

STAT 151A Lecture 19

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Remark 0.1

y type + female representation

$$\mathbf{X} = (\vec{1} \quad \vec{D}_{wc} \quad \vec{D}_{prof} \quad \vec{D}_F)$$

$$\hat{y}_i = \hat{\alpha} + \hat{\gamma}_{wc}D_{wc} + \hat{\gamma}_pD_p + \hat{\gamma}_FD_F \text{ (2-way ANOVA)}$$

Subtle reservation: difference between average for blue collar and female and blue collar only is the same as white collar and female and white collar only

- We should expect parallel lines
- The estimated parameters fit exactly equal to group means
- The real data may not fit this model well

Right now: 4 parameters, $\alpha, \gamma_{wc}, \gamma_{prof}, \gamma_F$

6 group means \rightarrow add 2 parameters

$$\hat{y} = \hat{\alpha} + \hat{\gamma}_{wc}D_{wc} + \hat{\gamma}_pD_p + \hat{\gamma}_FD_F + \hat{\tau}_{wf}D_{wc}D_F + \hat{\tau}_{pf}D_pD_F + \hat{\tau}_{FD}D_{wc}D_pD_F$$

$$\mathbf{X} = (\vec{1} \quad \vec{D}_{wc} \quad \vec{D}_p \quad \vec{D}_F \quad \vec{D}_{wc}D_F \quad \vec{D}_pD_F)$$

Now we can fully describe the six group means

$$\begin{pmatrix} \hat{\alpha} \\ \hat{D}_{wc} \\ \hat{D}_p \\ \hat{\tau}_{wF} \\ \hat{\tau}_{pF} \\ \hat{D}_F \end{pmatrix} = \begin{pmatrix} \bar{y}_{bc,F=0} \\ \bar{y}_{wc,F=0} - \bar{y}_{bc,F=0} \\ \bar{y}_{p,F=0} - \bar{y}_{bc,p=0} \\ (\bar{y}_{wc,f=1} - \bar{y}_{wc,F=0}) - (\bar{y}_{bc,F=1} - \bar{y}_{bc,F=0}) \\ (\bar{y}_{p,F=1} - \bar{y}_{p,F=0}) - (\bar{y}_{bc,F=1} - \bar{y}_{bc,F=0}) \\ \bar{y}_{bc,F=1} - \bar{y}_{bc,F=0} \end{pmatrix}$$