Summary of Methods. Inputs, Outputs, and Assumptions.

Method	*Inputs*	*Outputs*	*Assumptions*
MANOVA	g Samples of Data vectors	Tests for equality of multivariate means, MSLC, multiple comparisons	Numerical data, independent vectors, ideally MVN with common cov matrices
MANCOVA	g Samples of data vectors, some variables designated as response, others designated as covariate	Tests for covariate-adjusted equality of multivariate means, MSLC, multiple comparisons	Same as above, except MVN refers to residuals, and we also assume linearity of covariate effects on the response variables
Multivariate Regression	n observed data vectors, some variables designated as response, some designated as predictor	Estimated regression coefficients, tests for effects, partial correlations	Linear effects of the X's on the Y's, independent and identically distributed MVN residual vectors
Principal Components	Covariance or correlation matrix	PC scores that maximize variance	Reliable estimate of covariance matrix
Factor Analysis	" " " "	Estimated FA model	Reliable estimate of cov matrix, Existence of factors, Sigma = $LL` + \psi$, and (ideally) MVN
Confirmatory FA	" " " "	" CFA "	Same as above, except Sigma = (structure determined by the CFA model) instead of $LL` + \psi$.

Structural equations models	" " " "	Same as CFA, except with directional paths relating latent factors instead of bi-directional correlations	Same as CFA, in addition, linearity and correct causal directional determinations of the paths.
Canonical Correlation	" " " ", with pre-defined groups of variables.	Scores that maximize correlation between groups	Reliable estimate of correlation matrix, MVN ideally needed for tests of hypotheses
Discriminant Analysis	See MANOVA input	A classification rule to assign observations to groups, estimated error probabilities	Reliable estimates of the distributions, reliable assessments of costs and priors.
Canonical Discriminant Analysis	" " "	Linear combinations that maximally separate groups	MANOVA assumptions for "optimality", although there nothing wrong with using the method as a descriptive tool.
Hierarchical Cluster Analysis	A distance matrix and a choice of clustering algorithm	Groupings of items from the distance matrix, measures of separation of the groups, tree diagram	A reasonable distance matrix
K-means CA	An nxp data matrix of numerical data, an a priori spec. of nclusters.	Groupings of the observations that are rows of the matrix	Clusters have a constant radius
Multidimensional Scaling	A distance matrix and choice of scaling method	Scores (ideally two for plotting) for each item from the distance matrix, and a measure of how well the distances between scores match the distances in the distance	A reasonable distance matrix

		matrix	
Correspondence Analysis	An RxC contingency table (from n bivariate categorical data pairs)	Scores (ideally two for plotting) for each row item and column item.	Sample size large enough so that cell proportions are reliably estimated
Biplots	An (nxp) numerical data matrix	A plot of (PC1, PC2) data for all n observations, as well as variable directions as determined by the first two eigenvectors.	Two PCs capture a large proportion of the total variance.
Polychoric Correlation	An RxC contingency table of ordinal row and column variables (from n bivariate ordinal data pairs)	A polychoric correlation and se	Belief in the existence of underlying latent variables, and that they are bivariate normal