$$\sum_{1}^{q}\text{SS}_A \text{ for } b_j = \text{SS}_A + \text{SS}_{AB}$$

$$\sum_{1}^{q}\sum_{1}^{r}\text{SS}_A \text{ for } bc_{jk} = \text{SS}_A + \text{SS}_{AB} + \text{SS}_{AC} + \text{SS}_{ABC}$$

$$\sum_{1}^{r}\text{SS}_{AB} \text{ for } c_k = \text{SS}_{AB} + \text{SS}_{ABC}.$$

One can see that whenever the main effects have different error terms, these error terms are pooled in testing the simple main effects. The error terms in Table 8.14-5 are given as weighted pooled mean squares divided by their pooled degrees of freedom. For example, the error term for testing $\text{SS}_A$ at $b_1$ can be computed by either of the following formulas:

$$\frac{\text{MS}_{\text{subj w.groups}} + \text{MS}_{B\times\text{subj w.groups}}(q-1)}{q} = \frac{1.562 + .812(1)}{2} = 1.187$$

$$\frac{\text{SS}_{\text{subj w.groups}} + \text{SS}_{B\times\text{subj w.groups}}}{p(n-1) + p(n-1)(q-1)} = \frac{9.375 + 4.875}{2(3) + 2(3)(1)} = 1.188.$$

The two answers agree within rounding error.

## COMPARISONS AMONG MEANS

Tests of differences among means follow the procedures described in Section 8.7. For example, the error term for Tukey's ratio for the comparison $\hat{\psi} = \bar{A}_1 - \bar{A}_2$ is

$$\sqrt{\frac{\text{MS}_{\text{subj w.groups}}}{nqr}}.$$

The divisor, $nqr$, is the sample size for $\bar{A}_i$. The comparison $\hat{\psi} = \overline{AB}_{11} - \overline{AB}_{21}$ has as its error term

$$\sqrt{\frac{\text{MS}_{\text{subj w.groups}} + \text{MS}_{B\times\text{subj w.groups}}(q-1)}{nr(q)}}.$$

The term $[\text{MS}_{\text{subj w.groups}} + \text{MS}_{B\times\text{subj w.groups}}(q-1)]/q$ is the $F$ ratio denominator for testing $\text{MS}_A$ at $b_j$. The term $nr = 8$ is the number of scores in each cell of the $AB$ Summary Table.

## EXPECTED VALUES OF MEAN SQUARES

The expected values of mean squares for Models I, II, and III can be determined from Table 8.14-6. The terms $1 - p/P$, $1 - q/Q$, $1 - r/R$,