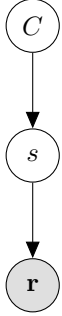


Variational Inference for Categorization Notes

We consider the problem of categorizing stimuli with overlapping distributions

0.1 Generative model



C is the category distribution ($\in \{0, 1\}$)

$P(C) = .5$

s is the presented stimulus, a draw from the selected category distribution

$P(s|C) = \mathcal{N}(s; 0, \sigma_C^2) = \mathcal{N}(s; 0, \tau_C^{-1})$

\mathbf{r} is the vector of neural responses to s . $P(r_i|s) = \text{Poisson}(r_i; f_i(s))$

$f_i(s)$ is the tuning curve of the i^{th} neuron in response to a stimulus s

Tuning curve assumptions:

- Tuning curves cover the space so $\sum_i f_i(s)$ is independent of s
- The tuning curves are Gaussian: $f_i(s) \sim \mathcal{N}(s_i^{\text{pref}}, \sigma_{\text{tc}}^2)$