

# Statistical Inference Course Project - Part 2

*Michael Atkins*

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## OVERVIEW

This paper provides results of basic inferential data analysis exercise utilizing the ToothGrowth data from R. I seek to describe the differences in tooth growth length by two factors, “OJ” and “VC.”

## ANALYSIS

```
require(ggplot2) ## require ggplot2 package
```

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

```
TG <- ToothGrowth ## load ToothGrowth data to TG variable
```

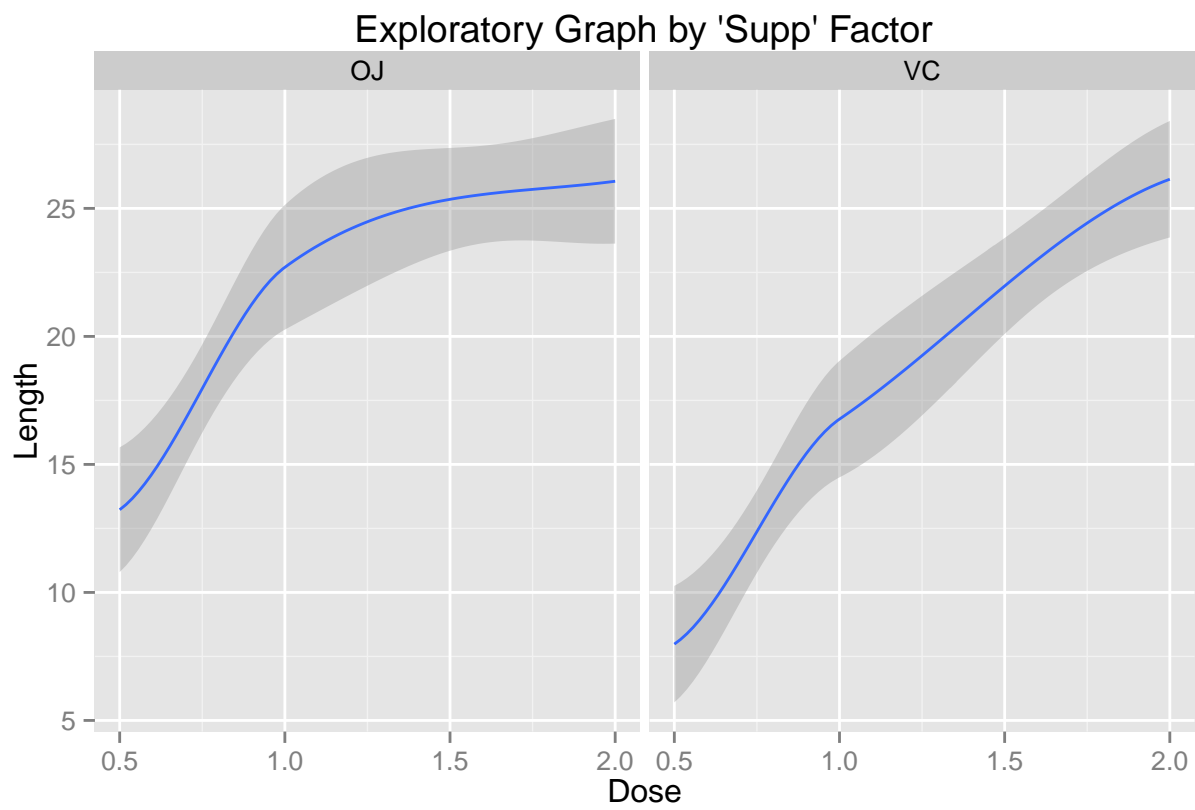
```
str(TG) ## explore structure of data
```

```
## '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 ...
```

```
head(TG) ## explore the struture of the data
```

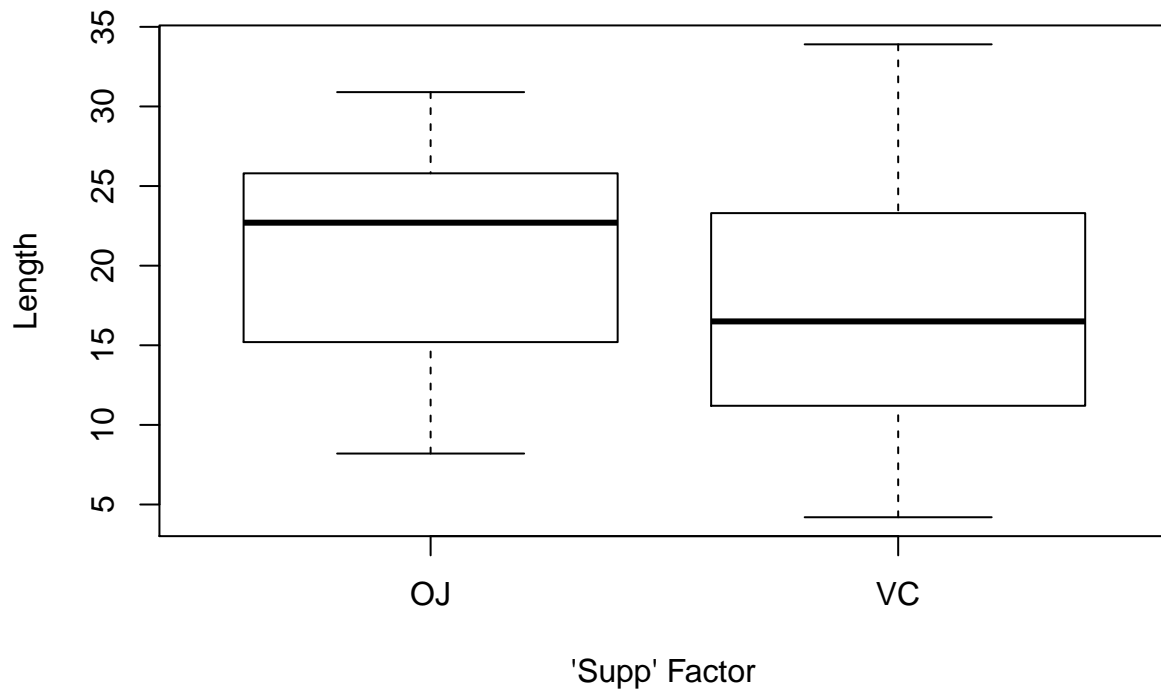
```
##      len supp dose
## 1  4.2   VC  0.5
## 2 11.5   VC  0.5
## 3  7.3   VC  0.5
## 4  5.8   VC  0.5
## 5  6.4   VC  0.5
## 6 10.0   VC  0.5
```

```
qplot(dose, len, data = TG, geom = "smooth", method = "loess", facets=~supp, main="Exploratory Graph by
```



```
boxplot(len~supp,data=TG, main="Exploratory Boxplot by 'Supp' Factor", xlab="'Supp' Factor", ylab="Leng
```

## Exploratory Boxplot by 'Supp' Factor



```
l1 <- TG$len[1:30]; l2 <- TG$len[31:60] ## create variables for OJ/VC factors
difference <- l2 - l1 ## create different variable between l2/l1
mnl <- mean(difference); sl <- sd(difference); n <- 30 ## create mean, standard deviation, and occurrence
t.test(difference) ## run t test by OJ/VC factors
```

```
##
## One Sample t-test
##
## data: difference
## t = 3.3026, df = 29, p-value = 0.00255
## alternative hypothesis: true mean is not equal to 0
## 95 percent confidence interval:
## 1.408659 5.991341
## sample estimates:
## mean of x
## 3.7
```

### ASSUMPTIONS

In this analysis, I assume that the data as provided by ToothGrowth contains all relevant variables and factors and there are no other unrecorded outside variables affecting the data. I further assume that observations 1:30 by VC factor and observations 31:60 by OJ factor are paired.

### CONCLUSION

It appears as though the use of the OJ supplement as compared to the VC supplement increases the mean of the length of tooth growth in addition to reducing the range of results by dose. The mean of differences as provided by t.test is 3.7 and the 95% confidence interval is 1.4 to 6.0, which appears significant.