■ RICK HESSE, Feature Editor, Graziadio Graduate School of Business, Pepperdine University

Box and Whiskers Again

Rick Hesse, Feature Editor

A while ago I showed a clumsy way to get Excel to draw a box and whiskers plot that once set up as a template, would give the user a way of showing this descriptive graph without resorting to add-ins, Visual Basic or macros. The purpose of this tip was to try to keep things as simple as possible and especially to keep the results "live," so that any change in the data results in an immediate change in the graph. Unfortunately, my first attempt at this may have been a bit overwhelming, and thankfully, Paul Hundelt, who does programming and scientific data analysis at bioMerieux Vitek, Inc., emailed me a much simpler way to accomplishing this same objective. He wrote:

> I have been a big proponent of using spreadsheets for data analysis because of the interactivity and insight that it brings to the whole problem analysis process. Because the spreadsheet is always showing you either the results of intermediate calculations or the final numbers, the focus is always on the best way to organize and present the data. I ran into this particular problem when trying to help someone who was putting together a poster for the ASM (American Society for Microbiology) conference. My approach to most problems of this sort is that I always believe there is a way to get Excel to do what you want, but you might have to trick it.

Paul's trick involves using a stacked bar chart and the distance between the five measurements (minimum, first, second, third quartiles, and maximum) for a box and whiskers graph. A brief description is given below, along with an example. Figure 1 shows the five data points for a box and whiskers plot, either hard-coded in B3:B7, or derived from live data using the five quartiles from a range named "data." The data for the graph, however, is derived from the quartiles, and are the lengths shown in B10:B14.

The instructions that follow are for Excel 97, but a similar set of steps is taken in Excel 5.0.

Highlight the five lengths and select Insert Chart and choose the Stacked Bar option (Bar, second option to the right, see Figure 2), click Next and in step 2 indicate

	A	B	C	D
1	**Box & Whiskers Plot - Stacked Bar Char**			
2		Values		
3	Min	32.32	=QUARTILE(data,0)	
4	Q1	52.75	=QUARTILE(data,1)	
5	Q2	57.68	=QUARTILE(data,2)	
6	Q3	65.75	=QUARTILE(data,3)	
7	Max	82.82	=QUARTILE(data,4)	
8				
9		Lengths		
10	1	32.32	=B3	
11	2	20.43	=B4-B3	
12	3	4.93	=B5-B4	
13	4	8.06	=B6-B5	
14	5	17.07	=B7-B6	

Figure 1. Data for box and whiskers graph.

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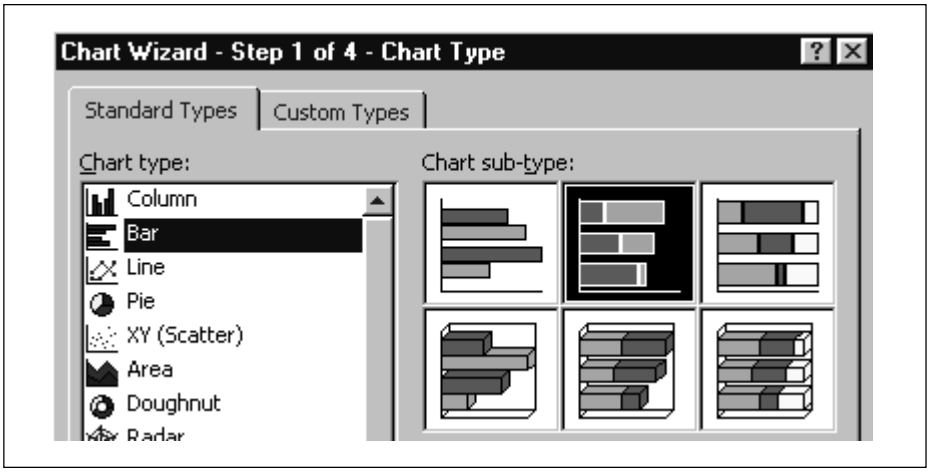

Figure 2: Stacked bar selection.

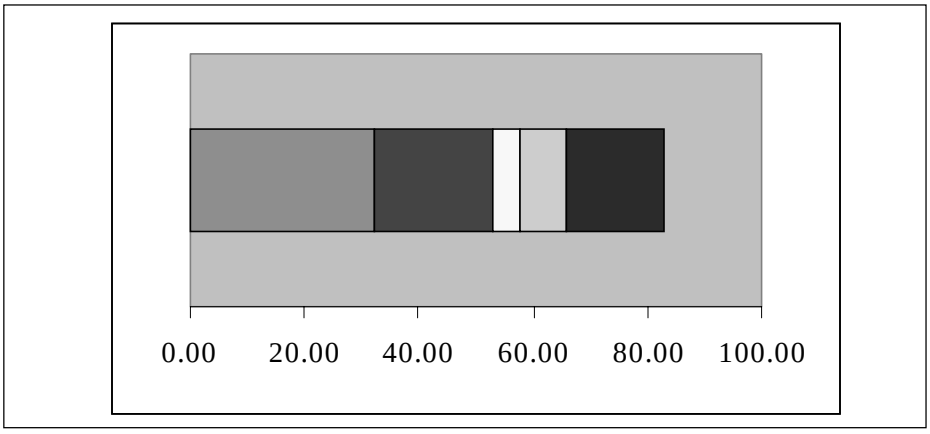

Figure 3: Initial stacked bar graph.

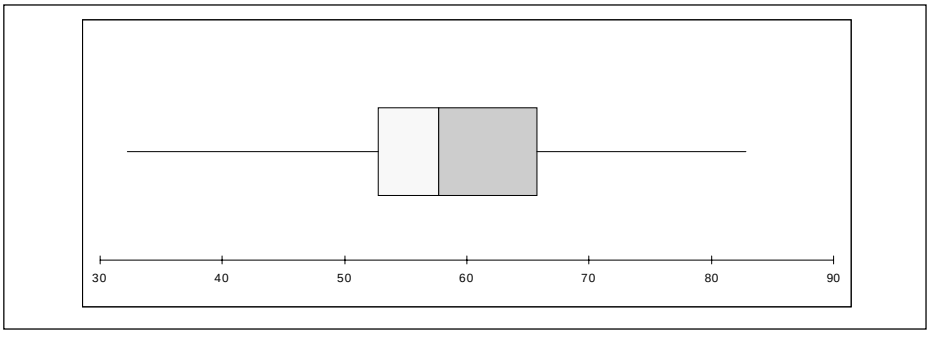

Figure 4: Box and whiskers plot.

Rows instead of the default Columns. For step 3, remove gridlines and uncheck the Legend box. Also uncheck the Primary (called "x" but really the "y") axis.

The initial graph will look like Figure 3 and will need some modification before it looks like a Box and Whisker. We will clean up the true x-axis, remove the background color and we have a stacked bar graph with five boxes.

Click on box 1 (first box on left) and then right click the mouse button. Select "None" for both border and outline from the Patterns tab. Move to box 2, click and then right click and again "None" for both border and outline, but also choose the Y Error Bars tab and select the "Minus" option and set to 100%. Do the same for box 5. After adjusting the x-axis scale, the final product should look like Figure 4.

The last and most important step, after you have the graph looking as you desire, is to save it as a built-in graph for your copy of Excel. Click on the border of the chart and choose Chart from the menu, then Chart Type and choose the tab Custom Types.

Next check the "User-defined" button and another menu will appear. Click the Add… button on this new menu and name the chart BoxWhisker and click OK. Now to use this new option, highlight the five data lengths (column) and go to Custom, User-defined and then click the Rows radio button. If you have the data in a row, then click the Column radio button. This will also work for several sets of data to quickly give a comparative set of box and whiskers plots, as shown in Figure 6. This last graph can be a handy visual tool when doing One-Way ANOVAs.

The quartile data for the three data sets is in cells C3:E7 while the calculated lengths are in cells C10:E14, which are highlighted for graphing. This automatically gives three box and whiskers graphs for visual comparative purposes. After following these steps, you should now have your own Box and Whiskers option to use to describe data pictorially. ■

Reference

[1] Hesse, R. (1997). Box and whiskers plots, *Decision Line, 28*(2), 17-18.

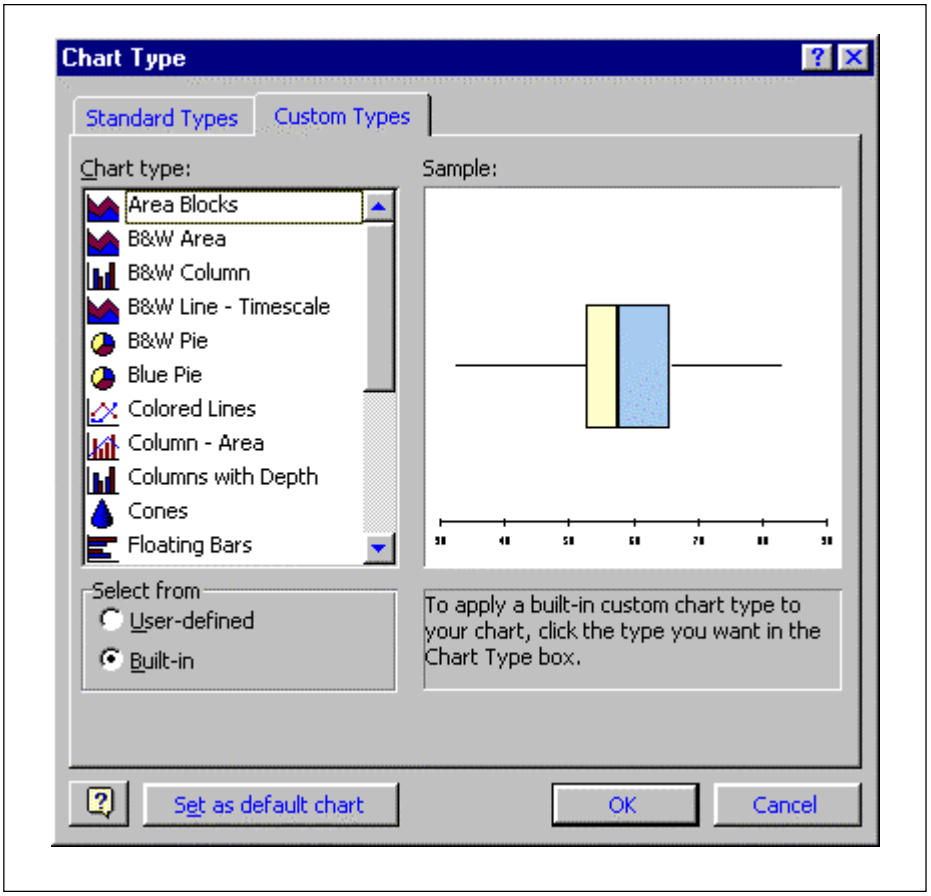

Figure 5: Adding the chart to excel.

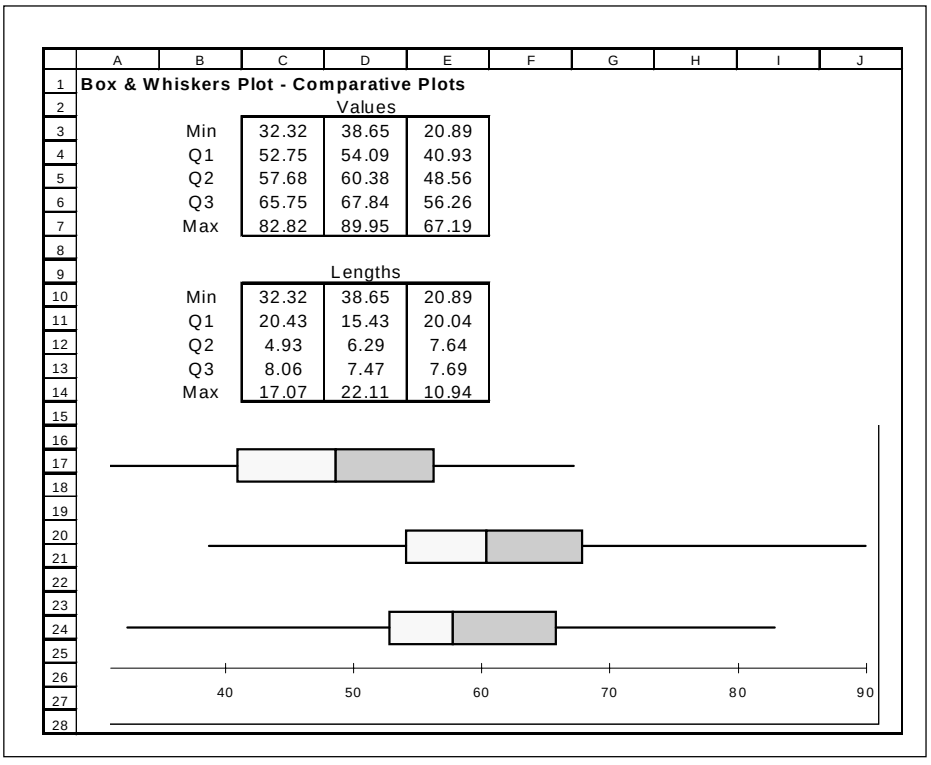

Figure 6: Comparative box and whiskers plot.