

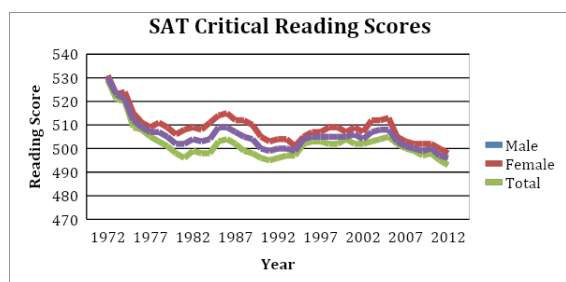
8.3: Graphics in the Media

There are many other types of graphs you will encounter in the media.

Multiple Line Graphs

A line graph is useful for seeing trends over time. Multiple line graphs are useful for seeing trends over time, and also comparing two or more data sets. As an example, suppose you want to examine the average SAT critical reading score over time for Arizona students, but you further want to compare the averages overall and between genders. So, a multiple line graph like the following may be used. As you can see, the average score for SAT critical reading has been going down over the years. You can also see that the average score for male students is higher than the average score for female students for all of the years. The other interesting aspect that you can see is that the average scores for male and female used to be closer to each other, then they separated fairly far, and look to be getting closer to each other again. One last comment is that even though there is a difference between male and female average score, the average scores seem to follow each other. In other words, when the male score was going down, so was the female score. Do be careful. Do not try to make up a reason for the scores to go down. You cannot say why the scores have decreased, since you did not run an experiment. The scores could have decreased because our education system is not teaching as well, funding has decreased for education, or the intelligence of Arizona students has decreased. Or it could be that the percentage of the overall student body that takes the SAT has increased over the years, meaning that more than just the highest ranked students have been taking the SAT in later years, which could lower the averages. Any one of these reasons, or other reasons, could be the right one, and you cannot determine which it is. Do not make unsubstantiated claims. *Note: A next step in analyzing this data could be to compare the AZ trends to national trends.*

Graph 1.6.1: Multiple Line Graph for SAT Critical Reading Scores in AZ



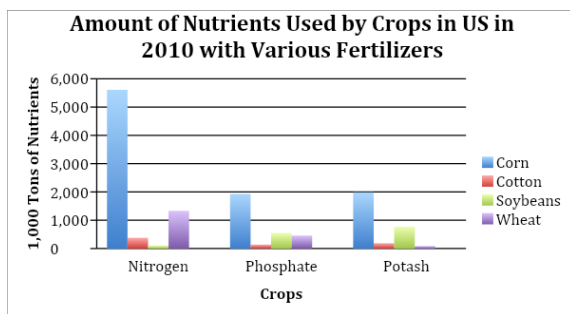
(College Board: Arizona, 2012)

Note: In this case the vertical axis did not start at zero, because if it did start at zero, the different lines would be very close together and difficult to see. When at all possible, the scale on the vertical axis should start at zero. Always carefully consider that if a vertical scale of a graph does not start at zero, the researchers could be attempting to exaggerate insignificant differences in the data.

Multiple Bar Graphs:

Sometimes you have information for multiple variables and instead of putting the information on different bar graphs, you can put them all on one so that you can compare the variables. The following is an example of where you might use this. The data is the amount of nutrients used by crops with various fertilizers. By creating a graph that has all of the fertilizers and all of the crops, you can see that corn with nitrogen uses the most nutrients, and soybeans with nitrogen uses the least amount of nutrients. You can also see that phosphate seems to use low amounts of nutrients for all of its crops. So, a multiple bar graph is useful to make all of these observations.

Graph 1.6.2: Multiple Bar Graph for the Amount of Nutrients Used by Crops: 2010

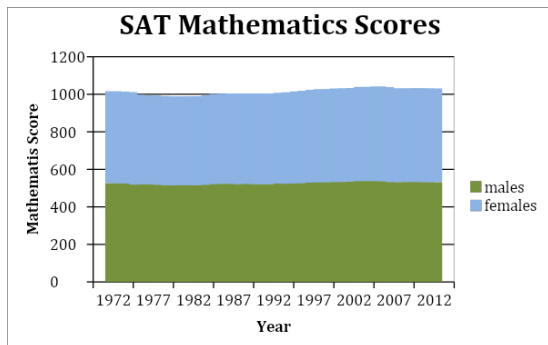


(United States Department of Agriculture [USDA], 2010)

Stack Plots:

A stack plot is basically a multiple line graph, but with the lines separated (or stacked) on top of each other instead of overlapping. This can be useful when it is difficult to interpret a multiple line graph since the lines are so close to one another. To read a given line on a stack plot, you must subtract that line from the line below it. In the example of a stack plot below, you can see that the SAT Mathematics score for males in 1972 is about 530 while the SAT Mathematics score for females in 1972 is about $1010 - 530 = 480$.

Graph 1.6.3: Stack Plot of SAT Mathematics Scores

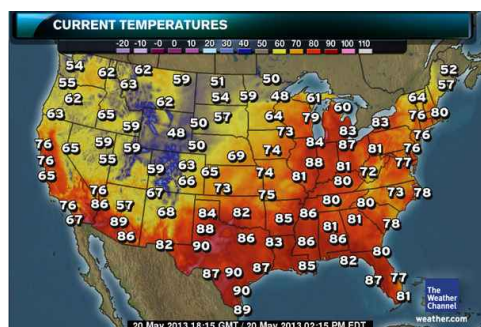


(College Board: Arizona, 2012)

Geographical Graphs:

Weather maps, topographic maps, population distribution maps, gravity maps, and vegetation maps are examples of geographical graphs. They allow you to see a trend of information over a geographic area. The following is an example of a weather map showing temperatures. As you can see, the different colors represent certain temperature ranges. From this graph, you can see that on this date, the red in the south means that the temperature was in the 80s and 90s there, and the blue in the Rockies area means that the temperature was in the 40s there.

Graph 1.6.4: Geographical Graph



(Weather Channel, 2013)

Three-Dimensional Graphics

Some people like to show a bar graph in three-dimensions. Occasionally, a three-dimensional graph is used to graph three variables together on three axes, but this type of graph may be difficult to read. The following graph just represents two variables and so it is basically the same as a standard bar graph, but the three-dimensional look may add a bit more style.

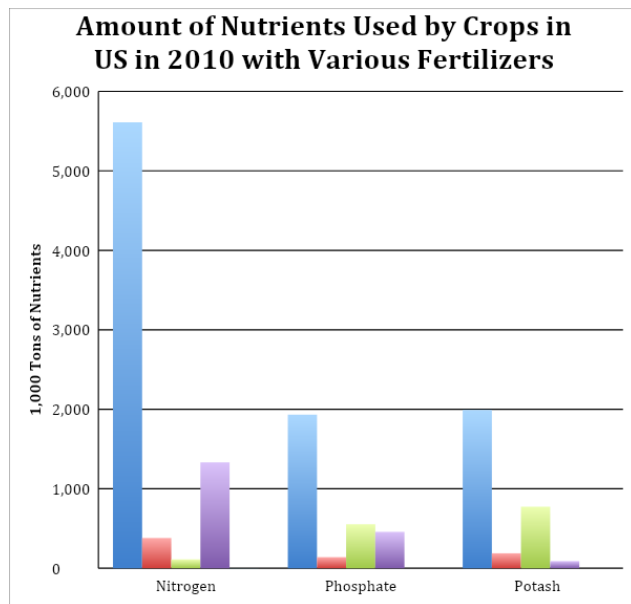
Graph 1.6.5: Three-Dimensional Graph

(USDA, 2010)

Combination Graphics

Some graphs are created so that they combine the data table and a graph or combine two types of graphs in one. The advantage is that you can see a graphical representation of the data, and still have the data to find exact values. The disadvantage is that they are busier, and usually people show graphical representation of data because people do not like looking at the data.

Graph 1.6.6: Combination Graph



(USDA, 2010)

These are just a few of the different types of graphs that exist in the world. There are many other ones. A quick Google search on statistical graphs will show you many more. Just open up a newspaper, magazine, or website and you are likely to see others. The most important thing to remember is that you need to look at the graph objectively, and interpret for yourself what it says. Also, do not read any cause and effect into what you see.

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