BEND: Varying Stance and Week Intercepts Model

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Model Specification

Data and Parameters

Let:

- N be the number of data points.
- K be the number of predictors.
- J be the number of stance groups.
- W be the number of weeks.
- $\mathbf{y}$ be an N-dimensional vector of the response variable.
- $\mathbf{X}$ be an $N \times K$ matrix of predictor variables.
- stance be an N-dimensional vector indicating the stance group.
- week be an N-dimensional vector indicating the week.

Parameters:

- α is the overall intercept.
- $\boldsymbol{\beta}$ is a K-dimensional vector of coefficients for the predictors.
- $\boldsymbol{\alpha}_{\text{stance}}$ is a J-dimensional vector of varying intercepts for stance groups.
- $\boldsymbol{\alpha}_{\text{week}}$ is a W-dimensional vector of varying intercepts for weeks.
- σ is the standard deviation of the residuals.

Priors

$$
\begin{aligned}
\alpha &\sim \mathcal{N}(0, 1) \\
\boldsymbol{\beta} &\sim \mathcal{N}(0, 1) \\
\boldsymbol{\alpha}_{\text{stance}} &\sim \mathcal{N}(0, 1) \\
\boldsymbol{\alpha}_{\text{week}} &\sim \mathcal{N}(0, 1) \\
\sigma &\sim \text{Cauchy}(0, 2)
\end{aligned}
$$

Likelihood

$$y_i \sim \mathcal{N}\left(\mathbf{X}_i\boldsymbol{\beta} + \alpha + \alpha_{\text{stance[stance}_i\text{]}} + \alpha_{\text{week[week}_i\text{]}}, \sigma\right)$$

Generated Quantities

$$y_{\text{rep},i} \sim \mathcal{N}\left(\mathbf{X}_i\boldsymbol{\beta} + \alpha + \alpha_{\text{stance[stance}_i\text{]}} + \alpha_{\text{week[week}_i\text{]}}, \sigma\right)$$