

# What's the probability of observing a word w?

d

Topic:  $\theta_d$

text 0.04  
mining 0.035

$$p(\theta_d) + p(\theta_B) = 1$$

$$\begin{aligned} P("the") &= p(\theta_d)p("the" | \theta_d) + p(\theta_B)p("the" | \theta_B) \\ &= 0.5 * 0.000001 + 0.5 * 0.03 \end{aligned}$$

$$= 0.5$$

the 0.000001

"the"?

"text"?

$$\begin{aligned} P("text") &= p(\theta_d)p("text" | \theta_d) + p(\theta_B)p("text" | \theta_B) \\ &= 0.5 * 0.04 + 0.5 * 0.000006 \end{aligned}$$

Topic  
choice

$$.5$$

we 0.01  
food 0.003  
...  
text 0.000006  
...

Background (topic)  $\theta_B$