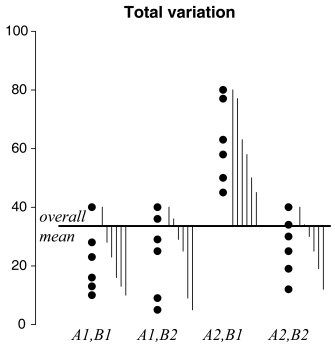
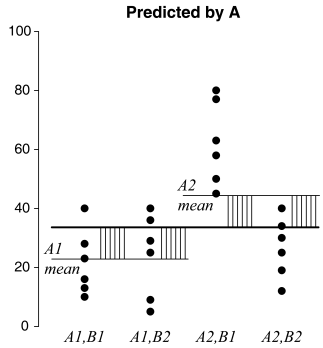
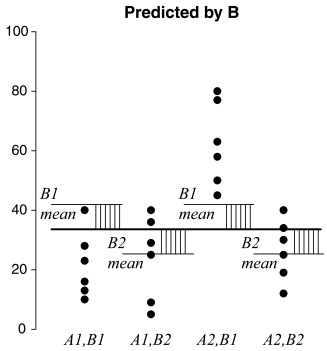
2.6.7 Pictorial representation



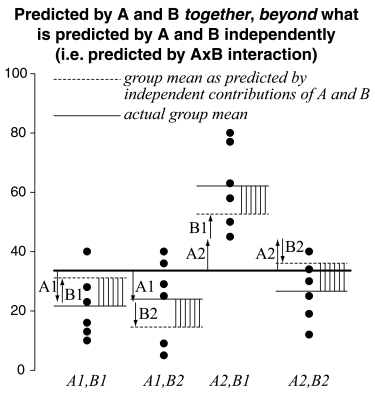
$$SS_{total} = \sum (y - \bar{y})^2$$



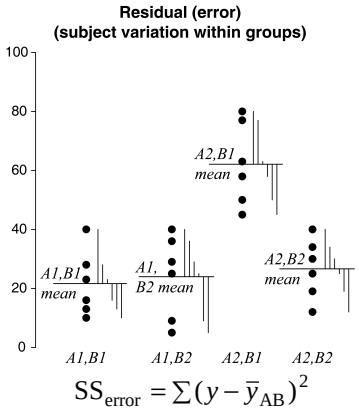
$$SS_A = \sum nb(\bar{y}_A - \bar{y})^2$$



$$SS_B = \sum na(\bar{y}_B - \bar{y})^2$$



$$SS_{A\times B} = \sum n\left(\bar{y}_{AB} - \left[\bar{y} + (\bar{y}_A - \bar{y}) + (\bar{y}_B - \bar{y})\right]\right)^2$$



$$SS_{error} = \sum (y - \bar{y}_{AB})^2$$

$$df_{total} = N - 1 = abn - 1$$
$$df_A = a - 1$$
$$df_B = b - 1$$
$$df_{A\times B} = df_A \times df_B = (a-1)(b-1)$$
$$df_{error} = df_{total} - df_A - df_B - df_{A\times B}$$

This illustrates a different, '2 × 2' factorial ANOVA (two factors: the first factor has 2 levels and the second factor also has 2 levels). There are N = 24 observations (n = 6 per group) and A and B both have 2 levels, so df_{total} = 23, $df_A = df_B = df_{A\times B}$ = 1, and df_{error} = 20.