

## Text handling in Graph by using Graph template language

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### ABSTRACT

Most of us have found that it is difficult for us to keep the text hanging indent in the figure. And it is also not as easy for us to adjust the position of text in the picture as in the rich text format. So we often can't put the text in the way we want when we face the graph production.

How can we let it display on our request? This paper will attempt to use the lesser used and lesser understood pieces of syntax about Graph Template Language. I will focus on one or two handy plot language, what they mean and why I personally have found them useful in my experience.

### INTRODUCTION

Although graphic information can be effective in presenting data, we always need to add some descriptive text to the diagram to make it clearer. In many cases, the position of the text can't be placed freely. There are some plot programs of Graph Template Language which can solve this situation. The idea for this paper comes from Sanjay Matange's blog on Forest Plot.

The primary goal of this paper is to show how to make text reasonable indentation and put them neatly in place. Secondly I will make the text wrap when it is too long in one column.

Two common graphs by using PROC TEMPLATE will be introduced.

### FOREST PLOT WITH SUBGROUPS

The graph itself can be easily created using GTL, but the main issue was the indentations needed in the subgrouped study names and statistical results. In GTL and SG Procedures, leading and trailing lanks are removed from the axis tick values and markercharacter strings. So, how can we realize the indentations?

Figure 1 plots the Odds Ratio of the measurements between group A and group B. This graph presents interactive P value of the two groups. Such graph can be produced by using a HIGHLOWPLOT statement to plot the odds ratio and confidence interval. We can first show the axes (figure 1). Then we can find appropriate value for the datasets.

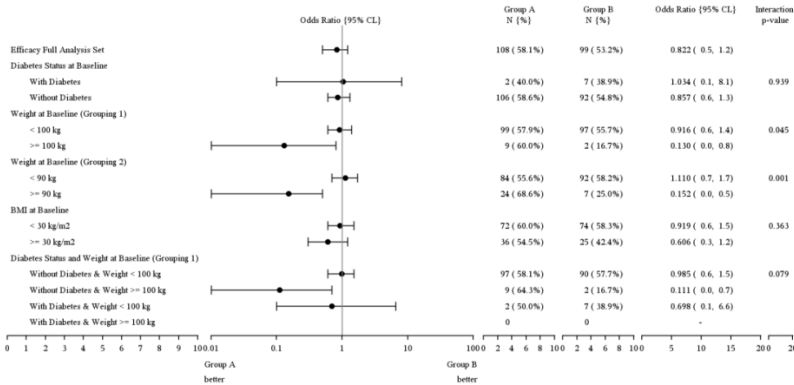


Figure 1. Forest Plot with Axis

The label of HIGHLOW plot can be used to make the text align left or right. The Lowlabel and Highlabel specifies subgrouped study names. We can control the position of them by using coordinates.

The following syntax creates a horizontal high-low chart, which would typically be used to display the header and subgroups.

```
highlowplot y=k low=itemh high=itemh / highlabel=header lineattrs=(thickness=0);
highlowplot y=k low=iteml high=iteml / highlabel=subgroup lineattrs=(thickness=0);
```

The variables, like itemh and iteml, are used for the coordinates, which will be put in the dataset. header and subgroup are variables for study names. The statement of 'thickness=0' is used to hide the line of HIGHLOW PLOT.

Below are the coordinates for this figure and sample code that illustrates the syntax.

```
itemh=0; iteml=1; groupah=4.25; groupal=9; groupbh=4.25; groupbl=9;
odds=9; oddsl=16; pvalueh=0; pvaluel=20;
```

```
proc template;
  define statgraph ForestPlot_2Col;
    dynamic_pct;
    begingraph / designwidth=600px designheight=520px;
    layout lattice / columns=6 columngutter=0 columnweights=(.25 .35 0.1 0.1 0.16 0.04);
      /*--Column headers--*/
      sidebar / align=top;
        layout lattice / rows=2 columns=6 columnweights=(.25 .35 0.1 0.1 0.145
0.055);
          entry halign=left " ";
          entry halign=center " ";
          entry halign=center "Group A";
          entry halign=center "Group B";
          entry halign=center "Odds Ratio {95% CL}";
          entry halign=left "Interaction";
          entry " ";
          entry "Odds Ratio {95% CL}";
          entry halign=center "N {%}";
          entry halign=center "N {%}";
          entry halign=center " ";
          entry halign=center "p-value ";
          entry halign=center textattrs=(size=6) "Medical Therapy";
        endlayout;
      endsidebar;
    /* .....ITEM..... */
    layout overlay / walldisplay=none
      xaxisopts=(display=(line ticks tickvalues) offsetmin=0 offsetmax=0
linearopts=(TICKVALUESEQUENCE=(start=0 end=10 increment=1) viewmin=0 viewmax=10))
      yaxisopts=(reverse=true display=none);
      highlowplot y=k low=itemh high=itemh / highlabel=header
lineattrs=(thickness=0)
```

```

;
    highlowplot y=k low=item1 high=item1 / highlabel=subgroup
lineattrs=(thickness=0);
endlayout;
    layout overlay / walldisplay=none
        yaxisopts=(display=none reverse=true)
        xaxisopts=(offsetmin=0 offsetmax=0
            type=log logopts=(base=10 minorticks=false viewmin=0.01 viewmax=100)
display=(line ticks tickvalues));
        entry halign=left "Group A" halign=right "Group B"/location=outside
valign=bottom;
        entry halign=left "better" halign=right "better" /location=outside valign=bottom;
        scatterplot x=difference y=k /xerrorupper=LowerCL xerrorlower=UpperCL
name='scatter' markerattrs=(symbol=circlefilled size=8) errorbarattrs=(thickness=0.5);
        referenceline x=1 / lineattrs=(pattern=solid);
    endlayout;
/* .....Group A..... */
    layout overlay / walldisplay=none
        xaxisopts=(display=(line ticks tickvalues) offsetmin=0 offsetmax=0
linearropts=(TICKVALUESEQUENCE=(start=0 end=10 increment=2) viewmin=0 viewmax=10))
        yaxisopts=(reverse=true display=none);
        highlowplot y=k low=groupal high=groupal / lowlabel=col11
lineattrs=(thickness=0);
        highlowplot y=k low=groupah high=groupah / lowlabel=col12
lineattrs=(thickness=0);
    endlayout;
/* .....Group B..... */
    layout overlay / walldisplay=none
        xaxisopts=(display=(line ticks tickvalues) offsetmin=0 offsetmax=0
linearropts=(TICKVALUESEQUENCE=(start=0 end=10 increment=2) viewmin=0 viewmax=10))
        yaxisopts=(reverse=true display=none);
        highlowplot y=k low=groupb1 high=groupb1 / lowlabel=col21
lineattrs=(thickness=0);
        highlowplot y=k low=groupbh high=groupbh / lowlabel=col22
lineattrs=(thickness=0);
    endlayout;
/* .....Odds Ratio {95% CL}..... */
    layout overlay / walldisplay=none
        xaxisopts=(display=(line ticks tickvalues) offsetmin=0 offsetmax=0
linearropts=(viewmin=0 viewmax=20))
        yaxisopts=(reverse=true display=none);
        highlowplot y=k low=odds1 high=odds1 / lowlabel=col31
lineattrs=(thickness=0);
        highlowplot y=k low=odds2 high=odds2 / highlabel=col32
lineattrs=(thickness=0);
    endlayout;
/* .....p-value..... */
    layout overlay / walldisplay=none
        xaxisopts=(display=(line ticks tickvalues) offsetmin=0 offsetmax=0
linearropts=(viewmin=0 viewmax=20))
        yaxisopts=(reverse=true display=none);
        highlowplot y=k low=pvalue1 high=pvalue1 / lowlabel=col4
lineattrs=(thickness=0)
;
    endlayout;
endlayout;
endgraph;
end;
run;

```

After we ensure the accurate coordinates for the subgroups and results, we can modify the option of template about axis to remove the extra X axis of figure 1. 'display=(line ticks tickvalues)' will just be

changed to 'display=(tickvalues) tickvalueattrs=(color=white)'. 'display= none' is not used here, for this option might make the coordinate biased. Below is the final result of figure 2.

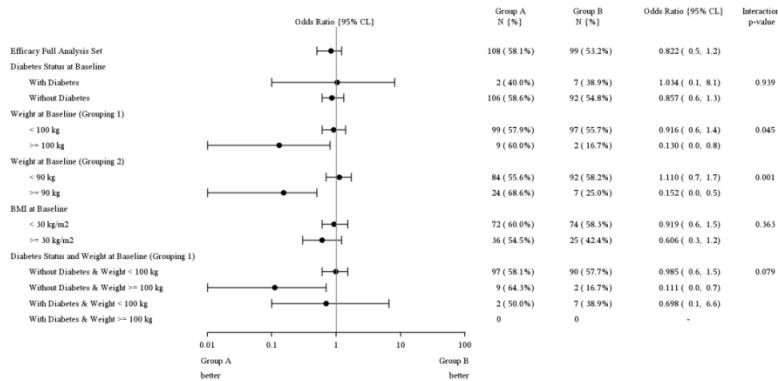


Figure 2. Forest Plot without Axis

### LINE PLOT WITH LONG LABEL

Figure 3 shows the graph which should have two line charts to make a contrast. The label will be too long to put in one column, so it will be truncated. Such graph can be produced by using ROWHEADER and LAYOUT GRIDDED statement to display the full label.

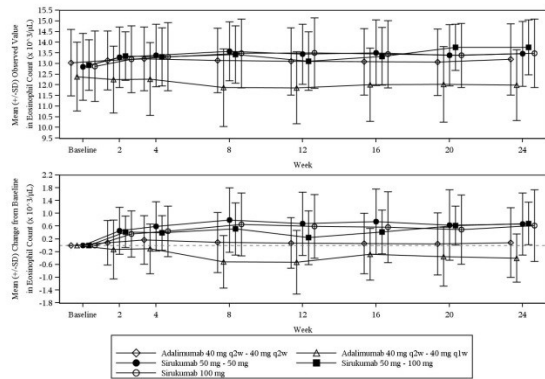


Figure 3. Line Plot with Long Label

The labels of the plot are wrapped manually. The code below is the part to solve the long label issue.

```
rowheaders;
layout gridded / columns=2;
  entry "Mean (+/-SD) Observed Value " / rotate=90;
  entry "in Eosinophil Count (x 10^3/~{unicode '03BC'x}L) /
  rotate=90;
endlayout;
layout gridded / columns=2;
  entry "Mean (+/-SD) Change from Baseline" /
  rotate=90;
  entry "in Eosinophil Count (x 10^3/~{unicode '03BC'x}L)\" /
  rotate=90;
endlayout;
endrowheaders;
```

The GRIDDED layout offers the best way to nest a table of information inside another layout. Header statements are used to display one or more headers for the columns and rows in a Lattice layout.

The following SAS code is used to create figure 3.

```

proc template;
  define statgraph lipid_profile;
    dynamic title;
    begingraph / designwidth=7in designheight=4.5in;
      DiscreteAttrMap name=" TRT_p";
        Value "Adalimumab 40 mg q2w - 40 mg q2w" / markerattrs=(symbol=diamond
color=black) lineattrs=( pattern=solid thickness=0.5 color=black);
        Value "Adalimumab 40 mg q2w - 40 mg q1w" / markerattrs=(symbol=triangle
color=black) lineattrs=( pattern=solid thickness=0.5 color=black) ;
        Value "Sirukumab 50 mg - 50 mg" / markerattrs=(symbol=circlefilled color=black)
lineattrs=( pattern=solid thickness=0.5 color=black);
        Value "Sirukumab 50 mg - 100 mg" / markerattrs=(symbol=squarefilled color=black)
lineattrs=( pattern=solid thickness=0.5 color=black);
        Value "Sirukumab 100 mg" / markerattrs=(symbol=circle color=black)
lineattrs=( pattern=solid thickness=0.5 color=black);
      EndDiscreteAttrMap;

      DiscreteAttrVar attrvar=trt var=tr02ag1n attrmap=" TRT_p";
      layout lattice /ORDER= ROWMAJOR rows=2 columndatarange=union rowweights=(0.5 0.5);
      rowheaders;
        layout gridded / columns=2;
          entry "Mean (+/-SD) Observed Value " / /* textattrs=(weight=bold)*/ rotate=90;
          entry "in Eosinophil Count (x 10^3/~{unicode '03BC'x}L)" / rotate=90;
        endlayout;
        layout gridded / columns=2;
          entry "Mean (+/-SD) Change from Baseline" / /*textattrs=(weight=bold)*/
rotate=90;
          entry "in Eosinophil Count (x 10^3/~{unicode '03BC'x}L)" / rotate=90;
        endlayout;
      endrowheaders;
      layout overlay /
        xaxisopts=( type=linear display=(TICKS TICKVALUES LINE LABEL ) LABEL='Week'
linearopts=(tickvaluelist=(0 2 4 8 12 16 20 24)))
yaxisopts=( display=(TICKS TICKVALUES )
griddisplay=off offsetmin=0 offsetmax=0
linearopts=( viewmin=9.5 viewmax=15.5
tickvalueformat=12.1
tickvaluesequence=( start=9.5 end=15.5 increment=0.5)));
        seriesplot x=visitn y=mean1 / group=trt groupdisplay=Cluster clusterwidth=0.8
connectororder=xaxis;
        scatterplot x=visitn y=mean1 / group=trt yerrorupper=upper1
yerrorlower=lower1 markerattrs=(size=8) groupdisplay=Cluster clusterwidth=0.8
errorbarattrs=(thickness=0.5);
        endlayout;
      layout overlay /
        xaxisopts=( type=linear display=(TICKS TICKVALUES LINE LABEL ) LABEL='Week'
linearopts=(tickvaluelist=(0 2 4 8 12 16 20 24)))
yaxisopts=( display=(TICKS TICKVALUES LINE )
griddisplay=off offsetmin=0 offsetmax=0
linearopts=( viewmin=-1.8 viewmax=2.2
tickvalueformat=12.1
tickvaluesequence=( start=-1.8 end=2.2 increment=0.4)));
        seriesplot x=visitn y=mean2 / group=trt name='series' groupdisplay=Cluster
clusterwidth=0.8 connectororder=xaxis ;
        scatterplot x=visitn y=mean2 / group=trt yerrorupper=upper2
yerrorlower=lower2 name='scatter' markerattrs=(size=8) groupdisplay=Cluster
clusterwidth=0.8 errorbarattrs=(thickness=0.5);
        referenceline y=0 / lineattrs=(pattern=shortdash);
        endlayout;
      sidebar / align=bottom spacefill=false;
        MERGEDLEGEND "series" "scatter" / opaque=false border=true halign=right
valign=bottom pad=(top=15px ) displayclipped=true;
    endgraph;
  enddefine;

```

```
endsidebar;  
endlayout;  
endgraph;  
end;  
run;
```

## CONCLUSION

The forest plot generates a far more informative graphic. With HIGHLOW PLOT the SAS programmer can make the indentations achieved. The ROWHEADER and LAYOUT GRIDDED statement allows the long label to show up completely.

## REFERENCES

Complex Clinical Graphs using SAS, Sanjay Matange. SAS Institute, Inc.  
SAS(R) 9.4 Graph Template Language: Reference, Fourth Edition. Available at:

<http://support.sas.com/documentation/cdl/en/grstatgraph/69718/HTML/default/viewer.htm#n1g9mj2kf03fqxn18n4wekss5ky3.htm>

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## CONTACT INFORMATION

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