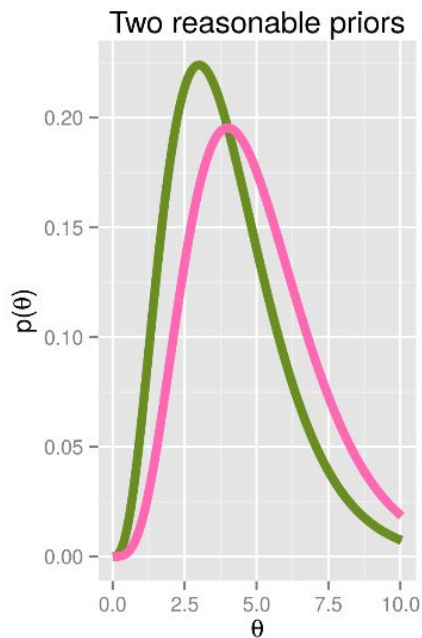


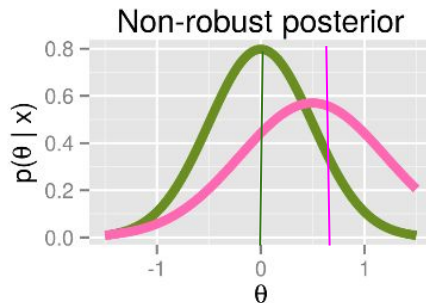
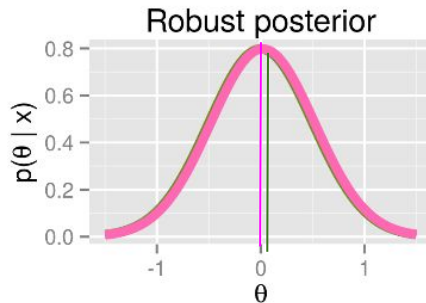
Robust Inference with Variational Bayes

Ryan Giordano, Tamara Broderick, Michael Jordan

What is robust Bayesian analysis?



Bayes' rule



Local sensitivity:

Posterior expectation of interest

$$\frac{d\mathbb{E}_{p_x^\alpha} [\theta]}{d\alpha}$$

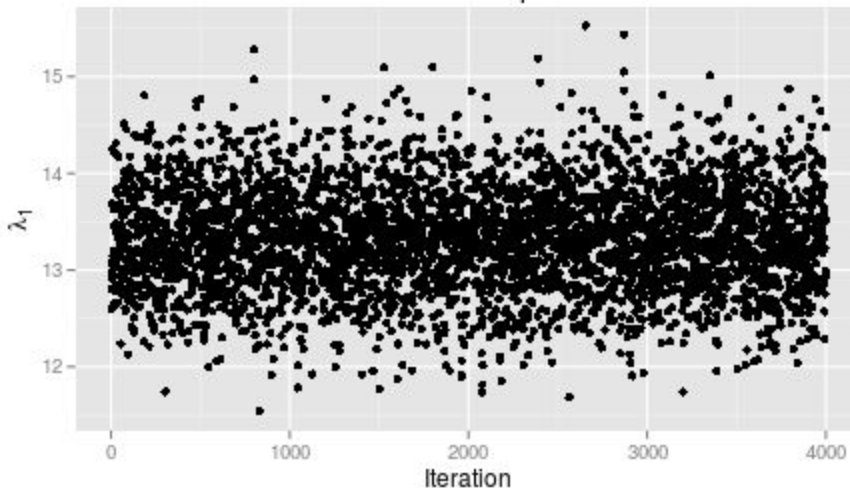
Prior parameters
(vector or function-valued)

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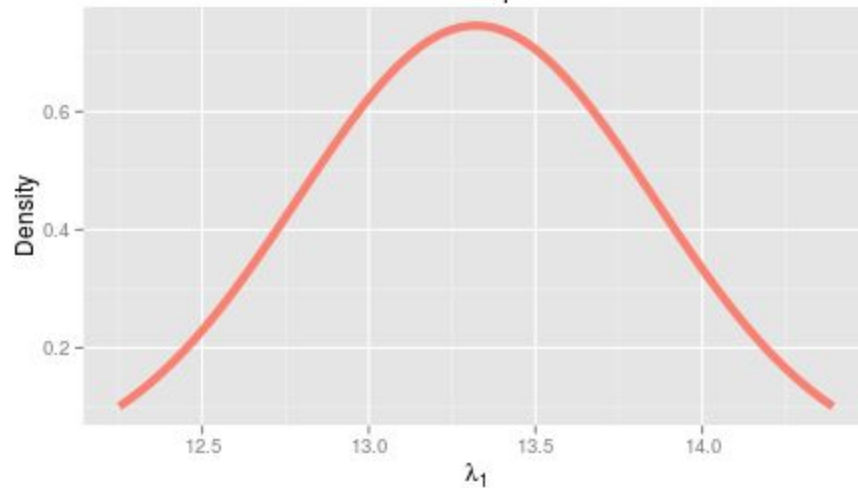
Variational Bayes is local-robustness friendly

MCMC Output



MCMC: designed for integration

VB Output



VB: designed for differentiation

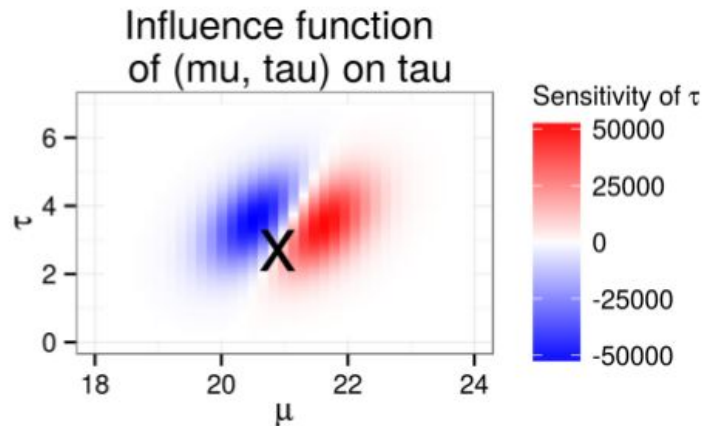
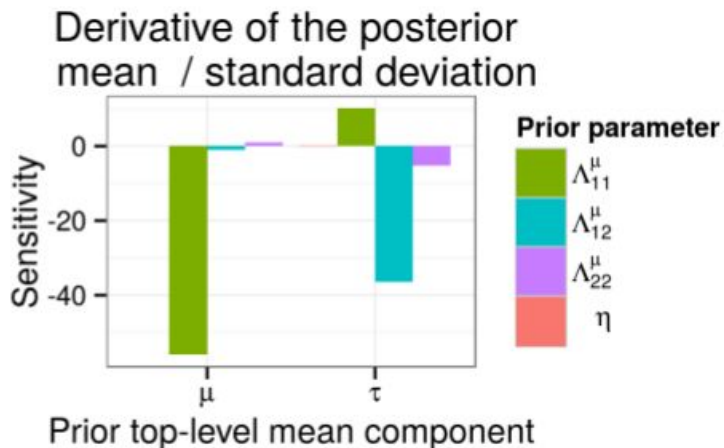
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Closed-form robustness measures using linear response

$$\frac{d\mathbb{E}_{q_x^\alpha}[\theta]}{d\alpha} = \hat{\Sigma} \nabla_m f \quad \text{where} \quad f(m) := \frac{d}{d\alpha^T} \mathbb{E}_q [\log(p(\theta|\alpha))].$$

Example diagnostic reports:



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