

Comment on Article by Craigmile et al.

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I would like to start by congratulating the authors for their interesting contribution, and thanking Brad Carlin for the opportunity of commenting on it. In reading this article (hereafter CCLPC) and the related references, one realizes how powerful the available tools for Bayesian analysis are, and how we can now tackle important problems in more realistic ways than only some years ago. Contributions such as this one illustrate the great development Bayesian methods have been experiencing since (Gelfand and Smith 1990) was published. However, despite these recent advances, there are many practical issues which still need to be addressed. And I understand, as outlined by the authors, that this work aims to open a dialog on practical strategies for hierarchical modelling.

My comments below follow the organization of the article and are based partly on my experiences in Brazil.

1 Model building

In an interesting section on exploratory data analysis and model building (Section 3), CCLPC makes clear that when tackling complex problems we should conduct the model fitting in compartmentalized fashion, separately validating and assessing the model fit of each component. I found this point extremely important. Although obvious, it bears repeating that life is easier when we start by solving simpler problems. From these simpler problems we gather a better understanding of the process(es) being studied and learn how better to communicate with the experts, which in turn may allow us to propose a more realistic model.

This section indicates that “model building should be a combination of EDA and scientific knowledge”, but does not make very clear to the reader how the subject-specific knowledge on arsenic pathways was acquired by the modellers. Expert opinion should be part of the exploratory analysis; therefore, readers would likely benefit from a description of any behind-the-scenes communication between themselves and the subject experts, as well as how these interactions were structured.

Prior specification

Although we, as Bayesians, claim the benefits of Bayesian inference, most of us, including CCLPC, still make use of noninformative priors. In this sense, I wonder if we are fully using the advantages that the Bayesian paradigm provides. Given that most of the parameters in CCLPC enter as coefficients of linear models, they may be interpretable

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