

Appendix 6.1 Further notes on using Idiogrid

6.1.1 Entering a new grid

To enter a new grid into the program so that analyses could be done on the original grid, the following steps were performed:

1. Make the Grid Data window active by selecting Window Grid Data from the Main Menu.

The Grid Data window is composed of a Toolbar, the active grid, and an Options Panel. When Idiogrid is loaded initially, a blank grid (Figure 1.) is automatically loaded and displayed. In the Grid Data window, constructs form the rows and elements form the columns. The emergent poles of the constructs are displayed by default and the implicit (opposite) poles can be viewed by selecting the Construct Poles toggle button labelled 'Emergent' in the upper-left-hand corner of the grid. When the button is pressed once, the label will change to 'implicit' and the implicit poles of the constructs will be displayed. If the button is pressed again, the label will change to 'Emergent': 'Implicit' and the emergent and implicit poles of the constructs will be shown side by side, hence allowing the user to view both sets of construct poles without having to toggle continuously between the two sets. A grid column can be widened or shortened by dragging the vertical line that forms its right side.

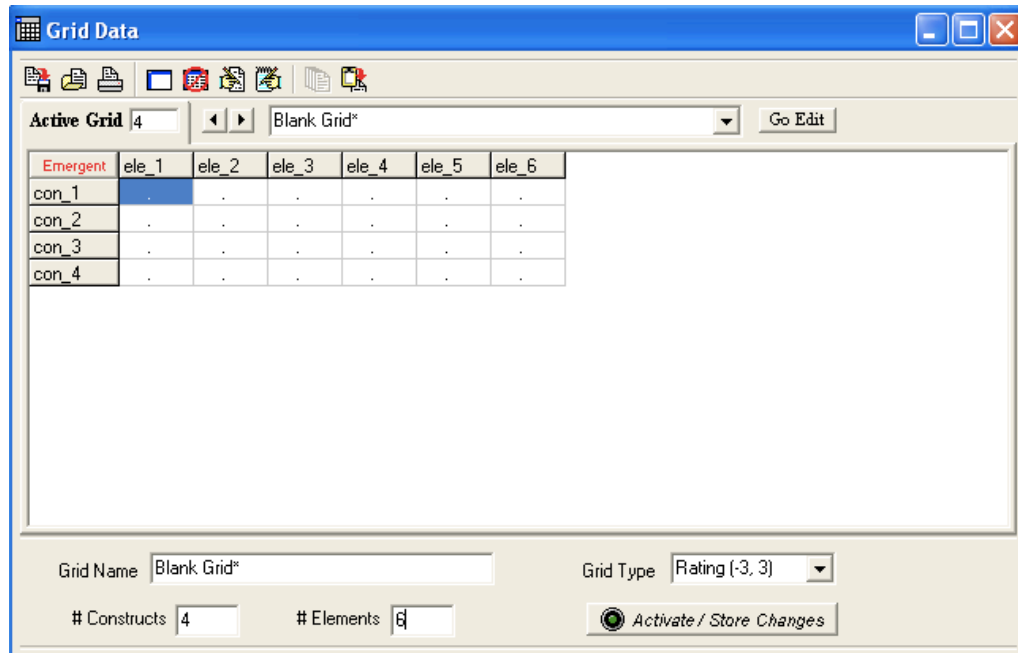


Figure 1. The blank grid data window

2. Select Edit Create New Grid from the Main Menu (or press the Create New Grid button on the Toolbar). A new blank grid with 4 constructs and 6 elements will be created.
3. Change the name in the Grid Name edit box of the Options Panel to the desired title (it is currently, 'Blank Grid', the coding of the grids are similar to that used in the study on Dicotyledonidae: VA, male; MU, female; SC, Sagrado Corazon; an integer, the age of the student in years; two to three alphanumerics, an identifier code for the subject). An example of such a code is therefore: VASC13AN.
4. Change the dimensions of the grid to the desired values by editing the number of constructs (to 21) and elements (to 9). The grid will not change its appearance after entering these numbers. It will only change to the new dimensions once the Activate / Store Changes button is pressed (see step 6 below).

5. Designate the type of grid to be entered by selecting the appropriate option from the Grid Type scroll box (currently set as a rating grid with scale values ranging from -3 to 3) on the Options Panel. The grids to be entered consist of a rating scale that ranges from 0 to 3, 'Rating (min, max)' was selected from the Grid Type scroll box and the endpoints of the scale were entered.

6. The Activate / Store Changes button was pressed on the Options Panel to activate the changes made in steps 3, 4, and 5 above.

7. The construct and element labels were edited (Figure 2.) by selecting Edit, Enter / Edit Constructs or Element from the Main Menu (or by pressing the Enter / Edit Constructs or Elements button on the Toolbar). Bipolar (with both explicit and implicit poles) or unipolar (stating only the explicit poles) constructs can be entered. In this study, the lists of constructs and elements were stored as listed in a text file and copied and pasted into the appropriate box in the enter/edit constructs tile. The Activate / Store Changes button was pressed again.

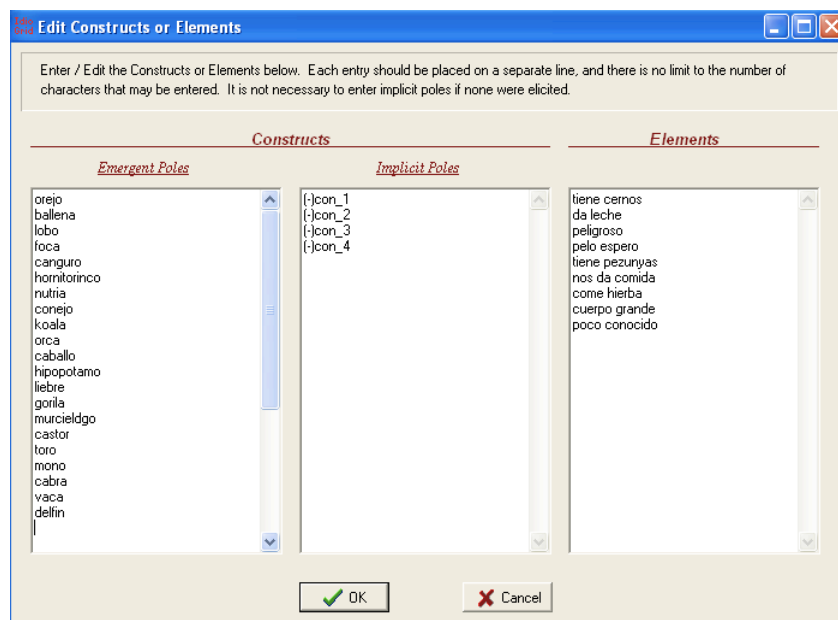


Figure 2. The 'edit constructs or elements' window

8. The framework of the grid was complete at this point (Figure 3.). The grid values can then be typed into the grid, a simple process of type and enter for each complete grid.

Construct	tiene ceros	da leche	peligroso	pelo espero	tiene pezun	nos da c	come hie	cuerpo g	poco cor
Emergent									
orejo									
ballena									
lobo									
foca									
canguro									
hornitorinco									
nutria									
conejo									
koala									
orca									
caballo									
hipopotamo									
liebre									
gorila									
murciélago									
castor									
toro									
mono									
cabra									
vaca									
delfin									

Figure 3. Grid Data window with constructs and elements entered, ready for ratings to be inputted

6.1.2 Saving a Grid

Idiogrid saves grids in a particular format as ASCII files. To save a grid, first make the Grid Data window active by selecting Window Grid Data from the Main Menu. Make the desired grid to be saved the active grid by (1) changing the Grid Index Number next to the words 'Active Grid', or (2) clicking the double-headed Grid Selection Arrow, or (3) selecting the grid from the Grid Name Selector scroll box. Once the desired grid is displayed, select File, Save Grid from the Main Menu or press the Save Grid button on the Toolbar. The name of the grid will serve as the default name of the file to which the grid will be saved. The saved file, however, can be given a different name.

6.1.3 Editing the grids

The number of elements and constructs.

Replacing the existing values with the desired values can change the number of elements or constructs. Values between 1 and 10,000 are allowed. The changes to the active grid, however, will not be invoked until the Activate / Store Changes button is selected. It should also be noted that Idiogrid is designed to handle repertory grids of typical size (for example, 16 constructs and 16 elements). Extremely large grids (with 200+ rows and columns) can also be entered, manipulated, and analyzed, but performance may be slowed depending on the capabilities (e.g., processor speed and RAM) of the computer. In this study, grids of 21 constructs and 9 elements were consistently entered.

Grid Type.

Five types of grids can be analysed with Idiogrid: Rating, Ranking, Binary, Coordinate, and Transformed. Select the appropriate type for the active grid. Changing the grid type will not necessarily have an immediate, apparent impact on the grid. It will dictate, however, which analysis options are made available in different parts of the program and will change the nature of printed output for a number of analyses. Also, if real numbers with multiple decimals (e.g., 1.45 or 1.3333) are entered as grid values, it is important that the grid type be set to 'Transformed', since Idiogrid will not necessarily save all of the decimal places for the other types of grids. It is therefore extremely important that the appropriate grid type be chosen. Rating should be selected if the grid was completed using a non-ranking scale with more than two points (e.g., a Likert-type scale with five

rating categories or a bipolar rating scale with seven points). If 'Rating' is selected, a prompt for the end points of the rating scale (e.g., -3 and 3) will appear. Idiogrid assumes that high scores on the rating scale correspond with the emergent poles of the constructs and low scores correspond with the implicit poles. The poles of all of the constructs can be switched quickly by selecting 'Edit' and then 'Switch Construct Poles' from the Main Menu when the Grid Data window is active. Ranking should be chosen when the grid was completed via a ranking process. Idiogrid automatically assumes 1 to be the top ranking and e, the number of elements, to be the bottom ranking. For example, each row of a ranked grid with 10 elements should contain all values between 1 and 10, with 1 indicating the highest degree of similarity. Binary should be selected for data that is scaled dichotomously. Such data can be entered in any fashion (e.g., 0 and 1, 1 and 2, etc.), but Idiogrid will automatically convert the data to a 0-1 scale, corresponding to the implicit and emergent poles, respectively, for analysis purposes. The user will be notified of the transformation before it is performed, and the changes will be visible in the active grid once they are made. Coordinate should be chosen if the active grid is a coordinate grid. A coordinate grid is a particular type of grid in which the same set of figures serves as both the rows and columns. These figures are rank-ordered to one another in terms of their general similarity, producing a square matrix of ranks with 1's in the diagonal (i.e., each figure is most similar to itself). Transformed is rarely chosen by the user, and refers to a type of grid that can be created in Idiogrid via centring, normalization, or standardization. When one of these transformations is applied to the grid the type will automatically be set to transformed by Idiogrid. The minimum and maximum values in the transformed grid will automatically be assigned as the minimum and maximum scale

values, respectively. Finally, since transformed values are rarely integers, the active grid display will change to a fixed format that accommodates decimal values.

Selecting the active grid

Multiple grids can be loaded into Idiogrid at any given time, as several analyses and manipulations involve pairs or large numbers of grids. Only one grid, however, can be displayed in the Grid Data window (viz., the active grid). There are three easy ways to search for a particular loaded grid and select it as the active grid. The grid selection arrow is a double-headed arrow located to the right of the 'Active Grid' label and Grid Index Number edit box. When only a single grid is loaded it will not be active. When multiple grids are loaded, however, the left or right arrow can be used to move sequentially through the list of grids. If the left arrow is pressed, the user is moved up the list of grids to those loaded first. If the right arrow is pressed, the user is moved down the list of grids to those loaded last. As either arrow is selected the grid index is updated accordingly. The Grid Name Selector is a scroll box located to the right of the Grid Selection Arrow. It displays the name of the active grid. When the down arrow on the right side of the scroll box is selected, a complete list of the loaded grid names appears. The desired grid can then be selected from this list to become the active grid. Using the Grid Name Selector is most useful for locating a particular grid name in a large list.

Idiogrid saves the active grid and its accompanying information, such as the elements, constructs, and notes, in ASCII format. Any word processing program or basic file editor can therefore be used to view the contents of a file saved by Idiogrid. The files are given extensions of .grd by default. These same files can be loaded into Idiogrid by

selecting File, Load from the Main Menu. Any attempt to load a text file that has not been generated by Idiogrid will produce an error message. No direct import procedures are currently available, but grids from other programs can easily be copied into Idiogrid using standard cut-and-paste procedures in Windows.

Any number of grids located in the same file directory can be loaded into Idiogrid at once. Only grid files that have been generated by Idiogrid can be loaded, and these files must have .grd extensions. This option facilitates analysis of a large number of grids or several grids generated by the same individual over time. The number of grids that Idiogrid can load into active memory during any one session is not strictly limited and will depend on the computer's resources. Several hundred grids, however, should easily be managed on almost any modern desktop computer.

The active grid can be exported, complete with construct and element labels, to an SPSS syntax file, a SAS IML file, or a SAS data file. The SPSS syntax file is a text file with an .sps extension that can be loaded directly into the SPSS syntax editor. Once in the editor, selecting the Run button or option will execute the syntax and read the grid into the SPSS data spreadsheet where analyses can then be performed. The constructs will be designated as the variables, and the elements will constitute the observations. The SAS IML file will have a .sas extension and can be loaded into SAS and executed provided that PROC IML has been installed. The SAS IML file sets the grid up as a matrix with constructs forming the rows and elements forming the columns. The SAS text file will also have a .sas extension that can be loaded and executed in SAS. The constructs will be labelled and designated as the variables, and the elements will constitute the observations.

6.1.4 Running analyses

All of Idiogrid's analyses are located under the Analyses option of the Main Menu. It is important to realize that Idiogrid does not use default settings for any of its available analyses; hence, if no options are selected for a particular analysis, no output will be generated. The analysis that was chosen to be conducted using Idiogrid was Slater Analysis of Multiple Grids to produce an averaged grid *inter alia* followed by Principal Components Analysis (to produce a Cartesian plane representing the mental construction of the natural kinds employed in this study).

Bi-variate Statistics

Idiogrid can carry out a number of bi-variate statistical protocols that are useful for examining the relationships between pairs of element or pairs of constructs in a grid. Each of these analyses generates a symmetrical matrix. Consequently, only the values below the major diagonal of each matrix are reported. The correlations between pairs of elements are computed as Pearson Product Moment correlation coefficients. Pair-wise deletion is used and a note is printed to remind the user of this fact when at least one missing value is present in the grid. Idiogrid first computes the covariance between two elements, x and y , as follows:

$$Cov_{xy} = \frac{\sum_{i=1}^c (G_{(ix)} - G_{(x)}) (G_{(iy)} - G_{(y)})}{N_{pair} - 1}$$

where N_{pair} equals the number of valid pairs of observations with no missing data for the two elements. The Pearson Product Moment correlation coefficient r_{xy} is then computed.

$$r_{xy} = \frac{Cov_{xy}}{s_x s_y}$$

where s_x and s_y are the standard deviations for the respective elements.

Table 1. *Features of the statistical functions summarized*

Feature	Description
Element Angles (Degrees)	The correlations among the elements computed above are transformed to angles, in degrees, by taking the arccosine of the correlation coefficients. For example, the arccosine of 1.0 is 0 and the arccosine of 0 is 90. These angles can be converted back to correlations by computing their cosines.
Element Euclidean Distances	The Euclidean distance represents the distance between two elements in the c-dimensional space formed by the constructs, which are assumed to be orthogonal in the formula
Element City-Block Distances	The city-block distance represents the absolute discrepancy between two elements across all of the constructs
Element Jaccard Proximities	The Jaccard proximities are only computed for binary grids and they represent the degree of similarity between pairs of elements