

## A Gentle Introduction to Creating SAS Graphs

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### ABSTRACT

Creating graphs using SAS can be intimidating even for an experienced SAS programmer. This paper will provide you with a very gentle introduction to creating graphs in SAS so that it is not an overwhelming experience when you are tasked with creating one.

### INTRODUCTION

There are two different ways to create graphs using SAS: SAS/GRAPH and ODS Graphics. For someone who hasn't ever used SAS to create graphs, this is confusing. If you play around with both methods, you begin to realize that using ODS Graphics creates much more eye appealing graphs that are easier to create than using SAS/GRAPH. That is because SAS/GRAPH came first and ODS Graphics is the newer way to create graphs in SAS. This paper will provide a gentle introduction to creating graphs using SAS ODS Graphics with the hope that it provides a nice firm foundation that will lead you to creating more complex graphs using SAS.

There are five ODS Graphics procedures to help us create SAS graphs.

PROC SGPLOT	Used to create statistical graphics such as histograms, scatter plots and line plots
PROC SGPIE	Used to create statistical graphics such as pie charts and donut charts
PROC SGMAP	Identifies the data sets needed for map areas, map response values, and overlay plots
PROC SGPANEL	Used to create a panel of graphs for the values of one or more classification variables
PROC SGSCATTER	Used to create a paneled graph of scatter plots for multiple combinations of variables

### DATA

The purpose of creating a graph is to help us visualize our data. We want to create a graph that is intuitive, easy to read and provides that extra insight that we cannot get by reading a table. In essence, we want to be able to glance at a graph and know what it is showing instantly. To introduce us to creating SAS graphs using ODS Graphics, I will be using my Wordle data to help us visualize my guess distribution from my daily plays. I started playing Wordle on January 30, 2022 and have been playing it daily with the exception of a few days where I didn't play the game. I've been keeping a record of my daily plays in a spreadsheet that contains two variables: **Date** and **Number\_of\_Guesses**. For people who are not familiar with Wordle, you have six tries to guess the daily word. So far, there's only been two days where I have not been able to guess the daily Wordle and I denoted those with a "7."

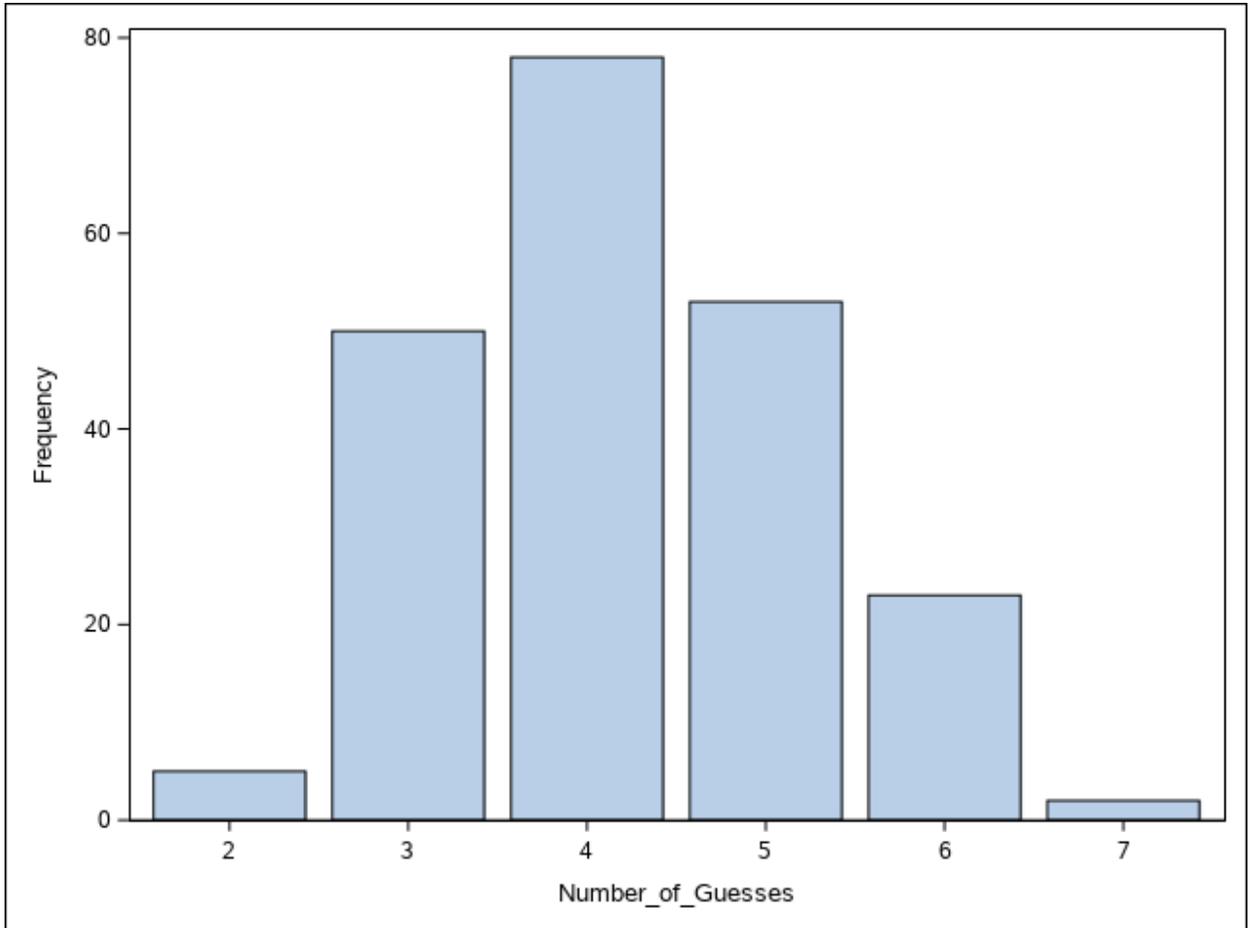
## A SIMPLE BAR CHART

To help us visualize my guess distribution from my daily Wordle plays, we will be using **PROC SGPLOT**.

The syntax to create a very simple bar chart of my daily Wordle guesses with no style options used:

```
proc sgplot data=wordle;  
  vbar Number_of_Guesses;  
run;  
quit;
```

**Figure 1. Basic plot.**



This is great for a quick visualization of our data, but we usually need our graphs to be a little bit more fancy for reports and presentations.

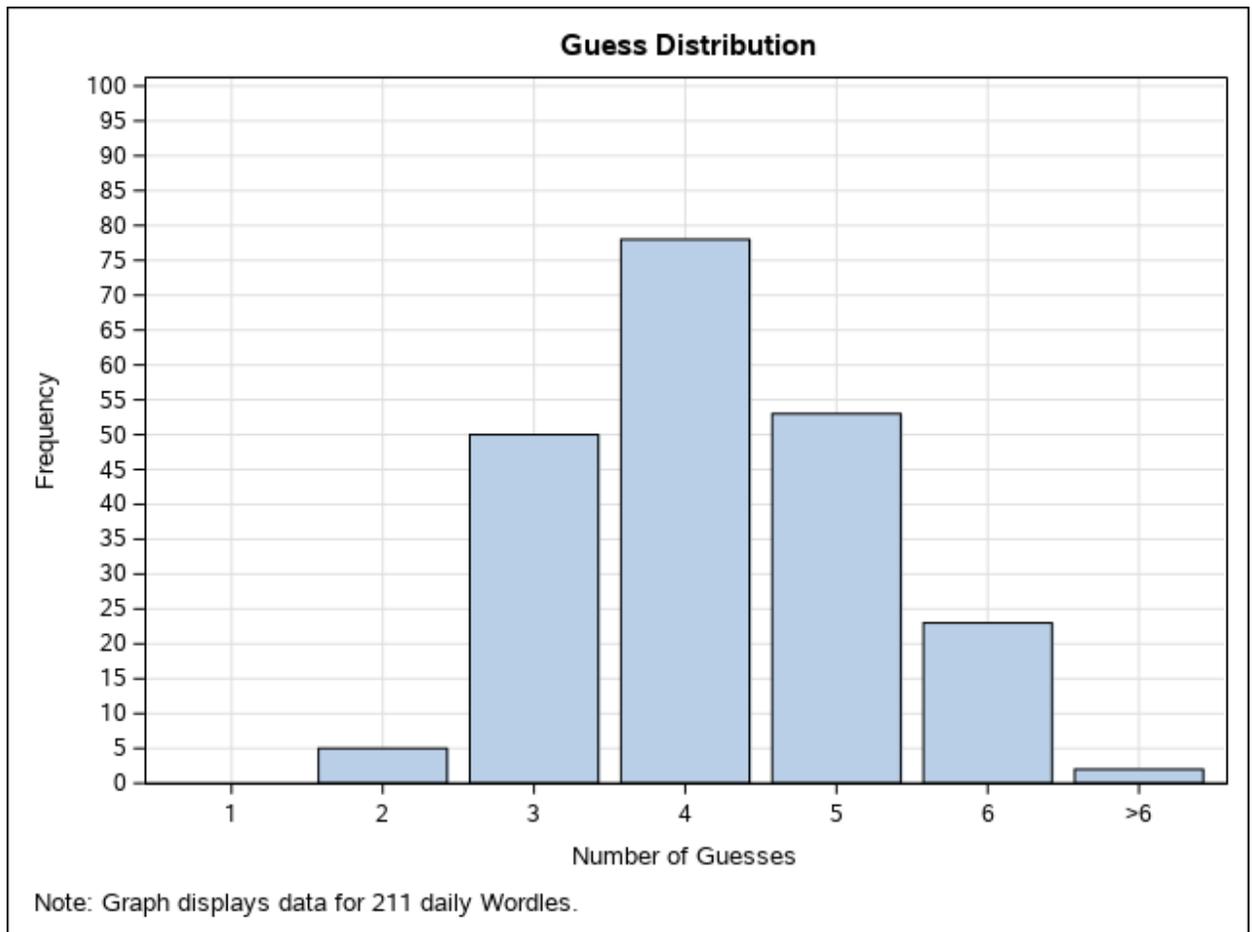
To make this a presentation ready graph we should fix the **x-axis label** and **title**. If you play Wordle, you know that you only have six guesses. Even if there are no "guessed the word correctly on the first try or second try" we should still show that on our graph so we can give our reader perspective. We should update our **x-axis display** to show the full range of possible guesses. If you only have six guesses, what about that "7," I see in our x-axis? This is where your own creativity can come into play. We can update the "7" to be ">6" or one can create a **footnote** letting the reader know the number of times one is not able to guess the Wordle in six tries. We should also probably mention to the reader the

total number of Wordle games played. One thing you will realize about creating graphs, there's always something we can do to make it better.

For this paper, I'm going to focus on showing you how to do the following:

- fixing our x-axis label
- adding a title
- updating our x-axis display
- adding a footnote
- adding color
- using special characters, such as  $\leq$  (less than or equal to) or  $\geq$  (greater than or equal to)
- specifying colors for your graph

**Figure 2.** Using the PROC SGPLOT options indicated in **bold**.



```

title 'Guess Distribution';
footnote j=l 'Note: Graph displays data for 63 daily Wordles.'; /* "j=l" is left justifying my
footnote. */
proc sgplot data=dk_wordle;
vbar Number_of_Guesses;
xaxis grid values=(1 2 3 4 5 6 7) valuesdisplay=("1" "2" "3" "4" "5" "6" ">6")
label="Number of Guesses";
yaxis grid values=(0 to 100 by 5); /* The "grid" is an option on the xaxis and yaxis that
you can remove if you do not want your graph to have grid lines. */
run;

```

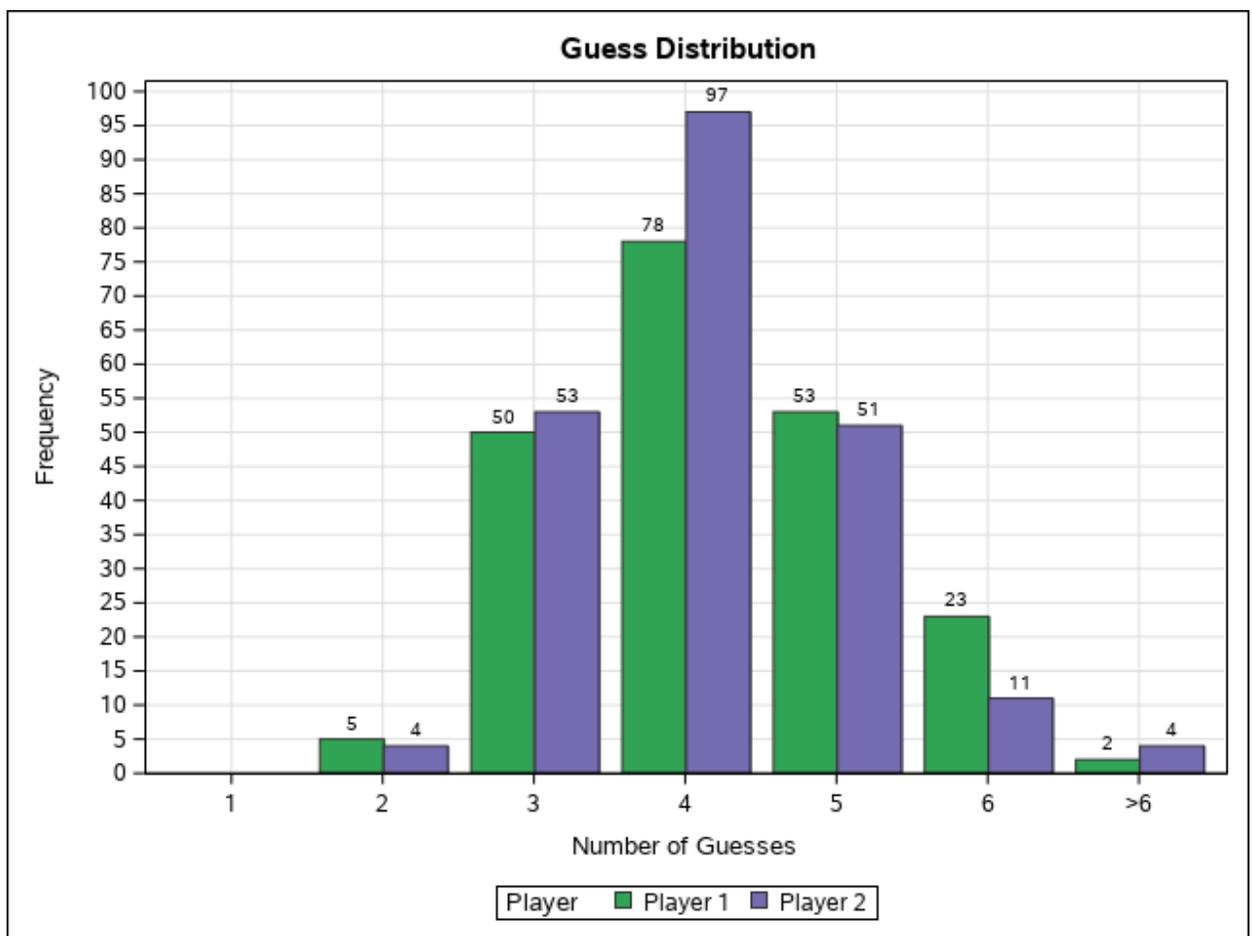
quit;

One thing to note, when using special characters, such as  $\leq$  (less than or equal to) use `“^{\text{unicode '2264'x}}”` or  $\geq$  (greater than or equal to) `“^{\text{unicode '2265'x}}”` in your code.

## SIDE-BY-SIDE BAR CHART

If you have been playing Wordle with another person, you can utilize the **group** and **groupdisplay** options to compare your guess distribution. The **datalabel** option displays the label for each bar. The **dattrmap** references the data attribute map that specifies what color I want each **group** attribute to be in the graph. The **outlineattr** option specifies what you want the outline color around each “bar” to be other than the default “reddish” type color. The **attrid** option is what displays the color we want for the specific Player that we specified in the attribute map. The code that creates Figure 3 is on the next page.

**Figure 3. Side-by-side bar chart.**



```

data myattrs;
length value $8 fillcolor $20;
show='AttrMap';
id="some_id";
value="Player 1"; fillcolor="#31a354"; output;
value="Player 2"; fillcolor="#756bb1"; output;
run;

title 'Guess Distribution';
proc sgplot data=wordle dattrmap=myattrs;
vbar Number_of_Guesses/group=Player groupdisplay=cluster datalabel
attrid=some_id outlineattrs=(color=gray33);
xaxis grid values=(1 2 3 4 5 6 7) valuesdisplay=("1" "2" "3" "4" "5" "6" ">6")
label="Number of Guesses";
yaxis grid values=(0 to 100 by 5);
run;
quit;

```

## OUTPUTTING YOUR GRAPHS

Once we have created the graph, how do we output to use it. SAS allows you to output your graph using HTML, or as a JPEG, PNG, or SVG static file. To learn more about what the different file types mean and outputting graphs, please visit the References section of this paper.

For this paper, I outputted the graph as a PNG file with the following ODS statements wrapped around my PROC SGPLOT:

```

ODS GRAPHICS ON /reset = all imagename="<Name of your plot>" imagefmt=png;
ODS LISTING GPATH = "<where you want SAS to output your file>";

```

```

PROC SGPLOT DATA=wordle;
VBAR Number_of_Guesses;
RUN;
QUIT;

```

```

ODS GRAPHICS OFF;

```

## CONCLUSION

Hopefully, this paper gives you a very gentle introduction to creating graphs in SAS. What helps me to create graphs using SAS is to first sketch out what you are hoping to create using the appropriate PROC and then add the additional options to enhance the graph one by one.

## REFERENCES

Scott, Kate. "JPG vs. PNG vs. GIF vs. SVG: The Ultimate Guide to Image File Formats - Kate Scott: Squarespace Templates." Kate Scott | Squarespace Templates, Kate Scott | Squarespace Templates, 16 June 2021, <https://www.katescott.co/blog/jpg-vs-png-vs-gif-vs-svg-image-file-formats>.

Delwiche, Lora. Slaughter, Susan. "SAS Global Forum 2010." *Using PROC SGPLOT for Quick High-Quality Graphs*.

Speaking, Robert Allison on Graphically. "Converting from SAS/Graph to ODS Graphics - Color Control." *Graphically Speaking*, 12 June 2019, <https://blogs.sas.com/content/graphicallyspeaking/2019/06/12/converting-from-sas-graph-to-ods-graphics-color-control/>

## ACKNOWLEDGMENTS

This paper is dedicated to PROC Bob and PROC Morgen.

## RECOMMENDED READING

- Checkout SAS's "Graphically Speaking" blog here: <https://blogs.sas.com/content/graphicallyspeaking/> or "The DO Loop" blog here: <https://blogs.sas.com/content/iml/>
- Harris, Kriss, and Richann Watson. 2020. *SAS Graphics for Clinical Trials by Example*. Cary, NC: SAS Institute Inc.

## CONTACT INFORMATION

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

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