# Lab 07: Models with Multiple Categorical Predictors (One Way ANOVA).

As always, indicate your answers using a different color font or shading to clearly separate your answers from the questions. When you are finished, save the file as "lab07\_FIRST\_LAST" using **your** first name and **your** last name, and then upload the file as a Word Document or .pdf on Canvas.

Start by opening the data\_ATTEMPTS.csv datafile in Jamovi. These data show the results of hypothetical study in which children were given feedback about their Failures (negative reinforcement), their Successes (positive reinforcement), or a neutral No Feedback condition about their performance on different tasks. The key dependent variable is the number of different tasks that the students subsequently attempted under these conditions.

## Question 1.

1A. Create a **boxplot** showing the number of attempts as a function of the type of feedback that students received:

Note that we have three different ways of representing the “Condition” variable in this dataset. One as a categorical factor with three levels (Failure, Success, NoFeedback). One as a set of **contrast coded** predictor variables (cond.c1 and cond.c1). And one as a set of **treatment coded** predictor variables (cond.t1 and cond.t2).

1B. First, using the **contrast-coded** variables, enter both variables into the Covariates window on the Regression tab, select Attempts as the dependent variable. Under the Model Fit box, select “F Test” for Overall Modell Test. Copy and paste your regression outputs below:

1C. Look at the **Omnibus F-test for the full model**. Did these predictors explain a statistically significant proportion of the variance assuming that α=0.05?

1D. Regardless of the performance of these predictors as a set, let’s see what our model actually predicts. **Write out the full regression model below** and then plug in the appropriate values for cond.c1 and cond.c2 to see what the model predicts in each of the three groups.

1E. Finally, obtain a **descriptive statistics** table with means and standard deviations for each of the three groups. Do your model predictions agree with group means in the descriptive statistics table? (Hint, they should agree.)

Question 2

2A. Next, using the **treatment/dummy-coded** variables, enter both variables into the Covariates window on the Regression tab, select Attempts as the dependent variable. Under the Model Fit box, select “F Test” for Overall Modell Test. Copy and paste your regression outputs below:

2B. Look at the **Omnibus F-test for the full model**. Did these predictors explain a statistically significant proportion of the variance assuming that α=0.05?

2C. Regardless of the performance of these predictors as a set, let’s see what our model actually predicts. **Write out the full regression model below** and then plug in the appropriate values for **cond.t1** and **cond.t2** to see what the model predicts in each of the three groups.

2D. Finally, obtain a **descriptive statistics** table with means and standard deviations for each of the three groups. Do your model predictions agree with group means in the descriptive statistics table? (Hint, they should agree.)

Question 3

Now, rather than specifically coding our contrasts using the Regression tab, we can get Jamovi to automatically code these variables for us using the ANOVA tab. Select ANOVA and the One-Way ANOVA option. Select Attempts as your dependent variable and Condition as the grouping variable.

3A. Under variances, select “assume equal”, turn on the Descriptives Table and the Descriptives Plots. Finally, turn on all three of the assumption checks, the Shapiro-Wilk Test of Normality, Levene’s Test for Homogeneity of Variance, and the QQ Normal plot. Insert all of these outputs below.

3B. In your own words, explain why the F-observed has 2 and 21 degrees of freedom in this situation.

Question 4

Finally, select another data set for analysis. This can be your own data or one of the other datasets from the course. The only requirement is that, in order to conduct a One-Way ANOVA, you will need to have a continuous outcome measure and a single categorical predictor with ≥2 levels.

Using these new data, select ANOVA and the One-Way ANOVA. Appropriately allocate your dependent variable and grouping variable.

4A. Under variances, select “assume equal”, turn on the Descriptives Table and the Descriptives Plots. Finally, turn on all three of the assumption checks, the Shapiro-Wilk Test of Normality, Levene’s Test for Homogeneity of Variance, and the QQ Normal plot. Insert all of these outputs below.

4B. In your own words, explain why the F-observed has the degrees of freedom that you see in this situation.

4C. Finally, provide an interpretation of results. Be sure to mention the Omnibus F-test and if the p-value you observed warranted any follow-up (i.e., post-hoc) tests to further ascertain the differences between specific groups. Do your best to phrase this result accurately and precisely, as you would in a scientific paper.