DISCUSSION

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A number of objective Bayesian methods of model selection and testing a sharp null hypothesis have been proposed and developed to deal with the difficulties with improper noninformative priors. Professors Berger and Pericchi have been the leading contributors to this area. Their present work is an illuminating overview of the subject as it stands now. As part of the overview they take up the important problem of evaluating these methods and give some final recommendations. We generally agree with them but feel many points need further study.

1. *Intrinsic Priors.* Berger and Pericchi are guided by the principle that a good method should produce a Bayes factor that is equal up to $o_p(1)$ to a Bayes factor with "reasonable default prior". The default Bayes factors like the intrinsic Bayes factor (IBF) and the fractional Bayes factor (FBF) seem to have this correspondence (at least asymptotically) as illustrated with a number of examples.

A potential problem is that it may not be easy to agree to a "reasonable default prior" in examples which have not been enriched by contextual discussions like that of Jeffreys. In such cases we would suggest that one can go a step further and argue as follows. If there is a prior which gives rise to a Bayes factor that is well approximated by an appealing data analytic procedure, then each of the two – the prior and the method – lends support to the other. We feel the above default Bayes factors are naturally developed, intuitively very appealing and may be considered to be good default Bayes factors in their own merits. The intrinsic priors may therefore be considered to be natural default priors as they correspond to naturally developed good default Bayes factors. In turn this argument strengthens the default Bayes factors as argued by Berger and Pericchi.

Thus these automatic methods represent one way of generating (conventional) default priors for hypothesis testing and model selection problems at least in the cases where the model dimension is small compared with sample size.

It is interesting to observe that the Cauchy prior recommended by Jeffreys for the problem considered in Illustration 1 can be obtained in this way, vide Ghosh and Samanta (2001, Section 2.5).

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