

Your Turn!

Random effects

1. Let's simulate some hierarchical data! Consider an experiment where each of $I = 100$ participants responds to $K = 50$ trials in $J = 2$ conditions. Simulate data from the following model:

$$Y_{ijk} \sim \text{Normal}(\mu + \alpha_i + x_j \theta_i, \sigma^2),$$

where $\alpha_i \sim \text{Normal}(0, \sigma_\alpha^2)$ is the random intercept, and $\theta_i \sim \text{Normal}(\theta_0, \sigma_\theta^2)$ is the random slope. Pick values for $\sigma^2, \sigma_\theta^2, \sigma_\alpha^2, \mu$, and θ_0 and simulate data (should be $N = I \times J \times K = 10000$ observations). Check whether the results seem reasonable (**boxplot** or **hist**, check the observed effects per person, etc.).

2. Conduct a Bayes factor analysis using **generalTestBF()**. Carefully pick your priors. You actually can let the true values from your simulation inform your scale choices.
3. Alter the true settings of your simulation to see the effect on the Bayes factor analysis. For example, you can remove a random effect (e.g., $\sigma_\theta^2 = 0$).

