Homework Exercises Week 09

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```r
# keep this chunk in all your RMarkdown scripts
knitr::opts_chunk$set(echo = TRUE)
knitr::opts_chunk$set(tidy.opts = list(width.cutoff = 60), tidy = TRUE)
```

```r
# List required packages
library(tidyverse)
```

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

```r
library(openxlsx)
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
```

HOMEWORK EXERCISES

Exercise 3

In this exercise, you will use the dataset "visit_and_peck_rates.xlsx" from the same study to conduct ANOVAs for both visitation and peck rates, verify assumptions, visualize your data, and interpret your results.

Part 1

Import the dataset. Create summary tables of visit and peck rates (you can create one table each or both together) with mean, median, standard error, 95% confidence interval, and sample size.

```
visit_peck <- read.xlsx("visit_and_peck_rates.xlsx")
colnames(visit_peck) <- sub(pattern = "\\.\\((.*?)\\)", replacement = "",
    colnames(visit_peck))

summary <- visit_peck %>%
    group_by(species, treatment) %>%
    summarize(mean_vr = mean(visit.rate), sd_vr = sd(visit.rate),
        median_vigilance = median(visit.rate), se_vr = sd_vr/sqrt(n()),
        CI_low_vr = mean_vr - 1.96 * se_vr, CI_high_vr = mean_vr +
            1.96 * se_vr, mean_pr = mean(peck.rate), sd_pr = sd(peck.rate),
        median_pr = median(peck.rate), se_pr = sd_pr/sqrt(n()),
        CI_low_pr = mean_pr - 1.96 * se_pr, CI_high_pr = mean_pr +
            1.96 * se_pr)
```

```
## `summarise()` has grouped output by 'species'. You can override using the
## `.groups` argument.
```

```
summary
```

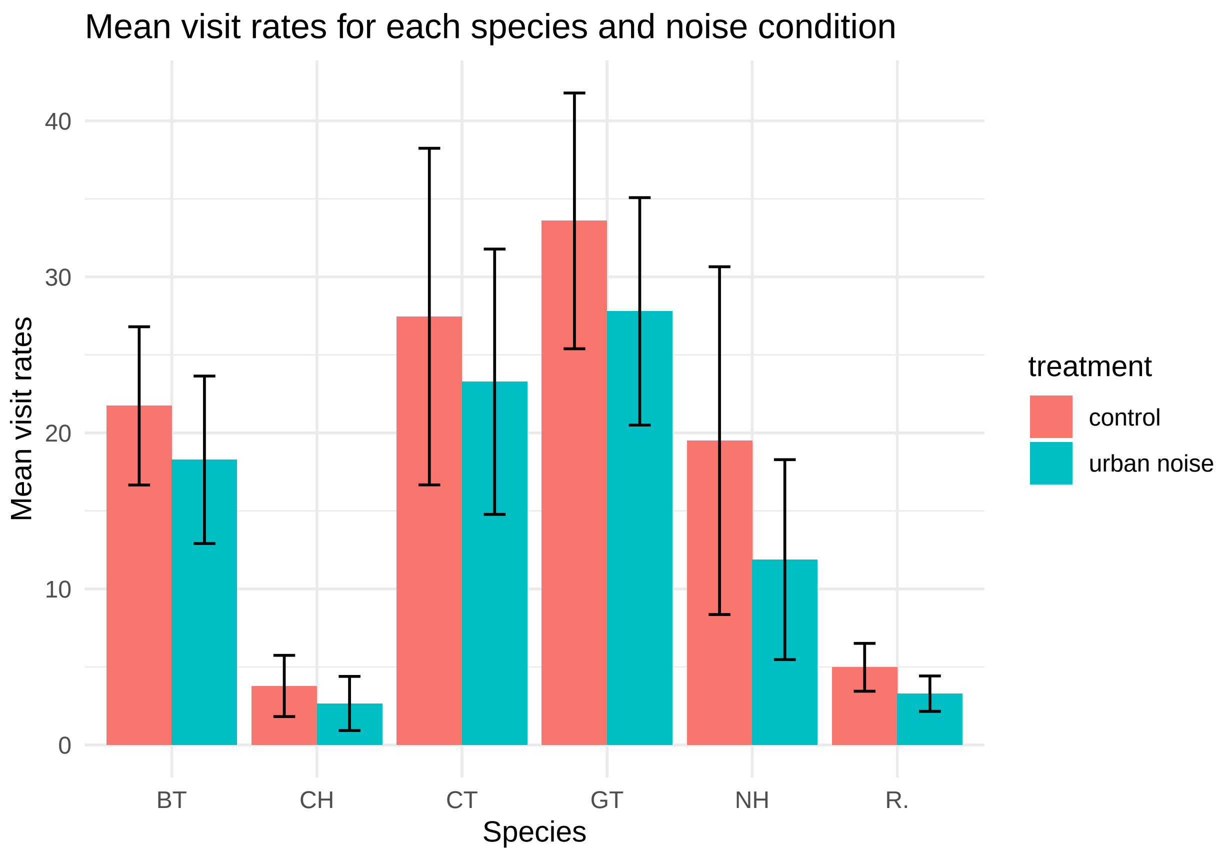
```
## # A tibble: 12 x 14
## # Groups:   species [6]
##    species treatment   mean_vr sd_vr median_vigilance se_vr CI_low_vr CI_high_vr
##    <chr>   <chr>         <dbl> <dbl>            <dbl> <dbl>     <dbl>      <dbl>
##  1 BT      control       21.7  17.2             16.1  2.59     16.7        26.8
##  2 BT      urban noise   18.3  18.2             13.4  2.74     12.9        23.6
##  3 CH      control        3.78  3.61             2.9  1.00      1.82        5.74
##  4 CH      urban noise    2.66  3.19             1.5  0.885     0.924       4.39
##  5 CT      control       27.5  31.6             18    5.50     16.7        38.2
##  6 CT      urban noise   23.3  24.9             14.8  4.34     14.8        31.8
##  7 GT      control       33.6  28.4             27.1  4.18     25.4        41.8
##  8 GT      urban noise   27.8  25.2             20.5  3.72     20.5        35.1
##  9 NH      control       19.5  21.3             10.3  5.69      8.36       30.6
## 10 NH      urban noise   11.9  12.2              6.04 3.27      5.47       18.3
## 11 R.      control        4.98  4.63             3    0.783     3.44        6.51
## 12 R.      urban noise    3.29  3.42             1.52 0.578     2.16        4.42
## # i 6 more variables: mean_pr <dbl>, sd_pr <dbl>, median_pr <dbl>, se_pr <dbl>,
## #   CI_low_pr <dbl>, CI_high_pr <dbl>
```

Part 2

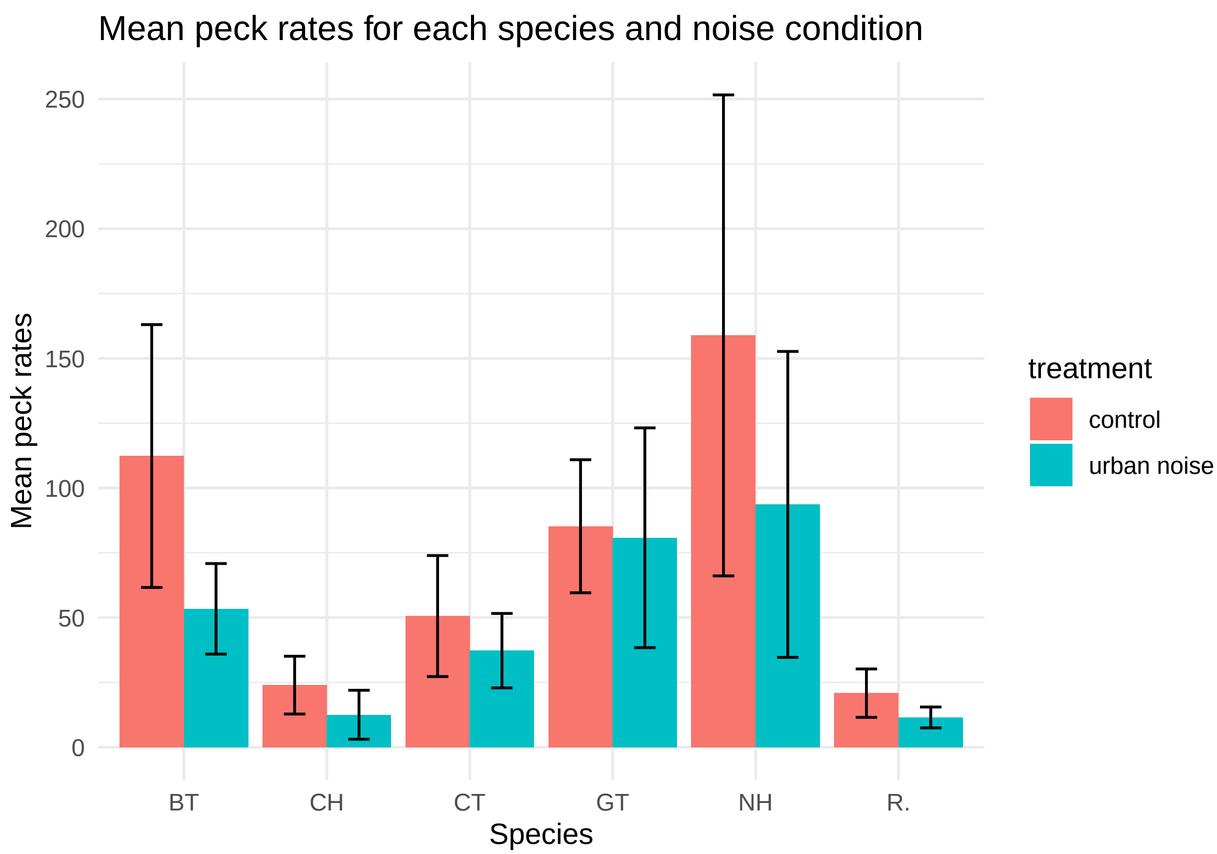
Visualize your data. For each variable, create a plot showing the mean +- 95% CI by species. Be sure to create appropriate labels, legends, and error bars.

```
summary %>%
    ggplot(aes(x = species, y = mean_vr, fill = treatment)) +
    geom_col(position = position_dodge(width = 0.9)) + geom_errorbar(aes(ymin = CI_low_vr,
    ymax = CI_high_vr), width = 0.3, color = "black", position = position_dodge(width = 0.9)) +
```

```
    labs(title = "Mean visit rates for each species and noise condition",
        x = "Species", y = "Mean visit rates") + theme_minimal()
```




```
summary %>%
    ggplot(aes(x = species, y = mean_pr, fill = treatment)) +
    geom_col(position = position_dodge(width = 0.9)) + geom_errorbar(aes(ymin = CI_low_pr,
    ymax = CI_high_pr), width = 0.3, color = "black", position = position_dodge(width = 0.9)) +
    labs(title = "Mean peck rates for each species and noise condition",
        x = "Species", y = "Mean peck rates") + theme_minimal()
```



Part 3

Conduct a two-way ANOVA for each variable to assess variation in mean visit and peck rates by species and condition. Print your summary ANOVA output. Interpret the output.

```
two_way_vr <- aov(visit.rate ~ species * treatment, data = visit_peck)
two_way_pr <- aov(peck.rate ~ species * treatment, data = visit_peck)

summary(two_way_vr)
```

```
##                    Df Sum Sq Mean Sq F value  Pr(>F)
## species             5  37591    7518  17.619 1.3e-15 ***
## treatment           1   1468    1468   3.441  0.0644 .
## species:treatment   5    321      64   0.150  0.9799
## Residuals         358 152759     427
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
```

```
## The mean visit rate is very significantly different
## across species (F5,358 = 17.6, p < 0.05), but not
## significantly different across treatment types (F1,358 =
## 3.4, p = 0.06), and not significantly different when you
## consider species and treatment types together (F5,358 =
## 0.15, p = 0.97).
```

```r
summary(two_way_pr)
```

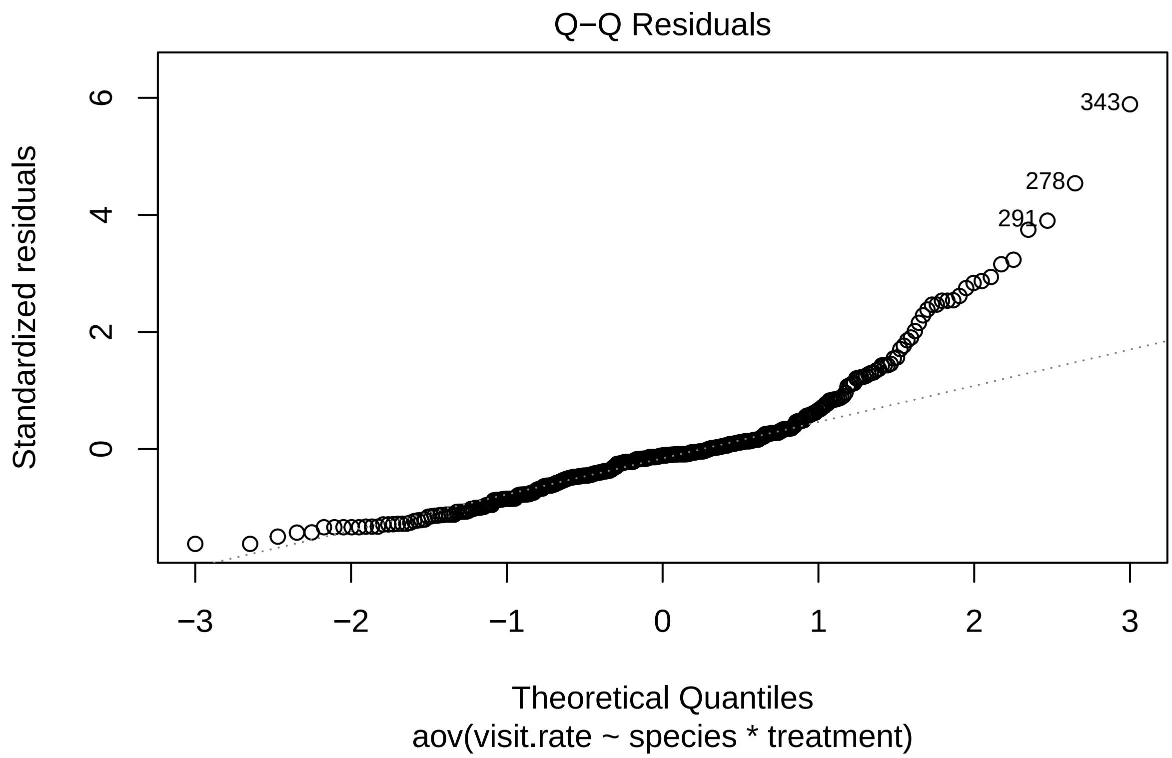
```
##                    Df  Sum Sq Mean Sq F value   Pr(>F)    
## species             5  412868   82574   8.308 1.92e-07 ***
## treatment           1   57862   57862   5.822   0.0163 *  
## species:treatment   5   54074   10815   1.088   0.3666    
## Residuals         358 3558218    9939                     
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
```

```r
## The mean peck rate is very significantly different
## across species (F5,358 = 8.3, p < 0.05) and fairly
## significantly different across treatment types(F1,358 =
## 5.8, p = 0.01), but not significant when you consider
## species and treatment types together (F5,358 = 1.1, p =
## 0.36).
```

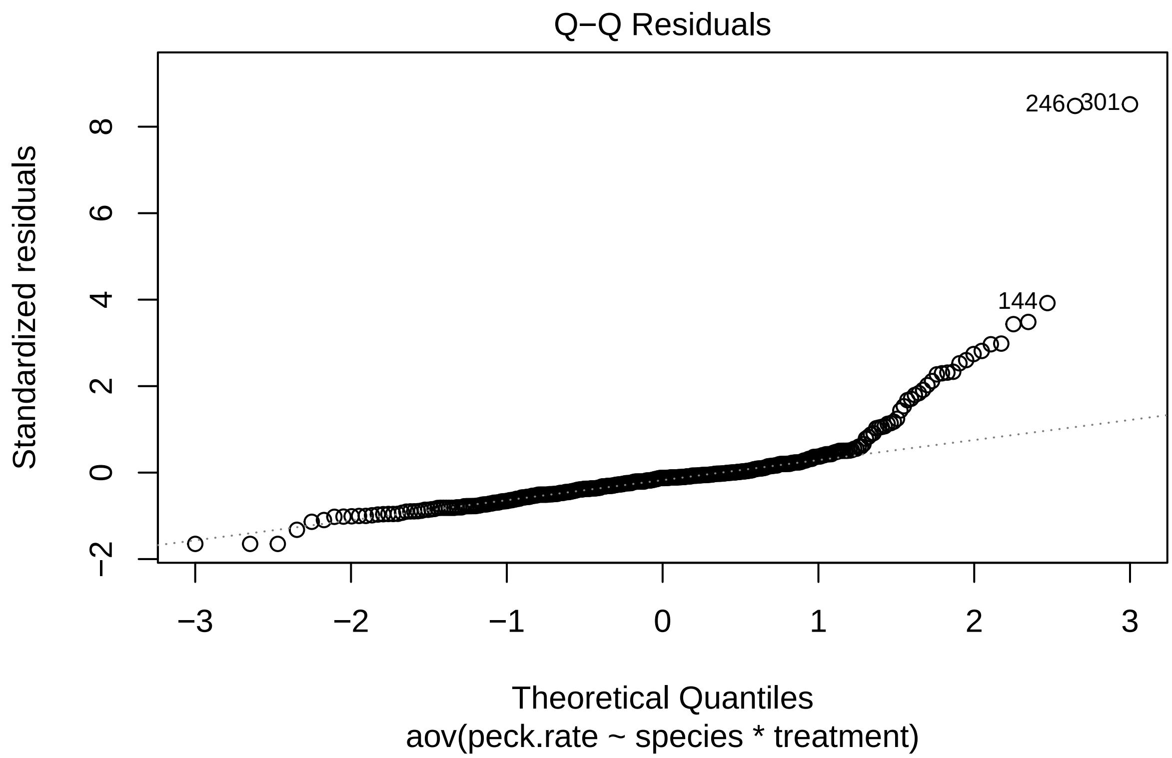
Part 4

Verify that assumptions are met for ANOVA for both variables. Use appropriate techniques to assess normal distribution and homogeneity of variances. Describe what you see.

```r
## First assumption: independent sampling of data. We can
## assume this is met.

## Second assumption: normal distribution of residuals
plot(two_way_vr, 2)
```



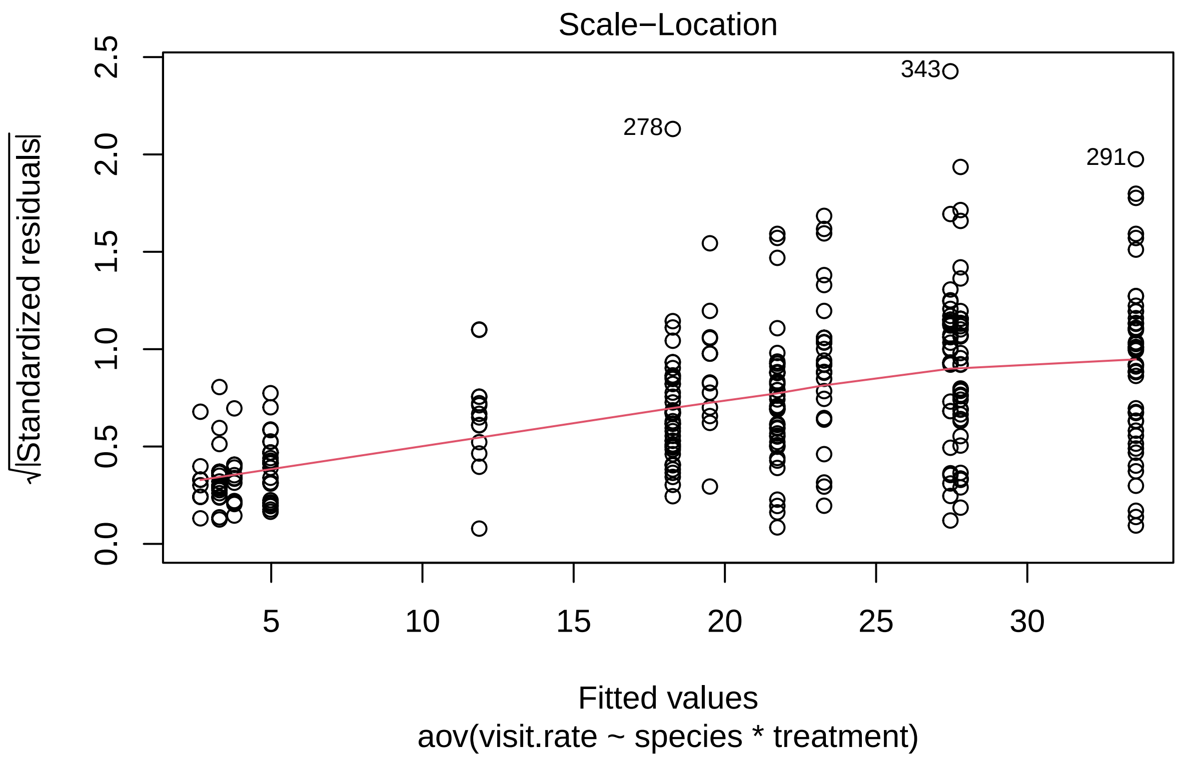

```
plot(two_way_pr, 2)
```



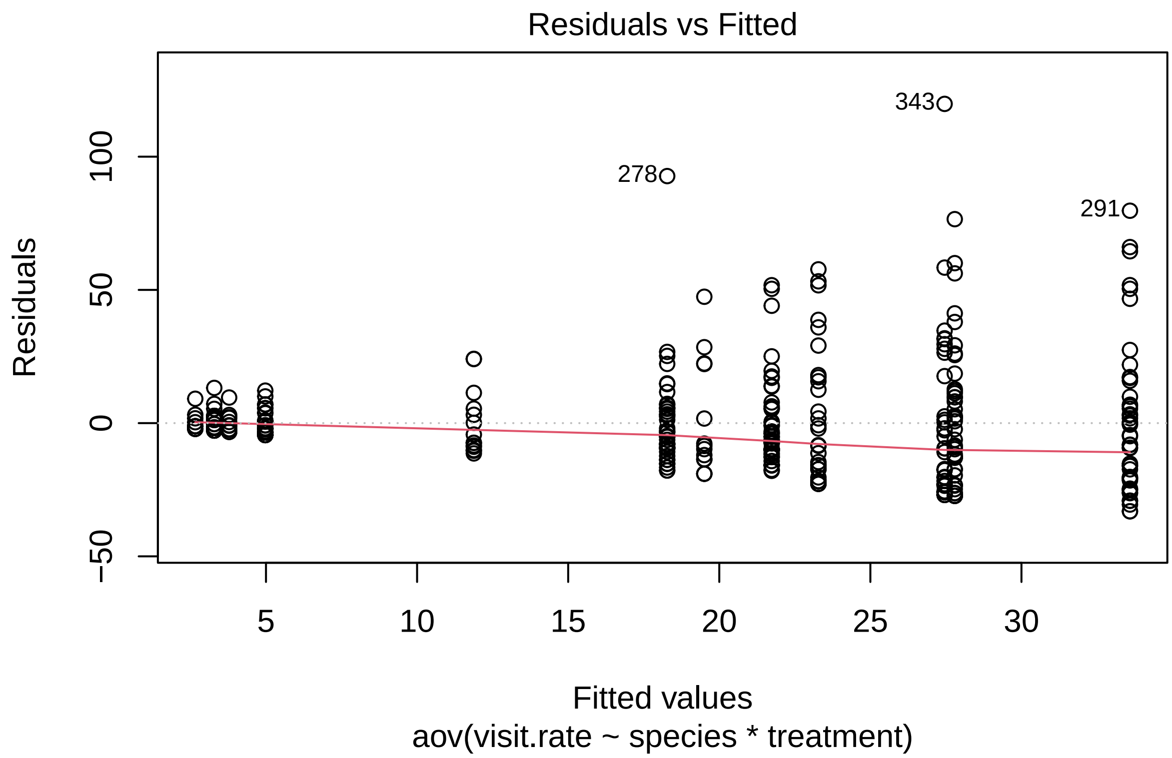

```r
## The residuals for each test are distributed roughly
## normally, except for the outliers on the far right end
## of the graphs.

## Third assumption: equal variance of residuals
leveneTest(visit.rate ~ species * treatment, data = visit_peck)
```

```
## Levene's Test for Homogeneity of Variance (center = median)
##        Df F value  Pr(>F)
## group  11  7.3201 2.6e-11 ***
##       358
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
```

```r
plot(two_way_vr, 3)
```



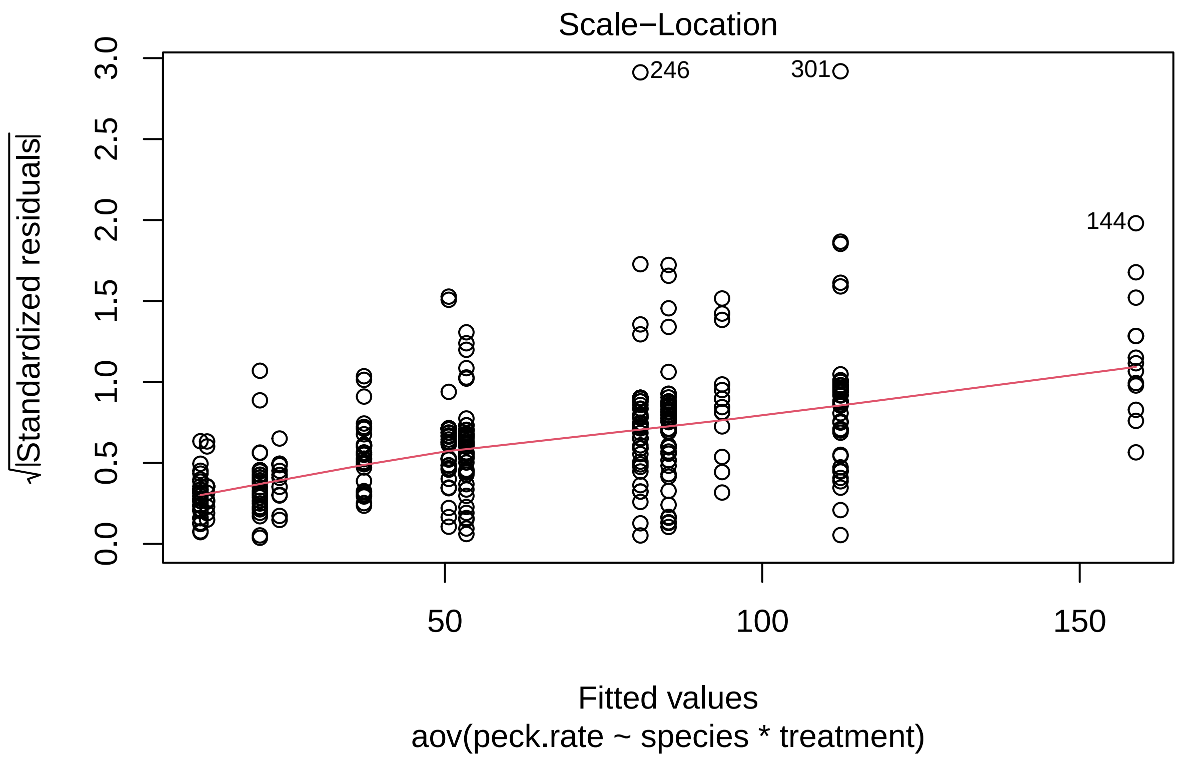

```r
plot(two_way_vr, 1)
```



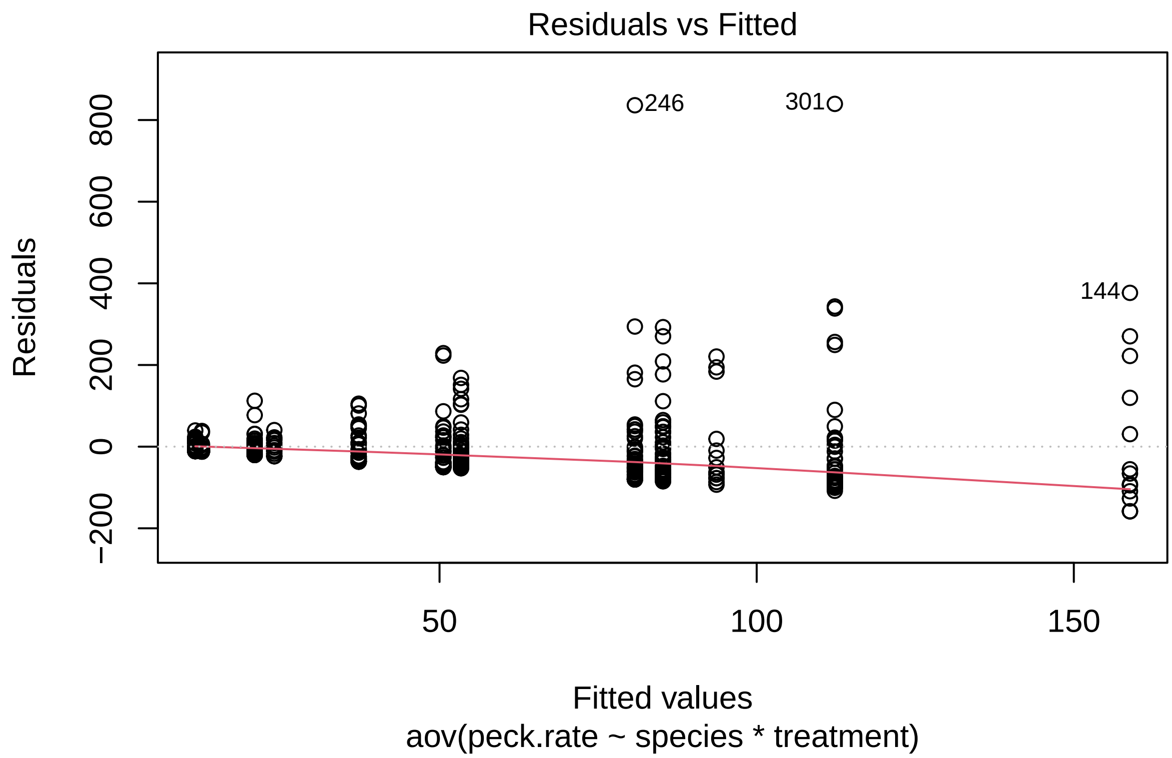

```
leveneTest(peck.rate ~ species * treatment, data = visit_peck)
```

```
## Levene's Test for Homogeneity of Variance (center = median)
##        Df F value    Pr(>F)
## group  11   3.751 4.293e-05 ***
##       358
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
```

```
plot(two_way_pr, 3)
```




```
plot(two_way_pr, 1)
```




```
## The third assumption is not met for both tests. The
## graphs and results from Levene's test demonstrate that
## there is a significant difference in the variances.
```

Part 5

Conduct post-hoc analyses if needed to identify the location of any significant differences. Summarize the result of your post-hoc analyses.

```
TukeyHSD(two_way_vr)
```

```
##   Tukey multiple comparisons of means
##     95% family-wise confidence level
##
## Fit: aov(formula = visit.rate ~ species * treatment, data = visit_peck)
##
## $species
##              diff        lwr        upr     p adj
## CH-BT -16.7852273 -29.996513  -3.573941 0.0041990
## CT-BT   5.3638636  -4.273711  15.001438 0.6026276
## GT-BT  10.6865119   1.861370  19.511653 0.0076559
## NH-BT  -4.3141558 -17.156057   8.527745 0.9293845
## R.-BT -15.8723701 -25.351290  -6.393450 0.0000346
## CT-CH  22.1490909   8.444819  35.853362 0.0000745
```

```
## GT-CH  27.4717391  14.326118  40.617360 0.0000001
## NH-CH  12.4710714  -3.648440  28.590583 0.2325923
## R.-CH   0.9128571 -12.680308  14.506023 0.9999634
## GT-CT   5.3226482  -4.224713  14.870009 0.6008412
## NH-CT  -9.6780195 -23.026555   3.670516 0.3015279
## R.-CT -21.2362338 -31.390982 -11.081486 0.0000001
## NH-GT -15.0006677 -27.775005  -2.226331 0.0109111
## R.-GT -26.5588820 -35.946064 -17.171700 0.0000000
## R.-NH -11.5582143 -24.792658   1.676229 0.1261201
##
## $treatment
##                          diff       lwr       upr     p adj
## urban noise-control -3.98427 -8.208136 0.2395951 0.0644098
##
## $`species:treatment`
##                                      diff        lwr         upr     p adj
## CH:control-BT:control         -17.9533217 -39.406010   3.4993669 0.2051397
## CT:control-BT:control           5.7228788  -9.926762  21.3725194 0.9885062
## GT:control-BT:control          11.8567787  -2.473621  26.1871787 0.2198055
## NH:control-BT:control          -2.2298052 -23.082681  18.6230705 0.9999999
## R.:control-BT:control         -16.7572338 -32.149250  -1.3652180 0.0197147
## BT:urban noise-BT:control      -3.4577273 -17.946479  11.0310246 0.9997541
## CH:urban noise-BT:control     -19.0748601 -40.527549   2.3778284 0.1365393
## CT:urban noise-BT:control       1.5471212 -14.102519  17.1967618 1.0000000
## GT:urban noise-BT:control       6.0585178  -8.271882  20.3889178 0.9647418
## NH:urban noise-BT:control      -9.8562338 -30.709109  10.9966419 0.9236737
## R.:urban noise-BT:control     -18.4452338 -33.837250  -3.0532180 0.0054222
## CT:control-CH:control          23.6762005   1.422995  45.9294062 0.0258348
## GT:control-CH:control          29.8101003   8.464040  51.1561604 0.0003713
## NH:control-CH:control          15.7235165 -10.451593  41.8986257 0.7092915
## R.:control-CH:control           1.1960879 -20.876702  23.2688781 1.0000000
## BT:urban noise-CH:control      14.4955944  -6.957094  35.9482829 0.5340491
## CH:urban noise-CH:control      -1.1215385 -27.776965  25.5338880 1.0000000
## CT:urban noise-CH:control      19.5004429  -2.752763  41.7536487 0.1515474
## GT:urban noise-CH:control      24.0118395   2.665779  45.3578996 0.0130901
## NH:urban noise-CH:control       8.0970879 -18.078021  34.2721971 0.9972384
## R.:urban noise-CH:control      -0.4919121 -22.564702  21.5808781 1.0000000
## GT:control-CT:control           6.1338999  -9.369251  21.6370508 0.9785564
## NH:control-CT:control          -7.9526840 -29.628240  13.7228725 0.9881940
## R.:control-CT:control         -22.4801126 -38.969548  -5.9906774 0.0005991
## BT:urban noise-CT:control      -9.1806061 -24.830247   6.4690345 0.7396816
## CH:urban noise-CT:control     -24.7977389 -47.050945  -2.5445332 0.0147735
## CT:urban noise-CT:control      -4.1757576 -20.905927  12.5544120 0.9996211
## GT:urban noise-CT:control       0.3356390 -15.167512  15.8387899 1.0000000
## NH:urban noise-CT:control     -15.5791126 -37.254669   6.0964439 0.4330718
## R.:urban noise-CT:control     -24.1681126 -40.657548  -7.6786774 0.0001324
## NH:control-GT:control         -14.0865839 -34.829748   6.6565804 0.5259468
## R.:control-GT:control         -28.6140124 -43.857063 -13.3709620 0.0000001
## BT:urban noise-GT:control     -15.3145059 -29.644906  -0.9841059 0.0245500
## CH:urban noise-GT:control     -30.9316388 -52.277699  -9.5855787 0.0001703
## CT:urban noise-GT:control     -10.3096574 -25.812808   5.1934934 0.5596252
## GT:urban noise-GT:control      -5.7982609 -19.968540   8.3720180 0.9723129
## NH:urban noise-GT:control     -21.7130124 -42.456177  -0.9698482 0.0310227
## R.:urban noise-GT:control     -30.3020124 -45.545063 -15.0589620 0.0000000
```

```
## R.:control-NH:control         -14.5274286 -36.017720   6.9628633 0.5333350
## BT:urban noise-NH:control      -1.2279221 -22.080798  19.6249536 1.0000000
## CH:urban noise-NH:control     -16.8450549 -43.020164   9.3300543 0.6107706
## CT:urban noise-NH:control       3.7769264 -17.898630  25.4524828 0.9999895
## GT:urban noise-NH:control       8.2883230 -12.454841  29.0314872 0.9768747
## NH:urban noise-NH:control      -7.6264286 -33.312240  18.0593831 0.9980877
## R.:urban noise-NH:control     -16.2154286 -37.705720   5.2748633 0.3544855
## BT:urban noise-R.:control      13.2995065  -2.092509  28.6915222 0.1669520
## CH:urban noise-R.:control      -2.3176264 -24.390417  19.7551638 0.9999999
## CT:urban noise-R.:control      18.3043550   1.814920  34.7937901 0.0155111
## GT:urban noise-R.:control      22.8157516   7.572701  38.0588019 0.0000820
## NH:urban noise-R.:control       6.9010000 -14.589292  28.3912919 0.9961620
## R.:urban noise-R.:control      -1.6880000 -17.933134  14.5571337 1.0000000
## CH:urban noise-BT:urban noise -15.6171329 -37.069821   5.8355557 0.4121844
## CT:urban noise-BT:urban noise   5.0048485 -10.644792  20.6544891 0.9962973
## GT:urban noise-BT:urban noise   9.5162451  -4.814155  23.8466451 0.5618834
## NH:urban noise-BT:urban noise  -6.3985065 -27.251382  14.4543692 0.9974309
## R.:urban noise-BT:urban noise -14.9875065 -30.379522   0.4045093 0.0645074
## CT:urban noise-CH:urban noise  20.6219814  -1.631224  42.8751871 0.0992116
## GT:urban noise-CH:urban noise  25.1333779   3.787318  46.4794380 0.0070165
## NH:urban noise-CH:urban noise   9.2186264 -16.956483  35.3937356 0.9915635
## R.:urban noise-CH:urban noise   0.6296264 -21.443164  22.7024165 1.0000000
## GT:urban noise-CT:urban noise   4.5113966 -10.991754  20.0145475 0.9984068
## NH:urban noise-CT:urban noise -11.4033550 -33.078911  10.2722015 0.8528913
## R.:urban noise-CT:urban noise -19.9923550 -36.481790  -3.5029199 0.0045467
## NH:urban noise-GT:urban noise -15.9147516 -36.657916   4.8284127 0.3283846
## R.:urban noise-GT:urban noise -24.5037516 -39.746802  -9.2607012 0.0000139
## R.:urban noise-NH:urban noise  -8.5890000 -30.079292  12.9012919 0.9768304
```

```
## The species with the largest significant differences in
## visit rate are: CT-CH GT-CH R.-CT R.-GT There isn't a
## high significant difference between treatment types.
## Comparing visit rate by species and treatment types, the
## most significant differences lie in:
## R.:control-GT:control R.:urban noise-GT:control R.:urban
## noise-GT:urban noise

TukeyHSD(two_way_pr)
```

```
##   Tukey multiple comparisons of means
##     95% family-wise confidence level
##
## Fit: aov(formula = peck.rate ~ species * treatment, data = visit_peck)
##
## $species
##               diff         lwr        upr     p adj
## CH-BT  -64.6107867 -128.372165  -0.849408 0.0449506
## CT-BT  -38.9253788  -85.439020   7.588263 0.1597316
## GT-BT    0.1624407  -42.430172  42.755054 1.0000000
## NH-BT   43.4050649  -18.573559 105.383688 0.3405643
## R.-BT  -66.6814351 -112.429367 -20.933503 0.0005297
## CT-CH   25.6854079  -40.455257  91.826073 0.8759916
## GT-CH   64.7732274    1.328768 128.217687 0.0422622
## NH-CH  108.0158516   30.218561 185.813142 0.0011755
```

```
## R.-CH   -2.0706484  -67.675084  63.533788 0.9999991
## GT-CT   39.0878195   -6.990427  85.166066 0.1485555
## NH-CT   82.3304437   17.906660 146.754227 0.0038881
## R.-CT  -27.7560563  -76.765723  21.253611 0.5840457
## NH-GT   43.2426242  -18.409916 104.895165 0.3388225
## R.-GT  -66.8438758 -112.149055 -21.538696 0.0004288
## R.-NH -110.0865000 -173.959643 -46.213357 0.0000179
##
## $treatment
##                          diff       lwr       upr     p adj
## urban noise-control -25.0107 -45.39626 -4.625142 0.0163322
##
## $`species:treatment`
##                                    diff         lwr         upr     p adj
## CH:control-BT:control         -88.370140 -191.906843  15.1665628 0.1810982
## CT:control-BT:control         -61.720000 -137.249563  13.8095628 0.2363679
## GT:control-BT:control         -27.083735  -96.246272  42.0788021 0.9801992
## NH:control-BT:control          46.532662  -54.109175 147.1744998 0.9340215
## R.:control-BT:control         -91.460909 -165.747102 -17.1747162 0.0035824
## BT:urban noise-BT:control     -58.934091 -128.860878  10.9926965 0.1963467
## CH:urban noise-BT:control     -99.785524 -203.322227   3.7511782 0.0708537
## CT:urban noise-BT:control     -75.064848 -150.594411   0.4647143 0.0531201
## GT:urban noise-BT:control     -31.525474 -100.688012  37.6370629 0.9400671
## NH:urban noise-BT:control     -18.656623 -119.298461  81.9852140 0.9999802
## R.:urban noise-BT:control    -100.836052 -175.122245 -26.5498591 0.0006516
## CT:control-CH:control          26.650140  -80.750084 134.0503636 0.9996418
## GT:control-CH:control          61.286405  -41.735679 164.3084885 0.7220084
## NH:control-CH:control         134.902802    8.574371 261.2312339 0.0247631
## R.:control-CH:control          -3.090769 -109.620257 103.4387180 1.0000000
## BT:urban noise-CH:control      29.436049  -74.100654 132.9727516 0.9987123
## CH:urban noise-CH:control     -11.415385 -140.061963 117.2311933 1.0000000
## CT:urban noise-CH:control      13.305291  -94.094932 120.7055151 0.9999997
## GT:urban noise-CH:control      56.844666  -46.177418 159.8667494 0.8087802
## NH:urban noise-CH:control      69.713516  -56.614915 196.0419481 0.8086483
## R.:urban noise-CH:control     -12.465912 -118.995399  94.0635752 0.9999998
## GT:control-CT:control          34.636265  -40.186297 109.4588271 0.9334918
## NH:control-CT:control         108.252662    3.640337 212.8649881 0.0351510
## R.:control-CT:control         -29.740909 -109.323556  49.8417380 0.9863055
## BT:urban noise-CT:control       2.785909  -72.743654  78.3154719 1.0000000
## CH:urban noise-CT:control     -38.065524 -145.465748  69.3346993 0.9911084
## CT:urban noise-CT:control     -13.344848  -94.089348  67.3996505 0.9999939
## GT:urban noise-CT:control      30.194526  -44.628037 105.0170879 0.9750626
## NH:urban noise-CT:control      43.063377  -61.548949 147.6757024 0.9710417
## R.:urban noise-CT:control     -39.116052 -118.698699  40.4665951 0.9019982
## NH:control-GT:control          73.616398  -26.495941 173.7287364 0.3958316
## R.:control-GT:control         -64.377174 -137.944418   9.1900703 0.1530314
## BT:urban noise-GT:control     -31.850356 -101.012893  37.3121815 0.9357671
## CH:urban noise-GT:control     -72.701789 -175.723873  30.3202946 0.4631525
## CT:urban noise-GT:control     -47.981113 -122.803676  26.8414489 0.6161845
## GT:urban noise-GT:control      -4.441739  -72.831486  63.9480081 1.0000000
## NH:urban noise-GT:control       8.427112  -91.685227 108.5394507 1.0000000
## R.:urban noise-GT:control     -73.752317 -147.319561  -0.1850726 0.0487701
## R.:control-NH:control        -137.993571 -241.711758 -34.2753845 0.0009509
## BT:urban noise-NH:control    -105.466753 -206.108591  -4.8249158 0.0306373
```

```
## CH:urban noise-NH:control     -146.318187 -272.646618 -19.9897552 0.0088454
## CT:urban noise-NH:control     -121.597511 -226.209837 -16.9851850 0.0084187
## GT:urban noise-NH:control      -78.058137 -178.170476  22.0542023 0.3037301
## NH:urban noise-NH:control      -65.189286 -189.156230  58.7776586 0.8532619
## R.:urban noise-NH:control     -147.368714 -251.086901 -43.6505273 0.0002597
## BT:urban noise-R.:control       32.526818  -41.759375 106.8130111 0.9546439
## CH:urban noise-R.:control       -8.324615 -114.854103  98.2048719 1.0000000
## CT:urban noise-R.:control       16.396061  -63.186586  95.9787077 0.9999423
## GT:urban noise-R.:control       59.935435  -13.631809 133.5026790 0.2404734
## NH:urban noise-R.:control       72.804286  -30.913901 176.5224727 0.4718986
## R.:urban noise-R.:control       -9.375143  -87.778723  69.0284369 0.9999998
## CH:urban noise-BT:urban noise  -40.851434 -144.388136  62.6852691 0.9790096
## CT:urban noise-BT:urban noise  -16.130758  -91.660320  59.3988052 0.9999174
## GT:urban noise-BT:urban noise   27.408617  -41.753921  96.5711538 0.9782890
## NH:urban noise-BT:urban noise   40.277468  -60.364370 140.9193050 0.9765916
## R.:urban noise-BT:urban noise  -41.901961 -116.188154  32.3842318 0.7855409
## CT:urban noise-CH:urban noise   24.720676  -82.679548 132.1208997 0.9998271
## GT:urban noise-CH:urban noise   68.260050  -34.762034 171.2821340 0.5654307
## NH:urban noise-CH:urban noise   81.128901  -45.199531 207.4573328 0.6139586
## R.:urban noise-CH:urban noise   -1.050527 -107.580015 105.4789598 1.0000000
## GT:urban noise-CT:urban noise   43.539374  -31.283188 118.3619364 0.7496093
## NH:urban noise-CT:urban noise   56.408225  -48.204101 161.0205509 0.8311356
## R.:urban noise-CT:urban noise  -25.771203 -105.353851  53.8114436 0.9958707
## NH:urban noise-GT:urban noise   12.868851  -87.243488 112.9811899 0.9999996
## R.:urban noise-GT:urban noise  -69.310578 -142.877822   4.2566666 0.0864486
## R.:urban noise-NH:urban noise  -82.179429 -185.897616  21.5387584 0.2798742
```

```
## The species with the largest significant differences in
## visit rate are: R.-BT R.-GT R.-NH There is a higher
## significant difference between treatment types for peck
## rate than visit rate.  Comparing visit rate by species
## and treatment types, the most significant differences
## lie in: R.:urban noise-NH:control R.:urban
## noise-BT:control R.:urban noise-NH:control

## These results suggest that treatment type has a higher
## significance for peck rate than visit rate, while
## species is the main influencing factor on visit rate.
```