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# Multilevel cumulative logistic regression model with random effects: application to British social attitudes panel survey data

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## Abstract

A multilevel model for ordinal data in generalized linear mixed models (GLMM) framework is developed to account for the inherent dependencies among observations within clusters. Motivated by a data set from the British Social Attitudes Panel Survey (BSAPS), the random district effects and respondent effects are incorporated into the linear predictor to accommodate the nested clusterings. The fixed (random) effects are estimated (predicted) by maximizing the penalized quasi likelihood (PQL) function, whereas the variance component parameters are obtained via the restricted maximum likelihood (REML) estimation method. The model is employed to analyze the BSAPS data. Simulation studies are conducted to assess the performance of estimators.

*Keywords:* Generalized linear mixed model; multilevel model; ordinal response; random effect

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