Contribution by M. A. Girolami

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This collection of Big Bayes Stories could be partitioned into two groups, one relating to the sciences, cosmology in particular, and the other relating to public policy, that is, health, fisheries management and demographics.

My first comment here is that inferential issues related to the sciences and the shaping and guiding of public policies can only be addressed appropriately by adoption of the Bayesian framework. This is a very strong, and no doubt provocative, statement, the opinion of which has been formed by my own experience of working very closely with a range of basic scientists, clinical professionals and econometricians providing support in developing fiscal policy.

The almost wholesale adoption of the Bayesian framework by astronomers and cosmologists is a good case in point where subjective Bayesian inference is viewed as a formal codification of the scientific method and therefore most natural in guiding scientific inquiry.

I have had first-hand experience of this when working with cellular biologists who previously had viewed statistical analysis as the means of providing nothing more than the *p*-values required by the editors of journals such as *Nature*. However, when presented with the Bayesian formalism of an expert informed prior to posterior belief updating the paradigm has been embraced wholeheartedly by cellular biologists and forms the common language of scientific collaboration, for example, Xu et al. (2010).

My second comment is that many of the cases presented required a complex statistical model, which of course brings with it associated technical issues, but are most naturally accommodated in the Bayesian framework. When considering the issues of systematically integrating diverse data sources, exploiting model structure to employ sparse measurements, or formally and explicitly quantifying uncertainty induced due to the use of complex computer codes, it is hard to see how satisfactory and transparent non-Bayesian solutions would follow.

In summary, I have viewed these interesting case studies from the perspective of how feasible the required analysis would be as part of an ongoing dialogue between statisticians and scientists or statisticians and policy makers. All of them suggest to me that, to misquote Karl Pearson, Bayesian inference provides the "Grammar of Science."

REFERENCE

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