

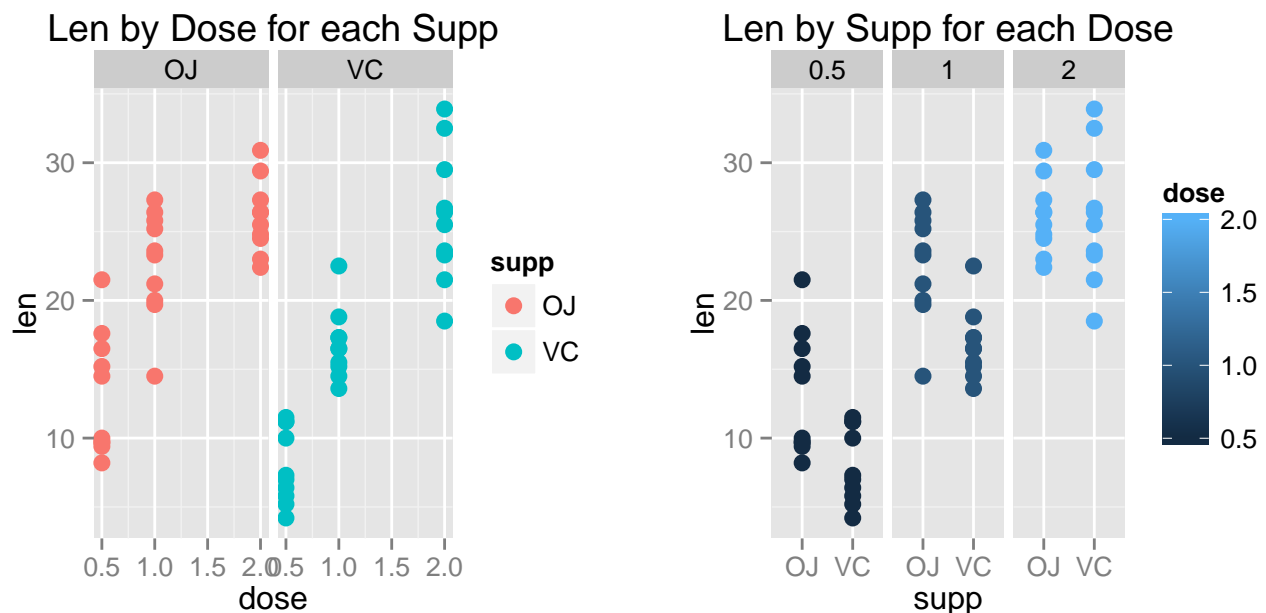
The project for the Statistical Inference class

GitHub Repo (if source code required): <https://github.com/d2ski/sicp1>

PART 2. Basic inferential data analysis.

ToothGrowth dataset analysis.

Q1. Load the ToothGrowth data and perform some basic exploratory data analyses.



Q2. Provide a basic summary of the 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 ...
```

len - the length of tooth; supp - the delivery method with 2 values (VC or OJ); dose is the dose of Vitamin C (0.5, 1, 2).

VC - the length of tooth for delivery method VC: mean 16.9633, sd 8.266.

OJ - the length of tooth for delivery method OJ: mean 20.6633, sd 6.6056.

d05 - the length of tooth for both methods of dose 0.5: mean 10.605, sd 4.4998.

d1 - the length of tooth for both methods of dose 1: mean 19.735, sd 4.4154.

d2 - the length of tooth for both methods of dose 2: mean 26.1, sd 3.7742.

Q3. Use confidence intervals and hypothesis tests to compare tooth growth by supp and dose.

t.test() VC vs OJ:

Confidence level 95%: -7.571, 0.171, p.value: 0.0606.

`t.test()` d05 vs d1:

Confidence level 95%: -11.9838, -6.2762, p.value: 1.2683×10^{-7} .

`t.test()` d05 vs d2:

Confidence level 95%: -18.1562, -12.8338, p.value: 4.3975×10^{-14} .

`t.test()` d1 vs d2:

Confidence level 95%: -8.9965, -3.7335, p.value: 1.9064×10^{-5} .

t-Tests for each dose of each delivery method: VC dose 0.5 (VCd05), VC dose 1 (VCd1), VC dose 2 (VCd2) vs OJ dose 0.5 (OJd05), OJ dose 1 (OJd1), OJ dose 2 (OJd2):

`t.test()` VCd05 vs OJd05:

Confidence level 95%: -8.7809, -1.7191, p.value: 0.0064.

`t.test()` VCd1 vs OJd1:

Confidence level 95%: -9.0579, -2.8021, p.value: 0.001.

`t.test()` VCd2 vs OJd2:

Confidence level 95%: -3.6381, 3.7981, p.value: 0.9639.

Q4. State your conclusions and the assumptions needed for your conclusions.

It was assumed that:

- the guinea pigs were randomly selected;
- dose and delivery methods are independent;
- dose and delivery methods affects the tooth length and no other factors.

Conclusions are:

Different doses lead to significant difference in length of tooth for any delivery method. Different delivery methods lead to significant difference in length of tooth if the dose is 0.5 or 1, but there is no evident difference if the dose is 2.