Sampling, confidence intervals, and Bayesian inference

Inference: from samples to population

We rarely measure the whole **population**, but take **samples** instead.

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5. Do all CIs contain true mean height?

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https://pollev.com/franciscorod726

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- The probability that X is greater than 0 is at least 95%
- The probability that X equals 0 is smaller than 5%

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- To read more: Morey et al (2015)

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- but still 5% of CIs will NOT contain true mean!

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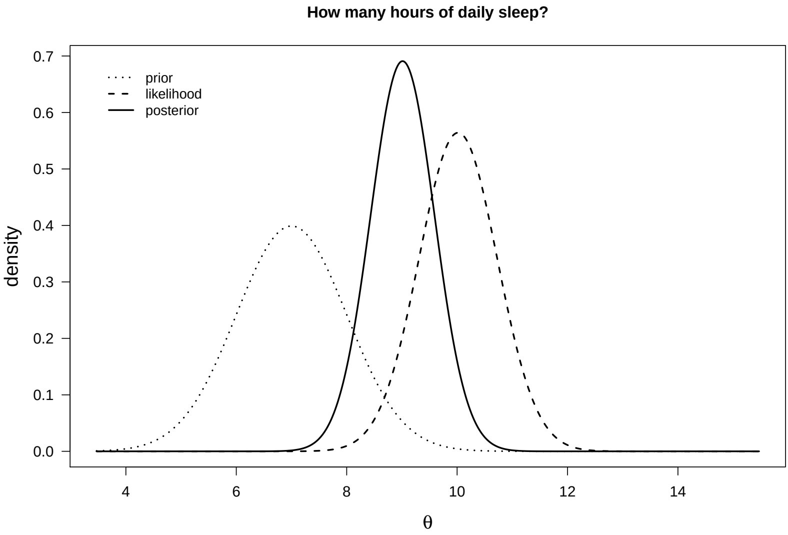
- Frequentist CIs and Bayesian credible intervals can be similar, but not always.

Bayesian inference: prior, posterior, and likelihood

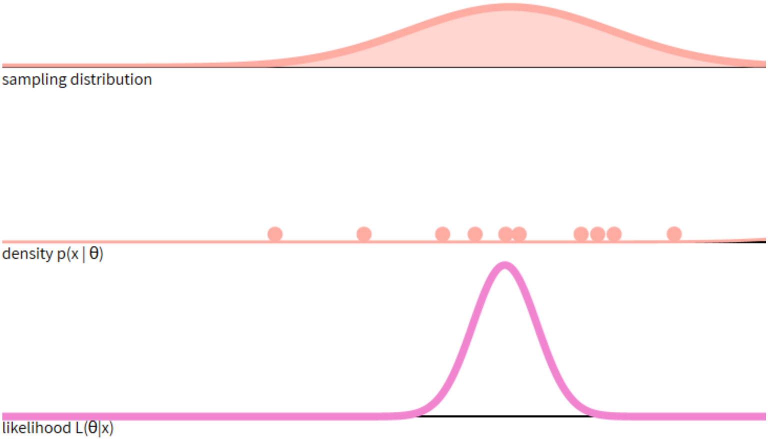
$P(H|D) \propto P(D|H) \cdot P(H)$

$Posterior \propto Likelihood \cdot Prior$



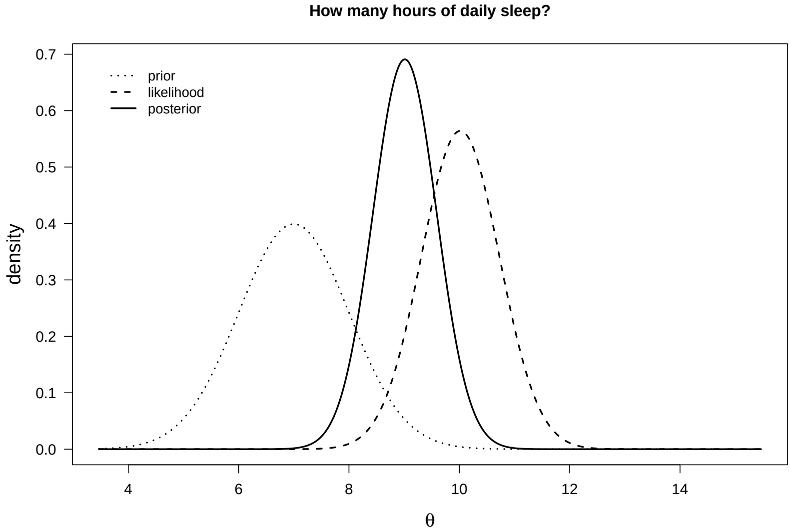
What is the likelihood?

$$L(\theta|x) = P(x|\theta)$$

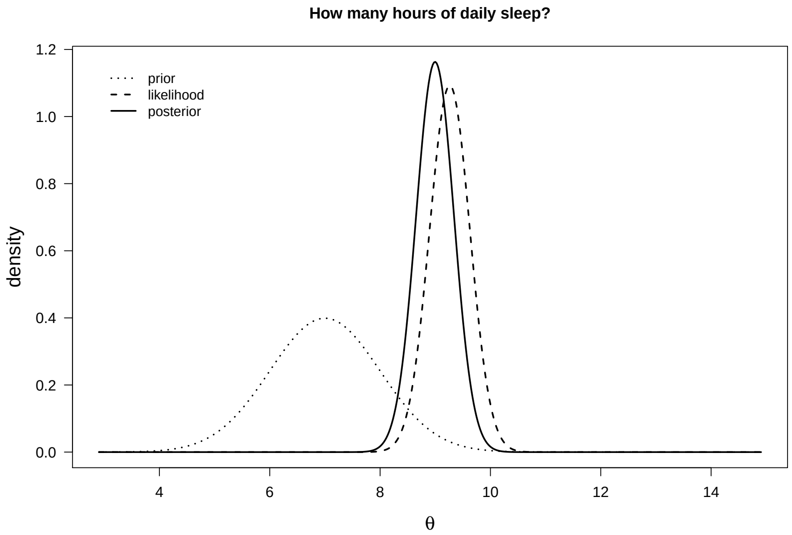


https://seeing-theory.brown.edu/bayesian-inference/index.html

Bayesian inference: prior and likelihood produce posterior



With increasing sample size, likelihood dominates prior



More apps to introduce Bayesian inference

- Bayesian Demo

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- Bayesian Demo
- Bayesian inference for a population mean

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- Binomial

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- Own data

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- Bayesian t-test

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- Large dataset -> prior effect diminishes
- Uncertainty / Propagate errors