



# Tutorial 5: Bayesian models

BAMB! Summer School  
Tutorial 5

# Tutorial overview

1. Basic Bayes
2. Bayesian Observers
3. Bayesian Cognition

\*Note: These sections are somewhat independent, you can skip to parts that interest you more if you are running low on time



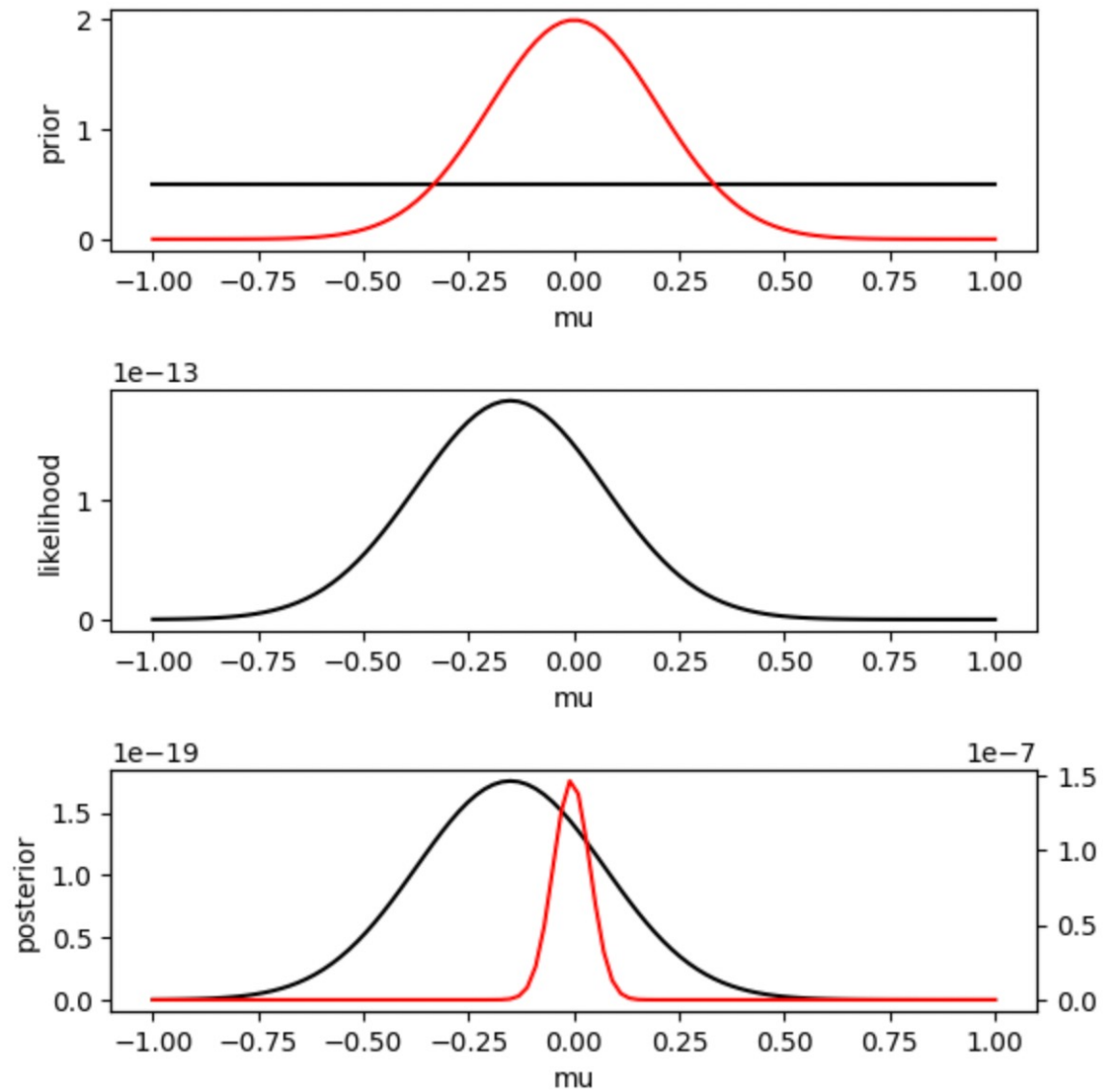
# 1. Basic Bayes

$$p(A|B) = \frac{p(B|A)p(A)}{p(B)}$$

1. Simple statistics
2. Statistics over distributions
3. Using prior knowledge



# 1. Basic Bayes



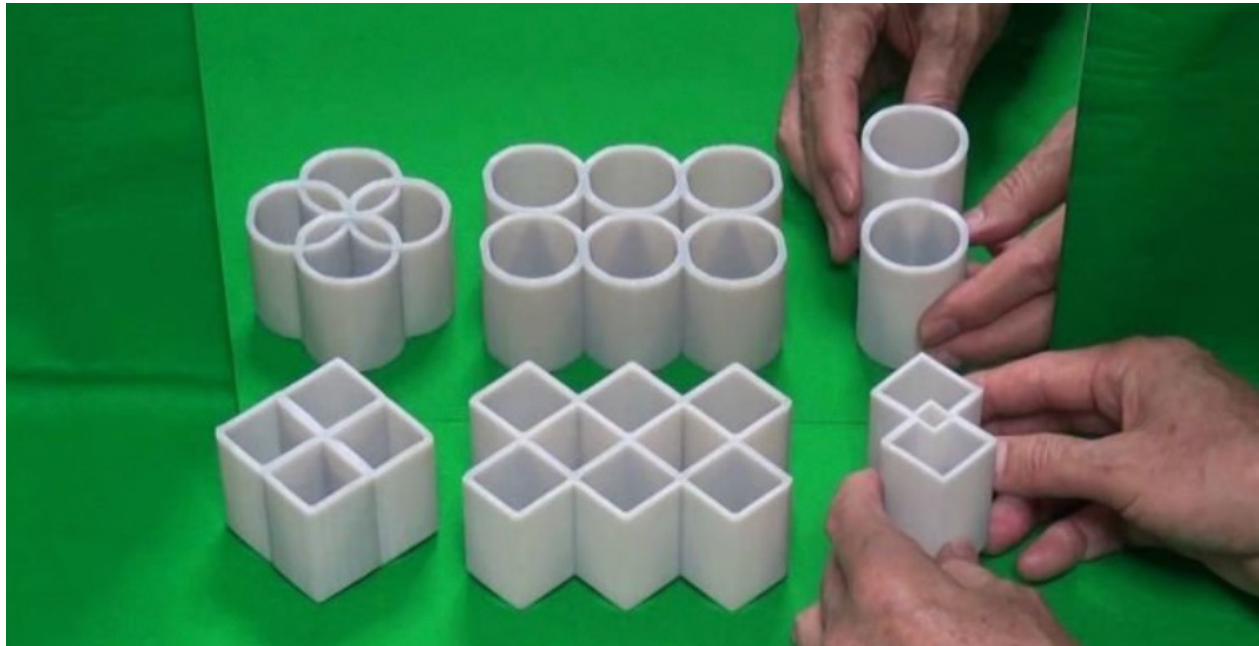
## 2. Bayesian Observers

$$p(\text{cause}|\text{sensations}) = \frac{p(\text{sensations}|\text{cause})p(\text{cause})}{p(\text{sensations})}$$



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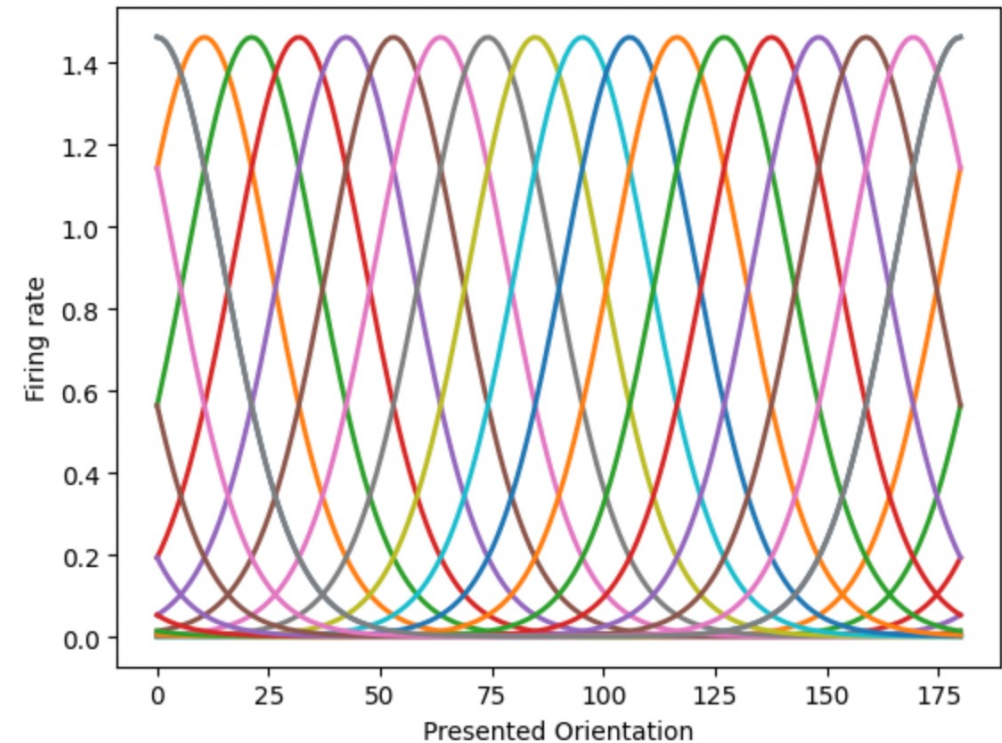
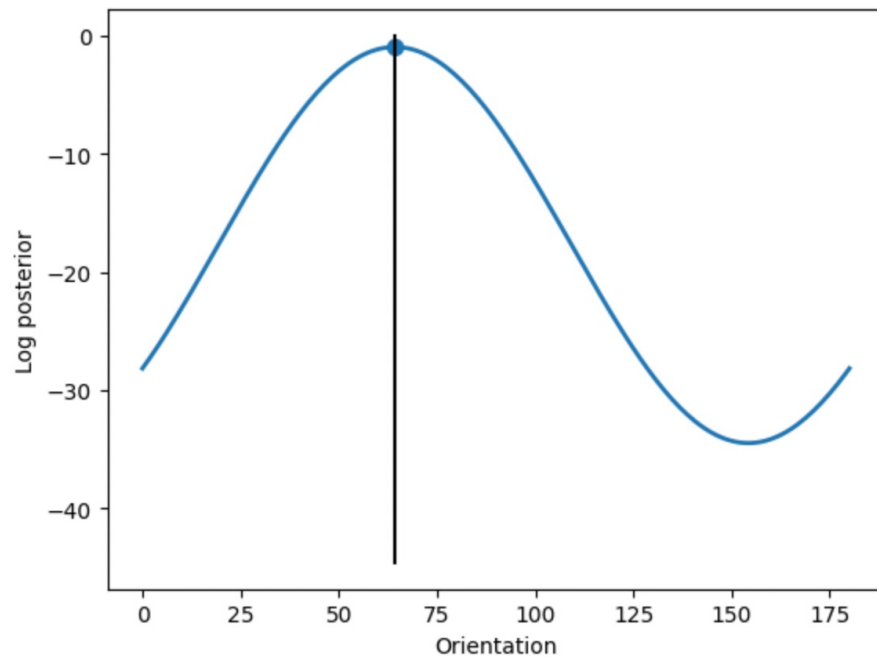




## 2. Bayesian Observers

$$p(\text{cause}|\text{sensations}) = \frac{p(\text{sensations}|\text{cause})p(\text{cause})}{p(\text{sensations})}$$

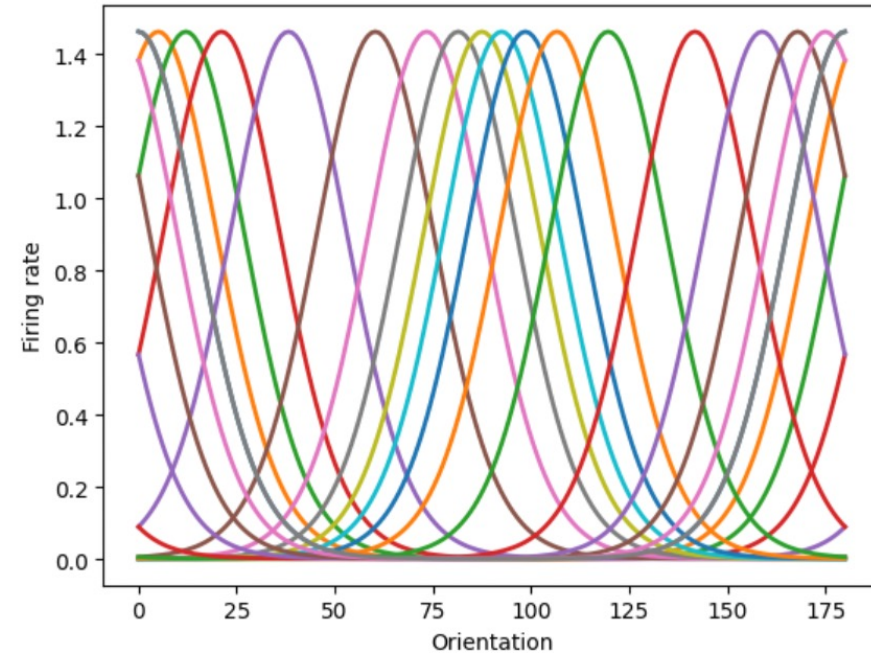
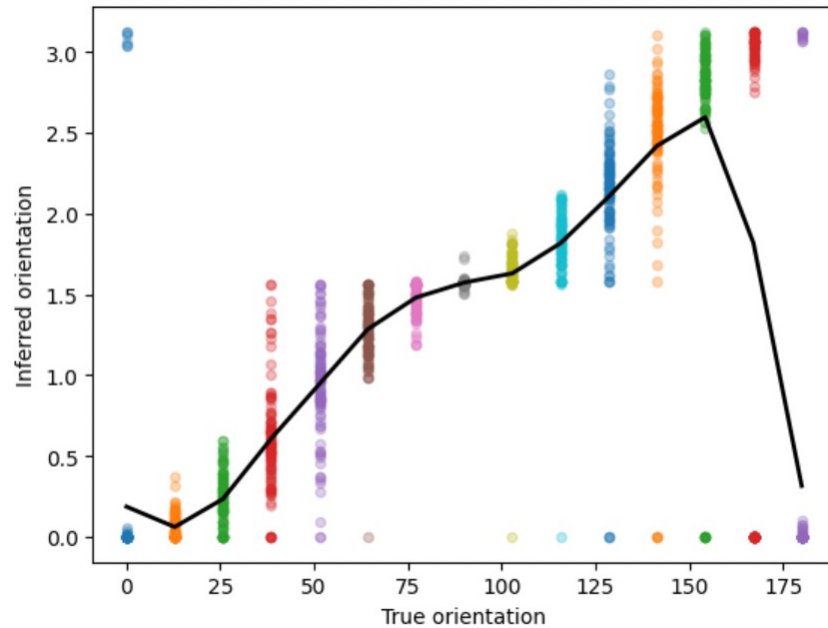
Maximum a posteriori



## 2. Bayesian Observers

$$p(\text{cause}|\text{sensations}) = \frac{p(\text{sensations}|\text{cause})p(\text{cause})}{p(\text{sensations})}$$

\* Only if you have time



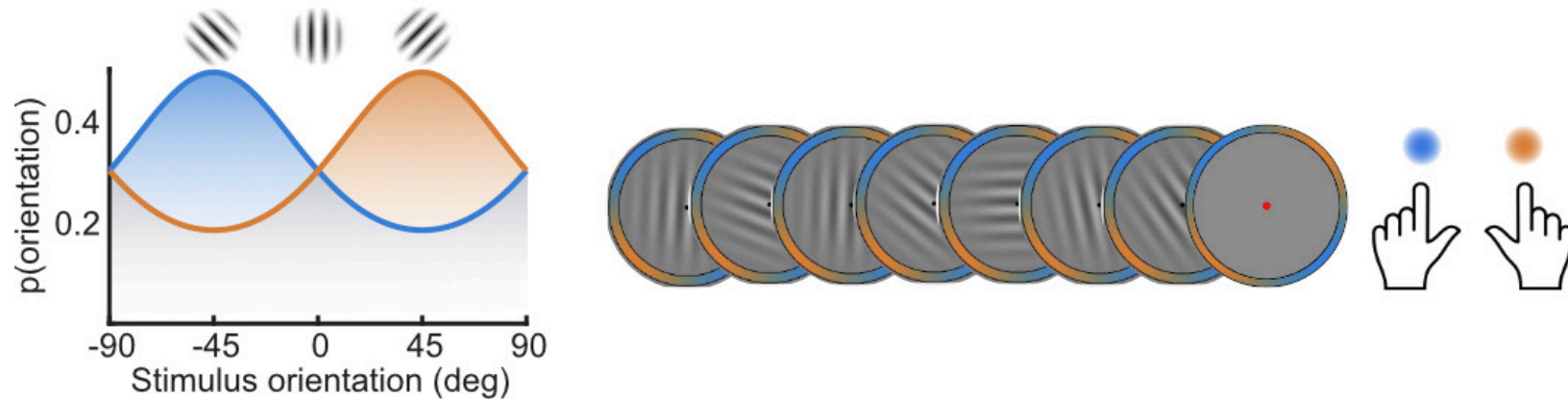


# 3. Bayesian Cognition

**"today's posterior is tomorrow's prior"**

(Lindley, Bayesian statistics, a review. 1972, p. 2)

Accumulating log-likelihoods is the optimal way to infer the cause of sequential samples of evidence



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**Job Ad:** 2 postdoc positions available with Marios Philiastides, Univ Glasgow  
Funded for 3 years, play with cool tech (simultaneous EEG-fMRI) and models!  
<https://mphiliastides.org/en/> (closes 31 Aug. see me for details)

