

$\mathbf{Y}$  = Observed  
BOLD

$\mathbf{X}$  = Design Matrix

$\beta$  = Activation  
coefficients

$\epsilon$  = Noise

$$\begin{bmatrix} \text{Observed BOLD signal} \end{bmatrix} = \begin{bmatrix} X_1 & X_2 & X_3 & \dots & X_k \\ \vdots & \vdots & \vdots & \vdots & \vdots \end{bmatrix} \begin{bmatrix} \beta_1 \\ \beta_2 \\ \beta_3 \\ \vdots \\ \beta_k \end{bmatrix} + \begin{bmatrix} \text{Noise} \end{bmatrix}$$