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Comment on Article by Gelman

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1 Introduction

Brad Carlin invited me to comment on Andrew Gelman's article because Brad considers me an "ex-Bayesian." It's true that my research moved away from Bayesian inference long ago. But I am reminded of a lesson I learned from Art Dempster over 20 years ago which I shall paraphrase:

> A person cannot be Bayesian or frequentist. Rather, a particular *analysis* can be Bayesian or frequentist.

My research is very frequentist but I would not hesitate to use Bayesian methods for a problem if I thought it was appropriate. So perhaps it is unwise to classify people as Bayesians, anti-Bayesians, frequentists or whatever. With the caveat, I will proceed with a frequentist tirade.

2 Coverage

I began to write this just a few minutes after meeting with some particle physicists. They had questions about constructing confidence intervals for a particular physical parameter. The measurements are very subtle and the statistical model is quite complex. They were concerned with constructing intervals with guaranteed frequentist coverage.

Their desire for frequentist coverage seems well justified. They are making precision measurements on well defined physical quantities. The stakes are high. Our understanding of fundamental physics depends on knowing such quantities with great accuracy. The particle physicists have left a trail of such confidence intervals in their wake. Many of these parameters will eventually be known (that is, measured to great precision). Someday we can count how many of their intervals trapped the true parameter values and assess the coverage. The 95 percent frequentist intervals will live up to their advertised coverage claims. A trail of Bayesian intervals will, in general, not have this property. Being internally coherent will be of little consolation to the physics community if most of their intervals miss the mark.

Frequentist methods have coverage guarantees; Bayesian methods don't. In science, coverage matters.

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