

$$\begin{aligned}
 y_{ijk} &= \underbrace{\bar{y}_{\dots}}_{\hat{\mu}} + (\bar{y}_{i\cdot\cdot} - \bar{y}_{\dots}) + (\bar{y}_{\cdot j\cdot} - \bar{y}_{\dots}) \\
 &+ \underbrace{(\bar{y}_{\cdot\cdot j} - (\bar{y}_{i\cdot\cdot} - \bar{y}_{\dots}) - (\bar{y}_{\cdot\cdot j} - \bar{y}_{\dots}) - \bar{y}_{\dots})}_{(\hat{\alpha\beta})_{ij}} \\
 &+ \underbrace{(y_{ijk} - \bar{y}_{\cdot\cdot j})}_{R_{ijk} \text{ (residual)}}
 \end{aligned}$$

$$\Rightarrow \sum_{i,j,k} (y_{ijk} - \bar{y}_{\dots})^2 = SS_A + SS_B + SS_{AB} + SS_E$$

$$SS_A = \sum_{i=1}^a b \cdot n (\hat{\alpha}_i)^2$$

$$SS_B = \sum_{j=1}^b a \cdot n (\hat{\beta}_j)^2$$

$$SS_{AB} = \sum_{i=1}^a \sum_{j=1}^b n \cdot (\hat{\alpha\beta})_{ij}^2$$