$$\mathcal{B}(1,1)$$
  $\mathcal{B}(1,1)$   $\mathcal{N}(1,\sigma_0^2)$ 

$$\mathcal{F}_{\alpha}$$

$$\mathcal{F}_{\beta}$$

$$\mathcal{A}_{ij}$$

$$\mathcal{$$

$$p_{ij} \sim \mathcal{B}(\alpha_{ij}, \beta_{ij})$$

$$lpha_{ij} = \mathcal{F}_{lpha}(oldsymbol{ heta}_i, oldsymbol{\delta}_j, \mathbf{a}_j) = \left(rac{oldsymbol{ heta}_i}{oldsymbol{\delta}_j}
ight)^{\mathbf{a}_j}$$

$$eta_{ij} = \mathcal{F}_{eta}(m{ heta}_i, m{\delta}_j, \mathbf{a}_j) = \left(rac{1-m{ heta}_i}{1-m{\delta}_j}
ight)^{\mathbf{a}_j}$$
Item Characteristic Curve

mapping ability to expected response:

$$E[p_{ij}|\boldsymbol{\delta}_j, a_j] = \frac{\alpha_{ij}}{\alpha_{ij} + \beta_{ij}} = \frac{1}{1 + \left(\frac{\boldsymbol{\delta}_j}{1 - \boldsymbol{\delta}_j}\right)^{\mathbf{a}_j} / \left(\frac{\boldsymbol{\theta}_i}{1 - \boldsymbol{\theta}_i}\right)^{\mathbf{a}_j}}$$