ANOVA\_RM\_Exercise

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## Note

*This document gives you a practice example. It does not show you how to run a repeated measures ANOVA in R. If you need a guide, then go to the file ANOVA\_RM\_Guide.docx.*

## Repeated Measures ANOVA

You are going to run a One-Way Repeated Measures ANOVA on the ***rm\_colours.csv*** data frame.

This study investigated the effect of listening to various noise-colours on resting heart rate to determine which was the most relaxing. Using a within-subjects design, the noise-colour IV had four levels (white, pink, blue, and grey noise-colours).

22 participants were randomly assigned to four separate 30-min sessions in which they listened to coloured noise being played and had their heart rate (beats per minute) recorded in final minute of each session.

Make sure the “***rm\_colours.csv***” file is in your week 8 folder. Write the following code to import into R.

colours\_df <- read.csv("rm\_colours.csv")

Write code to check the the head of the data frame (e.g., use head()).

## Descriptive Statistics and Assumptions Check

Before we run our ANOVA, let’s calculate some descriptive statistics and check for several assumptions of the test (Normality, No Outliers). We can do this using the **descriptives** function from the **jmv** package. If you need more in-depth information on how the package works, [see the following video](https://www.youtube.com/watch?v=p-7OadgNmKk&ab_channel=RyanDonovan).

In the code box below, replace the variables in var(var1, var2, var3, var4) to the noise-colour column names.

descriptives(data = colours\_df,  
 vars = c("var1", "var2", "var3", "var4"),  
 se = TRUE, #tells R to compute the standard error  
 ci = TRUE, #tells R to compute confidence intervals  
 iqr = TRUE, #tells R to compute the interquartile range  
 pc = TRUE, #tells R to compute percentiles   
 box = TRUE, #tells R to generate a boxplot  
 hist = TRUE, #tells R to generate a histogram  
 dens = TRUE, #tells R to generate a density plot  
 sw = TRUE #tells R to compute the standard error  
 )

Check whether your data is normally distributed and whether you have outliers.

## Running the Repeated Measures ANOVA

Now let’s run a repeated measures ANOVA. I have pasted the code syntax below. Your job is to replace the correct terms so it matches our colours\_df data frame.

The name of our IV is Colour and its levels are White, Pink, Blue, and Grey.

anovaRM(  
 data = colours\_df,  
 effectSize = "partEta", #we could also select "eta" or "omega"  
 spherTests = TRUE, #runs specificity tests  
 spherCorr = c("none", "GG"), #you can also add "HF" for Huynh-Feldt corrections  
 postHocCorr = list("bonf"), #can also choose "tukey", "scheffe", "holm"  
 rm = list(  
 list(label = "Name of Our IV",  
 levels = c("IV Level 1", "IV Level 2", "IV Level 3", "IV Level 4"))),  
 rmCells = list( #here we tell R where to identify each column and assign it to a specified level  
 list(measure = "Col1 of our IV",  
 cell = "IV Level 1"),  
 list(measure = "Col2 of our IV",  
 cell = "IV Level 2"),  
 list(measure = "Col3 of our IV",  
 cell = "IV Level 3"),  
 list(measure = "Col4 of our IV",  
 cell = "IV Level 4")),  
 rmTerms = list("Name of Our IV"),  
 postHoc = "Name of Our IV")

## Post-Hoc Power Analysis

Replace the appropriate values to calculate post-hoc power.

# Calculate power  
pwr.anova.test(k = number of levels, n = sample size, f = effect size, sig.level = type II error rate)

What was the level of statistical power we achieved?

If we wanted to run this test before the analysis. All we would need to do is remove f = effect size from the pwr.anova.test() function, and replace it with our desired power level (typically power = .80)

# Set parameters for power analysis  
beta = .80  
  
# Calculate power  
pwr.anova.test(k = number of levels, n = sample size, power = Type I error rate, sig.level = type II error rate)

## That’s a wrap.

There you have it. That’s how you run a Repeated Measures ANOVA in R.

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