

The Case for a Fully Robust Hierarchical Models and Priors for Clinical Trials

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In Fúquene, Cook and Pericchi (2008) (<http://www.bepress.com/mdandersonbiostat/paper44>) for two clinical trials (past and present), conjugate priors are compared with (Robust) Cauchy-Student-t and what we call Berger's prior. The behavior of the latter robust Bayesian methods is qualitatively different from conjugate Bayesian methods and arguably much more reasonable and acceptable to the practitioner and regulatory agencies like the FDA (Food and Drug Administration). (Although there is historical information, we consider the methods objective since: i) prior information is not subjective and ii) robust priors are discounted when there is a conflict with sample information) Here we extend the previous work to several clinical trials or hospitals, in a hierarchical fashion, using not only (robust)priors with heavy tails, but also a particular class of heavy tailed likelihoods to model "sufficient" statistics. The usual Exponential Family Hierarchical Modeling with conjugate priors is myopic with respect to large deviations of a single group from the bulk of the groups. This leads to potential excessive (and spurious) shrinkage to the general mean. On the other hand, Robust Hierarchical Modeling leads to "local shrinkage"; that is, only groups which are consistent affect each other, but groups which are outliers have a smaller influence on the not outlying groups. In that sense, outlying groups are discounted under the Robust Hierarchical Bayesian Model. The methods are illustrated with both simulated and real data. This is joint work with M.E. Pérez (University of Puerto Rico) and J. Cook (MDAnderson).