Interactions

Stu Field

1 Interaction

Given for groups 1 and 2:

$$
\begin{aligned}
\hat{y}_1 &= \hat{\beta}_{01} + \hat{\beta}_{11}x \\
\hat{y}_2 &= \hat{\beta}_{02} + \hat{\beta}_{12}x
\end{aligned}
$$

Set up a dummy variable `G`, where:

$$
G = \begin{cases} 0, & group\ 1 \\ 1, & group\ 2 \end{cases}
$$

therefore,

$$
\begin{aligned}
y_j &= G\big[\beta_{02} + \beta_{12} - (\beta_{01} + \beta_{11}x_j)\big] + (\beta_{01} + \beta_{11}x_j) + \epsilon \\[2ex]
&= \beta_{01} + \beta_{11}x + G\beta_{02} + G\beta_{12} - G\beta_{01} - G\beta_{11}x_j + \epsilon \\[2ex]
&= \beta_{01} + \beta_{11}x + G(\beta_{02} - \beta_{01}) + Gx_j(\beta_{12} - \beta_{11}) + \epsilon \\[2ex]
&= \alpha_0 + \alpha_1 x + G\alpha_2 + Gx_j\alpha_3 + \epsilon
\end{aligned}
$$