

Big Bayes Stories—Foreword

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Bayesian statistics is now endemic in many areas of scientific, business and social research. Founded a quarter of a millenium ago, the enabling theory, models and computational tools have expanded exponentially in the past thirty years. So what is it that makes this approach so popular in practice? Now that Bayesian statistics has “grown up,” what has it got to show for itself? In particular, what real-life problems has it really solved? A number of events motivated us to ask these questions: a conference in honor of Adrian Smith, one of the founders of modern Bayesian Statistics, which showcased a range of research emanating from his seminal work in the field, and the impressive book by Sharon McGrayne, *The Theory That Would Not Die*. At a café in Paris in 2011, we conceived the idea of gathering a similar collection of “big Bayes stories” that would demonstrate the appeal of adopting a Bayesian modeling approach in practice. That is, we wanted to collect real cases in which a Bayesian approach had made a significant difference, either in addressing problems that could not be analyzed otherwise or in generating a new or deeper understanding of the data and the associated real-life problem.

After submitting this proposal to Jon Wellner, editor of *Statistical Science*, and obtaining his encouragement and support, we made a call for proposals. We received around 30 submissions (for which authors are to be warmly thanked!) and after a regular review process by both Bayesian and non-Bayesian referees (who are also deeply thanked), we ended up with 17 papers that reflected the type of stories we had hoped to hear. Sharon McGrayne then read each paper with the utmost attention and provided helpful and encouraging comments on all. Sharon became part of the editorial team in

acknowledgement of this substantial editing contribution, which has made the stories much more enjoyable. In addition, referees who handled several submissions were asked to contribute discussions about the stories and some of them managed to find additional time for this task, providing yet another perspective on the stories. A few authors chose to reply to some of the discussions.

As can be gathered from the table of contents, the spectrum of applications ranges across astronomy, epidemiology, ecology, political science and demography, with the special case of the Air France wreckage story also reported in the paperback edition of *The Theory That Would Not Die*. What made those cases so well suited for a Bayesian solution? In some situations, the prior or the expert opinion was crucial; in others, the complexity of the data model called for a hierarchical decomposition naturally provided in a Bayesian framework; and others involved many actors, perspectives and data sources that only Bayesian networks could aggregate.

Now, before or (better) after reading those stories, one may wonder whether or not the “plus” brought by the Bayesian paradigm was truly significant. We think it was, at one level or another of the statistical analysis, while we acknowledge that in several cases other statistical perspectives or even other disciplines could have provided another solution, but presumably at a higher cost. We think this collection of papers constitutes a worthy tribute to the maturity of the Bayesian paradigm, appropriate for commemorating the 250th anniversary of the publication of Bayes’ *Essay towards solving a Problem in the Doctrine of Chances*. We thus hope you will enjoy those stories, whether or not Bayesianism is your statistical republic.

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