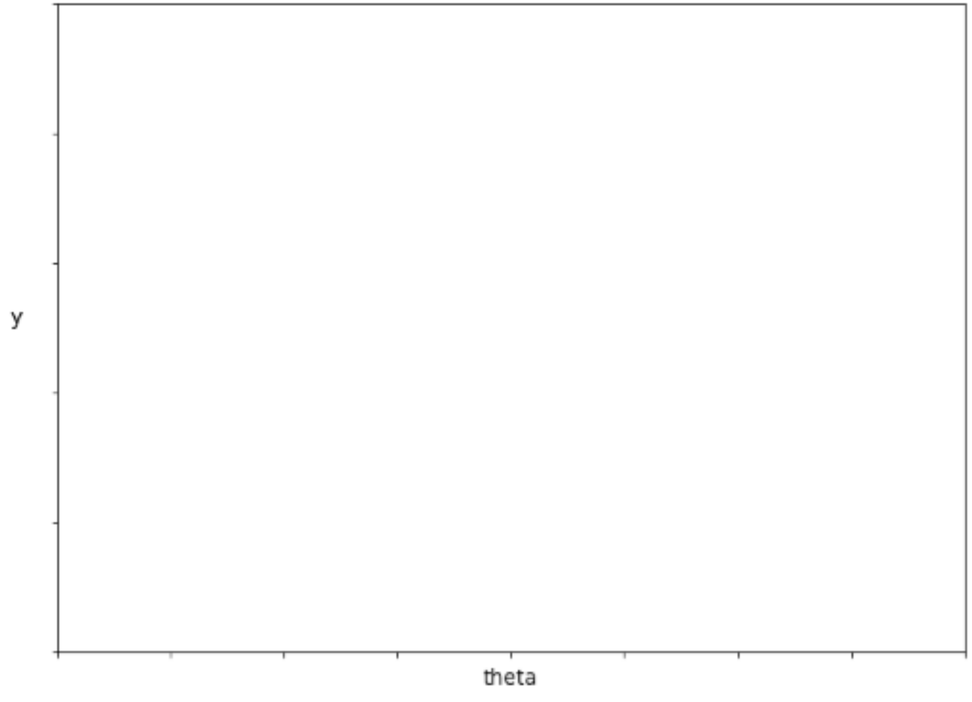
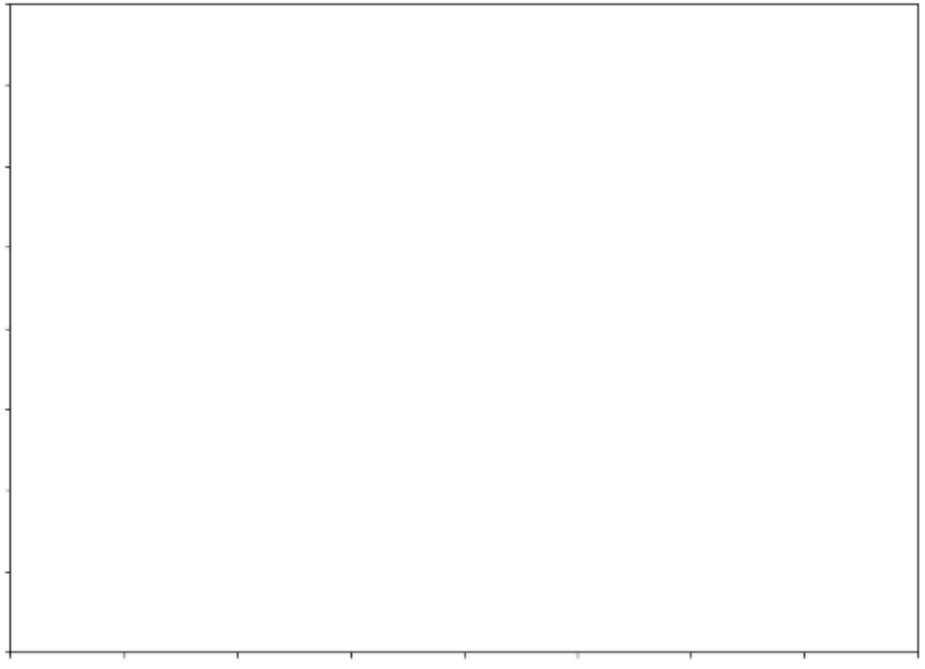
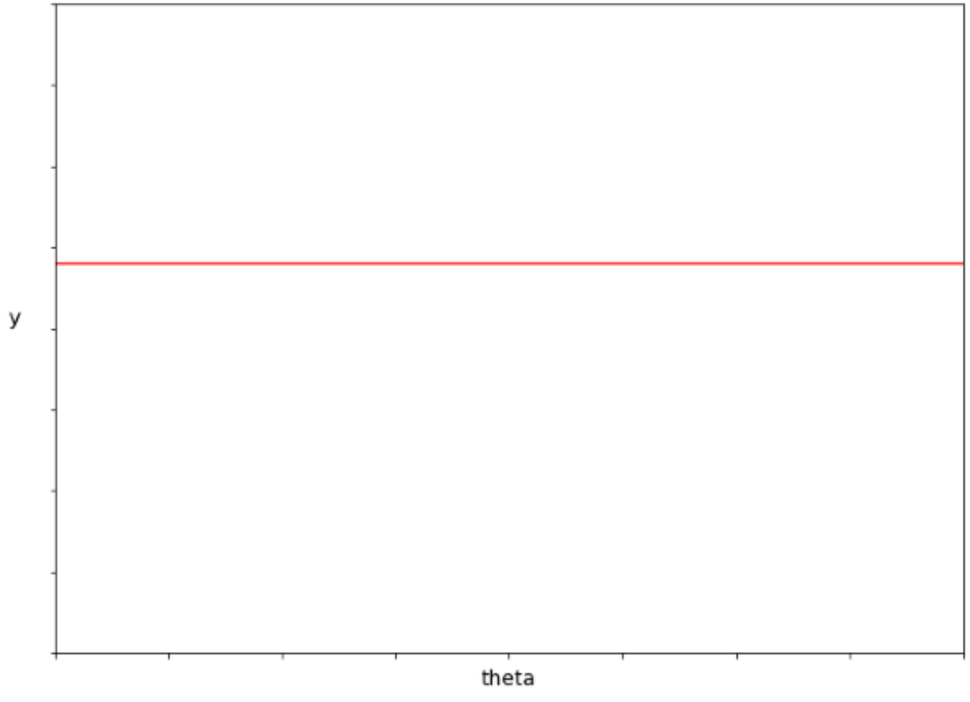
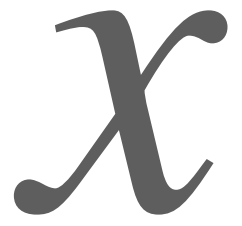

y
theta



Example

- Construct approximate likelihood at an arbitrary parameter value

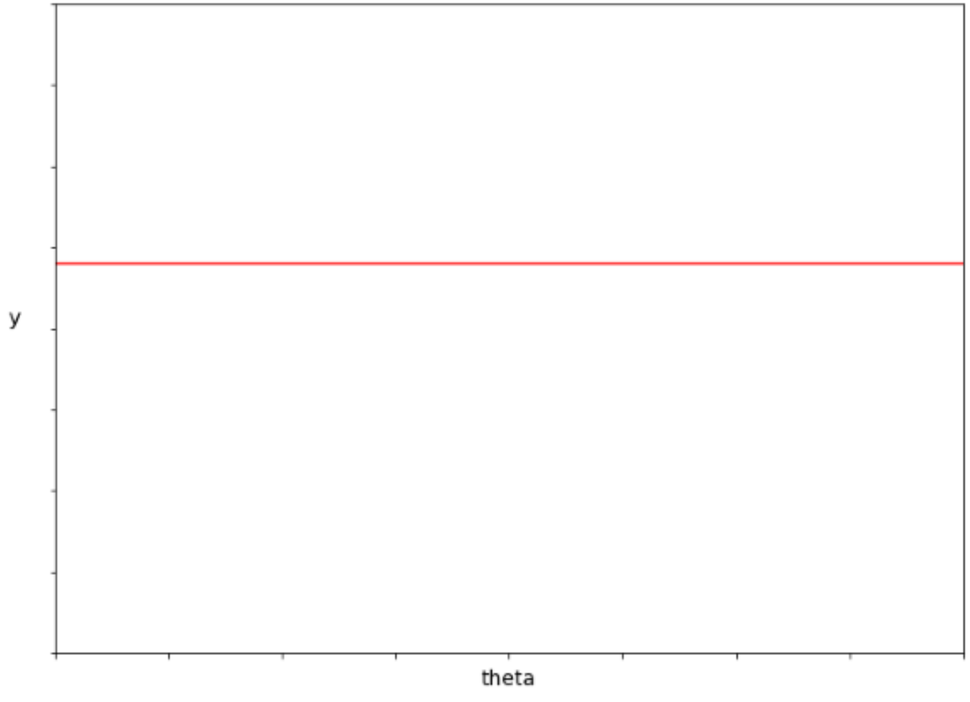

y
theta

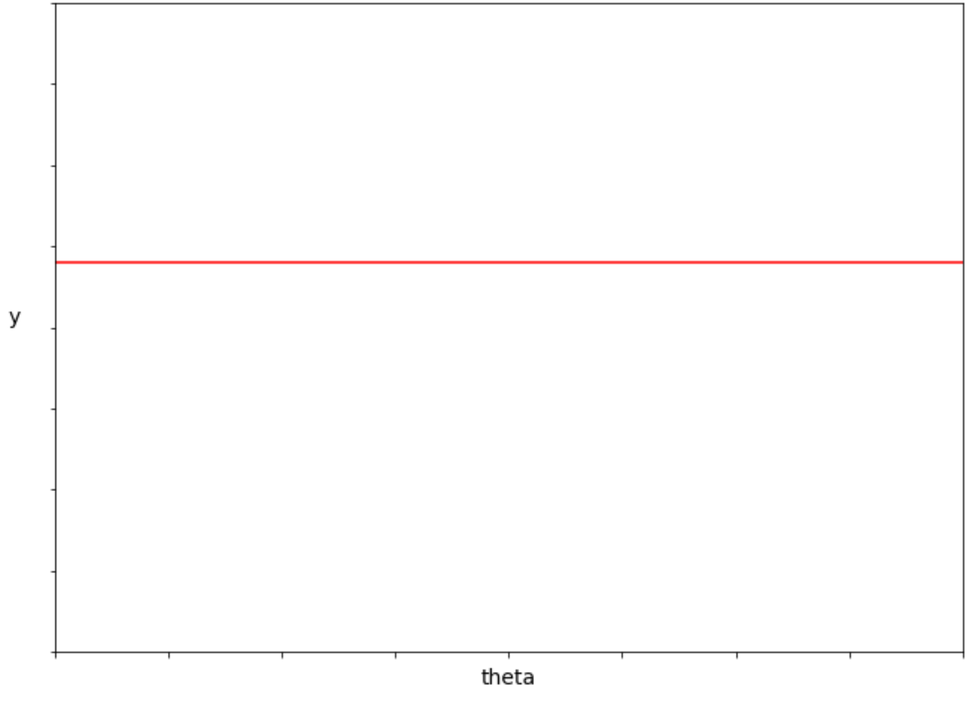


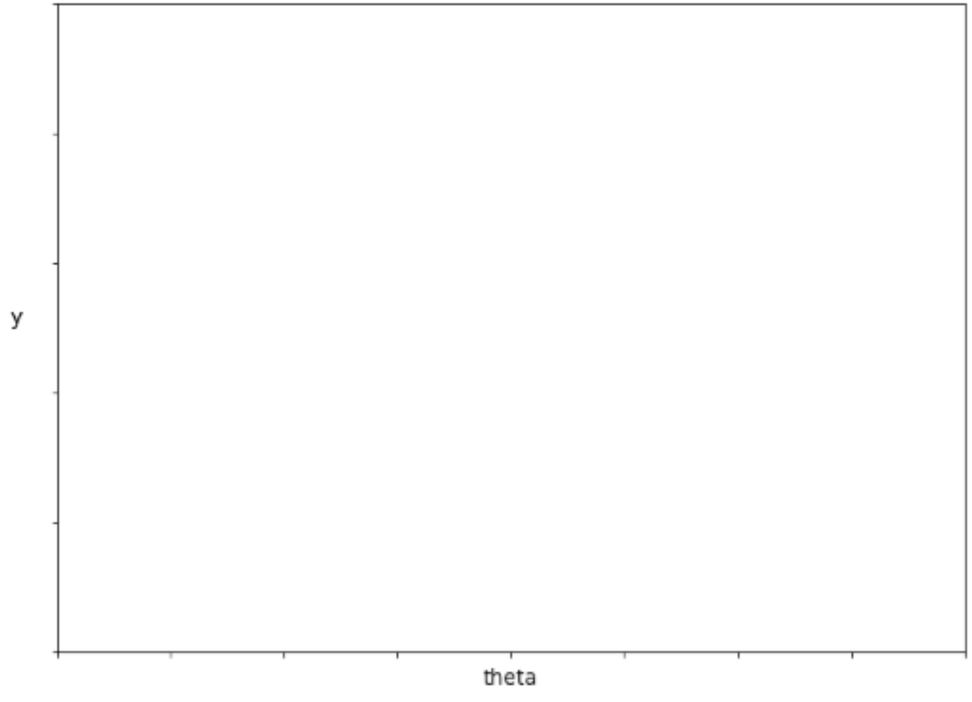
Gaussian empirical estimate

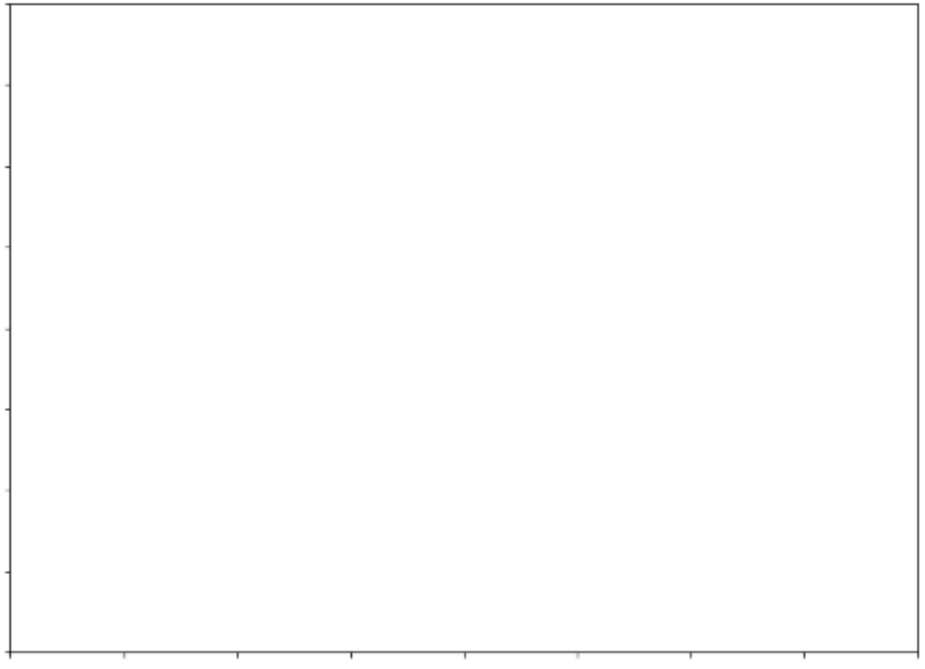
Set of samples at θ

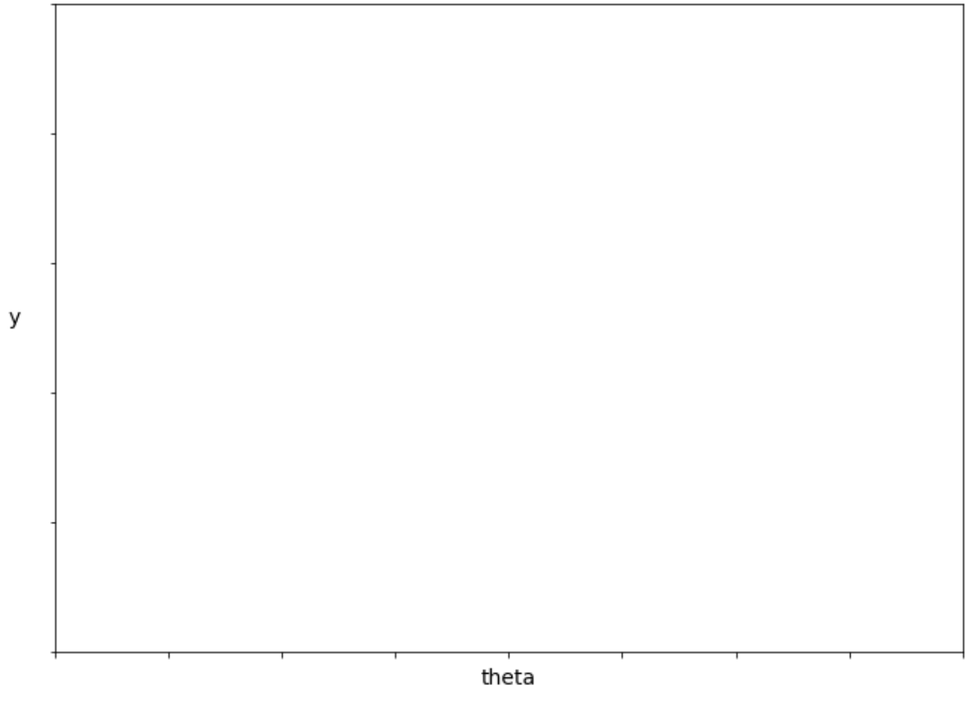
$$\approx p(\theta \mid x^o)$$

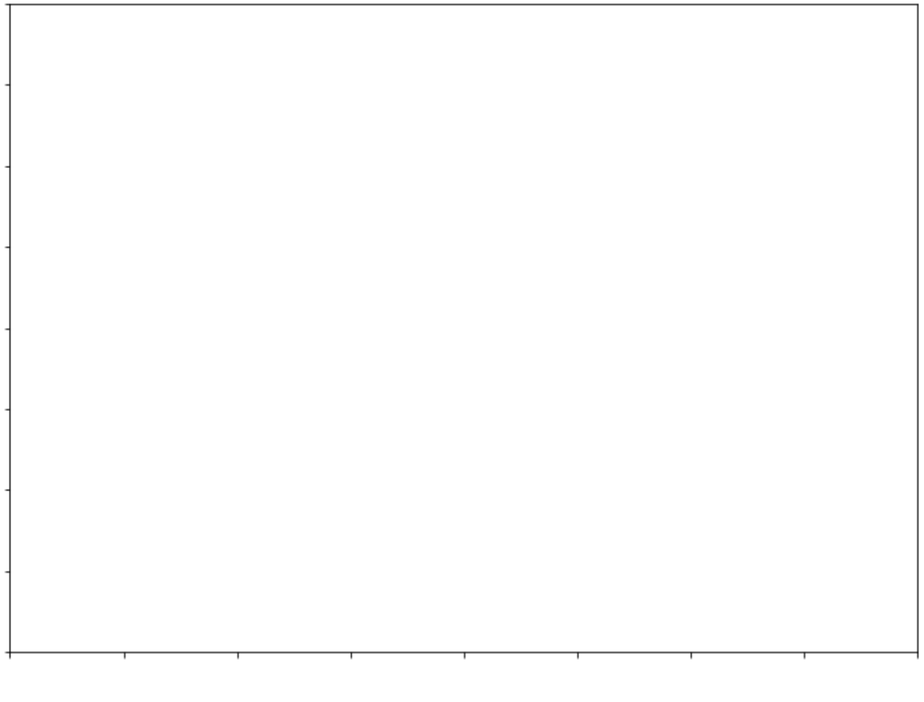

y
theta


y
theta


y
theta




y
theta



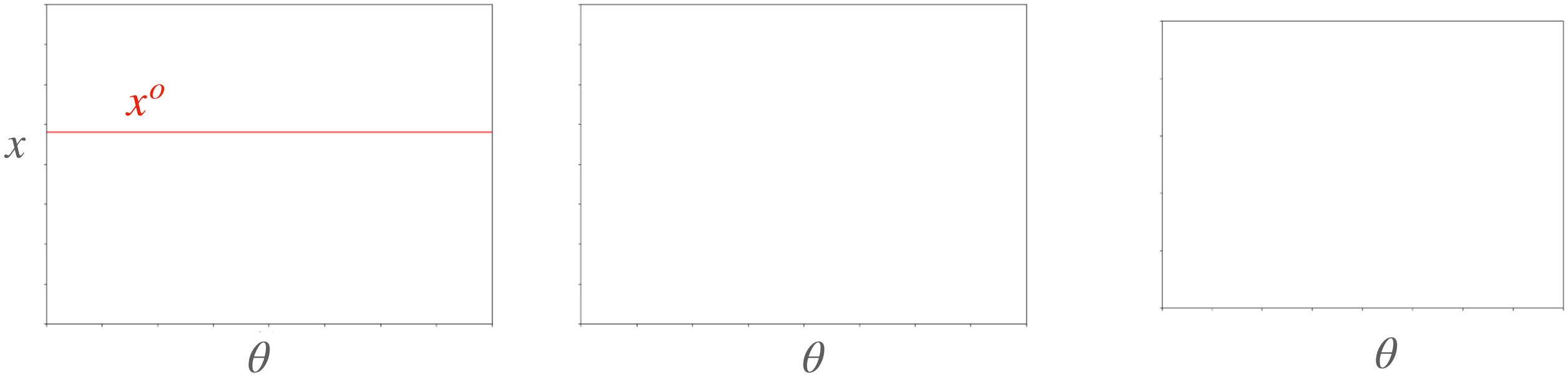
Example

- Construct approximate likelihood at an arbitrary parameter value

Gaussian
empirical estimate

Set of samples
at θ

$\approx p(\theta \mid x^o)$



Synthetic likelihood is hardly efficient

Surrogate is fitted at each parameter value separately

- BOLFI - Bayesian optimization for likelihood-free inference:
  - Model the discrepancy as a function of the parameter $\Delta(\theta) = d(x(\theta), x^o)$ conditioned on simulated data $\{(\theta_i, \Delta(\theta_i))\}_{i=1}^t$ using a Gaussian process

$$\Delta(\theta) \mid \{(\theta_i, \Delta(\theta_i))\}_{i=1}^t \sim \mathrm{GP}(\mu_{1:t}(\theta), v_{1:t}(\theta) + \sigma_n^2)$$