



EvalFest How-Tos for Conducting a Bonferroni Post Hoc Test using RStudio

Bonferroni Post Hoc Test

1. Explanation of a Bonferroni Post Hoc Test
 - a. If the results your Chi Square Test of Independence are statistically significant, and if your predictor variable has more than 2 categories, you need to run a series of additional tests to determine where the different patterns are in your data.
 - b. In this case, we will use a Bonferroni post hoc test to help figure out where those differences are. This statistic compares each cell to all of the other cells, and so that means instead of just one chi square test, we are now running lots of smaller statistical comparisons. The Bonferonni test takes the number of tests you are running into account, and adjusts the p-value based on that number.
2. First, you should conduct a Chi Square test of independence. If you are unfamiliar with the concept of this test or how to run it using RStudio, please see our other videos related to this test.
 - a. For this test, we are exploring the relationship between the amount of time festival-goers have been at the festival and their overall ratings of the festival on a scale from Poor to Excellent.
 - b. Lines 1-3 set up the data, lines 6-7 define the variables, lines 10-11 create the two-way table to be used in the Chi Square analysis, and line 14 runs the Chi Square test of independence. If you are unfamiliar with any of these steps, please visit our website to access the videos that go into further depth.
 - c. The results indicate that there are different patterns in the outcome variable, Overall Rating, based on the predictor variable, Time at Festival. Because our predictor variable, Time at Festival, has more than 2 categories, we need to run a Bonferroni post hoc test to determine where these different patterns are.
3. Running Bonferroni Post Hoc Tests in RStudio
 - a. In order to run a set of Bonferroni post hoc tests in RStudio, you will need to install a package and call a library. This provides additional functionality and commands we can use in RStudio. The package I like to use is called 'fifer'. Line 17 installs the package and Line 18 calls the library.
 - b. Line 19 runs the Bonferroni post hoc tests. The workspace command may not be necessary. If you try to run the Bonferroni post hoc test and get an error stating that your workspace is too small, you can add this command.

4. Interpreting Bonferroni Post Hoc Tests Output

- a. You will notice that RStudio provides both a raw p-value and an adjusted p-value for each paired comparison. The adjusted p-values are the ones we are interested in – just like before, you are looking for $p < .05$ to indicate statistical significance. You can see from the results, that there are significant differences in the patterns of Overall Ratings between the groups who have been at the festival 31-45 minutes and More than 91 minutes, 46-60 minutes and More than 91 minutes, and 61-90 minutes and More than 91 minutes. At this point, you would want to revisit your table to see how these patterns differ for each pair of groups, and to make an overall interpretation of the analysis.



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