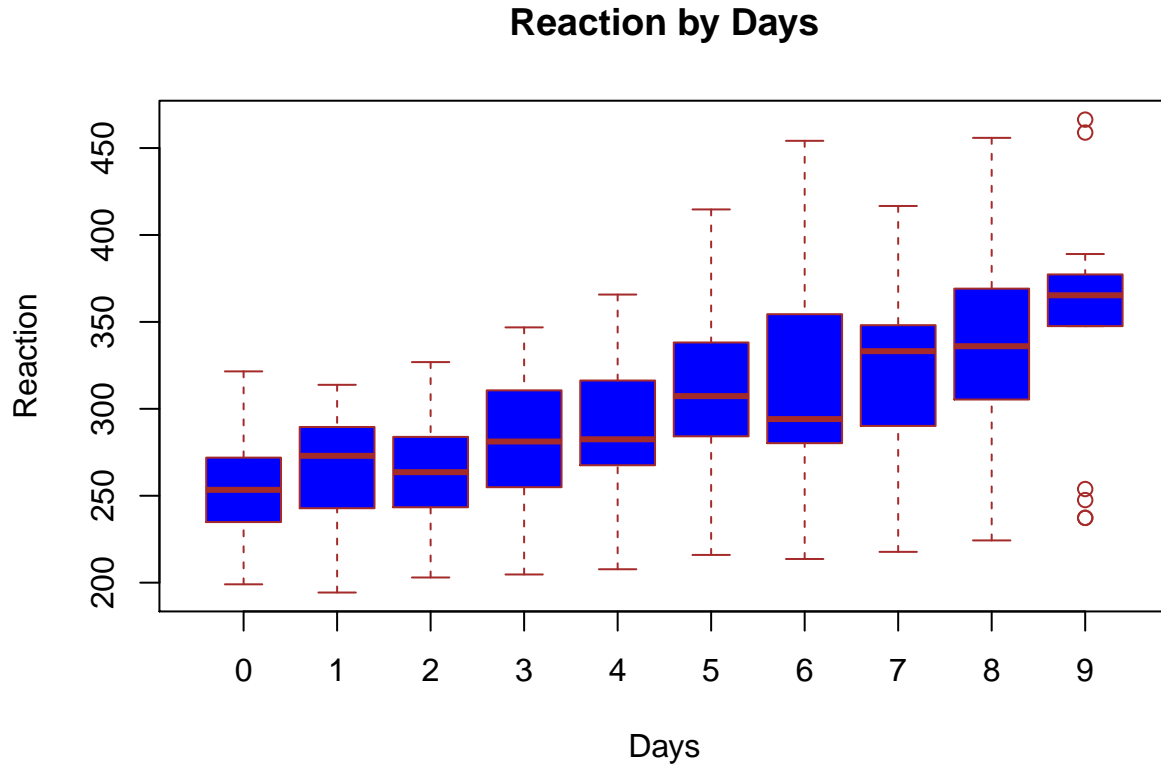


This is illustrated with the documentation example.

```
require(lme4)
boxplot(Reaction~Days, data=sleepstudy, main="Reaction by Days", xlab="Days", ylab="Reaction", col="blue")
```



We first run a simple linear regression,

```
l <- lm(Reaction ~ Days, sleepstudy)
s <- summary(l)
s
```

```
##
## Call:
## lm(formula = Reaction ~ Days, data = sleepstudy)
##
## Residuals:
##      Min       1Q   Median       3Q      Max
## -110.848  -27.483    1.546   26.142  139.953
##
## Coefficients:
##              Estimate Std. Error t value Pr(>|t|)
## (Intercept)   251.405     6.610   38.033  < 2e-16 ***
## Days           10.467     1.238    8.454  9.89e-15 ***
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 47.71 on 178 degrees of freedom
## Multiple R-squared:  0.2865, Adjusted R-squared:  0.2825
```

```
## F-statistic: 71.46 on 1 and 178 DF, p-value: 9.894e-15
```

```
names(s)
```

```
## [1] "call"          "terms"          "residuals"      "coefficients"
## [5] "aliased"        "sigma"          "df"             "r.squared"
## [9] "adj.r.squared" "fstatistic"     "cov.unscaled"
```

```
class(s)
```

```
## [1] "summary.lm"
```

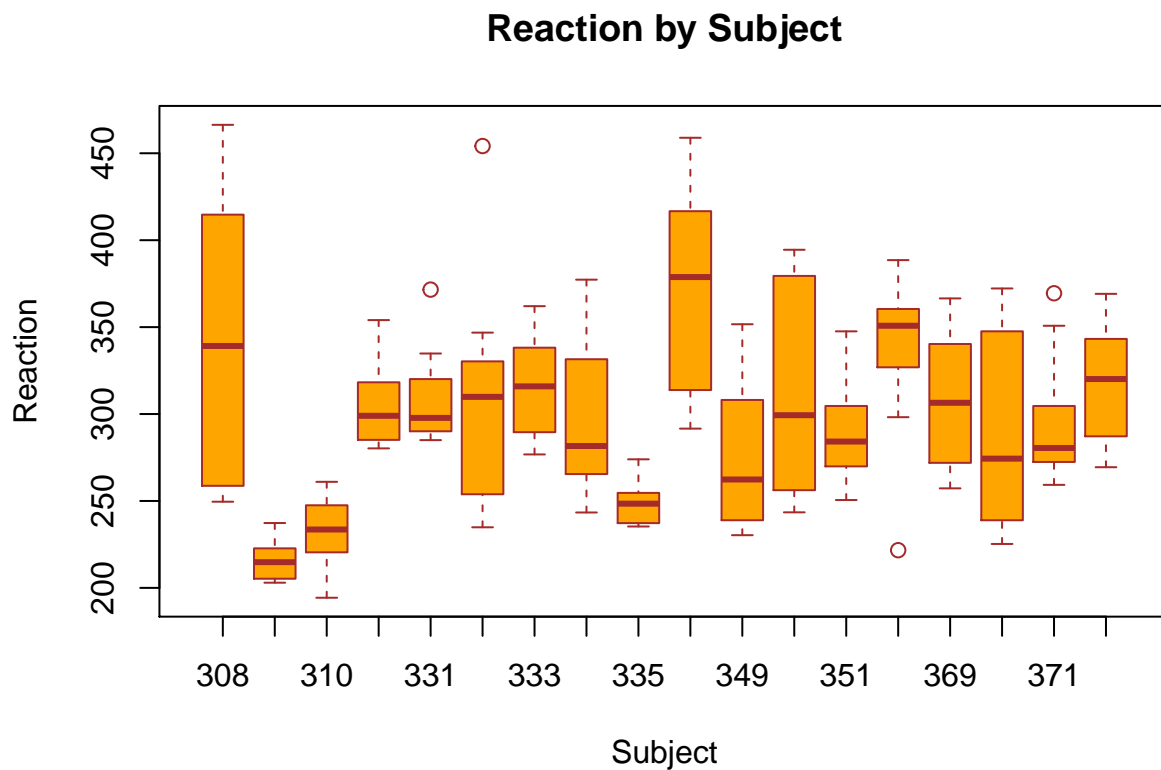
```
round(sqrt(s$fstatistic[1]),3)
```

```
## value
```

```
## 8.454
```

the F statistics is simply t^2 . Next we examine the effect of Subject

```
boxplot(Reaction~Subject, data=sleepstudy, main="Reaction by Subject", xlab="Subject", ylab="Reaction",
```



followed by a random effect model

```
f <- lmer(Reaction ~ Days + (Days | Subject), sleepstudy)
s <- summary(f)
s
```

```
## Linear mixed model fit by REML ['lmerMod']
## Formula: Reaction ~ Days + (Days | Subject)
## Data: sleepstudy
##
```

```
## REML criterion at convergence: 1743.6
##
## Scaled residuals:
##      Min       1Q   Median       3Q      Max
## -3.9536 -0.4634  0.0231  0.4633  5.1793
##
## Random effects:
##   Groups   Name                Variance Std.Dev. Corr
##   Subject  (Intercept)  611.90     24.737
##             Days           35.08     5.923   0.07
##   Residual                654.94     25.592
## Number of obs: 180, groups:  Subject, 18
##
## Fixed effects:
##              Estimate Std. Error t value
## (Intercept)  251.405      6.824   36.843
## Days         10.467      1.546    6.771
##
## Correlation of Fixed Effects:
##      (Intr)
## Days -0.138

names(s)

## [1] "methTitle"      "objClass"      "devcomp"      "isLmer"
## [5] "useScale"       "logLik"        "family"       "link"
## [9] "ngrps"          "coefficients"  "sigma"        "vcov"
## [13] "varcor"         "AICtab"        "call"         "residuals"
## [17] "fitMsgs"        "optinfo"

class(with(s,coefficients))

## [1] "matrix"

t <- with(s,coefficients)[,3]
p <- 2*(pnorm(-abs(t)))
p

##      (Intercept)      Days
## 3.851313e-297 1.281214e-11
```

We can see that the P value on Days became larger after accounting for individual differences.