

Behavior of a Mixture Model

$d = \boxed{\text{text the}}$

Likelihood:

$$\begin{aligned} P(\text{"text"}) &= p(\theta_d)p(\text{"text"} | \theta_d) + p(\theta_B)p(\text{"text"} | \theta_B) \\ &= 0.5 * p(\text{"text"} | \theta_d) + 0.5 * 0.1 \end{aligned}$$

$$P(\text{"the"}) = 0.5 * p(\text{"the"} | \theta_d) + 0.5 * 0.9$$

$$\begin{aligned} p(d | \Lambda) &= p(\text{"text"} | \Lambda) p(\text{"the"} | \Lambda) \\ &= [0.5 * p(\text{"text"} | \theta_d) + 0.5 * 0.1] \times \\ &\quad [0.5 * p(\text{"the"} | \theta_d) + 0.5 * 0.9] \end{aligned}$$

$\boxed{\text{text ?} \quad \theta_d}$
 the ?

$P(\theta_d) = 0.5$

$\boxed{\text{the } 0.9 \quad \theta_B}$
 $\text{text } 0.1$

How can we set $p(\text{"text"} | \theta_d)$ & $p(\text{"the"} | \theta_d)$ to maximize it?

Note that $p(\text{"text"} | \theta_d) + p(\text{"the"} | \theta_d) = 1$