**Research Question:**

Dogs were trained to perform basic tricks. Is one training method better than the other when examining an overall performance (correctness/length of learning time)? Is there an interaction between number of training sessions and method?

Remember to paste your output in this document and upload your R script to blackboard to complete this assignment.

**IVs:**

* Training: clicker versus traditional training
* Number of sessions: 5, 10, 15 sessions

**DVs:**

* Correct: number of correct actions
* Delay: how long it took before they learned the trick

**Accuracy:**

1. Check the data for out of range scores.
   1. Include a summary showing you do/do not have out of range scores.
   2. If necessary, fix the out of range scores.
      1. Indicate what the problems were in the dataset.
      2. Make all out of range values NA.
      3. Include a summary showing that you fixed the accuracy issues.

**Missing data:**

1. Include a table of the missing data by participant.
2. Include a table of the missing data by column after you exclude participants with too much missing data.
3. Exclude all missing data.

**Outliers:**

1. Calculate Mahalanobis distance scores for your data.
   1. What is your *df* for the cut off score?
   2. What is the cut off score?
   3. How many outliers did you have? You can include the summary of the mahal < cutoff.
   4. Delete the outliers.

**Additivity:**

1. Include a symnum table of the continuous variables.
2. Are any of the variables too highly correlated?

**Normality:**

1. Include the multivariate normality histogram.
2. Interpret the graph. Does it indicate multivariate normality?

**Linearity:**

1. Include the multivariate QQ plot.
2. Interpret the graph. Does it indicate multivariate linearity?

**Homogeneity:**

1. Include the multivariate residuals plot.
2. Interpret the graph. Does it indicate homogeneity?
3. Include Levene’s Test output for each DV.
4. Do you meet the assumption for homogeneity for each DV?

**Power:**

1. Calculate the number of participants you would need for this analysis with a medium effect size.
   1. Include a screen shot or summary of the numbers you typed into G\*Power, so we can give you partial credit if you get a different sample size than us.

**MANOVA:**

1. Include the MANOVA output for the main effects and interaction.
2. Include the ANOVAs for the significant DVs.
3. Follow up the significant effects for each DV.
4. If the interaction is significant, split on one IV, and calculate post hoc tests for the other IV.
5. If the interaction is not significant, but the main effects are, use the appropriate follow up procedure to analyze those effects.
6. Fill out the following chart – remember if your values stop being significant, you would stop filling in values for that column. (you will be replacing my notes with APA statistics or interpretations – like clicker > training).

|  |  |  |  |
| --- | --- | --- | --- |
|  | MANOVA Results | | |
| APA statistic | Training:  FILL IN HERE | Sessions:  FILL IN HERE | Interaction:  FILL IN HERE |
|  | ANOVA Results | | |
| APA statistic  DV: Correct | Training:  FILL IN HERE | Sessions:  FILL IN HERE | Interaction:  FILL IN HERE |
| APA statistic  DV: Delay | Training:  FILL IN HERE | Sessions:  FILL IN HERE | Interaction:  FILL IN HERE |

Post hoc tests:

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| DV | Mean 1 | Mean 2 | P-value | Explain? | Effect size |
|  |  |  |  |  |  |
|  |  |  |  |  |  |
|  |  |  |  |  |  |

**Graph:**

1. Include two graphs (one for each DV) of the means and confidence interval for your ANOVA. Be sure to check the following:
   1. X-axis label
   2. Y-axis label
   3. X-axis group labels
   4. Error bars
   5. Cleaned up graph (no gray backgrounds)
   6. Make sure the x axis and group labels are in a sensible order

**Write up:**

1. Write up an analysis of what you find in this data, including all the information you answered above. Use the example in the notes for a guide. This write up should include the following for credit:
2. Result section style (APA and AMA):
   1. Double space
   2. Times New Roman 12 point
   3. Two decimals
   4. Centered, bolded Results
3. Short description of the study/variables.
4. Data screening summary:
5. Accuracy – did you have problems? What did you do to fix it?
6. Missing data - did you have problems? What did you do to fix it?
7. Outliers - did you have problems? What did you do to fix it?
8. Assumptions:
   * 1. Additivity
     2. Normality
     3. Linearity
     4. Homogeneity
     5. Levene’s
9. MANOVA information:
10. Type of MANOVA using the number system (i.e. 4X3 between subjects).
11. F-values for all three effects (two main effects and interaction) even if they are non-significant.
12. ANOVA information:
13. F values for all DVs for significant MANOVAs.
14. List those F values even if they are non-significant (not the non-significant MANOVA ones, but if one DV is p = .01 and one is p = .10 list both).
15. Post Hocs for significant ANOVA effects with effect sizes.