

ToothGrowth Analysis

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A brief analysis of tooth growth in Guinea pigs. The description of this dataset does not make it clear whether these can be considered paired observations or not. As such, I'm assuming they aren't, to avoid drawing stronger conclusions than may be warranted.

A few summary explorations and graphs shows a potential relationship between increasing dosage, as well as a potential increase in growth for Orange Juice vs Ascorbic Acid

```
xtabs(len ~ dose + supp, data = ToothGrowth)
```

```
##      supp
## dose    OJ   VC
##  0.5 132.3  79.8
##    1  227.0 167.7
##    2  260.6 261.4
```



There is a good deal of variation of the density in the violin plot, and not a large sample of data, so it does not seem reasonable to assume equal variance

A test for the hypothesis of orange juice increasing tooth growth more than ascorbic acid yields

```
t.test(ToothGrowth[ToothGrowth$supp == "OJ",]$len, ToothGrowth[ToothGrowth$supp == "VC",]$len)[c(1,4)]
```

```
## $statistic
##      t
## 1.915
##
## $conf.int
## [1] -0.171  7.571
## attr("conf.level")
## [1] 0.95
```

As 0 is included in the confidence interval, and the t value is too small, we are unable to support this hypothesis

For increased dosage, however, each increase in level results in a statistically significant increase in tooth growth.

```
t.test(ToothGrowth[ToothGrowth$dose == 1.0,]$len, ToothGrowth[ToothGrowth$dose == 0.5,]$len)[c(1,4)]
```

```
## $statistic
##      t
## 6.477
##
## $conf.int
## [1]  6.276 11.984
## attr("conf.level")
## [1] 0.95
```

```
t.test(ToothGrowth[ToothGrowth$dose == 2.0,]$len, ToothGrowth[ToothGrowth$dose == 1.0,]$len)[c(1,4)]
```

```
## $statistic
##      t
## 4.9
##
## $conf.int
## [1]  3.734 8.996
## attr("conf.level")
## [1] 0.95
```

Based on the data available, each increased level of dosage yields increased tooth growth.

Although the difference between orange juice and ascorbic acid can not be supported by the data, there is enough difference to suggest that an increased sample size would support the hypothesis

For original Rmd file, visit the github repository at <https://github.com/LachlanAhren/JHStatisticalInference/blob/master/ToothGrowth.Rmd>