T-Tests (Part - 3)

Dependent t-test

Consider a different hypothesis.

Hypothesis 2

H1: *The unemployment rate for younger males (14-24 years) is higher than for older males (35-39).*

In this case, the two groups are not independent. When observations in the two groups are related, we have a dependent-groups design. We cannot use an Independent t-test in this situation.

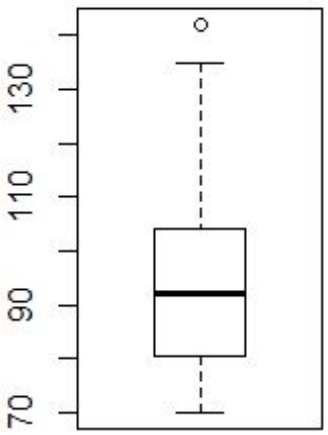
A dependent t-test assumes that the difference between groups is normally distributed. In this case, the format is `t.test(y1, y2, paired=TRUE)` where `y1` and `y2` are numeric vectors for the two dependent groups.

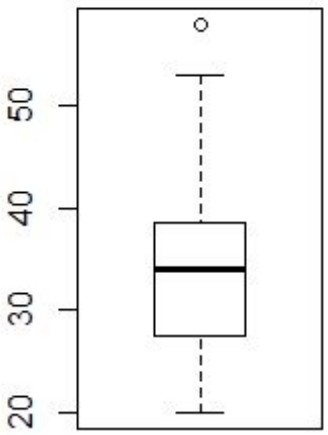
Summarizing the Data

```
library(MASS)
attach(UScrime)
library(psych)
describe(U1)

##    vars  n  mean    sd median trimmed   mad min max range skew kurtosis
## X1    1 47 95.47 18.03     92   93.69 17.79  70 142    72 0.77    -0.13
##      se
## X1 2.63

describe(U2)

##    vars  n  mean   sd median trimmed mad min max range skew kurtosis   se
## X1    1 47 33.98 8.45     34   33.49 8.9  20  58    38 0.54     0.17 1.23
```

Visualizing the data

```
par(mfrow=c(1,2))
boxplot(U1, data=UScrime)
boxplot(U2, data=UScrime)
```





Testing Hypothesis 2

```
t.test(U1, U2, paired=TRUE)

##
##  Paired t-test
##
## data:  U1 and U2
## t = 32.407, df = 46, p-value < 2.2e-16
## alternative hypothesis: true difference in means is not equal to 0
## 95 percent confidence interval:
##  57.67003 65.30870
## sample estimates:
## mean of the differences
##                61.48936
```