) and (will_joi=4);
```

He is less than pleased and waving the report at you asks if you seriously expect him to show this to someone. Bite your tongue. Let's look how to move from the report above to the one below.

## High School Female Students with Military Plans School Experience

Obs	H.S. Grades	Failed A Grade	Attended Summer School	Ever Suspended	Hours of Homework Per Week
1	C-	Yes	No	Yes	1 -4
2	B-	Yes	Yes	Yes	1 -4
3	C+	No	Yes	No	15-19
4	B+	No	No	Yes	1 -4
5	A	No	No	Yes	5- 9

### Answers: Requiring Thought

Let's start without programming. Let's start with actual thought. -- what variables can we throw out? We don't need gender, it's all female, we don't need the variable asking if they'll join the military.

KNOW YOUR DATA!

Yes, you were just asked to do a simple report but if it shows that everyone's mother has a sixth-grade education, you're going to be asked about that and it does not look good if you don't have an answer other than "It's not my job". There may be employers looking for people who don't think for themselves but personally, I want to hire people who show initiative. First we do a PROC CONTENTS and take a look at the variables. Note in particular that race is a character variable.

Alphabetic List of Variables and Attributes						
#	Variable	Type	Len	Format	Label	
1	CASEID1	Num	8	BEST10.		
6	DADS_ED	Num	8	BEST10.	Dads_Ed	
20	FAILGRAD	Num	8	BEST10.	FailGrade	
14	GO_4YR_C	Num	8	BEST10.	Go_4Yr_Coll	
13	GO_COLLE	Num	8	BEST10.	Go_College	
9	GRADES	Num	8	BEST10.	Grades	
18	HOMEALON	Num	8	BEST10.	HomeAlone	
10	HRS_HMWO	Num	8	BEST10.	Hrs_hmwork	
24	HRS_WORK	Num	8	BEST10.	Hrs_work	
7	MOMS_ED	Num	8	BEST10.	Moms_Ed	
8	MOM_WORK	Num	8	BEST10.	Mom_work	
5	RACE	Char	2		Race	
2	RADIO_HR	Num	8	BEST10.	RADIO_Hrs	
4	SEX	Num	8	BEST10.	Sex	

Next we do a PROC MEANS to check if the average, minimum and maximum of the values for each variable are reasonable. You're not doing an analysis here, you're simply seeing that the data make sense and that anything a reasonable person would be expected to notice, like that the education for students' mothers ranges from 1- 6. We go back to the codebook for this survey and find what each of the values for each variable actually means. Then, we do a PROC FORMAT, a portion of which is given below.

```

proc format ;
  value yn
    0 = "No"
    1 = "Yes" ;
  value plans
    1 = "No"
    2 = "Probably No"
    3 = "Probably Yes"
    4 = "Yes" ;
  value $race
    "1" = "White"
    "2" = "Black"
    "3" = "Hispanic" ;
  Value Educ
    1 = "Grade School"
    2 = "Some H.S."
    3 = "H.S. Grad"
    4 = "Some College"
    5 = "College Grad"
    6 = "Graduate School" ;

```

A couple of points to remember about formats:

- Formats allow us to display the data as answers like "Yes" or "No", instead of numbers.
- Formats don't change the actual data. It is still stored in your dataset as 0 and 1, so if, for example, at some later date you need to add up the columns to form a total score, you can do so because your data are numeric.
- Often I'll see someone use a Proc Format and they have 16 formats for 16 variables. If some of the variables use the same coding, you don't need individual formats. For example, the questions about whether the student has ever been in summer school, suspended or failed a grade are all "Yes" or "No". Similarly, the college going plans are all coded No, probably not, probably yes and yes.
- You can reuse formats. You can use the same format for several variables in a dataset and for different datasets or procedures.
- Character variables require character formats.

When doing the PROC FORMAT remember that race is character, even though when you look at it in your report above it's all numbers, it has been defined as a character variable and so you need to create a character format, which begins with a \$ and has the data to be formatted in quotes just like any other string variable, even if, as in the example above with race, your data are all numbers.

Simple fixes to PROC PRINT

Before we get into styles we're going to improve our PROC PRINT. The report above was produced by the following statements. Let's take these one at a time.

```

options nodate missing = " " ;
ods html file = "e:\wuss2010\print1.html" style = meadow ;
ods rtf file = "e:\wuss2010\print1.rtf" style = meadow ;
Title "High School Female Students with Military Plans" ;
Title2 "School Experience" ;
proc print data = females split = "/" ;
  var grades FAILGRAD SUMMERSC SUSPEND hrs_hmwo ;
  format FAILGRAD SUMMERSC SUSPEND YN. grades grades. hrs_hmwo hwhrs. ;
  Label grades = "H.S./Grades"
        Failgrad = "Failed/A/Grade"
        Summersc = "Attended/Summer/School"
        Suspend = "Ever/Suspended"
        hrs_hmwo = "Hours of/Homework/Per Week" ;

```

1> OPTIONS NODATE MISSING = " " ; gets rid of that date at the top, prints a blank for a missing value instead of a period. These options will be in effect throughout the SAS session or until changed by another OPTIONS statement.

2.> The first ODS statement will write the output to a file of the specified name and type. In this case, it is sending it to an html file. If the file does not already exist, it will be created. If it does already exist, it will be written over. The style = option specifies the style to use for the given html file. The second ODS statement is going to write the exact same output to an rtf file that can be opened in any word-processing software.

3> Titles - we have Title1 and Title2. When you have a new Title statement, it replaces the previous one, but all statements that are less than n stay the same. So, we can have a new Title2 for each report but the Title1 will stay the same.

4> The split = option in the PROC PRINT statement splits the label across lines whenever the specified character is found, in this case a "/" .

5 > VAR statement to select out specific variables

Let's go back to the thinking part. What's the purpose of these reports? Obviously it's to give you some information about this group that is unique and of interest to you, that is, young women who are definitely planning to join the military after high school. There are only 17 people out of over 2,500 high school sophomores in our survey who fit this profile. Instead of giving someone a report with 28 variables to puzzle through, how about simply organizing it a little. Let's start with doing three reports. It's very easy. Our first is college plans. Our second is school experiences and the third is family variables.

6> The FORMAT statement is specifying which formats to use when printing the report.

```
format FAILGRAD SUMMERS SC SUSPEND YN. grades grades. hrs_hmwo hw hrs. ;
```

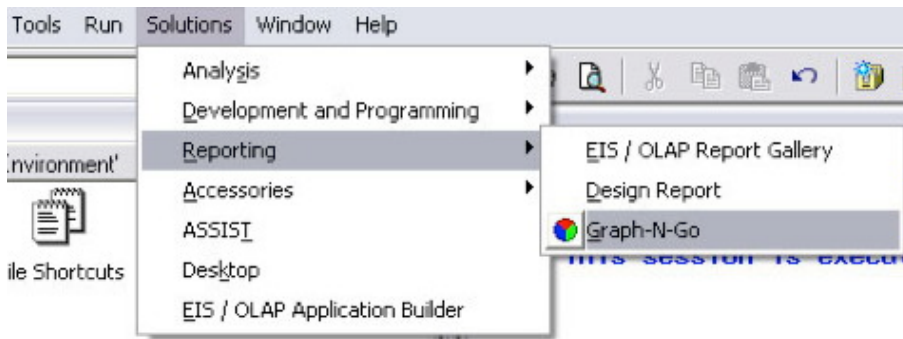
Because the first three variables all use the same format, yn. , I only need to specify it once, after I have listed all the variables that use it.

7> The LABEL statement labels the variables. If a label was given when the dataset was created, any label specified in a LABEL statement in the procedure will override it. As we saw in the PROC CONTENTS above, the labels for these variables were pretty short, such as Hrs\_hmwork, so I wanted to make more descriptive labels.

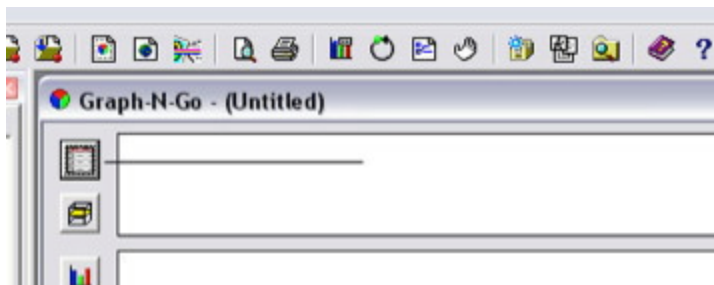
## GRAPH-N-GO

Your manager is very pleased with your new report and is very interested that a high proportion of these female students have been suspended. He asks for a bar chart of this to include in the report.

Personally, for point-and-click graphics, I prefer SAS Enterprise Guide, but that isn't always installed. We'll assume all you have available is Graph-N-Go. A surprising number of SAS programmers don't even know they have Graph-N-Go available, but it's right there next to the RUN menu under SOLUTIONS.

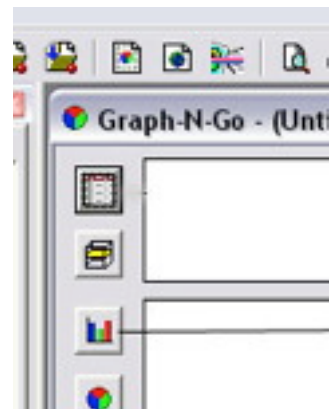


When you select Graph-N-Go, a new window will pop-up with an icon you are supposed to recognize as a SAS dataset.



Click on that and a new window will pop up with the words SAS dataset at the top, an empty box and, next to it, a button with three dots, causing you to ask yourself, "What the heck am I supposed to do now?" The answer is to click on the button with the "..."

Click on that and yet another window will pop up. The next window should look familiar. It has the libraries available to you in the left pane, including the WORK library, SASUSER, MAPS and any libraries you might have defined with a LIBNAME statement. Select the library you want to use. Then, in the right pane, select the dataset you want to use. In this case we are going to select the "WORK"



library and the dataset named "Females".

On the left of the window are several buttons. We want a bar chart, so we're going to click on the bar chart and drag it to the large pane in the bottom right. An empty box appears with the title BAR CHART 1. We right-click on the empty box and from the drop-down menu select PROPERTIES.

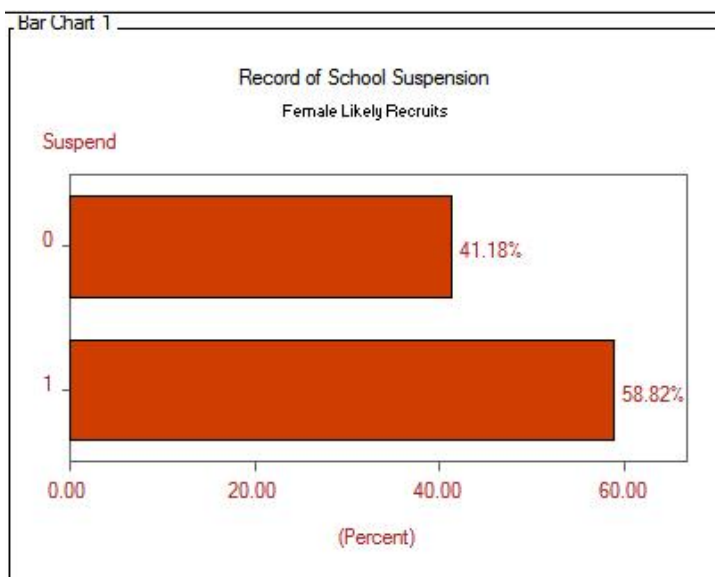
In the pop-up window is a drop-down menu with the title DATA MODEL. By this point we are wondering if it might be easier to learn SAS/GRAPH after all, but we forge ahead, selecting from the drop-down menu the one dataset that we identified previously, work.females.

There are five tabs at the top of the PROPERTIES window, these are "General", "Data", "Titles/Footnotes", "Appearance" and "Object Size".

We're going to click on DATA tab and from the drop down menu next to CATEGORY, select "Suspend" as the variable that we want to chart and under STATISTIC, we'll select "Percent". We'll also click the button next to SHOW BAR VALUES.

We'll click the TITLES tab and give a title for the bar chart.

Next, we'll click on the APPEARANCE tab and under COLOR SCHEME select "Fall". Under ORIENTATION, we click the button next to "Vertical". We click OK and the chart below is produced. If we didn't like the size, we could right-click on it, select Grow/Shrink and then drag on the side of the chart to increase or decrease it's size.



We're happy with this size, so we simply right-click on the chart, pick EXPORT and from the options select "External File". There will be a pre-filled default directory, name and type, something like :

C:\Users\Yourname\My SAS files\9.2\gng.bmp

If you want to change any of that, to the right is the ubiquitous box with the three dots again. Click on that and a new pop-up window will allow you to change the folder, file name and type.

Once we have saved the chart, we're going to right-click on it again, select EXPORT again and this time we are going to select "Source File" to save. This is the programming statements that created the chart.

The manager thinks the chart is great but wants a couple of modifications. He wants the categories to show up as "Yes" and "No" rather than 0. 1. He also thinks the axis should go to 100, and by 10, not 20 and without the decimal places. He'd like the title left off, too, because he's going to put it in a Powerpoint slide and wants to add his own title at the top. Oh,

and he also thinks there should be a better label, how about "Ever Suspended".

This is the part where you smile and control your temper because you saved the source file. Below are the statements written by Graph-N-Go.

```
/* Set the SAS/Graph options */
goptions reset=all
  ctext=CXA62427 ftext="MS Sans Serif" htext=8 pt
  colors=(CXCF3D00 CX808000 CXBCBA8B CX2C4321
          CXFFE300 CX50B454 CXA6242F CX69839C
          CX005F00 CXC17500 CX506686 CXDFE0D7
          CX676667 CXCBD5E8 CXC72037 CXFFCF00);
/* Set the Titles/Footnotes */
title1 justify=center color=CX000000 font="MS Sans Serif" height=8 pt "Record of School
Suspension";
title2 justify=center color=CX000000 font="MS Sans Serif" height=8 pt "Female Likely
Recruits";
axis1 minor=none label=("Suspend") ;
axis2 minor=none label=(height=12 pt "(Percent)")
  order=(0 to 60 by 20) value=('0.00' '20.00' '40.00' '60.00');
proc gchart data=temp;
  hbar SUSPEND /
```

```

type=PERCENT discrete
maxis=axis1 frame cframe=CXFFFFFF PERCENT percentlabel=none
woutline=1 coutline=CX000000 caxis=CX676667
raxis=axis2 ;

```

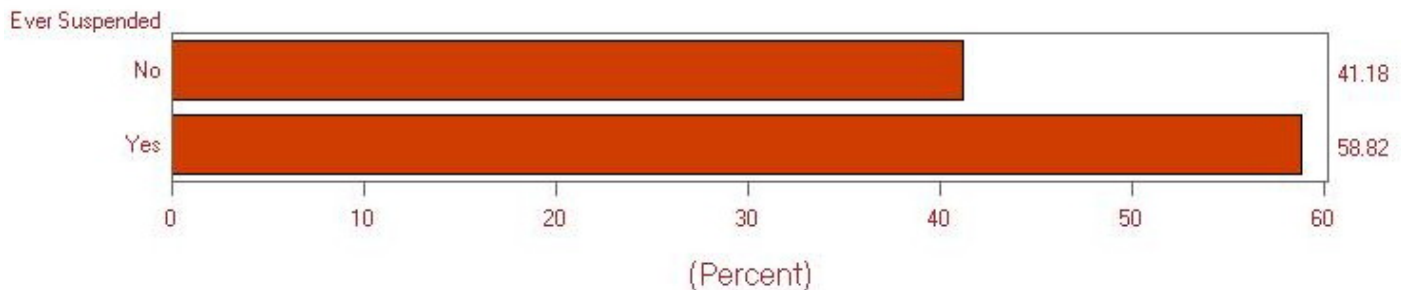
This is the part where I cheat. I'm simply going to change a few statements to the program that Graph-N-Go wrote for me. I open this file just like any other SAS program, because it is just a SAS program, change the label in the AXIS1 statement to say "Ever Suspended". I also change the AXIS2 statement to be by 10 instead of by 20. Since the default is to label the axis without the decimal places, I don't need any value labels. I change the order = to be "by 10". I add a TITLE statement with nothing after it to leave the title space blank. The Graph-N-Go application creates a temporary dataset it charts. Instead, I need to change the PROC GCHART statement to use the dataset "females". Finally, I add a FORMAT statement at the bottom, using that same yn format that I had created earlier. I do need to keep the GOPTIONS statement from above also, because that specifies the color scheme and the manager liked that. The revised program is below.

```

axis1 minor=none label=("Ever Suspended") ;
axis2 minor=none label=(height=12 pt "(Percent)") order=(0 to 60 by 10) ;
Title ;
proc gchart data=FEMALES ;
  hbar SUSPEND /
    type=PERCENT discrete
    maxis=axis1 frame cframe=CXFFFFFF PERCENT percentlabel=none
    woutline=1 coutline=CX000000 caxis=CX676667
    raxis=axis2 ;
  format suspend yn. ;

```

After I run it in SAS, I select from the FILE menu, EXPORT AS IMAGE and save it as a jpeg file.



Our manager loves the chart so much that he wants to change the report (remember the original report?) to match the colors. No problem, go back to the ODS statement and change the STYLE = to "harvest" :

```
ods rtf file = "e:\wuss2010\print1.rtf" style = harvest ;
```

Obs	Will Graduate High School	Will Attend Vo-Tech	Will Attend College	Will Attend 4-Year College
1	Yes	Probably No	Probably Yes	Probably Yes
2	Yes	Probably No	Yes	Yes
3	Yes	Probably No	Yes	Yes

In addition to all the lovely matching colors, our manager also has the option, since this in rtf and jpeg, two formats that work well with OpenOffice, Microsoft Office and any web design software of customizing the output further to suit himself. He can also share it with others who don't know SAS, just for their information or to incorporate it in their own documents. Congratulations, you are now officially a team player.

## Helpful Tips Before Moving On

There are several papers presented at user group meetings that give more detailed information on Graph-N-Go. My favorite, included in the reference section, is by Curtis Smith.

I just whipped out that harvest style off the top of my head because I've been using ODS since it became available. If you haven't memorized all the styles yet, you'll be happy to know that there is a website that gives examples of the available styles.

The wonderful people at Louisiana State University have a web page where you can look at all of the different styles that come with SAS.

[http://stat.lsu.edu/SAS\\_ODS\\_styles/SAS\\_ODS\\_styles.htm](http://stat.lsu.edu/SAS_ODS_styles/SAS_ODS_styles.htm)

Of course you can customize your own, but that is beyond the scope of this paper. Besides, you often don't need to do anything other than specify whichever one of the pre-defined styles fits.

## ODS Statistical Graphics: Another No-Hassle Graphics Solution

Following the presentation of the first report, there were questions regarding just what percentage of the female high school students surveyed said they would definitely enter the military anyway? Could you please produce this table and a bar chart showing the percentage who gave each of the four possible choices, in a pdf file right away?

Why, yes, certainly.

```
ODS graphics on ;
Title "Female High School Students" ;
Title2 "Military Plans" ;
proc freq data = readin.recruits ;
    where sex = 2 ;
    tables will_joi ;
    format will_joi plans. ;
    Label will_joi = "Will Join Military" ;
run;
ods graphics off ;
ods pdf close ;
```

Now isn't that nice?

What the ODS Graphics does -- it produces statistical graphics. If you specify ODS GRAPHICS ON for any procedure that you specify it will try to guess what it is that you would want for graphics. Often, it guesses right. However, I believe ODS GRAPHICS was designed by my big brother whose favorite saying is that it is better to have things you don't need than need things you don't have, so it throws in all kinds of graphs maybe you don't want. In this case, it gives a second graph, the cumulative frequency plot, which we don't want. We could just print off the first two pages or use a program like Acrobat to select out the pages of the pdf file we want. Let's save some time and do it in SAS.

## How to only keep the graphics you want in ODS GRAPHICS

We can SELECT or EXCLUDE certain objects. In this case, we would like to exclude the cumulative frequency plot. How do you know what that particular object name is?

Two options:

1. In the Results window, click all the little + signs to open the Freq: folder, then the Table: folder and finally the Distribution Plots: folder. There are two plots. We want to exclude the Cumulative Frequency plot. Right-click on it. Select Properties. This will show the name, which is CumFreqPlot .
2. In the program before the ODS GRAPHICS statement add the following:

```
ODS TRACE ON ;
```

```
Programming statements
```

```
ODS TRACE OFF ;
```

Run the program and look in the log.

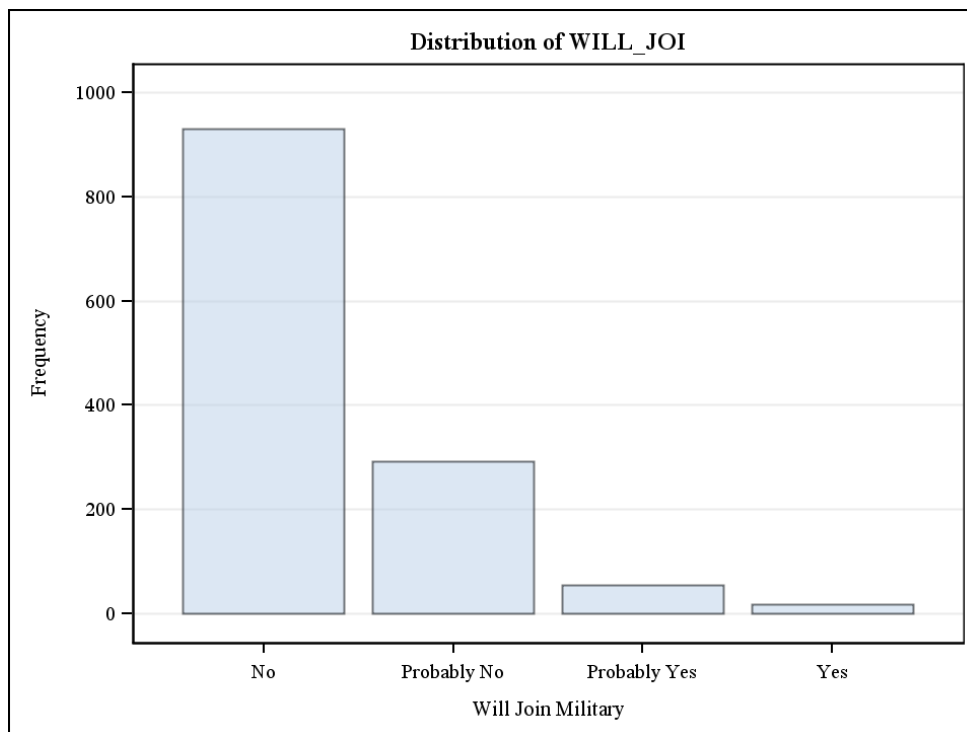
**Female High School Students  
Military Plans**

1

**The FREQ Procedure**

Will Join Military				
WILL_JOI	Frequency	Percent	Cumulative Frequency	Cumulative Percent
No	930	71.87	930	71.87
Probably No	292	22.57	1222	94.44
Probably Yes	55	4.25	1277	98.69
Yes	17	1.31	1294	100.00

**Frequency Missing = 23**



Every output object will have detail like this:

```
Output Added:
-----
Name:      CumFreqPlot
Label:     Cumulative Frequency Plot
Template:  Base.Freq.Graphics.OneWayFreqChart
Path:     Freq.Table1.OneWayFreqPlots.CumFreqPlot
```

Now we know that the name is CumFreqPlot, so we add the statement to our code

```
ODS EXCLUDE CUMFREQPLOT ;
```

This will produce a one-page pdf file, shown above.



## SAS Enterprise Guide: Output Takes a Whole New Look

We've started to see a little bit about these recruits but like any good analysis, that brings us to new questions. Next, we'd like to know if our female recruits are different from our male ones. My friend, who spent his career in the Navy, insisted that there were no men or women under his command, only sailors and he would never consider any gender differences. To me, having been a math teacher in an earlier life, that's like those teachers who say they never look at a student's records because they want to form their own opinions. If we could have information on any incoming group, why wouldn't we?

For this, let's use SAS Enterprise Guide. Everything we are going to do to produce the next report can be done with just pointing and clicking in Enterprise Guide. Enterprise Guide versus SAS programming is often presented as an either-or solution but I personally find it a lot easier to do certain things just writing the code. This includes setting the options, selecting a subset, writing formats and labels.

So, let's start by opening the previous program, editing it and running it. All we need to do is open SAS Enterprise Guide from the START menu, then from the FILE menu select OPEN > PROGRAM and select our saved program.

Because our next analyses use both males and females we need a new format. One of the great tragedies of life - although defining your own sex format sounds like it's going to be really hot, all it is, is this.

```
value sex
  1 = "Male"
  2 = "Female" ;
```

added to the previous FORMAT procedure. A very abbreviated form of the program is shown below.

```
libname readin "e:\wuss2010" ;
options nodate missing = " " ;
proc format ;
  value sex
    1 = "Male"
    2 = "Female" ;
data recruits ;
  set readin.recruits ;
  if will_joi = 4 ;
  format sex sex. FAILGRAD SUMMERS SC SUSPEND YN. GRADES grades. race $race .;
  Label grades = "H.S. GRADES"
        Failgrad = "Failed A Grade"
        Summersc = "Attended Summer School"
        Suspend = "EVER SUSPENDED" ;
```

Now that we have the data in order, we can use Enterprise Guide to create summary tables. [If you are familiar with PROC TABULATE, this accomplishes exactly the same thing. In fact, if you look at the code, it is, in fact PROC TABULATE.]

From the TASKS menu we select DESCRIBE and then SUMMARY TABLES.

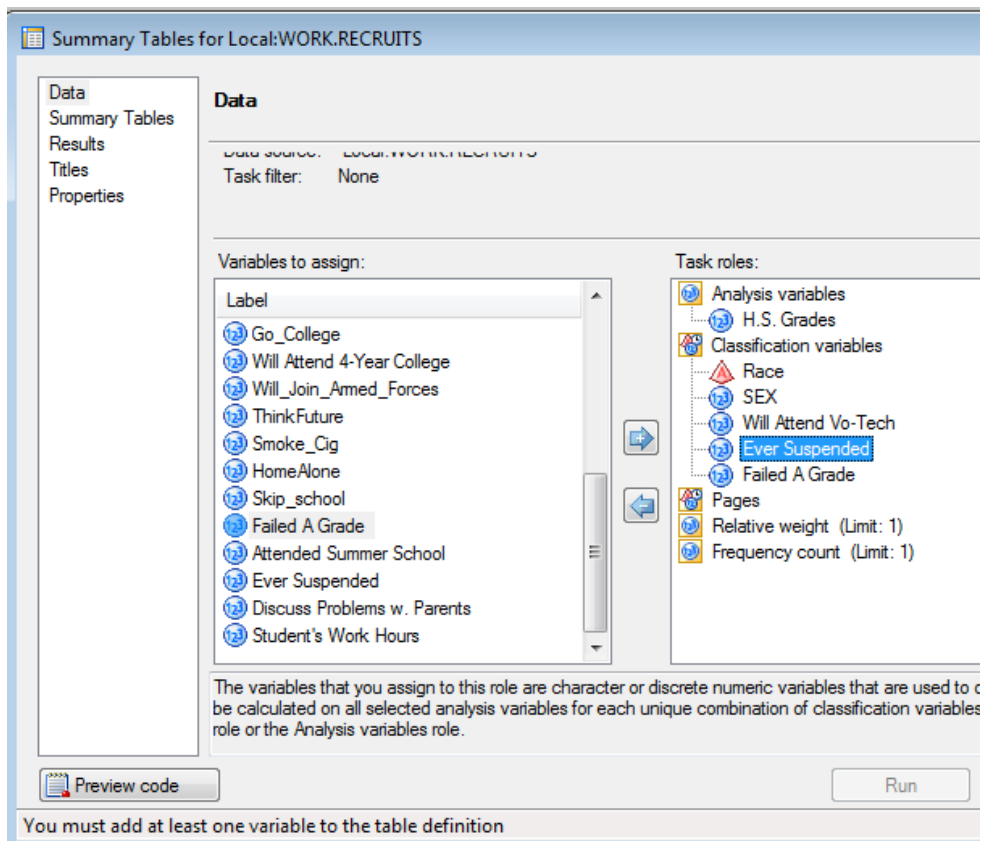
### Task Roles in SAS Enterprise Guide

Let's pause briefly before continuing with the pointing and clicking to review task roles in SAS Enterprise Guide, because this concept comes up a lot. Many Enterprise Guide tasks will require an analysis and/or classification variable.

- Analysis variables are variables for which statistics will be produced, e.g., mean, N, standard deviation. For some statistics, e.g., the mean, an analysis variable must be numeric.
- Classification variables - are variables by which subjects will be classified within an analysis. Classification variables can be either character (categorical) or numeric. However, if a numeric variable is defined as a classification variable, it will be treated as if it is a categorical variable.
- Group variables – are variables for which separate analyses will be performed.

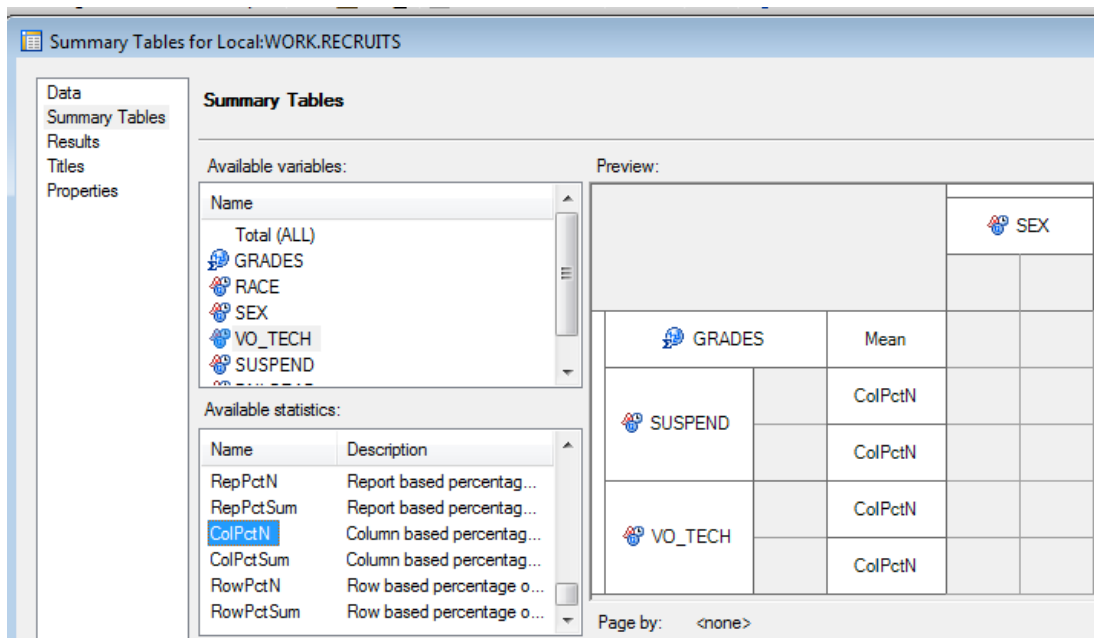
The window for the SUMMARY TABLES task is shown below. It pops up with the data window, as shown. The first step is to define the variables.

We drag sex, race, failgrad, vo-tech and suspend under CLASSIFICATION variables and grades under ANALYSIS variables.



Notice that the RUN button is grayed out and there is a helpful note at the bottom of the window that says *You must add at least one variable to the Table definition*

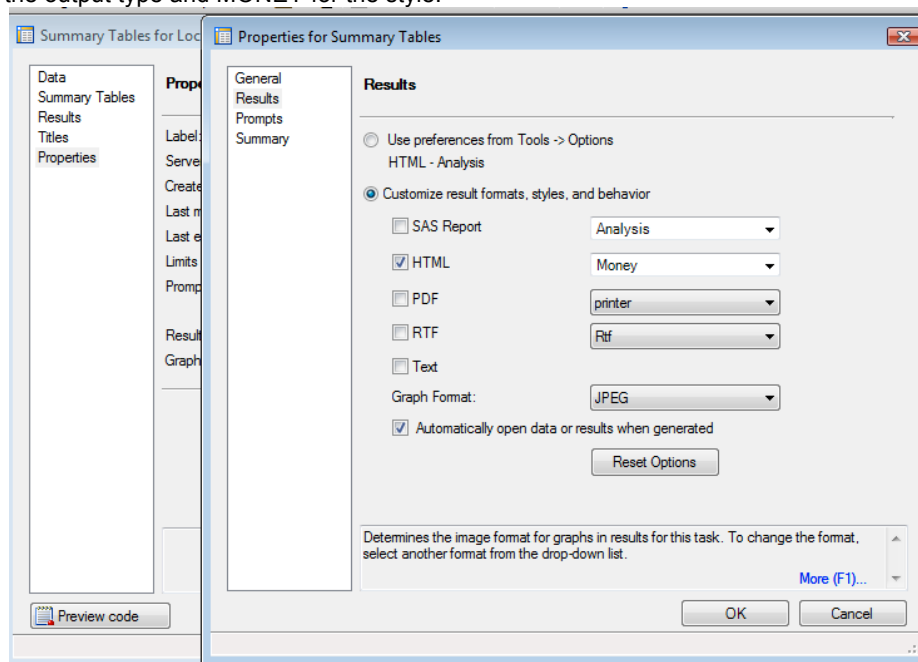
Next, we click on Summary Tables (in the left pane of the window) , and begin dragging the variables to the positions where we want them, either row or column. This is very much like painting a table, which is probably the closest I am ever going to get to art.



NOTE that we defined grades as a numeric variable so it is going to be treated that way, with only one row, for whatever statistic we choose. We defined SUSPEND as a classification variable so it will have categories

For each variable, we drag the statistic we want from the pane in the lower left to the desired position in the table. We want the output to be in html and think the default format is ugly so we're going to click on the PROPERTIES tab, select HTML for

the output type and MONEY for the style.



Next we go to TITLE and enter titles and footnotes for the output.

**Comparison of Male and Female Likely Recruit**

		SEX	
		Male	Female
H.S. Grades	Mean	5.21	4.94
Ever Suspended			
No	ColPctN	52.94	41.18
Yes	ColPctN	47.06	58.82
Will Attend Vo-Tech			
No	ColPctN	33.82	23.53
Probably No	ColPctN	26.47	29.41
Probably Yes	ColPctN	22.06	11.76
Yes	ColPctN	17.65	35.29

**Data from Monitoring the Future Study**

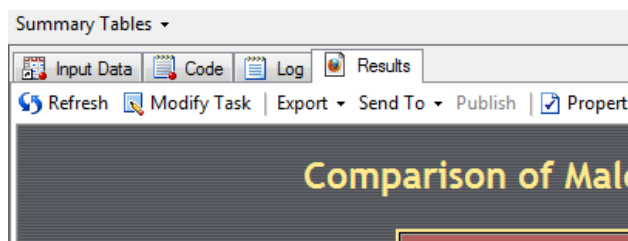
There are only two problems with the results.

1. It would be nice decide to show the N for both male and female
2. These results are really incredibly ugly.

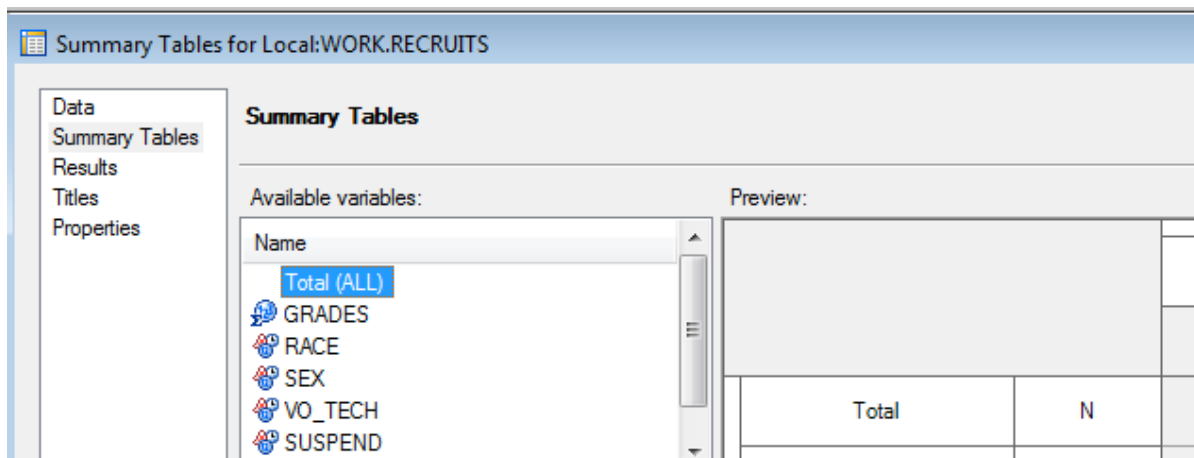
I know this is the sort of thing that, when someone says it to me, I get really offended because, hey, you told me to produce a report and I did and here it is - but come on, admit it, this really is ugly. You'd think something with the name "Money" would be green, wouldn't you?

You could click on the CODE tab, copy the code, modify it and run it as a program, but there is an even easier option.

Rather than create a whole new summary table, I'm just going to modify the existing one. You can click on the MODIFY TASK button, just below the CODE tab, and click CTRL+ Enter



We'll add TOTAL (all) to the table. N is the default statistic for ALL so we just need to drag TOTAL to the location in the table where we want it.

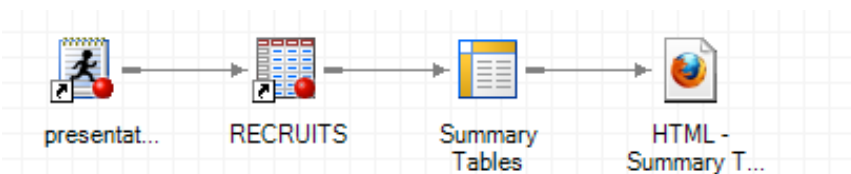


Going back to PROPERTIES, we specify a new style, "Torn" .. We click RUN and our new table is created, a portion of which is shown below.

### ***Comparison of Male and Female Likely Recruits***

		<b>SEX</b>	
		<b>Male</b>	<b>Female</b>
<b>Total (ALL)</b>	<b>N</b>	68	17
<b>H.S. GRADES</b>	<b>Mean</b>	5.21	4.94
<b>EVER SUSPENDED</b>			
<b>No</b>	<b>ColPctN</b>	52.94	41.18
<b>Yes</b>	<b>ColPctN</b>	47.06	58.82

The process flow for this "program" is shown below, beginning with the program that produced the Recruits dataset, the summary tables task that used the Recruits dataset as input and produced the html file as output. For those who want to look at the individual code, any of these steps can be double-clicked and a window will pop up with both a CODE tab and a LOG tab at the top and you can read code to your heart's content.



### **GRAPHS WITH SAS ENTERPRISE GUIDE**

Summary tables are one of the more complicated tasks in SAS Enterprise Guide, and they're not really that complicated. Making graphs is one of the easiest tasks. There wasn't really anything to use in a scatter plot with the dataset on high school students, so this next example is from an evaluation of an on-line education program for direct care staff. There was an experimental group that was trained and a control group that was not. I would like to produce two plots, one for each group, of pre-test by post-test.

## Scatter Plots by Group in 4 Easy Steps

### Step 1:

From the TASKS menu,  
 •Select GRAPH  
 •Select SCATTER PLOT

### Step 2:

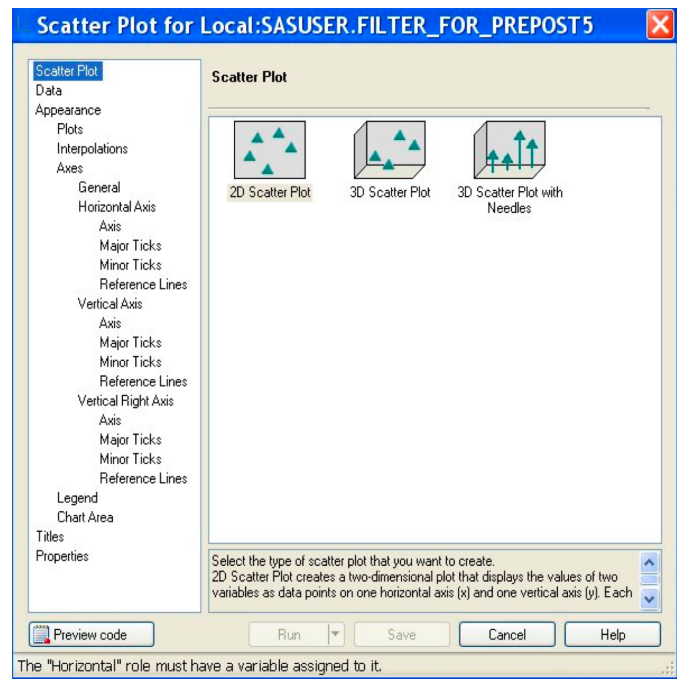
Click on 2D Scatter Plot

### Step 3:

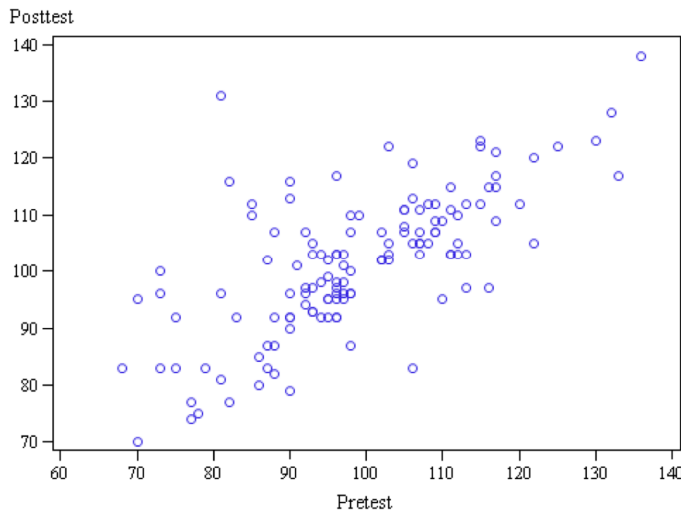
Click on Data

### Step 4:

- Drag Pretest under Horizontal Variable
- Drag Posttest under Vertical Variable
- Drag Group under Group Charts By
- Click Run



And voila! Two charts are produced. One of them is shown below.



## USING SAS DATASETS ON A MAC: THE JMP ® SOLUTION

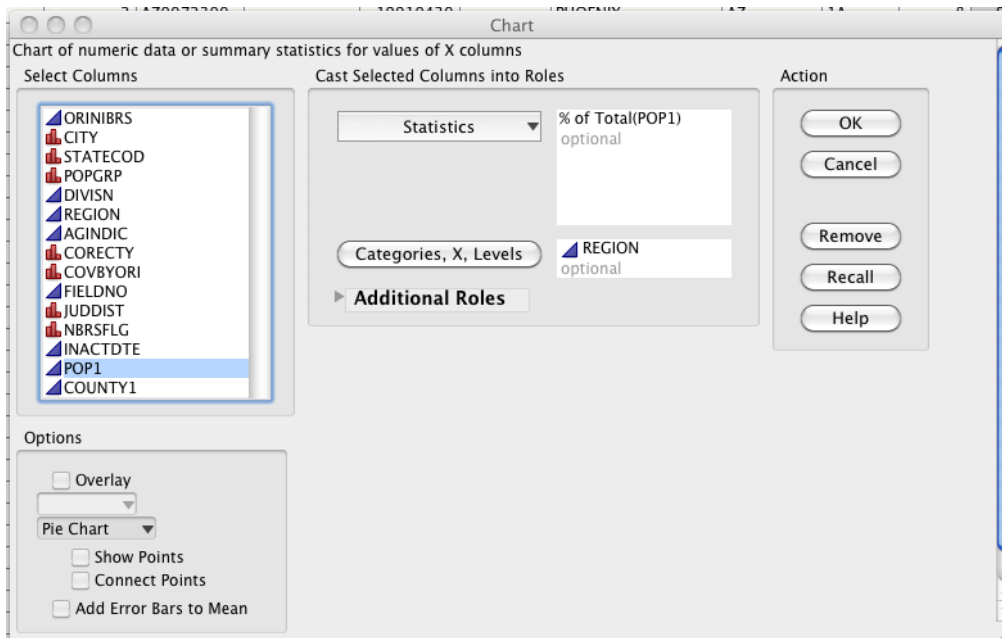
So far we've covered a lot of options for SAS – but what about people on your team who have an Apple computer and don't run SAS? Your data are in SAS datasets. First, let's move the data into a format that can be opened in JMP on the Mac. It takes three statements.

```
libname readin "E:\crimes\readout" ;
libname writeout xport "e:\wuss2010\crimes.xpt" ;
proc copy in = readin out =writeout ;
```

That's it. Now, to open my SAS dataset in JMP, I simply open it from the FILE menu. Graphs in JMP are equally simple. All the selections are made in one window, and, like Enterprise Guide, there are just a few easy steps. For example, to create a pie chart:

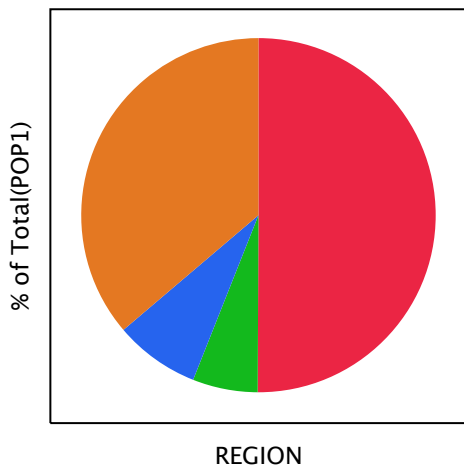
1. From the GRAPHS menu, select the type of graph desired, in this case, it was CHART. The window below pops up.
2. Drag the X variable under the Categories window.
3. If you want the statistics for a second variable, click that variable and then select the desired statistic from the drop-down menu for STATISTICS. In this case, I selected the PERCENT OF TOTAL.
4. In the bottom left pane, select the type of chart, in this case, Pie

5. Click OK



So, there you have it, producing a graph from a SAS dataset on a Mac in five easy steps – and one of the steps was clicking OK!

To include your JMP graph in an Office document, just select it, copy and paste. Discussing how to add value labels - the JMP term for formats - and other details of presentation with JMP are beyond the scope of this presentation (I keep saying that, don't I?).



REGION    West    South    Midwest    East

However, it should be noted that JMP is both incredibly easy and deceptively simple. Producing a pie chart, like the one above is easy. Instead of PROC FORMAT, you can right-click on a column, select COLUMN INFO, click on VALUE LABELS and add your formats. Simple.

On the other hand, JMP offers a vast array of graphic options, which are limited only by your knowledge of statistics and graphics. A few simple examples of using JMP for Decision Trees and Receiver Operating Characteristic (ROC) Curves are given in my other WUSS paper on data visualization (including in the references) and also in a great many papers by people much more familiar with JMP than I am.

## Conclusion

We've covered beautifying your output with ODS, using Graph-N-Go, ODS Statistical Graphics, SAS/Graph, SAS Enterprise Guide and JMP. In addition to the output-specific features of SAS, there are statements, such as OPTIONS and procedures, such as PROC FORMAT, that have many uses for "presenting" yourself in the best possible light. Clearly, we have only touched on each of these, but as you move forward as a SAS programmer, your next step is to delve even deeper into those that fit your needs, or maybe just that fit your desire for a little more variety and color in your life – and your output.

## References

Smith, C.A. (2001). Using Graph-N-Go® With ODS to Easily Present Your Data and Web-Enable Your Graphs. Presentation at the annual meet of SAS Users Group International. [www2.sas.com/proceedings/sugi26/p160-26.pdf](http://www2.sas.com/proceedings/sugi26/p160-26.pdf)

De Mars, A. & Kadu, R. (2010). Data Visualization: "Every Picture Tells a Story" or "Putting Atomic Numbers on Your Socks" ? Paper presented at the annual meeting of Western Users of SAS Software, San Diego, CA.

## CONTACT INFORMATION

Your comments and questions are valued and encouraged. Contact the author at:

Name: AnnMaria De Mars  
Enterprise: The Julia Group  
Address: 2111 7<sup>th</sup> St #8  
City, State ZIP: Santa Monica, CA 90405  
Work Phone: (310) 717-9089  
E-mail: [annmaria@thejuliagroup.com](mailto:annmaria@thejuliagroup.com)  
Web: <http://www.thejuliagroup.com>

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