

TABLE 14.14

Summary of the Process for the Two-Way Between-Subjects ANOVA

Terminology	Formula	Meaning
Step 1: State the hypotheses.		
Null hypotheses	$\sigma_A^2 > 0$	The levels of Factor A do not vary.
	$\sigma_B^2 = 0$	The levels of Factor B do not vary.
	$\sigma_{A \times B}^2 = 0$	Cell means do not vary.
Alternative hypotheses	$\sigma_A^2 > 0$	The levels of Factor A vary.
	$\sigma_B^2 > 0$	The levels of Factor B vary.
	$\sigma_{A \times B}^2 > 0$	Cell means vary.
Step 2: Set the criteria for a decision.		
Degrees of freedom for Factor A	$df_A = p - 1$	The levels of Factor A minus 1
Degrees of freedom for Factor B	$df_B = q - 1$	The levels of Factor B minus 1
Degrees of freedom for the A \times B interaction	$df_{A \times B} = (p - 1)(q - 1)$	The df for Factor A multiplied by the df for Factor B
Degrees of freedom error (within groups)	$df_E = pq(n - 1)$	The total number of cells multiplied by the df within each cell
Degrees of freedom total	$df_T = npq - 1$	The total number of participants minus 1
Step 3: Compute the test statistic.		
STAGE 1		
Levels of Factor A	p	Number of levels for Factor A
Levels of Factor B	q	Number of levels for Factor B
Total cells	pq	Total number of cells (or groups) in a study
Sample size	npq	Total sample size
Grand total	Σx_T	The sum of all cell totals
Sum of squared scores	Σx_T^2	The sum of all individually squared scores in each cell
STAGE 2		
[1]	$\frac{(\Sigma x_T)^2}{npq}$	The correction factor
[2]	Σx_T^2	The “uncorrected” total variation in a study
[3]	$\frac{\Sigma A^2}{nq}$	The “uncorrected” variation attributed to Factor A