Supplemental

Here we use *i* to index persons and *t* to index assessment time points:

$$\begin{matrix}Level 1:&&\\y\_{i\left[t\right]}&\~&N\left(α\_{i}+β\_{i}Months\_{i\left[t\right]},σ\_{ϵ}^{2}\right), for i=1,…,n;t=1,…,4\\Level 2:&&\\\left(\begin{matrix}α\_{i}\\β\_{i}\end{matrix}\right)&\~&N\left(\left(\genfrac{}{}{0pt}{}{\hat{μ}\_{α\_{i}}}{\hat{μ}\_{β\_{i}}}\right), Ω\right)\\where&&\\\hat{μ}\_{α\_{i}}&=&γ\_{00}+γ\_{01}Age\_{i}+γ\_{02}Age\_{i}^{2}+γ\_{03}survivor\_{i}+\\&&\_{}\_{}γ\_{04}survivor\_{i}∙Age\_{i}+γ\_{05}survivor\_{i}∙Age\_{i}^{2}\\\hat{μ}\_{β\_{i}}&=&γ\_{10}+γ\_{11}survivor\_{i}+γ\_{12}age4Q\_{i}+γ\_{13}survivor\_{i}∙age4Q\_{i}\\Ω&=&\left(\begin{matrix}σ\_{α}&0\\0&σ\_{β}\end{matrix}\right)R\left(\begin{matrix}σ\_{α}&0\\0&σ\_{β}\end{matrix}\right)\\R&\~&LKJCorr(2)\\γ\_{00}&\~&N(0, 2.5)\\γ\_{..}&\~&N(0, 2.5)\\σ\_{ϵ}&\~&Exponential(1)\end{matrix}$$

where the neurocognitive outcomes $y\_{i\left[t\right]}$ represent data collected at time *t* nested within the *i*th person*.* The varying intercepts and varying slopes are further analyzed in level 2, where the intercepts $α\_{i}$ and slopes $β\_{i}$ are drawn from a bivariate normal distribution with averages $\left(\genfrac{}{}{0pt}{}{\hat{μ}\_{α\_{i}}}{\hat{μ}\_{β\_{i}}}\right)$ and a 2x2 covariance matrix $Ω$. The average intercepts $\hat{μ}\_{α\_{i}}$ are expressed as a quardratic function of chronological age at enrollment, centered at age 72.5 (average age of the entire sample), and that the control and survivor cohorts follow two separate quadratic aging trends. Additionally, the average slopes $\hat{μ}\_{β\_{i}}$ are modeled as a function of 4 age quartiles in the age4Q predictor. This effectively fits 8 separate longitudinal effects, 4 for each of the age quartiles in controls and 4 for survivors.

The covariance $Ω$ is constructed by factoring it into separate standard deviations $σ\_{α}$, $σ\_{β}$ and a correlation matrix $R$ 57. The correlation matrix $R$ follows the LKJ prior 58, which offers advantages over the inverse Wishart distribution for a covariance matrix. The LKJCorr(2) prior with a shape parameter of 2 represents a weak concentration of correlations between -0.5 and +0.5 59. The remaining lines express the priors for the intercept $γ\_{00}$ and the fixed effects coefficients $γ\_{..}$, as normal distributions centered at 0 with a 2.5 standard deviation for a stretched tail (<https://cran.r-project.org/web/packages/rstanarm/vignettes/priors.html>). The error standard deviation has a default prior at exponential(1).