Chap14

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

We collect the data for each subjects for all levels of Factor A and Factor B for each subject.

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("chap14.csv", header = FALSE, skip = 1)
colnames(data) <- c("b1", "b2")
```

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

```
colnames(data) <- c("V1", "V2")
score=c(data$V1,data$V2)
```

We now prepare the labels for the 4x5x2 scores according to the factor levels: a1 a2 a3 a4 a5, a1 a2 a3 a4 a5.....etc for Factor A

```
Face=gl(5,1,5*4*2, labels=c("a1","a2","a3","a4","a5"))
```

b1 b2, b1 b2..... etc for Factor B

```
Typicality=gl(2,4*5*1,5*4*2,labels=c("Atypical","Typical"))
```

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

```
Subject=gl(4, 5*1, 5*4*2, labels = c("sub_1", "sub_2", "sub_3",
                                     "sub_4"))
```

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

```
data = data.frame(score = score, Face = factor(Face),
                  Typicality = factor(Typicality))
knitr::kable(xtable(data))
```

score	Face	Typicality
20	a1	Atypical
22	a2	Atypical
25	a3	Atypical
24	a4	Atypical
19	a5	Atypical
9	a1	Atypical
8	a2	Atypical
21	a3	Atypical
21	a4	Atypical
21	a5	Atypical

score	Face	Typicality
18	a1	Atypical
20	a2	Atypical
18	a3	Atypical
21	a4	Atypical
33	a5	Atypical
5	a1	Atypical
14	a2	Atypical
16	a3	Atypical
22	a4	Atypical
23	a5	Atypical
37	a1	Typical
37	a2	Typical
43	a3	Typical
48	a4	Typical
45	a5	Typical
34	a1	Typical
35	a2	Typical
35	a3	Typical
37	a4	Typical
39	a5	Typical
35	a1	Typical
39	a2	Typical
39	a3	Typical
37	a4	Typical
40	a5	Typical
38	a1	Typical
49	a2	Typical
51	a3	Typical
50	a4	Typical
52	a5	Typical

Anova when "Subject" is considered as a random factor

```
aov1 = aov(score ~ (Subject + Face%in%Typicality + Typicality +
                      Typicality:Subject))
Df = summary(aov(score ~ (Subject + Face%in%Typicality +
                            Typicality + Typicality:Subject)))[[1]]$Df
Sum_Sq = summary(aov(score ~ (Subject + Face%in%Typicality +
                               Typicality + Typicality:Subject)))[[1]]$Sum
MS = summary(aov(score ~ (Subject + Face%in%Typicality +
                            Typicality + Typicality:Subject)))[[1]]$Mean
F = summary(aov(score ~ (Subject + Face%in%Typicality +
                           Typicality + Typicality:Subject)))[[1]]$F
F[2]=NA
Pr = summary(aov(score ~ (Subject + Face%in%Typicality +
                            Typicality + Typicality:Subject)))[[1]]$Pr
Pr[2]=NA
Source_names = c("Subject", "Typicality", "Face(Typicality)",
                 "Subject * Typicality", "Error:Face * Subject(Typicality)")
```

We print the Anova table. The 'Typicality' factor has a Quasi F or F'. This F' has not been displayed in the Anova table and has to be calculated separately

```
Anova_table = data.frame(Names = Source_names, Df=Df, Sum.Sq=Sum_Sq, Mean.Sq=MS,
                         F.Value=F, "Pr>F" = Pr)
knitr::kable(xtable(Anova_table))
```

Names	Df	Sum.Sq	Mean.Sq	F.Value	Pr.F
Subject	3	240	80	5.333333	0.0058525
Typicality	1	4840	4840	NA	NA
Face(Typicality)	8	480	60	4.000000	0.0038873
Subject * Typicality	3	360	120	8.000000	0.0007215
Error:Face * Subject(Typicality)	24	360	15	NA	NA

We now print the rest of the results

```
print(model.tables(aov1,"means"),digits=3)
```

```
## Tables of means
## Grand mean
##
## 30
##
##  Subject
## Subject
## sub_1 sub_2 sub_3 sub_4
##    32    26    30    32
##
##  Typicality
## Typicality
## Atypical  Typical
##       19       41
##
##  Face:Typicality
##     Typicality
## Face Atypical Typical
##   a1 13       36
##   a2 16       40
##   a3 20       42
##   a4 22       43
##   a5 24       44
##
##  Subject:Typicality
##        Typicality
## Subject Atypical Typical
##   sub_1 22       42
##   sub_2 16       36
##   sub_3 22       38
##   sub_4 16       48
```