

TP1-1

Slim Kammoun

```
#####1#####
```

```
mydata<-read.table("donnepub.txt",sep="\t",dec=",",header=TRUE)
str(mydata)
```

```
## 'data.frame': 16 obs. of 7 variables:
## $ X : Factor w/ 16 levels "al","aut","bel",...: 3 4 7 1 8 9 10 11 13 5 ...
## $ new: num 35.3 76.1 28.6 46 26 63.7 27.8 50.4 25.1 37.6 ...
## $ mag: num 20.5 11.8 27.5 27.9 28.2 5.4 24 27.8 21.7 15.4 ...
## $ tv : num 27.5 9.6 24.8 15.8 35.3 ...
## $ rad: num 1.2 0.8 6.6 5.1 5.7 6.2 1.4 2.2 6.7 10.3 ...
## $ cin: num 1.4 0.4 0.8 1.2 0 0 0 0.3 0 0.8 ...
## $ otr: num 14.2 1.3 11.7 3.9 4.8 5.1 3.6 10.4 9.5 4.7 ...
```

```
head(mydata)
```

```
##      X new mag tv rad cin otr
## 1 bel 35.3 20.5 27.5 1.2 1.4 14.2
## 2 dk 76.1 11.8 9.6 0.8 0.4 1.3
## 3 fr 28.6 27.5 24.8 6.6 0.8 11.7
## 4 al 46.0 27.9 15.8 5.1 1.2 3.9
## 5 gr 26.0 28.2 35.3 5.7 0.0 4.8
## 6 ir 63.7 5.4 19.6 6.2 0.0 5.1
```

```
rownames(mydata)<-mydata$X # attention ici
mydata<-mydata[,-1]
head(mydata)
```

```
##      new mag tv rad cin otr
## bel 35.3 20.5 27.5 1.2 1.4 14.2
## dk 76.1 11.8 9.6 0.8 0.4 1.3
## fr 28.6 27.5 24.8 6.6 0.8 11.7
## al 46.0 27.9 15.8 5.1 1.2 3.9
## gr 26.0 28.2 35.3 5.7 0.0 4.8
## ir 63.7 5.4 19.6 6.2 0.0 5.1
```

```
#####2#####
```

```
#install.packages("xlsx")
```

```
library(xlsx)
summary(mydata)
```

```
##      new      mag      tv      rad
## Min.   :25.10  Min.   : 5.40  Min.   : 2.20  Min.   : 0.000
## 1st Qu.:33.62  1st Qu.:15.12  1st Qu.: 9.45  1st Qu.: 1.350
## Median :48.20  Median :18.65  Median :18.65  Median : 3.100
## Mean   :49.77  Mean   :19.24  Mean   :20.34  Mean   : 3.944
## 3rd Qu.:64.58  3rd Qu.:24.88  3rd Qu.:30.70  3rd Qu.: 6.300
## Max.   :78.60  Max.   :28.20  Max.   :43.02  Max.   :10.300
##      cin      otr
## Min.   :0.0000  Min.   : 1.300
## 1st Qu.:0.0750  1st Qu.: 3.550
## Median :0.4500  Median : 4.550
```

```
## Mean :0.5375 Mean : 6.156
## 3rd Qu.:0.8250 3rd Qu.: 9.725
## Max. :1.4000 Max. :14.200
```

```
#install.packages("psych")
library(psych)
psych::describe(mydata)
```

```
##      vars  n mean    sd median trimmed  mad min  max range skew
## new     1 16 49.77 19.00 48.20 49.48 25.57 25.1 78.60 53.50 0.17
## mag     2 16 19.24 6.66 18.65 19.59 7.04 5.4 28.20 22.80 -0.17
## tv      3 16 20.34 12.84 18.65 20.02 15.94 2.2 43.02 40.82 0.15
## rad     4 16 3.94 3.06 3.10 3.77 3.26 0.0 10.30 10.30 0.45
## cin     5 16 0.54 0.47 0.45 0.51 0.59 0.0 1.40 1.40 0.35
## otr     6 16 6.16 4.10 4.55 5.93 2.52 1.3 14.20 12.90 0.71
##      kurtosis  se
## new     -1.53 4.75
## mag     -0.95 1.67
## tv      -1.39 3.21
## rad     -1.14 0.76
## cin     -1.31 0.12
## otr     -1.10 1.03
```

```
des=psych::describe(mydata)
write.xlsx(as.data.frame(des),file="TP1-1.xlsx",sheetName="Descript")
```

```
## Loading required package: lattice
## Loading required package: survival
## Loading required package: Formula
## Loading required package: ggplot2
##
## Attaching package: 'ggplot2'
## The following objects are masked from 'package:psych':
##
##      %+%, alpha
##
## Attaching package: 'Hmisc'
## The following object is masked from 'package:psych':
##
##      describe
## The following objects are masked from 'package:base':
##
##      format.pval, units
```

```
rcorr(as.matrix(mydata))$P #p_values
```

```
##           new      mag      tv      rad      cin      otr
## new      NA 0.003164259 5.125911e-06 0.06884313 0.5962947 0.1107092
## mag 3.164259e-03      NA 1.613558e-01 0.79693664 0.7001739 0.1822664
## tv 5.125911e-06 0.161355842      NA 0.10273555 0.1793279 0.7108218
## rad 6.884313e-02 0.796936641 1.027356e-01      NA 0.4727308 0.9787926
## cin 5.962947e-01 0.700173855 1.793279e-01 0.47273078      NA 0.2583948
```

```
## otr 1.107092e-01 0.182266355 7.108218e-01 0.97879265 0.2583948 NA
rcorr(as.matrix(mydata))$r #estimation des coefs de corr

##          new          mag          tv          rad          cin          otr
## new  1.0000000 -0.68887444 -0.8853650 -0.466034023  0.1433769 -0.414199058
## mag -0.6888744  1.00000000  0.3675464  0.069921762  0.1044826  0.351200327
## tv  -0.8853650  0.36754645  1.0000000  0.422831694 -0.3534196  0.100613989
## rad -0.4660340  0.06992176  0.4228317  1.000000000 -0.1934994  0.007232302
## cin  0.1433769  0.10448265 -0.3534196 -0.193499363  1.0000000  0.300325432
## otr -0.4141991  0.35120033  0.1006140  0.007232302  0.3003254  1.000000000

P_values=as.data.frame(rcorr(as.matrix(mydata))$P)
corr_coeff=rcorr(as.matrix(mydata))$r
write.xlsx(as.data.frame(P_values),file="TP1-1.xlsx",sheetName="P-values",append=T)
write.xlsx(as.data.frame(corr_coeff),file="TP1-1.xlsx",sheetName="corr",append=T)

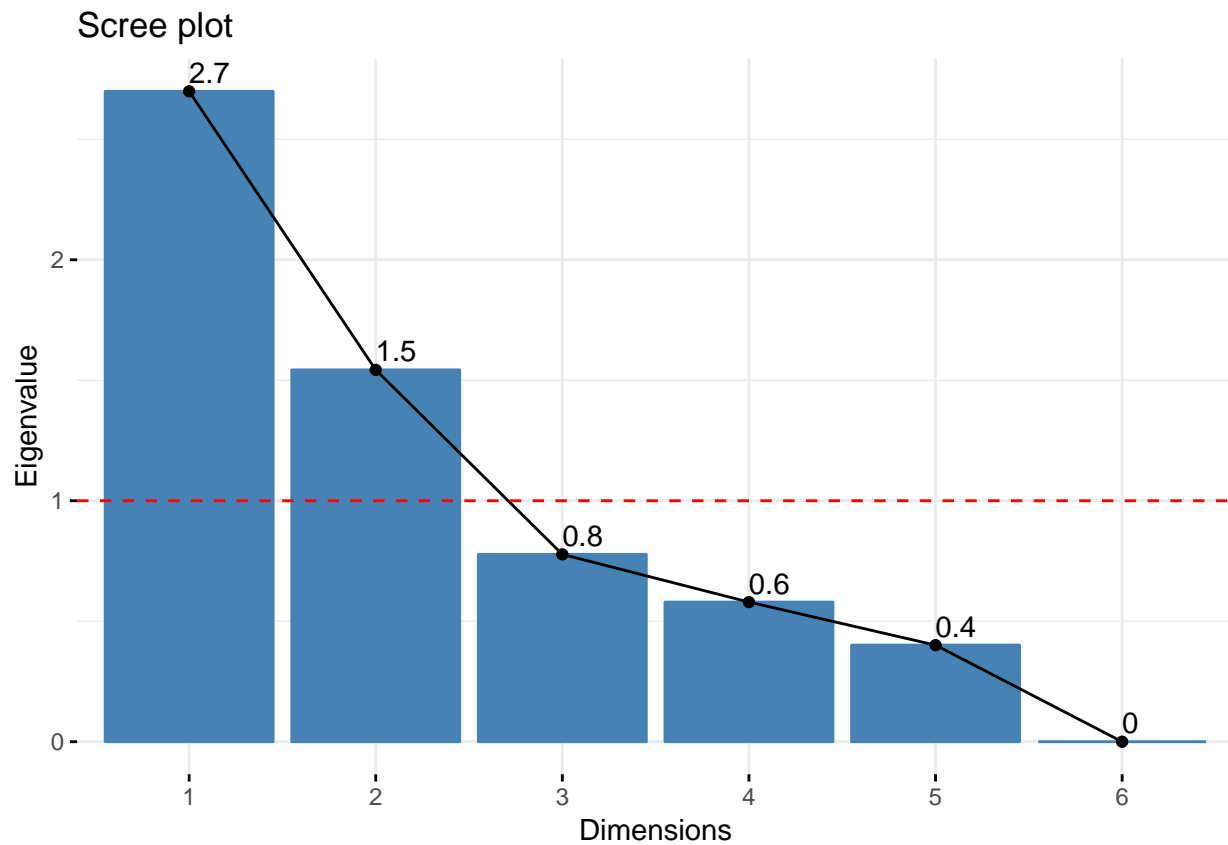
## Welcome! Related Books: `Practical Guide To Cluster Analysis in R` at https://goo.gl/13EFCZ
mydata.pca = PCA(mydata, scale.unit=TRUE,graph=FALSE)

#fviz_eig(mydata.pca, addlabels = TRUE, ylim = c(0, 50))

png("eig1.png", height=1000, width=1200, res=250, pointsize=8)
fviz_eig(mydata.pca,choice = "eigenvalue", addlabels = TRUE )+
  geom_hline (yintercept = 1, linetype = 2, color = "red")
dev.off()

## pdf
## 2

fviz_eig(mydata.pca,choice = "eigenvalue", addlabels = TRUE )+
  geom_hline (yintercept = 1, linetype = 2, color = "red")
```



```
png("eig2.png", height=1000, width=1200, res=250, pointsize=8)
```

```
barplot(mydata.pca$eig[,3]) +  
lines(c(0,20),c(80,80),type = "l", lty=2,col="red")
```

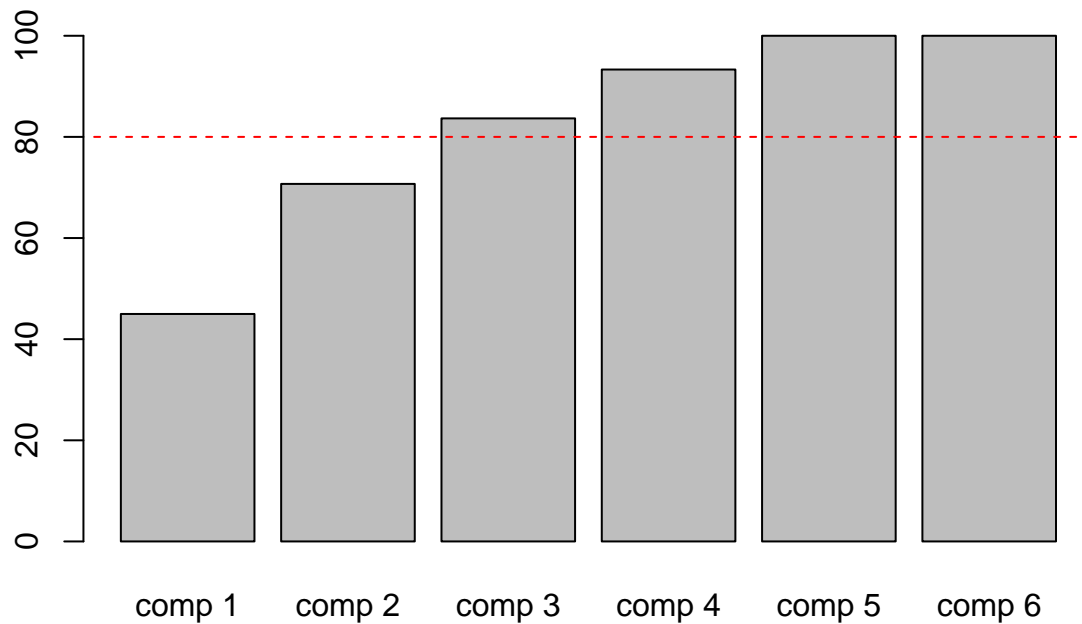
```
## numeric(0)
```

```
dev.off()
```

```
## pdf
```

```
## 2
```

```
barplot(mydata.pca$eig[,3]) +  
lines(c(0,20),c(80,80),type = "l", lty=2,col="red")
```



```
## numeric(0)
```

```
mydata.pca$eig
```

```
##          eigenvalue percentage of variance
## comp 1 2.699047e+00      4.498411e+01
## comp 2 1.543048e+00      2.571747e+01
## comp 3 7.775508e-01      1.295918e+01
## comp 4 5.795016e-01      9.658359e+00
## comp 5 4.008445e-01      6.680742e+00
## comp 6 8.196494e-06      1.366082e-04
##          cumulative percentage of variance
## comp 1                      44.98411
## comp 2                      70.70158
## comp 3                      83.66076
## comp 4                      93.31912
## comp 5                      99.99986
## comp 6                     100.00000
```

```
eig=mydata.pca$eig
```

```
write.xlsx(as.data.frame(eig),file="TP1-1.xlsx",sheetName="eig",append=T)
```

```
mydata.pca$var
```

```
## $coord
```

```
##          Dim.1      Dim.2      Dim.3      Dim.4      Dim.5
## new -0.9920905 -0.06106564  0.03906945 -0.01788785  0.10087660
## mag  0.6814347  0.43314328 -0.34658589  0.34464343  0.33035155
## tv   0.8672855 -0.29429274 -0.10679773 -0.01519317 -0.38674131
## rad  0.5420114 -0.39190197  0.70001163  0.11434215  0.22258926
## cin -0.2134828  0.78660218  0.35808804  0.36188506 -0.27657596
## otr  0.3986410  0.70197410  0.16202942 -0.56226037  0.07698831
```

```
##
```

```
## $cor
```

```
##          Dim.1      Dim.2      Dim.3      Dim.4      Dim.5
## new -0.9920905 -0.06106564  0.03906945 -0.01788785  0.10087660
```

```

## mag 0.6814347 0.43314328 -0.34658589 0.34464343 0.33035155
## tv 0.8672855 -0.29429274 -0.10679773 -0.01519317 -0.38674131
## rad 0.5420114 -0.39190197 0.70001163 0.11434215 0.22258926
## cin -0.2134828 0.78660218 0.35808804 0.36188506 -0.27657596
## otr 0.3986410 0.70197410 0.16202942 -0.56226037 0.07698831
##
## $cos2
##          Dim.1          Dim.2          Dim.3          Dim.4          Dim.5
## new 0.98424354 0.003729012 0.001526422 0.0003199752 0.01017609
## mag 0.46435327 0.187613102 0.120121781 0.1187790923 0.10913215
## tv 0.75218408 0.086608217 0.011405755 0.0002308325 0.14956884
## rad 0.29377633 0.153587153 0.490016282 0.0130741275 0.04954598
## cin 0.04557491 0.618742985 0.128227043 0.1309607972 0.07649426
## otr 0.15891467 0.492767642 0.026253535 0.3161367271 0.00592720
##
## $contrib
##          Dim.1          Dim.2          Dim.3          Dim.4          Dim.5
## new 36.466338 0.2416653 0.1963115 0.05521559 2.538662
## mag 17.204343 12.1586036 15.4487370 20.49676863 27.225555
## tv 27.868508 5.6128008 1.4668823 0.03983294 37.313431
## rad 10.884448 9.9534909 63.0204832 2.25609879 12.360398
## cin 1.688556 40.0987488 16.4911463 22.59886912 19.083275
## otr 5.887807 31.9346907 3.3764397 54.55321493 1.478678

write.xlsx(mydata.pca$var,file="TP1-1.xlsx",sheetName="var",append=T)

mydata.pca$ind

## $coord
##          Dim.1          Dim.2          Dim.3          Dim.4          Dim.5
## bel 0.7999605 2.6030438 0.22221512 -0.64215853 -1.2796850
## dk -2.4069194 -0.8147392 -0.56817432 0.06154194 -0.2369873
## fr 1.9752304 1.2878230 0.60454838 -0.02346439 0.4998936
## al 0.2902451 1.0390177 0.30229846 1.78764624 0.3254998
## gr 2.2570889 -0.8624721 -0.81852317 0.41699202 0.4652988
## ir -1.0392994 -1.9075174 0.96276331 -1.23703819 -0.2132120
## it 1.7030910 -0.9539679 -1.84192235 0.11245204 -0.7855195
## ne 0.1807401 1.1374650 -0.89190180 -0.50679197 1.4049972
## por 2.3435560 -0.6836342 0.04353914 -0.86439797 0.1058213
## esp 1.1621252 -0.9046069 1.96866508 0.59464953 -0.4954016
## uk 0.2689405 -0.4336052 -0.74443542 0.37997931 -0.7990084
## aut 0.1316536 -0.8945222 0.99010137 0.30388160 0.6045277
## fin -1.3623025 -1.3765700 -0.08778381 -0.14891750 0.3589521
## nor -2.6374899 0.7497973 0.06641563 1.02781000 -0.2689420
## sue -2.6050841 0.2441422 -0.54034120 -0.14459109 0.1559853
## sui -1.0615360 1.7703461 0.33253557 -1.11759303 0.1577801
##
## $cos2
##          Dim.1          Dim.2          Dim.3          Dim.4          Dim.5
## bel 0.067254640 0.712111779 0.0051895826 4.333808e-02 0.172104157
## dk 0.846987954 0.097049060 0.0471973190 5.537279e-04 0.008211156
## fr 0.631730139 0.268539661 0.0591777189 8.914861e-05 0.040462369
## al 0.018487056 0.236910285 0.0200544112 7.012958e-01 0.023250885
## gr 0.738468050 0.107826246 0.0971172418 2.520518e-02 0.031383269
## ir 0.149575116 0.503865962 0.1283562598 2.119065e-01 0.006295080

```

```

## it 0.370296738 0.116182763 0.4331285357 1.614391e-03 0.078774943
## ne 0.007504737 0.297236638 0.1827512347 5.900457e-02 0.453499876
## por 0.817313112 0.069548106 0.0002820964 1.111899e-01 0.001666418
## esp 0.203285949 0.123174631 0.5833714383 5.322598e-02 0.036941652
## uk 0.045281169 0.117704773 0.3469438217 9.039096e-02 0.399675791
## aut 0.007684263 0.354747279 0.4346064069 4.093979e-02 0.162020192
## fin 0.474702156 0.484697431 0.0019710743 5.672384e-03 0.032956954
## nor 0.804046036 0.064981090 0.0005098471 1.221026e-01 0.008360198
## sue 0.944758481 0.008297799 0.0406455926 2.910451e-03 0.003387231
## sui 0.199602730 0.555153958 0.0195872417 2.212404e-01 0.004409622
##
## $contrib
##      Dim.1      Dim.2      Dim.3      Dim.4      Dim.5
## bel 1.48185820 27.4450179 0.39691587 4.447438180 25.5334928
## dk 13.41506264 2.6886715 2.59486301 0.040847710 0.8756978
## fr 9.03452044 6.7175807 2.93774004 0.005938051 3.8963619
## al 0.19507396 4.3726670 0.73455292 34.465816534 1.6519827
## gr 11.79687359 3.0129412 5.38534076 1.875343859 3.3757312
## ir 2.50121463 14.7379671 7.45058375 16.504091792 0.7088060
## it 6.71653568 3.6861083 27.27054839 0.136382947 9.6209511
## ne 0.07564476 5.2405474 6.39418675 2.770032449 30.7790353
## por 12.71804219 1.8929888 0.01523740 8.058475596 0.1746024
## esp 3.12734269 3.3145176 31.15264376 3.813709190 3.8266513
## uk 0.16748740 0.7615344 4.45456487 1.557203325 9.9542102
## aut 0.04013608 3.2410283 7.87971593 0.995942378 5.6981833
## fin 4.29750789 7.6753316 0.06194127 0.239175608 2.0089865
## nor 16.10835586 2.2771322 0.03545617 11.393340811 1.1277721
## sue 15.71495385 0.2414272 2.34686120 0.225480228 0.3793775
## sui 2.60939013 12.6945389 0.88884791 13.470781342 0.3881579
##
## $dist
##      bel      dk      fr      al      gr      ir      it      ne
## 3.084661 2.615309 2.485146 2.134671 2.626533 2.687268 2.798742 2.086349
##      por      esp      uk      aut      fin      nor      sue      sui
## 2.592275 2.577503 1.263856 1.501867 1.977256 2.941375 2.680164 2.376028

write.xlsx(mydata.pca$ind,file="TP1-1.xlsx",sheetName="ind",append=T)
png("var.png", height=800, width=800, res=250, pointsize=8)
plot.PCA(mydata.pca, axes=c(1,2), choix="var")
dev.off()

## pdf
## 2

png("ind.png", height=800, width=800, res=250, pointsize=8)
plot.PCA(mydata.pca, axes=c(1,2), choix="ind")
dev.off()

## pdf
## 2

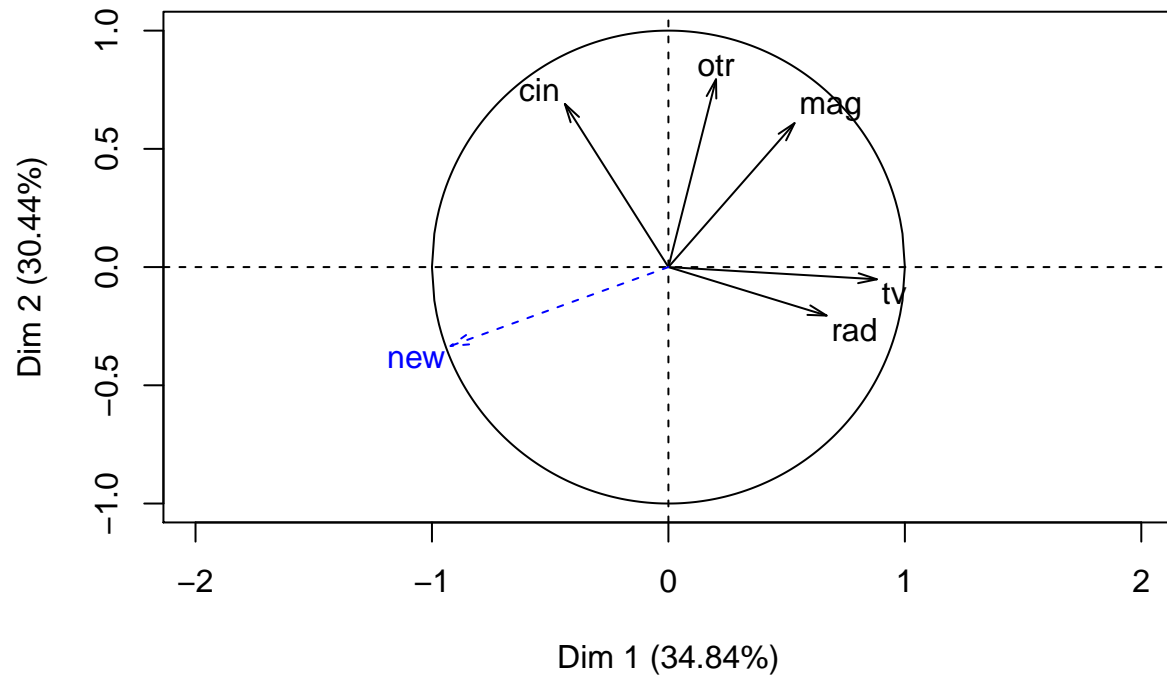
mydata.pca = PCA(mydata, scale.unit=TRUE, ncp=6,graph=FALSE,quanti.sup=1)
png("var_2.png", height=800, width=800, res=250, pointsize=8)

plot.PCA(mydata.pca, axes=c(1,2), choix="var")
dev.off()

```

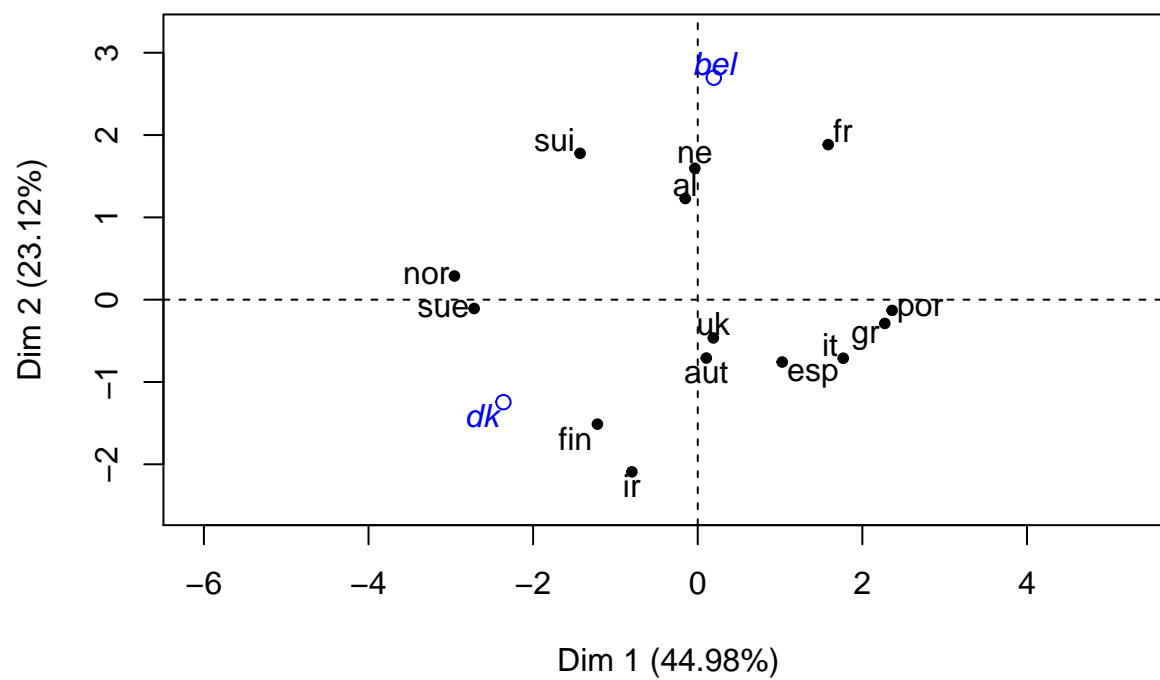
```
## pdf
## 2
plot.PCA(mydata.pca, axes=c(1,2), choix="var")
```

Variables factor map (PCA)



```
mydata.pca = PCA(mydata, scale.unit=TRUE, ncp=6, graph=FALSE, ind.sup=c(1,2))
plot.PCA(mydata.pca, axes=c(1,2), choix="ind")
```


Individuals factor map (PCA)



```
png("ind_2.png", height=800, width=800, res=250, pointsize=8)
plot.PCA(mydata.pca, axes=c(1,2), choix="ind")
dev.off()
```

```
## pdf
## 2
```