An introduction to multivariate analysis. Lecture 1. Exploring and presenting inter-relationships

by

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A complete lecture on CD-ROM.

PowerPoint presentation introducing multivariate statistical methods

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This lecture introduces Principal Components Analysis (PCA), Correspondence Analysis, Non-Metric Multi-Dimensional Scaling (nMDS), Cluster Analysis and TWINSPAN.

These are techniques that look at interrelationships among variables and objects defined by a number of variables.

They are termed multivariate because they look at the pattern of relationships between several variables simultaneously.
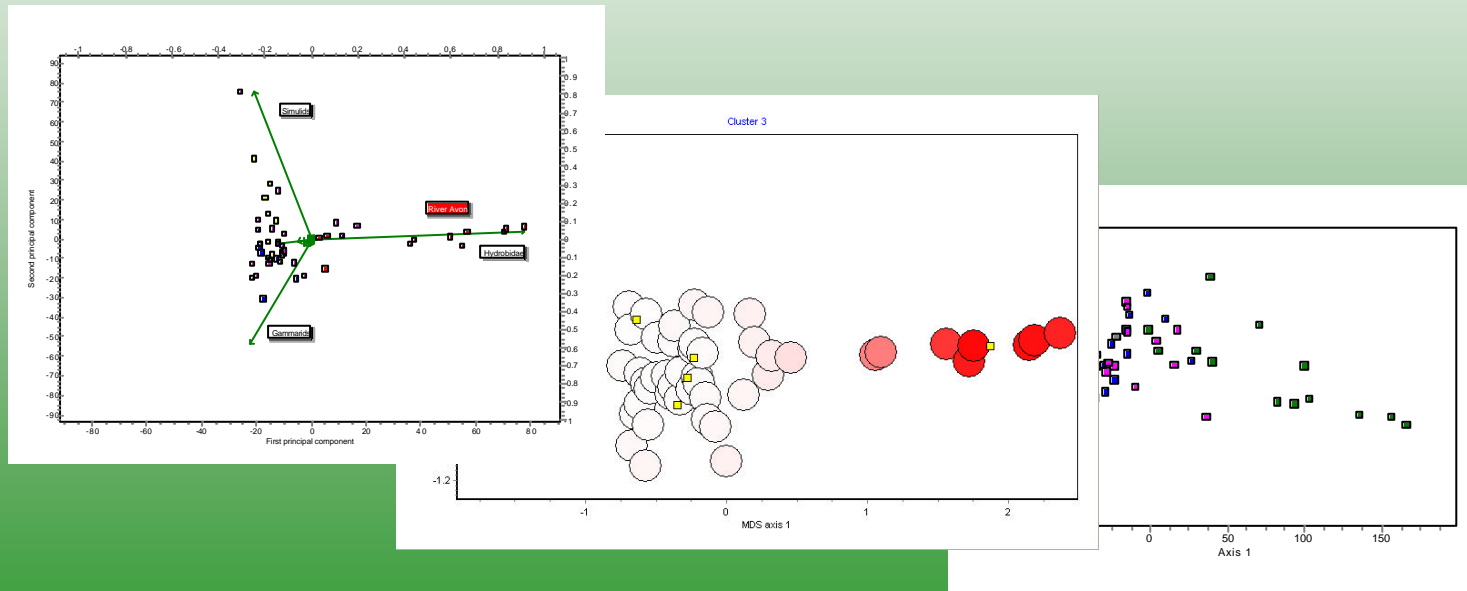
Methods considered here

# We will not consider all multivariate methods here

There are a range of multivariate techniques that examine the dependence between two sets of variables.

For example, multiple regression examines the influence of a number of explanatory variables on one dependent (response) variable.

If there are a number of explanatory and response variables then Redundancy Analysis or Canonical Correspondence Analysis is used.

These regression methods are considered in lecture 2.

In this lecture the data comprise a number of objects which are each described by the same variables.

Explanatory variable 1

Explanatory variable 2

Explanatory variable 3

Dependent variable 1

Dependent variable 2
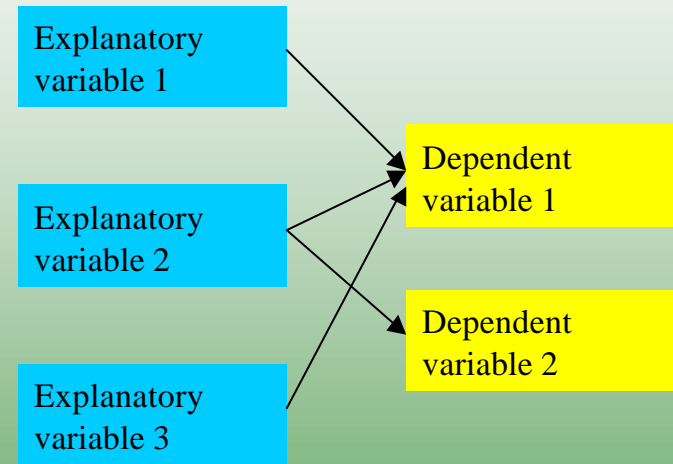
The reasons for carrying out multivariate analysis include

- Classification - dividing variables or samples into groups with shared properties.

- Identifying gradients or trends in multivariate data.

- Identifying which environmental variables are most influential in determining community structure.

- Finally and usually most importantly – we aim to distill from a set of data derived from an almost infinitely complex world the most important features so these can be presented clearly to others.

Classification

Ordination
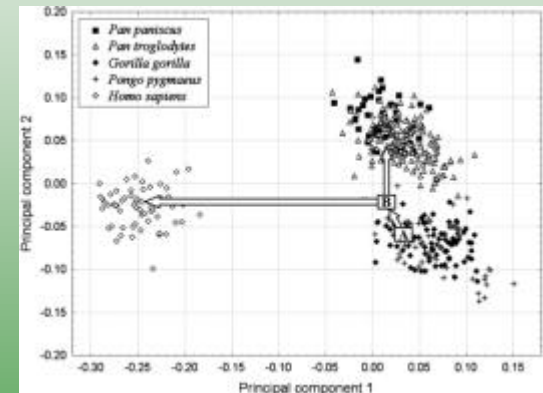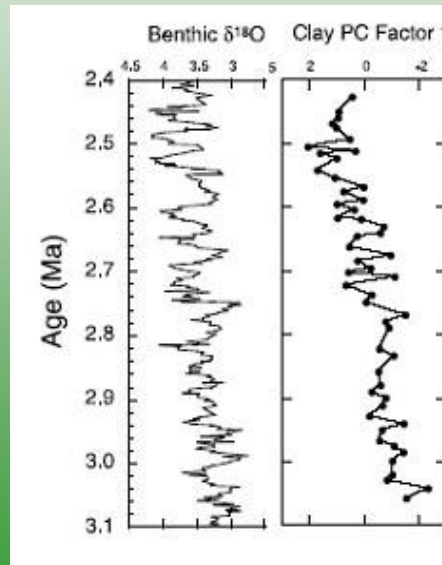

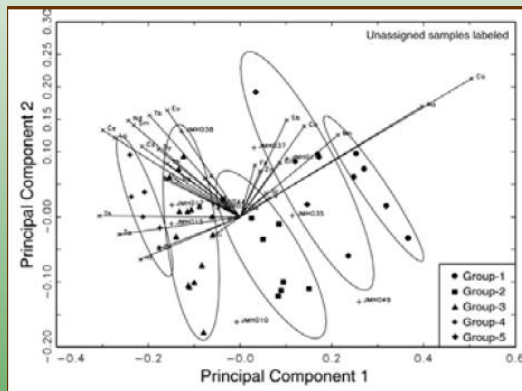The objectives of multivariate analysis
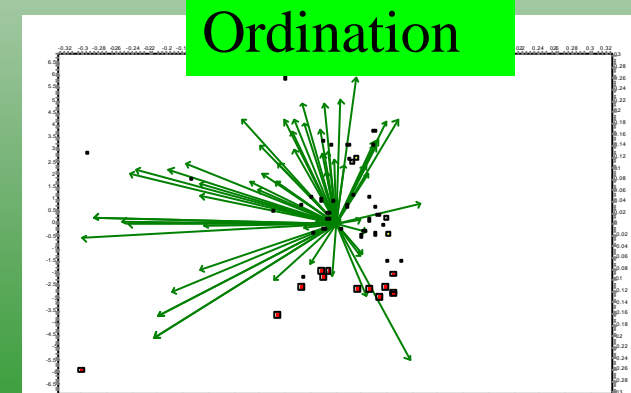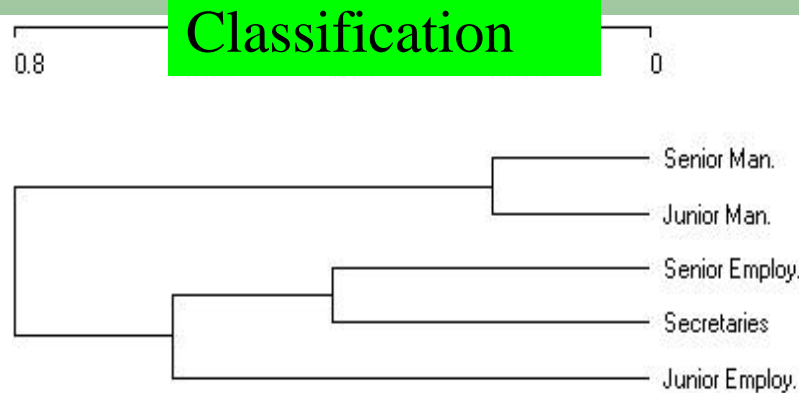
Who uses multivariate methods?

Our main example comes from biology, but multivariate methods are also frequently used in all scientific disciplines, including...

Archaeology - grouping pottery by composition	Geology - researching climate change	Anthropology - comparing skull shape

Multivariate methods are used in all disciplines