

TP3

Slim Kammoun

```
mydata=read.table("Race-canine.txt",sep="\t", head=T,encoding = "latin1", colClasses = "factor" )
## encoding pour lire les accents
head(mydata)
```

```
##      Race Taille Poids V  locit   Intelligence Affection Agressivit   Fonction
## 1 BEAU      3      2      3              3          2          2          3
## 2 BASS      1      1      1              1          1          2          2
## 3 B.AL      3      2      3              3          2          2          3
## 4 BOXE      2      2      2              2          2          2          1
## 5 BULD      1      1      1              2          2          1          1
## 6 BULM      3      3      1              3          1          2          3
```

Add a new chunk by clicking the *Insert Chunk* button on the toolbar or by pressing *Ctrl+Alt+I*.

```
rownames(mydata)<-mydata$Race
mydata<-mydata[,-1]
head(mydata)
```

```
##      Taille Poids V  locit   Intelligence Affection Agressivit   Fonction
## BEAU      3      2      3              3          2          2          3
## BASS      1      1      1              1          1          2          2
## B.AL      3      2      3              3          2          2          3
## BOXE      2      2      2              2          2          2          1
## BULD      1      1      1              2          2          1          1
## BULM      3      3      1              3          1          2          3
```

```
library(FactoMineR)
library(factoextra)
```

```
## Loading required package: ggplot2
```

```
## Welcome! Related Books: `Practical Guide To Cluster Analysis in R` at https://goo.gl/13EFCZ
```

```
library(ggplot2)
mydata.mca = MCA(mydata, graph=FALSE,quali.sup = 7,ncp=3)
```

```
library(plyr)
```

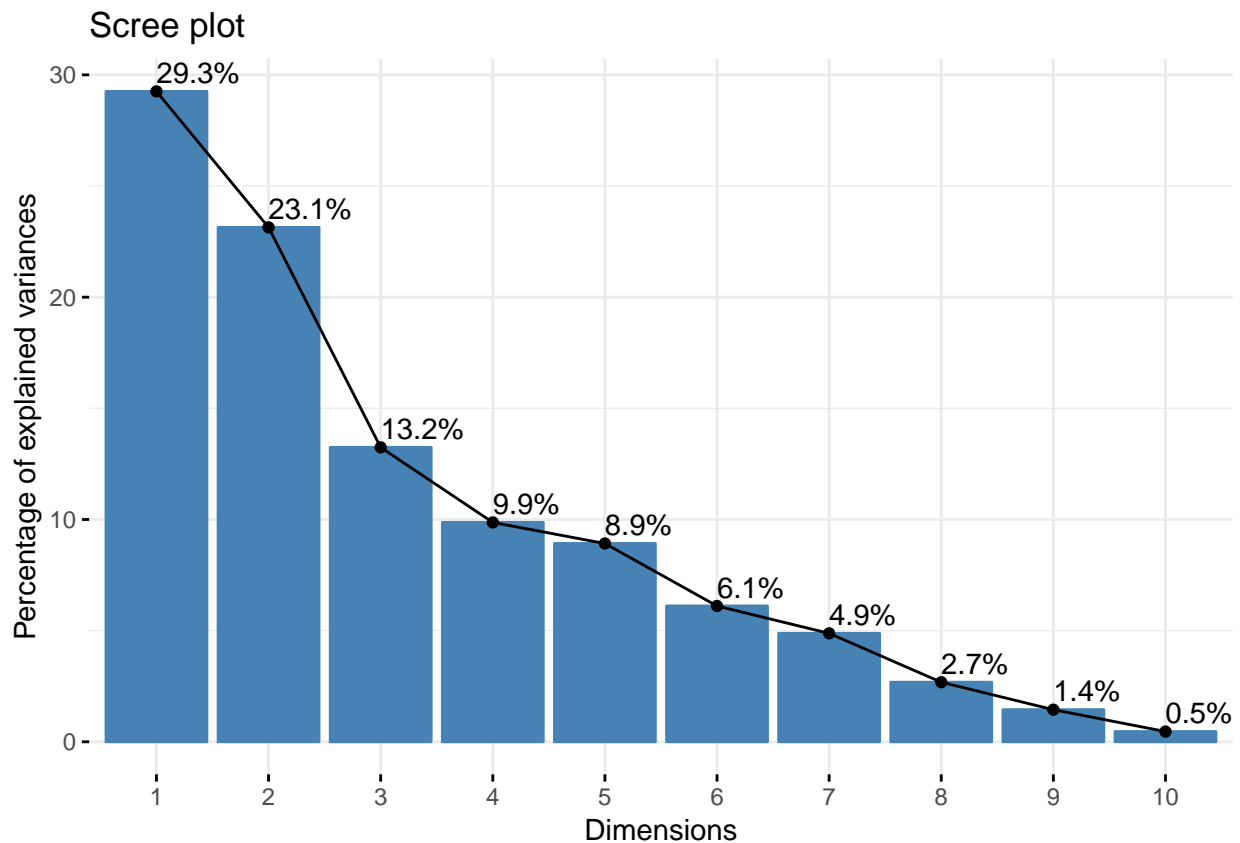
RQ: Le nombre de valeurs propres maximales dans]0,1[est la somme sur les variables (nb modalit   -1) ici $(3-1)+(3-1)+(3-1)+(3-1)+(2-1)+(2-1)=10$

```
mydata.mca$eig
```

```
##      eigenvalue percentage of variance
## dim 1  0.487590671          29.2554403
## dim 2  0.385667752          23.1400651
## dim 3  0.220728360          13.2437016
## dim 4  0.164472270           9.8683362
## dim 5  0.148659735           8.9195841
## dim 6  0.101816275           6.1089765
## dim 7  0.081305114           4.8783069
## dim 8  0.044665793           2.6799476
## dim 9  0.024078978           1.4447387
```

```
## dim 10 0.007681718          0.4609031
##          cumulative percentage of variance
## dim 1          29.25544
## dim 2          52.39551
## dim 3          65.63921
## dim 4          75.50754
## dim 5          84.42713
## dim 6          90.53610
## dim 7          95.41441
## dim 8          98.09436
## dim 9          99.53910
## dim 10         100.00000
```

```
fviz_eig(mydata.mca, addlabels = TRUE)
```



```
## inercie moyenne (Critère de Kaiser)
```

```
# code
```

```
## les commandes sont équivalents
```

```
sum(mydata.mca$eig[,2]>(100/nrow(mydata.mca$eig)), na.rm=TRUE)
```

```
## [1] 3
```

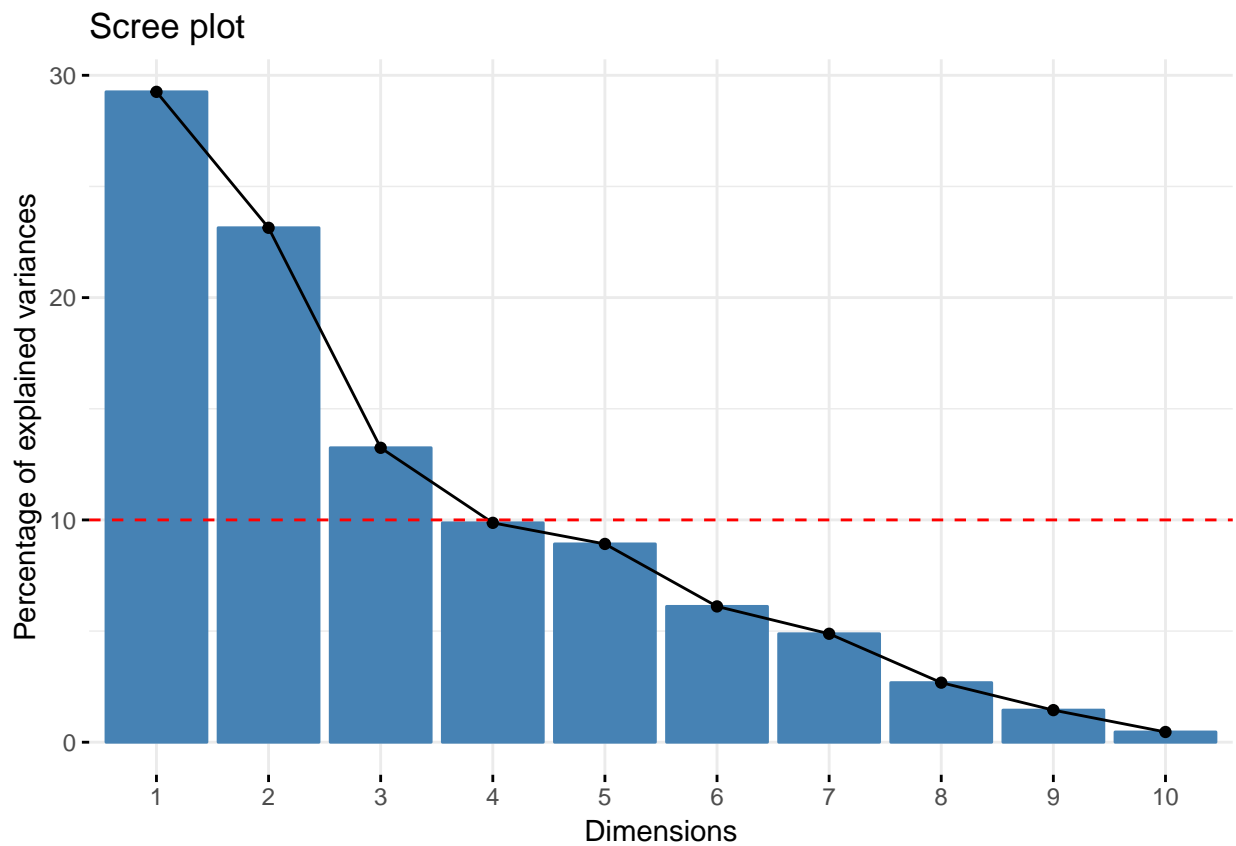
```
sum(mydata.mca$eig[,1]>(sum(mydata.mca$eig[,1])/nrow(mydata.mca$eig)), na.rm=TRUE)
```

```
## [1] 3
```

```
### graphiquement
```

```
fviz_screplot (mydata.mca) +
```

```
geom_hline (yintercept = 100/nrow(mydata.mca$eig), linetype = 2, color = "red")
```



```
## inercie totale,
```

```
# code
```

```
which(mydata.mca$eig[,3]>80)[1]
```

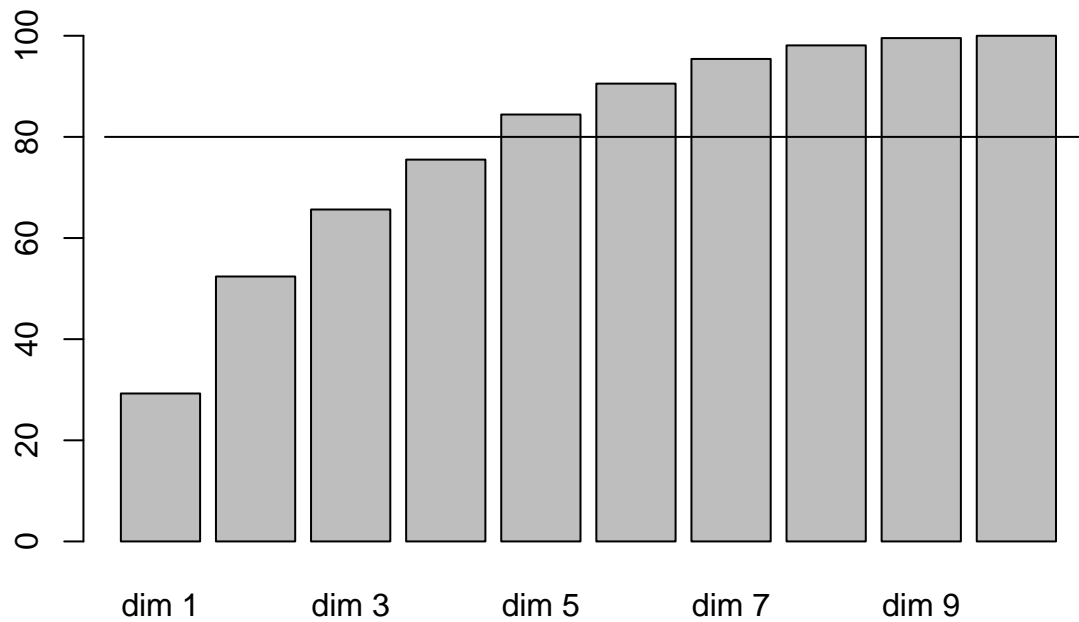
```
## dim 5
```

```
## 5
```

```
##graphiquement
```

```
barplot(mydata.mca$eig[,3])
```

```
lines(c(0,20),c(80,80))
```



##Q2##

mydata.mca\$var\$contrib

##	Dim 1	Dim 2	Dim 3
## Taille_1	12.553839	8.704555e+00	8.68815258
## Taille_2	4.535510	1.224454e+01	13.46697104
## Taille_3	13.322448	2.307632e-05	0.01105694
## Poids_1	14.010709	7.906445e+00	4.23412382
## Poids_2	1.922595	1.479251e+01	1.35478624
## Poids_3	5.829749	8.288840e+00	20.70679054
## Vélodité_1	1.582963	1.736933e+01	3.60747890
## Vélodité_2	3.637845	1.024184e+01	3.47591976
## Vélodité_3	9.762175	1.892912e+00	14.13634026
## Intelligence_1	1.101761	8.530147e+00	2.07170863
## Intelligence_2	3.299734	1.119923e+00	13.20977953
## Intelligence_3	1.578185	3.016142e+00	10.36832982
## Affection_1	10.750805	2.095476e+00	1.06659687
## Affection_2	9.982890	1.945799e+00	0.99041137
## Agressivité_1	2.950901	8.914721e-01	1.25741474
## Agressivité_2	3.177893	9.600469e-01	1.35413895

mydata.mca\$var\$cos2

##	Dim 1	Dim 2	Dim 3
## Taille_1	0.49581192	2.719224e-01	0.1553354552
## Taille_2	0.16284478	3.477347e-01	0.2188872152
## Taille_3	0.87694667	1.201472e-06	0.0003294784
## Poids_1	0.58247448	2.599896e-01	0.0796861975
## Poids_2	0.11681934	7.109302e-01	0.0372649528
## Poids_3	0.20931365	2.353962e-01	0.3365605898
## Vélodité_1	0.07355161	6.383552e-01	0.0758801234
## Vélodité_2	0.15123804	3.367850e-01	0.0654167993
## Vélodité_3	0.42839511	6.570317e-02	0.2808262078
## Intelligence_1	0.04580407	2.804990e-01	0.0389895501
## Intelligence_2	0.17376329	4.664716e-02	0.3149034805

```
## Intelligence_3 0.06233016 9.422151e-02 0.1853753391
## Affection_1 0.60657339 9.351538e-02 0.0272424033
## Affection_2 0.60657339 9.351538e-02 0.0272424033
## Agressivité_1 0.17930056 4.284427e-02 0.0345866377
## Agressivité_2 0.17930056 4.284427e-02 0.0345866377
```

```
mydata.mca$var$coord
```

```
##           Dim 1           Dim 2           Dim 3
## Taille_1      1.1902124  0.8814312493 -0.66619486
## Taille_2      0.8464733 -1.2369449391  0.98137849
## Taille_3     -0.8375902  0.0009803967 -0.01623523
## Poids_1       1.1761704  0.7857960033 -0.43503416
## Poids_2      -0.3293556 -0.8124958119 -0.18601927
## Poids_3      -0.9596770  1.0177146680  1.21690862
## Vélocité_1    0.3536067  1.0417311970  0.35916042
## Vélocité_2    0.5993249 -0.8943513681  0.39416354
## Vélocité_3   -0.9256296 -0.3625001139 -0.74943473
## Intelligence_1 -0.3298252  0.8162016046 -0.30430278
## Intelligence_2  0.4660516 -0.2414724706  0.62739888
## Intelligence_3 -0.4220026 -0.5188490270 -0.72776633
## Affection_1   -0.8082282  0.3173466033  0.17128331
## Affection_2    0.7504976 -0.2946789888 -0.15904879
## Agressivité_1  0.4080360 -0.1994591783 -0.17920983
## Agressivité_2 -0.4394234  0.2148021920  0.19299520
```

```
sign(mydata.mca$var$coord)
```

```
##           Dim 1 Dim 2 Dim 3
## Taille_1         1     1    -1
## Taille_2         1    -1     1
## Taille_3        -1     1    -1
## Poids_1          1     1    -1
## Poids_2         -1    -1    -1
## Poids_3         -1     1     1
## Vélocité_1       1     1     1
## Vélocité_2       1    -1     1
## Vélocité_3      -1    -1    -1
## Intelligence_1   -1     1    -1
## Intelligence_2    1    -1     1
## Intelligence_3   -1    -1    -1
## Affection_1     -1     1     1
## Affection_2      1    -1    -1
## Agressivité_1    1    -1    -1
## Agressivité_2   -1     1     1
```

#Q 3

```
Taille=colSums(mydata.mca$var$contrib[1:3,])
Poid=colSums(mydata.mca$var$contrib[4:6,])
Vélocité=colSums(mydata.mca$var$contrib[7:9,])
Intelligence=colSums(mydata.mca$var$contrib[10:12,])
Affection=colSums(mydata.mca$var$contrib[12:14,])
Agressivité=colSums(mydata.mca$var$contrib[14:16,])
rbind(Taille,Poid,Vélocité,Intelligence,Affection,Agressivité)
```

```
##           Dim 1           Dim 2           Dim 3
```

```
## Taille      30.411797 20.949116 22.166181
## Poids       21.763052 30.987798 26.295701
## Vitesse     14.982983 29.504080 21.219739
## Intelligence 5.979679 12.666212 25.649818
## Affection   22.311880 7.057417 12.425338
## Aggressivité 16.111684 3.797318 3.601965
```

4

```
mydata.mca$ind$contrib
```

```
##          Dim 1      Dim 2      Dim 3
## BEAU 2.10111844 2.17369113 5.71765657
## BASS 0.56486551 11.38631564 0.98243645
## B.AL 2.10111844 2.17369113 5.71765657
## BOXE 1.55161864 7.37413469 7.23383138
## BULD 8.16803372 2.69348375 0.43318803
## BULM 4.19439182 2.97447169 3.02225475
## CANI 5.93132626 0.03987790 6.63864170
## CHIH 5.44955505 6.35455623 4.04841413
## COCK 4.30303195 0.05013761 5.18408763
## COLL 0.09477557 2.52234098 0.92694388
## DAL 3.25124622 9.36400725 4.61695759
## DOBE 6.12510519 0.93187754 3.65246368
## DA.L 8.00267820 2.77932193 0.55185326
## E.BR 1.48580379 10.82905948 0.03220594
## E.FR 0.10894759 2.31498957 1.39016885
## FX.H 5.82864293 0.02102208 1.67906747
## FX.T 6.06211255 0.14101775 0.00441401
## GBLG 1.99121023 0.08840951 0.13397424
## LABR 3.25124622 9.36400725 4.61695759
## LEVR 3.44762033 0.03981654 3.37330515
## MAST 3.94969799 8.03718894 5.54045425
## PEKI 5.44955505 6.35455623 4.04841413
## POIN 3.67647489 1.71575624 6.01235105
## ST-B 2.14281499 3.82340445 13.74714214
## SETT 1.77749654 1.16463313 0.23305630
## TECK 8.16803372 2.69348375 0.43318803
## T.NE 0.82147815 2.59474760 10.02891524
```

```
mydata.mca$ind$cos2
```

```
##          Dim 1      Dim 2      Dim 3
## BEAU 0.19318200 0.158078170 0.2379780727
## BASS 0.03893080 0.620711031 0.0306517673
## B.AL 0.19318200 0.158078170 0.2379780727
## BOXE 0.11183606 0.420403058 0.2360304269
## BULD 0.64266568 0.167625423 0.0154293198
## BULM 0.27815801 0.156023623 0.0907311457
## CANI 0.38024293 0.002022086 0.1926598936
## CHIH 0.38556757 0.355617092 0.1296663063
## COCK 0.28975347 0.002670396 0.1580262244
## COLL 0.01095173 0.230541033 0.0484889401
## DAL 0.23755593 0.541172466 0.1527125209
## DOBE 0.55359781 0.066618921 0.1494408973
## DA.L 0.53895247 0.148051191 0.0168244731
```

```
## E.BR 0.09451162 0.544844311 0.0009273902
## E.FR 0.01169406 0.196541690 0.0675488576
## FX.H 0.55756256 0.001590595 0.0727104867
## FX.T 0.44081779 0.008110859 0.0001453019
## GBLG 0.18220281 0.006398746 0.0055496040
## LABR 0.23755593 0.541172466 0.1527125209
## LEVR 0.33582962 0.003067758 0.1487503335
## MAST 0.27298068 0.439369729 0.1733469229
## PEKI 0.38556757 0.355617092 0.1296663063
## POIN 0.33802415 0.124775596 0.2502437311
## ST-B 0.16426904 0.231835114 0.4770745045
## SETT 0.20103461 0.104185949 0.0119323415
## TECK 0.64266568 0.167625423 0.0154293198
## T.NE 0.06389477 0.159632893 0.3531230245
```

```
mydata.mca$ind$coord
```

```
##          Dim 1      Dim 2      Dim 3
## BEAU -0.5259384 -0.47575949 -0.58374071
## BASS  0.2726981  1.08888034 -0.24197092
## B.AL -0.5259384 -0.47575949 -0.58374071
## BOXE  0.4519622 -0.87628238  0.65659133
## BULD  1.0369751  0.52959725 -0.16067532
## BULM -0.7430945  0.55653626  0.42440108
## CANI  0.8836606 -0.06443988 -0.62899988
## CHIH  0.8470130  0.81345055 -0.49119441
## COCK  0.7526566  0.07225541  0.55583657
## COLL -0.1117012 -0.51249596 -0.23503778
## DAL   0.6542361 -0.98745978  0.52455242
## DOBE -0.8979794 -0.31150711 -0.46655613
## DA.L -1.0264251  0.53796989  0.18135217
## E.BR  0.4422729 -1.06190072  0.04381058
## E.FR -0.1197618 -0.49097917  0.28783575
## FX.H -0.8759782  0.04678712 -0.31633338
## FX.T  0.8933499  0.12117846 -0.01621913
## GBLG -0.5119978 -0.09594847  0.08935556
## LABR  0.6542361 -0.98745978  0.52455242
## LEVR -0.6737043 -0.06439028 -0.44837229
## MAST -0.7210934  0.91483050  0.57462384
## PEKI  0.8470130  0.81345055 -0.49119441
## POIN -0.6957054 -0.42268452 -0.59859504
## ST-B -0.5311313  0.63097720  0.90514293
## SETT -0.4837422 -0.34824358 -0.11785320
## TECK  1.0369751  0.52959725 -0.16067532
## T.NE -0.3288574  0.51979980  0.77310402
```

```
sign(mydata.mca$ind$coord)
```

```
##          Dim 1 Dim 2 Dim 3
## BEAU      -1    -1    -1
## BASS       1     1    -1
## B.AL      -1    -1    -1
## BOXE       1    -1     1
## BULD       1     1    -1
## BULM      -1     1     1
```

```

## CANI      1      -1      -1
## CHIH      1       1      -1
## COCK      1       1       1
## COLL     -1      -1      -1
## DAL       1      -1       1
## DOBE     -1      -1      -1
## DA.L     -1       1       1
## E.BR      1      -1       1
## E.FR     -1      -1       1
## FX.H     -1       1      -1
## FX.T      1       1      -1
## GBLG     -1      -1       1
## LABR      1      -1       1
## LEVR     -1      -1      -1
## MAST     -1       1       1
## PEKI      1       1      -1
## POIN     -1      -1      -1
## ST-B     -1       1       1
## SETT     -1      -1      -1
## TECK      1       1      -1
## T.NE     -1       1       1

```

```
###5
```

```
mydata.mca$quali.sup
```

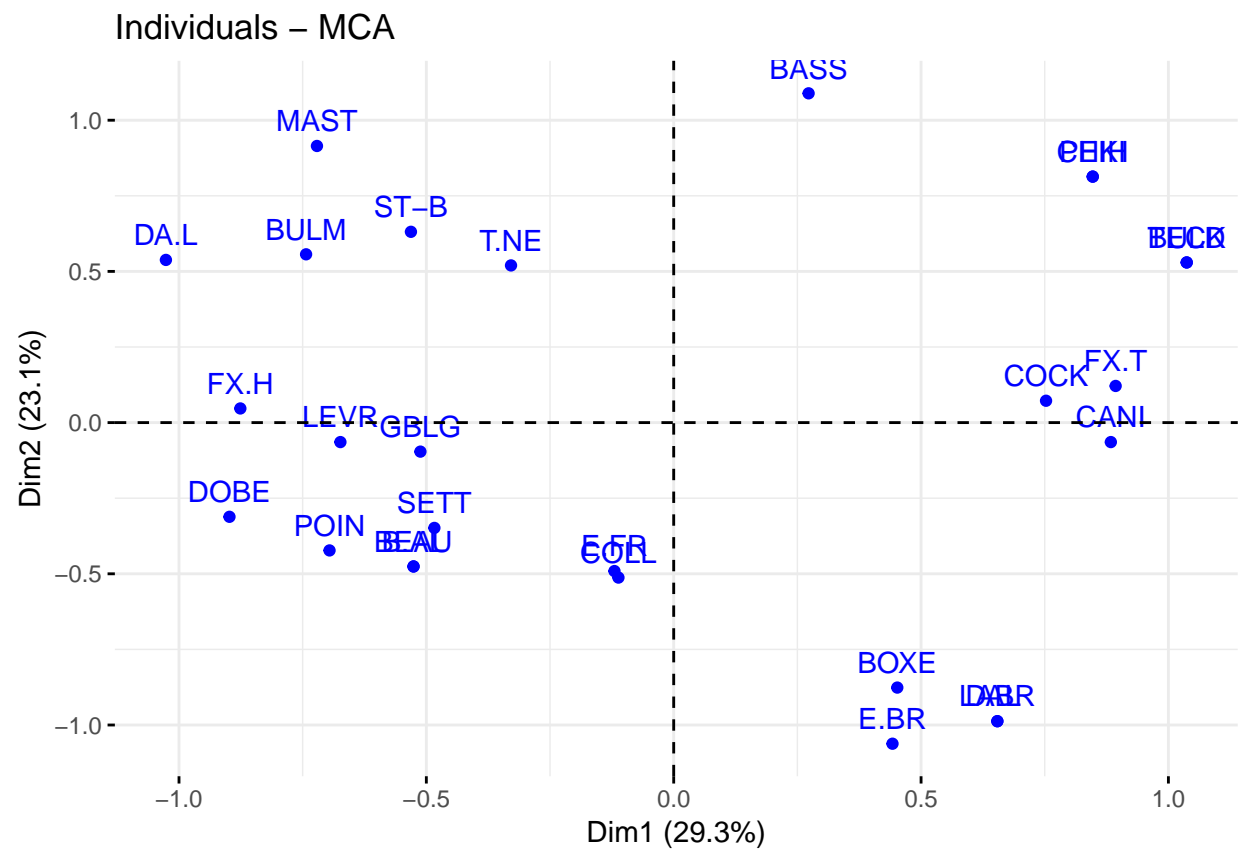
```

## $coord
##           Dim 1           Dim 2           Dim 3
## Fonction_1  1.0443049  0.07066607 -0.09514675
## Fonction_2 -0.3169202 -0.41793846 -0.18389428
## Fonction_3 -0.9488459  0.38184818  0.32581450
##
## $cos2
##           Dim 1           Dim 2           Dim 3
## Fonction_1  0.64151341  0.002937466  0.005325237
## Fonction_2  0.05021921  0.087336276  0.016908553
## Fonction_3  0.37907730  0.061392855  0.044696878
##
## $v.test
##           Dim 1           Dim 2           Dim 3
## Fonction_1  4.084036  0.2763587 -0.3720970
## Fonction_2 -1.142672 -1.5068985 -0.6630403
## Fonction_3 -3.139428  1.2634137  1.0780162
##
## $eta2
##           Dim 1           Dim 2           Dim 3
## Fonction  0.7041534  0.1032761  0.04607865

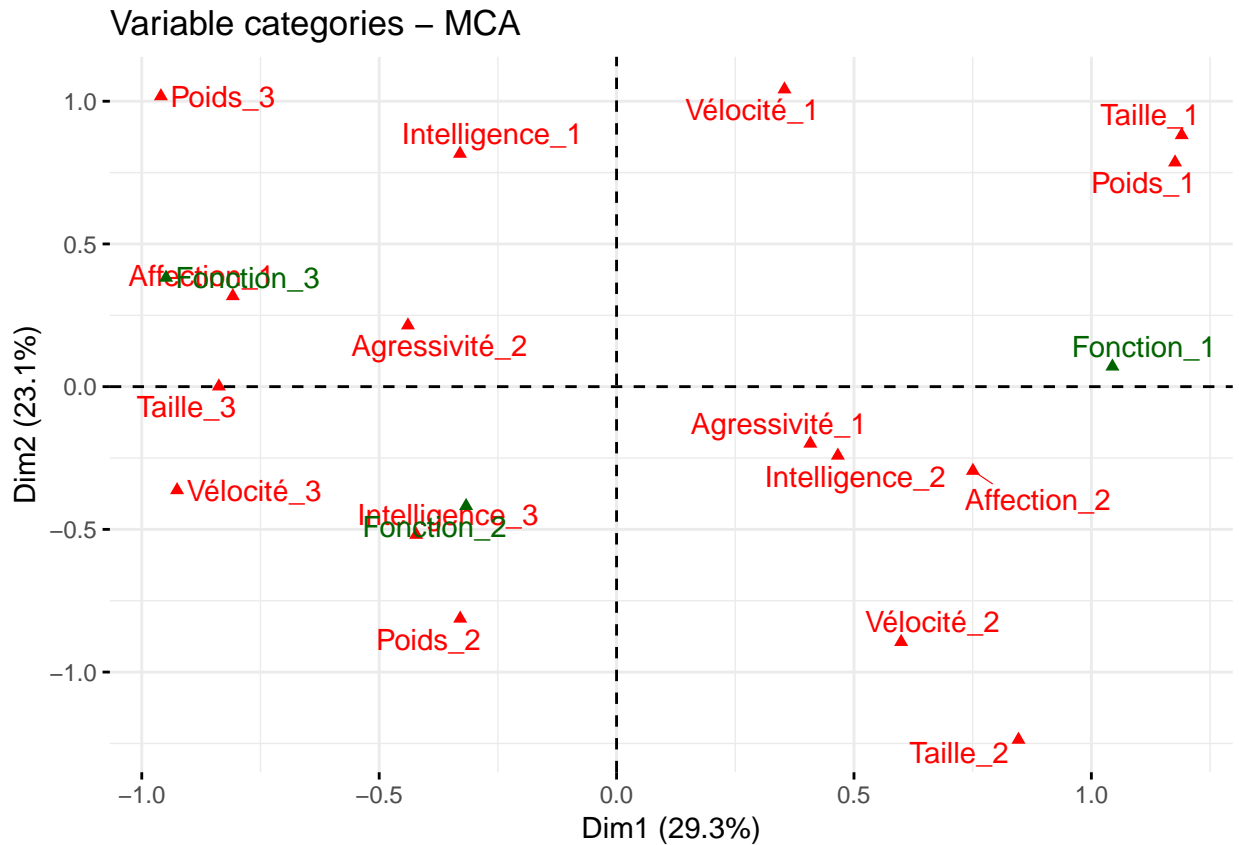
```

```
##6
```

```
fviz_mca_ind(mydata.mca,)
```

```
fviz_mca_var(mydata.mca, repel = TRUE)
```



```
plot(mydata.mca)
```

MCA factor map

