

elicitation

binomial distribution

you know n but not p

normal distribution

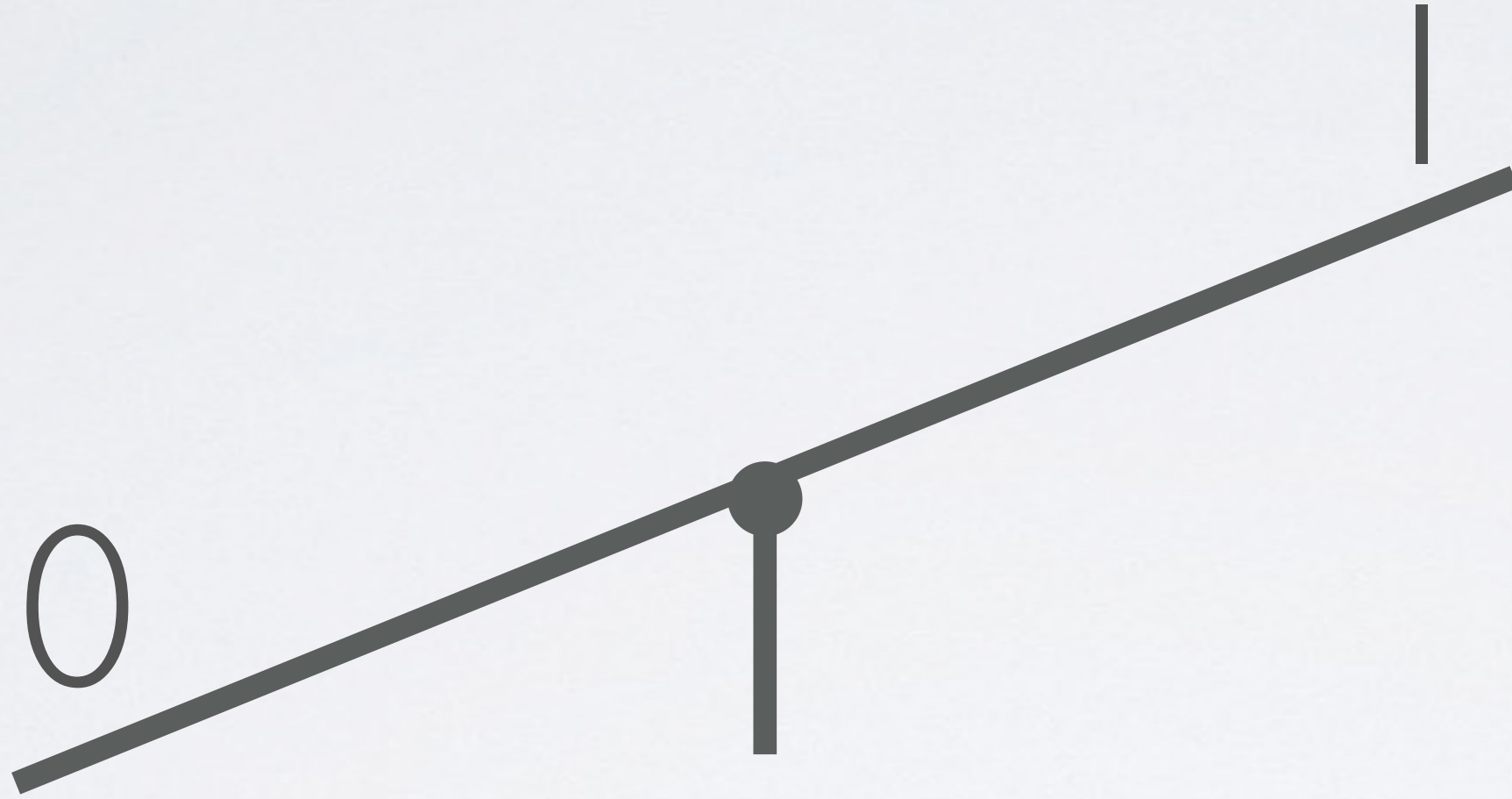
you know neither μ nor σ

personal probabilities

- ▶ incorporate everything the Bayesian knows or believes
- ▶ must obey **all laws of probability**
- ▶ be consistent with all of Bayesian's **knowledge**



P





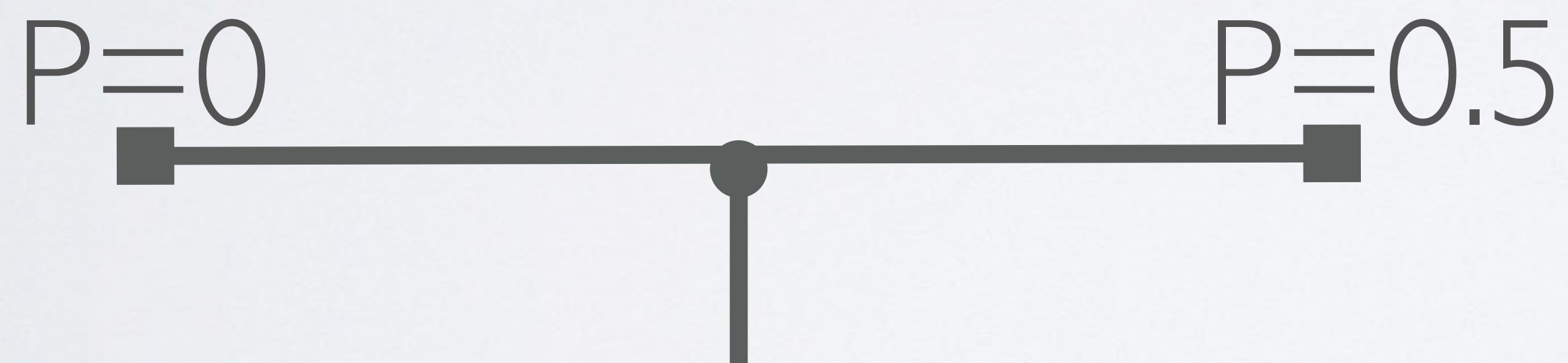
personal probability



uniform distribution



pdf = flat

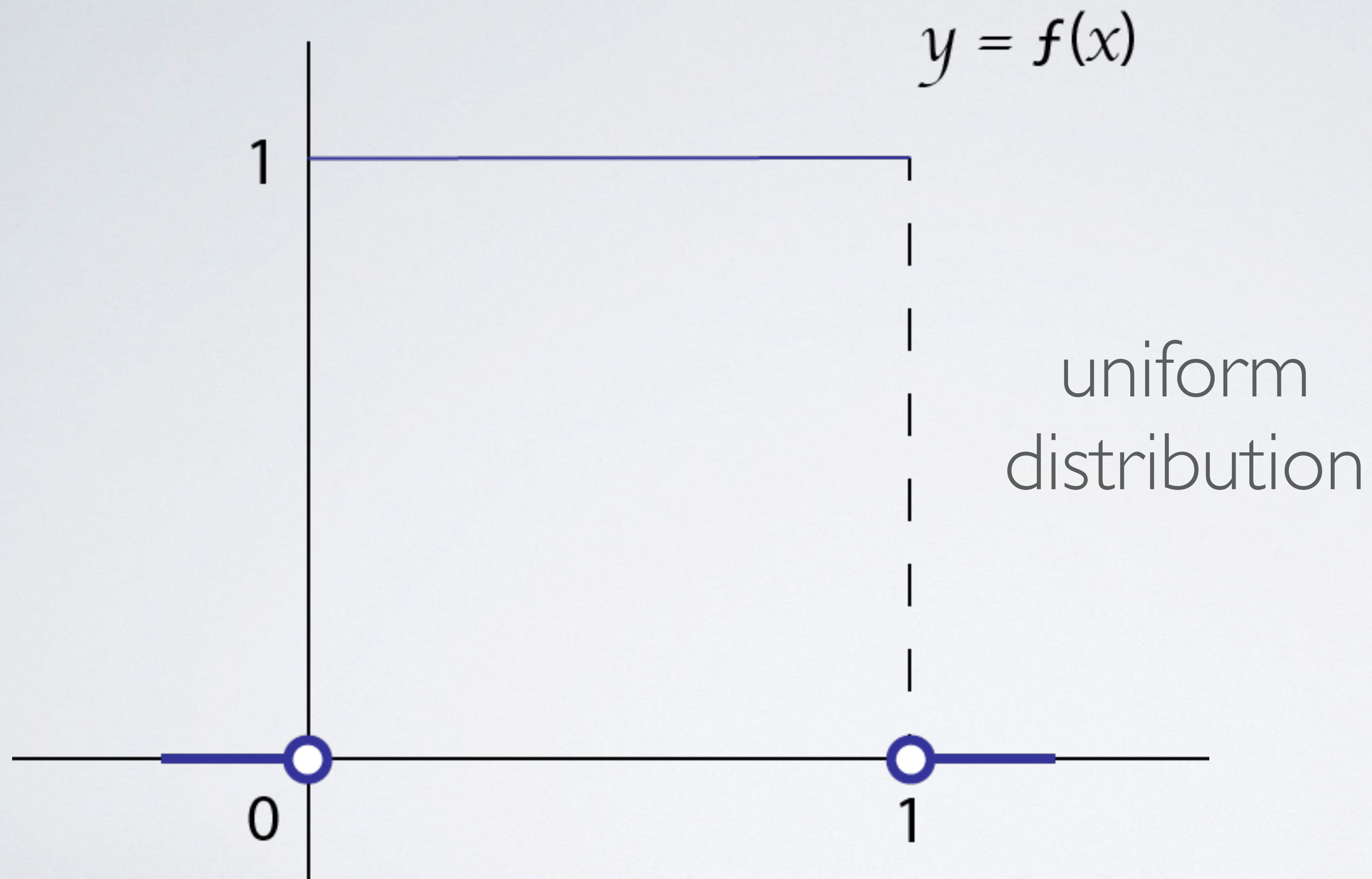


beta family

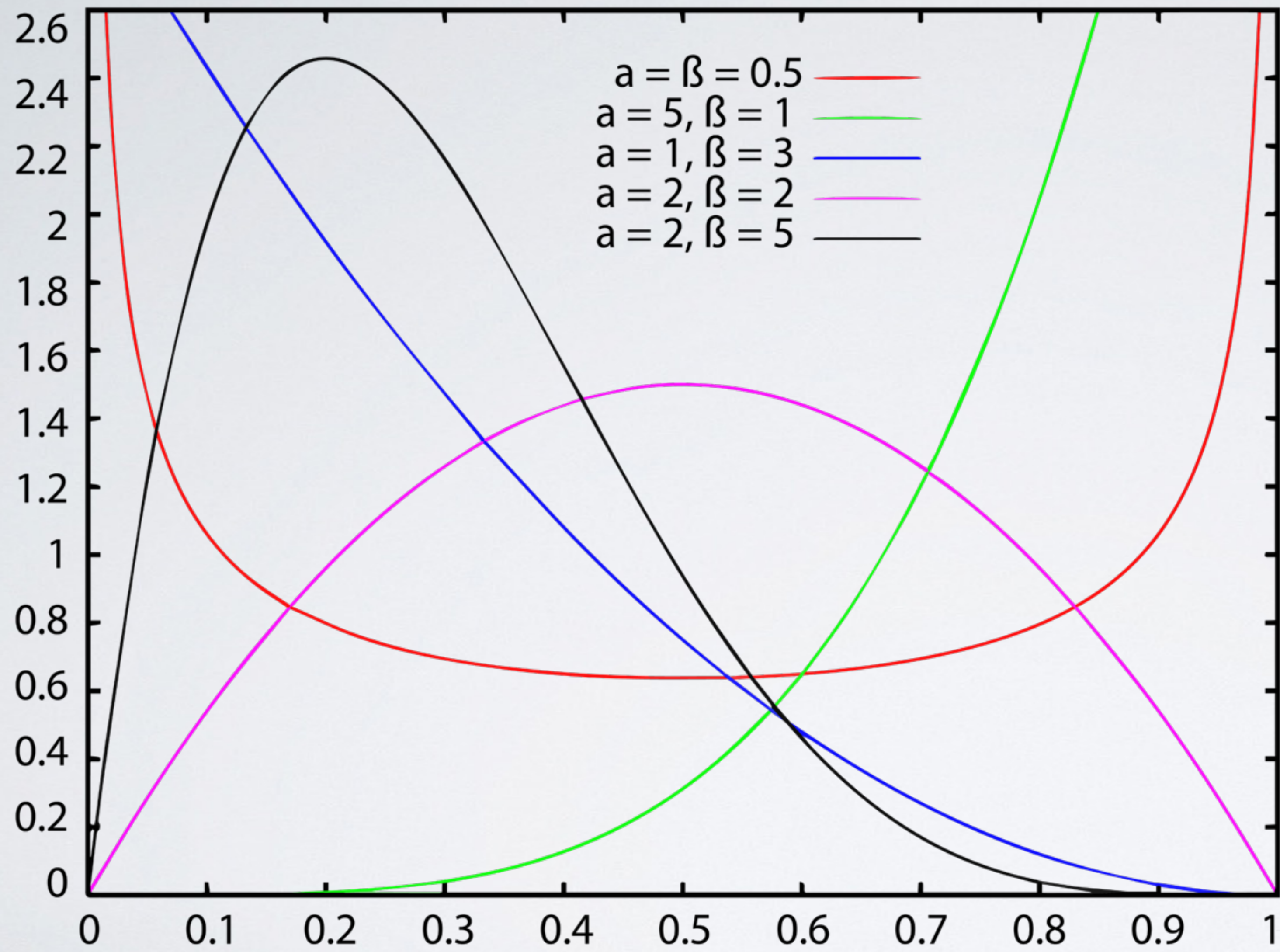
- ▶ the pdf of a beta distribution is specified by two parameters, α and β

$$f(p) = \frac{\Gamma(\alpha+\beta)}{\Gamma(\alpha)\Gamma(\beta)} p^{\alpha-1} (1-p)^{\beta-1}$$

- ▶ where $0 \leq p \leq 1$, $\alpha > 0$, $\beta > 0$,
and $\Gamma(n) = (n-1) \times (n-2) \times \dots \times 1$



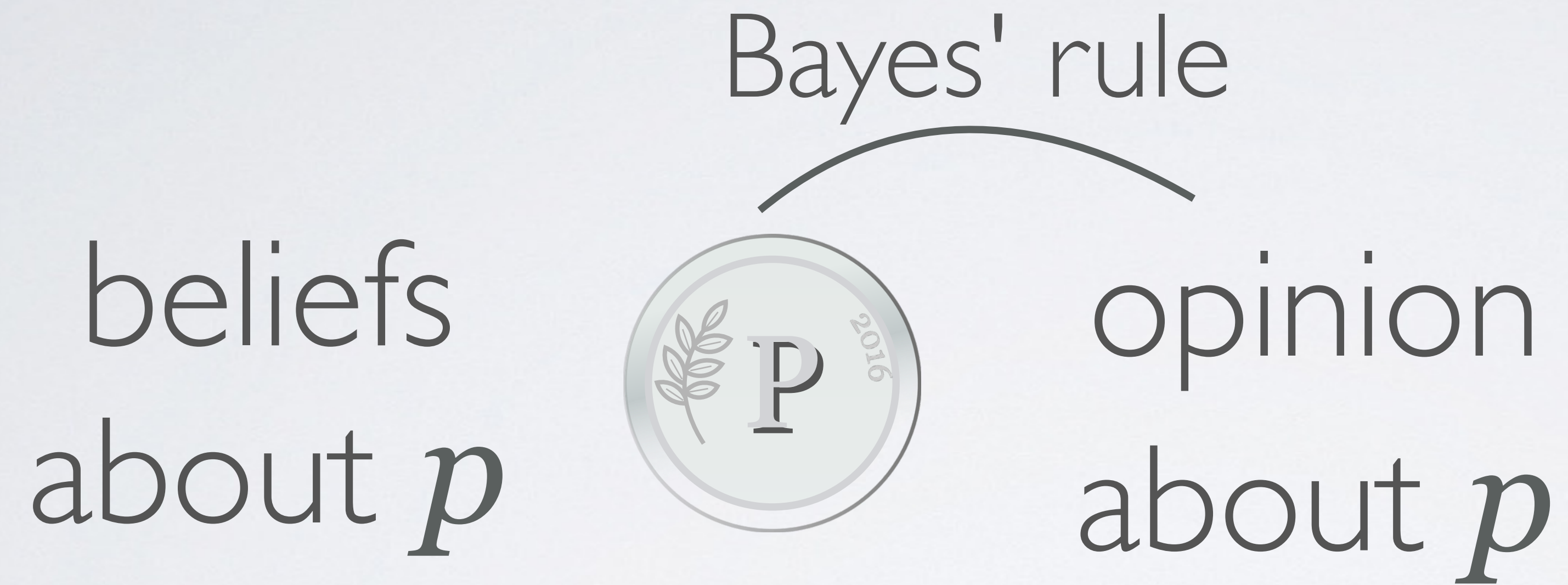
beta family



Bayes' rule

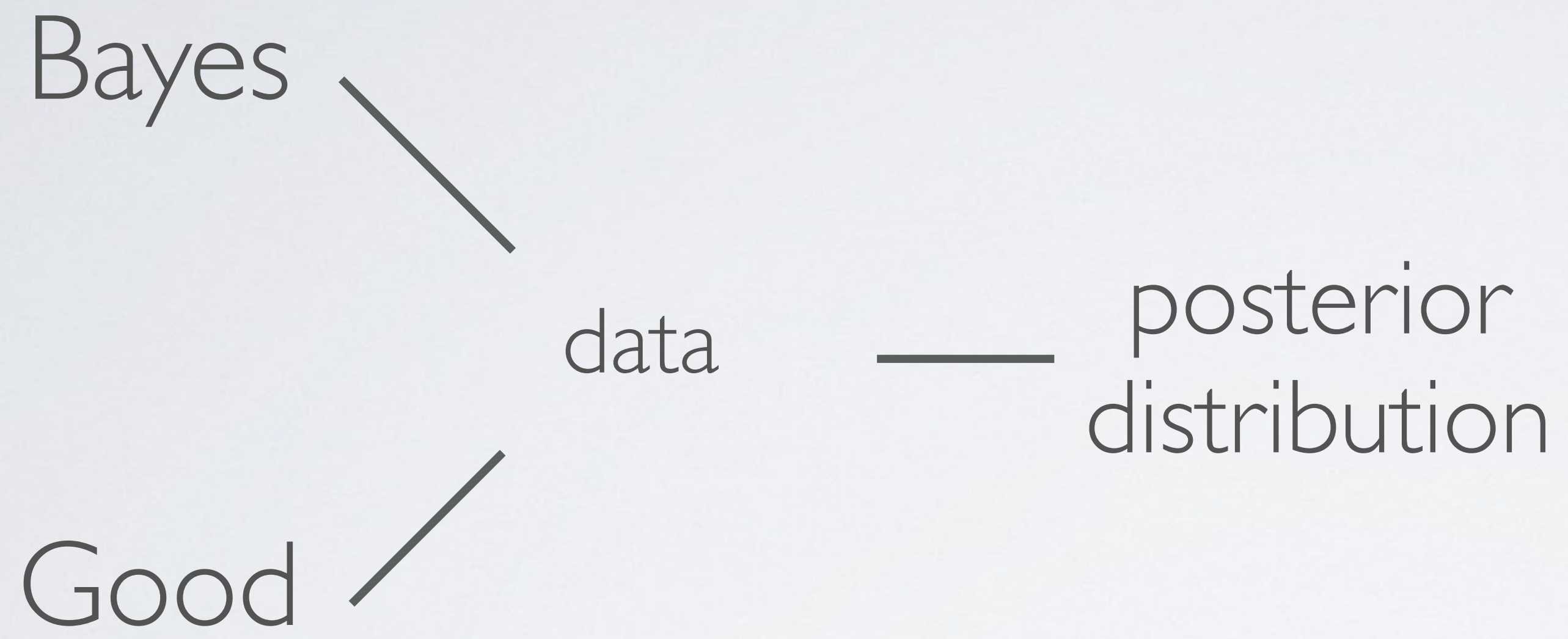
prior \Rightarrow posterior

binomial data



rational

coherent



summary

1. Bayesians express uncertainty through **probability distributions**
2. one can self-elicite a probability distribution that reflects your **personal probability**
3. personal probability should change as **new data** are observed
4. the **beta family** of distributions can flexibly express many possible beliefs about p