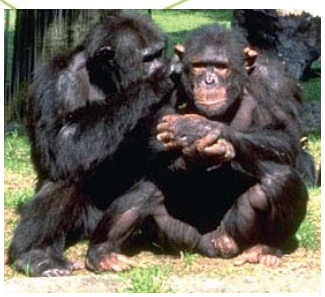
Noldus
Information Technology

MatMan™

Powerful software for matrix manipulation and analysis



MatMan is a powerful tool for performing a wide variety of ethological analyses on sociometric, behavioral profile, and behavioral transition matrices. To meet the current computing standards, Noldus Information Technology has developed MatMan for Windows, combining analytic power with user-friendliness and flexibility. MatMan for Windows is available as an add-in for Microsoft Excel, the industry-standard spreadsheet program.

MATRIX CHARACTERISTICS

In MatMan, matrices can be imported from other programs (e.g. The Observer) or typed in manually. There are virtually no limitations to the kind of matrices that can be analyzed. However, the analysis functions in MatMan are especially suitable for the following types of matrices:

	Queen	Worker 1	Worker 2	Worker 3
Queen	*	2	4	1
Worker 1	8	*	11	3
Worker 2	12	5	*	9
Worker 3	18	6	5	*

Sociometric matrices

Behavioral interactions between individuals, for instance in a bee colony, can be represented in a sociometric matrix. In this type of matrix, each cell contains the frequency of interactions shown by one individual (the actor) towards another individual (the receiver). In addition to behavioral interactions, physical distance and other associations between individuals can be summarized in a sociometric matrix as well.

Behavioral Profile Matrices

Individuals may perform any number of different behaviors. For example, children in a play group do not only play, but they also talk, smile, walk, etc. The behavioral profile matrix provides a quick overview of the frequency or duration of each of the behaviors for each individual. This means that if the individuals are indicated in the rows, each row will contain the behavioral profile of an individual.

	Play	Talk	Laugh	Walk
Alex	6	2	5	11
Jenny	1	12	10	1
Tom	8	7	2	3

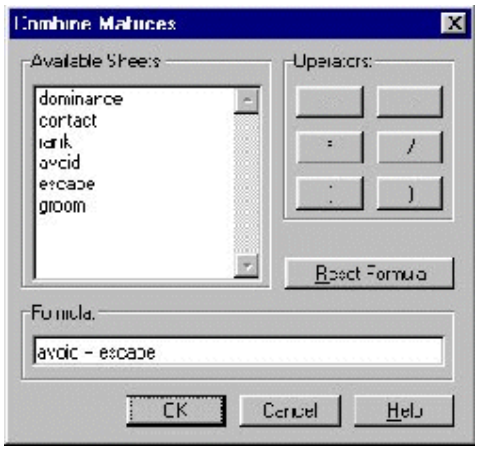
Behavioral Transition Matrices

Recording the consecutive activities, movements or postures of one or more individuals will result in a sequence of behaviors. Subjecting this data set to a lag sequential analysis may result in a transition matrix, in which each cell contains the frequency with which one behavior follows another.

	Embrace	Groom	Scream	Threaten
Embrace	*	8	7	14
Groom	5	*	4	2
Scream	4	7	*	3
Threaten	14	1	2	*

Matrix Manipulation

MatMan offers an elaborate set of options to manipulate the structure and content of a matrix. The program adds the following options to the standard Excel functionality:

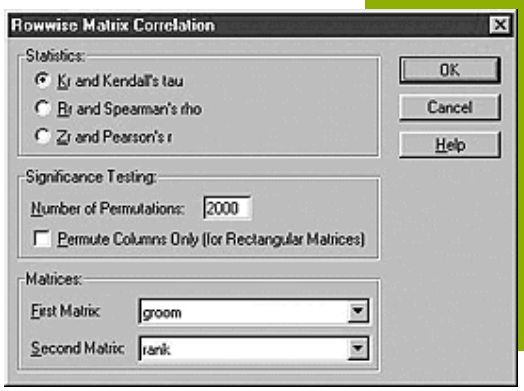


- **Reordering rows and columns of a matrix** *according to age, sex, family or any other user-defined sequence.*
- **Transposing a matrix,** *to enable direct comparison of matrices, like hierarchy matrices based on dominant and submissive behavior.*
- **Adding or subtracting the upper and lower triangular halves of a matrix**, *which results in a symmetrical matrix.*
- **Assigning new values to matrix cells with values within a user-defined range or to specific rows or columns**, *to quickly create your own matrix.*
- **Assigning zeroes to diagonals or triangular halves**, *to correct for scoring errors.*
- **Cell-wise matrix addition, subtraction, multiplication and division**, *making it possible to lump behavioral categories or to calculate relative frequencies.*

Matrix Analysis

Social Dominance

Researchers interested in social structure, whether they study primate colonies, a flock of birds, groups of children, people in a meeting or any other group-living species, may wish to gain insight in the dominance hierarchy of the group studied. MatMan not only allows you to determine the dominance hierarchy within the group, it also gives an assessment of the strength, as well as the statistical significance, of the linearity in the observed dominance relationships. In addition, the dominance matrix can be reordered to reflect the social structure in the observed group of individuals.

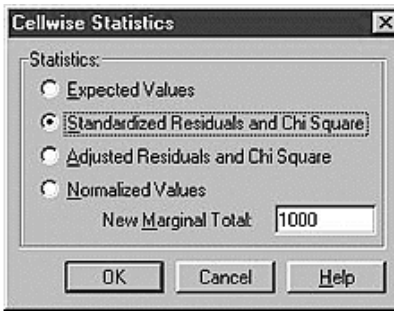


Matrix Correlation Methods

The matrix correlation methods in MatMan are very well suited for the investigation of associations between different types of behavioral, or other dyadic, relationships amongst the individuals of a group. For instance, correlations between kinship, rank distance, physical proximity and other relationships may be obtained. MatMan offers the Mantel test for square matrices (Z and R statistic) and row-wise matrix correlation methods for square or rectangular matrices Zr-Test, Kr-Test, Rr-Test). The significance of correlations is assessed by means of permutational tests.

Structure of Behavior

Sequences of activities, postures, movements, positions, facial expressions or any other aspect of human or animal behavior may form complex patterns in time. Examples are the acts of somebody executing a complex task, the string of behaviors following the spotting of a predator or the sequence of courtship behaviors. MatMan offers you a quick insight in the structure of behavior by analyzing the sequential structure of the ongoing behavior.



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