

$$p(t|w_{ij}) \propto \beta_w \frac{\alpha_t}{n(t) + \bar{\beta}} + \beta_w \frac{n(t, d = i)}{n(t) + \bar{\beta}} + \frac{n(t, w = w_{ij}) [n(t, d = i) + \alpha_t]}{n(t) + \bar{\beta}}$$