

3. How was the MS_{between} calculated?

A:

$$\frac{SS_{\text{between}}}{df_{\text{between}}} \\ \frac{24}{4} = 6$$

4. How was the MS_{error} calculated?

A:

$$\frac{SS_{\text{error}}}{df_{\text{error}}} \\ \frac{75}{64} = 1.17$$

6. How was the F ratio test statistic calculated?

A:

$$\frac{MS_{\text{between}}}{MS_{\text{error}}} \\ \frac{6}{1.17} = 5.13$$

7. Suppose this had been a one-way between-subjects ANOVA. What would the error variability (SS_{error}) have been had this summary table presented a between-subjects ANOVA? Explain what this means for the F ratio; would the F ratio have been greater than, the same as, less than what is now in the source table?

A: For a between-subjects ANOVA, SS_{error} would have been 75+ participants individual difference, which here was $SS_{\text{participant}} = 18$. Thus, in a between-subjects ANOVA, SS_{error} would have been $75 + 18 = 93$. This is the numerator for the calculation of MS_{error} , which would have been $93/64 = 1.45$. Of course, 1.45 is greater than the current MS_{error} of 1.17. MS_{error} is the denominator of the F ratio test statistics, and whenever we increase the value of a denominator, we decrease the resulting ratio, so our F ratio test statistic would have been $6/1.45 = 4.14$. This illustrates the statistical beauty of repeated-measures designs; they are more powerful (i.e., more likely to lead us to reject the null hypothesis) than are between-subjects designs.

Problem #2

A researcher wants to compare the means of four conditions. After collecting data from 25 people in a repeated-measures design, here are summary statistics needed to test her hypothesis, using an alpha level of .05, that there is no difference among the means of these four conditions:

Group A mean = 10; Group B mean = 8; Group C mean = 6; Group D mean = 4

$$SS_{\text{between}} = 36; SS_{\text{error}} = 216$$

Questions to Answer:

1. Put these data in an ANOVA summary table. (NOTE: $SS_{\text{participant}}$ cannot be determined from the information provided; it's already figured in the calculation of SS_{error} .)

(Continued)