

STATISTICS COLLOQUIUM

WEDNESDAY, May 1, 2013

TALK: 4:15 PM — SCIENCE CENTER RM. 705

RECEPTION: 3:50 PM — SCIENCE CENTER, 7TH FLOOR

“Catalytic Priors for Empirical Bayes Modeling”

Nathan Stein
Department of Statistics
Harvard University

ABSTRACT

We propose a strategy for constructing scientifically sensible priors in complex models. We call these priors “catalytic priors” to suggest that adding such prior information catalyzes our ability to use richer, more realistic models. Because they depend on observed data, catalytic priors are a tool for empirical Bayes modeling. The overall perspective is data-driven: catalytic priors have a pseudo-data interpretation, and the building blocks are alternative plausible models for observations, yielding behavior similar to hierarchical models but with a conceptual shift away from distributional assumptions on parameters. Our strategy is closely related to maximum entropy and variational methods, and the posterior under a catalytic prior can be viewed as an optimal approximation to a target measure, subject to a constraint on the posterior distribution’s predictive implications. We illustrate how to apply catalytic priors to several familiar models and investigate the performance of the resulting posterior distributions. We will conclude by applying catalytic priors in a preliminary analysis of a randomized experiment to evaluate a job training program, which is complicated by the need to account for noncompliance, partially defined outcomes, and missing outcome data.