

Kneitel_2010_algae_Dunnett2.R

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```
# Kneitel_2010_algae_Dunnett2.sas
# One-way ANOVA and Tukey method

# Load necessary libraries
library(ggplot2)
library(multcomp)

## Warning: package 'multcomp' was built under R version 4.0.4
## Loading required package: mvtnorm
## Loading required package: survival
## Loading required package: TH.data
## Warning: package 'TH.data' was built under R version 4.0.4
## Loading required package: MASS
##
## Attaching package: 'TH.data'
## The following object is masked from 'package:MASS':
##
##      geyser

# Read in data set
kndata <- read.table(header=T,colClasses=c("factor","numeric","numeric","numeric"),
text="
treat richness total algae
Control 8 78 1
Control 5 84 7
Control 10 115 45
Control 7 200 100
Control 6 72 20
Low 8 73 15
Low 7 124 70
Low 8 116 50
Low 8 92 5
Low 7 138 60
Medium 7 124 85
Medium 8 116 80
Medium 8 145 60
Medium 6 154 100
Medium 7 129 90
High 6 134 95
High 7 138 95
```

```

High      8 103 70
High      8 119 75
High      6 132 80
VeryHigh  6 148 95
VeryHigh  5 134 95
VeryHigh  5 119 100
VeryHigh  5 117 90
VeryHigh  5 129 80
")

```

```

# Apply transformations here
kndata <- transform(kndata,y=asin(sqrt(algae/100)))

```

```

# Print data
kndata

```

```

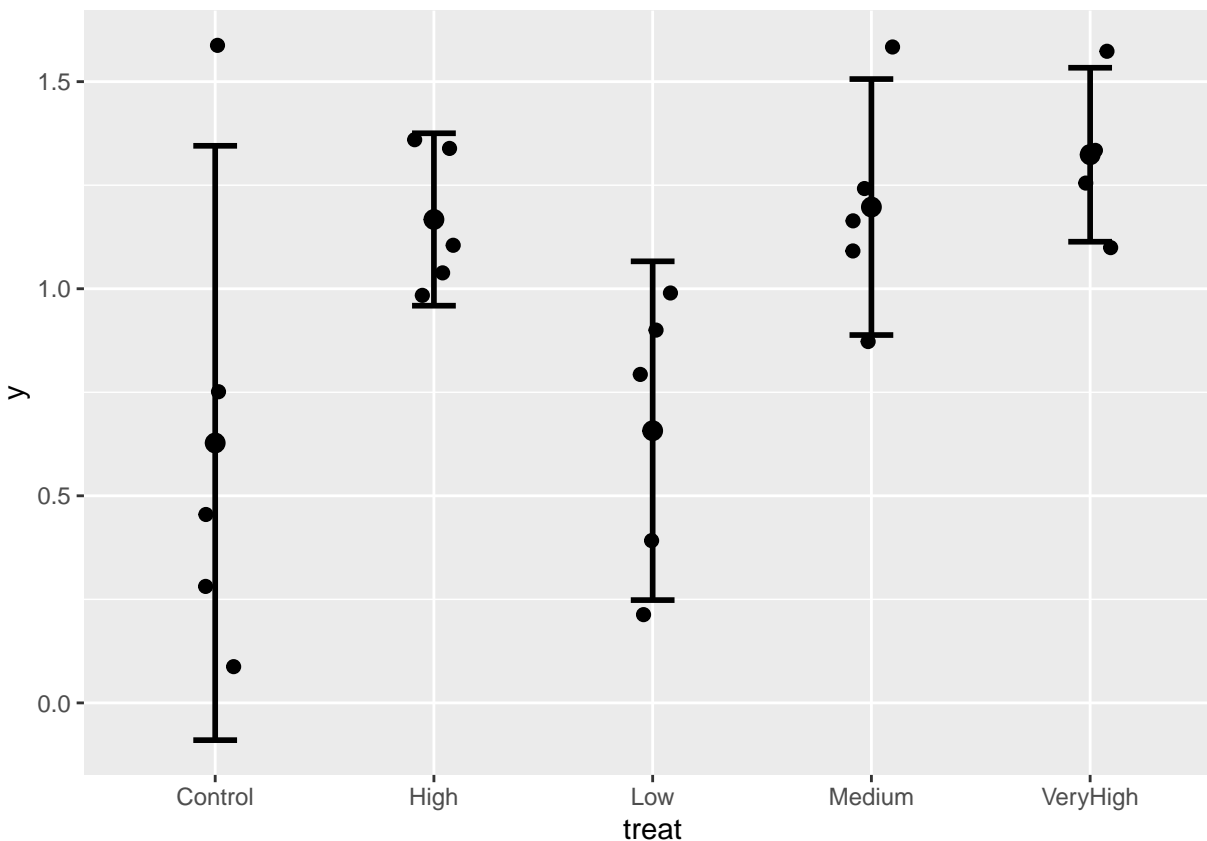
##      treat richness total algae      y
## 1 Control        8    78     1 0.1001674
## 2 Control        5    84     7 0.2677633
## 3 Control       10   115    45 0.7353145
## 4 Control        7   200   100 1.5707963
## 5 Control        6    72    20 0.4636476
## 6      Low        8    73    15 0.3976994
## 7      Low        7   124    70 0.9911566
## 8      Low        8   116    50 0.7853982
## 9      Low        8    92     5 0.2255134
## 10     Low        7   138    60 0.8860771
## 11   Medium        7   124    85 1.1730969
## 12   Medium        8   116    80 1.1071487
## 13   Medium        8   145    60 0.8860771
## 14   Medium        6   154   100 1.5707963
## 15   Medium        7   129    90 1.2490458
## 16     High        6   134    95 1.3452829
## 17     High        7   138    95 1.3452829
## 18     High        8   103    70 0.9911566
## 19     High        8   119    75 1.0471976
## 20     High        6   132    80 1.1071487
## 21 VeryHigh        6   148    95 1.3452829
## 22 VeryHigh        5   134    95 1.3452829
## 23 VeryHigh        5   119   100 1.5707963
## 24 VeryHigh        5   117    90 1.2490458
## 25 VeryHigh        5   129    80 1.1071487

```

```

# Graphics using ggplot2
ggplot(kndata,aes(treat,y))+
geom_jitter(size=2,position=position_jitter(width=0.1))+
stat_summary(fun="mean",geom="point",size=3)+
stat_summary(fun.data="mean_cl_normal",geom="errorbar",width=0.2,linewidth=1)

```



```
# One-way ANOVA
aovout <- aov(y~treat,data=kndata)
anova(aovout)

## Analysis of Variance Table
##
## Response: y
##          Df Sum Sq Mean Sq F value    Pr(>F)
## treat      4  2.1382   0.53454    4.7632 0.007295 **
## Residuals 20  2.2444   0.11222
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

# Obtain multiple comparison object
compout <- glht(aovout,linfct=mcp(treat="Dunnett"))

# Dunnett's method - controls the EER for comparisons with a control
dunnout <- summary(compout)
dunnout

##
##   Simultaneous Tests for General Linear Hypotheses
##
## Multiple Comparisons of Means: Dunnett Contrasts
##
##
## Fit: aov(formula = y ~ treat, data = kndata)
##
```

```
## Linear Hypotheses:
##               Estimate Std. Error t value Pr(>|t|)
## High - Control == 0    0.53968    0.21187   2.547   0.0618 .
## Low - Control == 0     0.02963    0.21187   0.140   0.9997
## Medium - Control == 0   0.56970    0.21187   2.689   0.0464 *
## VeryHigh - Control == 0 0.69597    0.21187   3.285   0.0129 *
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
## (Adjusted p values reported -- single-step method)
```

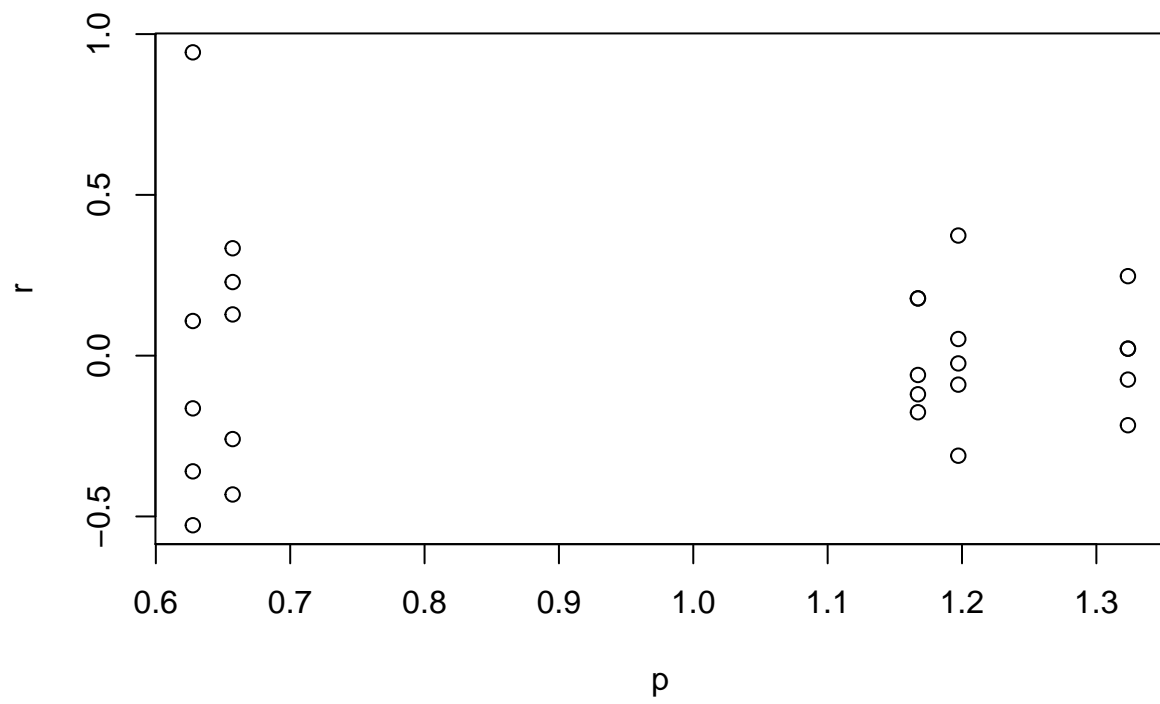
```
confint(dunnout)
```

```
##
##   Simultaneous Confidence Intervals
##
## Multiple Comparisons of Means: Dunnett Contrasts
##
##
## Fit: aov(formula = y ~ treat, data = kndata)
##
## Quantile = 2.6515
## 95% family-wise confidence level
##
##
```

```
## Linear Hypotheses:
##               Estimate   lwr      upr
## High - Control == 0    0.539676 -0.022103  1.101455
## Low - Control == 0     0.029631 -0.532148  0.591410
## Medium - Control == 0   0.569695  0.007916  1.131474
## VeryHigh - Control == 0 0.695974  0.134194  1.257753
```

```
# Diagnostic plots to check ANOVA assumptions
```

```
p <- predict(aovout)
r <- resid(aovout)
plot(p,r)
```



`qqnorm(r)`

