

Multiple Graph with common horizontal axis using GTL

Sumit Pratap Pradhan, Syneos Health®, Gurgaon, India
Navneet Agnihotri, Syneos Health®, Gurgaon, India

ABSTRACT

In clinical trials, graphical representation of data is an important method for communicating clinical trials results. In a majority of scenarios, only one graph or multiple graphs are shown on one page having independent x-axis for each graph. Figure becomes complex if multiple graphs are shown on one page having common x-axis. X-axis values can be in the form of discrete (e.g., a visit values like Screening, Day 1 etc.) or continuous (study day values like -14, 1, 7 etc.).

Consider an example of a figure having two graphs on one page – top and bottom graph. The major problem in drawing such graphs is alignment of x-axis values for top and bottom graph. For example – at a particular point, the bottom graph has value 21 on x-axis but top graph has value 30. So making these values align is a tricky task. In this paper, figure will be explained using GTL method.

INTRODUCTION

Below is the Mock Shell for the figure.

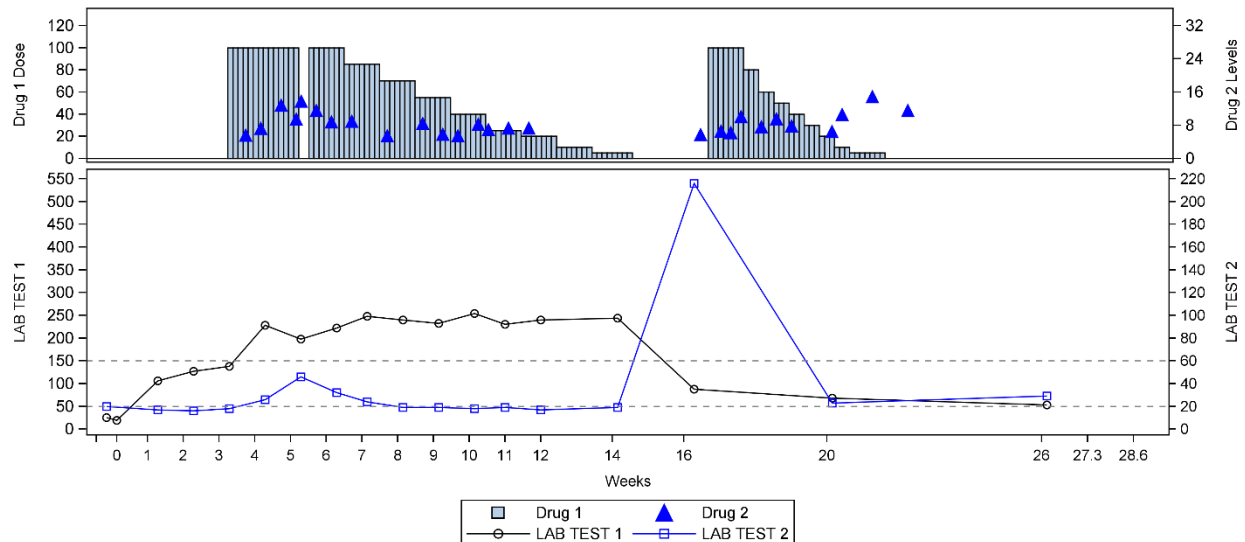


Figure has two parts:

1. Top Graph – Two different types of information needs to be displayed.
 - Bar Chart showing Dose for Drug 1. Y1 axis should display the tick values for dose.
 - Triangle showing Drug level for Drug 2. Y2 axis should display the tick values for drug level.
2. Bottom Graph – Three different types of information needs to be displayed.
 - Result for LAB TEST 1. Y1 axis should display the tick values for result.
 - Result for LAB TEST 2. Y2 axis should display the tick values for result.
 - Two reference lines should be drawn at Y = 50 and 150.

Graph should be plotted on single page having common horizontal axis whereas Y1 and Y2 axis should be used to display lab result, drug1 and drug2 values.

Two approaches are discussed to plot this figure.

APPROACH 1

Below is the template used for the figure. Code is tagged and each tag is explained in brief.

proc template;

define statgraph asis1;

begingraph/ **DESIGNWIDTH**=9in **DESIGNHEIGHT**=6in **border**=false;

layout lattice / **columns**=1 **column**datarange=UNIONALL **rowweights**=(0.3 0.7);

layout overlay / **wall**display=(outline)

1 **xaxisopts**=(**display**=NONE **TYPE**=LINEAR **labelattrs** = (size = 8)
tickvalueattrs=(size = 8) **linearopts**=(**TICKVALUE**list=(-3 1 7 14 21 28 35 42 49 56 63 70 77 84 98
112 140 182 191 200) **viewmin**=-3 **viewmax**=205))

2 **yaxisopts**=(**offsetmin**=0.02 **display**=(ticks tickvalues label) **type**=linear **label**='Drug 1 Dose' **labelattrs** =
(size = 8) **linearopts**=(**tickvalue**list=(0 20 40 60 80 100 120) **viewmin**=0 **viewmax**=120))

3 **y2axisopts**=(**offsetmin**=0.02 **display**=(ticks tickvalues label) **type**=linear **label**="Drug 2 Levels" **labelattrs** =
(size = 8) **linearopts**=(**tickvalue**list=(0 4 8 12 16 20 24 28 32) **viewmin**=0 **viewmax**=32));

4 **barchart** category = AVISITN_D1 response = DOSE_D1/**name**='BAR' **LEGENDLABEL**='Drug 1'
barwidth=1;

5 **scatterplot** x = AVISITN_D2 y = DOSE_D2 / **markerattrs**=(**symbol**=TriangleFilled **color**=blue **size**=10pt)
yaxis=y2 **name**='LINE' **LEGENDLABEL**='Drug 2';

endlayout;

layout overlay / **wall**display=(outline)

6 **xaxisopts**=(**display**=(ticks label tickvalues) **label** = "Weeks" **TYPE**=LINEAR **labelattrs** = (size = 8)
tickvalueattrs=(size = 8) **linearopts**=(**TICKVALUE**list=(-3 1 7 14 21 28 35 42 49 56 63 70 77 84 98 112
140 182 191 200) **viewmin**=-3 **viewmax**=205 **tickvalueformat**=CTICKVALUES.))

7 **yaxisopts**=(**offsetmin**=0.02 **display**=(ticks tickvalues label) **label** = "LAB TEST 1" **labelattrs** = (size = 8)
linearopts=(**tickvalue**list=(0 50 100 150 200 250 300 350 400 450 500 550) **viewmin**=0
viewmax=550))

8 **y2axisopts**=(**offsetmin**=0.02 **display**=(ticks tickvalues label) **label** = "LAB TEST 2" **labelattrs** = (size = 8)
tickvalueattrs=(size = 8) **linearopts**=(**tickvalue**list=(0 20 40 60 80 100 120 140 160 180 200 220)
viewmin=0 **viewmax**=220));

9 **seriesplot** x = XLAB1 y = YLAB1 /**markerattrs**=(**color**=black **symbol**=circle) **display**=all
INCLUDEMISSINGGROUP=FALSE **lineattrs**=(**pattern**=solid **color**=black **thickness**=1)
name='LAB1' **LEGENDLABEL**='LAB TEST 1';

10 **seriesplot** x = XLAB2 y = YLAB2 /**markerattrs**=(**color**=blue **symbol**=Square) **display**=all
INCLUDEMISSINGGROUP=FALSE **lineattrs**=(**pattern**=solid **color**=blue **thickness**=1) **name**='LAB2'
yaxis=y2 **LEGENDLABEL**='LAB TEST 2';

11 **referenceline** y=eval(coln(50, 150)) / **lineattrs**=(**color**=grey **pattern**=ShortDash);

discretelegend 'BAR' 'LINE' 'LAB1' 'LAB2' /**across**=2 **location**=outside **HALIGN**=center **VALIGN**=bottom;

endlayout;

endgraph;

end;

run;

1 and 6

Represents X-axis specifications. TICKVALUES must be same for both Top and Bottom graphsh. DISPLAY=NONE is set for Top graph so that nothing is displayed on x-axis. X-axis values of Bottom graph are used for reference by both Top and Bottom graphs. CTICKVALUES format is applied to x-axis tick values to display values in weeks.

2, 3, 7
and 8

Represents Y-axis specifications for Y1 and Y2 axis.

4, 5, 9
and 10

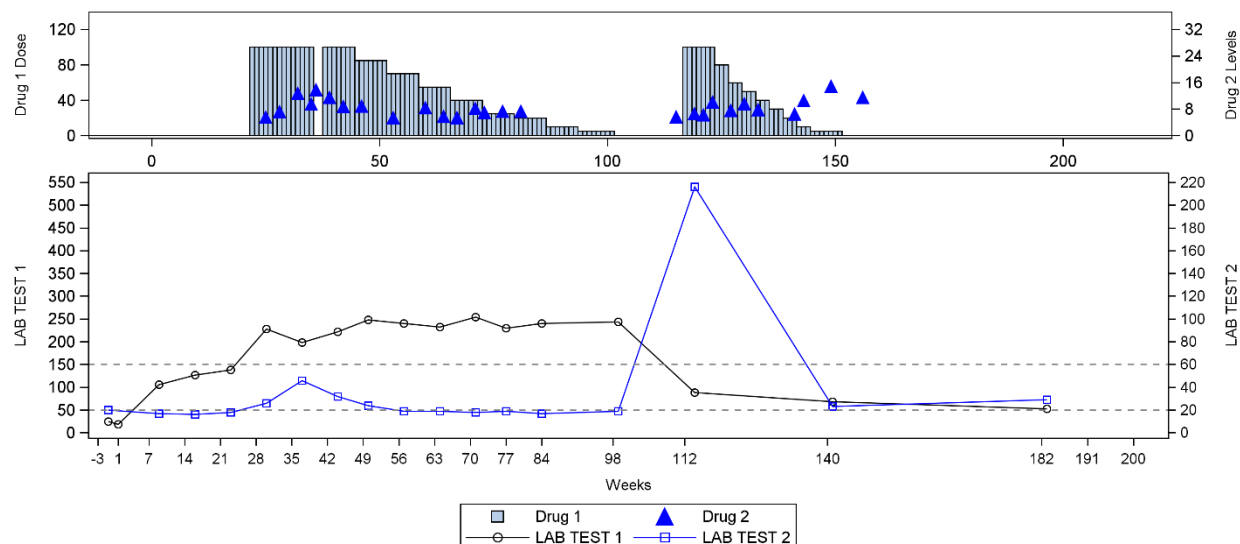
Represents Plot statements (Bar, Scatter, Series).

11

Represents Reference line statement

Easiest way to achieve the result is to keep x-axis specification exactly same for both graphs and apply DISPLAY=NONE for the graph where x-axis don't need to be displayed.

See the output below where x-axis specification are different for both graphs. DISPLAY=(TICKS TICKVALUES) has been used to debug the issue. It is clearly visible that x-axis values are not aligned for Top and Bottom graphs.



APPROACH 2

Only minor updates to 1st approach is needed. Since x-axis is common to both graphs, common x-axis can be defined for both Top and Bottom graphs using the highlighted portion of code below.

```
proc template;
define statgraph asis1;
  begingraph/ ...;
  layout lattice/columns=1 columndatarange=UNION
    rowweights=(0.3 0.7);

  columnaxes;
  columnaxis / label="Weeks" labelattrs=( size=8pt ) type=linear
    linearopts=(tickvaluelist=(-3 1 7 14 21 28 35 42 49 56 63
      70 77 84 98 112 140 182 191 200) viewmin=-3 viewmax=205
      tickvalueformat=CATTICKVALUES. );
  endcolumnaxes;

  layout overlay / walldisplay=(outline)
    /*Top Plot*/;
  endlayout;
  layout overlay / walldisplay=(outline)
    /*Bottom Plot*/;
  endlayout;
endgraph;
end;
run;
```

New
Code
added

CONCLUSION

In this paper, basic aspects of GTL are used. Brief explanation for statements used has been provided. It is recommended to read SAS documentation mentioned in references section for detailed information.

REFERENCES

SAS Documentation

https://documentation.sas.com/doc/en/pgmsascdc/9.4_3.5/grstatgraph/titlepage.htm

CONTACT INFORMATION

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

Sumit Pratap Pradhan
Syneos Health, Principal Statistical Programmer
Building No. 14, Tower B, DLF Cyber City, Gurgaon - 122002, Haryana, India
E-mail: sumit.pradhan@syneoshealth.com
LinkedIn: <https://www.linkedin.com/in/sumit-pradhan-71133345/>

Navneet Agnihotri
Syneos Health, Senior Statistical Programmer
Building No. 14, Tower B, DLF Cyber City, Gurgaon - 122002, Haryana, India
E-mail: navneet.agnihotri@syneoshealth.com
LinkedIn: <https://www.linkedin.com/in/navneet-agnihotri-78540553/>

Any brand and product names are trademarks of their respective companies.