

Bayesian Inference

Bayesian Inference - Foundations

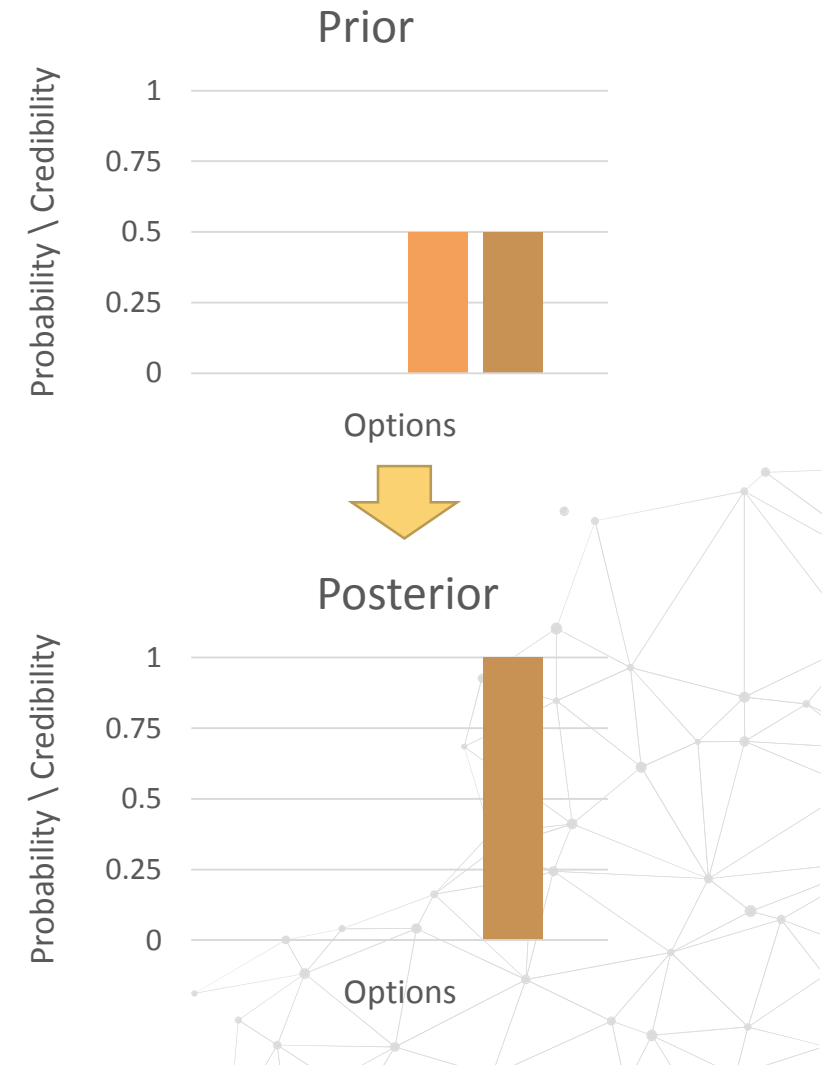
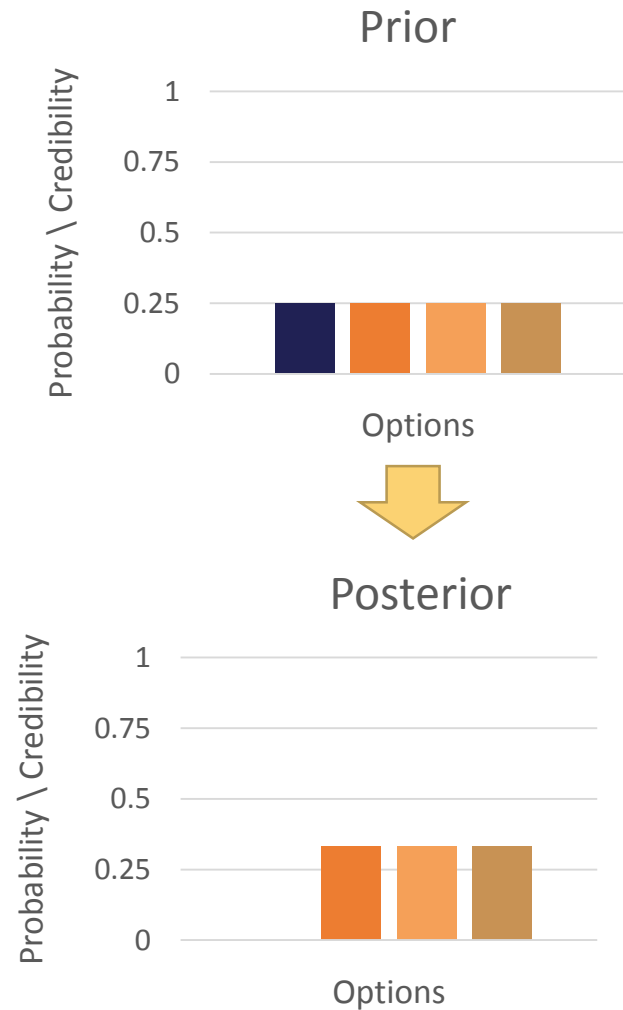
- Bayesian inference is the reallocation of credibility (i.e., probability) across possibilities.
- The possibilities across which the credibility (probability) is reallocated are usually the parameters (or hyperparameters) of a mathematical model.

Doing Bayesian Data Analysis, John Kruschke, 2nd Edition, Elsevier

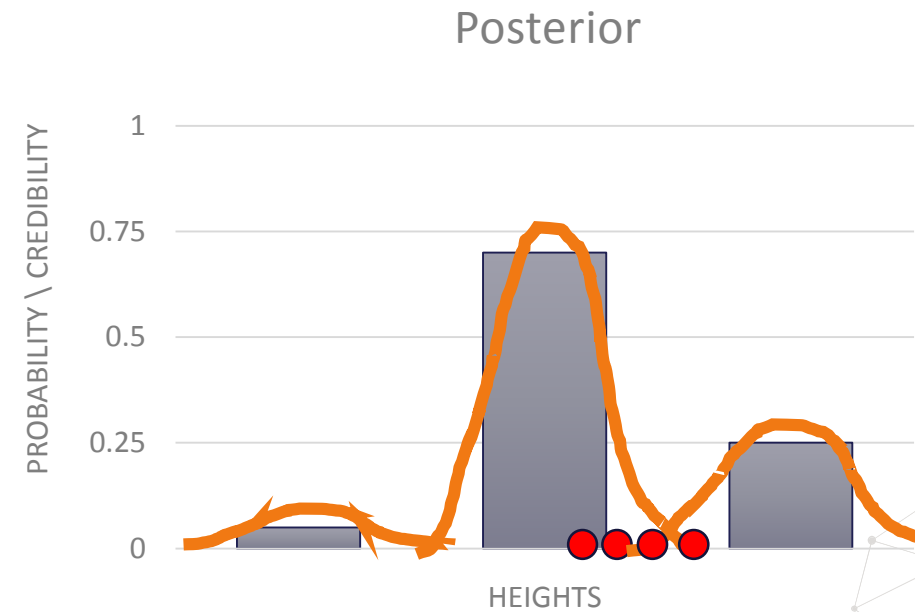
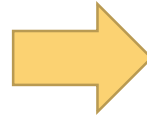
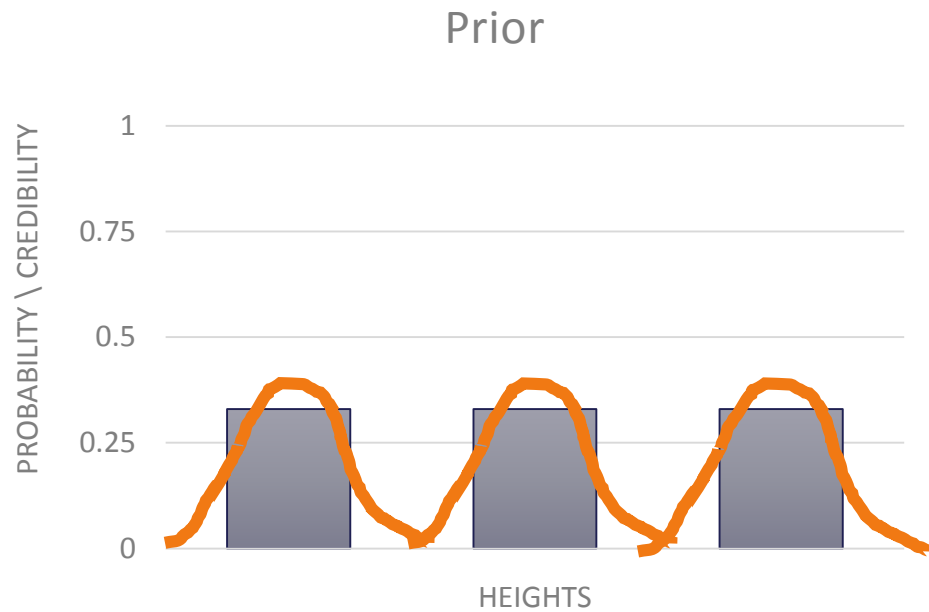
Bayesian Inference - Foundations

- In Bayesian Statistics, the probability (credibility) expresses the degree of belief in an event.
- The degree of belief can be based on prior knowledge about the event, i.e., data from an experiment, or on personal beliefs about the event.
- These beliefs (probabilities) can be **updated** when we gather **new information** about the event.
- We use Bayes' rule to update the belief (probability).

Bayesian Inference - Intuition

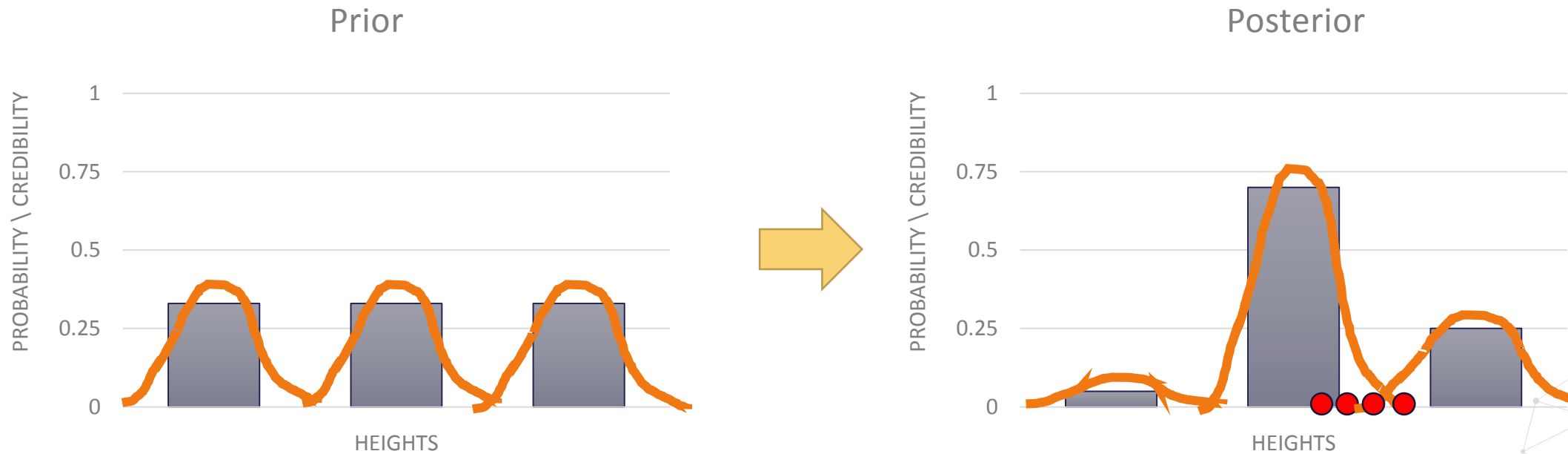


Probability reallocation



After we gather new information (red balls), we reallocate our beliefs.

Probability reallocation



We hypothesize a range of possible distributions, models or generators (priors), and from data we determine their credibility (posterior).

Prior and Posterior Probability

- Prior probability is the unconditional probability assigned to an event before any relevant information is taken into account.
- The posterior probability of an event, is the **conditional probability** that is assigned after taking into account the new evidence.
- Prior and posterior are mathematically related by Bayes' Rule

THANK YOU

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