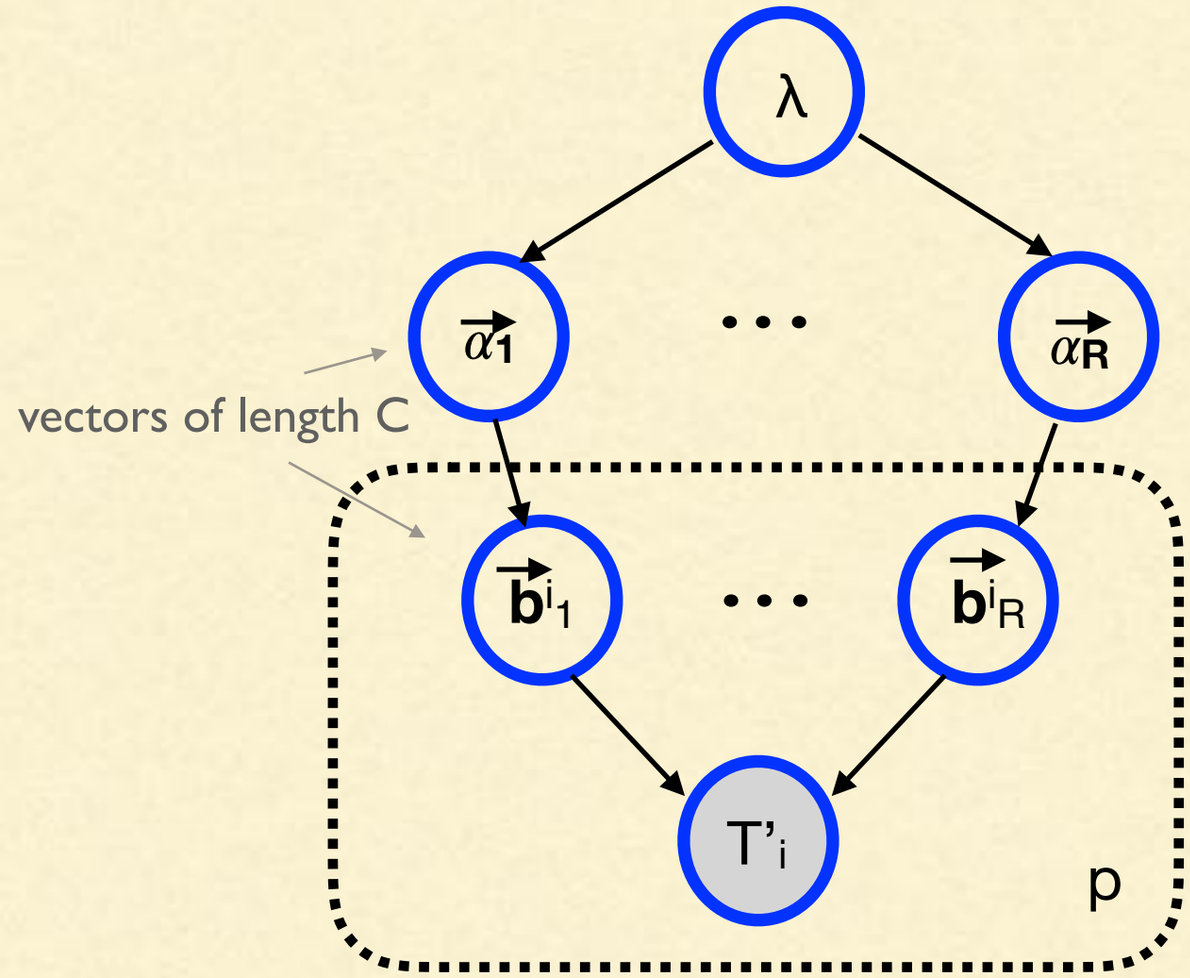
WITH MORE CATEGORIES (RXC)



$\alpha_{rc} \sim$ Exponential(λ_1) i.i.d.

$b^i_r \mid \alpha_r \sim$ Dirichlet(α_r) i.i.d.

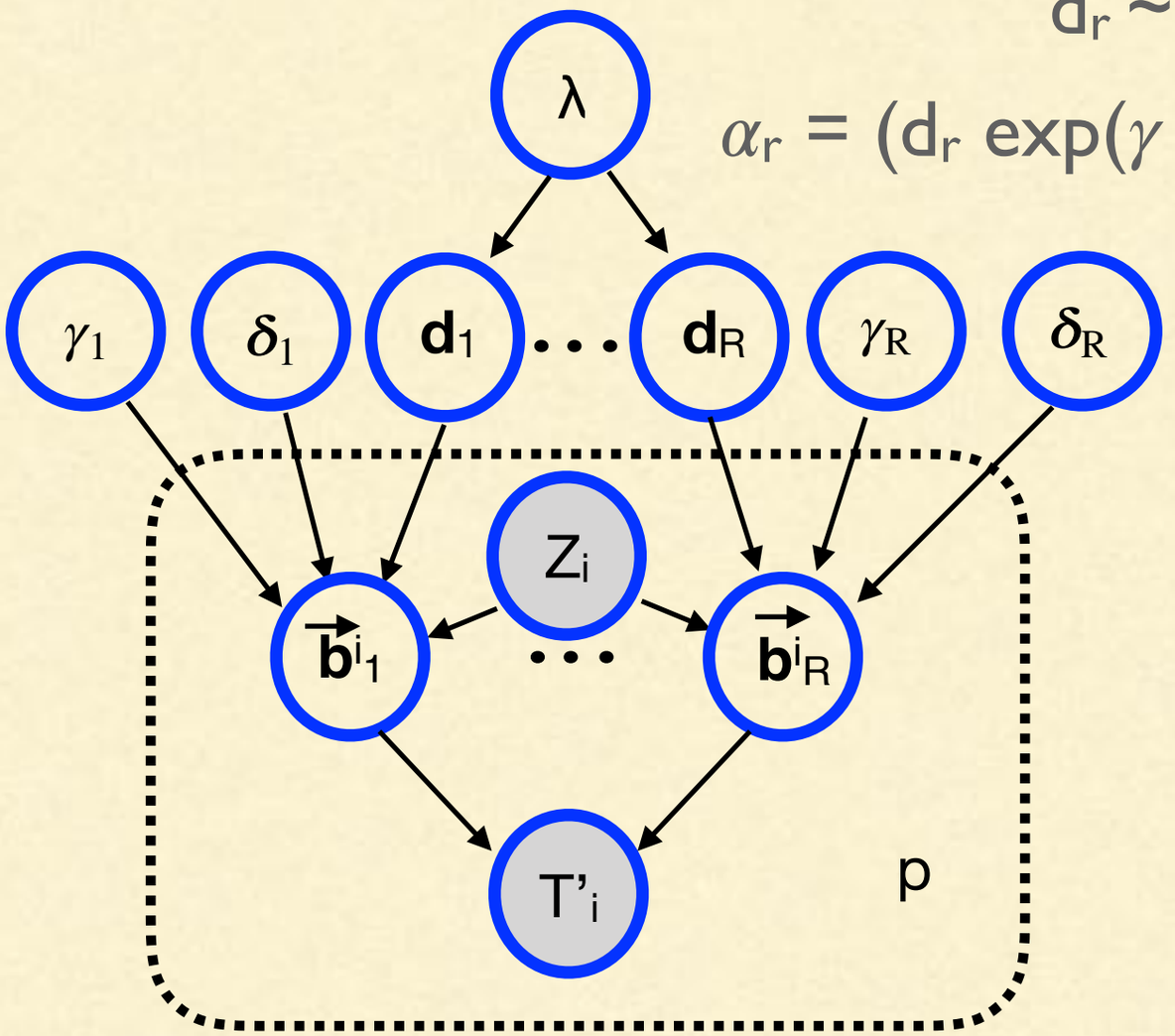
r = 1,…,R

$\theta_{ic}=X^i_r\, b^i_{1c} + X^i_R b^i_{Rc}$

c = 1… C

$T'_{ic} \sim$ Multinomial(N_i,θ_i)

WITH MORE CATEGORIES AND COVARIATES



$d_r \sim$ Exponential (λ) i.i.d. $r = 1 \ldots R$

$\alpha_r = (d_r \exp(\gamma_{r1} + \delta_{r1} Z_i), \ldots, d_r \exp(\gamma_{rC-1} + \delta_{rC-1} Z_i), d_r)$

$r = 1, \ldots, R$

$b_r^i \mid \alpha_r \sim$ Dirichlet(α_r) i.i.d.

$r = 1, \ldots, R$

$\theta_{ic} = X^i_1 b^i_{1c} + X^i_R b^i_{Rc}$

$c = 1, \ldots, C$

$T'_{ic} \sim$ Multinomial(N_i, θ_i)

Note: $\log \mathbb{E}(b^i_{rc}) / (1 - (b^i_{rc})) = \gamma_{rc} + \delta_{rc} Z_i$