Chap11_3

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```
library(xtable)
library(gmodels)
```

First, set working directory. 'data' is a table with two columns and same number of rows, and should be numeric. Columns have headers indicating the names of the variables. **User will also input desired variable names in double quotes**

```
data <- read.csv("chap11_3.csv", header = FALSE, skip = 1)
colnames(data) <- c("sub_1", "sub_2", "sub_3", "sub_4", "sub_5", "sub_6", "sub_7", "sub_8")
```

We now combine the observations into one long column (score)

```
colnames(data) <- c("V1", "V2", "V3", "V4", "V5", "V6", "V7", "V8")
score=c(data$V1,data$V2,data$V3,data$V4,data$V5,data$V6,data$V7,data$V8)
```

We now prepare the labels for the 6x8 scores according to the factor levels: rank_1 rank_2 rank_3 rank_4 rank_5 rank_6.....etc for Factor A

```
Rank=gl(6,1,8*6*1, labels = c("rank_1", "rank_2", "rank_3", "rank4", "rank_5", "rank_6"))
```

sub_1 sub_1....., sub_2 sub_2.....,sub_3 sub_3 ....,sub_4 sub_4 ....., sub_5 sub_5....., sub_6 sub_6 etc for Subjects.

```
Subject=gl(8,6*1,8*6*1, labels=c("sub _1", "sub_2", "sub_3",
                                 "sub_4", "sub_5", "sub_6", "sub_7", "sub_8"))
```

We now form a data frame with the dependent variable and the factors, then we print the results

```
data = data.frame(score = score, Rank = factor(Rank), Subject =
                    factor(Subject))
knitr::kable(xtable(data))
```

score	Rank	Subject
17	rank_1	sub _1
13	rank_2	sub _1
12	rank_3	sub _1
12	rank4	sub _1
11	rank_5	sub _1
11	rank_6	sub _1
14	rank_1	sub_2
18	rank_2	sub_2
13	rank_3	sub_2
18	rank4	sub_2
11	rank_5	sub_2
12	rank_6	sub_2
17	rank_1	sub_3

score	Rank	Subject
16	rank_2	sub_3
13	rank_3	sub_3
11	rank4	sub_3
15	rank_5	sub_3
14	rank_6	sub_3
18	rank_1	sub_4
16	rank_2	sub_4
11	rank_3	sub_4
10	rank4	sub_4
12	rank_5	sub_4
10	rank_6	sub_4
17	rank_1	sub_5
12	rank_2	sub_5
13	rank_3	sub_5
10	rank4	sub_5
11	rank_5	sub_5
13	rank_6	sub_5
16	rank_1	sub_6
13	rank_2	sub_6
13	rank_3	sub_6
11	rank4	sub_6
11	rank_5	sub_6
11	rank_6	sub_6
14	rank_1	sub_7
12	rank_2	sub_7
10	rank_3	sub_7
10	rank4	sub_7
10	rank_5	sub_7
10	rank_6	sub_7
16	rank_1	sub_8
17	rank_2	sub_8
15	rank_3	sub_8
11	rank4	sub_8
13	rank_5	sub_8
11	rank_6	sub_8

Anova when "Subject" is considered as a random factor, then we print the results

```
aov1=aov(score~Rank+Error(Subject),data=data)
summary(aov1)
```

```
##
## Error: Subject
##           Df Sum Sq Mean Sq F value Pr(>F)
## Residuals  7  52.48   7.497
##
## Error: Within
##           Df Sum Sq Mean Sq F value   Pr(>F)
## Rank       5 146.85  29.371   10.32 3.87e-06 ***
## Residuals 35  99.65   2.847
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
```

```r
print(model.tables(aov(score ~ Rank + Subject, data =
                         data),"means"),digits=3)
```

```
## Tables of means
## Grand mean
##
## 13.02083
##
##  Rank
## Rank
## rank_1 rank_2 rank_3  rank4 rank_5 rank_6
##  16.13  14.63  12.50  11.63  11.75  11.50
##
##  Subject
## Subject
## sub _1  sub_2  sub_3  sub_4  sub_5  sub_6  sub_7  sub_8
##  12.67  14.33  14.33  12.83  12.67  12.50  11.00  13.83
```