1)

memory<-read.csv(file.choose(), header=TRUE)

attach(memory)

boxplot(words ~ process)



summary(memory)

      age            process       words

 Older  :50   Adjective  :20   Min.   : 3.00

 Younger:50   Counting   :20   1st Qu.: 7.00

              Imagery    :20   Median :11.00

              Intentional:20   Mean   :11.61

              Rhyming    :20   3rd Qu.:15.25

                               Max.   :23.00

model1=lm(words ~ process)

summary(model1)

Call:

lm(formula = words ~ process)

Residuals:

    Min      1Q  Median      3Q     Max

-10.650  -1.788  -0.075   2.250   9.100

Coefficients:

                   Estimate Std. Error t value Pr(>|t|)

(Intercept)          12.900      0.779  16.561  < 2e-16 \*\*\*

processCounting      -6.150      1.102  -5.583 2.24e-07 \*\*\*

processImagery        2.600      1.102   2.360   0.0203 \*

processIntentional    2.750      1.102   2.496   0.0143 \*

processRhyming       -5.650      1.102  -5.129 1.54e-06 \*\*\*

---

Signif. codes:  0 ‘\*\*\*’ 0.001 ‘\*\*’ 0.01 ‘\*’ 0.05 ‘.’ 0.1 ‘ ’ 1

Residual standard error: 3.484 on 95 degrees of freedom

Multiple R-squared:  0.5679, Adjusted R-squared:  0.5497

F-statistic: 31.21 on 4 and 95 DF, p-value: < 2.2e-16

#in AgeMemory.csv

# these p-values mean that every group is significantly different from the adjective group.

# The intercept of 12.9 is the average number of words the adjective group is remembering. THe slope of -5.65 means that someone in the Rhyming group remembers on average 5.65 words less than someone in the adjective group.

# to make all comparisons between all possible pairs with Tukey, we do below.

> TukeyHSD(aov(words~process))

  Tukey multiple comparisons of means

    95% family-wise confidence level

Fit: aov(formula = words ~ process)

$process

                       diff         lwr       upr     p adj

Counting-Adjective    -6.15  -9.2134052 -3.086595 0.0000022

Imagery -Adjective     2.60  -0.4634052  5.663405 0.1354895

Intentional-Adjective  2.75  -0.3134052  5.813405 0.1000674

Rhyming -Adjective    -5.65  -8.7134052 -2.586595 0.0000150

Imagery -Counting      8.75   5.6865948 11.813405 0.0000000

Intentional-Counting   8.90   5.8365948 11.963405 0.0000000

Rhyming -Counting      0.50  -2.5634052  3.563405 0.9911101

Intentional-Imagery    0.15  -2.9134052  3.213405 0.9999212

Rhyming -Imagery      -8.25 -11.3134052 -5.186595 0.0000000

Rhyming -Intentional  -8.40 -11.4634052 -5.336595 0.0000000

> #AOV is average of variance. HSD is significant difference. Adjusted p value is knowing you are comparing lots of comparisons, not just these two.

>Better approach# when the p-value > alpha (0.05) or when the CI does contain 0, we believe that there is not a significant difference between these two groups.

> plot(TukeyHSD(aov(words~process)))

> #the lines that cross over 0 are not significantly different from eachother, while the ones that dont' touch the line ARE significantly different from eachother.

