

$$\begin{array}{c}
 \mathbf{Y} = \text{Observed BOLD} \\
 \left[\begin{array}{c} \text{BOLD signal trace} \end{array} \right]
 \end{array}
 =
 \begin{array}{c}
 \mathbf{X} = \text{Design Matrix} \\
 \left[\begin{array}{ccccccccc}
 X_1 & X_2 & X_3 & X_4 & X_5 & X_6 & \dots & X_{3k} \\
 \text{Hemodynamic response functions} \\
 \vdots \\
 \text{Hemodynamic response functions}
 \end{array} \right]
 \end{array}
 \begin{array}{c}
 \boldsymbol{\beta} = \text{Activation coefficients} \\
 \left[\begin{array}{c} \beta_1 \\ \beta_2 \\ \beta_3 \\ \vdots \\ \beta_{3k} \end{array} \right]
 \end{array}
 +
 \begin{array}{c}
 \boldsymbol{\varepsilon} = \text{Noise} \\
 \left[\begin{array}{c} \text{Noise trace} \end{array} \right]
 \end{array}$$