

## Investigation of the experimental Bayesian procedures in SAS® 9.2

G. Nehmiz

Boehringer Ingelheim Pharma GmbH & Co. KG, 88397 Biberach

gerhard.nehmiz@boehringer-ingelheim.com

The 3 procedures GENMOD (not MIXED), LIFEREG and PHREG are re-interpreted in a Bayesian way and the program language is extended by one statement with keywords and options, and a lot of output datasets and output graphs. All calculations are done numerically via MCMC.

(1) Which models are investigated?

BGENMOD and BLIFEREG form one cluster, here we have the GLMMs and the main parametric lifetime models. The procedure BPHREG investigates Cox models (semi-parametric) and piecewise exponential distributions; the simple exponential distribution is an intersection of this with the parametric models.

(2) How are prior distributions represented?

The first impression is that the descriptions are very limited and cumbersome but that is in the end not true. The necessary parameters are very close to the inputs that WinBUGS also needs. For precision parameters, the default pseudo-noninformative priors are Gamma distributions, which has been criticised in the last 2-3 years.

(3) Which data structures are expected?

The usual SAS datasets are sufficient. For covariance matrices of dependent parameters, datasets of type "COV" are necessary.

(4) Details on the algorithms (including convergence checks)?

A detailed investigation with examples will be provided.

(5) Display of results (descriptive statistics and graphical output of posterior distributions)?

The default displays are at least better than those produced by SAS/GRAPH before.

(6) Calculation of functionals (including utility functions)?

Unproblematic as the whole data handling of SAS is available.

(7) Support of scenarios?

Like (6).

The presentation will compare the 3 procedures with WinBUGS and show the advantages and disadvantages of both.

### References:

<http://support.sas.com/rnd/app/papers/bayesian.pdf>

<http://support.sas.com/rnd/app/da/focusbayesian.html>

<http://www.mrc-bsu.cam.ac.uk/bugs/winbugs/contents.shtml>