To_be_deleted_afterwards

Random Intercepts

Model 1 Freq

$$\begin{aligned}&\text{SecondVersion}_{ij} = \beta_0 + \beta_1 * \text{FirstVersion}_i + \eta_{0j} + \epsilon_{ij}\\ &\text{with}\\ &\eta_{0j} \sim \text{Normal}(0, \sigma_{\eta_0})\\ &\epsilon_{ij} \sim \text{Normal}(0, \sigma_\epsilon)\end{aligned}$$

Model 1 Bayes

$$\begin{aligned}&\text{SecondVersion}_i \sim \text{Normal}(\mu_i, \sigma_\epsilon)\\ &\mu_i = \beta_{0j[i]} + \beta_1 * \text{FirstVersion}_i\\ &\beta_{0j} \sim \text{Normal}(\beta_0, \sigma_{\beta_0})\end{aligned}$$

Random Slopes

Model 2 Freq

$$\begin{aligned}&\text{SecondVersion}_{ij} = \beta_0 + \beta_1 * \text{FirstVersion}_i + \eta_{0j} + \eta_{1j} * \text{FirstVersion}_i + \epsilon_{ij}\\ &\text{with}\\ &\eta_{0j} \sim \text{Normal}(0, \sigma_{\eta_0})\\ &\eta_{1j} \sim \text{Normal}(0, \sigma_{\eta_1})\\ &\epsilon_{ij} \sim \text{Normal}(0, \sigma_\epsilon)\end{aligned}$$

Model 2 Bayes (1)

$$
\begin{aligned}
&\text{SecondVersion}_i \sim \text{Normal}(\mu_i, \sigma_\epsilon) \\
&\mu_i = \beta_{0j[i]} + \beta_{1j[i]} * \text{FirstVersion}_i \\
&\beta_{0j} \sim \text{Normal}(\beta_0, \sigma_{\beta_0}) \\
&\beta_{1j} \sim \text{Normal}(\beta_1, \sigma_{\beta_1})
\end{aligned}
$$

Model 2 Bayes (2)

$$
\begin{aligned}
&\text{SecondVersion}_i \sim \text{Normal}(\mu_i, \sigma_\epsilon) \\
&\mu_i = \beta_0 + \beta_{0j[i]} + (\beta_1 + \beta_{1j[i]}) * \text{FirstVersion}_i \\
&\beta_{0j} \sim \text{Normal}(0, \sigma_{\beta_0}) \\
&\beta_{1j} \sim \text{Normal}(0, \sigma_{\beta_1})
\end{aligned}
$$

Model 3 Bayes

$$
\begin{aligned}
&\text{SecondVersion}_i \sim \text{Normal}(\mu_i, \sigma_\epsilon) \\
&\mu_i = \beta_0 + \beta_{0j[i]} + (\beta_1 + \beta_{1j[i]}) * \text{FirstVersion}_i + \beta_2 * \text{ExperimentalCondition}_i \\
&\beta_{0j} \sim \text{Normal}(0, \sigma_{\beta_0}) \\
&\beta_{1j} \sim \text{Normal}(0, \sigma_{\beta_1})
\end{aligned}
$$

Full specification Model 3

$$
\begin{aligned}
&\text{SecondVersion}_i \sim \text{Normal}(\mu_i, \sigma_\epsilon) \\
&\mu_i = \beta_0 + \beta_{0j[i]} + (\beta_1 + \beta_{1j[i]}) * \text{FirstVersion}_i + \beta_2 * \text{ExperimentalCondition}_i \\
&\begin{bmatrix} \beta_{0j} \\ \beta_{1j} \end{bmatrix} \sim \textbf{MVNormal}\left(\begin{bmatrix} 0 \\ 0 \end{bmatrix}, \mathbf{S} \right)
\end{aligned}
$$

$$
\mathbf{S} = \begin{bmatrix} \sigma^2_{\beta_0} & \sigma_{\beta_1\beta_0} \\ \sigma_{\beta_0\beta_1} & \sigma^2_{\beta_1} \end{bmatrix}
$$

Full specification M3 with priors

$$\text{SecondVersion}_i \sim \text{Normal}(\mu_i, \sigma_\epsilon)$$
$$\mu_i = \beta_0 + \beta_{0j[i]} + (\beta_1 + \beta_{1j[i]}) * \text{FirstVersion}_i + \beta_2 * \text{ExperimentalCondition}_i$$
$$\begin{bmatrix} \beta_{0j} \\ \beta_{1j} \end{bmatrix} \sim \textbf{MVNormal}\left(\begin{bmatrix} 0 \\ 0 \end{bmatrix}, \mathbf{S} \right)$$

$$\mathbf{S} = \begin{bmatrix} \sigma^2_{\beta_0} & \sigma_{\beta_1\beta_0} \\ \sigma_{\beta_0\beta_1} & \sigma^2_{\beta_1} \end{bmatrix}$$
$$\beta_0 \sim \text{StudentT}(3, 110.4, 13.3)$$
$$\beta_1 \sim \text{flat}$$
$$\beta_2 \sim \text{flat}$$
$$\sigma_\epsilon \sim \text{HalfStudentT}(3, 0, 13.3)$$
$$\sigma_{\beta_0} \sim \text{HalfStudentT}(3, 0, 13.3)$$
$$\sigma_{\beta_1} \sim \text{HalfStudentT}(3, 0, 13.3)$$
$$\mathbf{R} \sim \textbf{LKJcorr}(1)$$

Full specification M3 with CUSTOM priors

$$\text{SecondVersion}_i \sim \text{Normal}(\mu_i, \sigma_\epsilon)$$
$$\mu_i = \beta_0 + \beta_{0j[i]} + (\beta_1 + \beta_{1j[i]}) * \text{FirstVersion}_i + \beta_2 * \text{ExperimentalCondition}_i$$
$$\begin{bmatrix} \beta_{0j} \\ \beta_{1j} \end{bmatrix} \sim \textbf{MVNormal}\left(\begin{bmatrix} 0 \\ 0 \end{bmatrix}, \mathbf{S} \right)$$

$$\mathbf{S} = \begin{bmatrix} \sigma^2_{\beta_0} & \sigma_{\beta_1\beta_0} \\ \sigma_{\beta_0\beta_1} & \sigma^2_{\beta_1} \end{bmatrix}$$
$$\beta_0 \sim \text{StudentT}(3, 110.4, 13.3)$$
$$\beta_1 \sim \text{Normal}(1, 5)$$
$$\beta_2 \sim \text{Normal}(3.4, 17)$$
$$\sigma_\epsilon \sim \text{HalfStudentT}(3, 0, 13.3)$$
$$\sigma_{\beta_0} \sim \text{HalfStudentT}(3, 0, 13.3)$$
$$\sigma_{\beta_1} \sim \text{HalfStudentT}(3, 0, 5)$$
$$\mathbf{R} \sim \textbf{LKJcorr}(1)$$