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Comentarios / Comments

Comments on: Natural Induction: An Objective Bayesian Approach

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This very fine paper is valuable because it produces challenging and interesting results in a problem that is at the heart of statistics. The real populations that occur in the world are all finite and the infinities that we habitually invoke are constructs, albeit useful but essentially artificial. Another reason for being excited about the work is that it opens the way to further Bayesian studies of the practice of sampling procedures, where several features, and not just one as here, are being investigated.

The authors make much use of the term ‘objective’; what does this mean? My dictionary gives at least two, rather different, meanings: “exterior to the mind” and “aim”. The authors would appear to use both meanings in the same sentence when they say, at the end of Section 1, “A formal objective Bayesian solution …is the main objective of this paper”. My opinion is that all statistics is subjective, the subject being the scientist analysing the data, so that the contrary position needs clarification. There is also a confusion for me with the term ‘reference prior’, a term that I have queried in earlier discussions.

An unstated assumption that R and n are independent, given N, has crept into (2) where $\Pr(R \mid N)$ should be $\Pr(R \mid n, N)$. The assumption may not be trivial, as when the sampling procedure is to continue until the first non-conforming element is found. Another assumption made is that N is fixed, despite the fact that, in the example of the tortoises, it is unknown. I would welcome some clarification of the role of the sampling procedure.

Perhaps the most interesting section in the paper is 3, where the use of Jeffreys’s prior (12), or (13), superficially very close to the uniform (roughly $1/2$ a confirmation and $1/2$ non-confirmation) gives such different results from it. For example (20) can be written $\pi_r(E_n) = \frac{2n+1}{2n+2}$. Thus Jeffreys gives the same result as Laplace but for *twice* the sample size. Again in the hierarchical model $\pi_r(\text{All} + \mid n, N)$ is about $\sqrt{n/N}$, equation (13), whereas with the uniform it is about n/N, equation (9), the larger value presumably being due to the prior on θ attaching higher probability than the uniform to values near 1. We therefore have the unexpected situation where an apparently small change in the prior results in an apparently large change in at least some aspects of the posterior.

There are many issues here that merit further study and we should be grateful to the authors for the stimulus to employ their original ideas to do this.

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