

# **„Asymmetric Loss Functions and Sample Size Determination – A Bayesian Approach“**

by

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The talk is about results of the doctoral thesis „Bayesian Methods for Monitoring Systems“ which was approved in February 2004 at the University of Graz (Social Sciences). The central aim is the efficient implementation of monitoring systems in the field of public health. Frequently such programs are targeted at measuring a proportion e.g. of diseased persons within a population. By considering prior knowledge parameter estimation and sampling planning can be improved.

The consequences of monitoring results can also be built in within a decisiontheoretic framework by loss functions. If one gives different weights to the impact of overestimation and underestimation the use of asymmetric loss functions is straightforward. This has strong implications for optimal parameter estimations. The optimality conditions will be presented graphically, which allows a very instructive approach.

For the problem of optimal sample size determination Bayesian interval based approaches (average coverage criteria, average length criteria) are connected with loss functions. It will be shown that the effect on sample sizes strongly depends on the form of the prior function. A further step is the consideration of imperfect diagnostic tests and the amount of prior knowledge about sensitivity and specificity. To get numerical solutions for these problems analytical methods as well as stochastic simulation procedures are used.