Lab 4

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Contents

Problem 1

Consider the following example data for a between-subjects experiment with two groups, A and B:

```
example_data <- tibble(Group = rep(c("A","B"), each = 5),
                       DV = c(2,4,3,5,4,7,6,5,6,7))
```

Use R to conduct a t.test and ANOVA on this data. Then use R to prove that the results of both analyses are the same. For example, prove that the p-values are the same, and prove that the F-value and T-value are related. (3 points)

```
t_test_output <- t.test(DV~Group, var.equal = TRUE, example_data)
```

```
anova_output <- aov(DV~Group,example_data) %>% summary()
```

To prove that the p-values are the same:

```
t_test_output$p.value
```

```
## [1] 0.003386143
```

```
anova_output[[1]]$`Pr(>F)`[1]
```

```
## [1] 0.003386143
```

To show that t-value& F-value are related:

```
(t_test_output$statistic)^2
```

```
##    t
## 16.9
```

```
anova_output[[1]]$`F value`[1]
```

```
## [1] 16.9
```

Problem 2

Look at the lab on ANOVA that I wrote for our undergraduate statistics OER lab manual https://crumplab.github.io/statisticsLab/lab-8-one-way-anova.html. That lab shows an example of obtaining data from a published paper in psych science where a one-factor ANOVA was used as a part of the analysis. Load the data, conduct the ANOVA, report a ggplot of the means, and use papaja to help you write a short results section reporting the ANOVA result. (3 points).

```
library(data.table)
```

```
##
## Attaching package: 'data.table'
```

```
## The following objects are masked from 'package:dplyr':
##
##     between, first, last
```

```
all_data <- read.csv("open_data/Jamesetal2015Experiment2.csv")

all_data$Condition <- as.factor(all_data$Condition)
levels(all_data$Condition) <- c("Control",
                                "Reactivation+Tetris",
                                "Tetris_only",
                                "Reactivation_only")
```

ANOVA

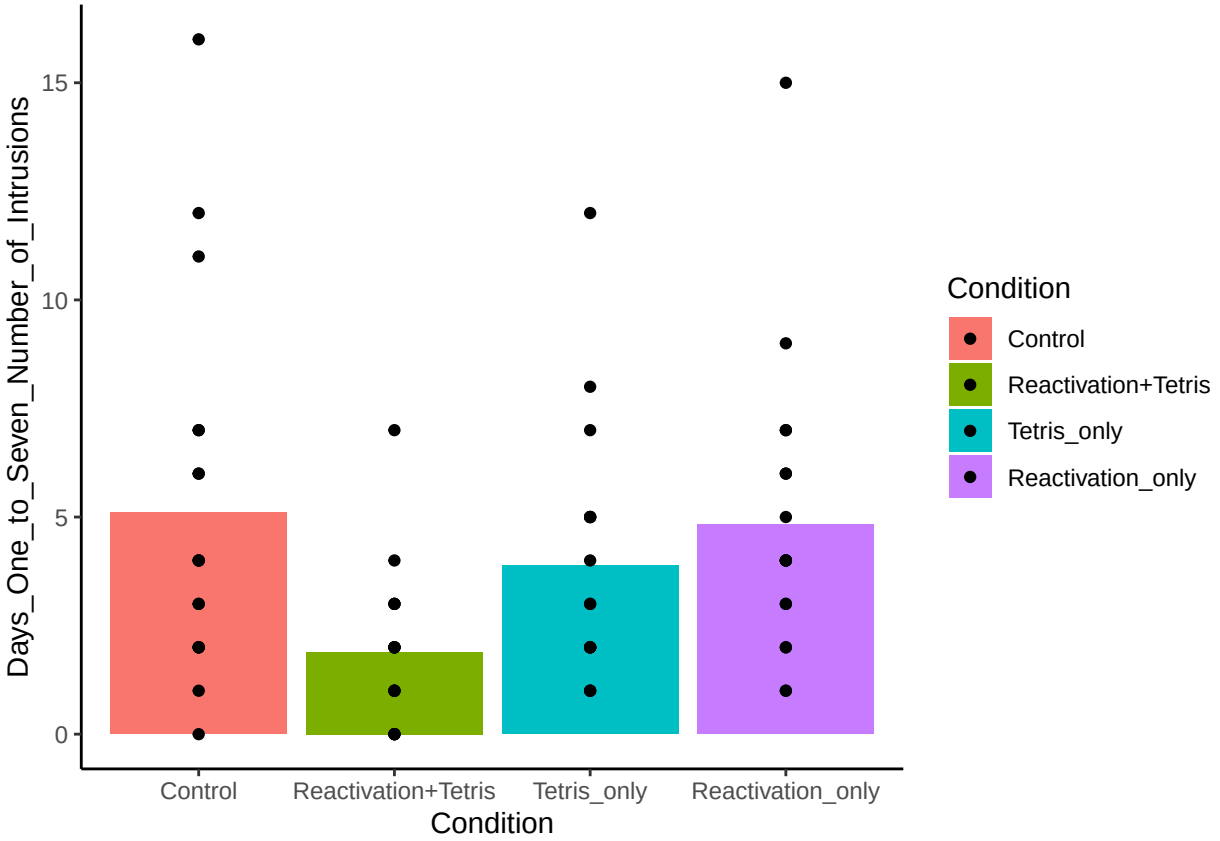
```
anova_jamesetal<- aov(Days_One_to_Seven_Number_of_Intrusions~Condition, all_data) %>% summary()

anova_jamesetal
```

```
##             Df Sum Sq Mean Sq F value Pr(>F)
## Condition    3  114.8   38.27   3.795 0.0141 *
## Residuals   68  685.8   10.09
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
```

Figure

```
ggplot(all_data, aes(x= Condition, y= Days_One_to_Seven_Number_of_Intrusions, fill = Condition)) +
  geom_bar(stat= "summary", fun = "mean", position ="dodge")+
  geom_point()+
  theme_classic()
```



Results

```
apa_print(anova_jamesetal)$full_result$Condition
```

```
## [1] "$F(3, 68) = 3.79$, $\\mathit{MSE} = 10.09$, $p = .014$, $\\hat{\\eta}^2_G = .143$"
```

A one-factor between-subjects ANOVA was conducted with Intervention type as the independent variable. We found a main effect of intervention type, $F(3, 68) = 3.79$, $MSE = 10.09$, $p = .014$, $\hat{\eta}^2_G = .143$