

International Society for Bayesian Analysis, 9<sup>th</sup> World Meeting,  
Hamilton Island, Australia, 2008.

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## ADAPTIVE MARKOV CHAIN MONTE CARLO ALGORITHMS

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Markov chain Monte Carlo (MCMC) algorithms are often used to sample from complicated posterior distributions. A wide variety of MCMC schemes and settings are available, and it can be difficult to choose among them. One possibility is to have the computer automatically "adapt" the algorithm while it runs, in an attempt to improve efficiency. However, natural-seeming adaptive schemes can destroy the ergodicity properties necessary for MCMC to be valid. In this talk, we review adaptive MCMC, and explain how it can fail even on very simple examples. We then present a theorem which gives conditions ensuring ergodicity, and apply it to several high-dimensional adaptive Metropolis and Metropolis-within-Gibbs examples. (Joint with G.O. Roberts.)