Tooth Growth Analysis: Correlation with diet and Vitamin C

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Get the data and take a quick look at it

```
data(ToothGrowth)
```

```
## 'data.frame':    60 obs. of  3 variables:
##  $ len : num  4.2 11.5 7.3 5.8 6.4 10 11.2 11.2 5.2 7 ...
##  $ supp: Factor w/ 2 levels "OJ","VC": 2 2 2 2 2 2 2 2 2 2 ...
##  $ dose: num  0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 ...
```

Exploratory Analysis

Here is a plot of the data showing behavior trends in tooth growth factored by supplement.

```
require(ggplot2)
```

```
## Loading required package: ggplot2
```

```
ggplot(ToothGrowth, aes(x=dose, y = len))+geom_point(size = 2)+facet_grid(. ~ supp)+geom_smooth()
```

```
## geom_smooth: method="auto" and size of largest group is <1000, so using loess. Use 'method = x' to cl
```

```
## Warning: pseudoinverse used at 0.4925
## Warning: neighborhood radius 1.5075
## Warning: reciprocal condition number  1.5661e-16
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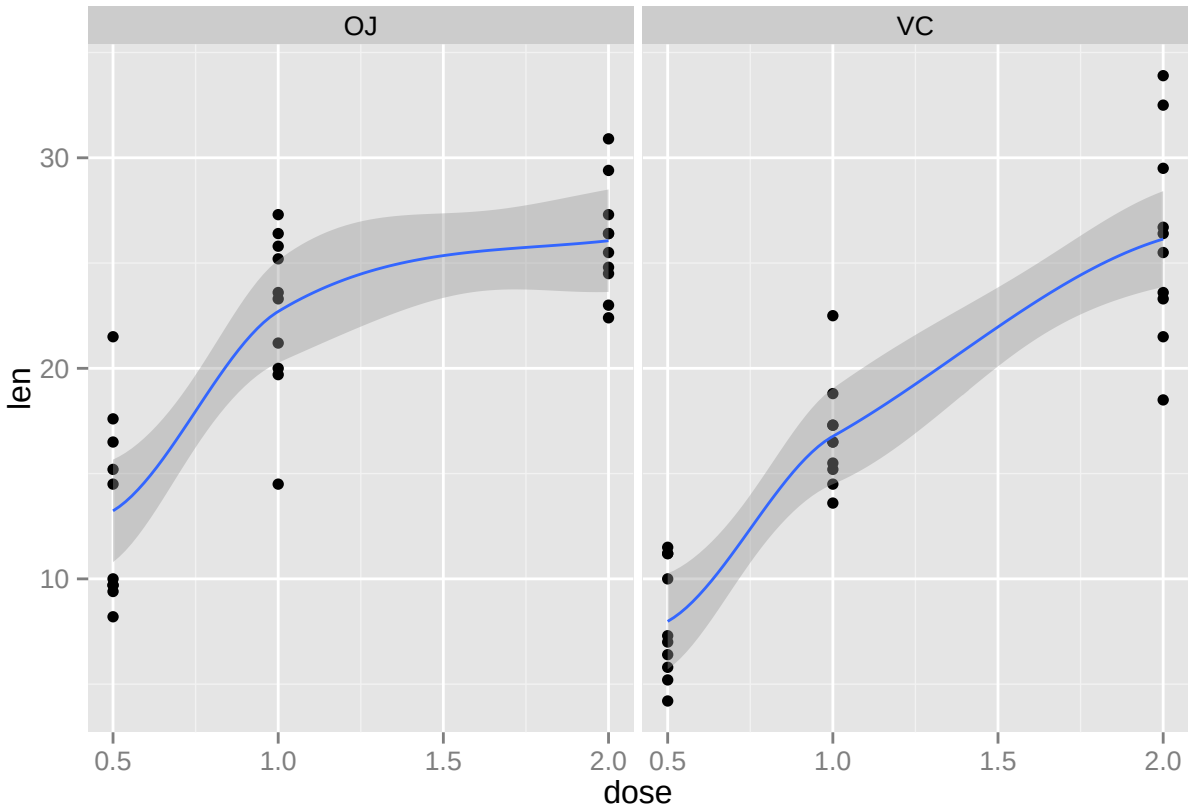

A summary of the data:
Min. : 4.2 , 1st Qu.:13.1 , Median :19.2 , Mean :18.8 , 3rd Qu.:25.3 , Max. :33.9 , OJ:30 , VC:30 , NA, NA, NA, NA, Min. :0.50 , 1st Qu.:0.50 , Median :1.00 , Mean :1.17 , 3rd Qu.:2.00 , Max. :2.00
shows the data appear to be well behaved (10 unpaired observations at each condition) and do not require cleaning for this anlaysis.

‘r head(ToothGrowth)

Confidence Intervals

The first step is to look at the statistical significance of the shift in the data. There are six pair-wise comparisons that make sense, three for each supplement.

To keep the analysis part clean, first split up the data by Supplement and Dose

```
##Group the data into individual sets with somewhat descriptive names (Supplement and Dose)
        ##Vitamin C set
        VC05<-ToothGrowth[1:10,]
        VC10<-ToothGrowth[11:20,]
        VC20<-ToothGrowth[21:30,]
        ##Ornage Juice Set
        OJ05<-ToothGrowth[31:40,]
        OJ10<-ToothGrowth[41:50,]
        OJ20<-ToothGrowth[51:60,]
```

Vitamin C

```
a<- t.test(VC10$len, VC05$len, paried=FALSE)
lcb<-a$conf.int[1]
ucb<-a$conf.int[2]
```

Dose0.5 to Dose1.0 The confidence interval differents between tooth length at these doses is 6.3143 to 11.2657 which does not contain 0.

```
a<- t.test(VC20$len, VC10$len, paried=FALSE)
lcb<-a$conf.int[1]
ucb<-a$conf.int[2]
```

Dose1.0 to Dose2.0 The confidence interval differents between tooth length at these doses is 5.6857 to 13.0543 which does not contain 0.

```
a<- t.test(VC20$len, VC05$len, paried=FALSE)
lcb<-a$conf.int[1]
ucb<-a$conf.int[2]
```

Dose0.5 to Dose2.0 The confidence interval differents between tooth length at these doses is 14.4185 to 21.9015 which does not contain 0.

Orange Juice

```
a<- t.test(OJ10$len, OJ05$len, paried=FALSE)
lcb<-a$conf.int[1]
ucb<-a$conf.int[2]
```

Dose0.5 to Dose1.0 The confidence interval differents between tooth length at these doses is 5.5244 to 13.4156 which does not contain 0.

```
a<- t.test(OJ20$len, OJ10$len, paried=FALSE)
lcb<-a$conf.int[1]
ucb<-a$conf.int[2]
```

Dose1.0 to Dose2.0 The confidence interval differents between tooth length at these doses is 0.1886 to 6.5314 which does not contain 0.

```
a<- t.test(OJ20$len, OJ05$len, paried=FALSE)
lcb<-a$conf.int[1]
ucb<-a$conf.int[2]
```

Dose0.5 to Dose2.0 The confidence interval differents between tooth length at these doses is 9.3248 to 16.3352 which does not contain 0.