

**PAIRWISE FITTING OF MIXED MODELS FOR THE JOINT MODELING OF
MULTIVARIATE REPEATED MEASURES**

Steffen Fieuws and Geert Verbeke

Biostatistical Centre, Katholieke Universiteit Leuven, Belgium

A mixed model is a flexible tool for joint modeling purposes, especially when the gathered data are unbalanced. However, computational problems due to the dimension of the joint covariance matrix of the random effects arise as soon as the number of outcomes and/or the number of used random effects per outcome increases. We propose a pairwise approach in which all possible bivariate models are fitted, and where inference follows from pseudo-likelihood arguments. The approach is applicable for linear, generalized linear, and nonlinear mixed models, or for combinations of these. Two illustrations will be given. First, 22 linear mixed models will be combined for the joint analysis of longitudinal profiles of hearing thresholds, allowing to study the association of longitudinal evolutions at different frequencies. Second, data from a study which assesses the effect of physical activity on psychocognitive functioning will be analysed. The psychocognitive functioning is measured with 7 different questionnaires, each consisting of a number of binary items. Joint analysis of the 7 questionnaires will be based on the combination of 7 logistic mixed models, and this will allow to draw overall conclusions.