18.1 Means plots

Several examples have been seen in previous chapters of the advantages of viewing ordination plots of the samples averaged over replicates within each factor level, or sometimes over the levels of other factors. This reduces the variance (technically, 'multivariate dispersion') in the resulting mean samples, usually allowing the structure of factor levels, e.g. patterns over sites, times or treatments, to be viewed with low stress on a 2- or 3-d non-metric or metric MDS plot. Chapter 5 (e.g. page 5.7 and the footnote on page 5.9) discusses the range of choices here, from averaging transformed data, through averaging similarities, to calculating distances among centroids in high-d PCO space computed from the resemblances, and the point was made that there is not often much practical difference in the resulting ordination of these means.

Here we shall concentrate on just the simplest, and most common case, that of replicate data from a one-factor design (which may, of course, result from a combination of two or more crossed factors or from examining a higher level of a nested design in which the replicates are the averaged levels of the factor immediately below). If the data is univariate, e.g. a diversity measure computed from replicate transects of coral communities sampled over a series of years, standard practice would be to test for inter-annual differences using the replicate data and then construct a *means plot* with interval estimates, as in Fig. 14.5. It is rare in such cases to see a plot of the replicate values themselves, plotted against year, because the large variability from transect to transect in the index can make it difficult to see the patterns, even where these are clearly established by the hypothesis tests. And so it should be with a multivariate response, e.g. the coral species communities themselves: a useful mantra will often be to *test* effects using replicates but – having established the existence of such effects – to *display* them in ordinations on averaged data.

Revision #5
Created 16 March 2022 11:32:18 by Arden
Updated 27 June 2023 22:11:58 by Arden