Typically

$$y_i = \beta_0 + \beta_1 x_i + b_{j[i]} + \varepsilon_i$$

$$b_j \sim N(0, \sigma_b^2)$$

$$\varepsilon_i \sim N(0, \sigma^2)$$

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$$y_i \sim N(\hat{y}_i, \tau)$$

$\tau = \frac{1}{\sigma^2}$ precision

$$\hat{y}_i = \beta_0 + \beta_1 x_i + b_{j[i]}$$

$$b_j \sim N(0, \tau_b)$$

$$\tau_b = \frac{1}{\sigma^2}$$

$$\beta_0 \sim N(0, 1000)$$

$$\beta_1 \sim N(0, 1000)$$

$$\sigma^2 \sim Unif(0, 1000)$$

$$\sigma_b^2 \sim Unif(0, 1000)$$

```
model {
  for(i in 1:N) {
     y[i] ~ dnorm(yhat[i], tau_y)
     yhat[i] <- beta0 + beta1 * x[i] + b[j[i]]
  }
```

looping through each observation

$$y_i \sim N(\hat{y}_i, 1/\sigma^2)$$

$$\hat{y}_i = \beta_0 + \beta_1 x_i + b_j$$

```
  for(j in 1:J) {
     b[j] ~ dnorm(0, tau_b)
  }
```

looping through each group

$$b_j \sim N(0, \tfrac{1}{\sigma_b^2})$$

```
  beta0 ~ dnorm(0, .001)
  beta1 ~ dnorm(0, .001)
  tau_y <- pow(sigma_y, -2)
  sigma_y ~ dunif(0, 1000)

  tau_b <- pow(sigma_b, -2)
  sigma_b ~ dunif(0, 1000)
}
```

$$\beta_0 \sim N(0, \tfrac{1}{.001})$$

$$\beta_1 \sim N(0, \tfrac{1}{.001})$$

$$\tau = \frac{1}{\sigma^2}$$

$$\sigma \sim Unif(0, 1000)$$

$$\tau_b = 1/\sigma_b^2$$

$$\sigma_b \sim Unif(0, 1000)$$

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Baseball example

Typical

$$y_i = \beta_0 + \beta_1 \, age_i + \beta_2 \, age_i^2 + b_{j[i]} + \varepsilon_i$$

$$b_j \sim N(0, \sigma_b^2)$$

$$\varepsilon_i \sim N(0, \sigma^2)$$

JAGS Land

$$y_i \sim N(\hat{y}_i, \tau)$$

$$\tau = \frac{1}{\sigma^2}$$

$$\hat{y}_i = \beta_0 + \beta_1 \, age_i + \beta_2 \, age_i^2 + b_{j[i]}$$

$$b_j \sim N(0, \tau_b^2)$$

$$\tau_b = \frac{1}{\sigma_b^2}$$

$\beta_0 \sim N(0, 1000)$

$\beta_1 \sim N(0, 1000)$

$\beta_2 \sim N(0, 1000)$

$\sigma^2 \sim Unif(0, 1000)$

$\sigma_b^2 \sim Unif(0, 1000)$

```
model {
  for(i in 1:N) {
    y[i] ~ dnorm(yhat[i], tau_y)
    yhat <- beta0 +beta1*a1[i] + beta2*a2[i]+b[j[i]]
  }
  for(j in 1:J) {
    b[j] ~ dnorm(0, tau_b)
  }
  Beta0 ~ dnorm(0, .001)
  beta1 ~ dnorm(0, .001)
  beta2 ~ dnorm(0, .001)
```

$y_i \sim N(\hat{y}_i, \tau_y)$

$\hat{y}_i = \beta_0 + \beta_1 * a1_i + \beta_2 a$ $+ b_{j[i]}$