Parameterizations (Constraints)
(Use Excel Example of Average Age in Pulse Study)

Cell mean,
\[ y_s = \mu_s \]
Deviations from mean (use \( \varepsilon_s \))
\[ y_s = \mu + \varepsilon_s \]

Constraint:
Reference cell (use \( \tau \))
\[ y_s = \tau + \delta_s \]
(Use Excel Example of Average Age in Pulse Study)

Linear model: Value is a sum of parameters.
Examples for parameterizations.
Cell mean,
\[ y_s = X_s \mu_s \]
Deviations from mean
\[ y_s = X_{1s} \mu + X_{2s} \varepsilon_s \]
Reference cell (use \( \tau \))
\[ y_s = X_{1s} \tau + X_{2s} \delta_s \]

Example of a non-linear model. \( y_s = \mu \varepsilon_s + \varepsilon_s \)

Design Variables (Linear models)
Weights for the parameters

Vector Representations of Parameterizations
Cell mean,
\[ \mu = \begin{pmatrix} \mu_1 & \mu_2 & \cdots & \mu_N \end{pmatrix}^T \]
\[ y_s = X_s \mu_s \]
Deviations from mean
\[ y_s = X_{1s} \mu + X_{2s} \varepsilon_s \]
Reference cell (use \( \tau \))
\[ y_s = X_{1s} \tau + X_{2s} \delta_s \]

Ideas of vectors and Matrices:
Transpose
Multiplication
Dimension