

# Graphing: Taking the Mystery out of Subscripts and Superscripts (The Why Not's and How To's are Presented)

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## ABSTRACT

This paper covers several different areas of a graph where subscripting and superscripting may occur. For example, when graphing, have you ever had a title that needed a superscripted character or a footnote that needed a subscripted character added? Maybe you need to add a note statement that has a character that is superscripted. There are other areas of a graph, like axis values and axis labels that might also contain a subscripted or superscripted character.

The intent of this paper is to illustrate the differences in your code that exist when adding subscripts or superscripts to titles, footnotes, notes, axis labels and axis values. Some of these labeling areas of the graph require alternative graphing techniques in order to accomplish the task of subscripting or superscripting.

## INTRODUCTION

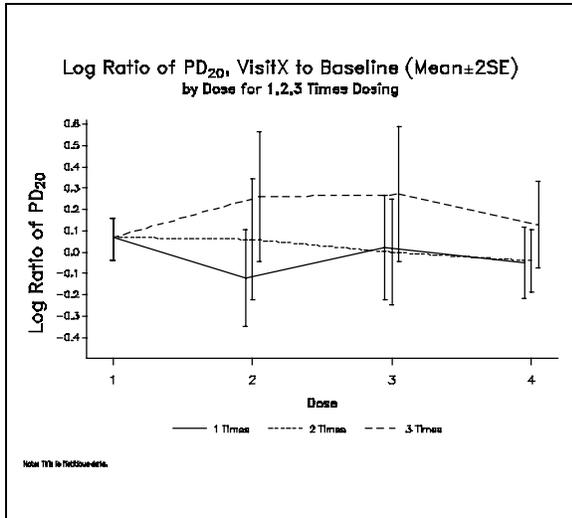
This paper is intended for all levels of SAS® programmers from the beginner to the more advanced. I believe everyone will learn a technique or two that may come in handy when attempting to add a subscripted or superscripted value to their graph. This presentation has six sections regarding subscripting and

superscripting. The first three sections are concerning the title, footnote and note statements, these three sections are more closely related as far as the code required for sub/superscripting. The next two sections cover axis labels and axis values, these sections are probably the most interesting, because it covers useful techniques that are more complex than the previous sections. The final section labeled other alternative methods covers other methods available when sub/superscripting.

## TITLES

The easiest way to add a sub/superscript to a title is to use the MOVE= option. See the following title statement which contains a MOVE= option to apply a subscripted value of PD<sub>20</sub> to the graph. Figure 1 displays the results of the subscripted title statement.

```
TITLE1 H=1.2 F=duplex J=C
'Log Ratio of PD'
move=(-0,-.3) h=.75 '20'
move=(+0,+ .3) h=1.2
', VisitX to Baseline (Mean'
f=math 'G'
f=duplex '2SE)' a=90 ' ';
```



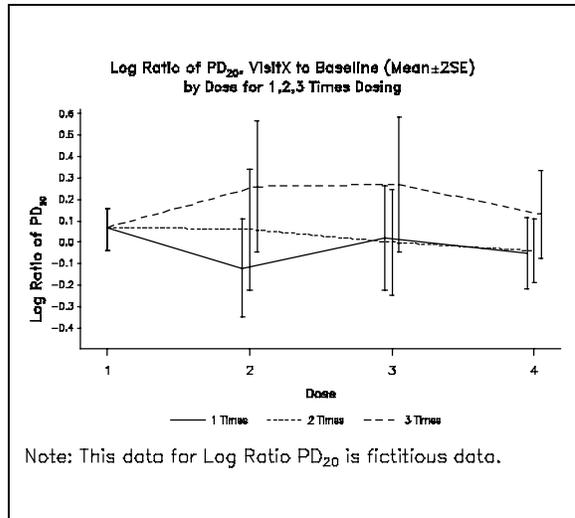
**Figure 1** Subscripted Title

Since the coordinates are preceded by a plus sign (+) or a minus sign (-), they are interpreted as relative coordinates, with the end of the previous statement used as a starting point. You can mix relative and absolute coordinates. You can also specify units for the coordinates. The units you have to choose from are CELLS (character cells), CM (centimeters), IN (inches), or PCT (percentage of the graphics output area). For more detailed information concerning relative and absolute coordinates reference the SAS/Graph documentation.

## FOOTNOTES

The MOVE= option is also the easiest way to add a sub/superscripted value to a footnote. I have increased the size of the footnote, in Figure 2, so that it is easier to view.

```
FOOTNOTE1 H=1.2 F=&FTTEXT J=L
>Note: This data for Log Ratio PD"
  move=(-0,-.3) h=.75 '20'
  move=(+0,+ .3) h=1.2
  " is fictitious data.;"
```



**Figure 2** Subscripted Footnote

## NOTES

The same MOVE= option is available with the note statement. I thought something a little more difficult would be interesting, something like adding a few mathematical formulas to your output. This can be done by using the same MOVE= option that has been demonstrated in the previous title and footnote sections. Figure 3 displays the arithmetic, population and sample mean calculations using a MOVE= option on the note statement.

```

goptions reset=global ftext=simplex;

title1 h=2 f=duplex j=c 'Using the MOVE
option, within a NOTE statement';
proc gslide;
  note h=2 j=c f=duplex
    'Arithmetic mean'
    h=5 ' ' ;
  note ' '
    move=(+27, +0) h=2
    f=duplex 'Mean = '
    move=(+2, +4) h=1 f=zapfi 'n'
    move=(-2, -3) h=4
    font=greek 'S'
    move=(+0, +.5) h=2 f=zapfi 'X'
    move=(-5, -1.5) h=1
    f=zapfi 'i=1'
    draw=(+2, -1,
    -5, +0)
    move=(-1,-3) h=2 f=zapfi 'n';
  note h=5 ' '
    h=2 j=c f=duplex
    'Population mean'
    h=5 ' ' ;
  note ' '
    move=(+29, +0) h=2
    f=greek 'm = '
    move=(+2, +4) h=1 f=zapfi 'n'
    move=(-2, -3) h=4
    font=greek 'S'
    move=(+0, +.5) h=2 f=zapfi 'X'
    move=(-5, -1.5) h=1
    f=zapfi 'i=1'
    draw=(+2, -1,
    -5, +0)
    move=(-2,-3) h=2 f=zapfi 'N';
  note h=5 ' '
    h=2 j=c f=duplex 'Sample mean'
    h=5 ' ' ;
  note ' '
    move=(+28,+0) h=2
    f=zapfi 'X = '
    move=(-6.5,+2.5) ' '
    move=(+6, +2) h=1 f=zapfi 'n'
    move=(-2, -3) h=4
    font=greek 'S'
    move=(+0, +.5) h=2 f=zapfi 'X'
    move=(-5, -1.5) h=1
    f=zapfi 'i=1'
    draw=(+2.5, -1,
    -5.5, +0)
    move=(-1,-3) h=2 f=zapfi 'n'
;
run;
quit;

```

Using the MOVE option, within a NOTE statement

Arithmetic mean

$$\text{Mean} = \frac{\sum_{i=1}^n X}{n}$$

Population mean

$$\mu = \frac{\sum_{i=1}^n X}{N}$$

Sample mean

$$\bar{X} = \frac{\sum_{i=1}^n X}{n}$$

**Figure 3** Using the MOVE= option on a NOTE statement

## AXIS LABELS

The X and Y-axis labels are not quite as easy as what has been covered so far. The MOVE= option is not a valid option on the axis label statements. So just how do you add a sub/superscripted value to an axis label? Instead of using an axis label you use an angled title statement for the Y-axis and a footnote for the X-axis. You can also use annotate, which is demonstrated later, to achieve the same results. The first example demonstrates using a footnote in place of an X-axis label statement. Figure 4 displays the X-axis label created by the footnote statement.

```

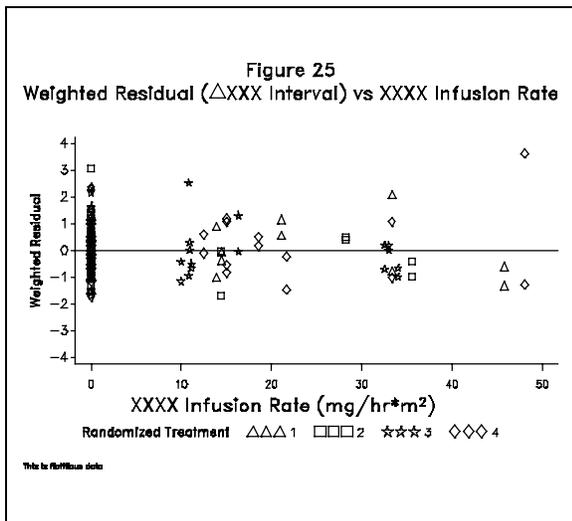
footnote1 j=c f=duplex
m=(20pct, 14.5pct) h=1.2
'XXXX Infusion Rate (mg/hr*m
m=(+.03, +.4) h=1 '2'
m=(+.03, -.4) h=1.2 ' ');

```

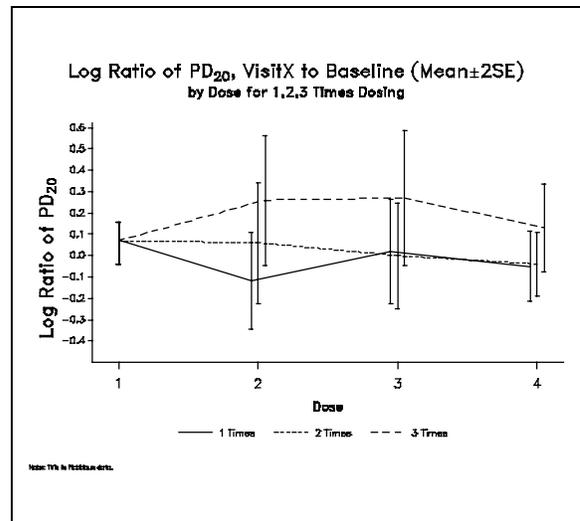
```

TITLE1 H=1.5 F=duplex J=C
'Log Ratio of PD'
move=(-0,-.3) h=1 '20'
move=(+0,+0.3) h=1.5 ',
VisitX to Baseline (Mean'
f=math 'G' f=duplex '2SE)'
a=90 ' '
'Log Ratio of PD'
move=(+.5,+0) h=1 '20';

```



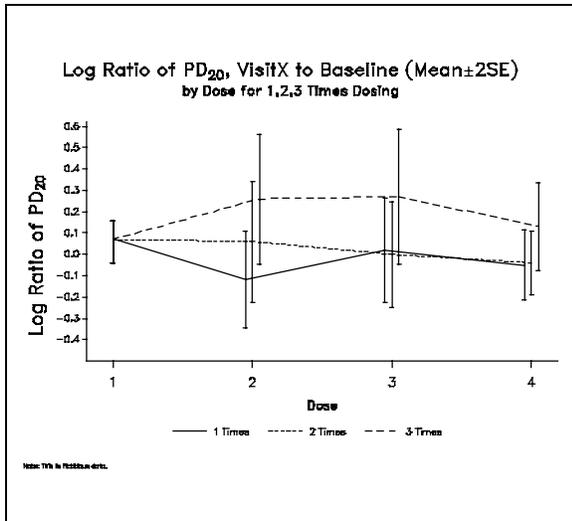
**Figure 4** Superscripted X-Axis Label



**Figure 5** Subscripted Y Axis using a Title

The next example uses an angled title statement with the MOVE= option to apply the subscript. Figure 5 displays the subscripted Y-axis created using the title statement.

Figure 6 displays the subscripted Y-axis created using annotate. Figure 6 achieves the same results as the Figure 5 which used the title statement.



**Figure 6** Subscripted Y-Axis using Annotate

If you are accustomed to and comfortable with using annotate, this method really is not as bad as it looks. However, the title statement is less code and probably easier to use.

```

      .
      .
data anno;
xsys='3';
ysys='3';
angle=90;
function='label'; size=1.2;
style="duplex"; x=1.8; y=50;
text='Log Ratio of PD';
output;
function='label'; size=.6; x=4;
y=.; position='0'; text='20';
output;
      .
      .
      .
TITLE1 H=1.2 F=duplex J=C
      'Log Ratio of PD'
      move=(-0,-.3) h=.75 '20'
      move=(+0,+.3) h=1.2
      ', VisitX to Baseline (Mean'
      f=math 'G' f=duplex '2SE)'
      a=90 ' ';
      .
      .
      .
PROC GPLOT DATA=HILO anno=anno;
FORMAT SORT TIMES.;
FORMAT NDOSE DOSE.;
PLOT VALUE*NDOSE=SORT
      /HAXIS=AXIS1
      VAXIS=AXIS2;
LEGEND1 LABEL=NONE;
AXIS1 LABEL=(H=1 f=duplex 'Dose')
ORDER=(1 TO 4 BY 1)
VALUE=(H=1)
OFFSET=(5PCT,5PCT)
MINOR=NONE ;
AXIS2 LABEL=NONE
OFFSET=(5PCT,1PCT)
ORDER=(&START TO &FINISH BY &BY)
MINOR=NONE;

```

## AXIS VALUES

The easiest way I have found to subscript or superscript axis values is to use annotate. Figure 7 contains both a subscripted X and Y-axis values.

```
DATA ANNO;
%ANNOMAC;
LENGTH TEXT $2.;
xsys='5'; YSYS='2';
%label(3.7,0,'r',blue,...,
1.5,duplex,.);
%label(5,-.6,'o',blue,...,1,
duplex,.);
XSYS='2'; YSYS='5';
%label(10,12.5,'x',blue,...,
1.5,duplex,.);
%label(10.35,11.2,'o',blue,.
.,1,duplex,.);
```

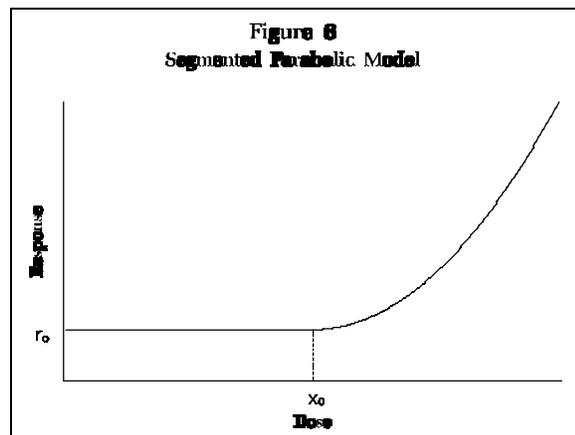


Figure 7 Subscripting X and Y axis values

## OTHER ALTERNATIVE METHODS

Just make sure before you get to worried about sub/superscripting that you first investigate your alternatives. For

example, Figure 8 has the degrees symbol ( $^{\circ}$ ), for degrees fahrenheit. It looks as though it is superscripted, but instead I have used the special font of 'O'. This is just a reminder that there are a lot of options available, so take a moment and consider your alternatives.

```
Title4 f=duplex h=1.75
'Plot of Temperature ('
f=special 'O'
f=duplex 'F) over time';
```

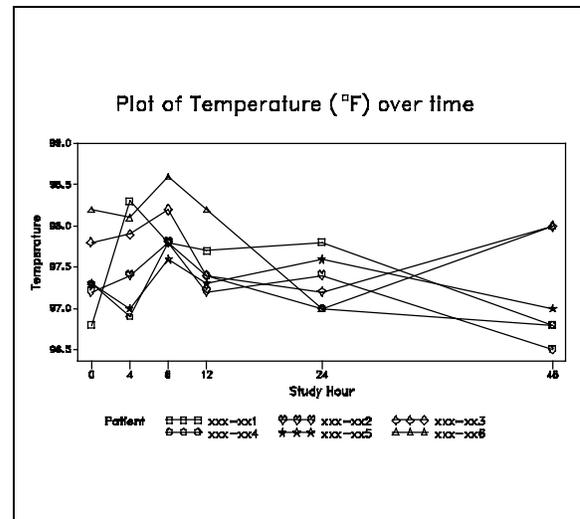


Figure 8 Superscript Alternative

Another alternative method available is to reduce the size of the subscripting character and not use the MOVE= option at all. This gives the illusion that the value is subscripted without the MOVE= option. This method is easier but does not truly represent that the value is

subscripted, but if you are in a hurry and your audience is aware of the meaning then this method would be fine. At a glance Figure 9's title and Y-axis label looks as though it is subscripted, but if you have a picky person critiquing your graph then you may have a problem. So just a reminder, you should know your audience and their expectations.

```
TITLE1 H=1.5 f=duplex J=C
'Log Ratio of PD'
h=1 '20'
h=1.5 ', VisitX to
Baseline (Mean'
f=math 'G'
f=duplex '2SE)'
a=90 ' ',
'Log Ratio of PD'
h=1 '20';
```

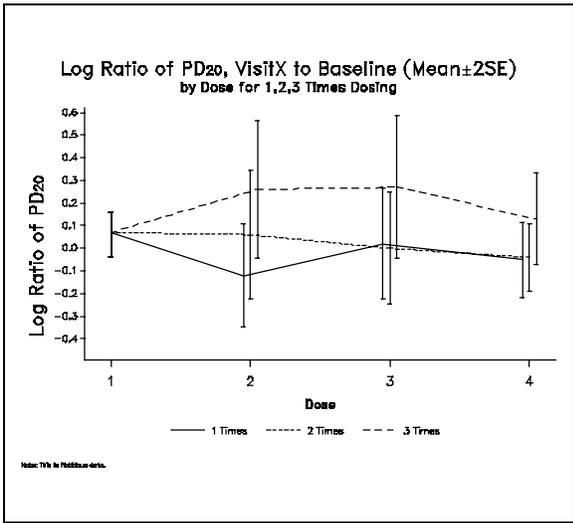


Figure 9 Not true Subscripting

## CONCLUSION

Hopefully, the information presented in this paper will prove beneficial in any endeavors you may encounter concerning subscripting or superscripting.

## ACKNOWLEDGMENTS

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