# How adrenaline,Energy drinks, methamphetamine affect running speed?

Purpose and sampling

- The purpose of our study is to see if using energy drinks and injections does strengthen athletes' performance on outdoor 100m running.

- In the procedure of collecting data, we use randomly assignment. In our experiment, we have treatments (controllable variable) in 3 levels (adrenaline, energy drinks, Methamphetamine,) and we have gender as the nuisance block, and outdoor 100m running time as our response variable. Firstly, we separate 42 into our men sample, and assign 3 groups of 7 subjects into each of 3 treatment levels. And also, we selected another 21 subjects in women group with the same arrangement.

Design

Grand Mean   df=1

n=21

n=21

Gender   df =1

Treatment df=2

Error df=38

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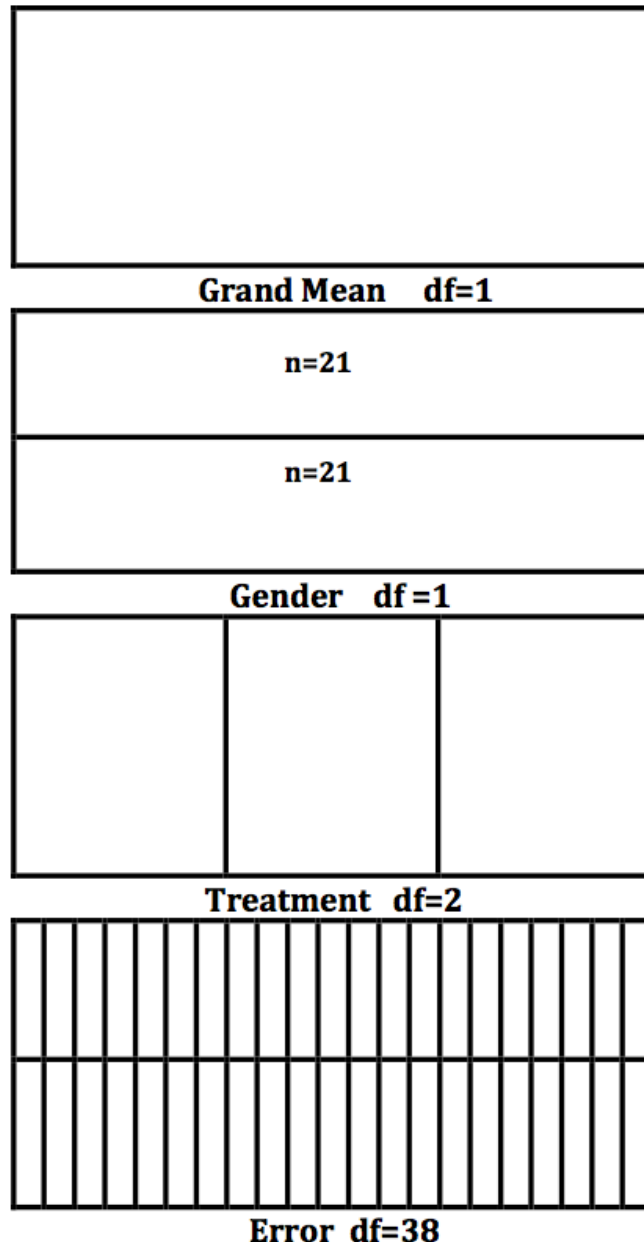
Anova Table

```
> m1 <- aov(time~factor(treatment)+factor(gender),data=d1)

> summary(m1)
```

	Df Sum	Sq Mean	Sq F value	Pr(>F)
factor(treatment)	2 196.3	98.14	3.816	0.0309 *
factor(gender)	1 29.2	29.17	1.134	0.2936
Residuals	38 977.2	25.72		

Conclusion:
Gender is a nuisance factor that we are not interesting, but after blocking on gender, the p-value decreased from 0.031 to 0.0309 and power increased. The effect of treatments is become more statically significant after we blocking on gender.
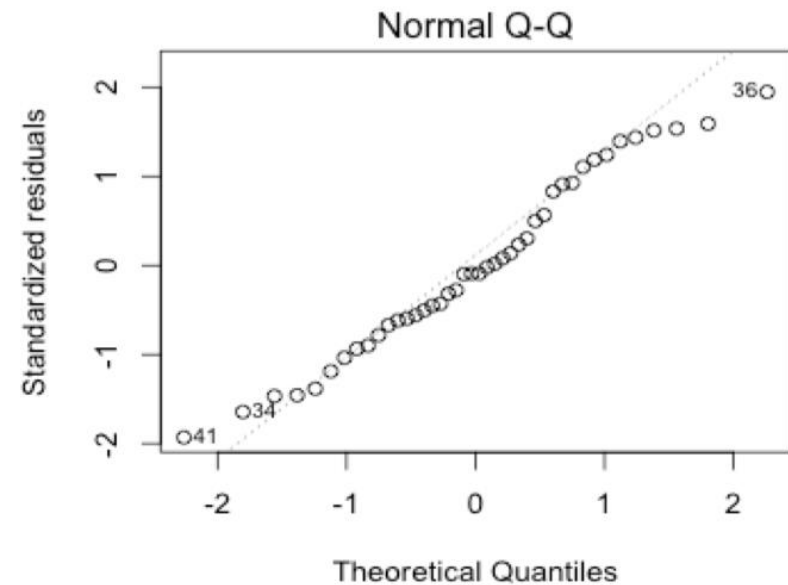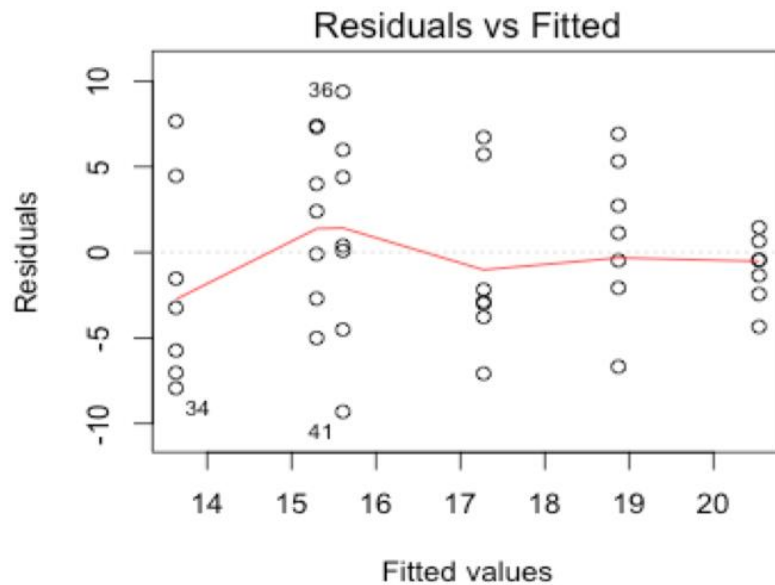
- We have tried three different designs which are BF[1], BF[2] and CB. Since gender is not what we are interested in and the interaction plot is not significant, we did not choose BF[2]. We chose CB[1] as our final design because blocking increases the power of hypothesis test even though it doesn't increase a lot. However, when the sample size increase, the power will be more significant.