Inference without likelihood

- Use the capability to draw simulated data conditioned on the input parameters
- Likely true parameter values are thought to produce data that are *similar enough* to the observed data
- Approximate the posterior distribution as

$$p(\theta \mid x^o) \propto p(x^o \mid \theta)p(\theta) = \int \mathbb{I}_{\Omega(x^o)}(x)p(x \mid \theta)\mathrm{d}xp(\theta)$$

- Region $\Omega(x^o) = \{x : d(x, x^o) \leq \epsilon\}$ contains data that are similar enough to the realised observation

Distance metric

- Acceptation region is defined by the distance metric
- Reasonable distance metrics depend on the data format, e.g.
  - Euclidean distance for low dimensional numerical outputs
  - L1 distance for data containing outliers
  - Quantiles or Wasserstein distance for distributions