# FLEXIBLE LATENT VARIABLE MODELS FOR TERATOLOGY

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A Generalized Linear Mixed Model (GLMM) for multivariate binary data will be presented that is more flexible towards two common basic assumptions, normality of the latent variable and conditional independency, and this by means of finite mixture distributions and copula functions respectively. Violations of both assumptions may lead to biased inferences.
While the normality assumption puts a constraint on the shape of the distribution of the latent variable, finite mixtures avoid the specification of a parametric form for the latent variable and are capable of fitting a large variety of distributions. The conditional independence assumption states that conditional upon the latent variable (and in addition to the covariates) the outcomes are independent realizations, and thus that the dependence in the data is soley ascribed to this latent variable. Introducing copula functions into the latent variable model can help to provide a more appropriate dependency structure than the one imposed by the conditional independence assumption, while still preserving the model of the univariate marginals.
The model will be applied to a teratology study (Legler & Ryan, 1997) and will be shown a valuable tool for diagnosis and etiology research in the study of birth defects (Holmes, et. al., 1994).