



$$\theta \sim \text{Dir}(\delta) \quad (1)$$

$$\phi \sim \text{Dir}(\eta) \quad (2)$$

$$\alpha \sim \text{Dir}(\zeta) \quad (3)$$

$$\beta \sim \text{Dir}(\epsilon) \quad (4)$$

$$\gamma \sim \text{Dir}(\xi) \quad (5)$$

$$z \sim \text{Mult}(\theta) \quad (6)$$

$$s \sim \text{Mult}(\phi) \quad (7)$$

$$y_c \sim \text{Mult}(\alpha_{c,z,s}) \quad (8)$$

$$x \sim \text{Mult}(\beta_{z,s}) \quad (9)$$