Speaking Science

W241 Final Project

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Contents


```
d <- fread('speaking_science_data_03-24_clean.csv')
head(d)
```

```
##         start_date        end_date      ip_address duration_in_seconds
## 1: 3/23/2020 20:59 3/23/2020 21:00   196.17.67.134                  85
## 2: 3/23/2020 21:00 3/23/2020 21:03  68.105.189.229                 185
## 3: 3/23/2020 20:59 3/23/2020 21:03   76.176.54.192                 284
## 4: 3/23/2020 21:00 3/23/2020 21:06 107.185.127.204                 379
## 5: 3/23/2020 21:04 3/23/2020 21:06      71.6.87.50                 163
## 6: 3/23/2020 21:02 3/23/2020 21:06   72.216.72.106                 275
##      recorded_date       response_id latitude longitude       mturk_id
## 1: 3/23/2020 21:00 R_3si5y4qwGLzKYPh 34.05440 -118.2440 A1201HOODXBGC3
## 2: 3/23/2020 21:03 R_1jqhwROmmrLPaoy 36.05881 -115.3104 A12ATVBE1I4567
## 3: 3/23/2020 21:03 R_2ASHk9ILabLrZCB 33.02870 -117.0846  A9OOV3976AFYF
## 4: 3/23/2020 21:06 R_3n6PLtv1K8spEfC 33.96750 -118.1464 A2C73Y1COWCA51
## 5: 3/23/2020 21:06 R_3kbIZqjBaOkb1pG 37.76880 -122.2620 A1OROXYXMV5MBO
## 6: 3/23/2020 21:06 R_sRUrOCfBuUjTAuB 32.89461 -111.7493  A83OLM1ZQCO83
##    browser_type browser_version      browser_os browser_resolution
## 1:       Chrome   80.0.3987.149  Windows NT 6.3           1366x768
## 2:       Chrome   80.0.3987.149 Windows NT 10.0           1536x864
## 3:       Chrome   79.0.3945.136     Android 7.0            360x640
## 4:       Chrome   80.0.3987.149 Windows NT 10.0          1920x1080
## 5:       Chrome   80.0.3987.132       Macintosh           1440x900
## 6:       Chrome   80.0.3987.149 Windows NT 10.0           1536x864
##    time_read_intro time_read_article credibility importance q1 q1_correct q2
## 1:           2.607            17.922           5          4  1          0  3
## 2:           7.588            29.649           5          4  3          1  5
## 3:          13.345           166.381           6          7  1          0  3
## 4:           2.854            67.943           7          6  4          0  3
## 5:          18.607            47.366           6          6  2          0  1
## 6:          10.128           163.601           7          7  3          1  1
##    q2_correct q3 q3_correct q4 q4_correct q5 q5_correct q6 q6_correct
## 1:          1  2          0  1          0  3          0 NA          0
```

```
## 2:          0  3          1  1          0  4          1  1          1
## 3:          1  1          0  4          0  4          1  1          1
## 4:          1  3          1  2          0  2          0 NA          0
## 5:          0  1          0  2          0  1          0  1          1
## 6:          0  3          1  1          0  3          0  1          1
##    questions_correct time_answering_questions donation time_donation
## 1:                 1                  22.689       50         7.384
## 2:                 4                 125.852        1         4.044
## 3:                 3                  67.334        1         7.657
## 4:                 2                 287.135        0         5.991
## 5:                 1                  49.709       50         7.145
## 6:                 3                  72.550        0        14.611
##            city state   zip treatment
## 1:  Los Angeles    CA 90009         1
## 2:    Las Vegas    NV 89113         0
## 3:    San Diego    CA 92127         0
## 4: Bell Gardens    CA 90201         1
## 5:      Vallejo    CA 94589         1
## 6:  Casa Grande    AZ 85122         1
```

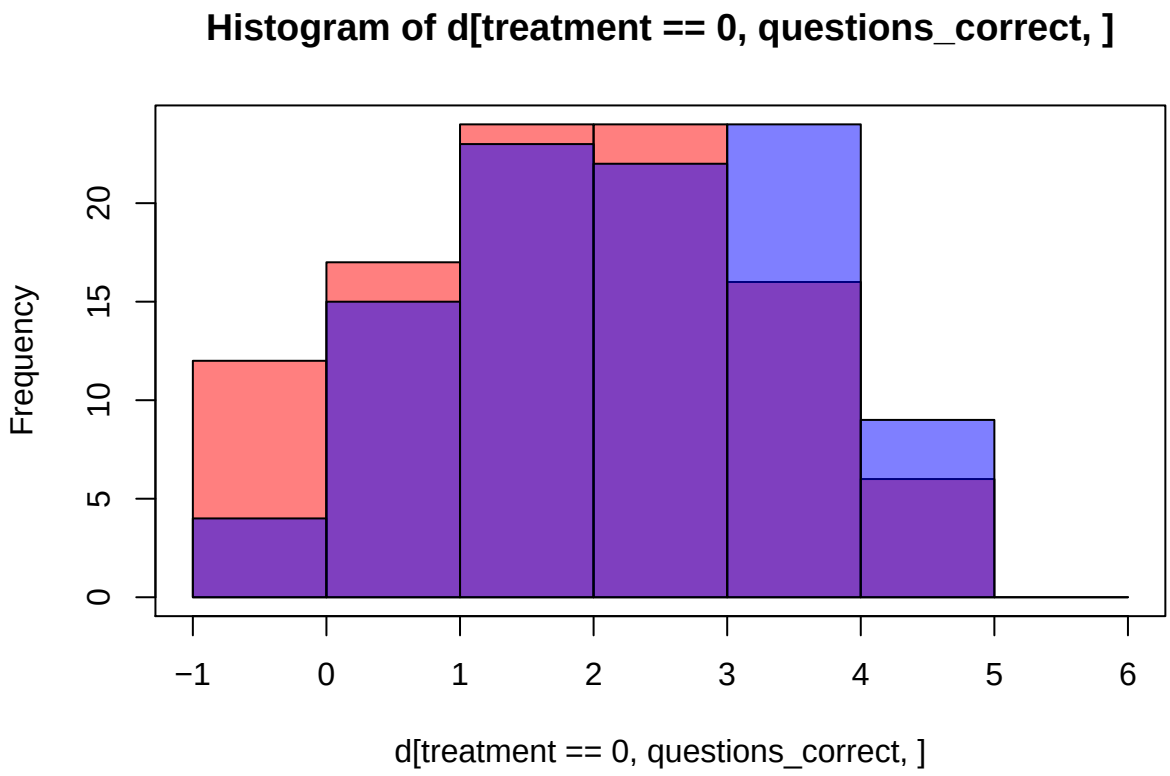
Functions

Simple Linear Regression

```
mod <- lm(questions_correct ~ treatment + time_read_article, data=d)
summary(mod)
```

```
##
## Call:
## lm(formula = questions_correct ~ treatment + time_read_article,
##     data = d)
##
## Residuals:
##      Min       1Q   Median       3Q      Max
## -2.69093 -0.94764  0.06458  0.91228  2.80838
##
## Coefficients:
##                    Estimate Std. Error t value Pr(>|t|)
## (Intercept)       1.6241406  0.1641966   9.891  < 2e-16 ***
## treatment         0.4009627  0.1781902   2.250   0.0256 *
## time_read_article 0.0037659  0.0005634   6.685 2.42e-10 ***
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 1.247 on 193 degrees of freedom
## Multiple R-squared:  0.2074, Adjusted R-squared:  0.1992
## F-statistic: 25.25 on 2 and 193 DF,  p-value: 1.817e-10
```

```
hist(d[treatment == 0, questions_correct,], col=rgb(1,0,0,0.5), breaks=seq(-1,6, by=1))
hist(d[treatment == 1, questions_correct,], col=rgb(0,0,1,0.5), breaks=seq(-1,6, by=1), add = T)
box()
```



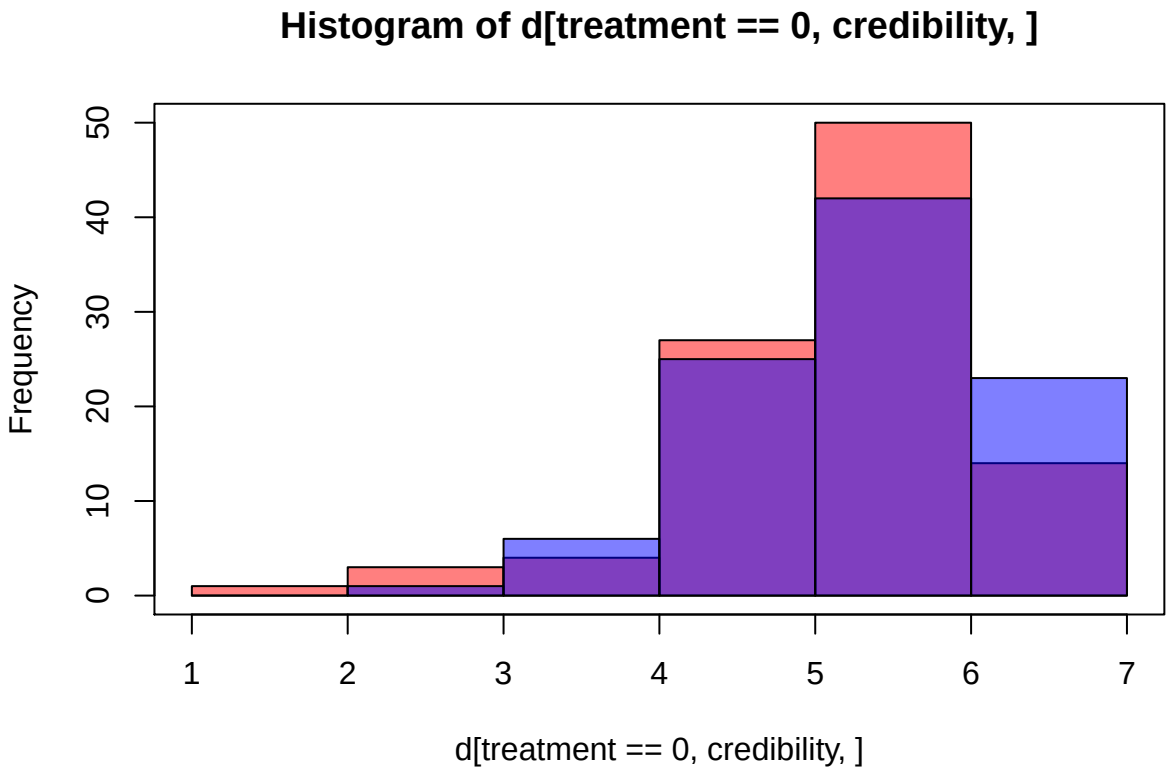

```
stargazer(mod, type = "text")
```

```
##
## ================================================
##                         Dependent variable:
##                     ---------------------------
##                           questions_correct
## ------------------------------------------------
## treatment                      0.401**
##                                (0.178)
##
## time_read_article             0.004***
##                                (0.001)
##
## Constant                      1.624***
##                                (0.164)
##
## ------------------------------------------------
## Observations                     196
## R2                              0.207
## Adjusted R2                     0.199
## Residual Std. Error       1.247 (df = 193)
## F Statistic            25.249*** (df = 2; 193)
## ================================================
## Note:                *p<0.1; **p<0.05; ***p<0.01
```

```r
mod <- lm(credibility ~ treatment, data=d)
summary(mod)
```

```
##
## Call:
## lm(formula = credibility ~ treatment, data = d)
##
## Residuals:
##     Min      1Q  Median      3Q     Max
## -3.6566 -0.6566  0.1753  0.3434  1.3434
##
## Coefficients:
##             Estimate Std. Error t value Pr(>|t|)
## (Intercept)  5.65657    0.09306  60.781   <2e-16 ***
## treatment    0.16818    0.13229   1.271    0.205
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 0.926 on 194 degrees of freedom
## Multiple R-squared:  0.008262,   Adjusted R-squared:  0.00315
## F-statistic: 1.616 on 1 and 194 DF,  p-value: 0.2052
```

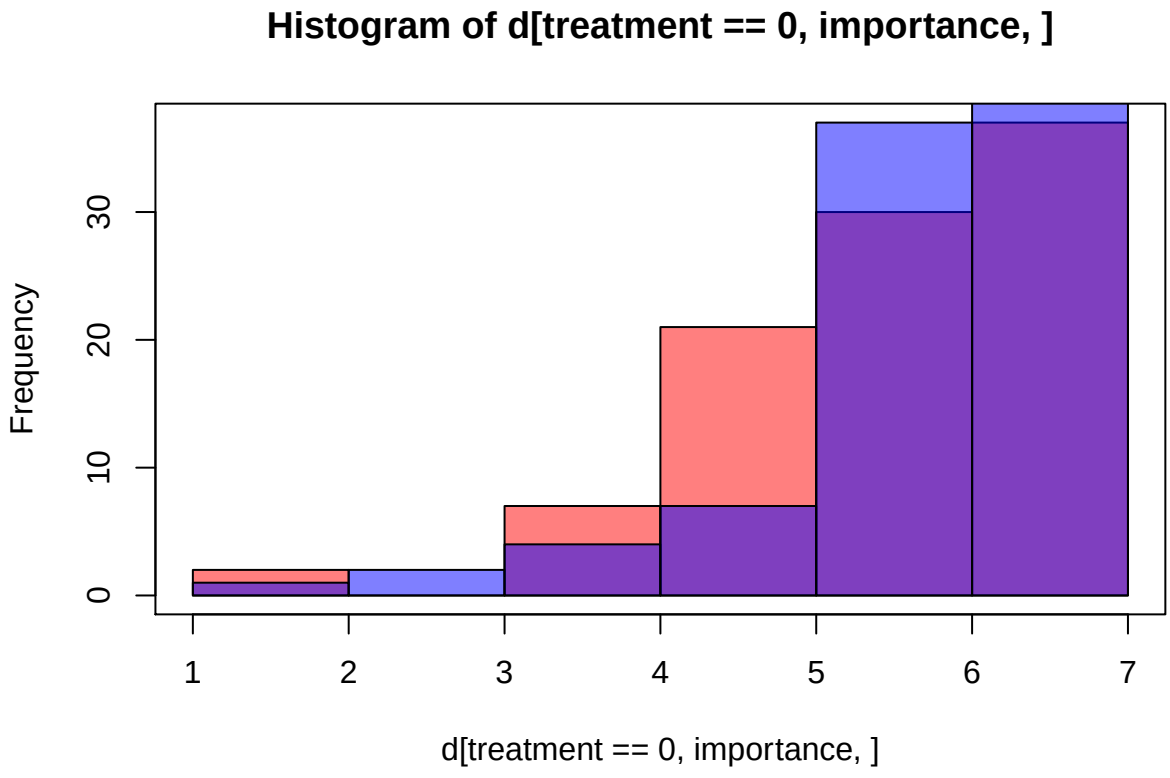
```r
hist(d[treatment == 0, credibility,], col=rgb(1,0,0,0.5), breaks=seq(1,7, by=1))
hist(d[treatment == 1, credibility,], col=rgb(0,0,1,0.5), breaks=seq(1,7, by=1), add = T)
box()
```



```r
mod <- lm(importance ~ treatment, data=d)
summary(mod)
```

```
##
## Call:
## lm(formula = importance ~ treatment, data = d)
##
## Residuals:
##     Min      1Q  Median      3Q     Max
## -5.2062 -0.2062  0.0825  0.7938  1.0825
##
## Coefficients:
##             Estimate Std. Error t value Pr(>|t|)
## (Intercept)   5.9175     0.1143  51.782   <2e-16 ***
## treatment     0.2887     0.1616   1.786   0.0757 .
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 1.126 on 192 degrees of freedom
##   (2 observations deleted due to missingness)
## Multiple R-squared:  0.01634,    Adjusted R-squared:  0.01122
## F-statistic:  3.19 on 1 and 192 DF,  p-value: 0.07566
```

```r
hist(d[treatment == 0, importance,], col=rgb(1,0,0,0.5), breaks=seq(1,7, by=1))
hist(d[treatment == 1, importance,], col=rgb(0,0,1,0.5), breaks=seq(1,7, by=1), add = T)
box()
```

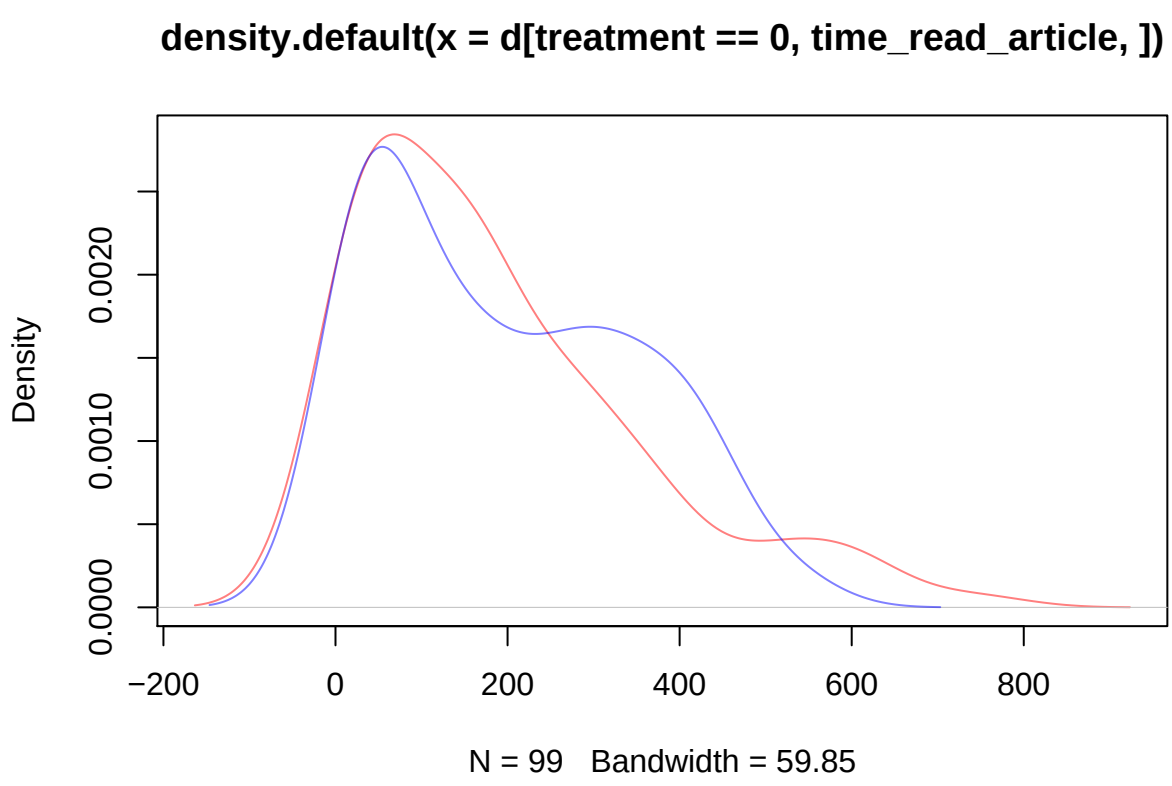


```r
mod <- lm(time_read_article ~ treatment, data=d)
summary(mod)
```

```
##
## Call:
## lm(formula = time_read_article ~ treatment, data = d)
##
## Residuals:
##     Min      1Q  Median      3Q     Max
## -179.58 -138.20  -32.26   98.13  555.57
##
## Coefficients:
##             Estimate Std. Error t value Pr(>|t|)
## (Intercept)  188.318     15.971  11.792   <2e-16 ***
## treatment      7.592     22.702   0.334    0.738
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 158.9 on 194 degrees of freedom
## Multiple R-squared:  0.0005761,  Adjusted R-squared:  -0.004576
## F-statistic: 0.1118 on 1 and 194 DF,  p-value: 0.7384
```

```r
d1 <- density(d[treatment == 0, time_read_article,])
d2 <- density(d[treatment == 1, time_read_article,])

plot(d1, col=rgb(1,0,0,0.5))
lines(d2, col=rgb(0,0,1,0.5))
```

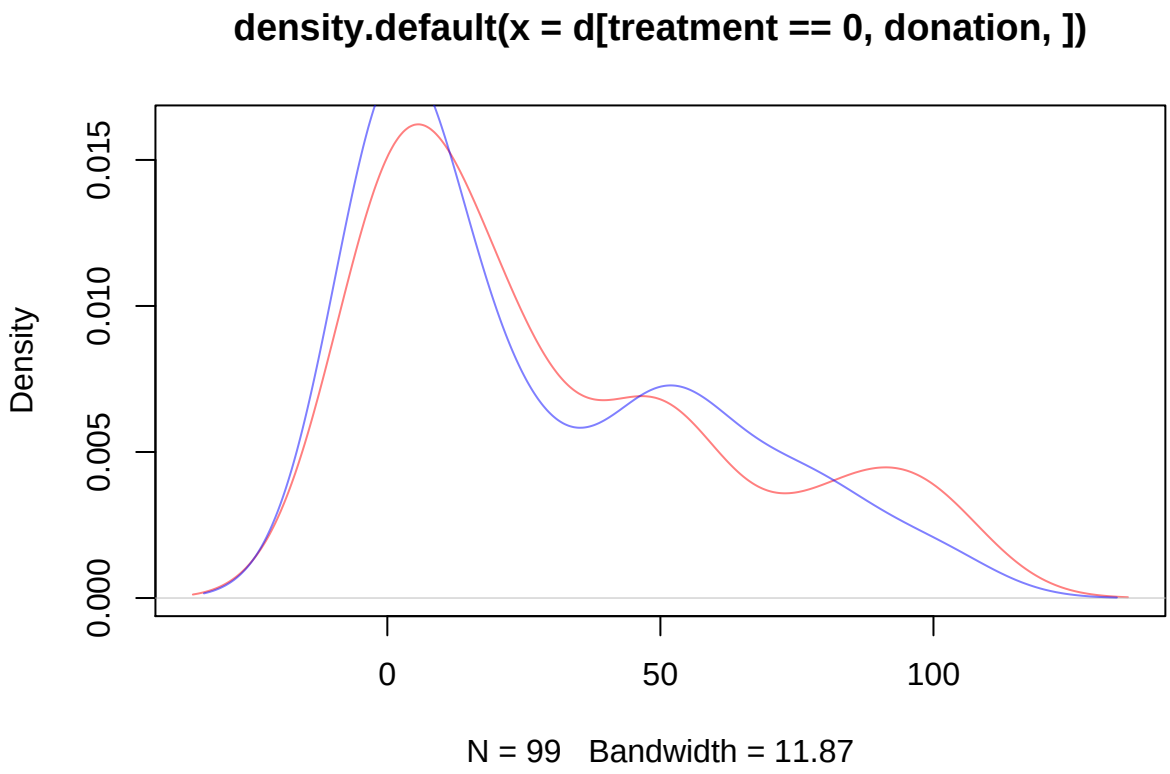



```
mod <- lm(donation ~ treatment, data=d)
summary(mod)
```

```
##
## Call:
## lm(formula = donation ~ treatment, data = d)
##
## Residuals:
##    Min     1Q Median     3Q    Max
## -30.74 -27.16 -11.45  22.84  72.84
##
## Coefficients:
##             Estimate Std. Error t value Pr(>|t|)
## (Intercept)   30.737      3.224   9.533   <2e-16 ***
## treatment     -3.583      4.583  -0.782    0.435
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 32.08 on 194 degrees of freedom
## Multiple R-squared:  0.00314,    Adjusted R-squared:  -0.001998
## F-statistic: 0.6111 on 1 and 194 DF,  p-value: 0.4353
```

```
d1 <- density(d[treatment == 0, donation,])
d2 <- density(d[treatment == 1, donation,])

plot(d1, col=rgb(1,0,0,0.5))
lines(d2, col=rgb(0,0,1,0.5))
```



Randomization Inference

Testing the sharp null hypothesis that the treatment has no effect for anyone.

```
#TODO
```