Summative Assessment 2

Vera Frances A. Aguila

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Introduction

This performs the necessary assumption checks for conducting a 2-Factor ANOVA on the Alzheimer's Mice Data. Assumptions include normality, homogeneity of variance, and independence of observations.

```
# Load required libraries
library(tidyverse)
```

```
## ── Attaching core tidyverse packages ──────────────────────── tidyverse 2.0.0 ──
## ✔ dplyr     1.1.4     ✔ readr     2.1.5
## ✔ forcats   1.0.0     ✔ stringr   1.5.1
## ✔ ggplot2   3.5.1     ✔ tibble    3.2.1
## ✔ lubridate 1.9.3     ✔ tidyr     1.3.1
## ✔ purrr     1.0.2
## ── Conflicts ────────────────────────────────────────── tidyverse_conflicts() ──
## ✖ dplyr::filter() masks stats::filter()
## ✖ dplyr::lag()    masks stats::lag()
## ℹ Use the conflicted package (<http://conflicted.r-lib.org/>) to force all conflicts to become errors
```

```
library(car)
```

```
## Loading required package: carData
##
## Attaching package: 'car'
##
## The following object is masked from 'package:dplyr':
##
##     recode
##
## The following object is masked from 'package:purrr':
##
##     some
```

```
# Load the data
data <- read.csv("Alzheimers Mice Data.csv")

# View the first few rows
head(data)
```

```
##   AD_Status Treatment Training Memory
## 1         1         1       12     10
## 2         1         1       15     12
## 3         1         1       13     13
## 4         1         1       12     10
## 5         1         1       14     13
## 6         1         2       15     13
```

##Check Assumptions

###Assumption 1: Normality The Shapiro-Wilk test is used to check normality for the Training and Memory columns. Histograms with density curves and QQ plots are also generated for visual inspection.

```
# Normality check
training_normality <- shapiro.test(data$Training)
memory_normality <- shapiro.test(data$Memory)

# Display results
training_normality
```

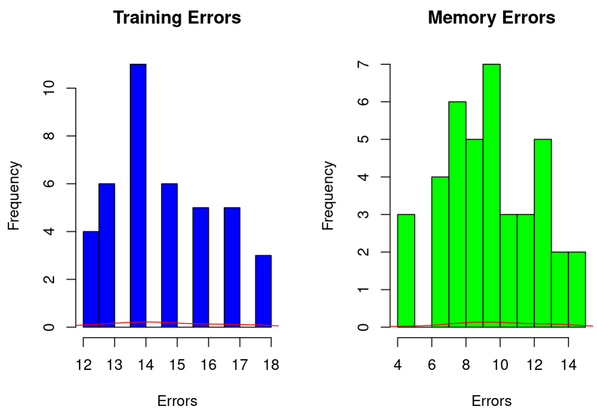
```
##
##  Shapiro-Wilk normality test
##
## data:  data$Training
## W = 0.93583, p-value = 0.02507
```

```
memory_normality
```

```
##
##  Shapiro-Wilk normality test
##
## data:  data$Memory
## W = 0.97184, p-value = 0.4107
```

```
# Visual inspection: histograms
par(mfrow = c(1, 2)) # Set layout
hist(data$Training, breaks = 10, col = "blue", main = "Training Errors", xlab = "Errors")
lines(density(data$Training), col = "red")

hist(data$Memory, breaks = 10, col = "green", main = "Memory Errors", xlab = "Errors")
lines(density(data$Memory), col = "red")
```



Assumption 2: Homogeneity of Variance

Levene's test is performed to assess homogeneity of variances.

```
# Levene's Test for Training Errors
levene_training <- leveneTest(Training ~ as.factor(AD_Status) * as.factor(Treatment), data = data)
levene_training
```

```
## Levene's Test for Homogeneity of Variance (center = median)
##       Df F value Pr(>F)
## group  7  0.4346 0.8731
##       32
```

```
# Levene's Test for Memory Errors
levene_memory <- leveneTest(Memory ~ as.factor(AD_Status) * as.factor(Treatment), data = data)
levene_memory
```

```
## Levene's Test for Homogeneity of Variance (center = median)
##       Df F value Pr(>F)
## group  7  0.8275 0.5722
##       32
```

##Results