

Graphing Module: Creating Line Graphs

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TASK LIST ITEMS RELATED TO THIS MODULE

Task	Description
A-10	Design, plot and interpret data using equal-interval graphs
H-01	Select a measurement system to obtain representative data given the dimensions of the behavior and the logistics of observing and recording.
H-03	Select a data display that effectively communicates relevant quantitative relations.
H-04	Evaluate changes in level, trend, and variability.

PURPOSE/FUNCTION

From the Cooper Text (Cooper, 2007)

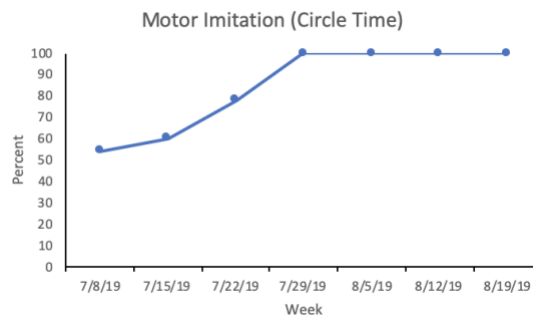
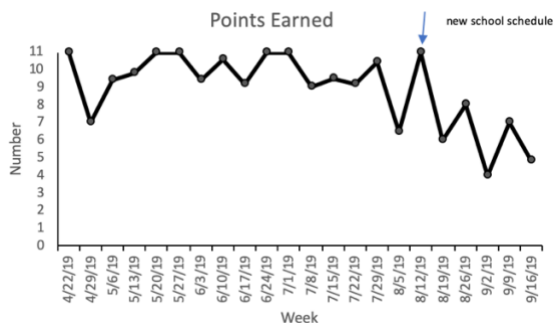
Graphic Display

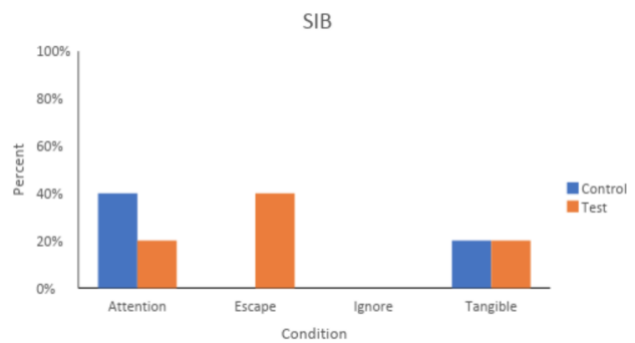
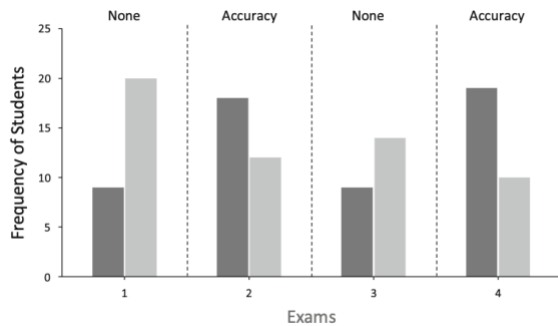
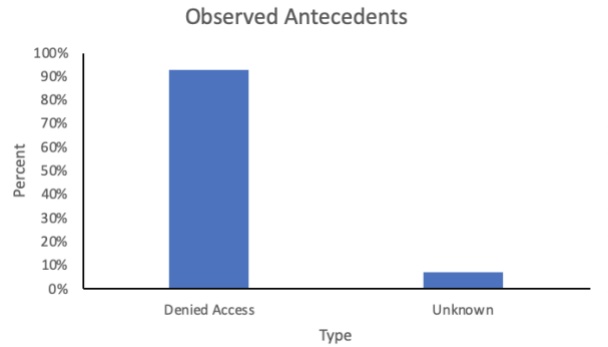
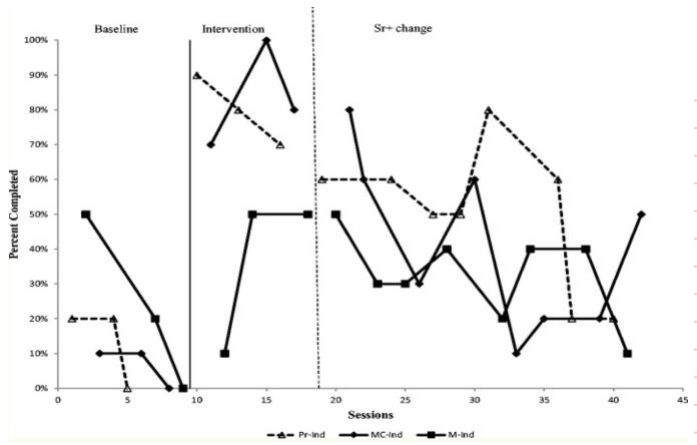
Purpose: To communicate, in a readily assumable and attractive manner, description and summaries of data that enable rapid and accurate analysis of the facts.

Benefits of graphic display

- 1) Immediate access to ongoing visual record of bx
- 2) Readily analyzable format, to see variation in bx
- 3) Judgmental aid to interpret the results
- 4) Method for determining significance of bx change
- 5) Enable and encourage independent judgment and interpretation
- 6) Effective sources of feedback

EXAMPLES FROM THE FIELD- AND IDENTIFYING KEY ELEMENTS OF GRAPH

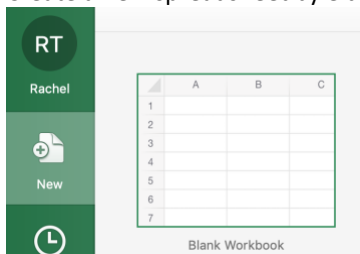




DESIGNING A LINE GRAPH WITH EXCEL

Part 1: Inputting your data to prepare for graphing.

1. Open the Excel program.
2. Create a new spreadsheet by either selecting the “new” option, or “blank workbook”.



3. Create your header titles on the spreadsheet. These will be your axis titles.
 - a. Column A (cell A1) will be the X-axis/ horizontal axis, showing a succession of time. An example of a header would be “Date” or “Session”.
 - b. Column B (cell B1) will be the Y-axis/ vertical axis, showing a quantifiable dimension of behavior (such as duration, number/frequency, rate, etc). Sample titles for this column could be “Number”, “Number of Hits” or “Rate per Hour”.

	A	B	C
1	Date	Frequency	
2			
3			
4			

4. Input the X-axis information starting on row 2 in Column A. List it in date (1/2/18, 1/3/18, etc.) or session format (1, 2, 3, etc). If there was a date/session with zero rates of behavior, for instance, you will mark it with a “0”. If no data was taken that session, then skip that date/session.

	A	B
1	Date	Frequency
2	10/20/18	
3	10/21/18	
4	10/22/18	
5	10/23/18	
6	10/24/18	
7	10/25/18	
8	10/26/18	
9	10/27/18	
10	10/28/18	
11	10/29/18	
12	10/30/18	
13	10/31/18	
14	11/1/18	
15		

- Next, type the Y-axis data beginning on row 2 in Column B. If you will be graphing baseline and intervention(s), note the date the intervention began because you will be creating a phase change line once this data is graphed. If you plan to graph percent, keep it as a number without the percent sign. That will be added later.

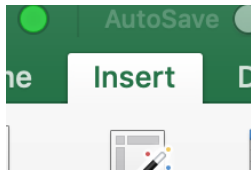
	A	B
1	Date	Frequency
2	10/20/18	1
3	10/21/18	0
4	10/22/18	1
5	10/23/18	1
6	10/24/18	1
7	10/25/18	2
8	10/26/18	1
9	10/27/18	0
10	10/28/18	1
11	10/29/18	1
12	10/30/18	1
13	10/31/18	0
14	11/1/18	0
15		

Part 2: Creating a line graph from the data on the spreadsheet.

- With the mouse, highlight the cells with data; include row 1. Do not highlight blank cells.

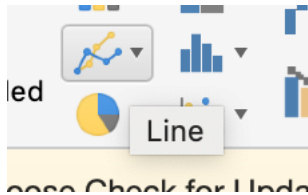
	A	B	C
1	Date	Frequency	
2	10/20/18	1	
3	10/21/18	0	
4	10/22/18	1	
5	10/23/18	1	
6	10/24/18	1	
7	10/25/18	2	
8	10/26/18	1	
9	10/27/18	0	
10	10/28/18	1	
11	10/29/18	1	
12	10/30/18	1	
13	10/31/18	0	
14	11/1/18	0	
15			
16			
17			
18			

- Click on the “insert” tab from the top menu on the Excel program.

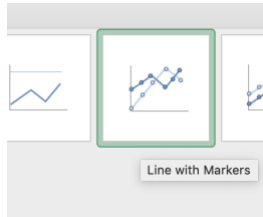


- Select your graph:

- Move the cursor to right, towards the area with recommended charts.
- Click on the “Line” button.



- Select the “Line with Markers” option by clicking the picture.

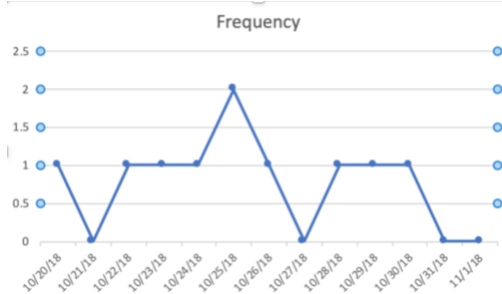


- d. A graph will appear. This is your starting point. In the next section we will modify it to look more streamlined with ABA Graphs.

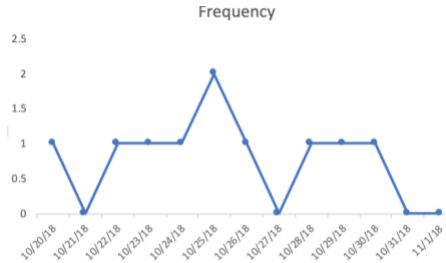
Part 3: Modifying the graph to align it with APA formatting.

1. To remove the horizontal grid lines:

- a. Click on one of them. After you click on them, all of the lines will be selected automatically (each grid line will have circles on the right and left ends).

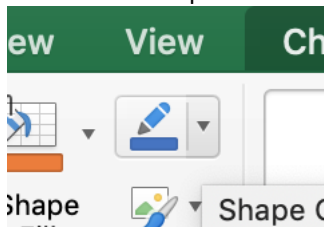


- b. Press delete and the horizontal lines will disappear.

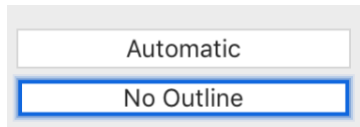


2. When a data is graphed on Excel, the default graph has a square around the perimeter. This will need to be modified. Steps to take out the square go as follows:

- a. Click on the graph to highlight the entire selection.
- b. At the top of the Excel document, hover over the "Format" tab.
- c. Click on the "Shape Outline" button.

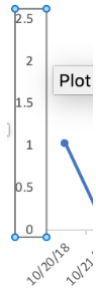


- d. Next select "No Outline".



3. To add a vertical line for the Y-axis:

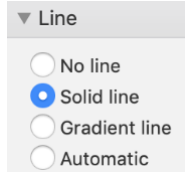
- a. Move your cursor to the Y-axis and click it; now your Y-axis is selected.



- b. Right click your mouse and select “Format Axis”. A menu will appear on your right. The “Axis Options” button should be shaded as this is the section that allows you to modify the axis. We will use the “Text options” later.



- c. Click on the pail of paint.
 d. Next, click on the triangle that says “Line”.
 e. Select “Solid Line” by clicking on the circle. A line will appear on your Y-axis.



- f. Last, change the color of the line that was just created by clicking the “color” button just below the line options. Select black.
 g. Repeat the steps to modify the color of X-axis so it has the same black color as your new Y-axis line.

***In this section, select the options you need based on your data.**

To add X and Y-axis titles:

1. Click on the axis you want to add the title to.
2. At the top of the Excel menu, select “Insert” and then scroll to the right.
3. Click on the “Chart Design” tab.
4. Scroll to the left and select “Add Chart Element”.
5. Click on the axis you want to add the title to and select that option. After making that selection, your graph will have a temporary axis title. You can click on that title to modify the name (such as “frequency”).

To add tick marks on an axis:

1. Right click on the axis you want to modify and click “Format Axis”. The menu will be on your right. The “Axis Options” button should be shaded in; or you can click on those words to select that menu.
2. Select the triangle next to the words “Tick Marks”.
3. Scroll to the “Major Axis” option and select the choice marked as “Outside”.

To modify the Y-Axis Range:

1. Select the Y-Axis and right click the option “Format Axis”.
2. Select the triangle next to “Axis Options”. From there, you can modify it to suit the data. Options include:
 Minimum and Maximum Bounds are the range of the Y-Axis.
 Units are the value between tick marks.

To convert your Y-Axis to show percent:

1. Select the Y-Axis and right click the option “Format Axis”.
2. Select the triangle next to “Number”.
3. In the section marked “Category”, select “Percentage”.
4. Below that you can modify the decimals. When your Y-Axis is in percent, be sure to have your range span from 0 to 100%.

To change the color of the lines:

1. Click on your data points (or lines) on the graph automatically created.
2. Right click the mouse and select "Format Data Series". A menu will be on your right.
3. Be sure to have the "Line" option at the top of the mini-menu highlighted.
4. Click on the triangle next to the word "Line" and select "Solid Line".
5. Then scroll below to select your color option; I typically choose black.

To change the color or style of the data points:

1. Click on your data points on the graph automatically created.
2. Right click the mouse and select "Format Data Series". A menu will be on your right.
3. Be sure to have the "Marker" option at the top of the mini-menu highlighted (in ABA we call them data points; Excel refers to them as markers). From there, you can modify it to suit the data and type of data point you want to display. Options include:

Select the triangle next to "Marker Options" to change the size or type.

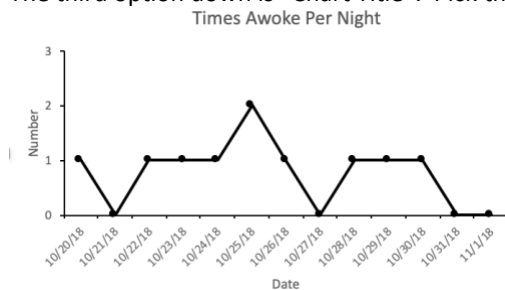
Below that, in the section marked "Fill" you can modify the color of data point.

If you change the color you will likely need to change the color of border too.

*Border and inside color should be uniform.

Part 4: Adding a Title for the Graph

1. Click on the entire graph to select it.
2. At the top of the Excel menu, select "Insert" and then scroll to the right.
3. Click on the "Chart Design" tab. Scroll to the left and select "Add Chart Element".
4. The third option down is "Chart Title". Pick the one to best suit your display. (This is "Above Chart".



Part 5: Moving the Graph to a Word/Google Doc.

*This is for when/if you want to share it with others. Rather than copying and pasting it into a doc, my preferred method is to take a picture of the graph and then insert it into the doc.

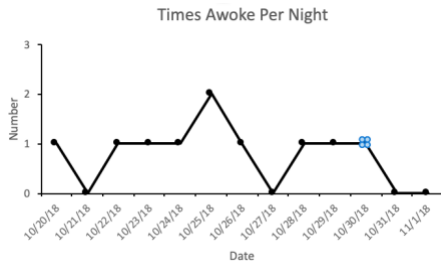
1. To take a picture of part of the screen, the graph (on a mac), press three buttons at once: shift, command, and the number 4.
2. Then click the mouse and slide it (while pressing down) diagonally to the right. This will take a picture of that section.
3. Then you will locate the picture and simply insert the picture into your doc.
4. Lastly, you need to include written information about the graph under the graph. Below the graph, in italics, write the words *Figure 1* and then a sentence that describes the graph. The sentence will NOT be in italics. Note the words are aligned with the graph.



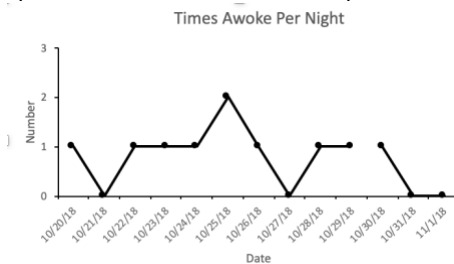
Figure 2. Frequency of times parents reported he awoke each night before the 6:30 a.m. time.

Part 6: Adding a Condition Change Line (Intervention after Baseline).

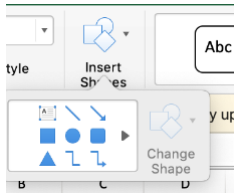
1. Determine the date/session that marks the first phase change. In the sample graph, we are going to choose 10/30/18 as the first day with the intervention phase.
2. Place the cursor on the line between the data points that represents that date as well as the date before. It will look like this:



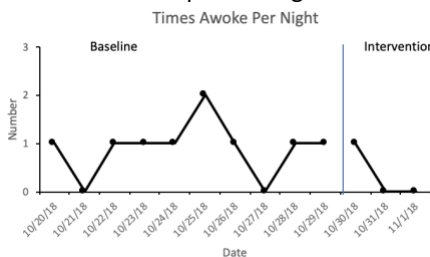
3. Next, right click the mouse and select "Format Data Point". The menu will appear on your right.
4. Click on the pail of paint and select the "Line" option (NOT "Marker").
5. Just below that, select the triangle to open the Line options and select "No Line". Now your graph will have a space between those two data points.



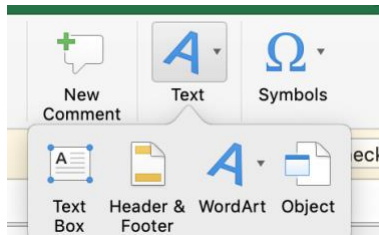
6. Next you will create a line to separate the phases.
 - a. At the top of the Excel menu, select the "Format" tab.
 - b. Next, click on "Insert Shapes".
 - c. Click on the one that looks like a line.



- d. Then you will move the cursor back to the graph; click and draw a line at the separation. When creating the line, press the shift bar to keep it a straight line. Be sure to place the line between the two dates. You will also want it equal in height to the Y-axis.



- e. Change the color of the line to align with the rest of the graph such as black. Right click the line, then select "Format Shape". Select the pail of paint and then change the color in the options below the paint.
7. Lastly, the conditions need titles.
 - a. At the top of the Excel menu, select "Insert".
 - b. Then click on the "Text" button.
 - c. Hover over and then click on "Text Box".



- d. Move the cursor back to the graph and click on the graph. A box will pop up. This box will let you type right into it. You will want to space the words out to go across the phases; and example is below.

