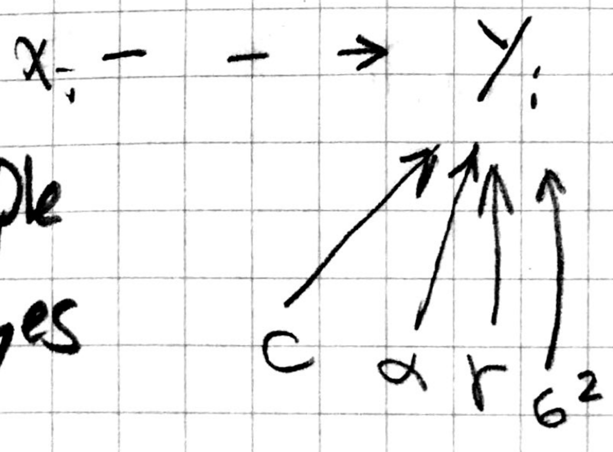
Simple Bayes



$$g(\alpha,\gamma,c,x_i) = \frac{\alpha(x_i - c)}{\frac{\alpha}{\gamma} + (x_i - c)}$$

Caveat about using σ^2

$y_i \sim \text{normal}(g(c,\gamma,\alpha,x_i), \sigma^2)$

$c \sim \text{dunif}(0, 50)$

$\alpha \sim \text{gamma}\left(\frac{35^2}{4.25^2}, \frac{35}{4.25^2}\right)$

$\gamma \sim \text{dunif}(0, 10)$

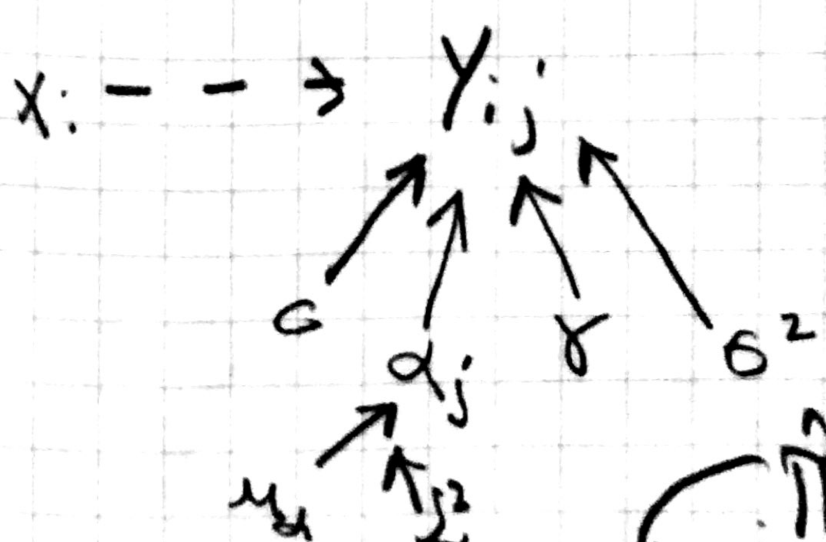
$\sigma \sim \text{dunif}(0, 50)$

Better to use informed priors!!

$$[\alpha,\gamma,c,\sigma^2 \mid \underline{y}] \propto \prod_{i=1} [y_i \mid \alpha,\gamma,c,\sigma^2][c][\gamma][\alpha][\sigma^2]$$

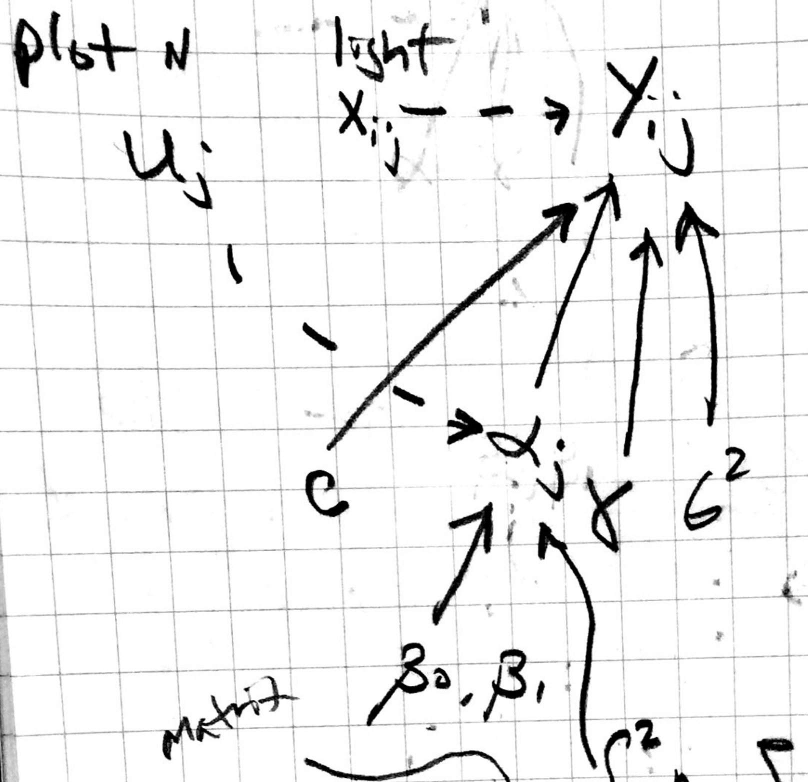
Multi-level model for groups (locations) of trees

i indexes trees
j indexes groups



$$[\alpha,\gamma,c,\sigma^2,\mu_\alpha,\varsigma^2_\alpha \mid \underline{y}] \propto \prod_{i=1} \prod_{j=1}^{J} [y_{ij} \mid \alpha_j,\gamma,c,\sigma^2][\alpha_j][\gamma][c][\sigma^2] \times [\mu_\alpha][\varsigma^2_\alpha]$$

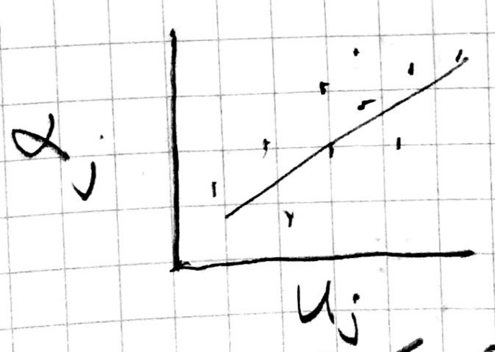
Multi-level model with covariate for groups

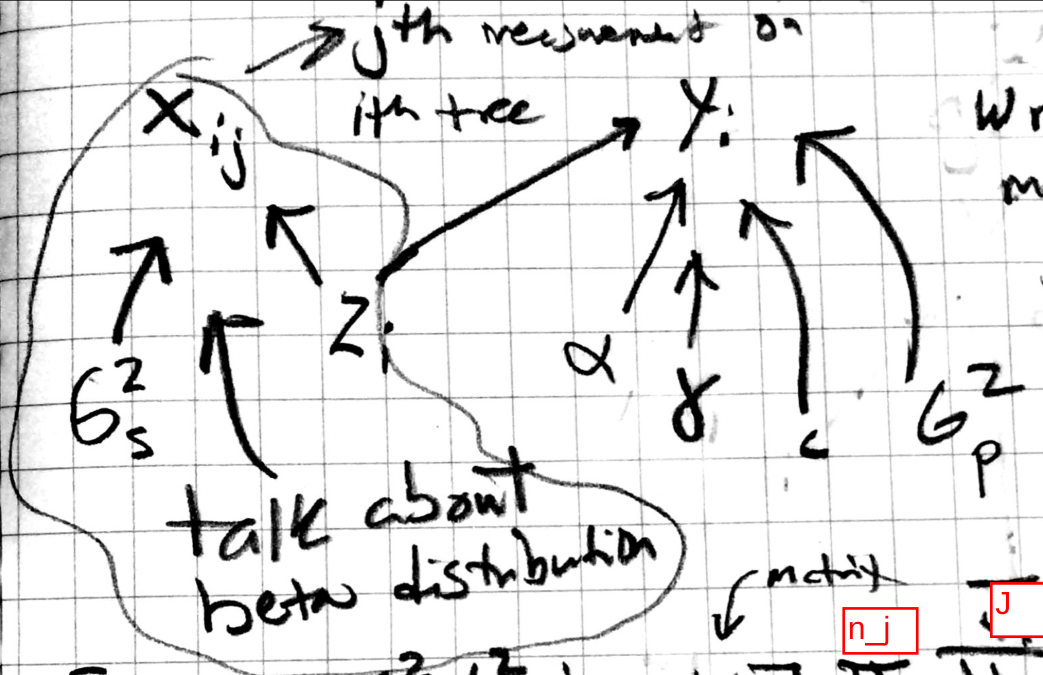


$$[\gamma, \alpha, c, \sigma^2, \beta_0, \beta_1, \varsigma^2 \mid \underline{y}] \propto \prod_{i=1} \prod_{j=1} [y_{ij} \mid \alpha_j, \gamma, c, \sigma^2]$$

$$\times [\alpha_j \mid \beta_0, \beta_1, \varsigma^2]$$

× priors on ....





Write out the model predicting growth

interpet

matrix

$$[\underline{\alpha}, \gamma, c, \underline{Z}, \sigma_p^2, \sigma_s^2 \mid \underline{y}, \underline{X}] \prod_{i=1}^{n_j} \prod_{j=1}^{J} [y_i \mid \alpha, \gamma, c, z_i, \sigma_p^2]$$

$$\times [X_{ij} \mid z_i, \sigma_s^2]$$

$\times$ priors on ....

Calibration error in y's

now the response tree biomass

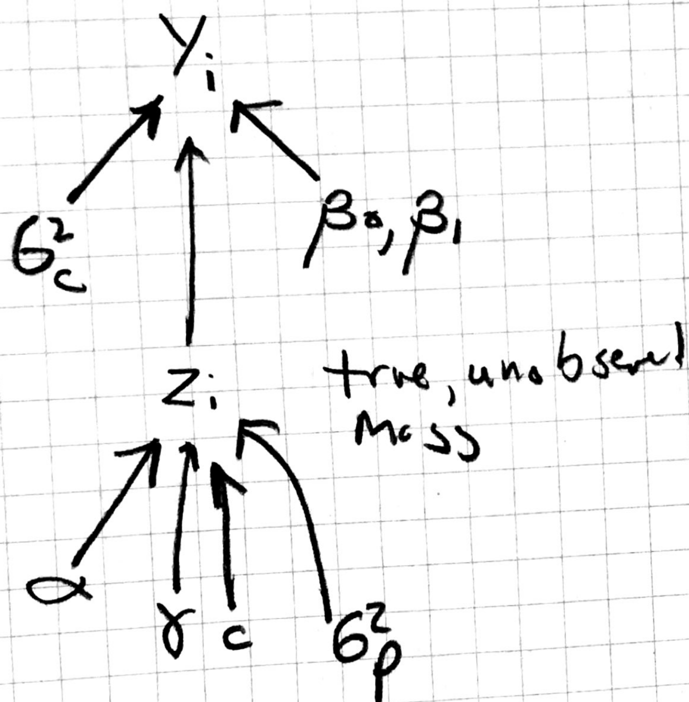
Theory: $\text{Mass} = aH^b$ b theoretically $= 2$

algebra

$$\log(H) = \beta_0 + \beta_1 \log(\text{mass})$$

$$\beta_0 = \log(a)\frac{1}{b}$$

Calibration model for response



$$[\alpha, \gamma, c, \sigma_p, \beta_0, \beta_1, \sigma_c^2 \mid \underline{Y}] \propto \prod_{i=1}^{n} \text{normal}(\log(Y_i) \mid \beta_0 + \beta_1 \log(z_i))$$

$$\times \text{lognormal}(\log(z_i) \mid \alpha, \gamma, c, \sigma_p^2)$$

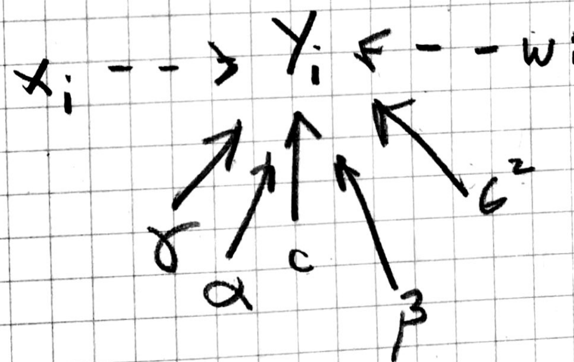
$\times$ priors

Differences due to treatment

$$g(\gamma, \alpha, c, \beta) = \frac{\alpha(x_i - c)}{\frac{\alpha}{\gamma} + (x_i + c)} + \beta w_i$$

$w_i = 0$ if control

$w_i = 1$ if treatment



Differences among species