

LEARNING CHECK

1. All else being equal, why is the repeated-measures ANOVA more powerful than the between-subjects ANOVA? Stated differently, why is it more likely we will reject the null hypothesis using a repeated-measures ANOVA than when using a between-subjects ANOVA?

A: The repeated-measures ANOVA removes participant individual differences from the MS_{error} , which is the denominator of the F ratio. Thus, reducing the denominator of a fraction makes the quotient of that fraction larger. With a larger F ratio, we are more likely to reject the null hypothesis than we are with a smaller F ratio.

2. As initially discussed in step 9 in this section, why is it possible we could reject the null hypothesis but have an extremely small effect size? In your response, explain what is meant when we say we “reject the null hypothesis” and “effect size.”

A: If the sample size is large enough, any group mean difference could be significant even if it is not a huge difference. However, in such cases, the effect size will be fairly small, indicating that although we have a statistically significant effect that exists in the population, it is not a powerful effect in the population.

Problem #1

Use this ANOVA summary table to answer the questions that follow it:

Source of Variability	SS	df	MS	F
Participant Individual Differences	18	6	—	
Between	24	4	6	5.13
Error	75	64	1.17	
Total	117	74		

1. How many conditions were there in this analysis? Explain how you know.

A: We know that df_{between} (4) is the number of conditions to which people responded, minus 1. Therefore, there were 5 conditions in this analysis.

2. What is the sample size for this analysis? Explain how you know.

A: Sample size was 15. Remember that df_{total} (74) is the number of responses in the research study, minus 1. Therefore, there were 75 total responses. From the previous question, we also know that df_{between} (4) is the number of conditions to which people responded, minus 1. Therefore, there were 5 conditions in this analysis. If we have 75 total responses and 5 conditions, we now divide 75 by 5, giving us our sample size of 15.