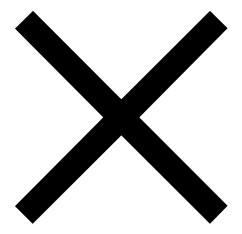
Semantic conjugate prior

Def. For a likelihood $p(x \mid \theta)$ with "sufficient statistics", there exists a *conjugate* [...] *prior density function*(s) such that the posterior $p(\theta \mid x, \tau)$ is in the same class as the prior $p(\theta \mid \tau)$.[1]

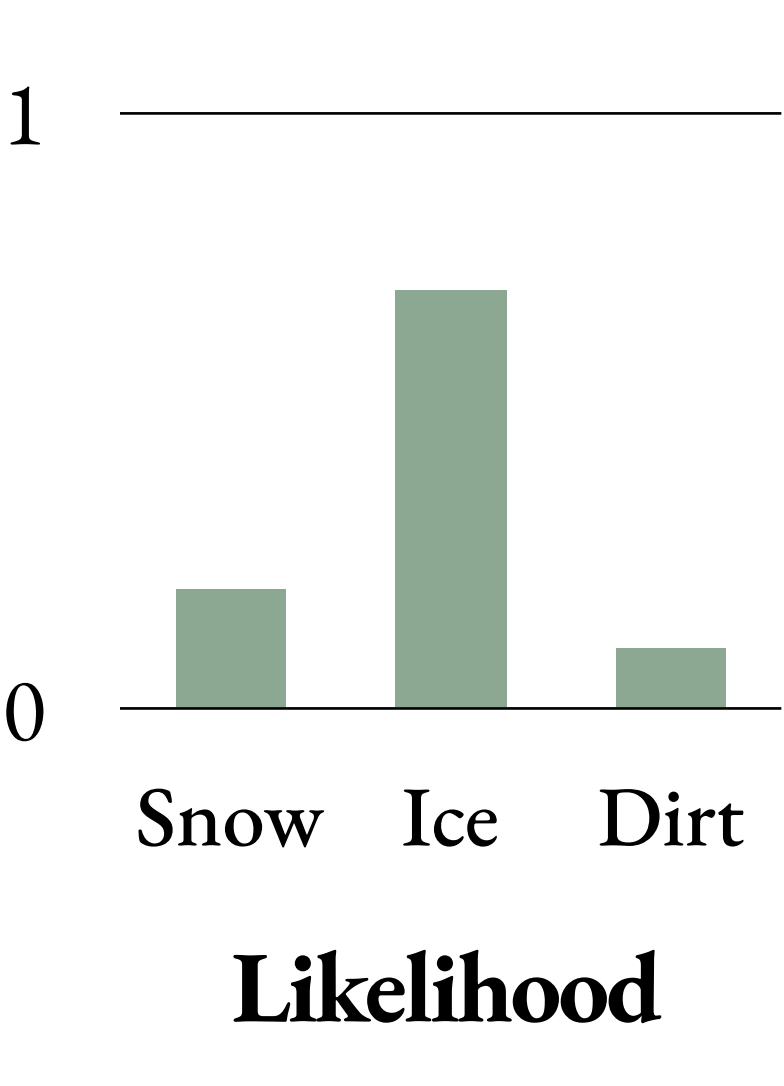
1. [Bernardo, J., & Smith, A. *Bayesian Theory*.]

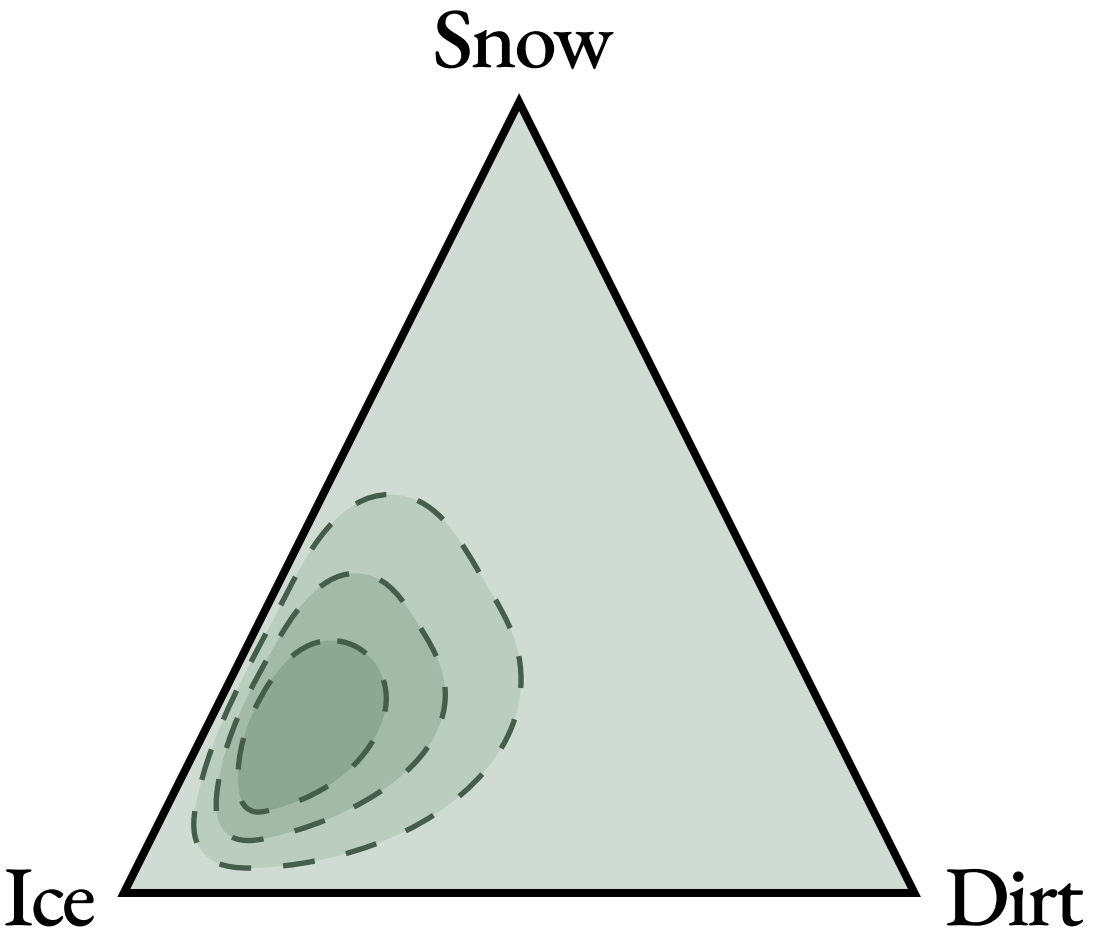
Thm 1. The Dirichlet distribution is a conjugate prior for the Categorical distribution. Moreover, the posterior has a closed form solution.



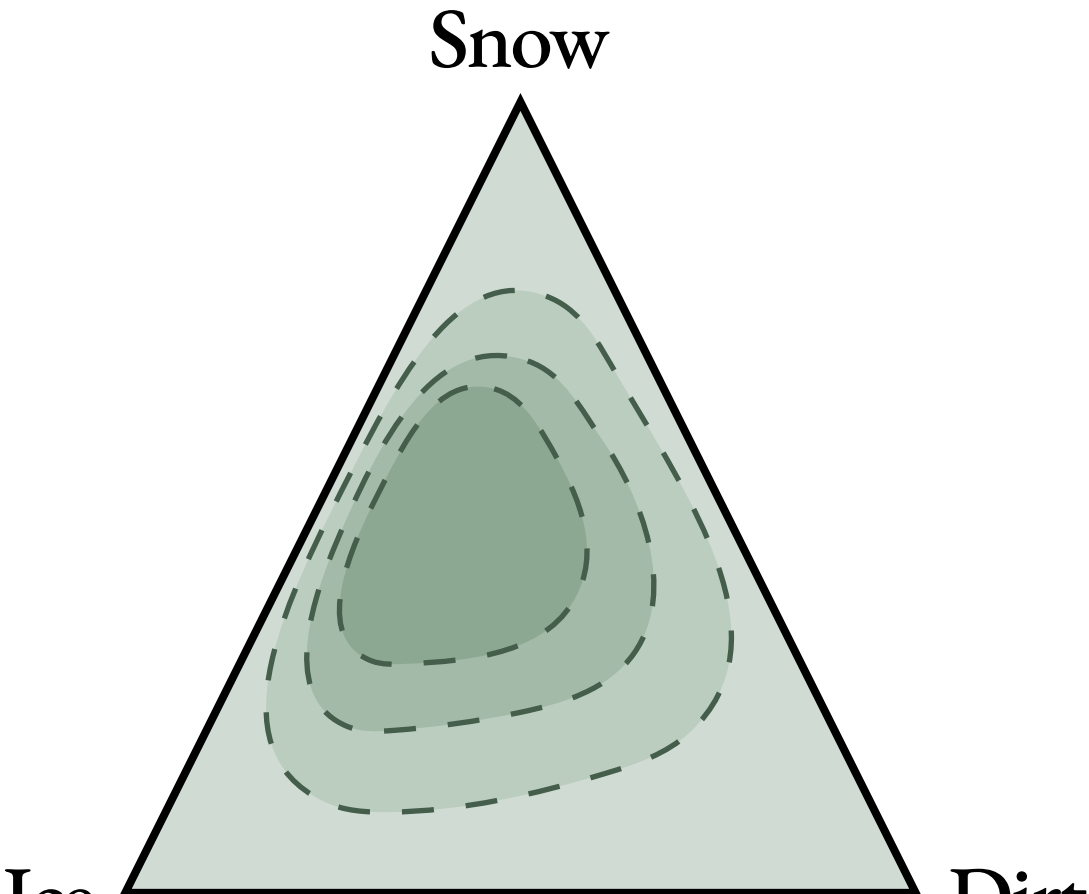
[redacted]

[redacted]


1
0
Snow
Ice
Dirt
Likelihood



Posterior



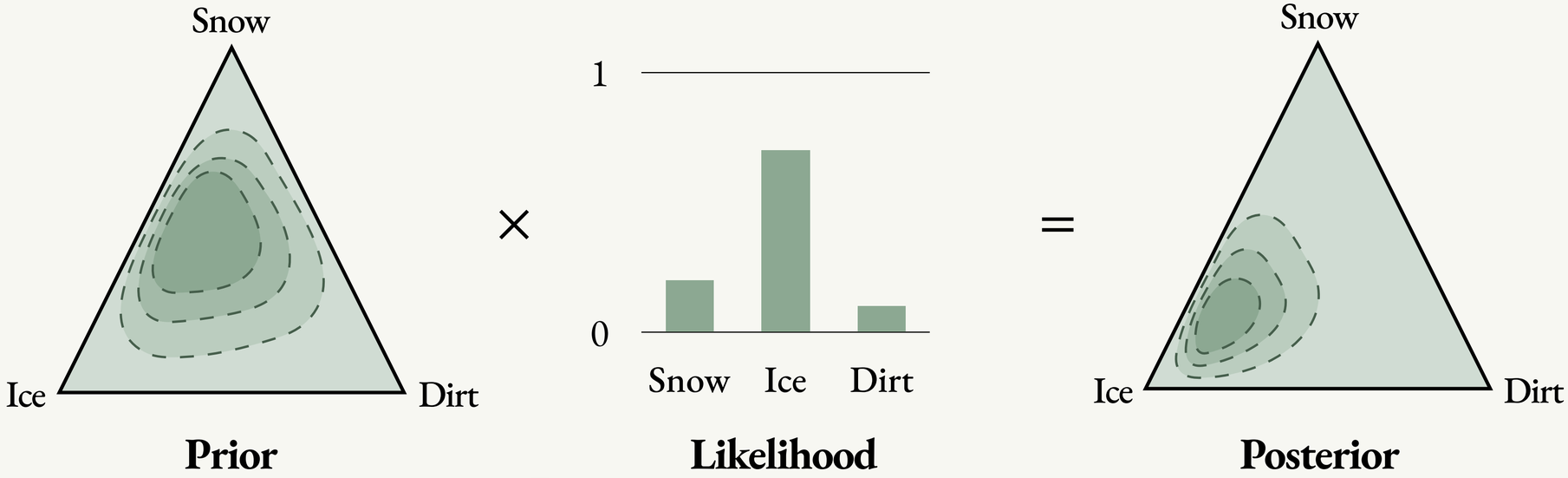
Prior

Insight: Dirichlet "models" the uncertainty of segmentation prior to physical measurements

Semantic conjugate prior

Thm 1. The Dirichlet distribution is a conjugate prior for the Categorical distribution. Moreover, the posterior has a closed form solution.

Def. For a likelihood $p(x \mid \theta)$ with "sufficient statistics", there exists a *conjugate* [...] *prior density function*(s) such that the posterior $p(\theta \mid x, \tau)$ is in the same class as the prior $p(\theta \mid \tau)$.[1]



Insight: Dirichlet "models" the uncertainty of segmentation prior to physical measurements

1. [Bernardo, J., & Smith, A. *Bayesian Theory*.]

Update measurements with semantics