Synthetic likelihood is hardly efficient

Surrogate is fitted at each parameter value separately

- BOLFI - Bayesian optimization for likelihood-free inference:
  - Likelihood can be approximated from the surrogate (pointwise) by

$$p(x^o \mid \theta) \approx \Phi\left(\frac{\epsilon - \mu_{1:t}(\theta)}{\sqrt{v_{1:t}(\theta) + \sigma_n^2}}\right)$$

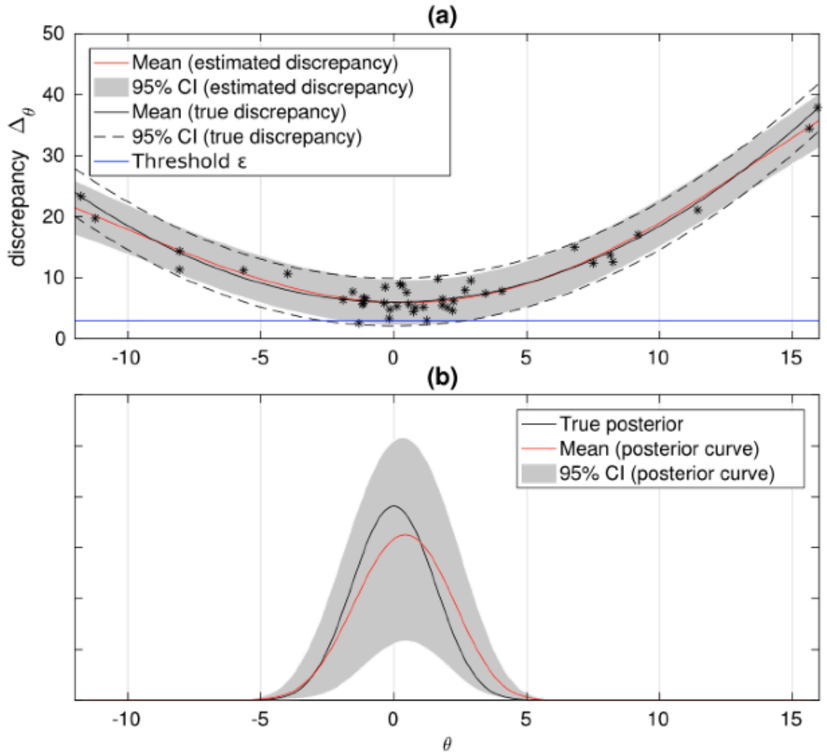

Figure from M. Järvenpää, “Efficient Acquisition Rules for Model-Based Approximate Bayesian Computation”, 2019

GP surrogates can utilise active learning

- Different strategies for selecting parameter values where to query the simulator
  - Reduce the number queries required to produce reasonable approximations to posterior/likelihood
- Usually based on optimization
  - Parameters that produce minimum discrepancies
  - Parameters that decrease most the uncertainty about the posterior