BOI_Regression

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This document describes the relationship between scores on the ADC and performance on a semantic decision task. Independent samples t-tests show that groups overall do not differ in accuracy or response latency $t(603.71) = -0.56$, $p = 0.58$ & $t(597.39) = 1.49$, $p = 0.14$, respectively. Distributions of response latency and accuracy across groups and BOI are shown in the violin plots below. Also plotted is the distribution of accuracy and resposne latency across a range of ADC scores. Each point refers to the average latency or average accuracy for a participant in each of the BOI levels. This is separated out by group. Finally, there are nested linear models showing the relationship between each of our DVs (resposne latency & accuracy) and group, group and BOI level, and group, BOI level, and ADC score. Nested model comparisons show that the best fitting model for both of the DVs includes group & BOI level, but not ADC scores.

Table of means and violin plots

Table 1: Descriptives Between Groups

| Group	Mean Duration	SD Duration	Average Percent Correct	SD Percent Correct
ASD	977.7054	184.7615	0.8499320	0.1245079
NA	1001.5459	208.4481	0.8440951	0.1324285

Table 2: Descriptives Between Groups and BOI Levels

Group	Level	Mean Duration	SD Duration	Average Percent Correct	SD Percent Correct
ASD	abstract	1045.2303	186.0486	0.8152527	0.1211803
ASD	high	870.3469	144.4500	0.9401900	0.0589838
ASD	low	1052.1727	183.1366	0.7633212	0.1382650
ASD	medium	943.0715	160.4966	0.8809642	0.0854218
NA	abstract	1048.6056	210.4664	0.8611279	0.0934746
NA	high	883.5153	159.3386	0.9394869	0.0667352
NA	low	1098.1592	219.4395	0.7136195	0.1401492
NA	medium	975.9036	176.6799	0.8621461	0.1045079

Table 3: ADC Descriptives Between Groups

Group	Mean ADC	SD ADC
ASD	38.56579	15.29411

Group	Mean ADC	SD ADC
NA	23.36842	14.14665

Mean Duration Between Groups & Across BOI Levels
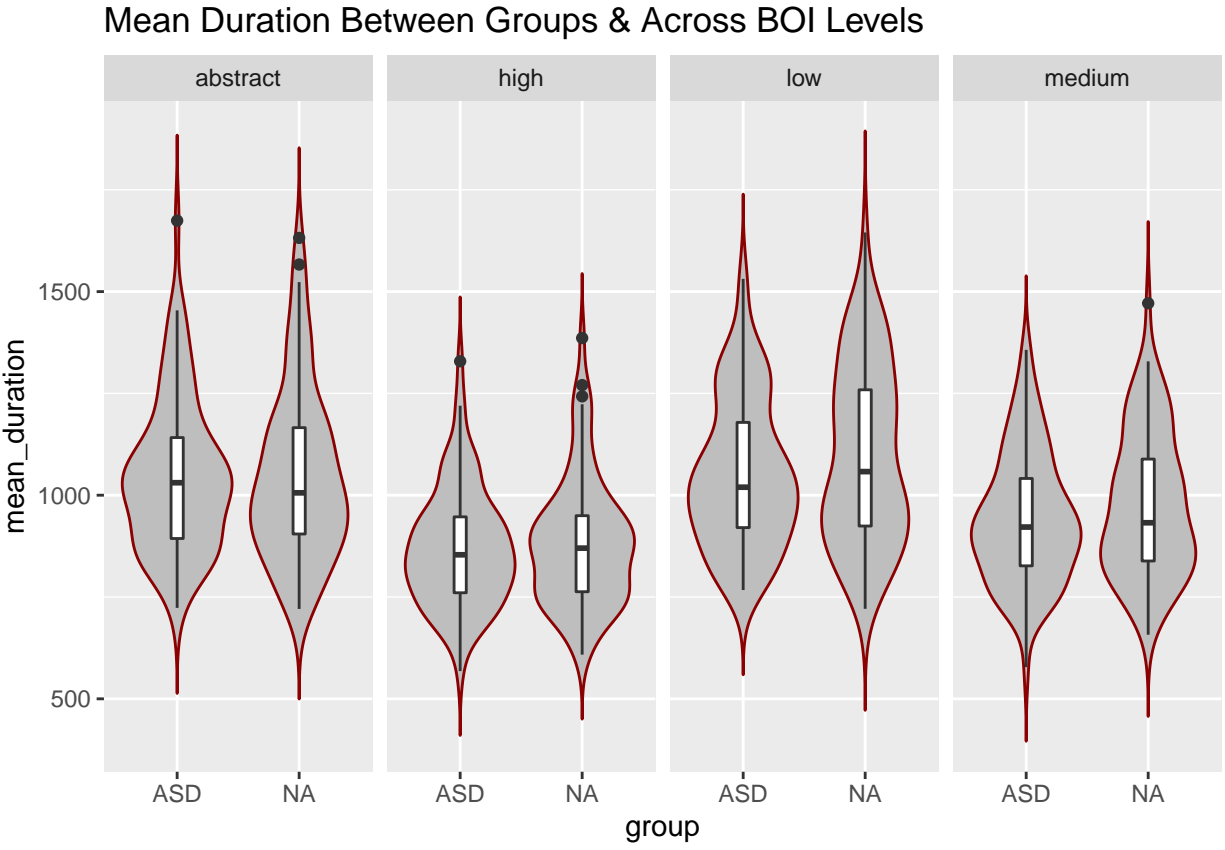
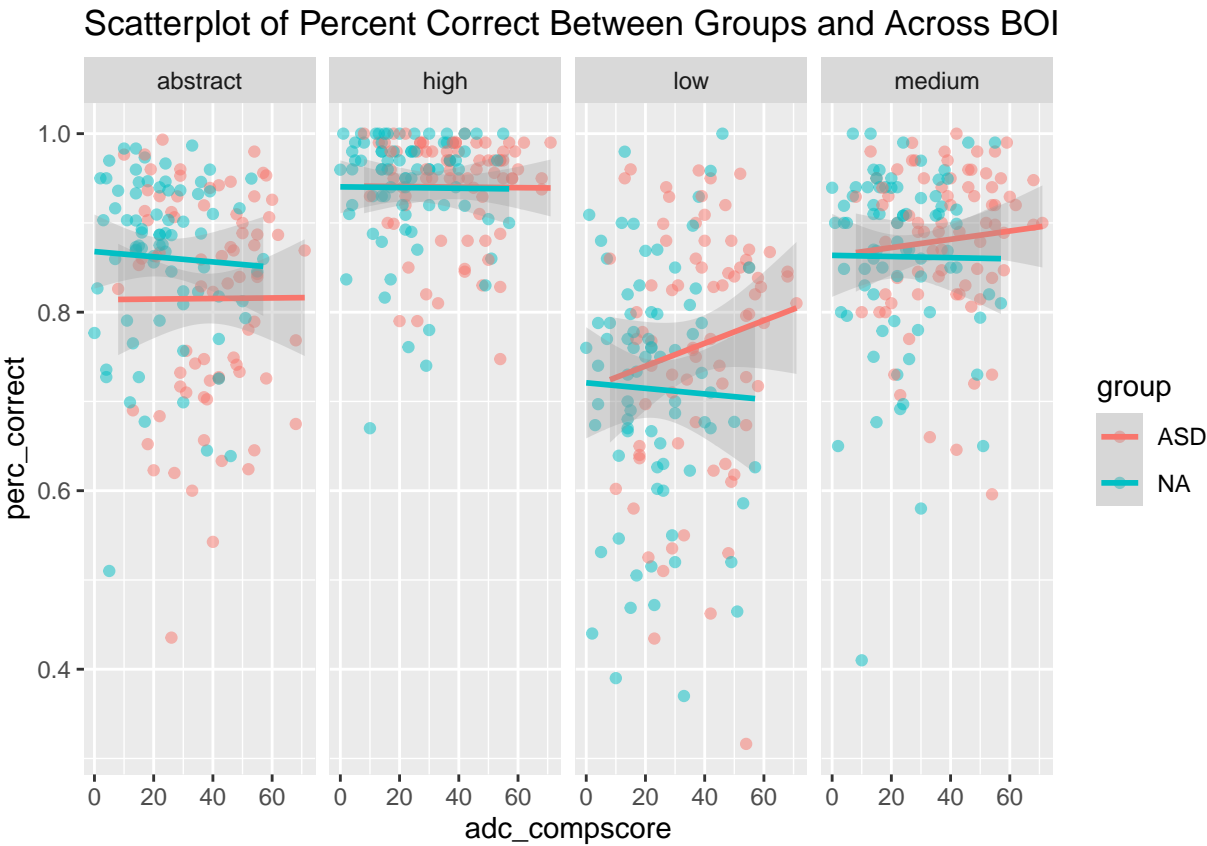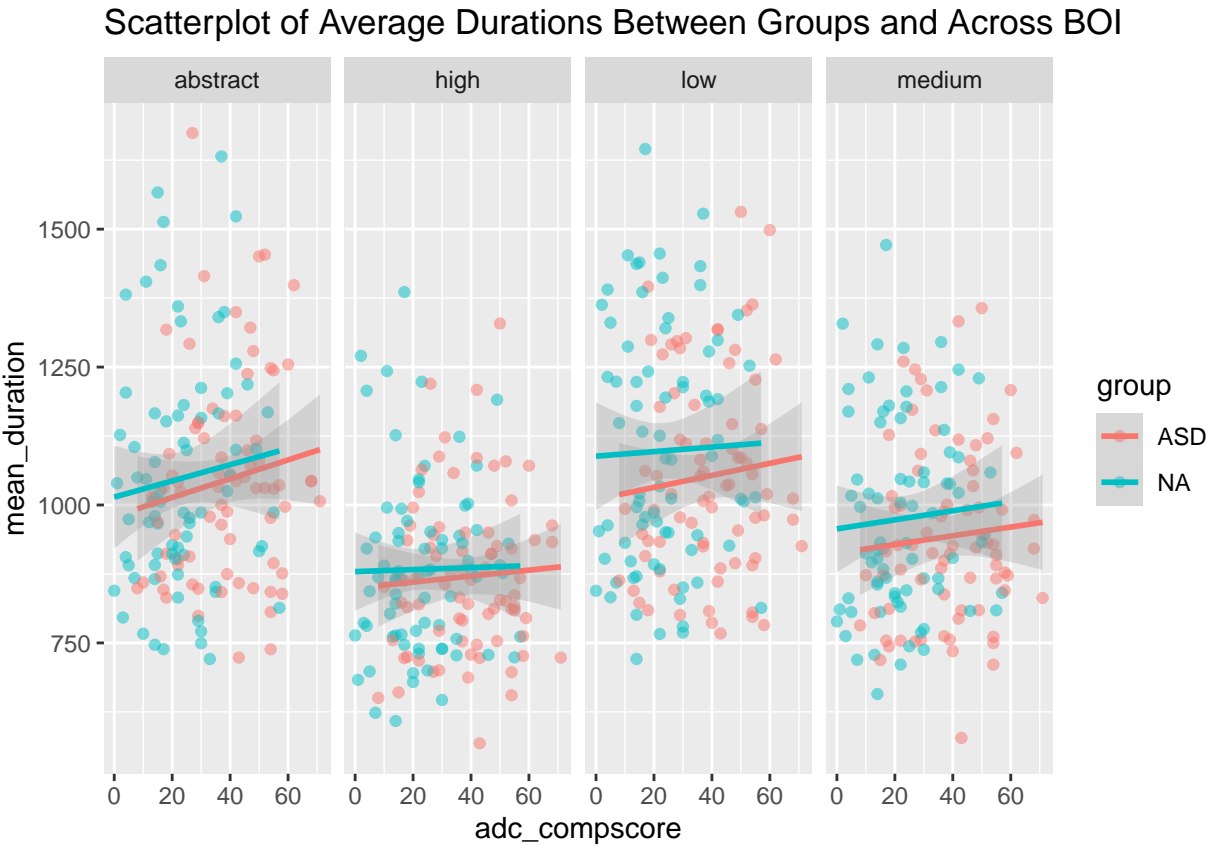Percent Correct Between Groups & Across BOI Levels
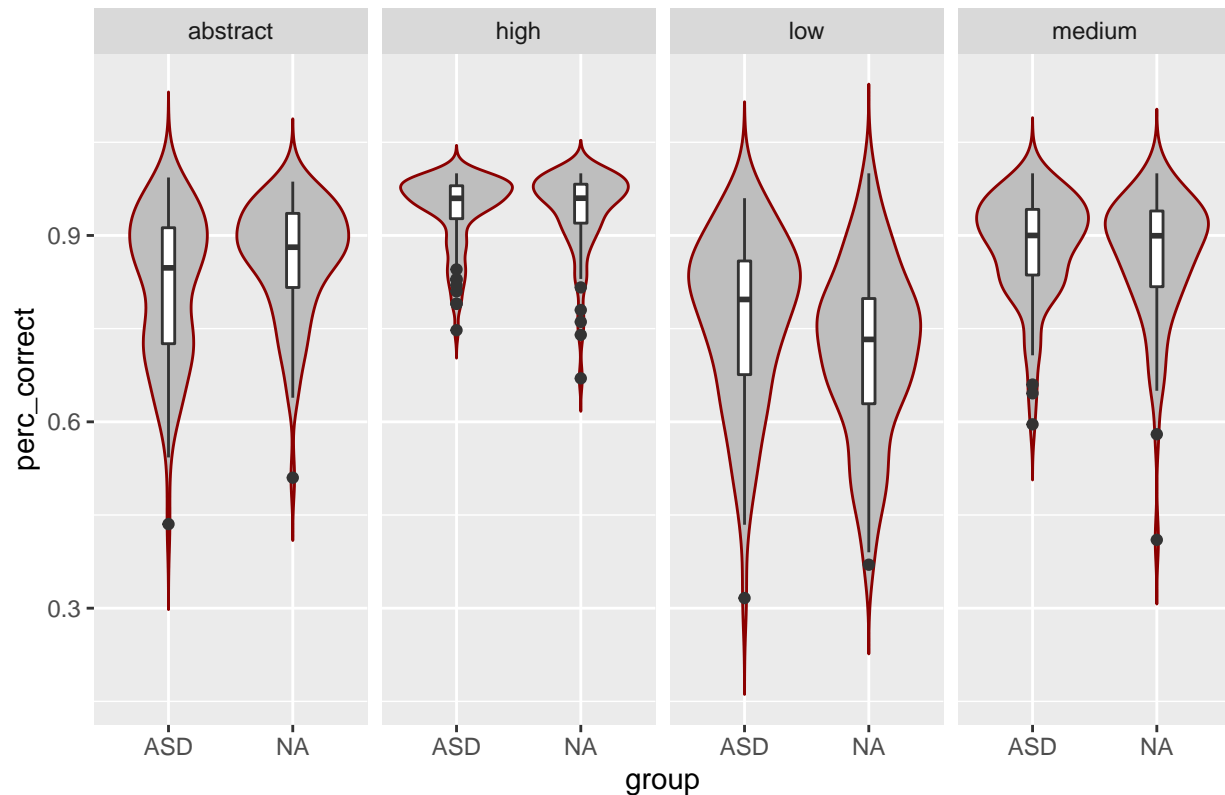
T-tests of overall response latency and accuracy. Groups do not differ in overall response latency or accuracy.

```
##
##  Welch Two Sample t-test
##
## data:  mean_duration by group
## t = -1.4923, df = 597.39, p-value = 0.1361
## alternative hypothesis: true difference in means is not equal to 0
## 95 percent confidence interval:
##  -55.215863   7.534715
## sample estimates:
## mean in group ASD  mean in group NA
##          977.7054         1001.5459


##
##  Welch Two Sample t-test
##
## data:  perc_correct by group
## t = 0.55989, df = 603.71, p-value = 0.5758
## alternative hypothesis: true difference in means is not equal to 0
## 95 percent confidence interval:
##  -0.01463697  0.02631075
## sample estimates:
## mean in group ASD  mean in group NA
```

```
##          0.8499320          0.8440951
```

Plotting duration and percent correct over ADC scores.

Scatterplot of Average Durations Between Groups and Across BOI

Scatterplot of Percent Correct Between Groups and Across BOI

Nested model comparisons (group, group + level, & group + level + ADC)

```
m1_duration <- lm(mean_duration ~ group, data = df_descrip)
m2_duration <- lm(mean_duration ~ group * level, data = df_descrip)
m3_duration <- lm(mean_duration ~ group * level + adc_compscore, data = df_descrip)
list_mods_dur <- list(model_1 = m1_duration,model_2 = m2_duration,model_3 = m3_duration)
lapply(list_mods_dur, summary)
```

```
## $model_1
##
## Call:
## lm(formula = mean_duration ~ group, data = df_descrip)
##
## Residuals:
##     Min     1Q  Median     3Q     Max
## -409.57 -141.51  -33.56  116.38  696.59
##
## Coefficients:
##             Estimate Std. Error t value Pr(>|t|)
## (Intercept)   977.71      11.30  86.549   <2e-16 ***
## groupNA        23.84      15.98   1.492    0.136
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 197 on 606 degrees of freedom
## Multiple R-squared:  0.003661,   Adjusted R-squared:  0.002017
## F-statistic: 2.227 on 1 and 606 DF,  p-value: 0.1361
##
##
## $model_2
##
## Call:
## lm(formula = mean_duration ~ group * level, data = df_descrip)
##
## Residuals:
##     Min     1Q  Median     3Q     Max
## -377.17 -137.33  -19.78  109.96  629.07
##
## Coefficients:
##                    Estimate Std. Error t value Pr(>|t|)
## (Intercept)        1045.230     20.831  50.176  < 2e-16 ***
## groupNA               3.375     29.460   0.115 0.908822
## levelhigh          -174.883     29.460  -5.936 4.93e-09 ***
## levellow              6.942     29.460   0.236 0.813780
## levelmedium        -102.159     29.460  -3.468 0.000562 ***
## groupNA:levelhigh     9.793     41.662   0.235 0.814244
## groupNA:levellow     42.611     41.662   1.023 0.306824
## groupNA:levelmedium  29.457     41.662   0.707 0.479817
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 181.6 on 600 degrees of freedom
## Multiple R-squared:  0.1614, Adjusted R-squared:  0.1516
```

```
## F-statistic:  16.5 on 7 and 600 DF,  p-value: < 2.2e-16
##
##
## $model_3
##
## Call:
## lm(formula = mean_duration ~ group * level + adc_compscore, data = df_descrip)
##
## Residuals:
##     Min      1Q  Median      3Q     Max
## -369.26 -134.71  -25.39  105.89  639.34
##
## Coefficients:
##                     Estimate Std. Error t value Pr(>|t|)
## (Intercept)        1010.9743    28.3551  35.654  < 2e-16 ***
## groupNA              16.8743    30.3722   0.556  0.57870
## levelhigh          -174.8834    29.4068  -5.947 4.64e-09 ***
## levellow              6.9423    29.4068   0.236  0.81345
## levelmedium        -102.1589    29.4068  -3.474  0.00055 ***
## adc_compscore         0.8882     0.4999   1.777  0.07608 .
## groupNA:levelhigh     9.7931    41.5875   0.235  0.81392
## groupNA:levellow     42.6112    41.5875   1.025  0.30596
## groupNA:levelmedium  29.4568    41.5875   0.708  0.47903
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 181.3 on 599 degrees of freedom
## Multiple R-squared:  0.1658, Adjusted R-squared:  0.1546
## F-statistic: 14.88 on 8 and 599 DF,  p-value: < 2.2e-16
```

```r
anova( m1_duration,m2_duration,m3_duration)
```

```
## Analysis of Variance Table
##
## Model 1: mean_duration ~ group
## Model 2: mean_duration ~ group * level
## Model 3: mean_duration ~ group * level + adc_compscore
##   Res.Df      RSS Df Sum of Sq       F  Pr(>F)
## 1    606 23508989
## 2    600 19787433  6   3721556 18.8753 < 2e-16 ***
## 3    599 19683670  1    103762  3.1576 0.07608 .
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
```

```r
m1_correct <- lm(perc_correct ~ group, data = df_descrip)
m2_correct <- lm(perc_correct ~ group * level, data = df_descrip)
m3_correct <- lm(perc_correct ~ group * level + adc_compscore, data = df_descrip)
list_mods_acc <- list(model_1 = m1_correct, model_2 = m2_correct, model_3 = m3_correct)
lapply(list_mods_acc, summary)
```

```
## $model_1
##
## Call:
```

```
## lm(formula = perc_correct ~ group, data = df_descrip)
##
## Residuals:
##      Min      1Q   Median      3Q      Max
## -0.53361 -0.06882  0.03027  0.10007  0.15590
##
## Coefficients:
##              Estimate Std. Error t value Pr(>|t|)
## (Intercept)  0.849932   0.007372  115.30   <2e-16 ***
## groupNA     -0.005837   0.010425   -0.56    0.576
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 0.1285 on 606 degrees of freedom
## Multiple R-squared:  0.000517,   Adjusted R-squared:  -0.001132
## F-statistic: 0.3135 on 1 and 606 DF,  p-value: 0.5758
##
##
## $model_2
##
## Call:
## lm(formula = perc_correct ~ group * level, data = df_descrip)
##
## Residuals:
##      Min      1Q   Median      3Q      Max
## -0.45215 -0.05217  0.02051  0.06074  0.28638
##
## Coefficients:
##                     Estimate Std. Error t value Pr(>|t|)
## (Intercept)          0.81525    0.01205  67.637  < 2e-16 ***
## groupNA              0.04588    0.01705   2.691 0.007317 **
## levelhigh            0.12494    0.01705   7.329 7.51e-13 ***
## levellow            -0.05193    0.01705  -3.047 0.002417 **
## levelmedium          0.06571    0.01705   3.855 0.000128 ***
## groupNA:levelhigh   -0.04658    0.02411  -1.932 0.053810 .
## groupNA:levellow    -0.09558    0.02411  -3.965 8.23e-05 ***
## groupNA:levelmedium -0.06469    0.02411  -2.684 0.007484 **
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 0.1051 on 600 degrees of freedom
## Multiple R-squared:  0.3386, Adjusted R-squared:  0.3309
## F-statistic: 43.88 on 7 and 600 DF,  p-value: < 2.2e-16
##
##
## $model_3
##
## Call:
## lm(formula = perc_correct ~ group * level + adc_compscore, data = df_descrip)
##
## Residuals:
##      Min      1Q   Median      3Q      Max
## -0.45010 -0.05301  0.02143  0.06291  0.28291
##
```

```
## Coefficients:
##                       Estimate Std. Error t value Pr(>|t|)
## (Intercept)          0.8093396  0.0164463  49.211  < 2e-16 ***
## groupNA              0.0482053  0.0176162   2.736 0.006395 **
## levelhigh            0.1249372  0.0170563   7.325 7.75e-13 ***
## levellow            -0.0519315  0.0170563  -3.045 0.002431 **
## levelmedium          0.0657114  0.0170563   3.853 0.000129 ***
## adc_compscore        0.0001533  0.0002899   0.529 0.597113
## groupNA:levelhigh   -0.0465782  0.0241212  -1.931 0.053954 .
## groupNA:levellow    -0.0955769  0.0241212  -3.962 8.32e-05 ***
## groupNA:levelmedium -0.0646933  0.0241212  -2.682 0.007520 **
## ---
## Signif. codes:  0 ’***’ 0.001 ’**’ 0.01 ’*’ 0.05 ’.’ 0.1 ’ ’ 1
##
## Residual standard error: 0.1051 on 599 degrees of freedom
## Multiple R-squared:  0.3389, Adjusted R-squared:  0.3301
## F-statistic: 38.38 on 8 and 599 DF,  p-value: < 2.2e-16
```

```
anova(m1_correct,m2_correct,m3_correct)
```

```
## Analysis of Variance Table
##
## Model 1: perc_correct ~ group
## Model 2: perc_correct ~ group * level
## Model 3: perc_correct ~ group * level + adc_compscore
##   Res.Df     RSS Df Sum of Sq       F Pr(>F)
## 1    606 10.0110
## 2    600  6.6249  6    3.3860 51.0489 <2e-16 ***
## 3    599  6.6219  1    0.0031  0.2797 0.5971
## ---
## Signif. codes:  0 ’***’ 0.001 ’**’ 0.01 ’*’ 0.05 ’.’ 0.1 ’ ’ 1
```