

Back to Laplace's historical example

1 The question

When a child is born, is it equally likely to be a girl or a boy ?

2 Sampling model

...

3 *prior*

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Bernoulli's law for $Y_i = 1$ if the new born i is a girl, 0 if it is a boy:

$$Y_i \sim \text{Bernoulli}(\theta) \quad \theta \in [0, 1]$$

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A uniform prior on θ (the probability that a newborn would be a girl rather than a boy):

$$\theta \sim \mathcal{U}_{[0,1]}$$

Posterior distribution

Purpose of a Bayesian modeling: **infer the *posterior*** distribution of the **parameters**

- **Posterior**: the law of θ conditionally on the observations $p(\theta|\mathbf{y})$

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Posterior is calculated from:

- 1 the sampling model $f(\mathbf{y}|\theta)$ – which yields the likelihood $f(\mathbf{y}|\theta)$ for all observations
- 2 the *prior* $\pi(\theta)$

Application to the historical example

- 1 the likelihood
- 2 the prior
- 3 the posterior

Application to the historical example

① the likelihood

...

② the prior

...

③ the posterior

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