2-way BEST

On the right of this main dialog box for **BEST** is another option new to PRIMER 7, also covered in Chapter 11 of CiMC, namely the check box (✓Within levels of factor). Essentially, this gives a *constrained* (or *2-way*) BEST procedure in which the match in sample patterns between (usually) abiotic variables and the assemblages is calculated separately for each level of the supplied factor, and the appropriate matching statistic (a matrix correlation) averaged over those levels. Selection of the variables is made simultaneously in all levels of that factor, and the optimum match is therefore given by the variable set which succeeds in maximising this averaged matrix correlation. The idea is that there may often be situations in which the dominant differences between communities are due to an (unordered) categorical factor, which cannot be simply accommodated by adding another (ordered) variable to the abiotic matrix, and is perhaps a nuisance factor in trying to understand the detailed relationship between abiotic and biotic patterns – its effect is fully removed by matching only within the strata of this factor. The analogy with 2-way ANOSIM is strong, e.g. removing the effect of Site when testing for differences over Time, by constructing an R statistic for a Time test separately for each Site, and averaging them. So this analogous matching procedure can be thought of as a *2-way* form of BEST. Just as with ANOSIM, it may be possible (and sensible) to run BEST entirely separately within each stratum of the nuisance factor, e.g. match abiotic to biotic patterns completely independently for each of a small number of geographical regions. However, where there are rather few samples in each region, 2-way BEST provides a ‘half-way house’ in which matching is carried out separately for each region but with common choice of the abiotic variable set, which makes sense if there is not a strong *interaction* between the effect of an environmental variable and the region (e.g. an interaction would be when salinity is crucial to the community in region A but, though varying equally greatly in region B, has no effect on the community structure there). Under these (*additive*, not interactive) conditions, such a constrained, 2-way BEST routine may lead to a much more incisive (powerful) analysis.

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