

Three Dimensional (3D) Scatterplots

DANIEL B. WRIGHT AND SIÂN E. WILLIAMS

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Editors

Brian S. Everitt & David C. Howell

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Three Dimensional (3D) Scatterplots

A standard **scatterplot** is appropriate to display the relationship between two continuous variables. But what happens if there are three variables? If the third variable is categorical, it is customary to print different symbols for the different points. If the variable is metric, then many packages allow the user to set the size of the data points to represent the value on the third variable and the result is the **bubble plot**. This is what is normally recommended when graphing three continuous variables and the sample size is small. Another possibility is to make a series of two-variable scatterplots for each bivariate comparison, sometimes called a **scatterplot matrix**. But if it is the three-way relationships that is of interest, these bivariate scatterplots are not appropriate.

An alternative procedure available in many graphics packages is to plot the data points for three variables in a three dimensional space. Like the standard scatterplot, the data points are placed at their appropriate location within a coordinate space, but, this time, the space is three dimensional. Because paper and computer screens are two dimensional, it is important to use some of the available features, such as rotation of axes, so that the all the dimensions are clear.

Figure 1(a) shows data on the baseline scores for working memory span using three tests: digit span, visual spatial span, and Corsi block span [1]. These were expected to be moderately correlated, and they are. While this plot can help in understanding the patterns in the data, it can still be difficult to make sense of the data. The Corsi task is more complex than the other two tasks, and the researchers were interested in how well the digit and visual spatial tasks could predict the Corsi scores. The resulting regression plane has been added to Figure 1(b). This helps to show the general pattern of the cloud of data points. Other planes could be used instead (for example, from more robust methods, polynomials, etc.).

There is a sense in which the three-dimensional scatterplots attempt to make the two-dimensional page into a three-dimensional object, and this can never be wholly satisfactory. Using size, contours, and colors to show values on other dimensions within a two-dimensional space are often easier for the reader to interpret.

Reference

- [1] Wright, D.B. & Osborne, J.E. (in press). Dissociation, cognitive failures, and working memory, *American Journal of Psychology*.

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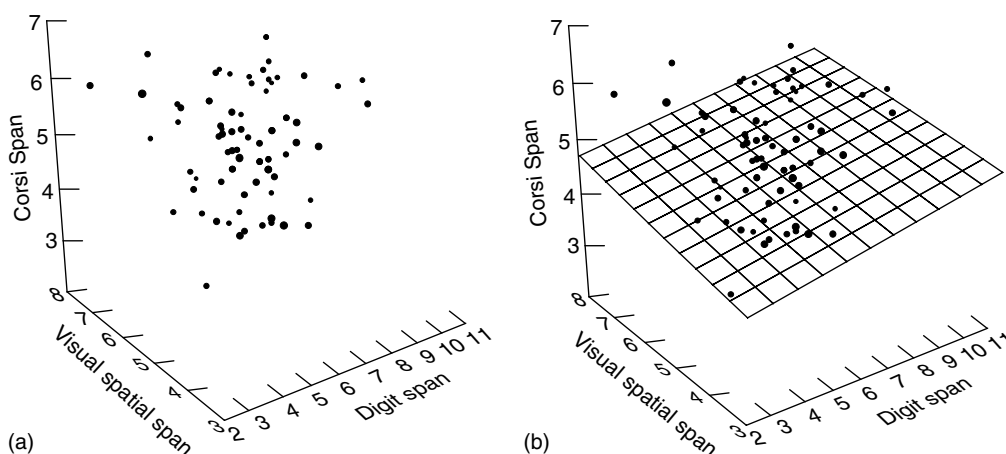


Figure 1 Showing three dimensions in a scatterplot. Figure 1a shows only the data points. Figure 1b includes the linear regression plane