

Graphing Single Subject Research Data

AAC Colloquium
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Set up the spreadsheet

The screenshot shows an Excel spreadsheet with a table structure. The table has columns for Date, Base, Gen, Int, and Maint for three characters: Harry Potter, Hermione Granger, and Ron Weasley. The columns are organized as follows:

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z	AA	AB	
1			Harry Potter				Hermione Granger				Ron Weasley																		
2	Date	Base	Pre Gen	Post Gen	Maint	Base	Pre Gen	Int Gen	Maint	Base	Pre Gen	Int Gen	Maint																
3																													
4																													
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32																													
33																													

The spreadsheet interface includes a ribbon with tabs for File, Home, Insert, Draw, Page Layout, Formulas, Data, Review, and View. The status bar at the bottom shows 'Ready' and '90%' zoom. A blue circular icon is visible on the right side of the spreadsheet area.

Input the data

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AB1

	A	B	C Harry Potter			F	G Hermione Granger					L Ron Weasley					Q	R	S	T	U	V	W	X	Y	Z	AA	AB	
		Base	Pre Gen	Int	Post Gen	Maint	Base	Gen	Int	Gen	Maint	Base	Gen	Int	Gen	Maint													
2	Date	Base	Pre Gen	Int	Post Gen	Maint	Base	Gen	Int	Gen	Maint	Base	Gen	Int	Gen	Maint													
3	9.1.17	10					30					10																	
4	9.3.17	20																											
5	9.5.17	10	20				40																						
6	9.7.17	30	10									30																	
7	9.9.17	10	10																										
8	9.11.17			60			30					10																	
9	9.13.17			70																									
10	9.15.17			90	80				30																				
11	9.17.17			70			40	20																					
12	9.19.17			80	80							20																	
13	9.21.17			90	90		40	40																					
14	9.23.17								80			10	10																
15	9.25.17								70	90																			
16	9.27.17								100	100			20																
17	9.29.17								100	100		30	10																
18	10.1.17																			50									
19	10.3.17																			60									
20	10.5.17																			50									
21	10.7.17					90														70									
22	10.9.17					80														80	70								
23	10.11.17					80														60	80								
24	10.13.17																			80									
25	10.15.17										100									80	70								
26	10.17.17										100																		
27	10.19.17										100																		
28	10.21.17																												
29	10.23.17																												
30	10.25.17																												
31	10.27.17																												
32	10.29.17																												
33																													

Sheet1

Ready 90%

Graph Harry's data

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PivotTable Recommended Table Pictures Online Pictures Store My Add-ins Recommended Charts

Tables Illustrations Add-ins

	Date	Pre Baseline	Post Intervention	Post Gen	Maintenance	Pre Baseline	Post Intervention	Post Gen	Maintenance	Pre Baseline	Post Intervention	Post Gen	Maintenance
2													
3	9.1.17	10				30				10			
4	9.3.17	20											
5	9.5.17	10	20			40							
6	9.7.17	30	10							30			
7	9.9.17	10	10							10			
8	9.11.17			60		30							
9	9.13.17			70									
10	9.15.17			90	80		30						
11	9.17.17			70		40	20						
12	9.19.17			80	80					20			
13	9.21.17			90	90	40	40						
14	9.23.17							80		10	10		
15	9.25.17							70	90				
16	9.27.17							100	100		20		
17	9.29.17							100	100	30	10		
18	10.1.17										50		
19	10.3.17										60		
20	10.5.17										50		
21	10.7.17										70		
22	10.9.17										80	70	
23	10.11.17										60	80	
24	10.13.17										80		
25	10.15.17										100	70	
26	10.17.17										100		
27	10.19.17										100		
28	10.21.17												
29	10.23.17												
30	10.25.17												70
31	10.27.17												60
32	10.29.17												80

2-D Line 3-D Line 2-D Area 3-D Area More Line Charts...

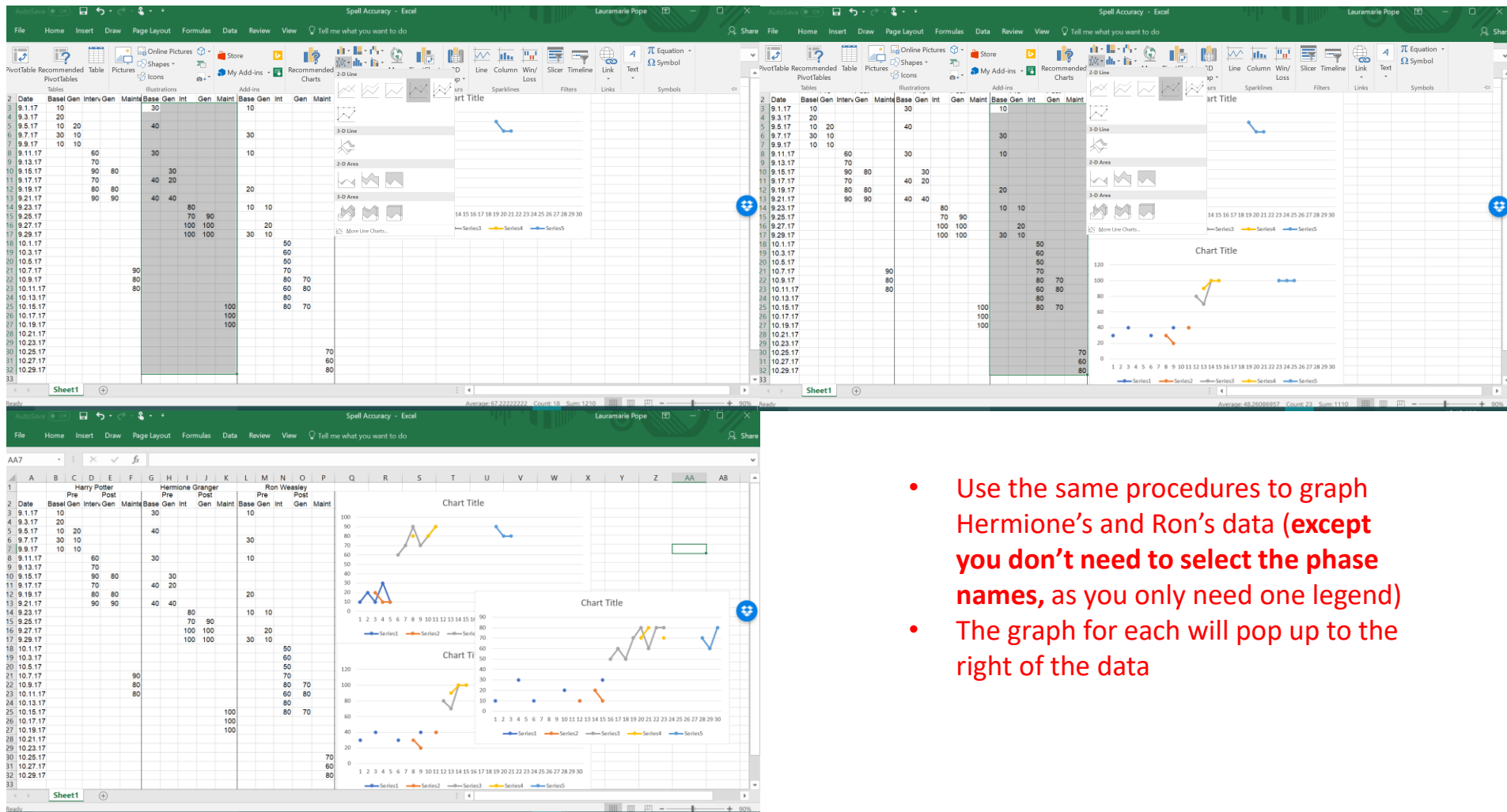
- Click and hold, then drag to select Harry's data
- Just for the top graph (i.e., Harry), select the phase names as well (e.g., baseline, intervention, etc.), in order to create the legend
- Make sure to select the cells down to the last session for the last participant in that leg (i.e., Ron), so all graphs have the same x-axis
- Click on **Insert>Line or Area Chart>Line with Markers***

*Where to go to select 'Line with Markers' may vary by Excel version/operating system. You're looking for 'Charts'

Sheet1

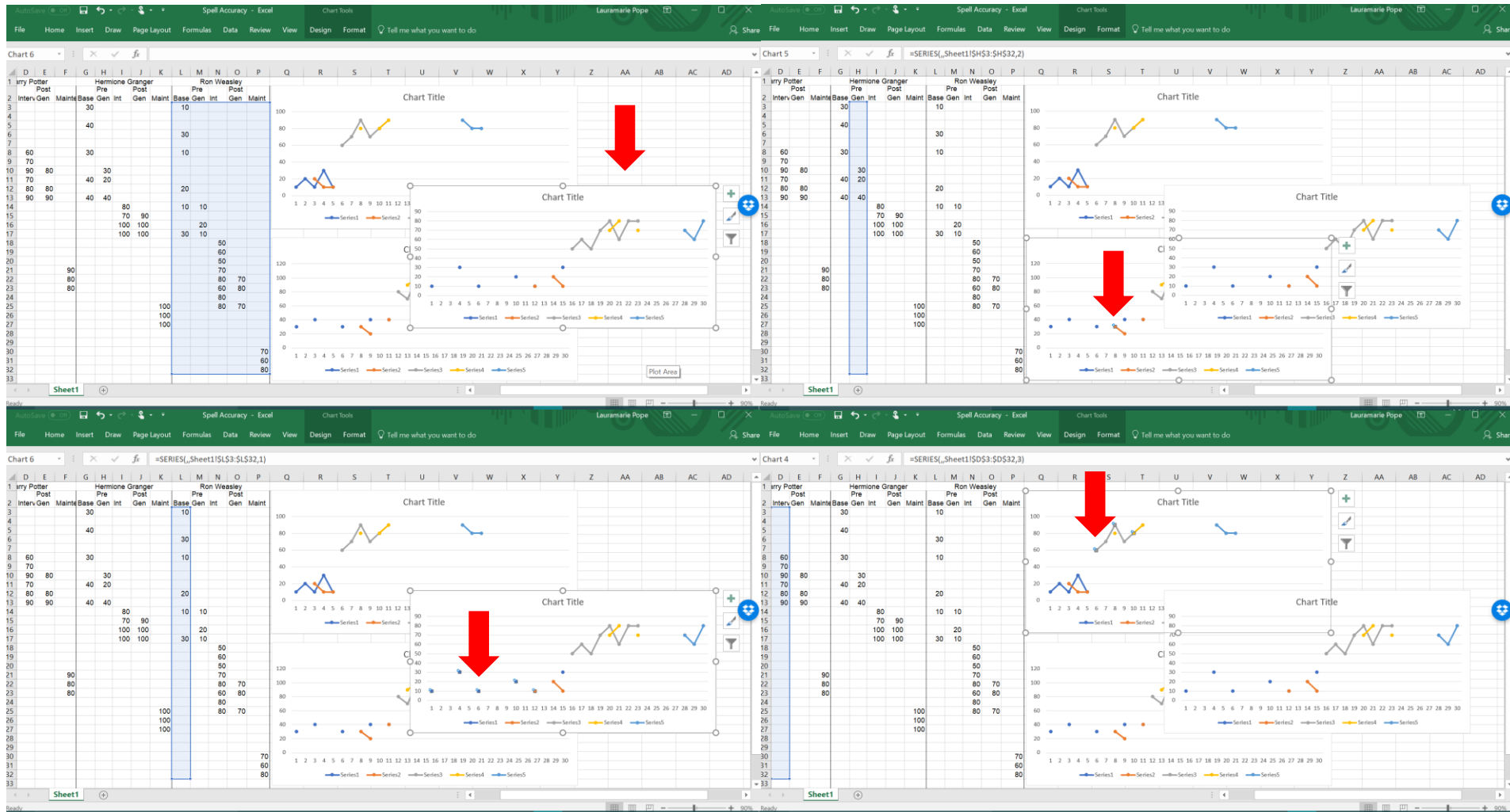
Ready Average: 54 Count: 25 Sum: 1080 90%

Graph Hermione's and Ron's data



- Use the same procedures to graph Hermione's and Ron's data (**except you don't need to select the phase names, as you only need one legend**)
- The graph for each will pop up to the right of the data

Selected data is always highlighted



Connect data points

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Chart 6

Harry Potter				Hermione Granger				Ron Weasley				
Pre Gen	Post Interv Gen	Maint	Base	Pre Gen	Post Int Gen	Maint	Base	Pre Gen	Post Int Gen	Maint	Base	
			30				10					
			40									
20			30				10					
10			40	20			20					
10			40	40			10	10				
	60			80	70	90					50	
	70			100	100						60	
	90	80		100	100						70	
	70										80	70
	80	80									60	80
	90	90									80	
							100				80	70
							100					
							100					
			90									70
			80									60
			80									80

- Right click on one data series (e.g., Intervention)
- Choose **Select Data** from the dropdown menu

Sheet1

Ready 90%

Connect data points

The image shows a Microsoft Excel spreadsheet with a line chart. The chart has five data series: Series1 (blue), Series2 (orange), Series3 (grey), Series4 (yellow), and Series5 (light blue). The chart is titled "Chart Title".

The "Select Data Source" dialog box is open, showing the chart data range as "=Sheet1!\$L\$3:\$P\$32". The "Legend Entries (Series)" list includes Series1 through Series5, all checked. The "Horizontal (Category) Axis Labels" list includes 1 through 5, all checked. The "Hidden and Empty Cells" button is highlighted in blue.

The "Hidden and Empty Cell Settings" dialog box is also open, showing the "Show empty cells as:" options: Gaps, Zero, and Connect data points with line. The "Connect data points with line" option is selected. The "Show data in hidden rows and columns" checkbox is unchecked. The "OK" button is highlighted in blue.

A red arrow points from the "Hidden and Empty Cells" button in the "Select Data Source" dialog to the "Connect data points with line" option in the "Hidden and Empty Cell Settings" dialog.

Click Hidden and Empty Cells > Connect data points with line

Series	1	2	3	4	5
Series1	10	30	10	20	30
Series2	20	40	20	30	40
Series3	30	50	30	40	50
Series4	40	60	40	50	60
Series5	50	70	50	60	70

Delete gridlines

The screenshot shows the Microsoft Excel interface with a chart titled "Chart Title" selected. The chart displays five data series: Series1 (blue), Series2 (orange), Series3 (grey), Series4 (yellow), and Series5 (light blue). The chart area is overlaid with a grid. A text box on the right side of the chart provides instructions:

- Click on a grid line – blue dots will appear at the ends
- Hit **Delete** or **Backspace** to delete them

The chart's data series are as follows:

X-axis	Series1	Series2	Series3	Series4	Series5
1	10	10	60	70	80
2	20	20	70	80	80
3	10	10	80	90	80
4	30	10	90	90	80
5	10	10	70	80	80
6	10	10	60	80	80
7	10	10	70	80	80
8	10	10	80	90	80
9	10	10	90	90	80
10	10	10	80	80	80
11	10	10	70	80	80
12	10	10	60	80	80
13	10	10	70	80	80
14	10	10	80	90	80
15	10	10	90	90	80
16	10	10	80	80	80
17	10	10	70	80	80
18	10	10	60	80	80
19	10	10	70	80	80
20	10	10	80	90	80
21	10	10	90	90	80
22	10	10	80	80	80
23	10	10	70	80	80
24	10	10	60	80	80
25	10	10	70	80	80
26	10	10	80	90	80
27	10	10	90	90	80
28	10	10	80	80	80
29	10	10	70	80	80
30	10	10	60	80	80

Format phases – lines

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Chart 9: =SERIES(,Sheet1!\$L\$3:\$L\$32,1)

Chart Title

- Right click on one data series (e.g., Intervention)
- Choose **Format Data Series** from the dropdown menu
- Click the **paint can**
- Change the color to **black** for baseline and intervention, and **grey** for generalization and maintenance

Chart Title

Series1 Series2 Series3 Series4 Series5

Format Data Series

Series Options

Line Marker

Line

- No line
- Solid line
- Gradient line
- Automatic

Color

Transparency 0%

Width 2.25 pt

Compound type

Dash type

Cap type Round

Join type Round

Begin Arrow type

Begin Arrow size

End Arrow type

Ready | 100%

Format phases – markers

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Chart 9: =SERIES(,Sheet1!\$L\$3:\$L\$32,1)

Chart Title

- Click on **Marker, Marker Options, and Fill**
- Click **Built-in** to change the **Type** (circle for baseline and intervention, triangle for generalization, square for maintenance)
- Change **Border and Fill color to black** for baseline and intervention, and **grey** for generalization and maintenance

Format Data Series

Series Options

Line Marker

Marker Options

- Automatic
- None
- Built-in**

Type

Size 5

Fill

Border

- No line
- Solid line
- Gradient line
- Automatic

Color

Transparency 0%

Width 0.75 pt

Compound type

Chart 1: Baseline (1-5), Pre Generalizat (6-10)

Chart 2: Series1 (1-10), Series2 (11-15), Series3 (16-20), Series4 (21-25), Series5 (26-30)

Chart 3: Series1 (1-10), Series2 (11-15), Series3 (16-20), Series4 (21-25), Series5 (26-30)

Sheet1

Ready | 100%

Format the other phases

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Chart 9 | =SERIES(,Sheet1!\$P\$3:\$P\$32,5)

	N	O	P	Q	R	S	T	U	V	W	X	Y	Z	AA	AB	AC
1	In Weasley	Post														
2	Int	Gen	Maint													
3																
4																
5																
6																
7																
8																
9																
10																
11																
12																
13																
14																
15																
16																
17																
18	50															
19	60															
20	50															
21	70															
22	80	70														
23	60	80														
24	80															
25	80	70														
26																
27																
28																
29																
30																

Chart 9: You can either make both intervention and baseline black lines with black markers, as well as both generalizations grey lines with grey markers (see below), or mix and match different greys/black combos for lines and markers, to make each phase unique

Format Data Series

Series Options

- Line
- Marker

Line

- No line
- Solid line
- Gradient line
- Automatic

Color

Transparency: 0%

Width: 2.25 pt

Compound type

Dash type

Cap type: Round

Join type: Round

Begin Arrow type

Begin Arrow size

End Arrow type

Format Axes

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Chart 9

Chart Title

Click on each axis to adjust the **minimum/maximum and units** – these should be the same across all graphs in each leg (i.e., for Harry, Hermione, and Ron)

Format Axis

Axis Options Text Options

Axis Options

Bounds

Minimum 0.0 Auto

Maximum 90.0 Auto

Units

Major 10.0 Auto

Minor 2.0 Auto

Horizontal axis crosses

Automatic

Axis value 0.0

Maximum axis value

Display units None

Show display units label on chart

Logarithmic scale Base 10

Values in reverse order

Tick Marks

Labels

Row	Col N	Col O	Col P	Col Q	Col R	Col S	Col T	Col U	Col V	Col W	Col X	Col Y	Col Z	Col AA	Col AB	Col AC
1	n	Weasley														
2	Int	Post	Maint													
3		Gen														
4																
5																
6																
7																
8																
9																
10																
11																
12																
13																
14																
15																
16																
17																
18		50														
19		60														
20		50														
21		70														
22		80	70													
23		60	80													
24		80														
25		80	70													
26																
27																
28																
29																
30																

Sheet1

Ready

Delete (or add!) tick marks

Excel interface showing a chart with two data series and a 'Format Axis' task pane on the right. A red arrow points to the 'Major type' dropdown menu in the task pane, which is currently set to 'Cross'.

Chart Data (Estimated):

Category	Series 1 (Black)	Series 2 (Grey)
1	10	60
2	30	70
3	10	70
4	30	80
5	10	70
6	10	70
7	30	80
8	10	70
9	30	80

Format Axis Task Pane (Visible Settings):

- Axis Type: Automatically select based on data
- Vertical axis crosses: Automatic
- Axis position: Between tick marks
- Tick Marks:
 - Interval between marks: 1
 - Major type: Cross
 - Minor type: None

Red Text Annotations:

- If there are automatically tick marks on the x axis and you do not want them, set 'Major type' to 'None'
- If there are not tick marks and you want to add them, set 'Major type' to some other value (e.g., cross, above)

Delete the key/chart title

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AF5

	N	O	P	Q	R	S	T	U	V	W	X	Y	Z	AA	AB	AC	AD	AE	AF	AG	A	
1	n Weasley																					
2	Int	Post Gen	Maint																			
3																						
4																						
5																						
6																						
7																						
8																						
9																						
10																						
11																						
12																						
13																						
14																						
15																						
16																						
17																						
18	50																					
19	60																					
20	50																					
21	70																					
22	80	70																				
23	60	80																				
24	80																					
25	80	70																				
26																						
27																						
28																						
29																						
30																						

Chart Title

- Delete the **key** at the bottom of each graph (**except for Harry's key!**) by clicking on it to select it and then hitting 'Delete' or 'Backspace'
- You can either delete the **Chart Title** in the same way, or click on it and edit to be the participant ID/pseudonym

Chart Title

Series1 Series2 Series3 Series4 Series5

Sheet1

Ready 100%

Remove background and border

Excel interface showing a chart titled "Ron" with data points across sessions. The chart is overlaid with a text box containing instructions:

- Right click in the chart area (click near the perimeter of the graph) and select **Format Chart Area**
- Select **No fill** and **No line**
- Do the same for the **plot area** (click near the graphed data)

The right-hand pane shows the **Format Chart Area** task pane with the following settings:

- Fill:** No fill
- Border:** No line

The chart data is as follows:

Session	Baseline	Pre Generalization	Intervention	Post Generalization	Maintenance
1	10				
2	20				
3	15	20			
4	30	15			
5	15	10			
6			60		
7			70		
8			90		
9			70		
10			80		
11			90		
12				100	
13					20
14					15
15					20
16					15
17					15
18					50
19					60
20					50
21					70
22					80
23					60
24					80
25					80
26					70
27					
28					
29					

Save the graph as a template

The screenshot shows the Microsoft Excel interface. The 'Change Chart Type' dialog box is open, displaying the 'My Templates' section. A preview of a line chart template named 'MBD' is shown. The background spreadsheet has the following data:

	Int	Post Gen	Maint
2			
3			
4			
5			
6			
7			
8			
9			
10			
11			
12			
13			
14			
15			
16			
17			
18	50		
19	60		
20	50		
21	70		
22	80	70	
23	60	80	
24	80		
25	80	70	
26			
27			
28			
29			

- To save this chart design as a template, **right click** in the **chart area** and select **Save as template**
- Name your template, and hit save
- You can then use this template for another graph by clicking on the chart area of a graph (say, Harry's or Hermione's) and going to **Insert>See All Charts>Templates**

Group graphs together

The screenshot shows the Microsoft Excel interface. The 'Format' ribbon is active, and the 'Group' menu is open, with a red arrow pointing to the 'Group' option. The worksheet contains three line graphs for Hermione, Ron, and another character. The graphs are vertically aligned and share a common x-axis. The y-axis for the top graph ranges from 0 to 90, and for the bottom graph from 0 to 100. The x-axis for all graphs ranges from 1 to 29.

Character	1	3	5	7	9	11	13	15	17	19	21	23	25	27	29
Hermione	10	20	15	30	25	60	70	75	70	80	85	80	85	90	95
Ron	30	40	30	35	40	35	70	75	70	80	85	80	85	90	95
Other	10	25	15	20	25	15	50	55	60	65	70	75	80	85	90

- Use the template you created to format the graphs for the other participants – you may still need to do some minor formatting (e.g., change the chart titles)
- Align them vertically, then select all three graphs by holding **Shift + clicking**
- Click on **Drawing Tools>Format>Align>Align Left** to line up the graphs
- Click on **Drawing Tools>Format>Group>Group** to group the graphs together into one unit

Change the legend names

The screenshot shows the 'Select Data Source' dialog box in Microsoft Excel. The 'Chart data range' is set to '=Sheet1!\$L\$3:\$P\$32'. The 'Legend Entries (Series)' section lists five series: Series1, Series2, Series3, Series4, and Series5. A red arrow points to the 'Edit' button in this section. The 'Horizontal (Category) Axis Labels' section lists categories 1 through 5. The background shows a line chart with a legend containing five entries: Baseline, Pre Generalization, Intervention, Post Generalization, and Maintenance. The chart is titled 'Ron' and has an x-axis labeled '1' through '29'.

- If you want to **change the names of the legends** (e.g., if you have formatted baseline, intervention, and maintenance the same, and the two generalization phases the same, and just want to have the labels 'probe' and 'generalization'), you can **right click on the legend and select 'Select data'**
- Within the window that opens, click on the phase name you want to edit and click **Edit**

Format the legend

Format the legend (on Harry's graph) by right clicking on it and selecting **Format legend**

- You can now change the location of the legend
- You also want to be sure to **uncheck 'Show the legend without overlapping the chart'**, otherwise the legend will impact the size of the first graph's chart area
- You can also **delete particular items from the legend** (e.g., if you only want 'probe' and 'generalization') by **double clicking on the item** and hitting **backspace or delete**

Format Legend

Legend Options Text Options

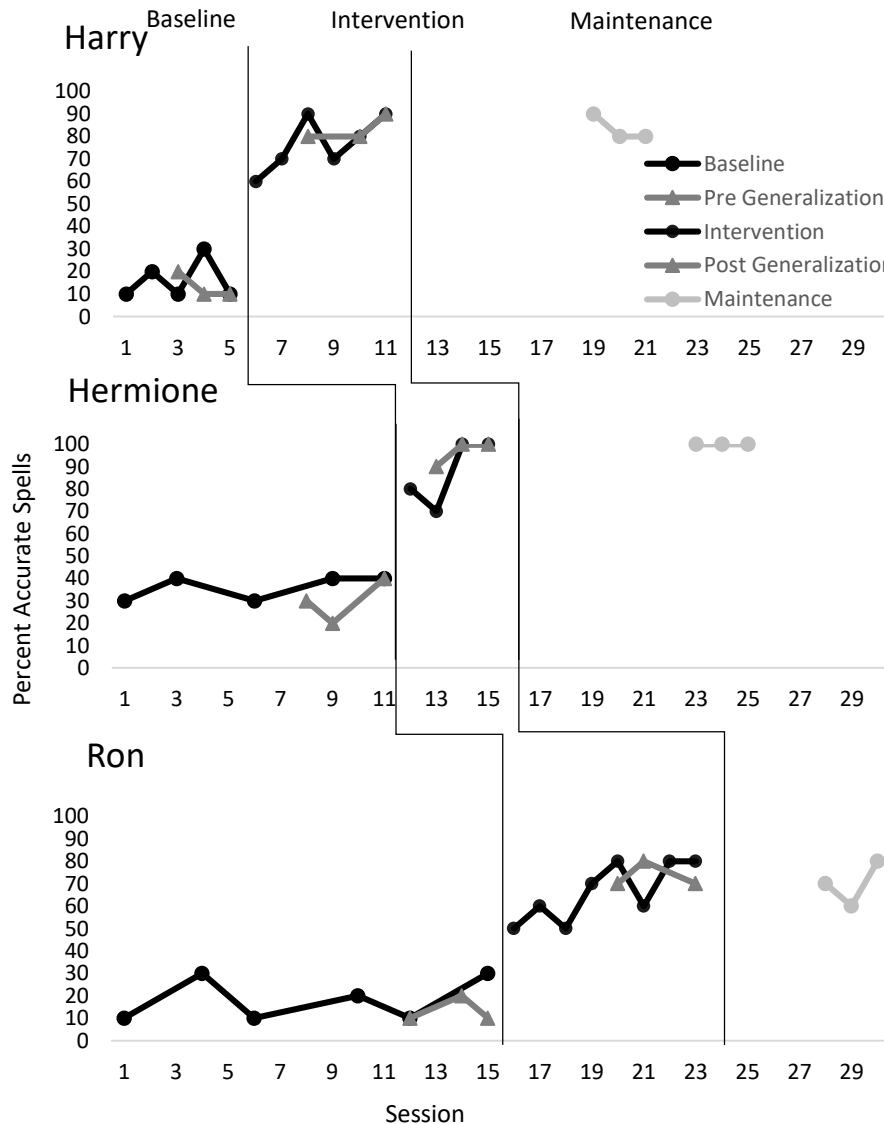
Legend Options

Legend Position

- Top
- Bottom
- Left
- Right
- Top Right

Show the legend without overlapping the chart

Exporting the graph



- Copy and paste from Excel into the final location (e.g., Word, Powerpoint)
- To insert phase lines, click on **Insert>Shapes>Connector:Elbow**
- Copy and paste the elbow and match two (or more) up to cover all participant graphs, and to separate intervention from maintenance
- Change the lines to black under **Format**
- Move the phase lines pixel by pixel using the arrow keys
- Add axis titles and phase titles as text boxes using **Insert>Text Box**