Multivariate response version of Curtis & Ghosh

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\begin{aligned}
y_{ij} &= \text{trait } j \text{ in individual } i,\ i = 1, \ldots, I \\
x_{ik} &= \text{covariate } k \text{ for individual } i,\ k = 1, \ldots, K \\
\beta_{jk} &= \text{regression of trait } j \text{ on covariate } k \\
y_{ij}|\boldsymbol{x}_i, \boldsymbol{\beta}, \boldsymbol{\Sigma} &\sim \text{MVN}(\boldsymbol{x}_i^T\boldsymbol{\beta}, \boldsymbol{\Sigma}) \\
\beta_{jk} &= \theta_{jk}\gamma_{jk} \\
\gamma_{jk} &\sim \text{Bernoulli}(\pi_j) \\
\theta_{jk} &= \xi_{S_{jk}} \\
S_{jk} &\sim \text{Categorical}(p_{j1}, \ldots, p_{jM}) \\
\xi_m &\sim \text{N}(0, \sigma^2) \\
\pi_j &\sim \text{Unif}(0, 1) \\
\boldsymbol{p}_j &\sim \text{Dirichlet}(1/M, \ldots, 1/M) \\
1/\sigma^2 &\sim \text{Gamma}(1, 1) \\
\Sigma^{-1} &\sim \text{Wishart}(I, K + 2)
\end{aligned}
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