

# Optimal designs for prediction of individual effects in random coefficient regression models

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## Abstract

In the last years random coefficient regression models have become popular in many application fields, especially in biosciences. Besides the estimation of population parameters describing the mean behavior across all individuals a prediction of the individual response or the individual deviations for the specific individuals under investigation may be of interest, the latter for example in selection studies.

For the determination of optimal designs for estimating the population parameters some analytical and practical results may be found in the literature. Concerning prediction of the individual responses the theory developed by Gladitz and Pilz [1] for optimal designs requires the prior knowledge of the population parameters.

We develop the theory and solutions for prediction of individual response and individual deviations for the practical relevant situation of unknown population parameters. While the optimal designs for individual response will differ from the Bayesian designs proposed by Gladitz and Pilz [1], the Bayesian designs turn out to remain their optimality, if only the individual deviations are of interest, as long as all individuals are treated under the same regime. The obtained theoretical results will be illustrated by a simple example.

## Keywords

Individual designs, Prediction, Individual parameters, Random coefficient regression models, Linear mixed models.

## References

- [1] Gladitz, J. and J. Pilz (1982). Construction of optimal designs in random coefficient regression models. *Statistics* 13, 371–385.