Scatterplot Matrices

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When researchers are interested in the relationships between pairs of several continuous variables, they often produce a series of **scatterplots** for each of the pairs. It can be convenient to view these together on a single screen or page using what is usually called a *scatterplot matrix* (though sometimes referred to as a *draftman's plot*). Many statistical packages have this facility. With k variables, there are $k(k-1)/2$ pairs, and therefore for even small numbers of variables the number of scatterplots can be large. This means each individual scatterplot on the display is small. An example is shown in Figure 1.

Scatterplot matrices are useful for quickly ascertaining all the bivariate relationships, but because of the size of the individual scatterplot it may be difficult to fully understand the relationship. Some of the extra facilities common for two variable scatterplots, such as adding symbols and including confidence limits on regression lines, would create too much clutter in a scatterplot matrix. Here, we have included a line for the linear regression and the univariate **histograms**. Any more information would be difficult to decipher.

Figure 1 just shows bivariate relationships. Sometimes, it is useful to look at the bivariate relationship between two variables at different values or levels of a third variable. In this case, we produce a **trellis display** or casement display. Consider the following study [3] in which participants heard lists of semantically associated words and were played a piece of music. Later, they were asked to recall the words, and how many times the participant recalled a semantically related word that was not originally presented (a lure) was recorded. Figure 2 shows the relationship between the number of lures recalled and how much the participant liked the music. There were two experimental conditions. In the first, participants were told to recall as many as words as

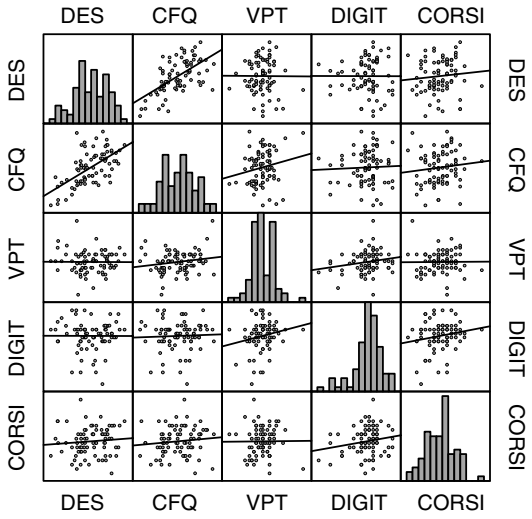

Figure 1 A scatterplot matrix that shows the bivariate relationships between two personality measures (DES – dissociation, CFQ – cognitive failures questionnaire) and impairment from secondary tasks on three working memory tasks (VPT – visual patterns, DIGIT – digit span, CORSI – Corsi block test). Data from [2]

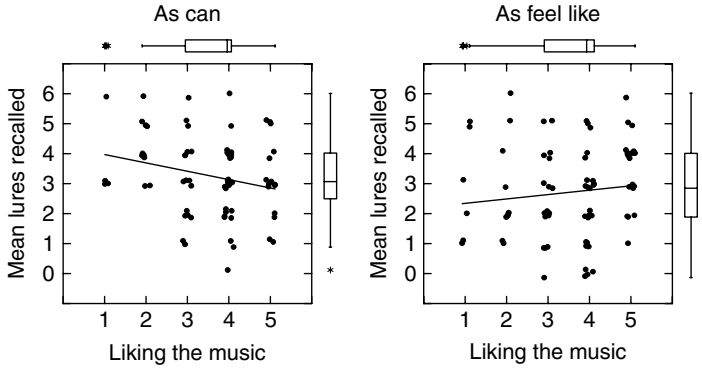

Figure 2 The relationship between liking the music and the number of critical lures recalled depends on the recall task. A random jitter has been added to the points that all are visible. Data from [3]

they could. The more the participant liked the music, the fewer lures were recalled. The argument is that the music put these people in a good mood so they felt satisfied with their recall so did not try as hard. In the second condition, participants were told to recall as many as words as they felt like. Here, the more people liked the music, the more lures they recalled, that is, if they were happy because of the music, they continued to feel like recalling words.

Trellis scatterplots can be used with more than one conditioning variable. However, with more than two conditioning variables, they can be difficult to interpret. If multivariate relationships are of interest, other techniques, such as **three-dimensional scatterplots** and **bubble plots**, are more appropriate.

A useful source for further information on scatterplot matrices is [1].

References

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