# Using SPSS 20, Handout 3: Producing graphs:

In this handout I'm going to show you how to use SPSS to produce various types of graph. I'll use the data in the modified version of the STARS "fast food" database (*Fast-food study SPSS data* on my website.

1. A simple bar chart:
To begin with, we will get a graph that will use the quantitative variable of *Purchases*, to answer the following question: how many times a month do males and females eat fast food? We want a graph that contains two bars: one showing the mean number of fast-food purchases for males, and the other showing the mean for females.
(a) In the "Data view" window, go to the menu at the top of the screen, and click on "Graphs" and then "Chart Builder..". The following dialog box pops up:
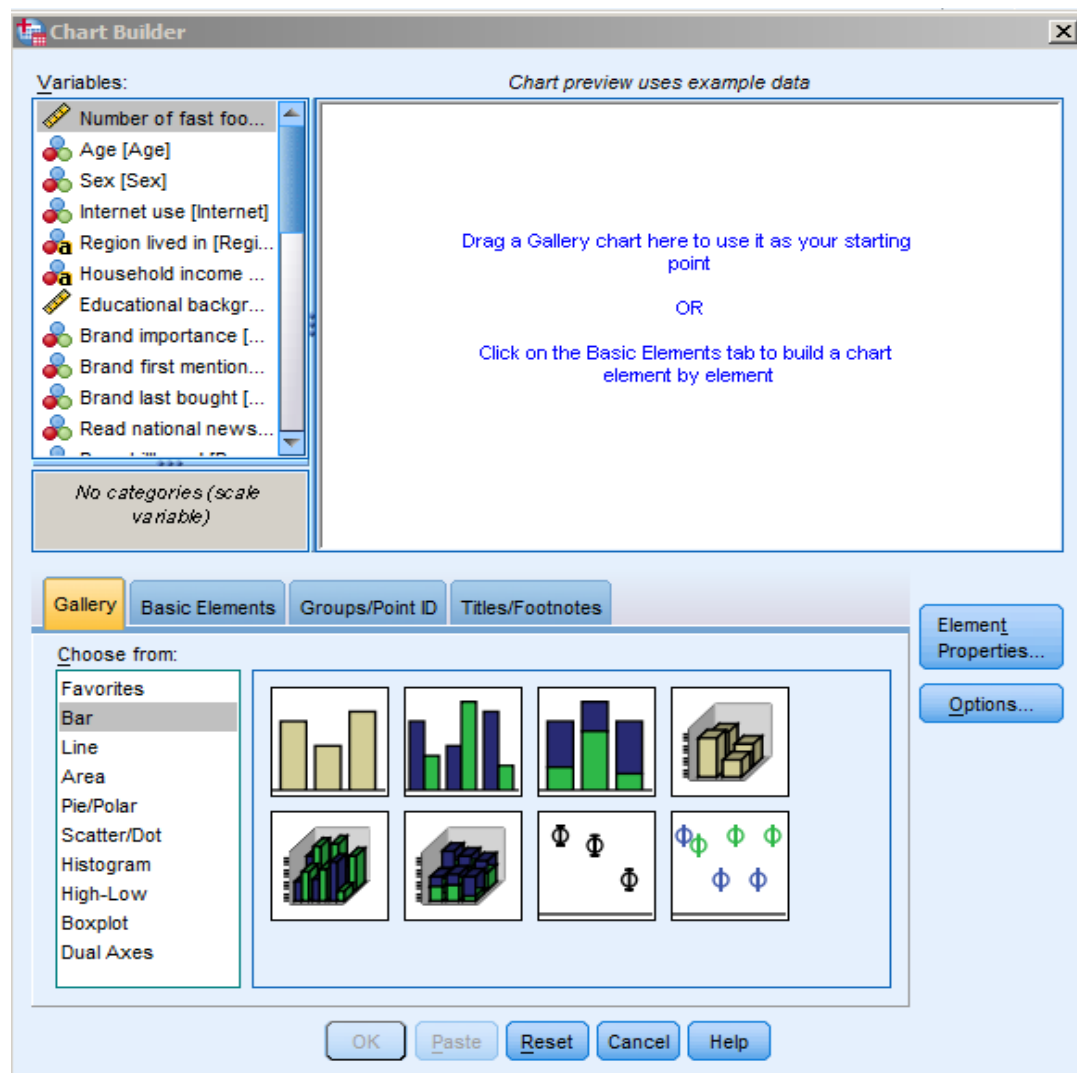
(b) In the "Gallery", click on the graph entitled "simple bar" (top left in the array of little graphs), and drag it into the Chart Preview window above it:
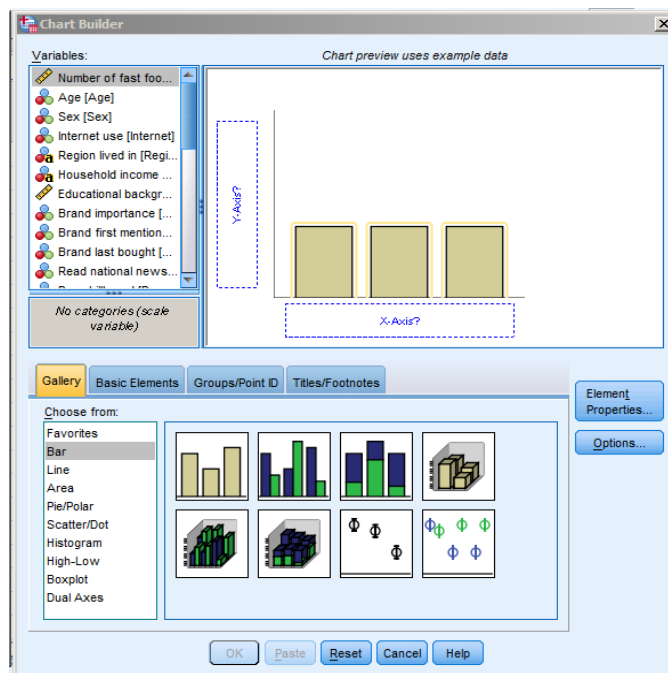
(c) Click on "Number of fast food purchases" in the "Variables" window on the left side of the dialog box, and drag it into the "Y-axis?" box on the preview graph. Likewise drag "sex" into the "X-axis?" box. The default graph will change to two bars, giving some idea of how it will look eventually.
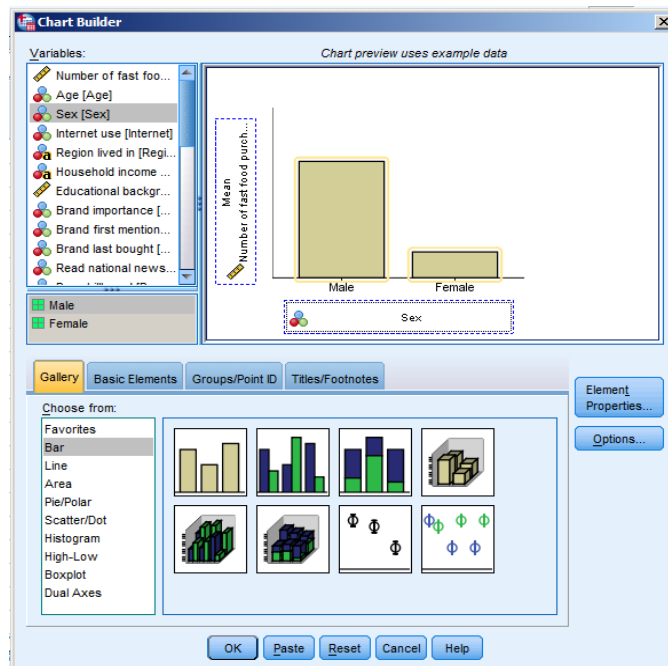
Add a title by highlighting "Titles/Footnotes", putting a tick in the box next to "Title 1", and then clicking on "Element Properties". Type the title that you want in the box labelled "Content", and then click on "Apply" at the bottom. The "Element Properties" box is very useful, as it enables you to change all sorts of things, including what the bars represent: SPSS assumes you want means, but you can change the graph to showing medians, modes and all sorts of other things.
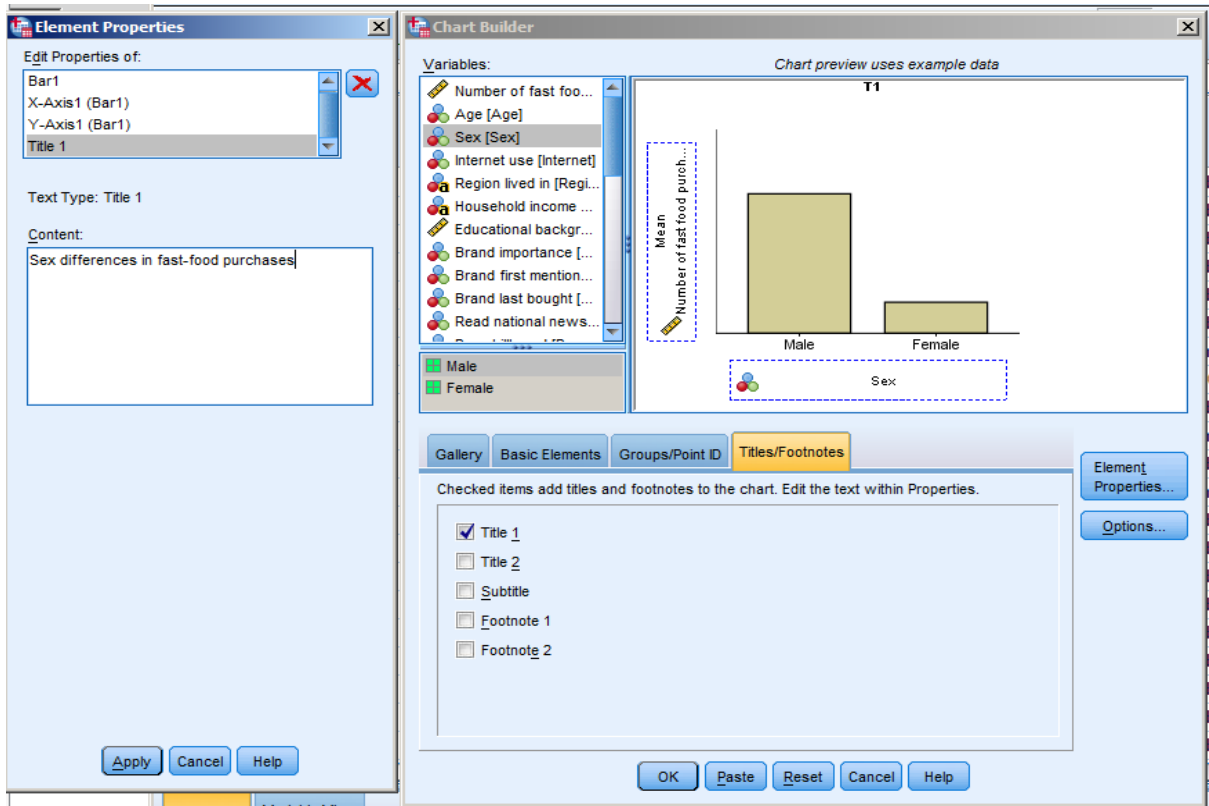
(d) Lastly, put a tick in the box that says "Display error bars". You have various options that you can pick for the error bars. The most common would be to display the means plus or minus one standard deviation, or plus and minus one standard error. Click on "standard error", and then change the number in "multiplier" to 1. Then click on "Apply" at the bottom of the "Element Properties" box; and lastly, click on "OK" in the "Chart Builder" dialog box.

You should have a graph that looks like this:

Gender differences in fast food consumption

Error bars: +/- 1 SE
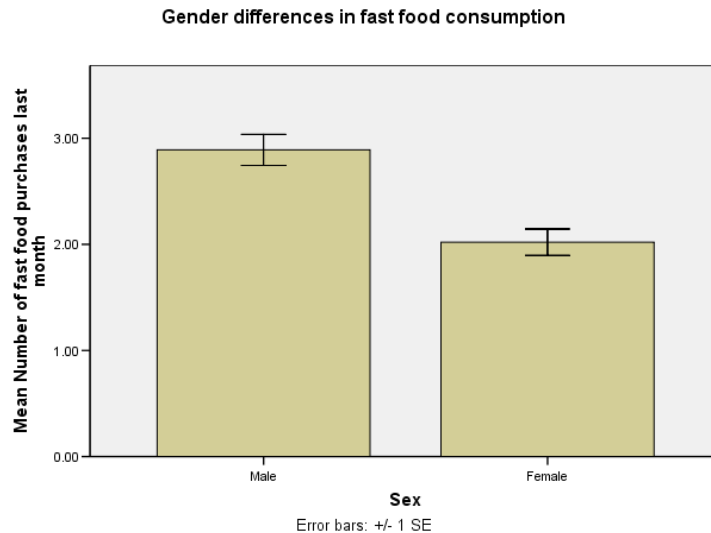
The vertical and horizontal labels are supplied automatically by SPSS from the variable labels (so this is a good reason for making sure that you label the variables appropriately). It also helpfully adds a label that tells the reader whether the error bars represent standard deviations or standard errors.

If you want to alter any aspect of a graph in SPSS, all you have to do is to double click on it, and it will open in a new window called the "Chart Editor". Using the menus at the top of this, you can change the widths and colours of the bars; convert the graph from bars to lines or vice versa; alter the font size of the labels; alter the labels themselves; and so on. Have a play with these features. When you are happy with the graph, click on the "close" button in the top right corner and you will be returned to the output window. Here's my attempt:

Gender differences in fast food consumption
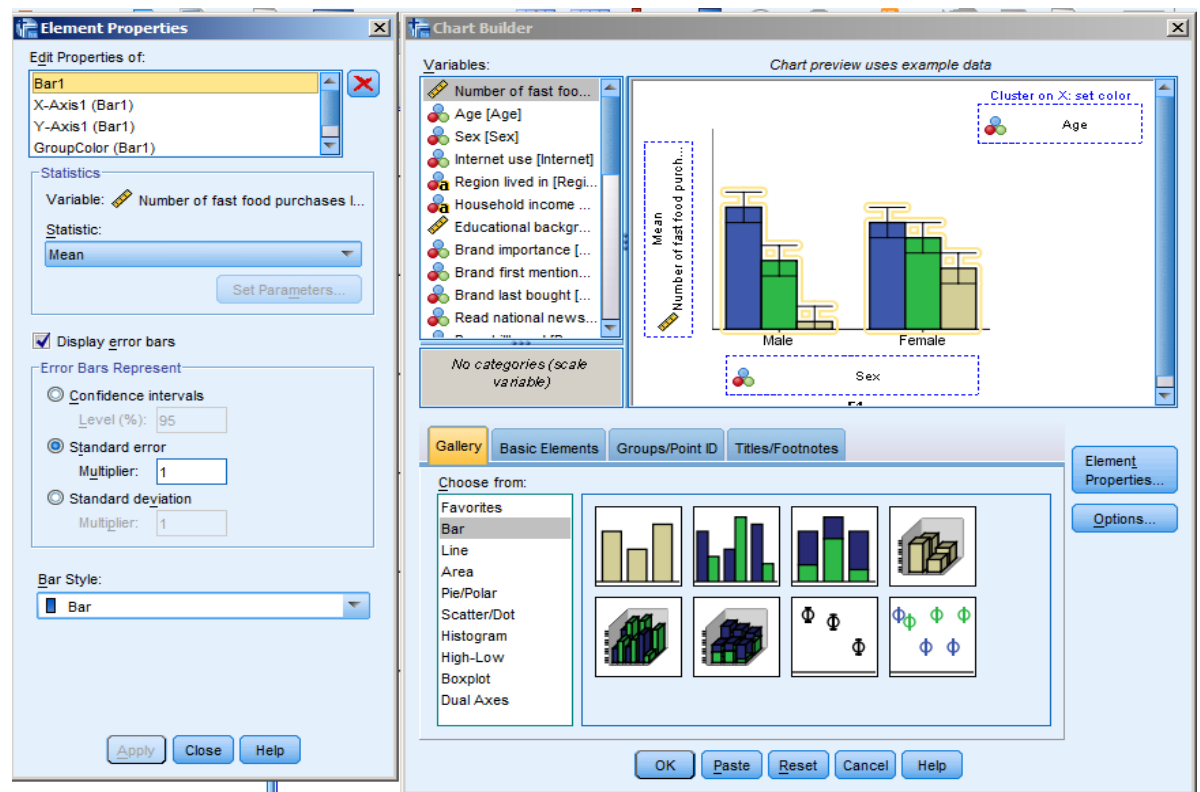

Error Bars: +/- 1 SE
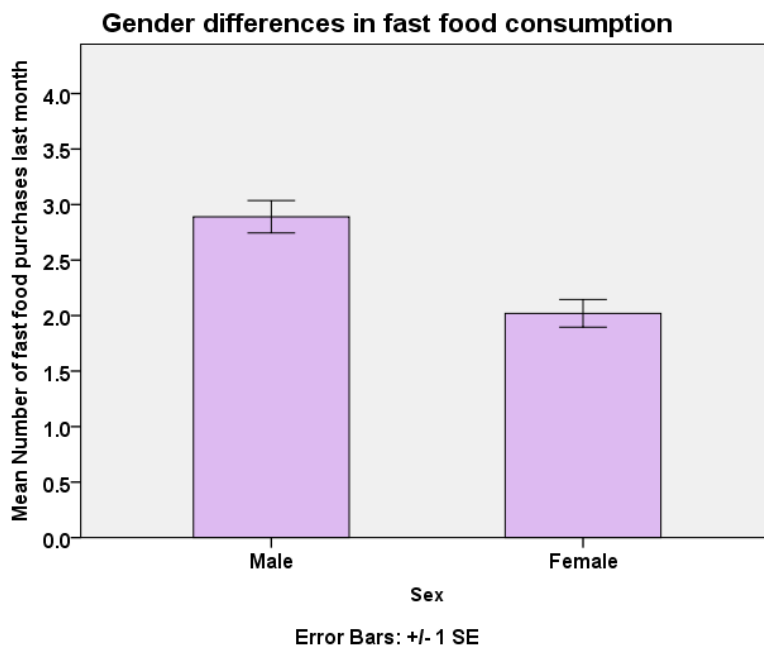
By default, SPSS graphs often use too small a font, so that they look terrible when imported into a Word document. In the above example, I've changed the font to size 18 throughout. I've also changed the vertical scale, the format of the numbers on the vertical scale (from two significant digits to one) and the number of ticks on the vertical scale that are labelled.

2. A clustered bar chart:
Now let's produce a chart of fast food purchases broken down by *two* independent variables - age and sex.

(a) In the "Data view" window, go to the menu at the top of the screen, and click on "Graphs" and then "Chart Builder...". This time, click on the graph labelled "Clustered Bar", and drag it into the Chart Preview" window. (You might want to click on "Reset" at the bottom first, to get rid of the earlier graph):

Everything is entered as in the previous example, except now you put one of your independent variables into "X axis?" box, and the other into the box entitled "Cluster on X, set colour". Here, I've got *Sex* in "Category" and *Age* in "Cluster on X, set colour". Don't forget to set all the various options in the "Element Properties" box, such as error bars.
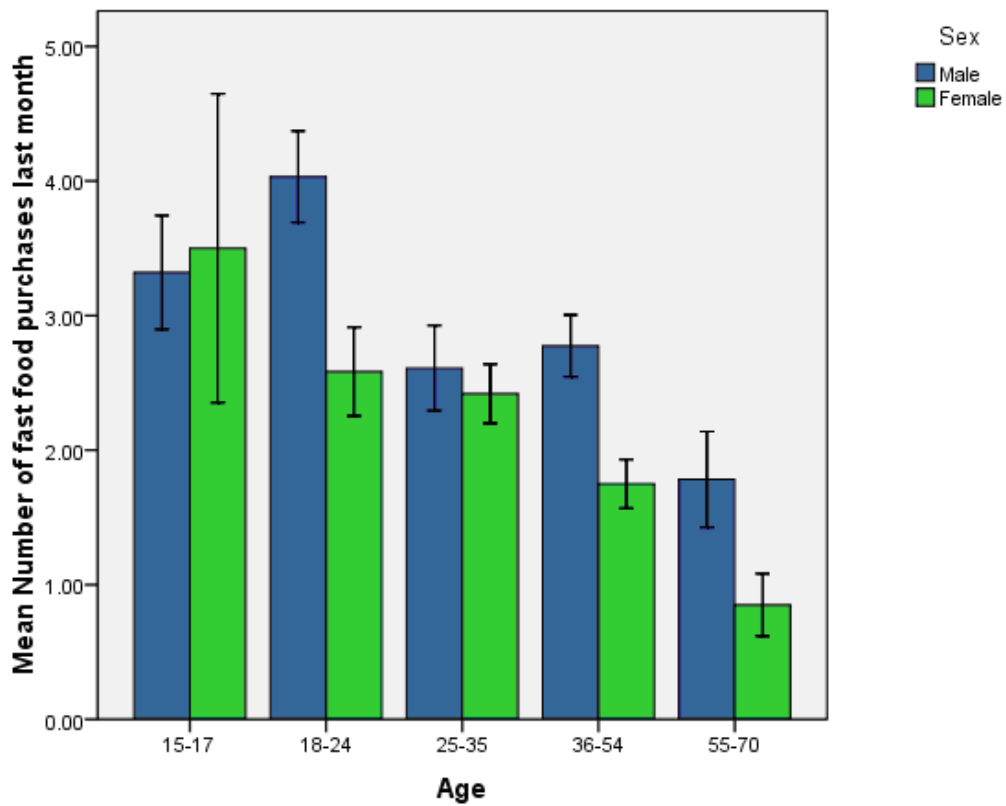
Click on "Apply" and then "OK" in the "Chart Builder" box, and you should get a graph like the following:
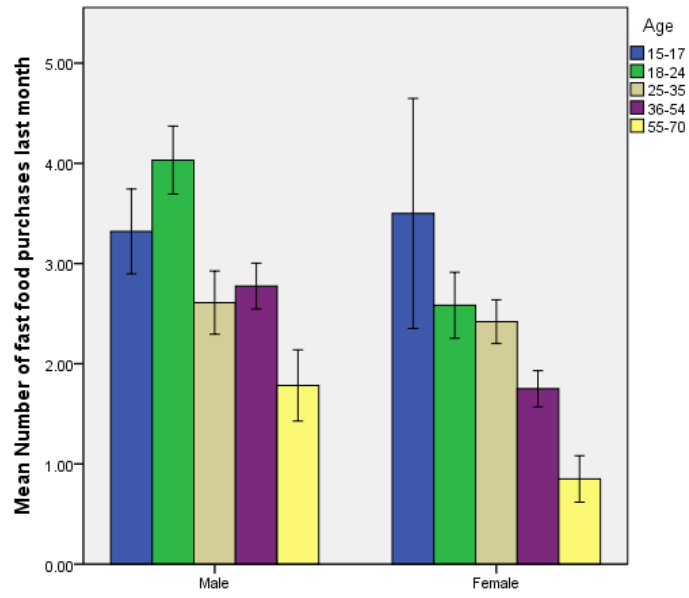
Error Bars: +/- 1 SE

The following graph is the other way round, so to speak, with *Age* in "Category" and *Sex* in "Cluster on X, set colour":


Error Bars: +/- 1 SE

Often you will find that the data make more sense plotted one way round than the other, depending on the questions that you want to answer. Here, I think the first graph makes the age pattern more obvious, whereas the second graph makes it a little easier to compare males and females within each age-category.

3. Line graphs:

Line graphs are just as easy to produce. Click on "Graphs.." then "Line.." and then on the picture for "Simple Line" if you want a graph with one line on it, or "Multiple Line" if you want more than one line. Then follow the same procedures as in the bar chart examples earlier. Here's a one-line line graph with error bars, with error bars representing one standard error. I've altered the font for the axes, so that they remain legible when the graph is reduced in size:

Age differences in monthly mean number of fast food purchases

Error bars: +/- 1 SE
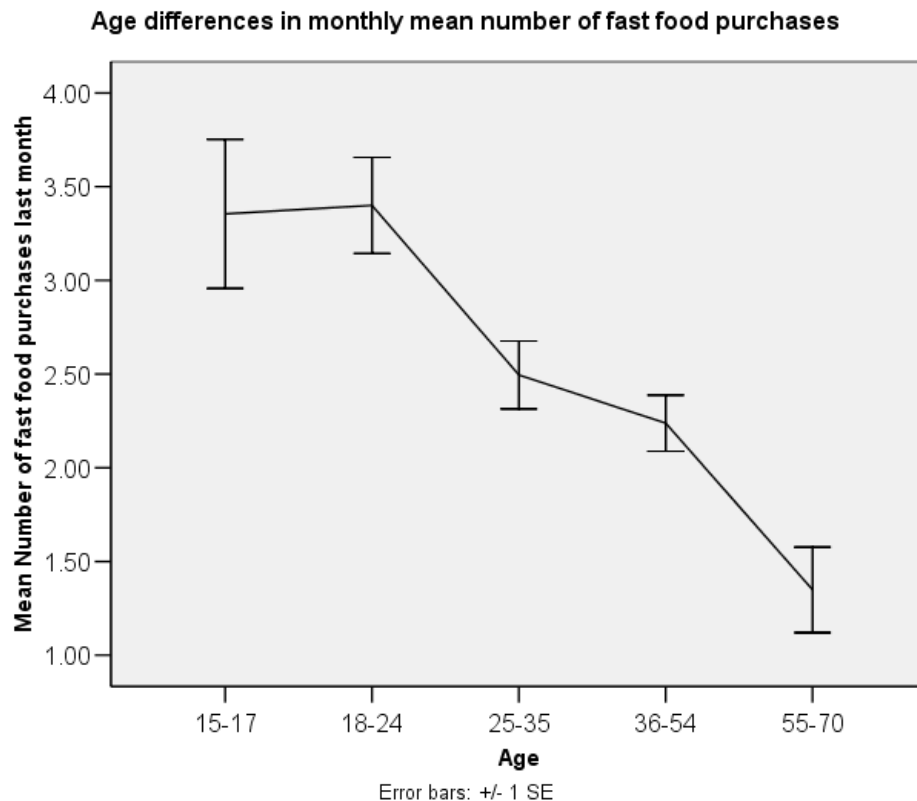
Try to get the same graph as I produced, and play around with the options.

Here's how to produce a "multiple" line version, showing age and gender differences in purchasing behaviour. Click on "Graphs..", then "Chart Builder", then "Line..". Then click on the little graph next to "Multiple " and drag it into the chart preview area. Put the dependent variable (*Purchases*) into the "Y axis?" box. Put "age" into the "X axis?" box. Lastly, put into "Set color:" the IV for which you want separate lines on the graph (in this case, *Sex*).

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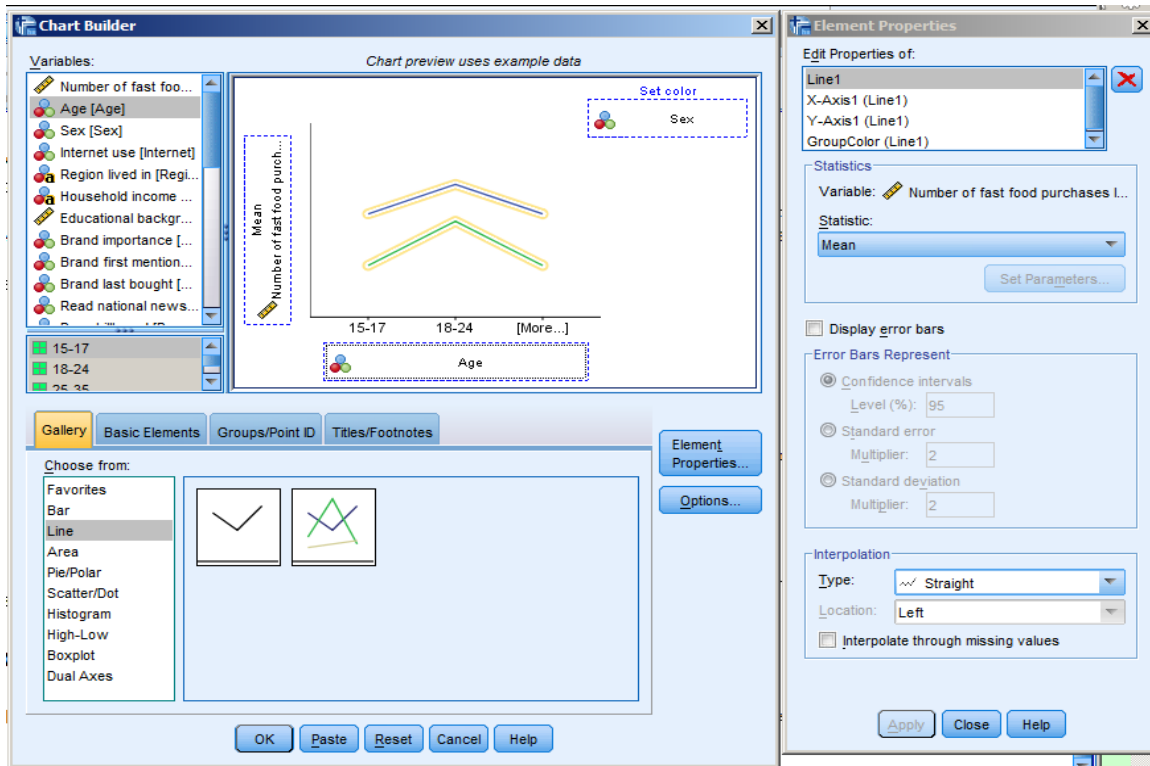
Put a tick next to "Display error bars", and then click on the button next to "Standard error". Change the "multiplier" to 1, so that the error bars will be each mean plus and minus one standard error of the mean. Then click on "Apply" and "OK" to get your graph. It should look like this. (I've altered the font size, and added value markers (little round circles) on the two lines that display the data).

Sex and age differences in monthly fast food purchasing behaviour
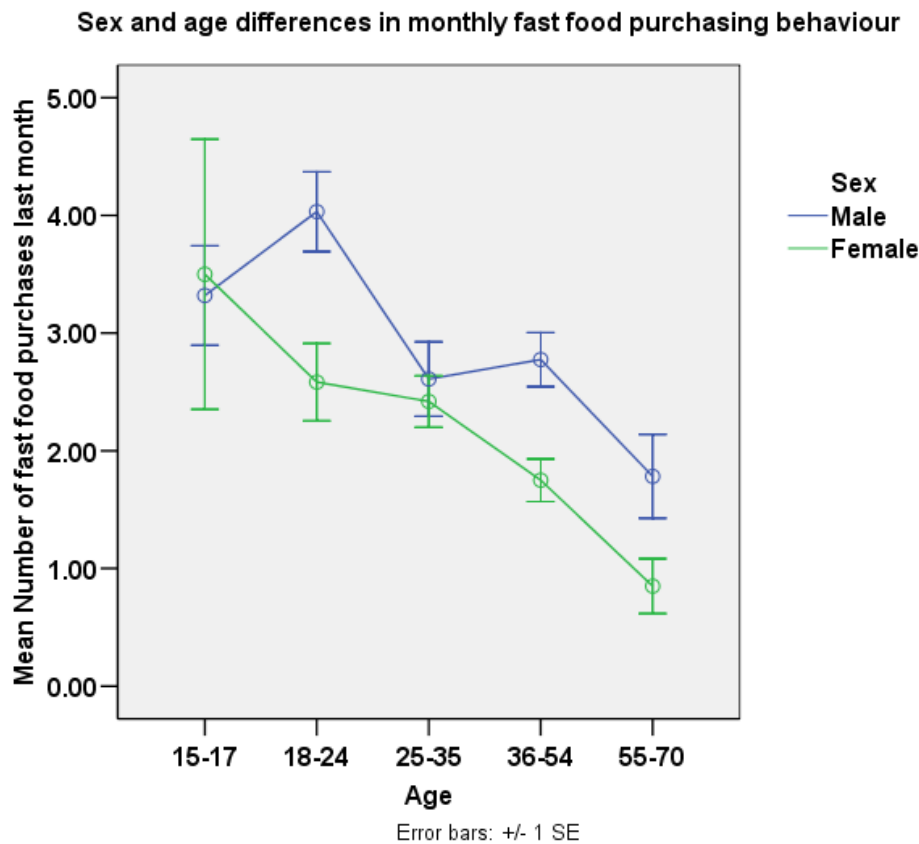
Bar charts of *frequency* data:

The previous graphs have all been concerned with *Purchases*, which are measured on a ratio scale, and for which we have graphed averages of one kind or another. Many of the variables in the fast food spreadsheet can best be described in terms of how often they occur. For example, how many people think the brand of fast food is important? These data are given in the *Brand importance* variable. People could respond by giving one of four answers: "not", "quite", "very" or "don't know". These are **categorical** (nominal) data, so it makes no sense to average them! We can only plot the frequency with which each of these responses occurred.

First, let's produce a simple bar chart of the frequency with which each of these responses occurred. Here are the frequencies, in table form (obtained by clicking on "Analyze", then "Descriptives" and then "Frequencies"). "9" represents "don't know".
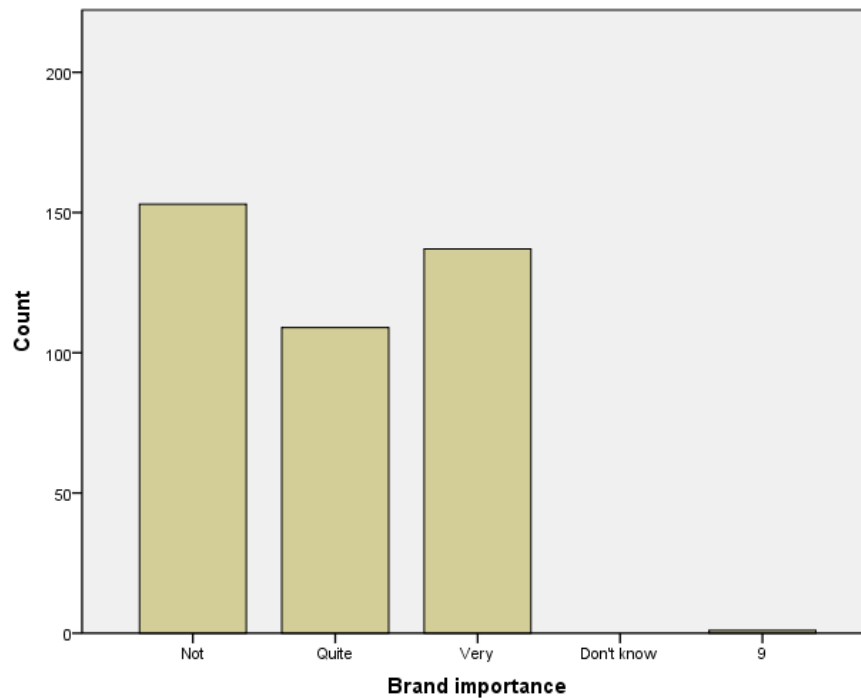
Brand importance

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Not	153	38.3	38.3	38.3
	Quite	109	27.3	27.3	65.5
	Very	137	34.3	34.3	99.8
	9	1	.3	.3	100.0
	Total	400	100.0	100.0	

To present these frequencies graphically, click on "Graphs", "Chart Builder", "Bar" and then choose "Simple Bar" as before. When you put "Brand Importance" into the "X axis?" box in the Chart Preview box. SPSS automatically changes the "Y axis?" box to "count", sensing that

this is a categorical variable. So, in contrast to the previous graphs, you don't have to put anything into the Y-axis box.

Click on "OK" and you should get a graph like the following. I'll leave you to tidy it up: put a title on it, give the vertical axis a more meaningful label, change the colour of the bars and enlarge the font. (If you were going to include the graph in a lab-report, you might want to import it into Word first (see below) and *then* give it a title within Word. There are conventions on figure titles that you should adhere to. (See the handout on writing lab-reports, or Field and Hole 2003). Essentially, all graphs and tables are numbered consecutively - e.g. "Fig.1. Gender differences in ratings of brand importance". However, if you are saving the SPSS output as a file in its own right, it's a good idea to give the graphs titles within SPSS so that when you return to the output, you can remember what they are graphs of!).


Next, we'll produce a frequency chart of brand importance broken down according to gender of respondent. First, here are the relevant frequencies (obtained by clicking on "Analyse", "descriptive statistics", and then "Crosstabs" command).

Brand importance * Sex Crosstabulation

Count

|		Sex		
		Male	Female	Total
Brand importance	Not	82	71	153
	Quite	56	53	109
	Very	61	76	137
	9	1	0	1
Total		200	200	400

To graph these data, click on "graphs", "Chart Builder..", and drag the "clustered bar" image into the "Chart Preview" box.

       Put *Brand importance* into "X axis?" and *Sex* into "Cluster on X: set colour". Here's the graph:
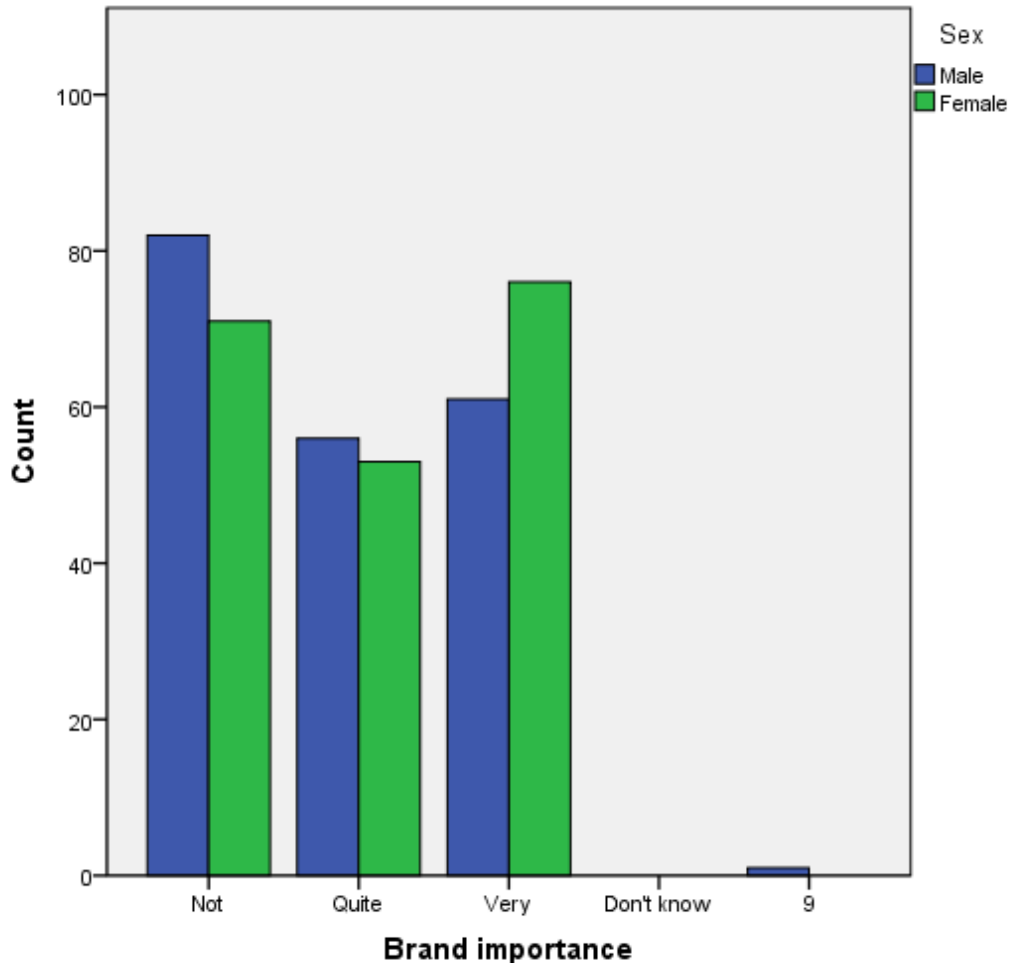
       Again, it could do with some tidying up. You could produce the same graph, but with relative frequencies instead of raw frequencies (i.e. with each column showing the *percentage* of males and females who fell into each of these categories of brand importance). To do that, simply click on "count" in the "Element Properties" box, and change it to "Percentage". Click on "Set Parameters" and change it to "Grand Total".

       Finally, here's the same two variables, but displayed differently. This time I put *Sex* into "category axis" and *Brand importance* into " Cluster on x: set colour ".
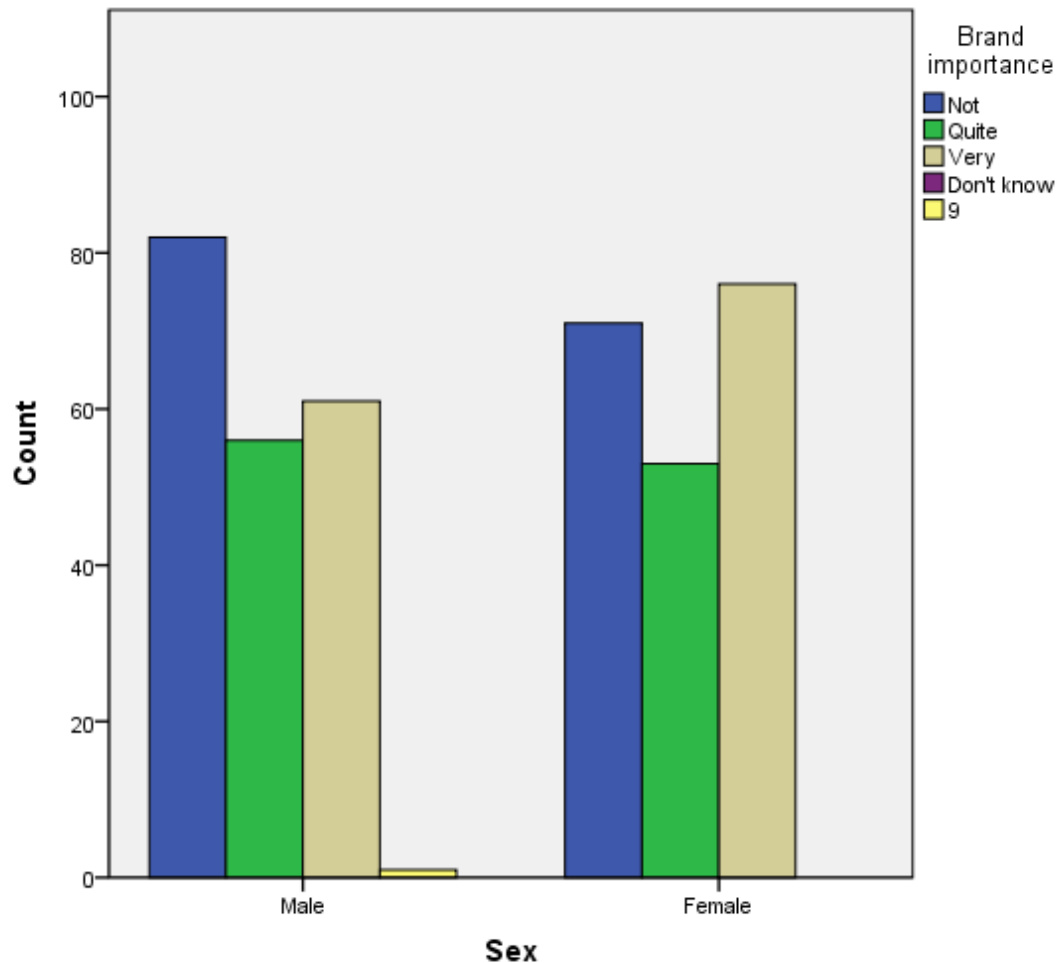
Importing graphs into Word:

Most of the time, you will want to embed an SPSS graph into a Word document, such as a lab report. To do this, click once on the graph in SPSS to highlight it. Then go to the menu at the top of the screen, pick "Edit" and then click on "copy". Switch to your Word document and place the graph in it by clicking on "Edit" , then "Paste Special" and then "Bitmap". If you click and drag on the little black dots around the box that contains the graph, you can resize it. It's best to do this by clicking on a corner dot and holding down the shift key, so that the aspect ratio of the graph is preserved. Otherwise, the text can get distorted and hard to read. You will have to do all of the editing of the graph (colours, labels, font size, etc.) *before* you import it into Word -once it's in Word, it will be a picture, an image rather than a graph as such, and you won't be able to edit it. Be prepared - Word doesn't handle pictures particularly well, and you may find odd things happening as you resize it, such as the graph suddenly jumping from one page to another or occasionally disappearing altogether!

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