

Doing Bayesian Data Analysis: A Tutorial with R and BUGS

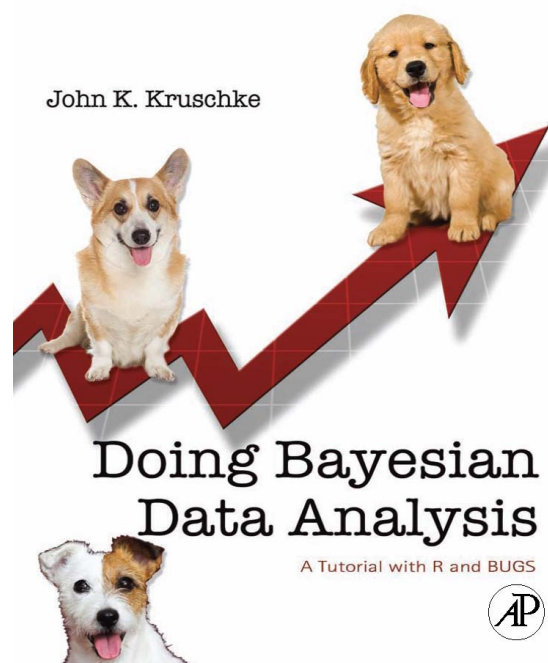
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Bayesian reasoning is a blessed relief to those who have always struggled with the idea that the probability of heads coming up in a supposedly fair coin flip is always 50%, even after a long series of coin flips has come up tails each time. According to Bayes, if a coin keeps coming up tails we should adjust our prior belief that the probability is 50% in the light of the *posterior* belief that the coin appears to be biased towards tails. John Kruschke's book is a 600 page development of this Bayesian theme. The 23 chapters cover the basics of parameters, probability, Baye's rule, the R and BUGS statistical programmes, the fundamentals applied to inferring a binomial proportion, and how all of this is applied to the generalized linear model. Kruschke has the rare ability amongst statistical textbook authors of writing very engagingly about knotty topics. For those who want to do what the title of the book suggests – learning to do Bayesian data analysis by learning programs languages R and BUGS – this book must be ideal.

One aspect of the book that might appeal to some readers is the prospect of learning to use the statistical package R. R has the big advantage over SPSS, STATA etc of not costing the user any money, but has the disadvantage of requiring the user to learn a programming language. I'm a programming newbie but was willing to take up the challenge of learning R with Kruschke's book. After downloading R I spent about an hour trying out the basic exercises in Chapter 2; my success was limited, and my advice to SPSS fans who are newbs to programming is: if you are getting Kruschke's book, also download 'R for SAS and SPSS Users' by Bob

Muenchen <http://RforSASandSPSSusers.com> or if you just outright insist on a 'point and click' version of R then try out R Commander, which is a way of making R look more like SPSS <http://socserv.mcmaster.ca/jfox/Misc/Rcmdr/> After my struggles to learn R, I chickened out of trying out BUGS, but no doubt readers who are more determined will have greater success than I did.

Kruschke suggests that of the 23 chapters, the most important are: Chapter 4 on Bayes' rule; Chapter 7 on Markov Chain and Monte Carlo methods; Chapter 9 on hierarchical models; Chapter 14 on the generalized linear model. Other recommended sections are those on how to learn R and BUGS, reporting a Bayesian data analysis, and Chapter 13 on power analysis. Although written very clearly throughout, the reason for the inclusion of some of the material isn't always made clear. For example, while reading some interesting information on probability density, I found myself wondering how this information fitted into the overall aim of the book. Also, although I found his point of view interesting, I wasn't convinced by the Kruschke's arguments in Chapter 11 that mainstream statistical methods based on the null hypothesis significance testing ('NHST') have had their day. For example, his illustration of the superiority of Bayesian probability over NHST by claiming that most researchers of the NHST mould would treat the probability of a nail landing on its point or base as being equal to that for a coin landing on its head or tail isn't a particularly persuasive argument.

In conclusion, this book appears to do what it says on the cover, and is recommended to those who want to learn to do Bayesian analysis using R and BUGS. However, readers who are mainly interested in learning about Bayesian methods, or aren't keen on learning programming languages, might find – like I did – some parts of this book somewhat too long and complex