(Continued)

A:

| **Source of Variability** | *SS* | *df* | *MS* | *F* |
|---|---|---|---|---|
| Participant Individual Differences | – | 24 | – | |
| Between | 36 | 3 | 12 | 4.00 |
| Error | 216 | 72 | 3 | |
| Total | 252 | 99 | | |

2. What is the approximate critical value in this analysis?

   A: Given our $df_{between}$ of 3, $df_{error}$ of 72, and alpha level of .05, we consult Appendix C and see that our critical value is going to be between 2.68 (the critical value of $df_{error}$ of 120) and 2.76 (the critical value of $df_{error}$ of 60). To be conservative, we can use 2.76 as the critical value. Doing so makes it as difficult as possible to reject the null hypotheses given our degrees of freedom.

3. Do you reject or fail to reject the null hypothesis?

   A: Given that our *F* ratio test statistic is greater than the critical value, we reject the null hypothesis.

4. Calculate the effect size.

   A:

$$\eta_p^{\,2} = \frac{SS_{\text{between}}}{SS_{\text{between}+SS_{\text{error}}}}$$
$$= \frac{36}{36+216}$$
$$= .14$$

Regarding post hoc tests, calculate the HSD for this example. Explain in plain English what this HSD number means.

A:

$$\text{HSD} = Q \times \sqrt{\frac{MS_{\text{error}}}{\text{number of participants in each group}}}$$

In Appendix D, there is not a value available given our $df_{error}$. Let's use $df_{error}$ of 60, which will make *Q* larger than it otherwise would be with $df_{error}$ of 72. A larger *Q* will make the HSD larger, and a larger HSD requires more extreme mean differences for us to detect statistical significance:

$$= 3.75 \times \sqrt{\frac{3}{25}}$$
$$= 3.75 \times 0.346$$
$$= 1.30$$

This number of 1.30 indicates that for a mean difference between any two conditions to be statistically significant, that mean difference must be at least 1.30. In this example, all mean differences are greater than 1.30; therefore, we conclude that each group had a statistically significant difference from every other group.