

Convergence of the iterative procedure

Always check the output for the iterative procedure to ensure that convergence has been reached and a stable solution has been found. If the process has not converged, this will be stated in the output file just prior to the final results. The program will also prompt the user to continue the process if the maximum number of iterations specified is reached and convergence has not yet been attained.

If the iterative procedure is simply converging slowly, increasing the number of iterations will take care of this problem. The convergence criterion may also be relaxed to make convergence easier to obtain, although this may be at the cost of reducing the accuracy of the estimates.

If an increase in the number of iterations still does not lead to convergence, or the addition of one or more predictors leads to a sudden large increase in the number of iterations required for convergence, check the elements of the Tau matrices at all levels of the hierarchy. Small diagonal elements in these matrices indicate that negative variances may have been found, and that attempts by the program to fix this (specified on the **Iteration Settings** dialog box accessed via the **Other Settings** menu) may have been unsuccessful. Intervention by the program in such cases is due to the use of the EM algorithm for estimation in HLM2/HLM3, and the unrestricted sections of HMLM/HMLM2. In the case of special models fitted using HMLM/HMLM2, (homogenous etc.), the Fisher accelerator is used and, if a negative variance is encountered, the program will exit with a message concerning the problem encountered during estimation. If this is the cause of the problem, you may want to fix the slope associated with the problem element of tau, in other words to assume that a common, fixed slope over units is adequate. To do this, remove the random coefficient from the slope in question.