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What is a Bayesian model?

- We often think of this as specifying a **prior** and a **likelihood**, as if these are two separate things

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A Bayesian modeler commits to an a priori *joint distribution*

$$p(\mathbf{y}, \boldsymbol{\theta}) = p(\mathbf{y} \mid \boldsymbol{\theta})p(\boldsymbol{\theta}) = p(\boldsymbol{\theta} \mid \mathbf{y})p(\mathbf{y})$$

Likelihood x Prior

Posterior x Marginal Likelihood

Data *(observed)*

Parameters *(unobserved)*