$$[\boldsymbol{z}, \boldsymbol{\beta}, p^{auditory}, p^{visual} | \mathbf{y}^{auditory}, \mathbf{y}^{visual}] \propto$$

$$\prod_{i=1}^{64} \text{binomal}\left(y_i^{auditory} \mid n_i^{auditory}, z_i \cdot p^{auditory}\right) \text{binomial}\left(y_i^{visual} \mid n_i^{visual}, z_i \cdot p^{visual}\right) \times$$

$$\text{Bernoulli}\left(z_i \mid \text{invlogit}\left(\beta_0 + \beta_1 x_1 + \beta_2 x_2 + \beta_3 x_1 x_2\right)\right) \times$$

$$\prod_{j=0}^{3} \text{normal}\left(\beta_j \mid 0, .0001\right) \text{uniform}(p^{visual} \mid 0,1) \text{uniform}(p^{auditiory} \mid 0,1)$$