

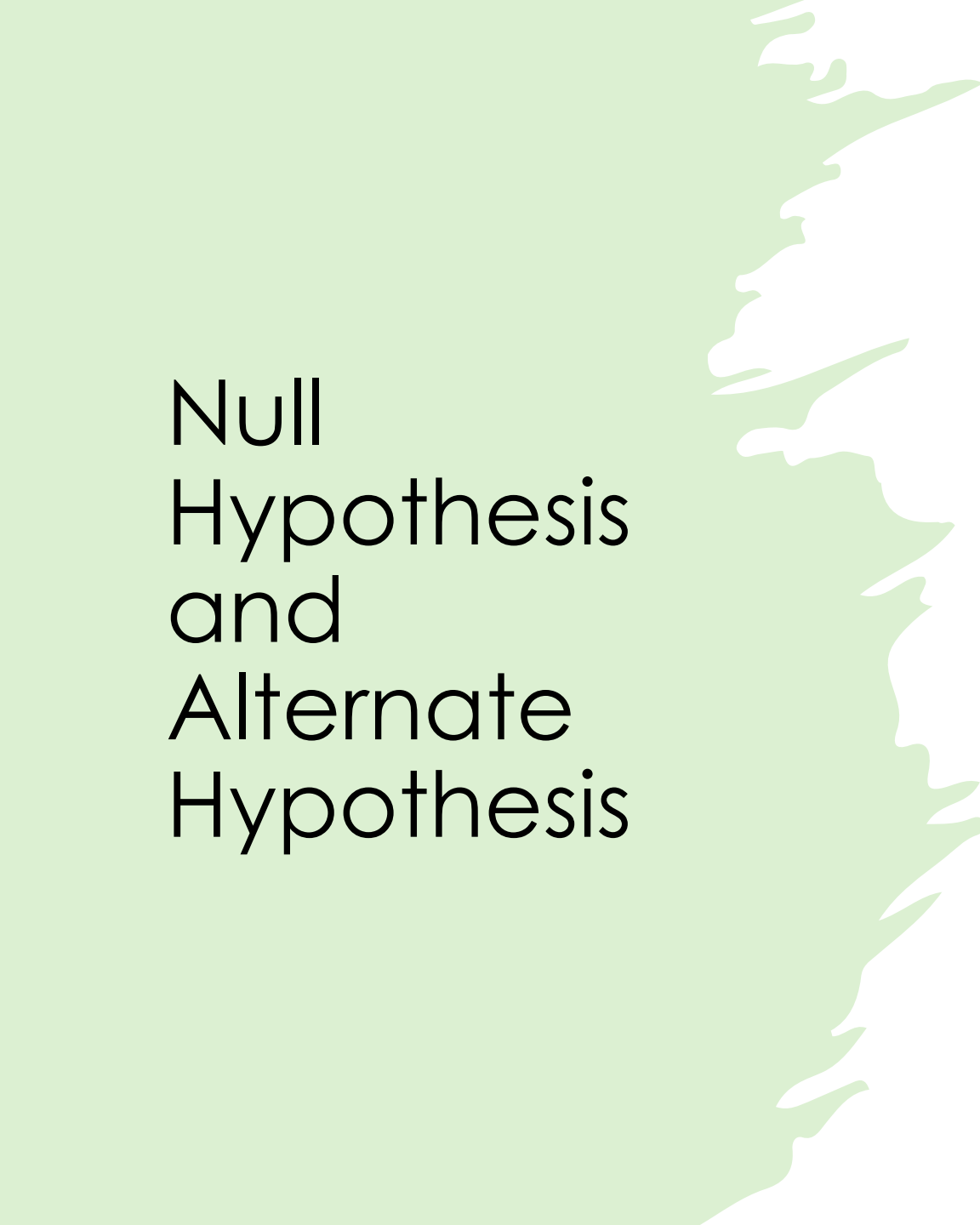


Is Gun Control Effective?

BY FAUZAN AMJAD

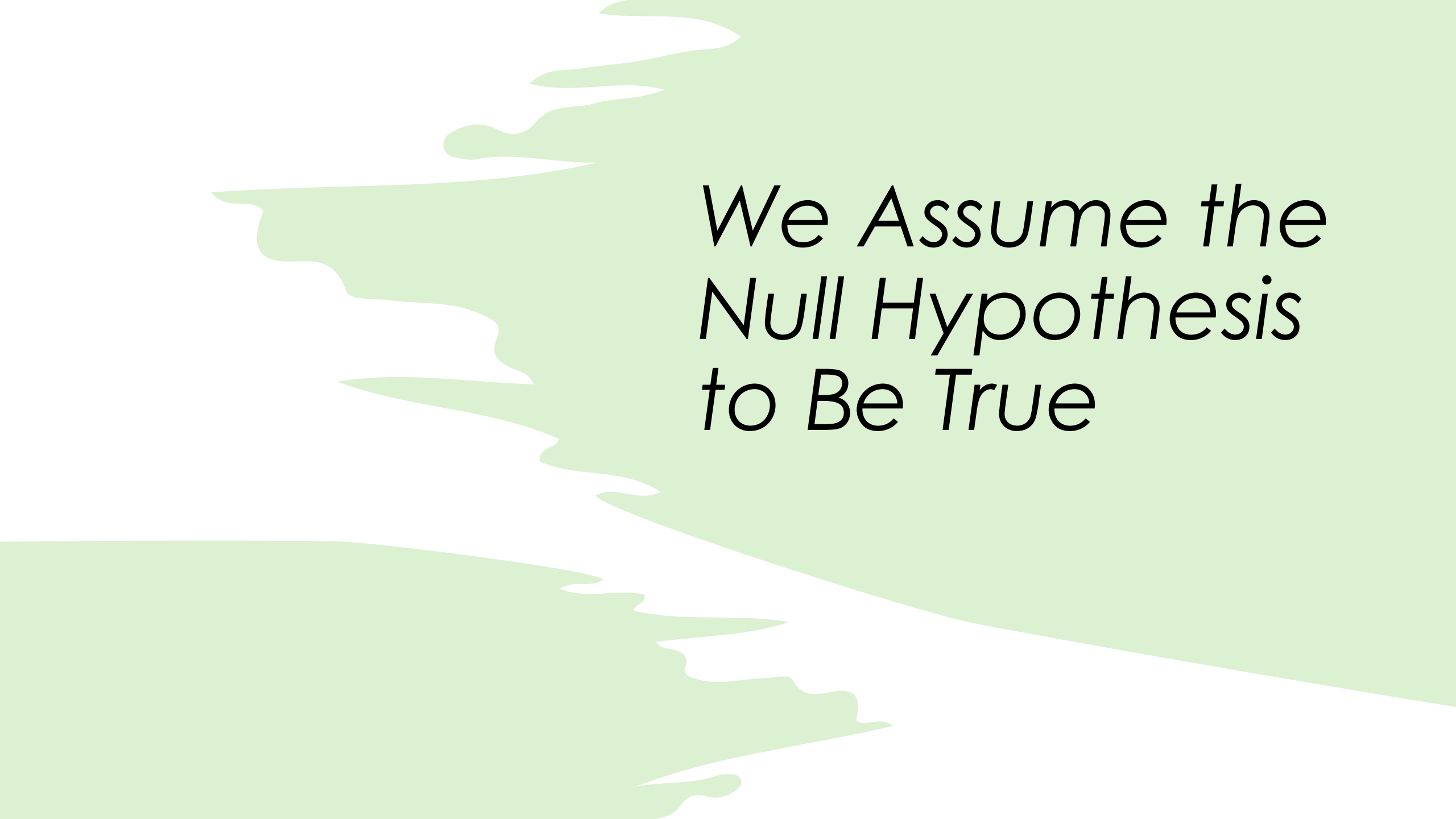
Background Information

- We're given a rich dataset with both categorical and quantitative data allowing us to run a variety of statistical models on it.
- Categorical data values include weapons used, the type of gun law in place at the time, the moon phase, and weather.
- The quantitative data that'll assist a lot is monetary damage inflicted by the weapon.
- We want to be able to determine from this data whether gun control is effective or not.
 - Let's do a permutation test.



Null Hypothesis and Alternate Hypothesis

- Null Hypothesis: The robberies in locations with strict gun laws in place have the same monetary damages as the robberies in locations with loose gun laws in place.
- Alternate Hypothesis: The robberies in locations with strict gun laws in place have different monetary damages as the robberies in locations with loose gun laws in place.
 - If we manage to accept to alternate hypothesis, the statistical test can be used as evidence to illustrate how gun control is effective.

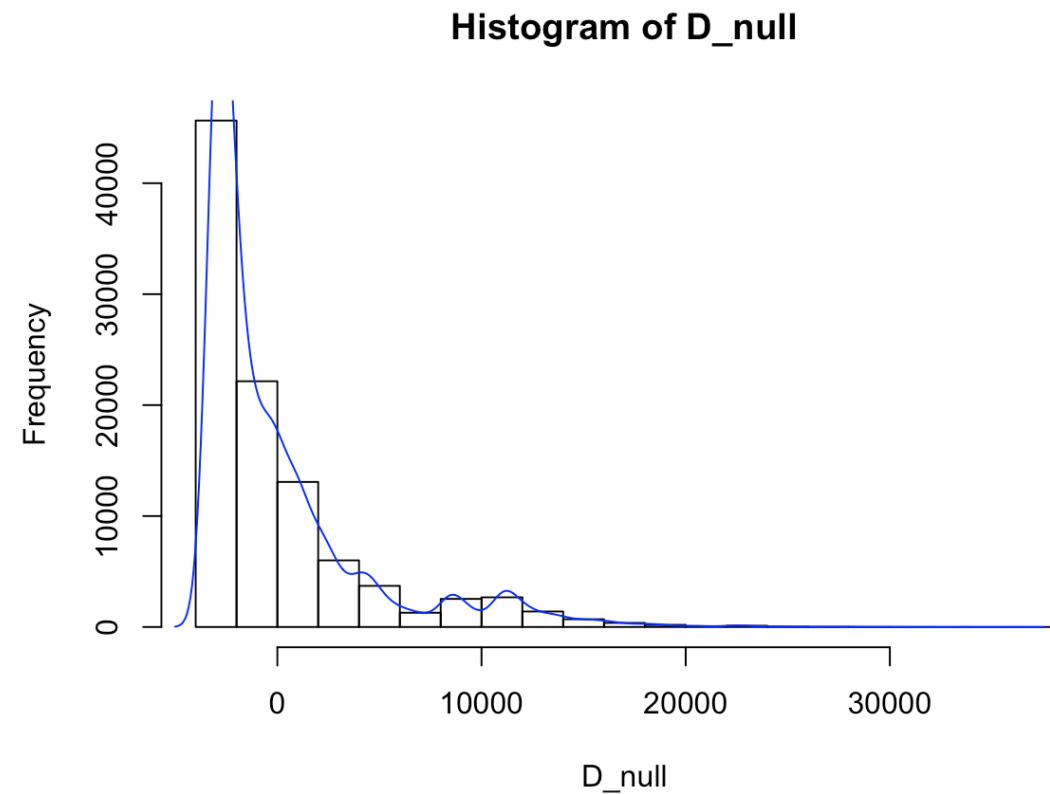
The background features a large, abstract, light green brushstroke that originates from the left side and extends towards the right, creating a textured, painterly effect. The stroke is composed of several overlapping, irregular shapes that give it a sense of movement and depth.

*We Assume the
Null Hypothesis
to Be True*

```
1  ##Fauzan Amjad
2
3  ## Data Set
4  library(readr)
5  Gun_Control <- read_csv("Desktop/Gun_Control.csv")
6
7
8  ## Colors
9  colors <- c("red", "blue" , "green")
10
11  ## Null Hypothesis: The Average monetary damage of strict gun laws is the same the average monetary damage of loose gun laws
12
13  ## Subset Data via Gun Laws
14  strict.data <- subset(Gun_Control, Gun_Control$Gun_Laws == "Strict_Gun_Laws")
15  loose.data <- subset(Gun_Control, Gun_Control$Gun_Laws == "Loose_Gun_Laws")
16
17  ## Collect Damage Data Per Gun Law
18  strict.damage <- strict.data$Monetary_Damage
19  loose.damage <- loose.data$Monetary_Damage
20
21  ## Collect Mean data for Each
22  mean.strict <- mean(strict.damage)
23  mean.loose <- mean(loose.damage)
24  mean.strict
25  mean.loose
26
27  ## Permutation Test
28  PermutationTestSecond::Permutation(Gun_Control, "Gun_Laws", "Monetary_Damage",100000,"Strict_Gun_Laws", "Loose_Gun_Laws")
29  PermutationTestSecond::Permutation(Gun_Control, "Gun_Laws", "Monetary_Damage",100000,"Medium_Gun_Laws", "Loose_Gun_Laws")
30  PermutationTestSecond::Permutation(Gun_Control, "Gun_Laws", "Monetary_Damage",100000,"Strict_Gun_Laws", "Medium_Gun_Laws")
31
```

The Result of Our Permutation Test

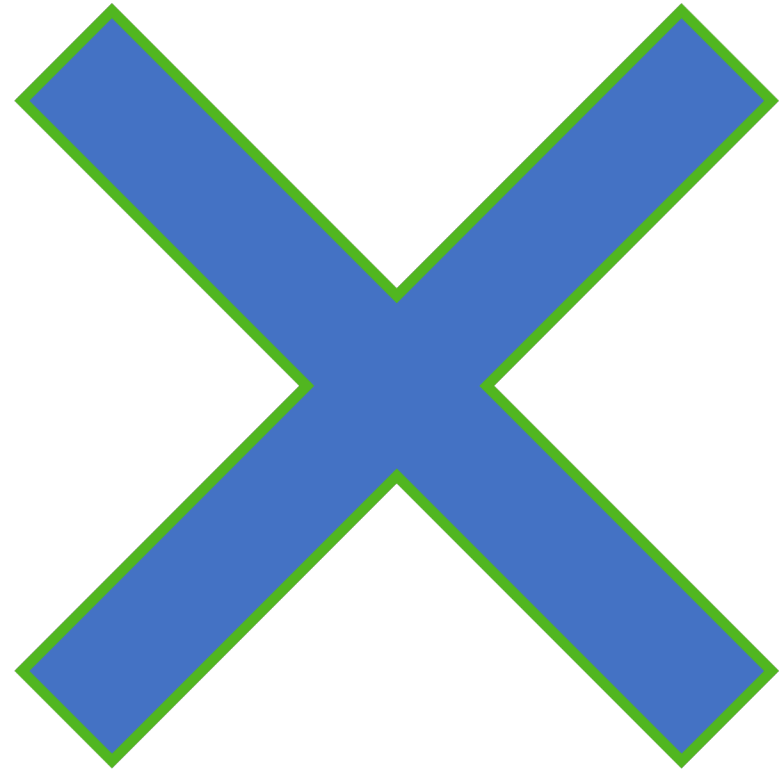
WE'VE ATTAINED A
P-VALUE OF 0.



Permutation Test Interpretation

- The calculated p-value derived from our Permutation Test will be used as our evidence against the null hypothesis.
- We'll use 0.05 as our threshold to either reject the null hypothesis or fail to reject the null hypothesis.
- The p-value I got was 0.
 - 0 is less than the 0.05 threshold we established.

*We reject the null hypothesis.
We can conclude with a high
degree of certainty that the
alternative hypothesis is true.*



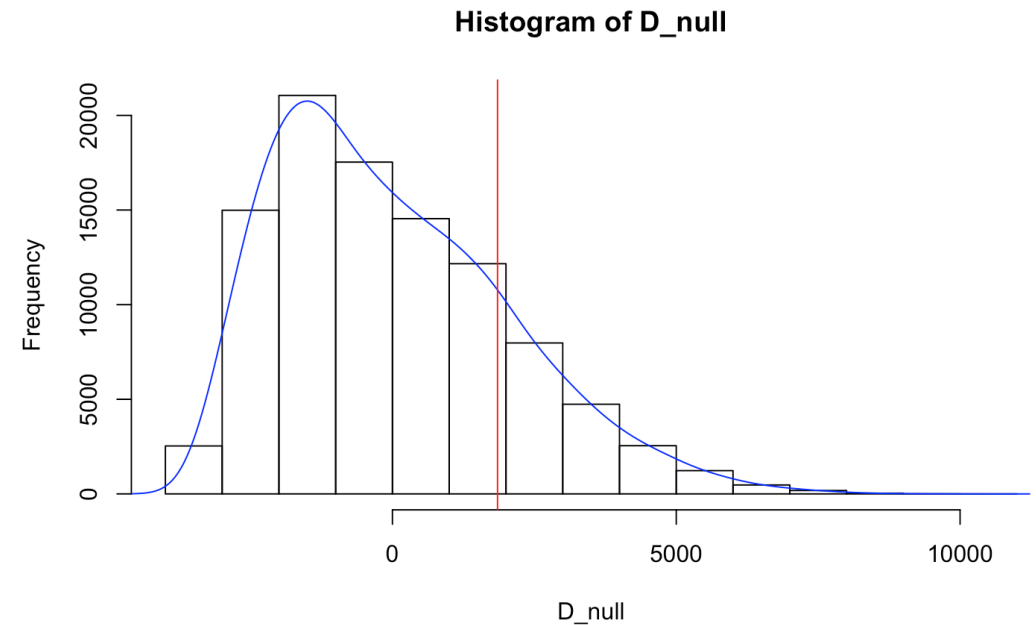


Trying to Prove that Gun Control is Not Effective

EXTRA CREDIT

Evidence 1

- Null Hypothesis: The robberies in locations with strict gun laws in place have the same monetary damages as the robberies in locations with medium gun laws in place.
- Alternate Hypothesis: The robberies in locations with strict gun laws in place have different monetary damages as the robberies in locations with medium gun laws in place.
- P-Value Threshold: 0.05
- P-Value Calculated: 0.18776
- Conclusion: We fail to reject the null hypothesis. Therefore, we can consider, not conclude, that increasing gun control does not change monetary damage



Evidence 2

- Null Hypothesis: The robberies with GUNS in locations with medium gun laws in place have the same monetary damages as the robberies with GUNS in locations with loose gun laws in place.
- Alternate Hypothesis: The robberies with GUNS in locations with medium gun laws in place have different monetary damages as the robberies with GUNS in locations with loose gun laws in place.
- P-Value Threshold: 0.05
- P-Value Calculated: 0.99
- Conclusion: We fail to reject the null hypothesis. Therefore, the monetary damage by GUNS is the same regardless of medium or loose gun laws.

```
## Exhibit 2
medium.data <- subset(Gun_Control, Gun_Control$Gun_Laws == "Medium_Gun_Laws")

medium.gun <- subset(medium.data, medium.data$Weapon_Used == "Gun")
loose.gun <- subset(loose.data, loose.data$Weapon_Used == "Gun")

medium.gun.damage <- medium.gun$Monetary_Damage
loose.gun.damage <- loose.gun$Monetary_Damage

mean.medium <- mean(medium.gun.damage)
mean.loose.new <- mean(loose.gun.damage)

sd.mean.medium <- sd(medium.gun.damage)
sd.mean.loose.new <- sd(loose.gun.damage)

len1 <- length(medium.gun.damage)
len2 <- length(loose.gun.damage)

sd.all <- sqrt(sd.mean.medium^2/len1 + sd.mean.loose.new^2/len2)

zeta.al.set <- (mean.medium - mean.loose.new)/sd.all

pNew <- 1 - pnorm(zeta.al.set)
pNew
```

A large, irregular green brushstroke shape serves as the background for the text. It has a rough, hand-painted appearance with varying shades of green and some white highlights.

Evidence 3

WE DON'T HAVE ENOUGH
LOOSE GUN LAW DATA!!!