Sensometrics tools
for a product's improvement strategy taking into account the preference of the consumers

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My basics in sensory analysis

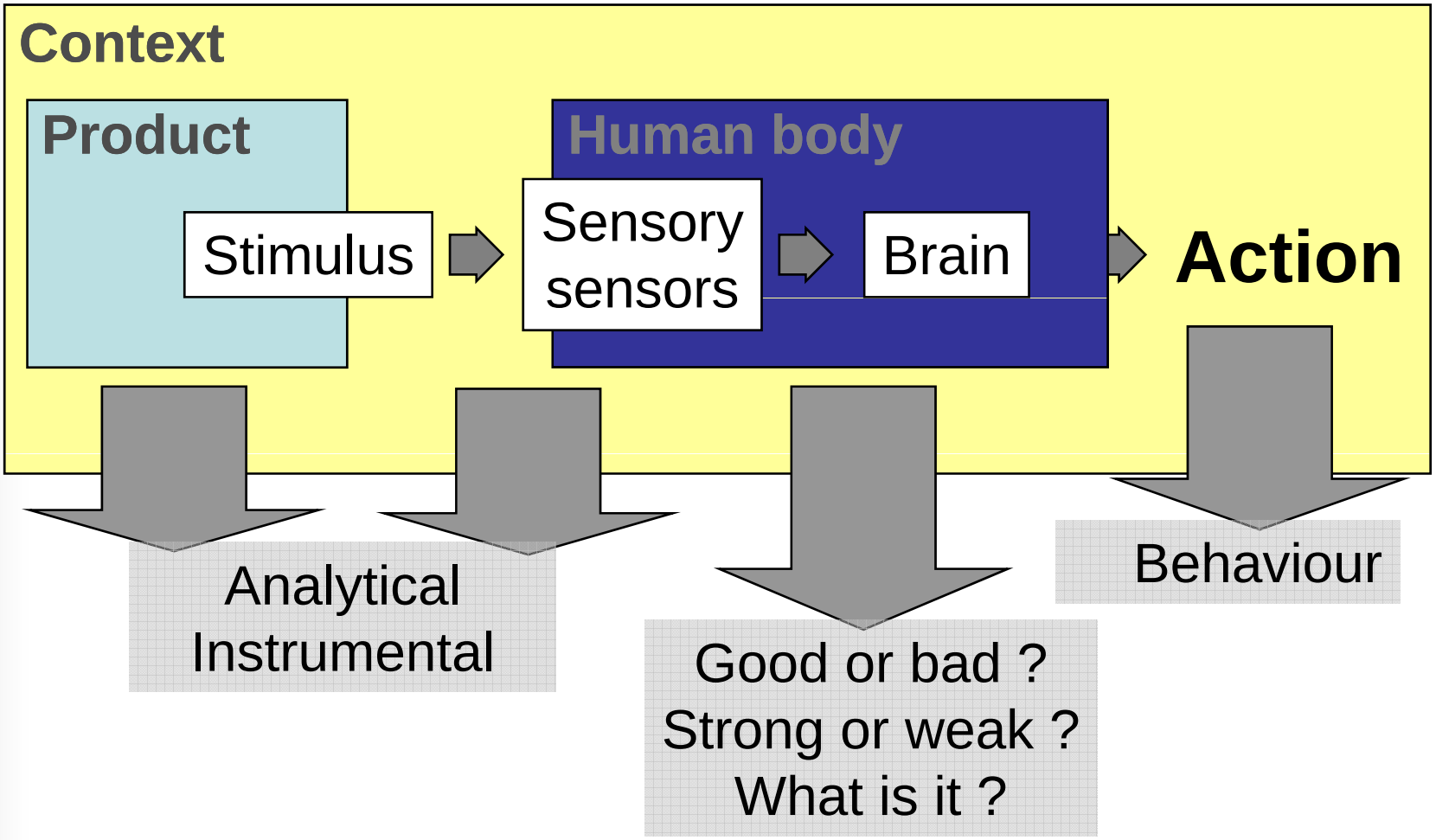
Elementary approach of consumer data

New advance in Quadratic Preference mapping

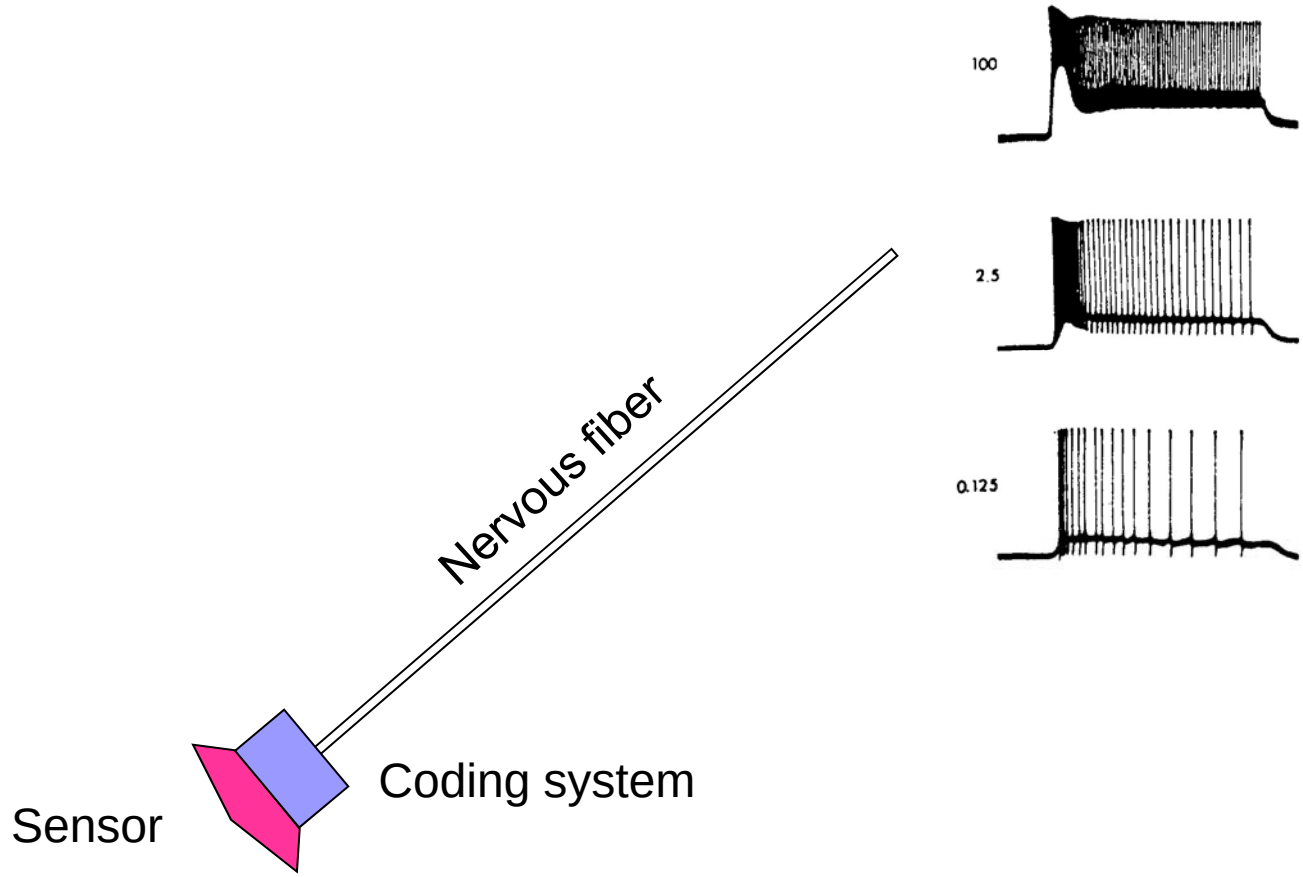
Understand the clusters

Flash profile with consumers

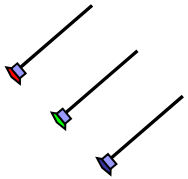
Sensory measurement :
an interaction between the product and the consumer



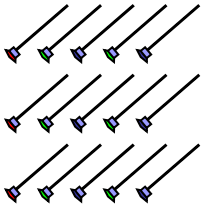
The principles of the sensory system



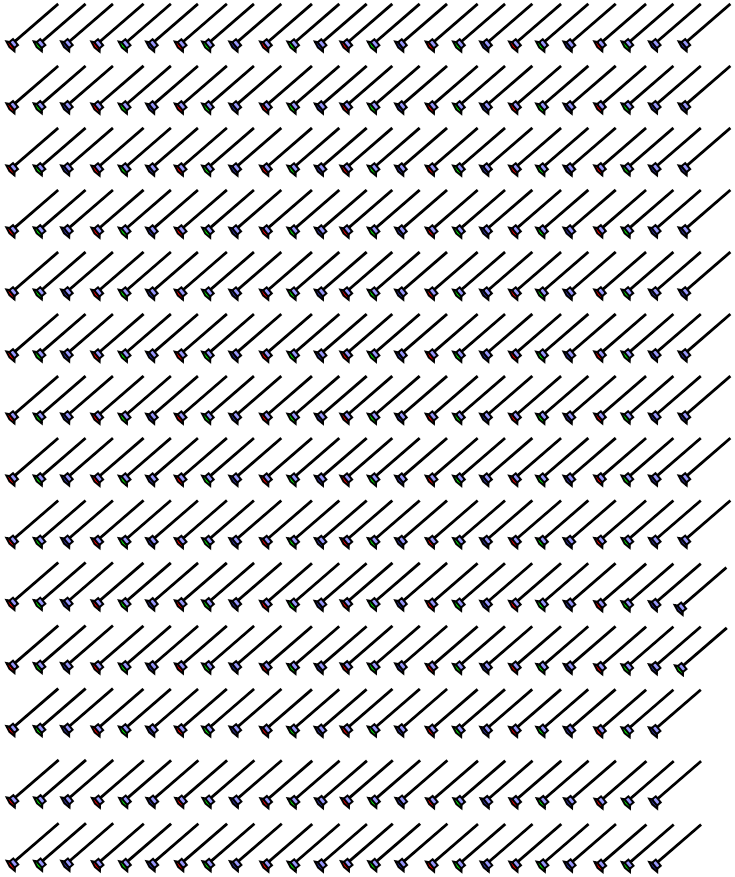
The sight :
3 sensors (proteins)
1 000 000 fibers

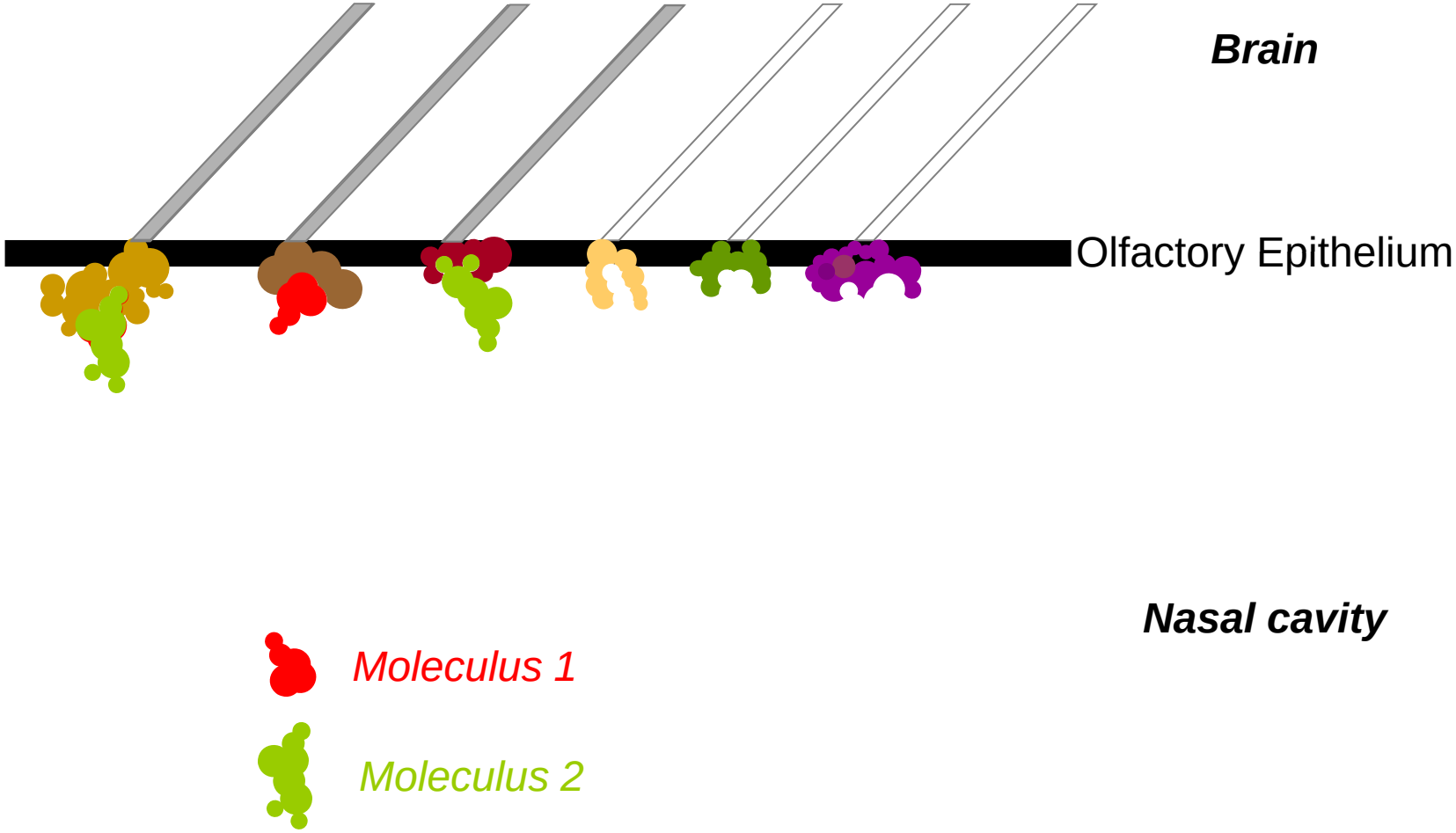


The taste :
15 sensors (proteins)
20 000 fibers

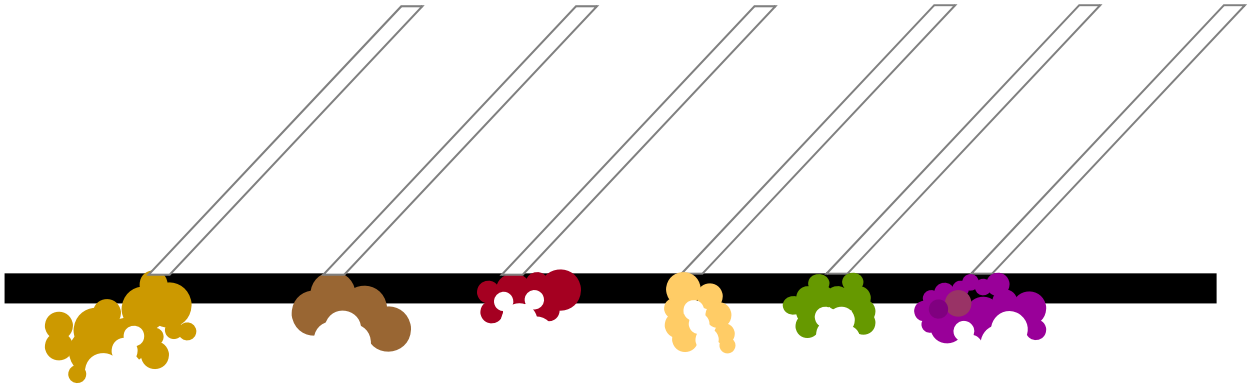


The smell
347 sensors(proteins)
50 000 fibers

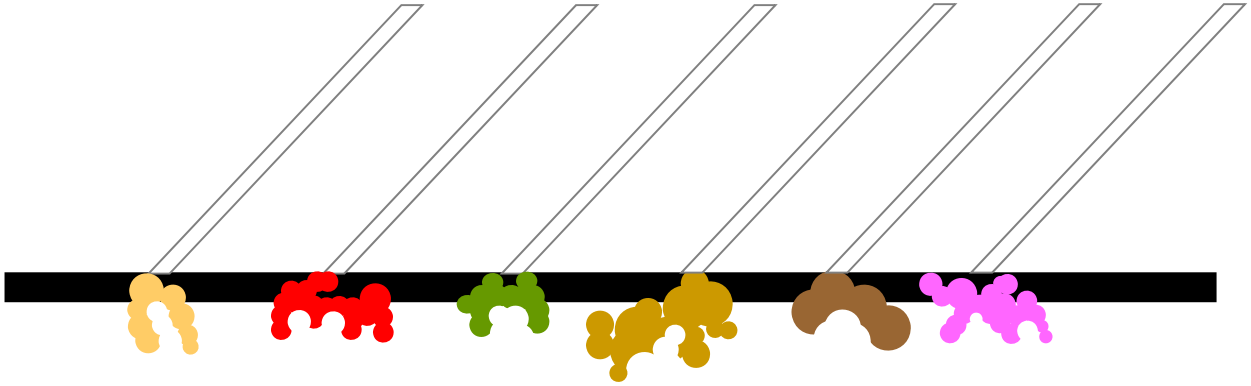



Brain
Olfactory Epithelium
Nasal cavity
Moleculus 1
Moleculus 2

We haven't the same proteins !



Panelist n° 1



Panelist n° 2

Sight : 3 proteins

Taste : 15 proteins

Flavor : 347 proteins

Each of us have between 200 and 250 proteins… but

not all the 347

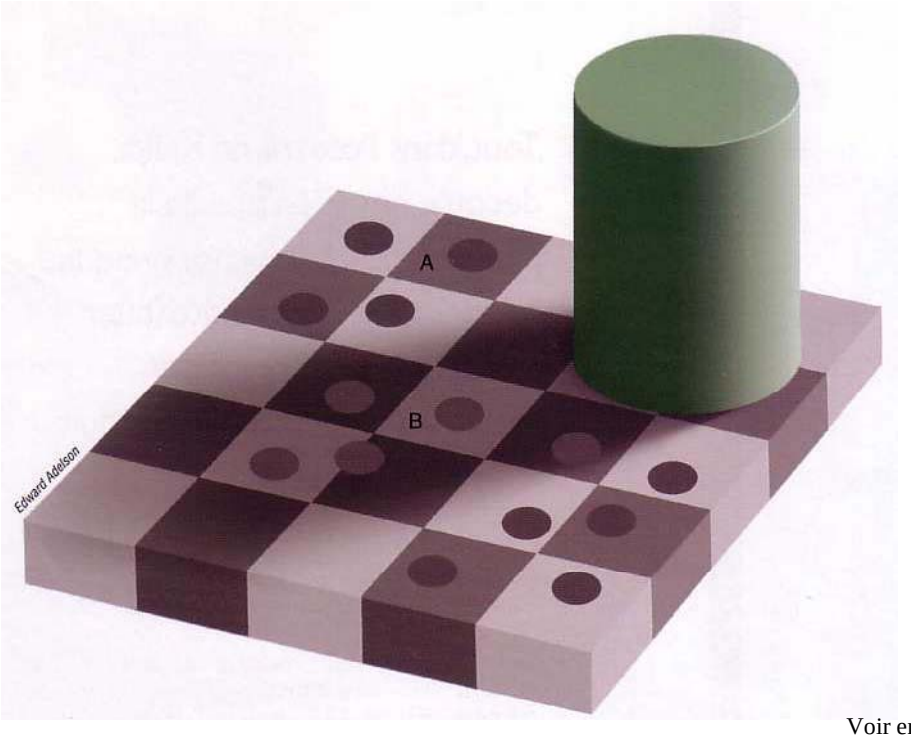
not the same !

Nobody have the same sensations for all the products

We are all strongly partially blind taster for the taste

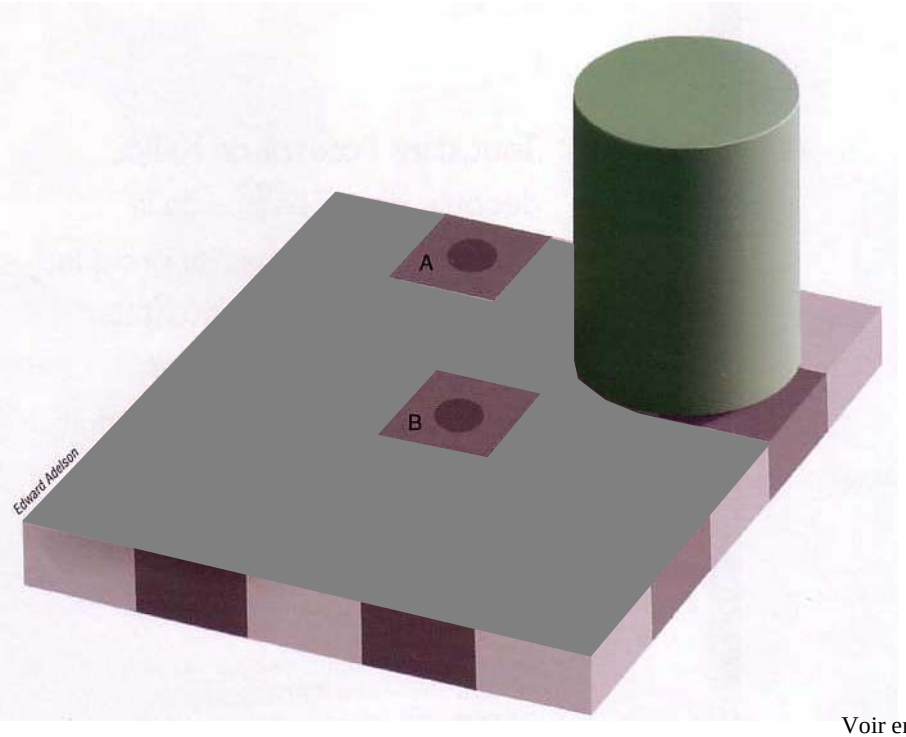
The agreement between people (either experts or consumers) is possible only because the products are complex.
We doesn’t feel the same subsets of moleculus but sufficiently enough to make difference between the products.
We thought that we agree on the attributes, in fact we agree on the products (we learned the products).

Reality versus perception



Voir en noir et blanc.
Alan Gilchrist.
Cerveau et psycho, 2007, n°18, pp. 85-89.

Reality versus perception



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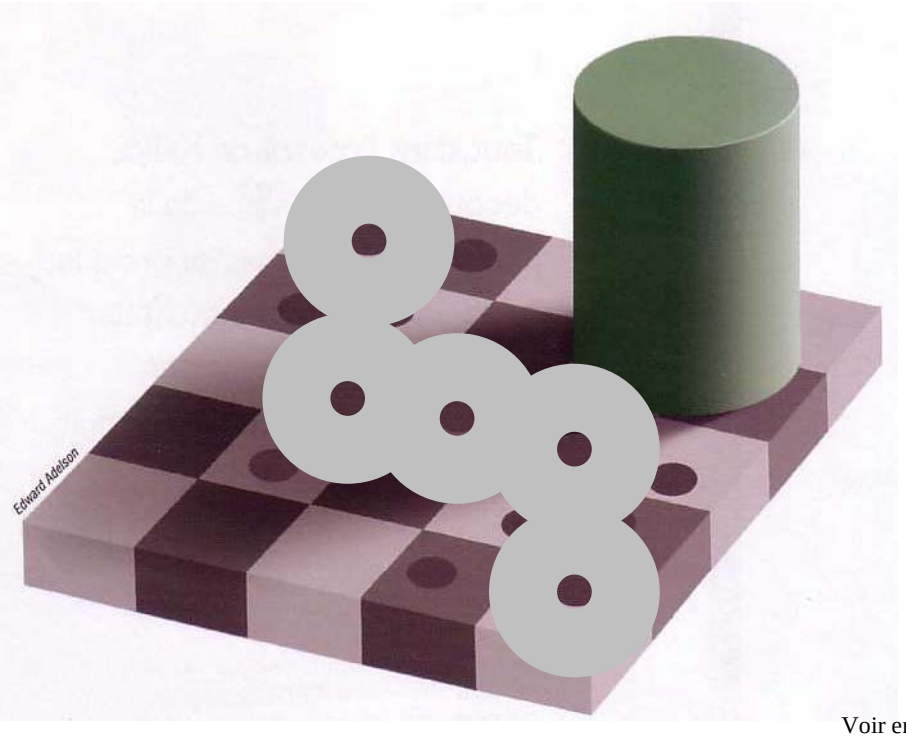
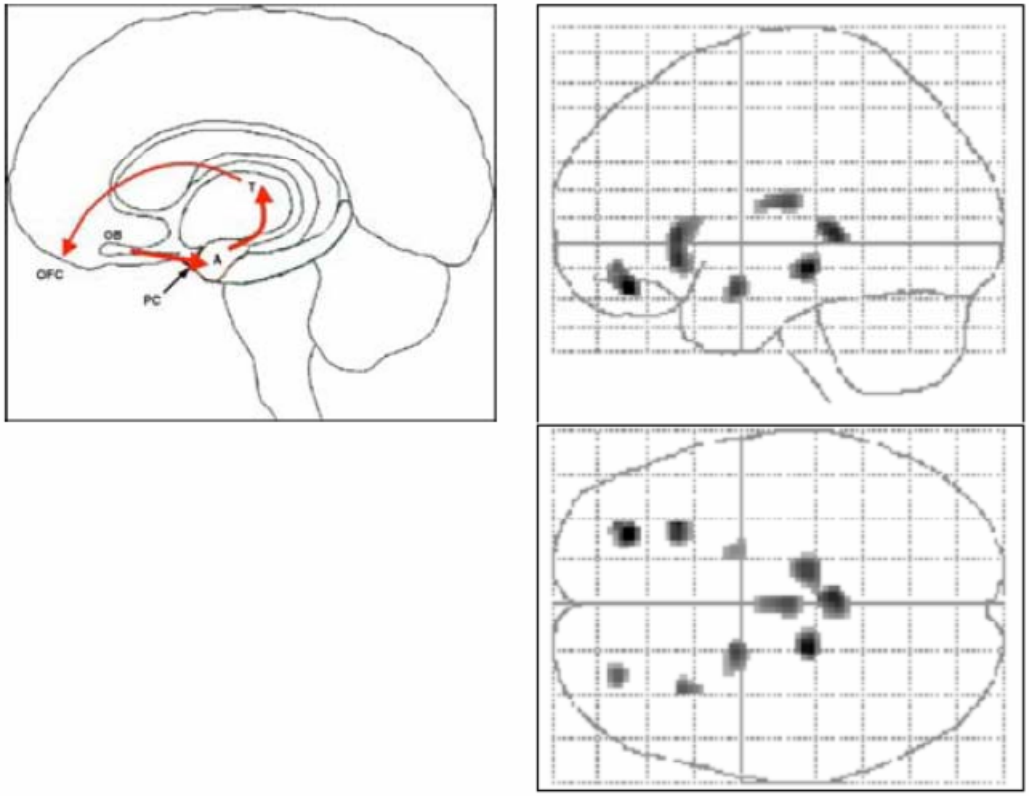
Reality versus perception



Voir en noir et blanc.
Alan Gilchrist.
Cerveau et psycho, 2007, n°18, pp. 85-89.

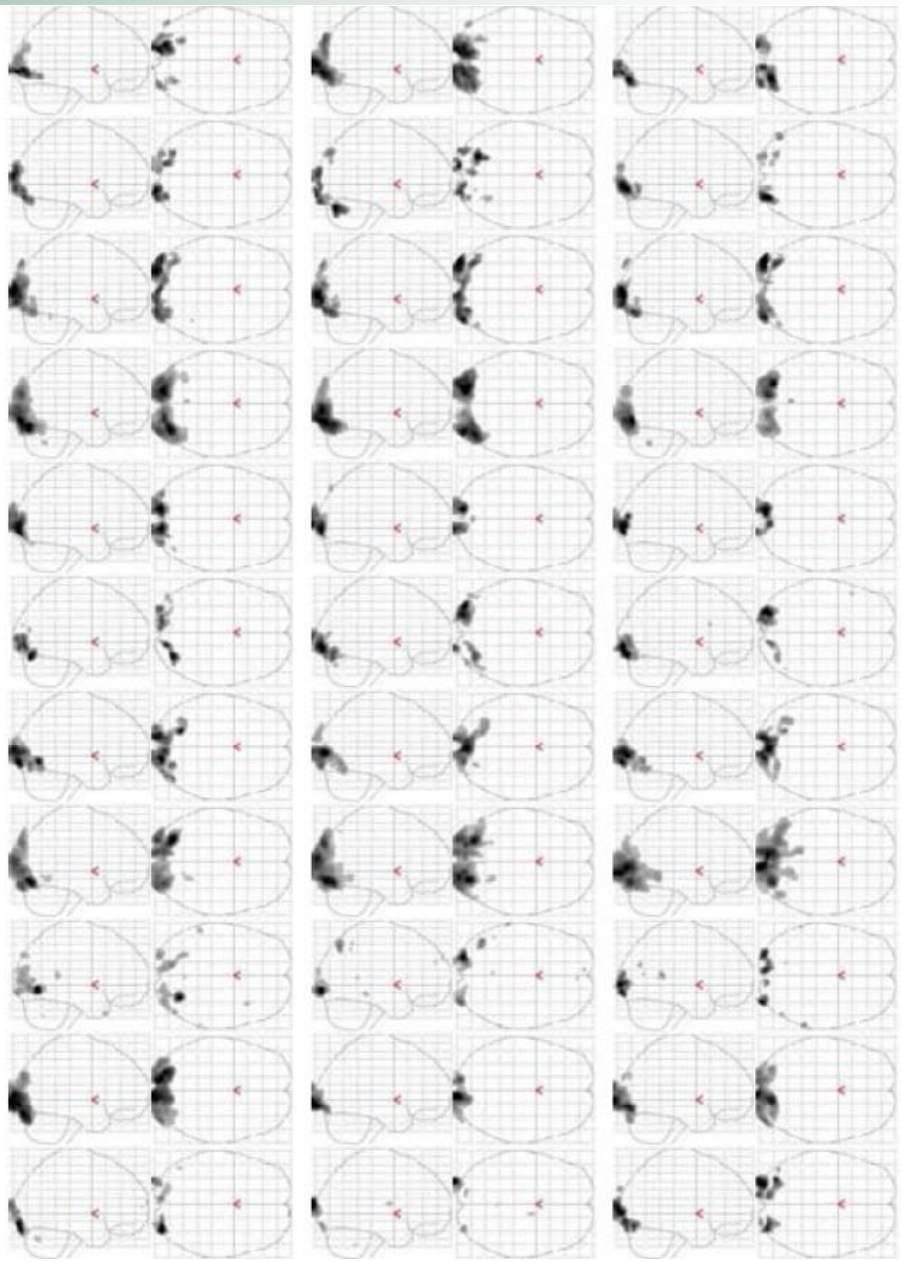
Brain activation during a sensory task



G. Morrot, M. Zanca, F. Barnay, E. Lebars (2007)

Visual task

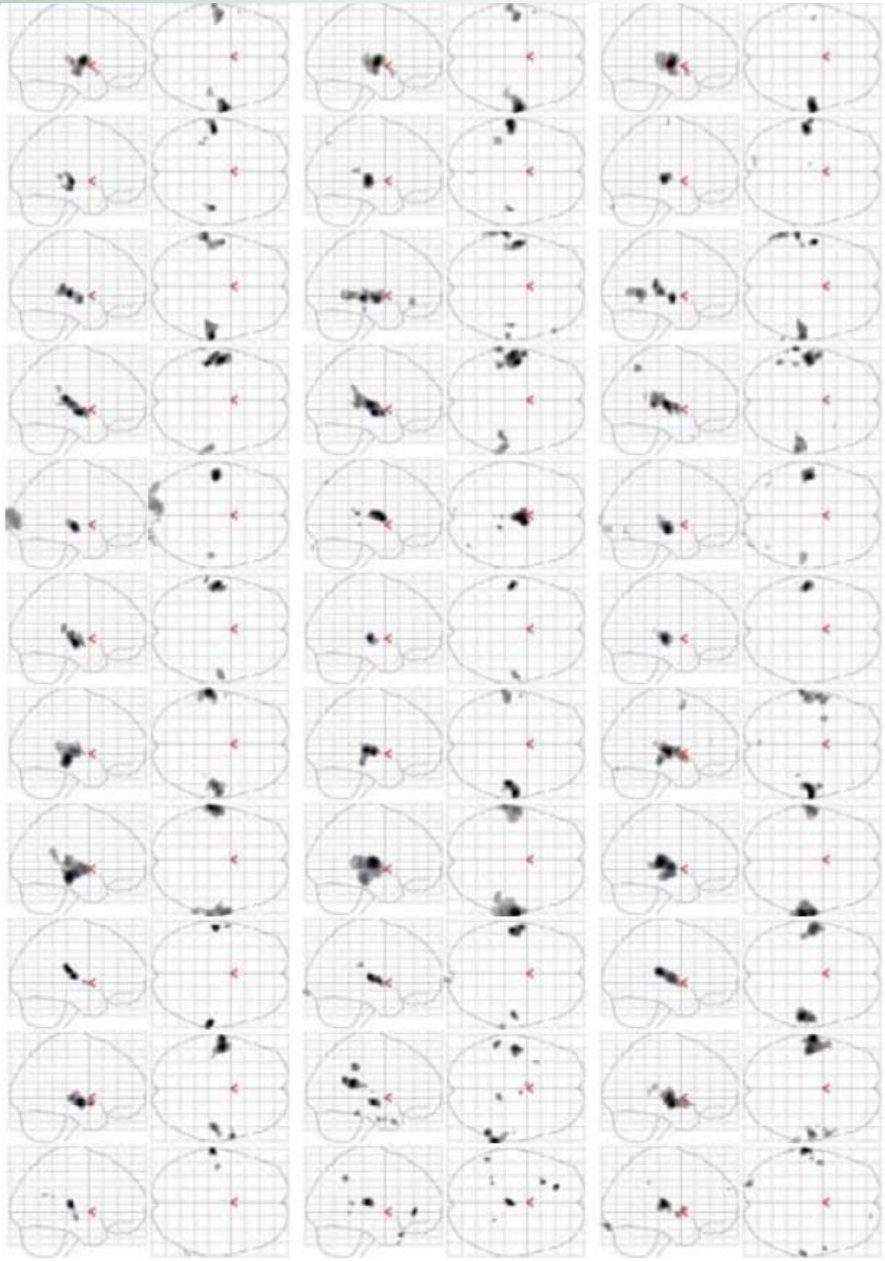
the 33 peoples look the same image



G. Morrot, M. Zanca, F. Barnay, E. Lebars (2007)

Earing task

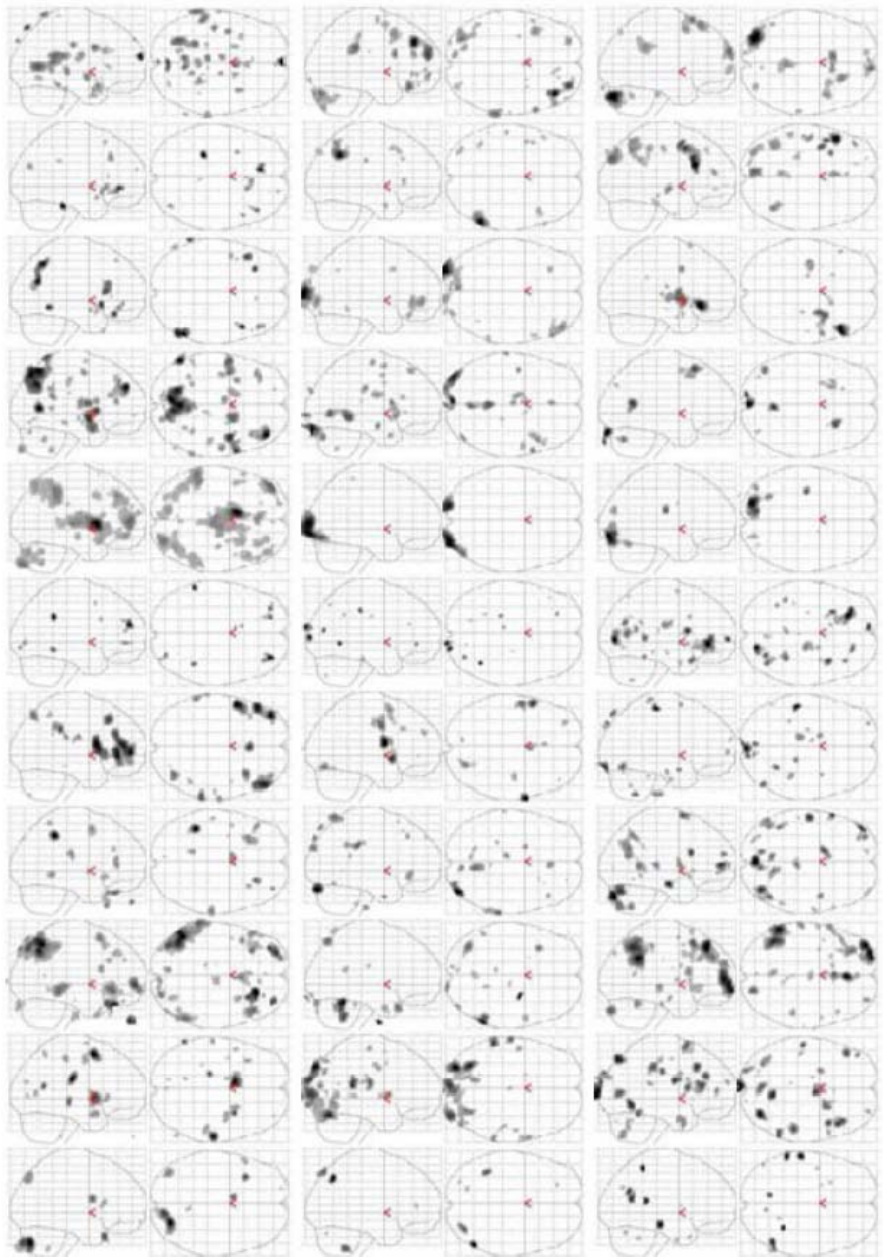
the 33 peoples listen the same music



G. Morrot, M. Zanca, F. Barnay, E. Lebars (2007)

Smelling task

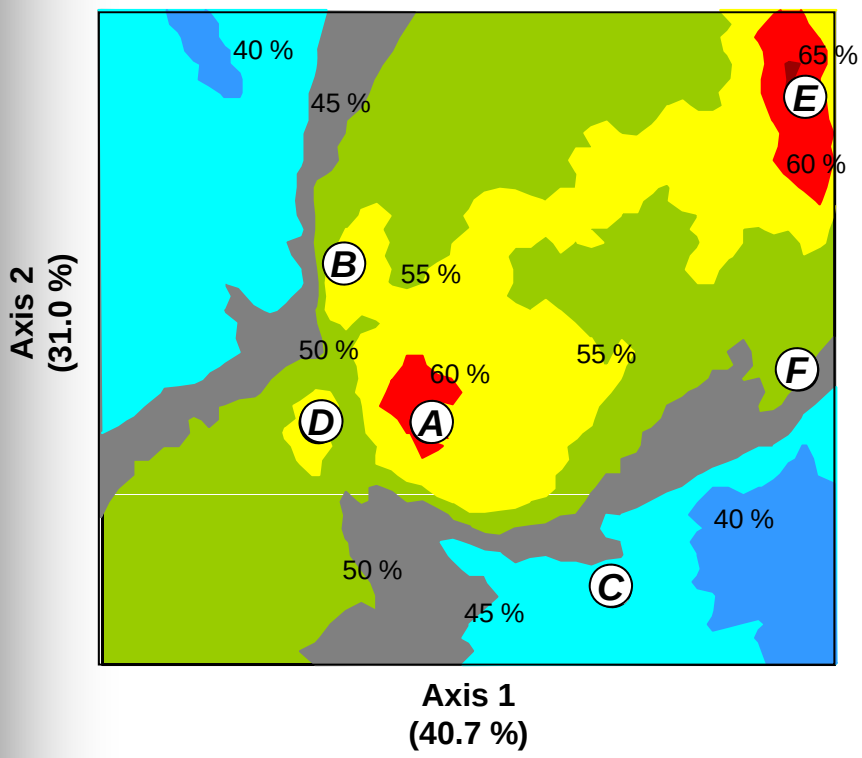
the 33 peoples smell the same product



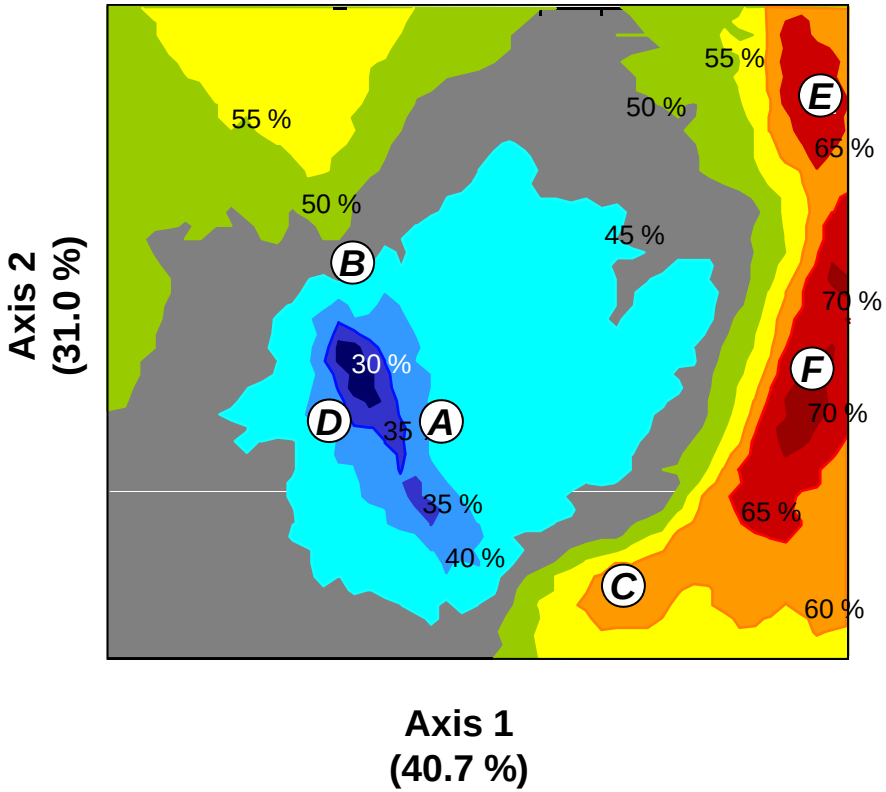
G. Morrot, M. Zanca, F. Barnay, E. Lebars (2007)

STUDY OF CHAMPAGNES

Blind testing



Brand testing



Basic treatments

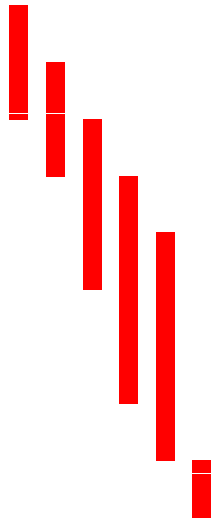
of the consumer preference

	P1	P2	P3	P4	P5	P6	P7	P8	P9
1001	6	6	6	4	6	4	7	4	6
1002	6	3	7	6	5	4	6	5	6
1003	5	4	7	7	4	4	5	4	4
1004	9	5	9	9	9	1	1	9	1
1005	9	7	8	8	9	8	7	8	7
1006	4	4	8	7	6	7	4	4	9
1007	6	7	5	7	5	3	1	5	3
1008	8	8	7	7	8	8	8	8	6
2096	5	6	2	1	2	2	2	2	2
3105	4	2	6	4	5	3	7	6	4
3106	4	3	7	1	8	2	7	6	9
3107	4	6	8	4	6	5	5	7	6
3108	7	7	8	6	5	3	5	5	3

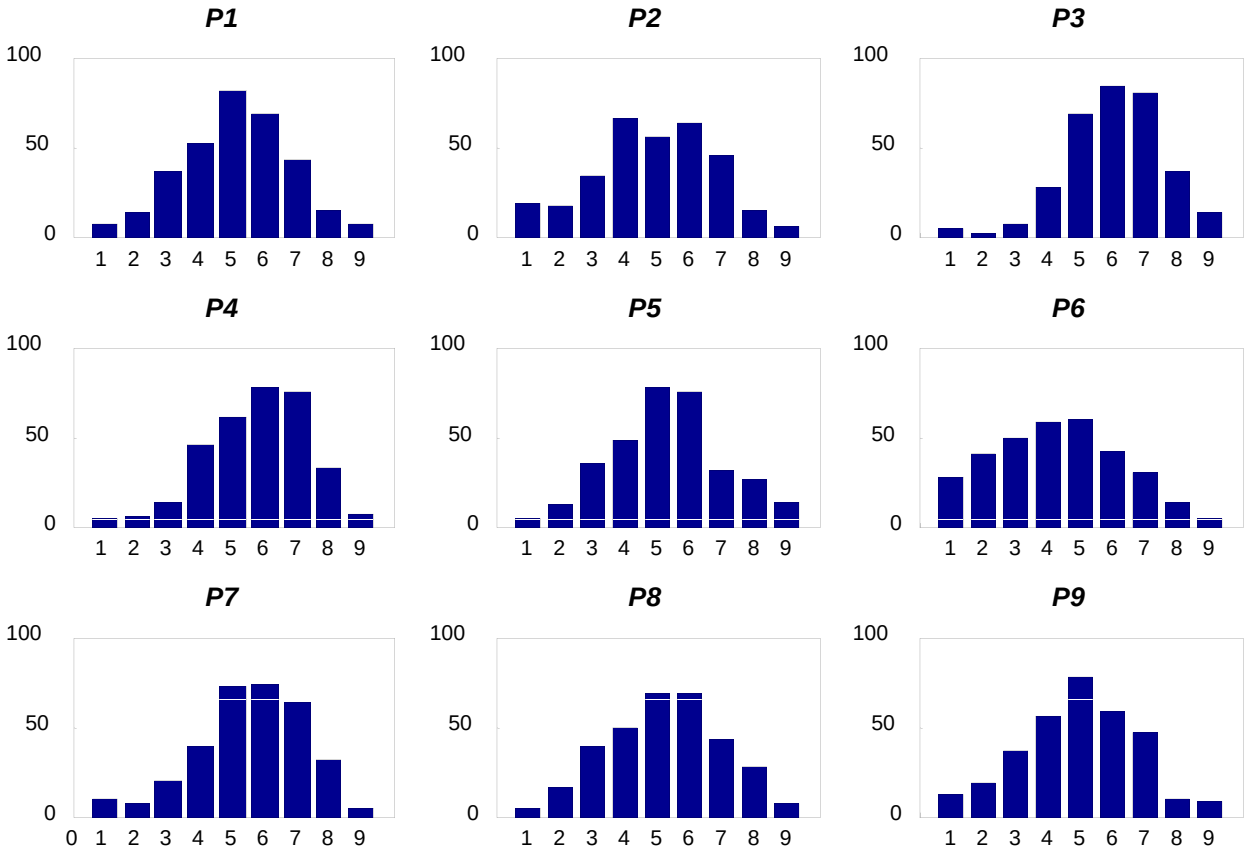
Mean	5,11	4,89	6,06	5,77	5,31	4,31	5,54	5,23	4,94
Standard error	1,68	1,88	1,52	1,59	1,74	1,96	1,70	1,76	1,78
Rank	6	8	1	2	4	9	3	5	7

Source	S.S.	df	M.S.	F	p-value
Product	691,54	8	86,44	36,115	1,3E-54
Consumer	2607,51	322	8,10	3,383	4,3E-65
Residual	6165,79	2576	2,39		
Total	9464,84	2906			

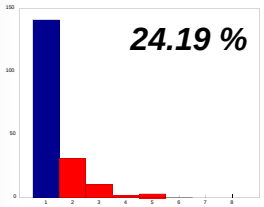
Product	Mean value	Comparisons
P3	6,06	
P4	5,77	
P7	5,54	
P5	5,31	
P8	5,23	
P1	5,11	
P9	4,94	
P2	4,89	
P6	4,31	



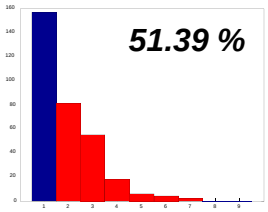
Raw scores



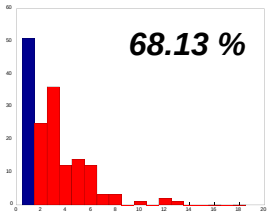
Number of ex-aequo for the maximum score by consumer in different studies



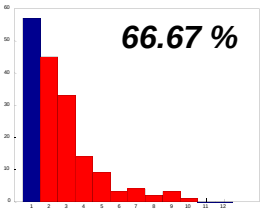
8 products
186 consumers
Food



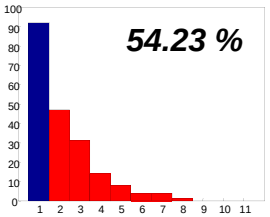
9 products
323 consumers
Beverage



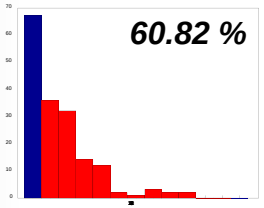
18 products
160 consumers
Perfume



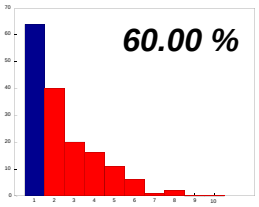
12 products
171 consumers
Food



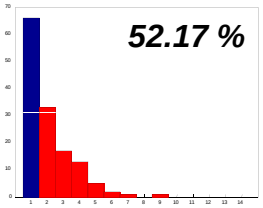
11 products
201 consumers
Foundation



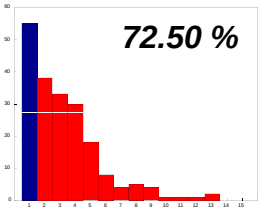
13 products
168 consumers
Food



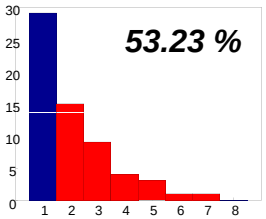
10 products
160 consumers
Cheese



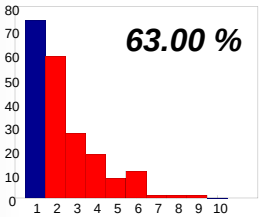
14 products
138 consumers
Food



15 products
200 consumers
Shampoo



8 products
62 consumers
Serum



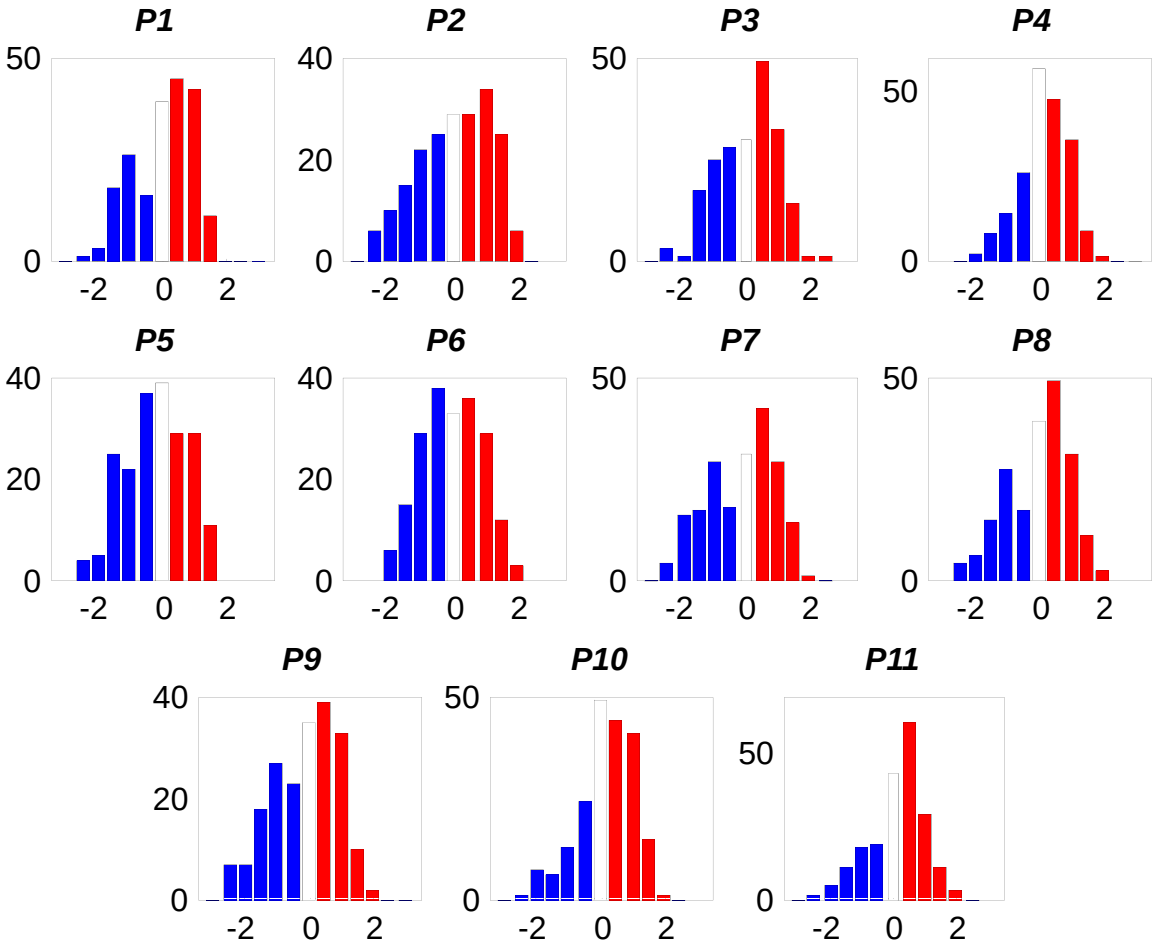
10 products
200 consumers
Make-up

We must work on centered and reduced data by consumer

	P1	P2	P3	P4	P5	P6	P7	P8	P9
1001	6	6	6	4	6	4	7	4	6
1002	6	3	7	6	5	4	6	5	6
1003	5	4	7	7	4	4	5	4	4
1004	9								
1005									
1006									
1007									
1008									
2096									
3105									
3106									
3107									
3108									

	P1	P2	P3	P4	P5	P6	P7	P8	P9
1001	0,491	0,491	0,491	-1,278	0,491	-1,278	1,376	-1,278	0,491
1002	0,544	-1,905	1,361	0,544	-0,272	-1,089	0,544	-0,272	0,544
1003	0,088	-0,700	1,663	1,663	-0,700	-0,700	0,088	-0,700	-0,700
1004	0,860	-0,279	0,860	0,860	0,860	-1,258	-1,258	0,860	-1,258
1005	1,421	-1,137	0,142	0,142	1,421	0,142	-1,137	0,142	-1,137
1006	-0,961	-0,961	1,074	0,565	0,057	0,565	-0,961	-0,961	1,583
1007	0,667	1,167	0,167	1,167	0,167	-0,833	-1,833	0,167	-0,833
1008	0,612	0,612	-0,745	-0,755	0,612	0,612	0,612	0,612	-2,141
2096	1,467	2,010	-0,402	-1,065	-0,402	-0,402	-0,402	-0,402	-0,402
3105	-0,349	-1,607	0,909	-0,349	0,280	-0,978	1,537	0,909	-0,349
3106	-0,434	-0,788	0,631	-1,498	0,986	-1,143	0,631	0,276	1,340
3107	-1,260	0,252	1,764	-1,260	0,252	-0,504	-0,504	1,008	0,252
3108	0,894	0,894	1,469	0,319	-0,255	-1,405	-0,255	-0,255	-1,405

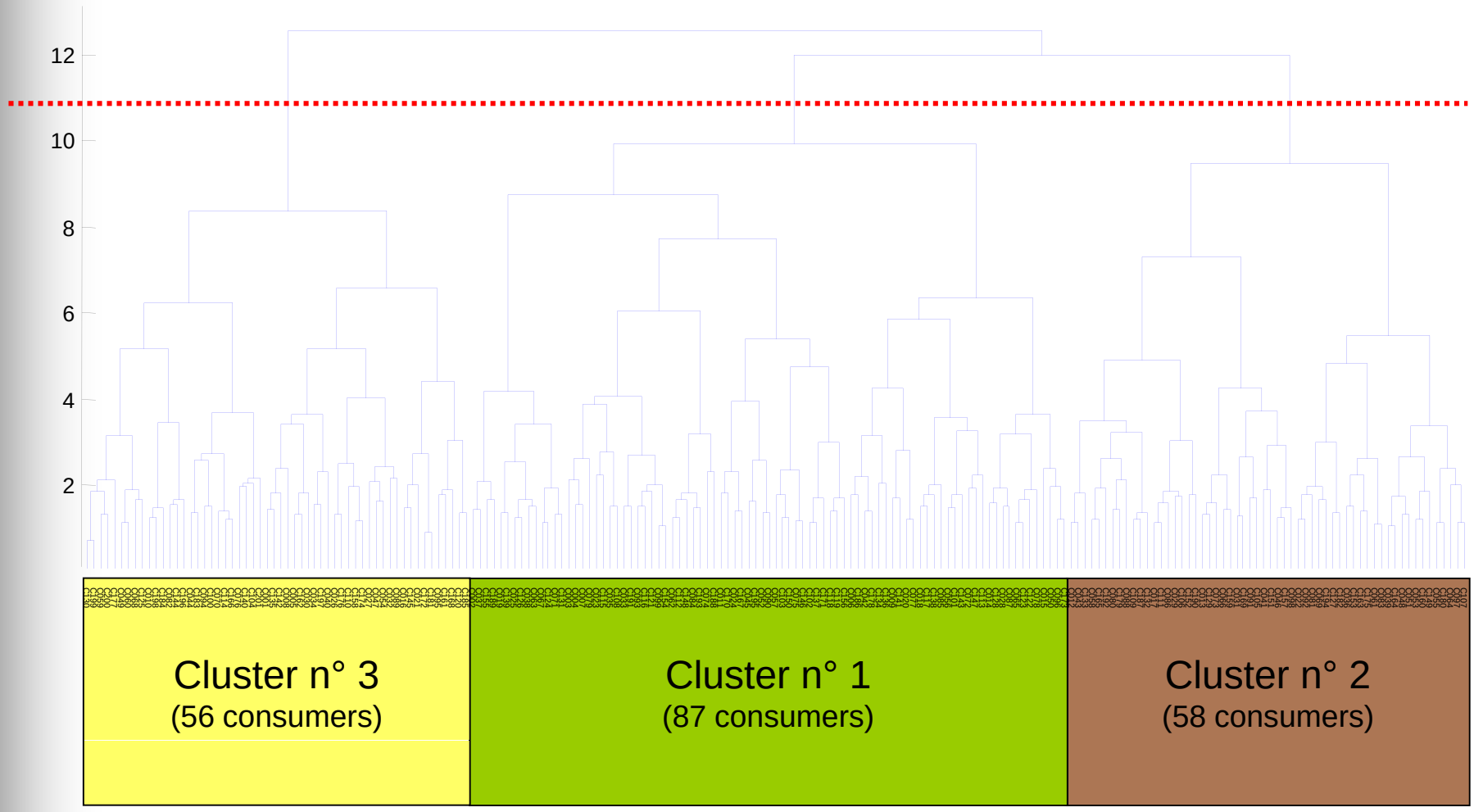
HISTOGRAMS OF THE STANDARDIZED SCORES



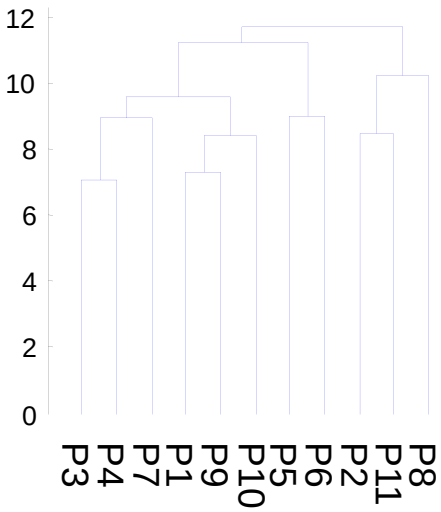
Cluster Analysis

of the consumer preference

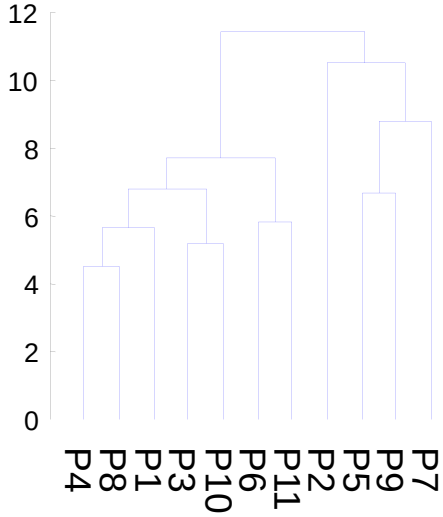
Cluster analysis of the consumers



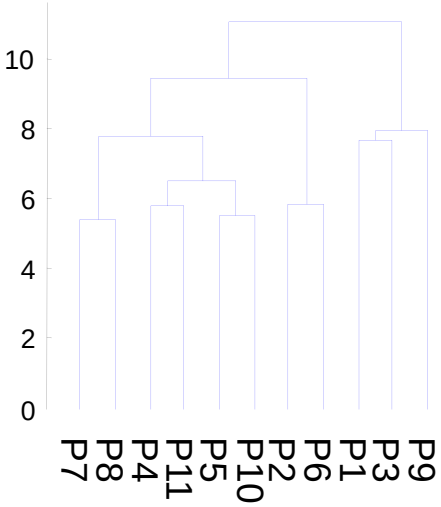
Cluster 1
(87 consumers)



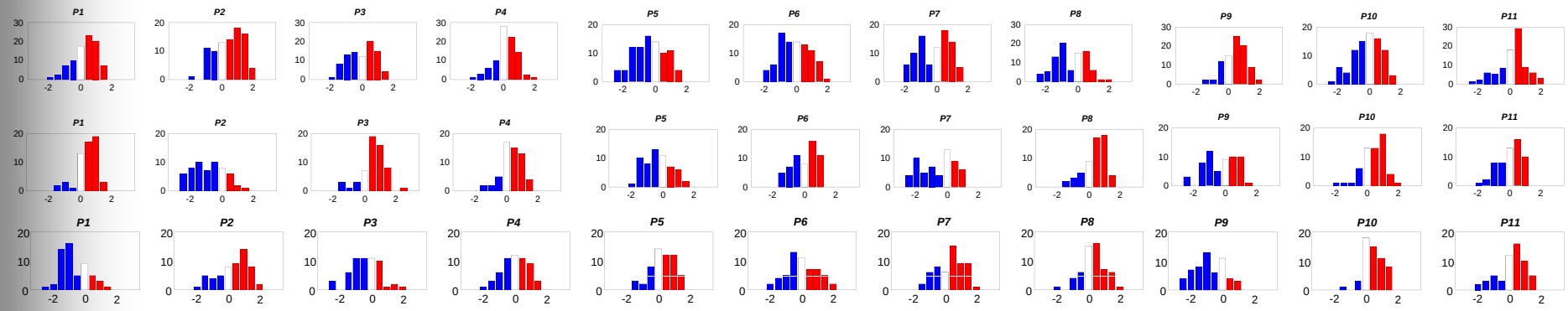
Cluster 2
(58 consumers)



Cluster 3
(56 consumers)

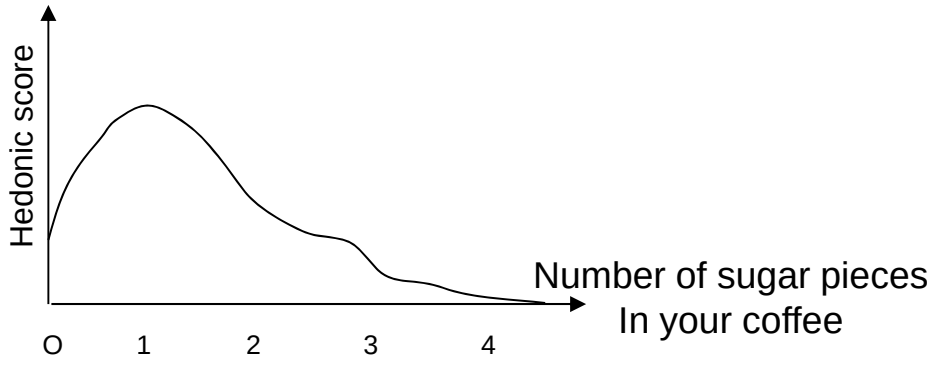


	P1	P2	P3	P4	P5	P6	P7	P8	P9	P10	P11
Cluster n° 1	0,302	0,422	-0,063	0,150	-0,382	-0,136	-0,171	-0,528	0,424	-0,180	0,163
Cluster n° 2	0,452	-0,913	0,557	0,325	-0,325	-0,020	-0,625	0,377	-0,279	0,418	0,032
Cluster n° 3	-0,702	0,335	-0,366	0,013	0,254	-0,002	0,334	0,298	-0,838	0,494	0,178


P1
P2
P3
P4
P5
P6
P7
P8
P9
P10
P11

A quick summary of the quadratic preference mapping

- In quite all cases preference are not linear!



- In most case, the consumers appreciate several products And this products can be very different in their sensory characteristics

Simply mind your own experience !

If you like cheese … Do you always take the same cheese ?

Do you always use the same color for your lipstick ?

You had several cars in your life … always the same color ?

The preference are not linear,
I will fit <u>quadratic models</u> :

$$score = a_0 + a_1.c_1 + a_2.c_2 + a_3.c_1^2 + a_4.c_2^2 + a_5.c_1.c2 + \varepsilon$$

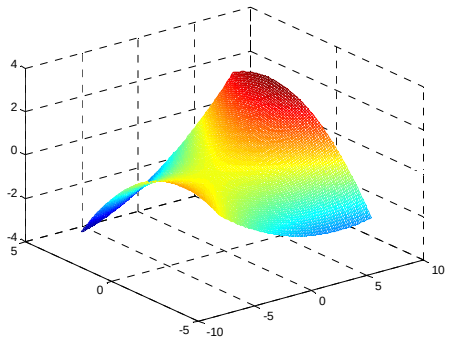
For a prediction with 2 components

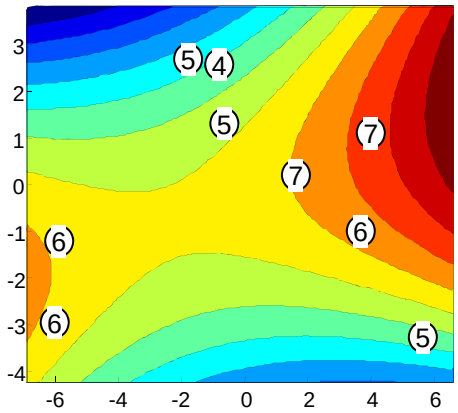
$$score = a_0 + a_1.c_1 + a_2.c_2 + a_3.c_3 + a_4.c_1^2 + a_5.c_2^2 + a_6.c_3^2 + a_7.c_1.c_2 + a_8.c_1.c_3 + a_9.c_2.c_3 + \varepsilon$$

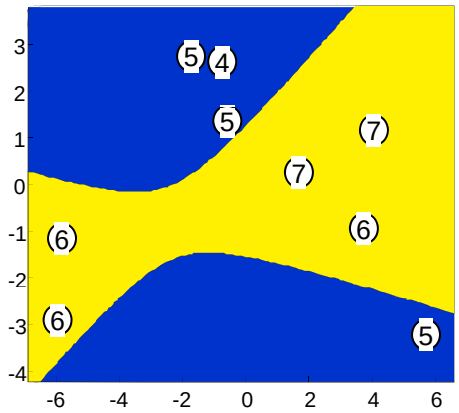
For a prediction with 3 components

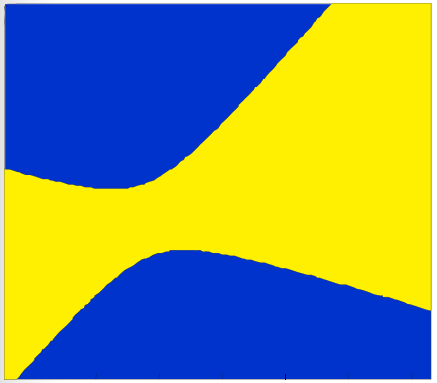
We can fit models with 4 components or more 4 composantes ou plus
… but it will need more and more products to be compared

PREFERENCE MAPPING









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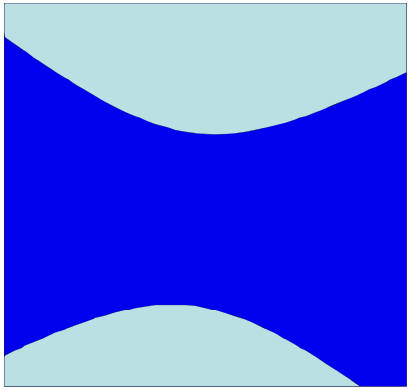

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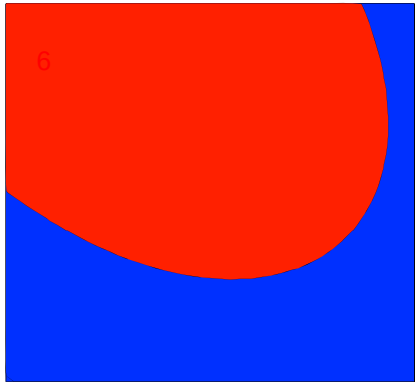

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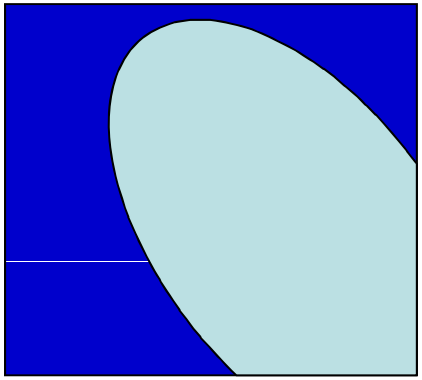

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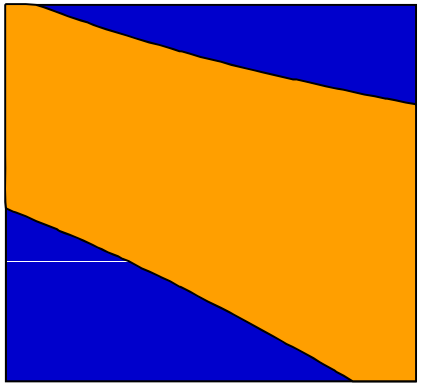
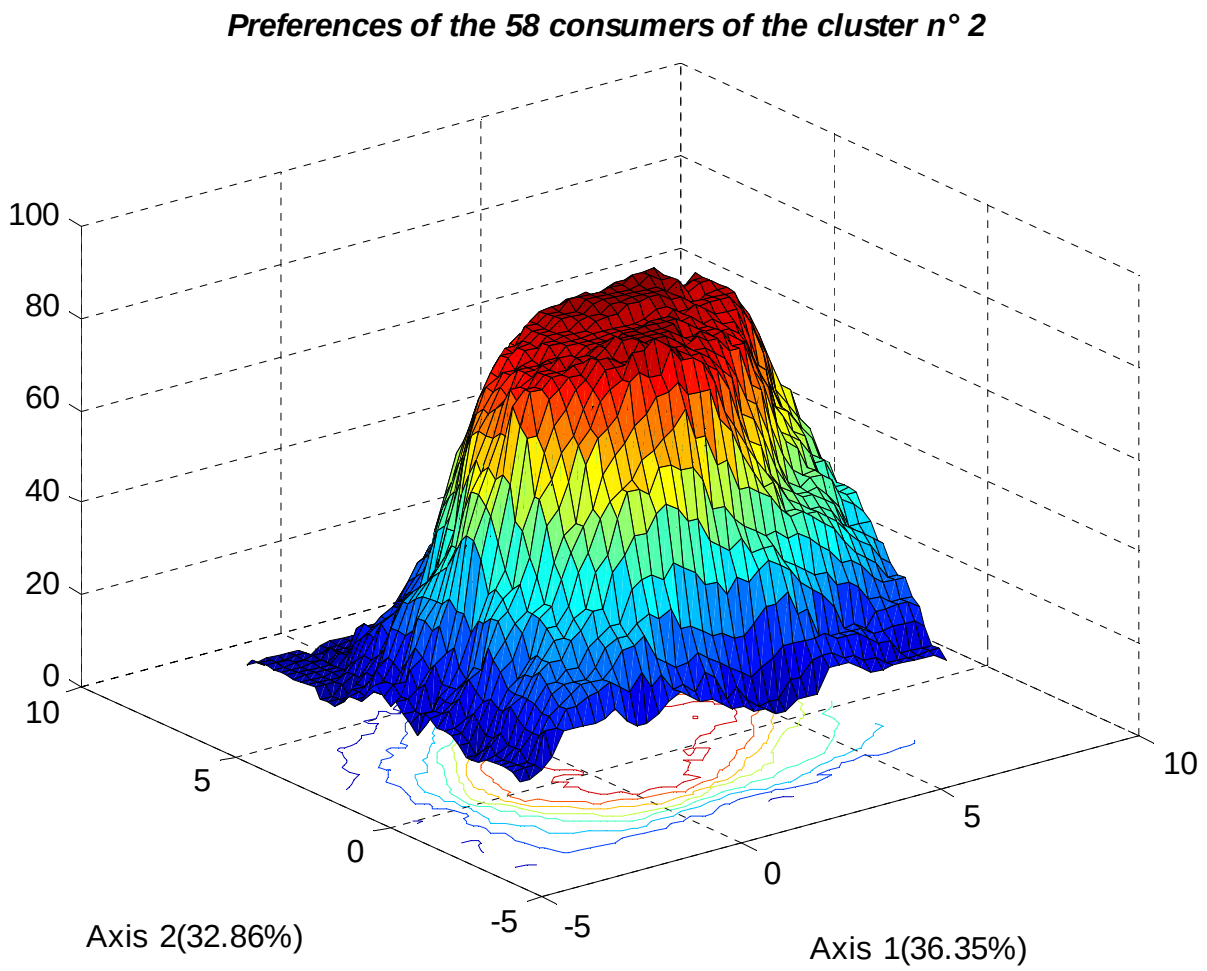


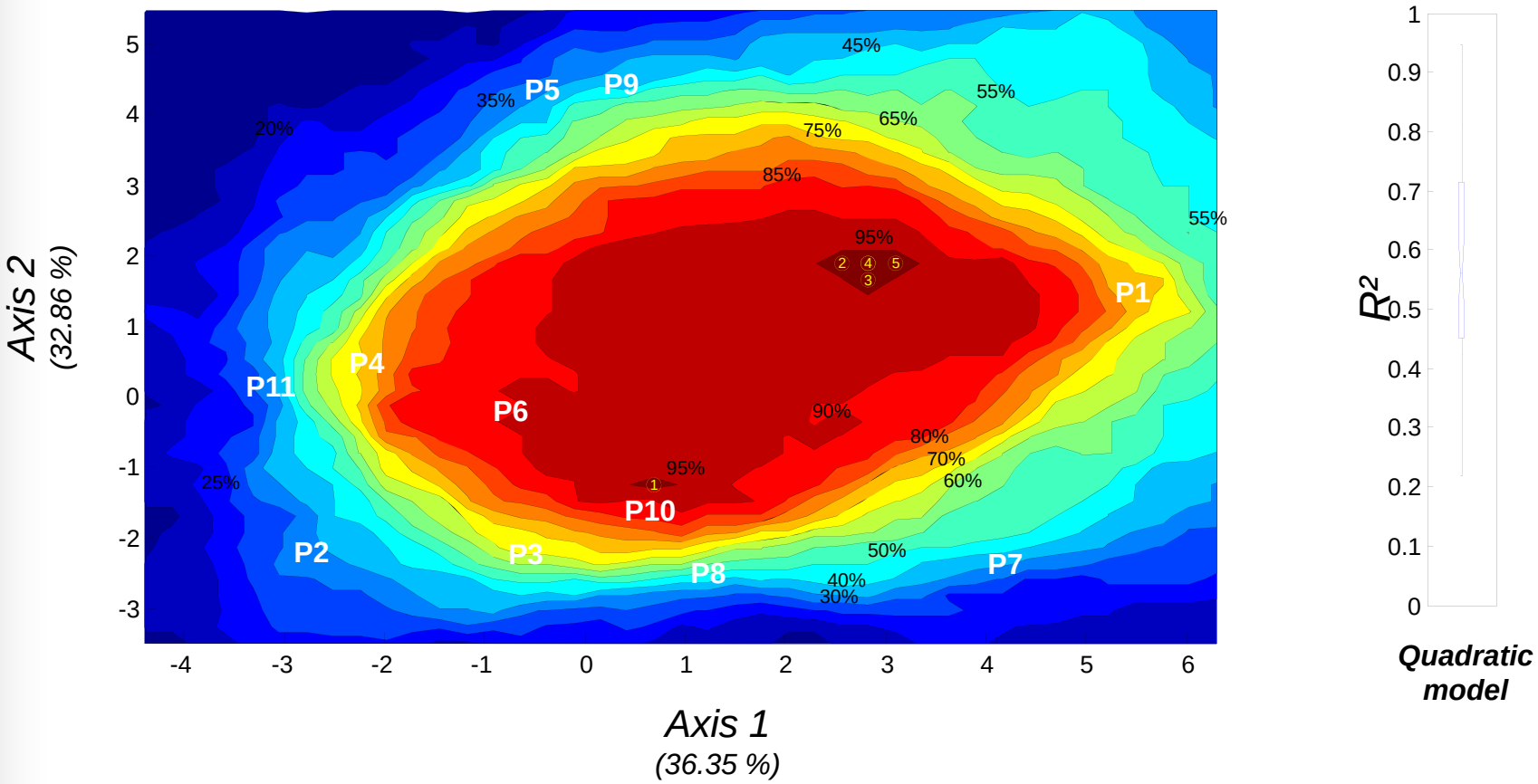

Preferences of the 58 consumers of the cluster n° 2
100
80
60
40
20
0
10
5
0
-5
-5
0
5
10
Axis 2(32.86%)
Axis 1(36.35%)

PREFERENCE MAPPING

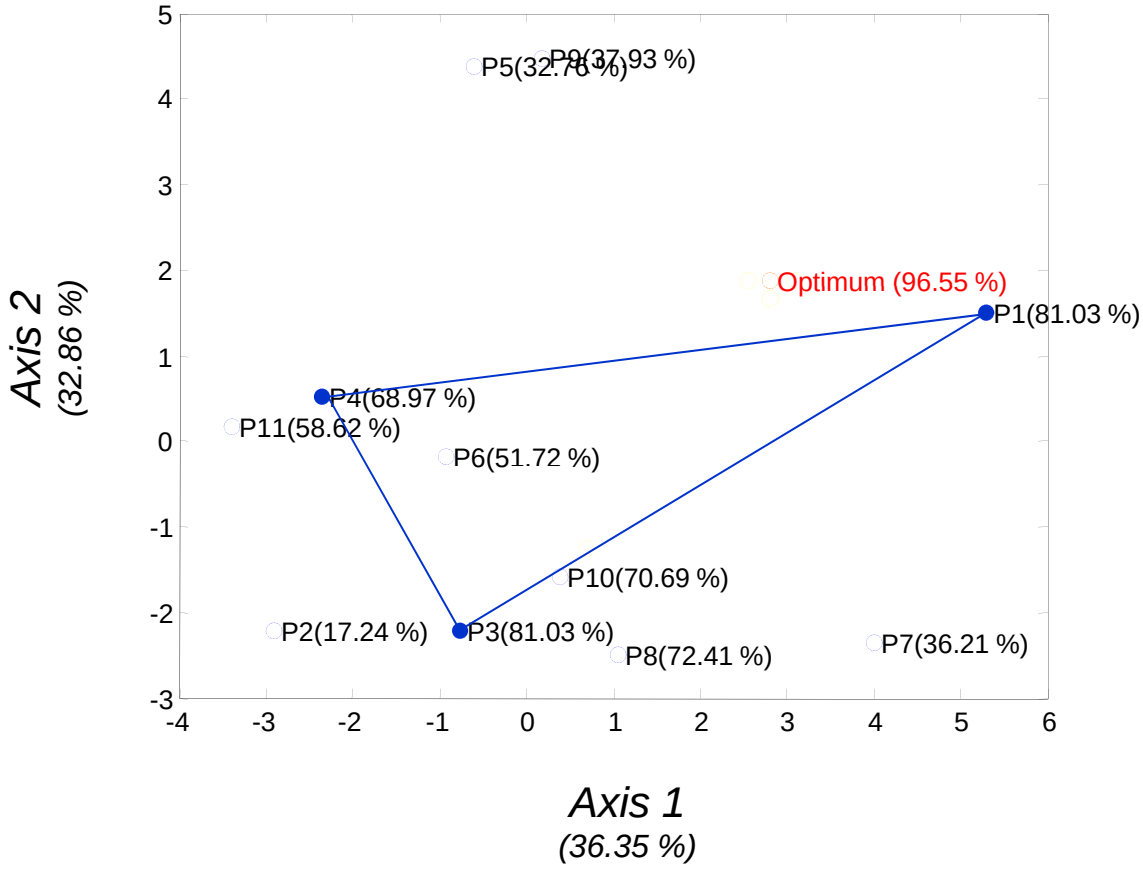
$$\text{Pref}\ (x.y) = 100 * \frac{\sum_{i=1}^{n} C_i\ (x.y)}{n}$$

Pref (x.y) is the percentage of consumers which will appreciate a product with sensory characteristics that will locate the product on the expert map with coordinate (x,y)

Preference region for the 58 consumers of the cluster n° 2



DEFINE THE OPTIMUM PRODUCT AS A BARYCENTER OF 3 REAL PRODUCTS

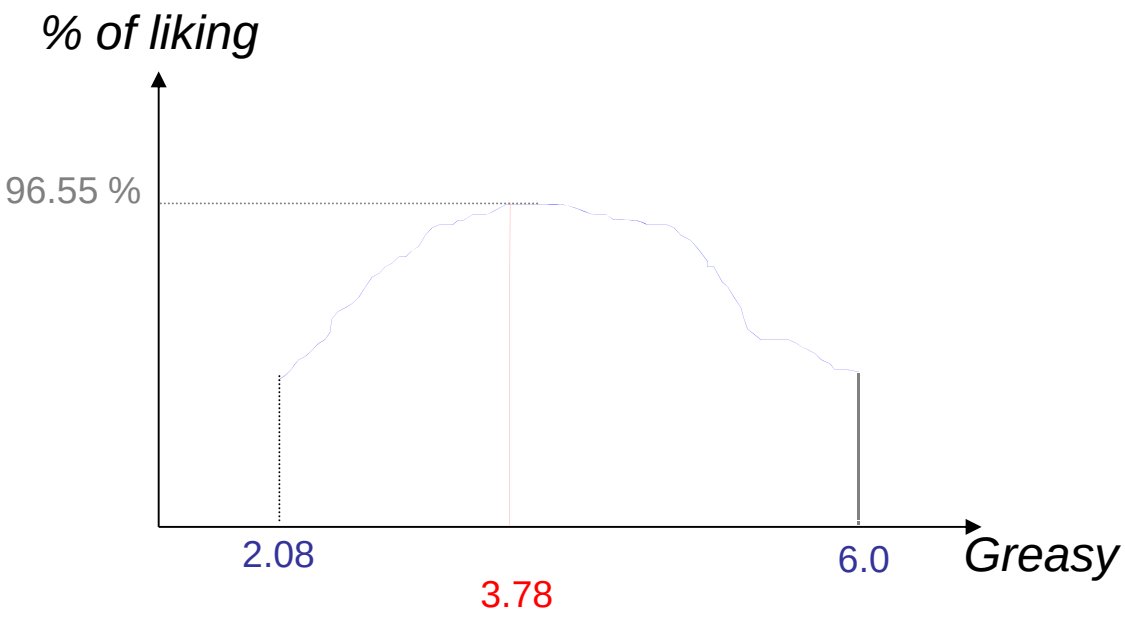


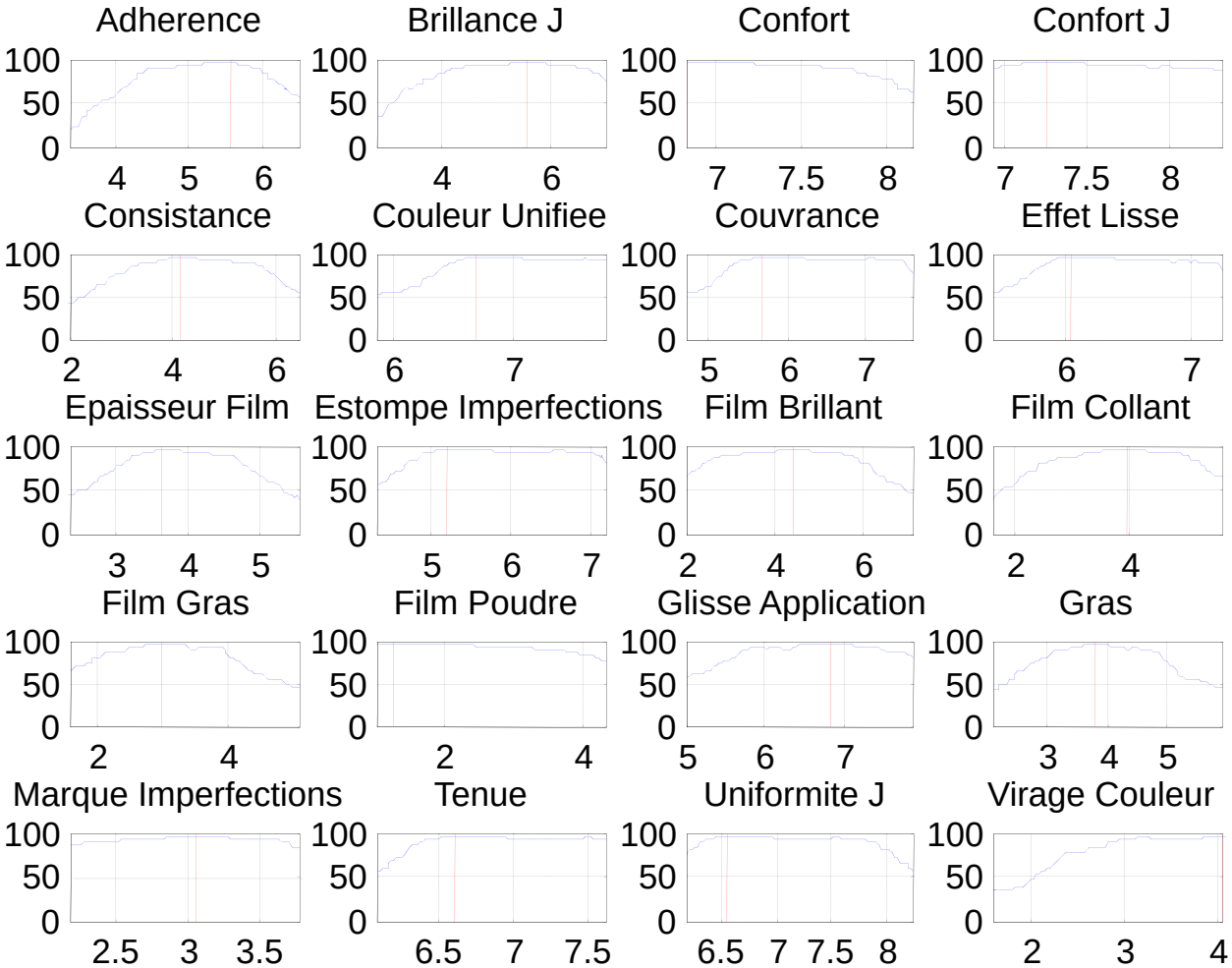
P3	-0.2369
P1	0.7262
P4	0.5107

	Optimal product
Adherence	5,57
Brillance J	5,56
Confort	6,82
Confort J	7,25
Consistance	4,16
Couleur Unifiee	6,69
Couvrance	5,68
Effet Lisse	6,05
Epaisseur Film	3,65
Estompe Imperfections	5,20
Film Brillant	4,40
Film Collant	3,94
Film Gras	3,00
Film Poudre	1,26
Glisse Application	6,84
Gras	3,78
Marque Imperfections	3,05
Tenue	6,60
Uniformite J	6,56
Virage Couleur	4,04

SENSITIVITY STUDY AND KEY SENSORY ATTRIBUTES

But, what happens if the real value of an attribute differs of the target value ?

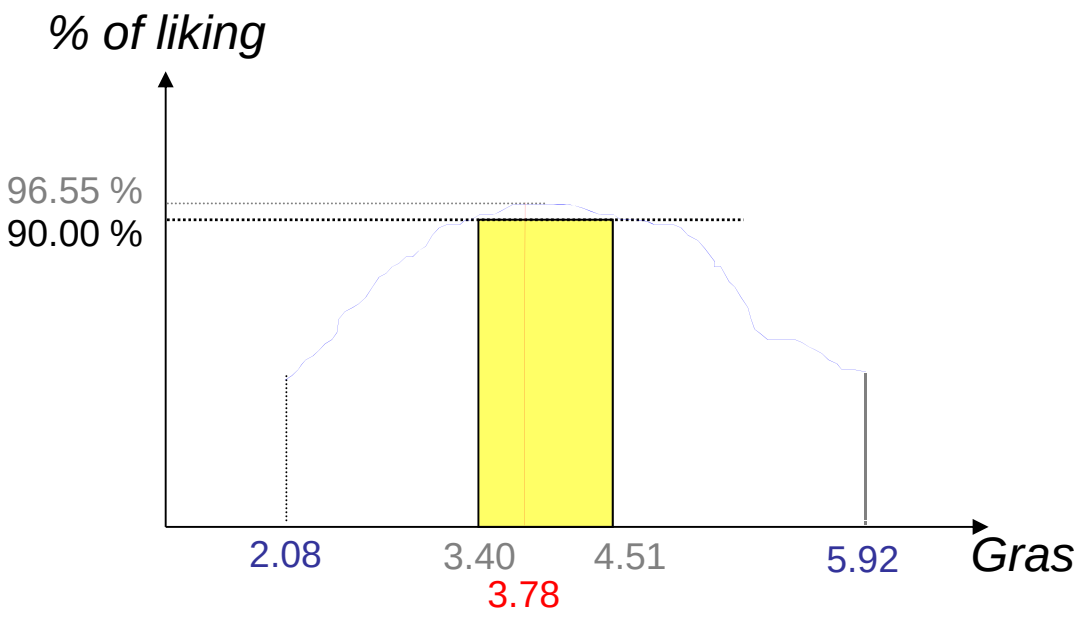



Adherence
100
50
0
4 5 6
Brillance J
100
50
0
4 6
Confort
100
50
0
7 7.5 8
Confort J
100
50
0
7 7.5 8
Consistance
100
50
0
2 4 6
Couleur Unifiee
100
50
0
6 7
Couvrance
100
50
0
5 6 7
Effet Lisse
100
50
0
6 7
Epaisseur Film
100
50
0
3 4 5
Estompe Imperfections
100
50
0
5 6 7
Film Brillant
100
50
0
2 4 6
Film Collant
100
50
0
2 4
Film Gras
100
50
0
2 4
Film Poudre
100
50
0
2 4
Glisse Application
100
50
0
5 6 7
Gras
100
50
0
3 4 5
Marque Imperfections
100
50
0
2.5 3 3.5
Tenue
100
50
0
6.5 7 7.5
Uniformite J
100
50
0
6.5 7 7.5 8
Virage Couleur
100
50
0
2 3 4

SENSITIVITY STUDY AND KEY SENSORY ATTRIBUTES

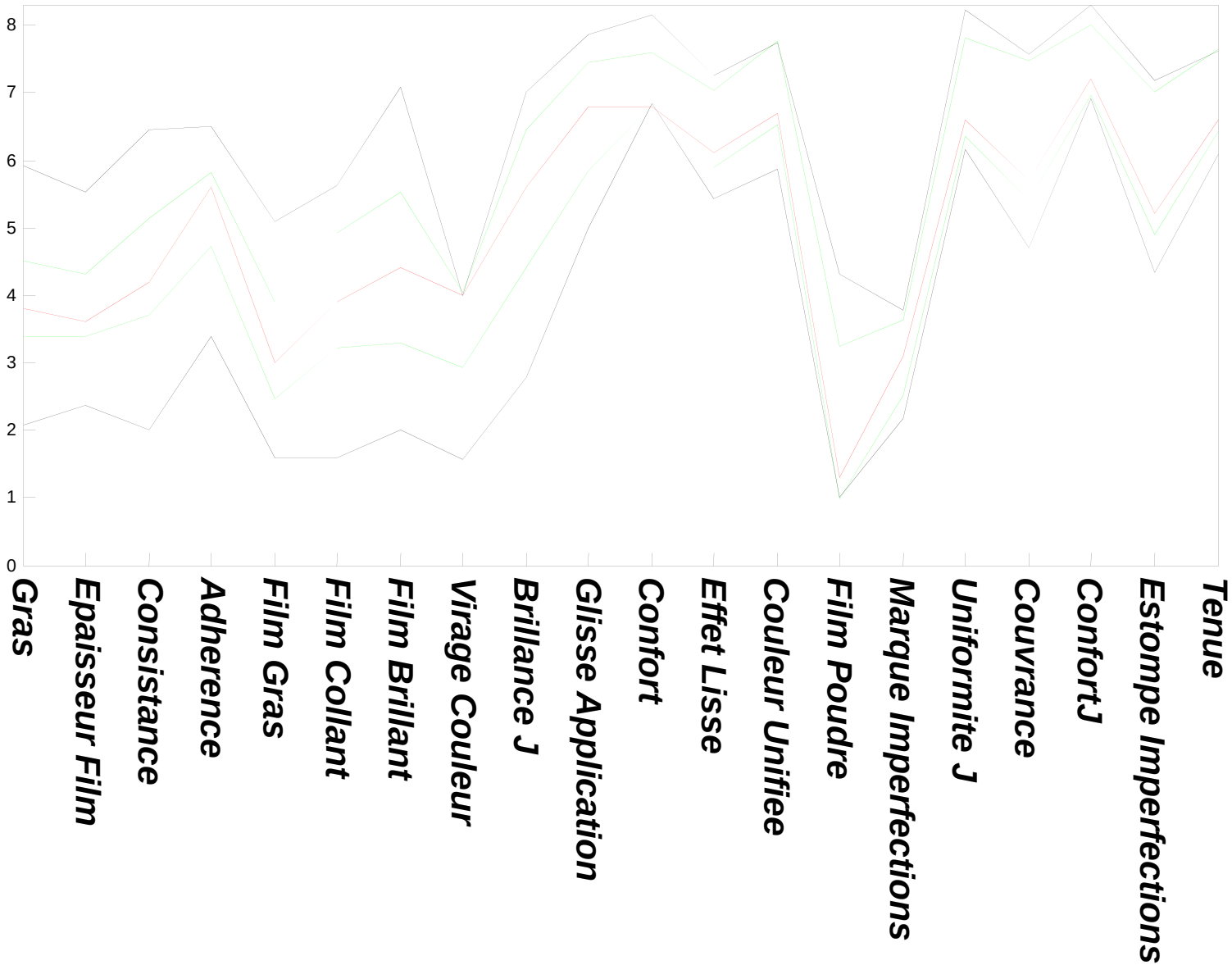
The optimum product is supposed (from the model) to satisfact 96.55 % of the consumers for this cluster.

Choose a minimum level of satisfaction (lower than the maximum) let's say 90 %



$$\text{Delta} = \frac{4.51 - 3.40}{5.92 - 2.08} = 28.68\ \%$$

THE QUADRATIC VERSION OF KEY DRIVERS



The main weakness of this method is that the expert map (*Axis 1 – Axis 2*) is not necessarly the most relevant to predict the consumer preference !

1. We can in a first step change the axes !
(try to fit a model with Axis 2 and Axis 4)

2. I don’t believe in vectorial model …
then I don’t want to use linear relationship
to find the appropriate map.

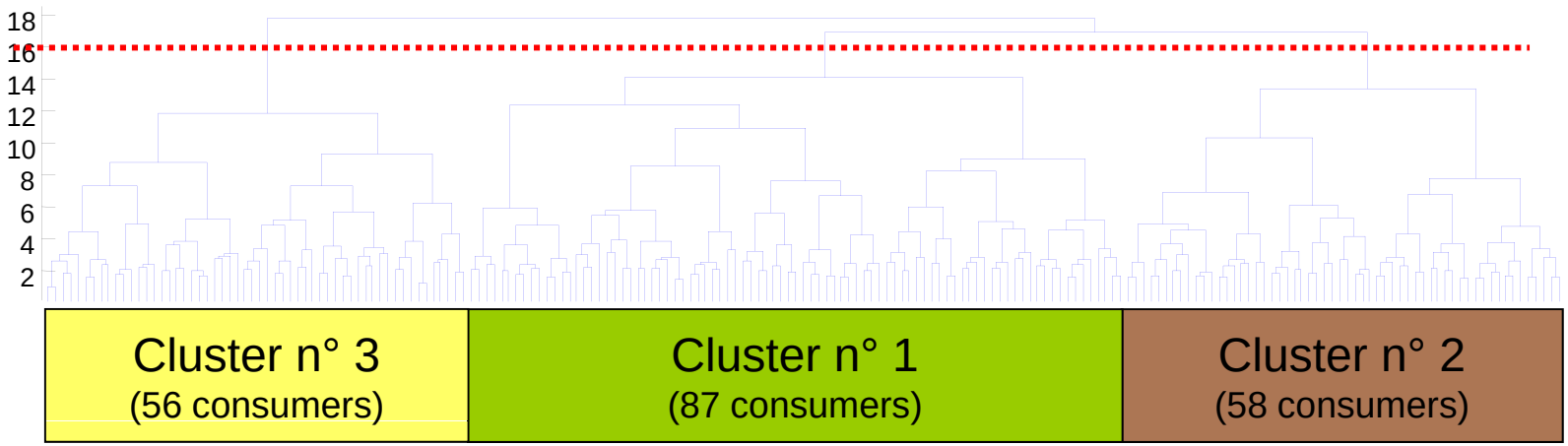
3. I propose to perform a weighted analysis.
That means to give more importance to the
prefered or rejected products

Weighted Preference mapping

Study on make up foundations

11	products
20	attributes
12	panelists
201	consumers

Cluster analysis of the consumers



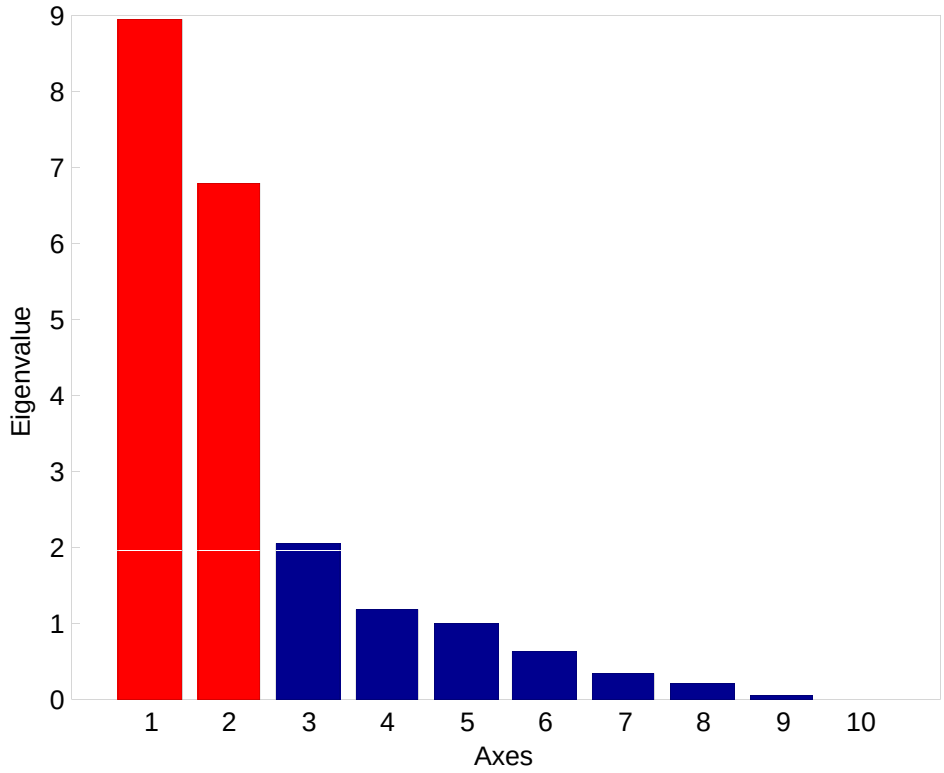
Mean of the standardized preference

Cluster n° 2
(58 consumers)

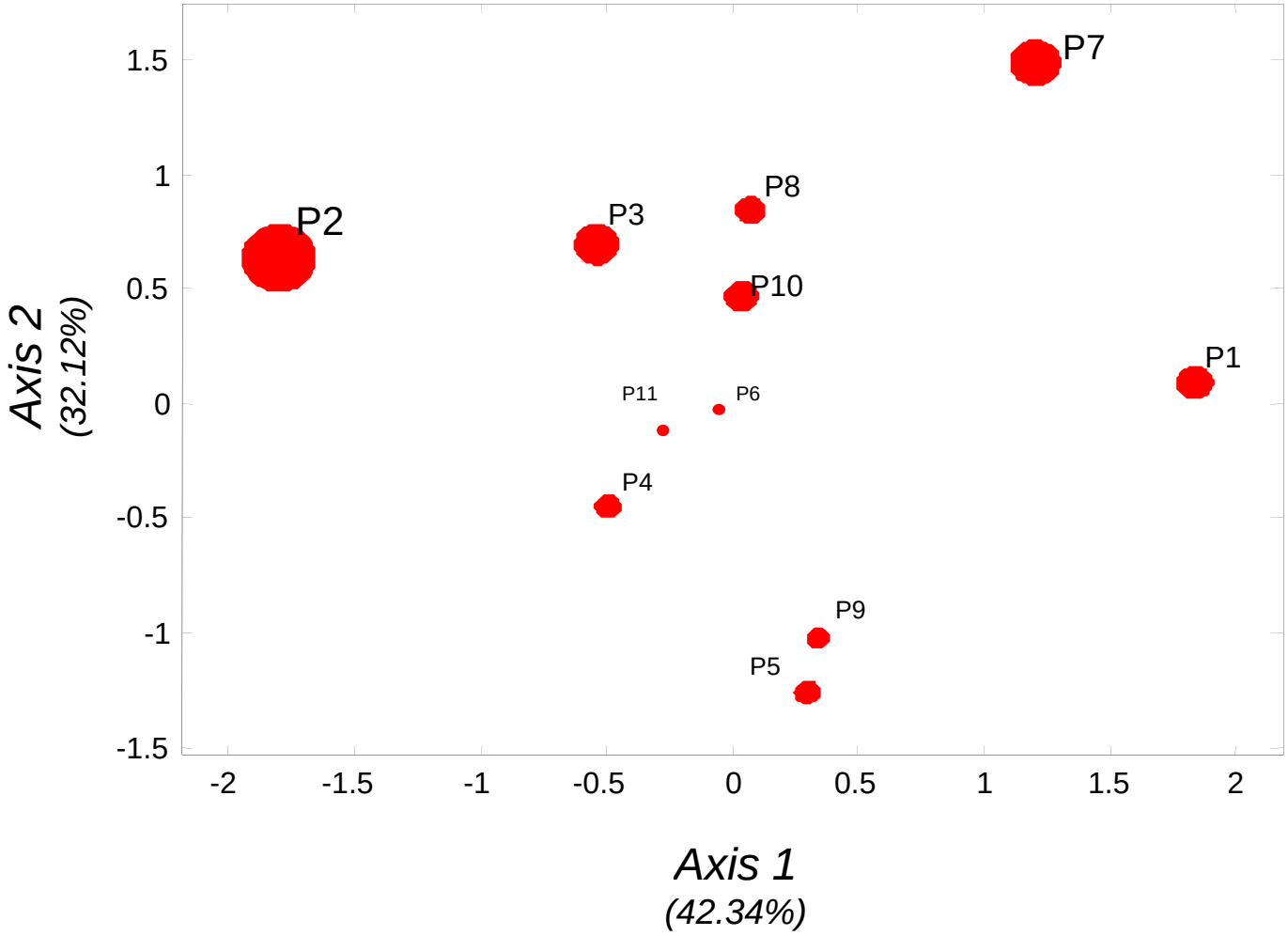
	Mean	*Abs(Mean)*	*Weigth*
P1	0,452	0,452	**10,46%**
P2	-0,913	0,913	**21,11%**
P3	0,557	0,557	**12,89%**
P4	0,325	0,325	**7,53%**
P5	-0,325	0,325	**7,51%**
P6	-0,020	0,020	**0,46%**
P7	-0,625	0,625	**14,45%**
P8	0,377	0,377	**8,72%**
P9	-0,279	0,279	**6,47%**
P10	0,418	0,418	**9,67%**
P11	0,032	0,032	**0,73%**

We will perform a P.C.A. with these weights for each product

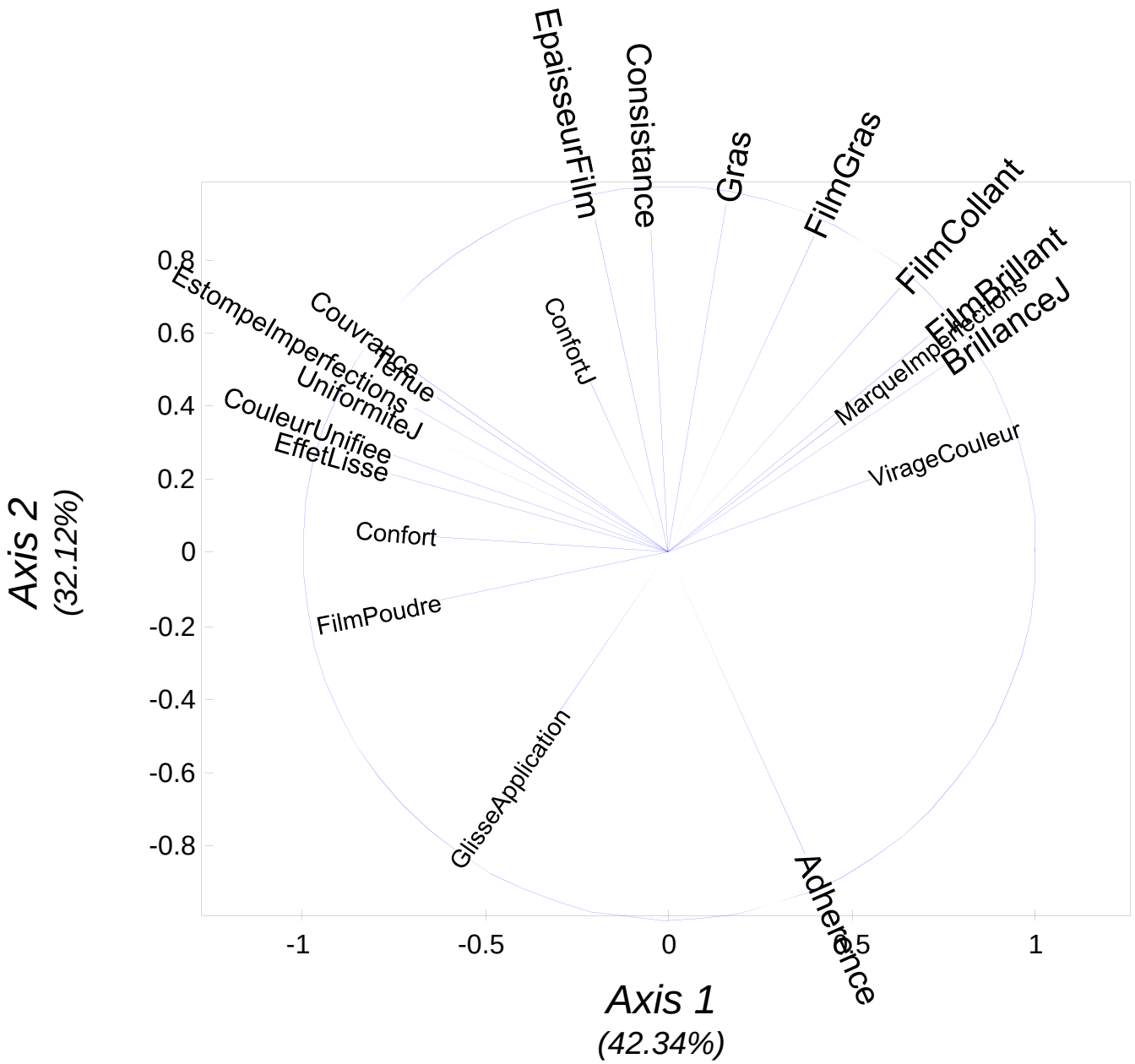
Histogram of the eigenvalues for the weighted P.C.A.



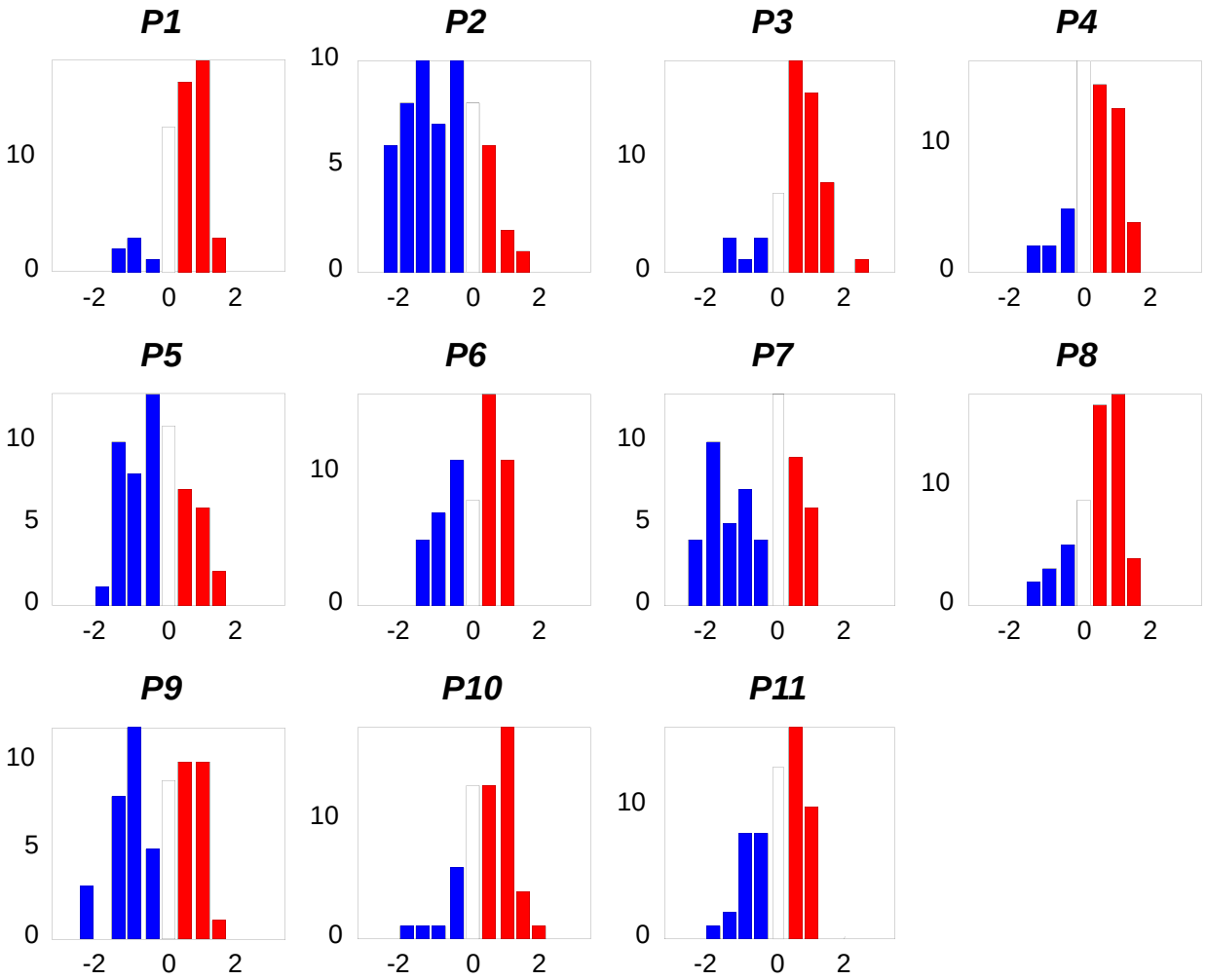
Weighted PCA : Product plot (Axis 1 - Axis 2)



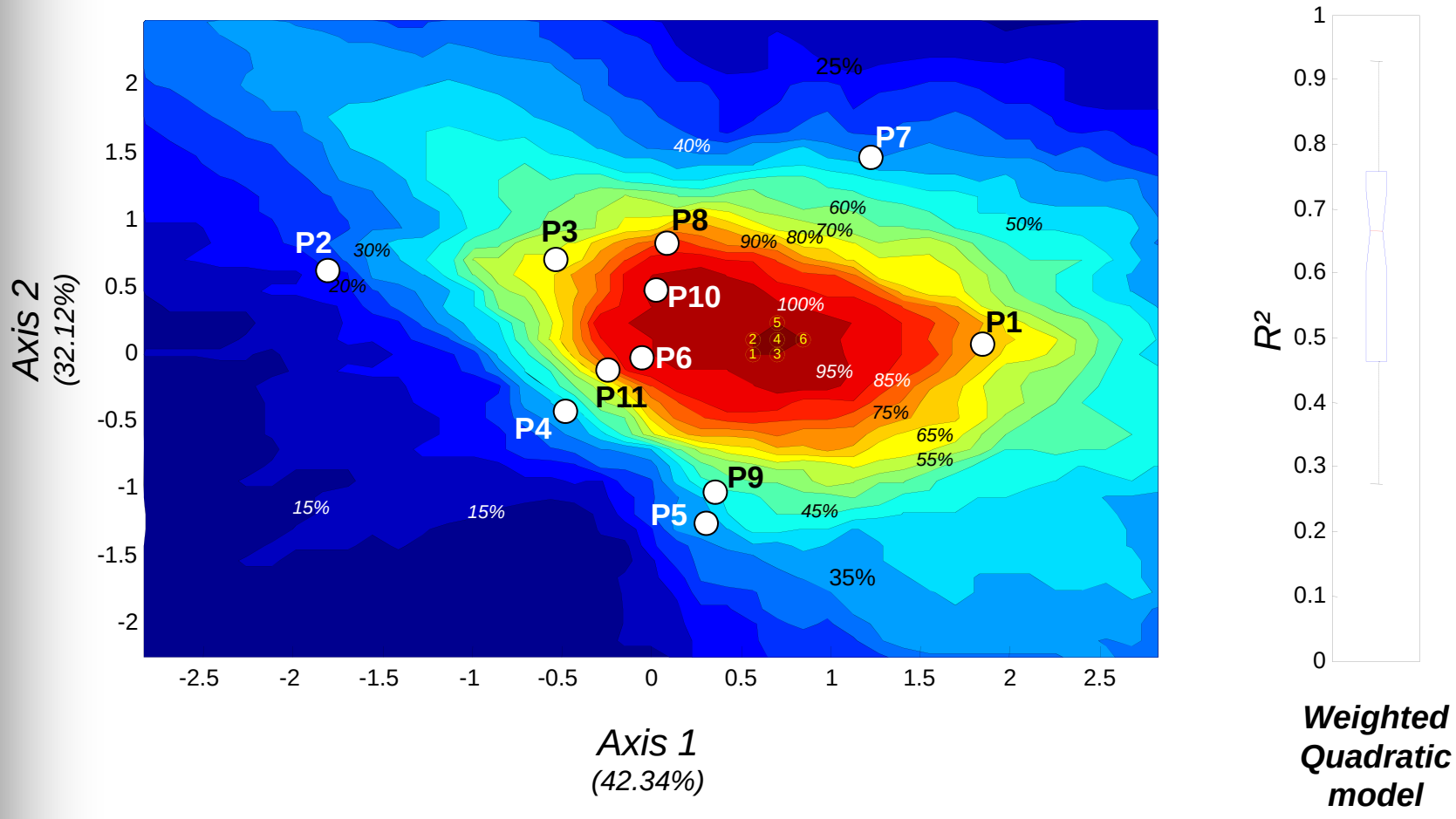
Weighted PCA : Variable plot (Axis 1 - Axis 2)

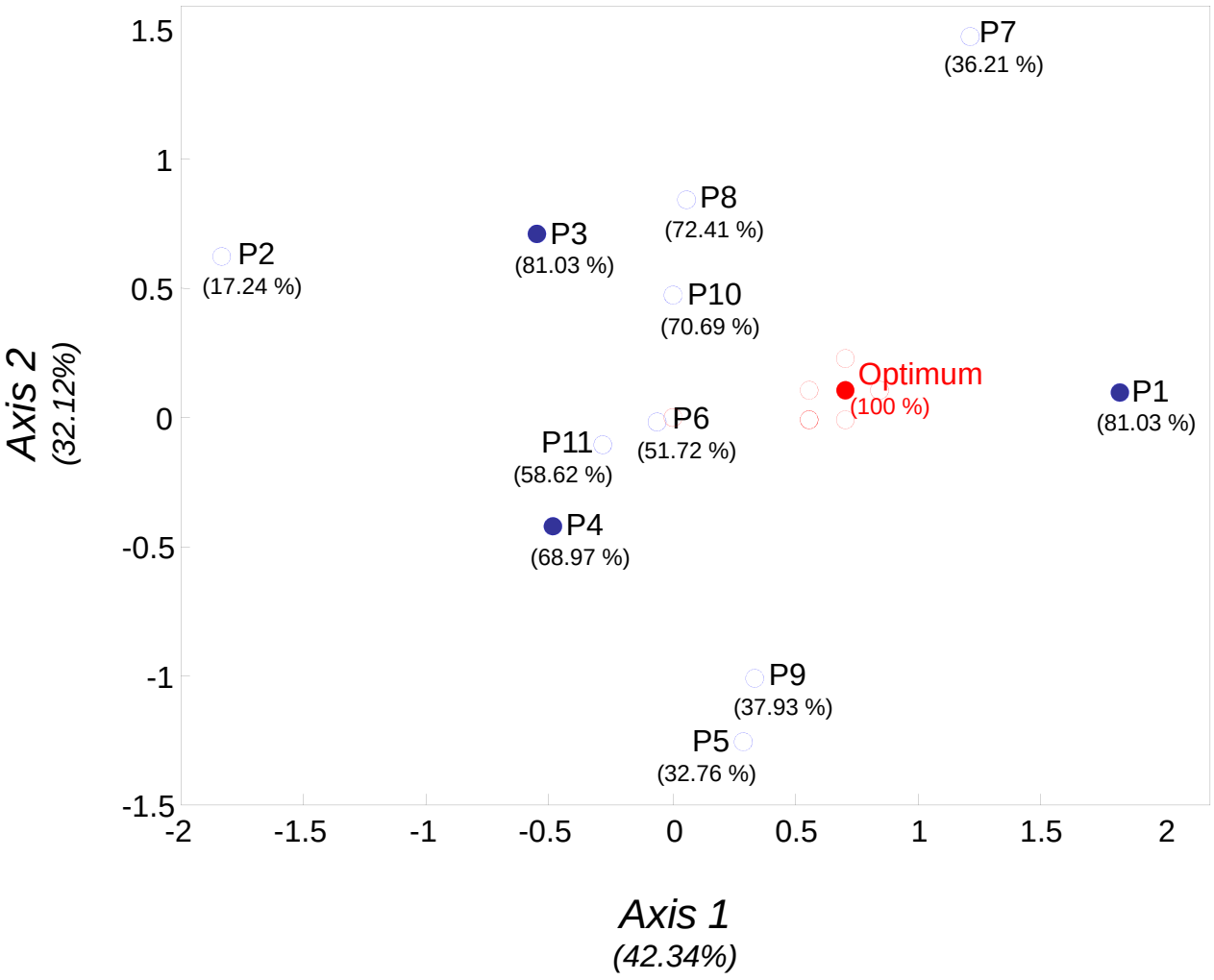


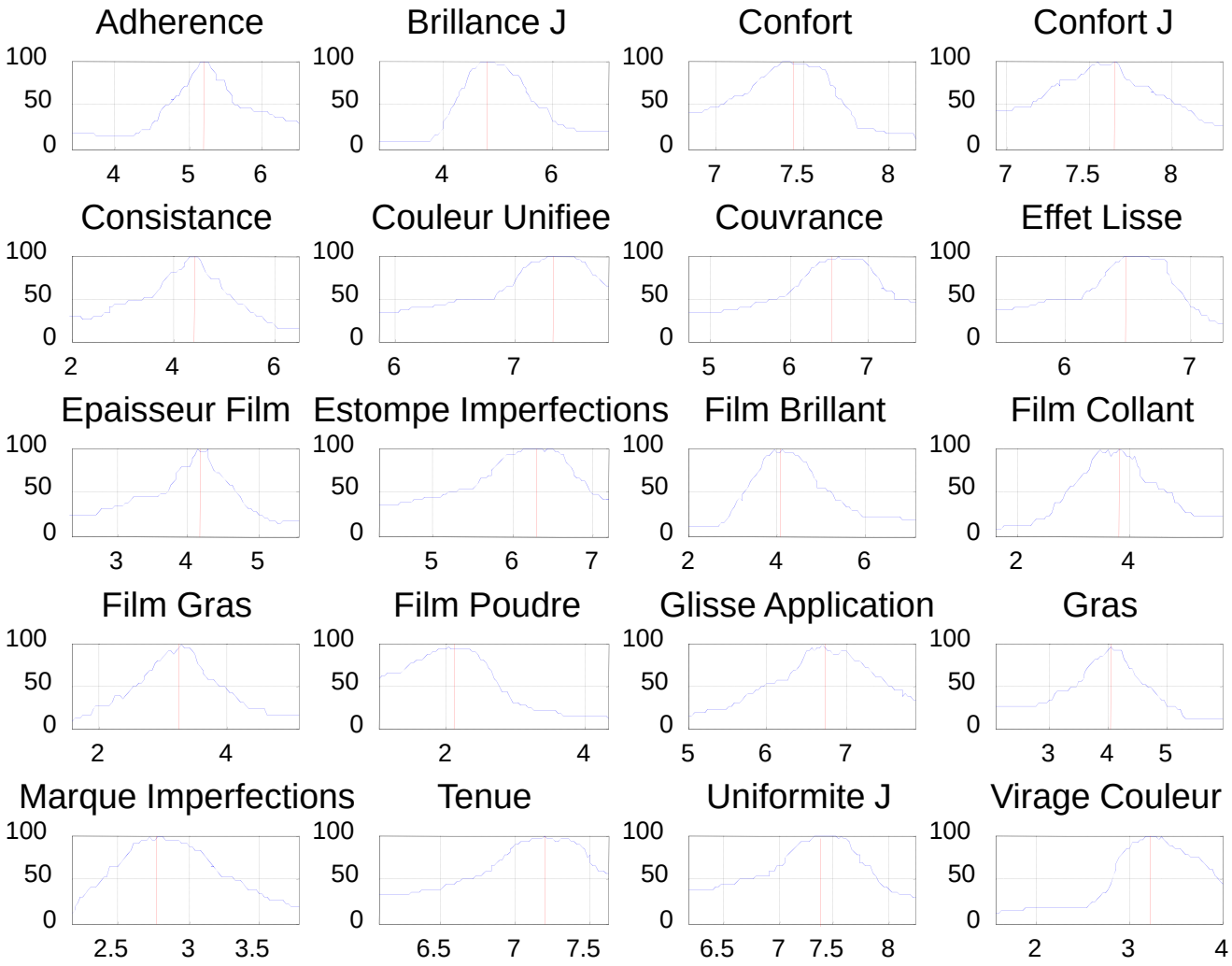
PREFERENCE FOR THE CLUSTER N° 2



Preference regions for the 58 consumers of the cluster n° 1

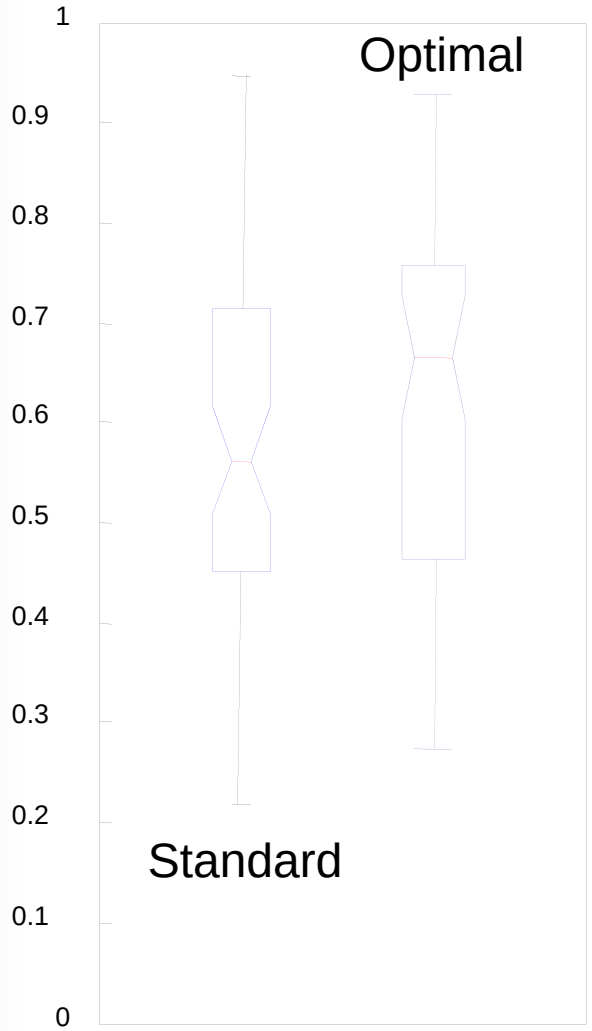



P7
(36.21 %)
P8
(72.41 %)
P3
(81.03 %)
P2
(17.24 %)
P10
(70.69 %)
Optimum
(100 %)
P1
(81.03 %)
P6
(51.72 %)
P11
(58.62 %)
P4
(68.97 %)
P9
(37.93 %)
P5
(32.76 %)
1.5
1
0.5
0
-0.5
-1
-1.5
-2
-1.5
-1
-0.5
0
0.5
1
1.5
2
Axis 2
(32.12%)
Axis 1
(42.34%)


Adherence
100
50
0
4 5 6
Brillance J
100
50
0
4 6
Confort
100
50
0
7 7.5 8
Confort J
100
50
0
7 7.5 8
Consistance
100
50
0
2 4 6
Couleur Unifiee
100
50
0
6 7
Couvrance
100
50
0
5 6 7
Effet Lisse
100
50
0
6 7
Epaisseur Film
100
50
0
3 4 5
Estompe Imperfections
100
50
0
5 6 7
Film Brillant
100
50
0
2 4 6
Film Collant
100
50
0
2 4
Film Gras
100
50
0
2 4
Film Poudre
100
50
0
2 4
Glisse Application
100
50
0
5 6 7
Gras
100
50
0
3 4 5
Marque Imperfections
100
50
0
2.5 3 3.5
Tenue
100
50
0
6.5 7 7.5
Uniformite J
100
50
0
6.5 7 7.5 8
Virage Couleur
100
50
0
2 3 4

COMPARISONS

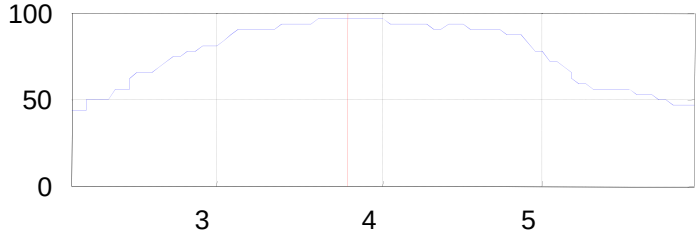
R^2 values



Sensitivity curves

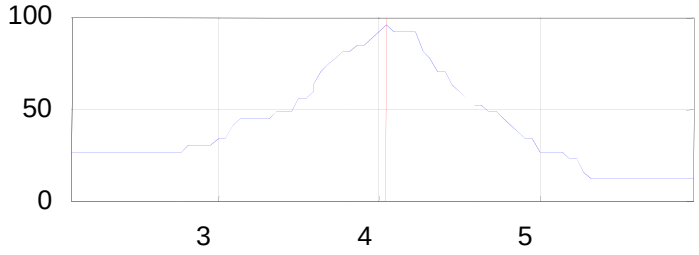
Standard

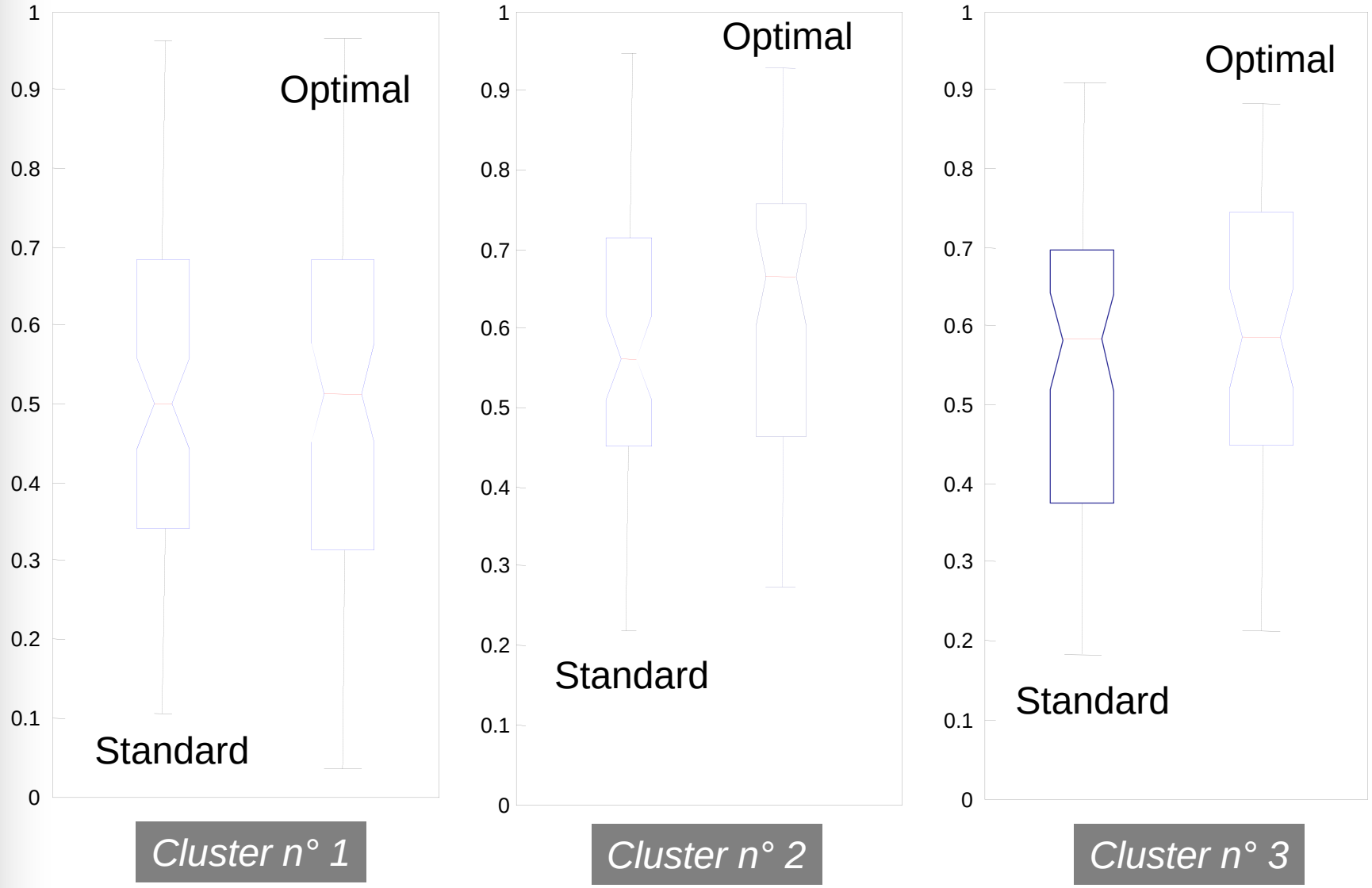
Greasy



Optimal

Greasy




1
0.9
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0
Optimal
Standard
Optimal
Standard
Optimal
Standard
Cluster n° 1
Cluster n° 2
Cluster n° 3

Qualitative Regression

A tool to explain the clusters
by qualitative characteristics
of the consumers

QUALITATIVE REGRESSION

Probabilistic technique

Without information

$$P(x \in Groupe_1) = \frac{n_1}{n} = \mu_1$$

With information

$$P\left(x \in Groupe_1 \Big/ x \in C_{11}, x \in C_{23}, \ldots, x \in C_{k2} \right) = \mu_1 + \alpha_1 + \beta_3 + \ldots + \kappa_2 + \varepsilon$$

	Cluster 1	Cluster 2	Cluster 3	Size
Size	87	58	56	
Probabilities	43.28 %	28.86 %	27.86 %	
Q14BP5				
Level 1	4,34%	11,62%	-15,96%	42
Level 2	12,27%	-1,08%	-11,19%	18
Level 3	-13,05%	13,00%	0,05%	43
Level 4	14,61%	-10,43%	-4,18%	38
Level 5	-6,14%	-6,00%	12,14%	35
Level 6	-7,28%	-16,86%	24,14%	25
Q14BP1				
Level 1	6,72%	-3,86%	-2,86%	20
Level 2	-14,50%	9,02%	5,47%	66
Level 3	***25,61%***	-11,08%	-14,53%	45
Level 4	-10,78%	1,14%	9,64%	40
Level 5	-5,78%	-3,86%	9,64%	16
Level 6	13,86%	-0,28%	-13,57%	14

	Khi-squared Test	*df*	*p-value*
Q14BP5	25,777	10	0,41%
Q14BP2	23,028	10	1,06%
Q14BP1	22,999	10	1,08%
Q8BP1	25,789	12	1,15%
Q13P4	24,081	14	4,48%
Q9P7	5,745	2	5,65%
Q14AP2	17,333	10	6,73%
Q7P9	5,258	2	7,21%
Q13P2	22,113	14	7,63%
Q8B	5,024	2	8,11%
Q9P4	4,920	2	8,54%
Q13P7	21,572	14	8,79%
Q19BP1	10,954	4	8,98%

Reallotement table

The rows represents the real clusters
The columns represents the fitted clusters

	Cluster 1	***Cluster 2***	***Cluster 3***	
Cluster 1	60	14	13	*87*
Cluster 2	11	39	8	*58*
Cluster 3	11	8	37	*56*

Percentages of the correct reallotement

	Cluster 1	***Cluster 2***	***Cluster 3***	
Cluster 1	***68,97 %***	16,09 %	14,94 %	*100%*
Cluster 2	18,97 %	***67,24 %***	13,79 %	*100%*
Cluster 3	19,64 %	14,29 %	***66,07 %***	*100%*

Global Statistic 68 % of correct reallotements

Cluster n° 1

		Size	Proba	Change
Q14BP1	Level 2	66	-14,50	-957
Q13P7	Level 4	30	-23,28	-699
Q14BP2	Level 3	33	-19,04	-628
Q14BP5	Level 3	43	-13,05	-561
...	...	...	...	...
Q14BP5	Level 4	38	14,61	555
Q14BP2	Level 2	28	24,57	688
Q14BP1	Level 3	45	25,61	1152

Cluster n° 2

		Size	Proba	Change
Q8B	Level 2	94	-6,52	-612
Q13P4	Level 2	59	-10,21	-602
Q14BP2	Level 2	28	-18,14	-508
...	...	...	...	...
Q14BP5	Level 3	43	13,00	559
Q14BP1	Level 2	66	9,02	596
Q8B	Level 1	107	5,72	612
Q13P7	Level 4	30	24,48	734

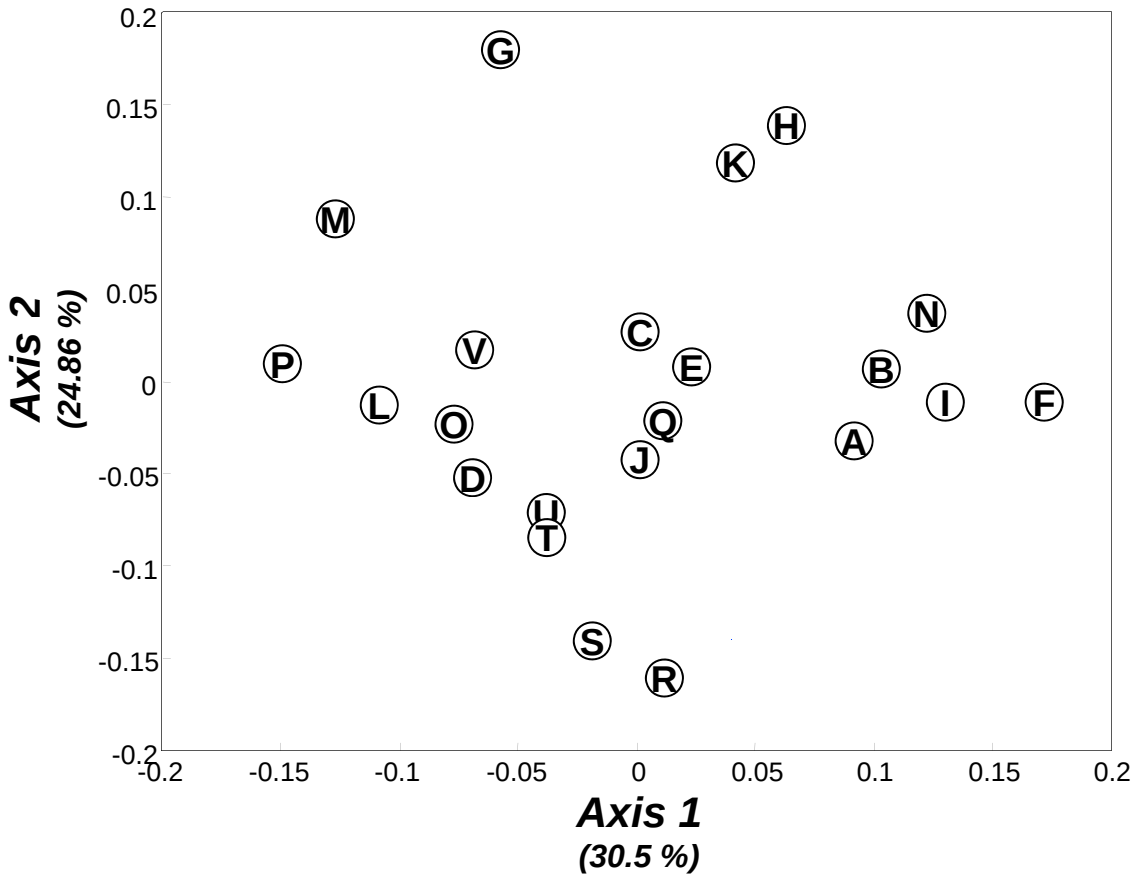
Cluster n° 3

		Size	Proba	Change
Q14BP5	Level 1	42	-15,96	-670
Q14BP1	Level 3	45	-14,53	-654
Q14AP2	Level 2	70	-9,29	-650
Q9P7	Level 1	59	-10,91	-644
Q9P4	Level 1	143	-4,08	-584
Q8B	Level 1	107	-5,43	-581
Q7P9	Level 1	150	-3,86	-579
Q8BP1	Level 1	142	-3,92	-556
...	...	...	...	...
Q8BP1	Level 3	13	41,37	538
Q7P9	Level 2	51	11,35	579
Q8B	Level 2	94	6,18	581
Q9P4	Level 2	58	10,07	584
Q14BP5	Level 6	25	24,14	603
Q9P7	Level 2	142	4,53	644
Q13P2	Level 5	26	29,83	776

Experimental designs

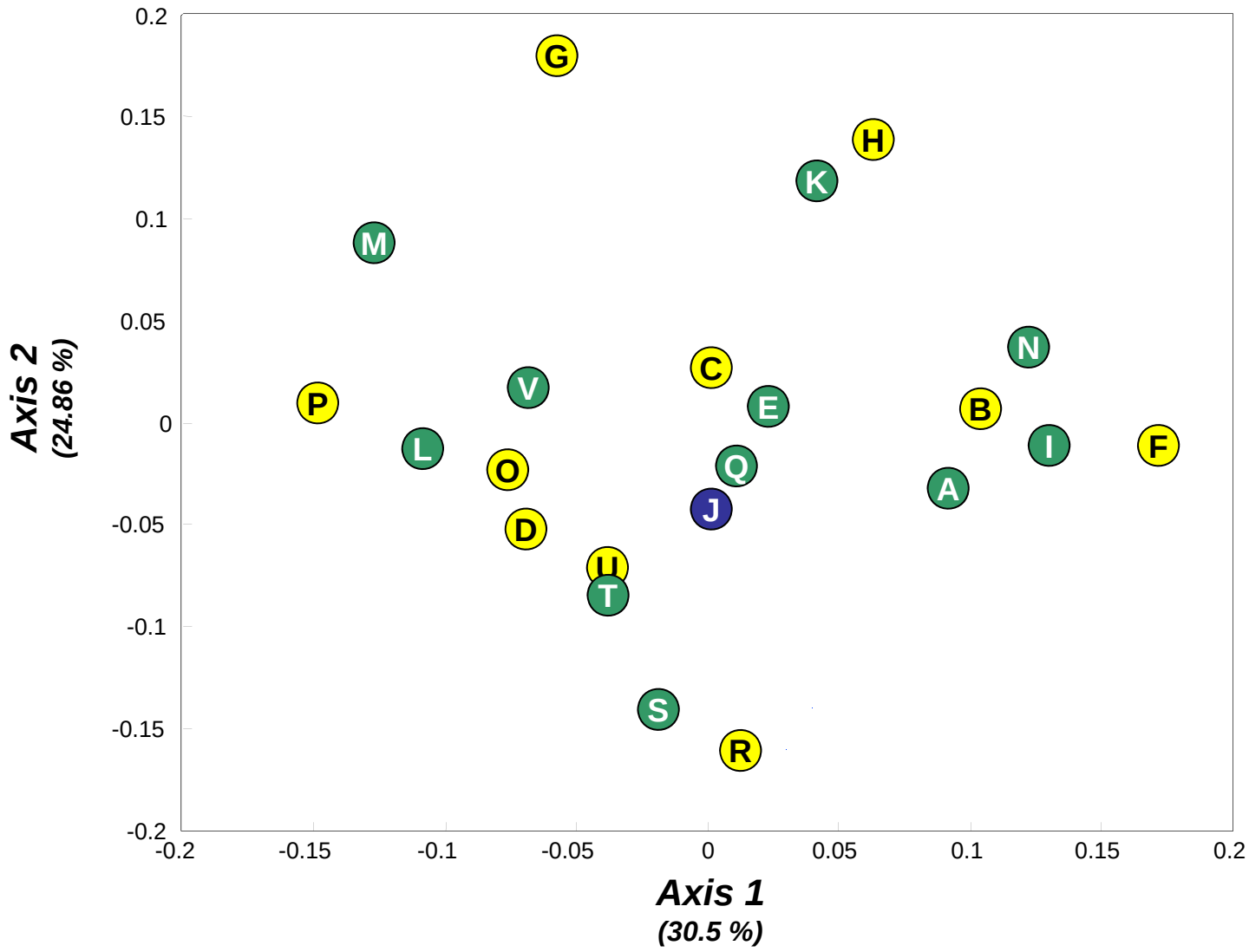
in order to reduce the number
of products by consumer

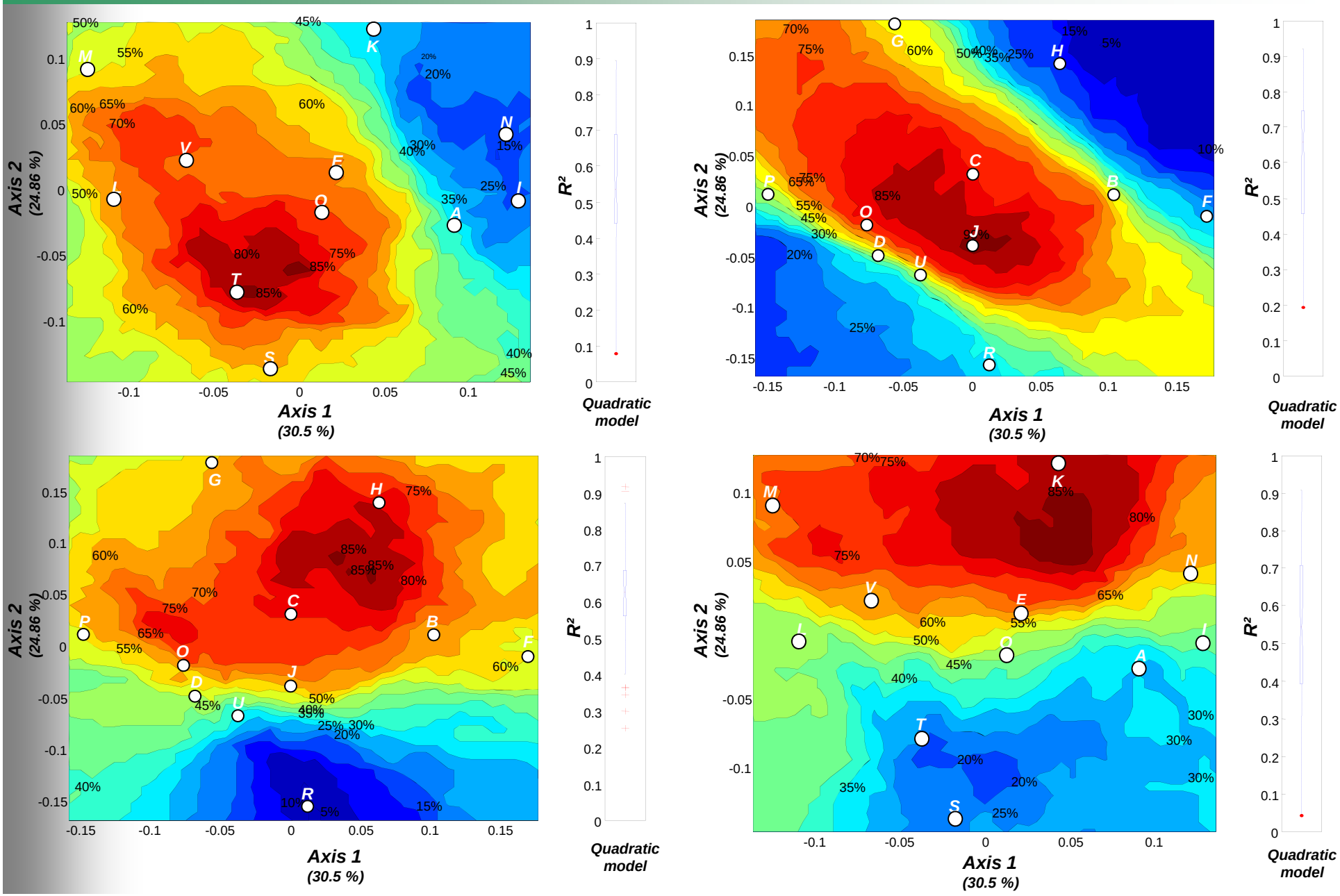
21 SURIMI STICKS

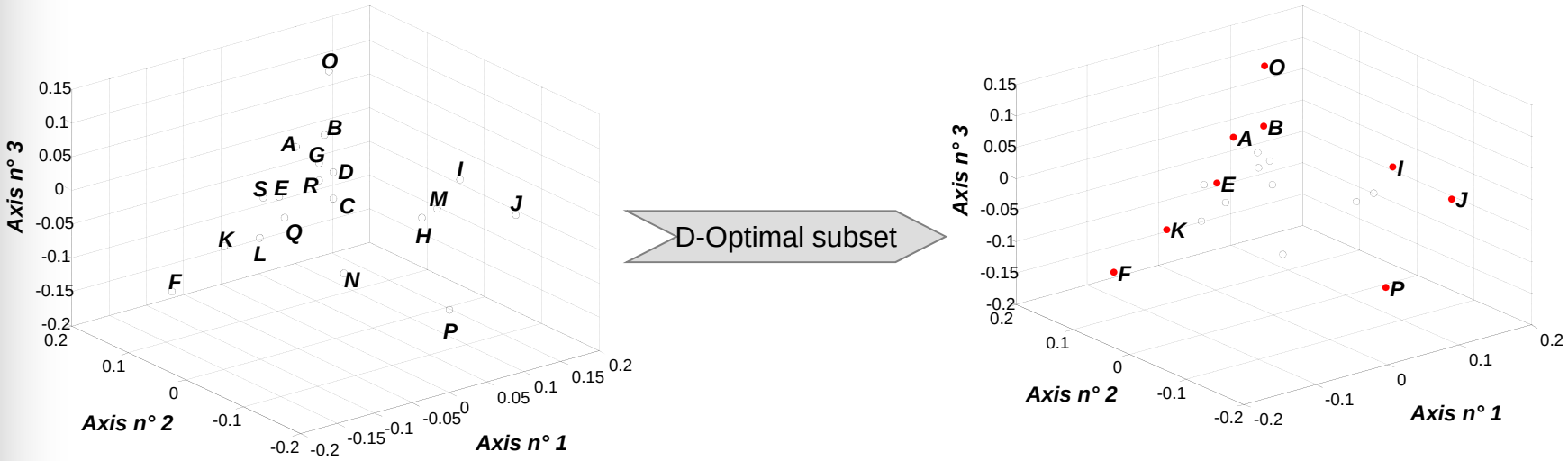


I wrote an algorithm to split the set in 2 representative subsets
Product J was given to the 2 subgroups

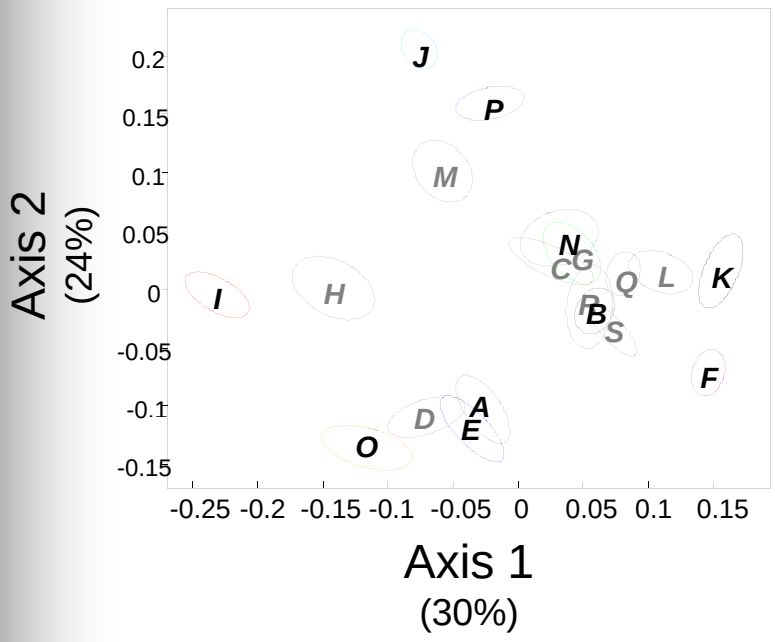
21 SURIMI STICKS



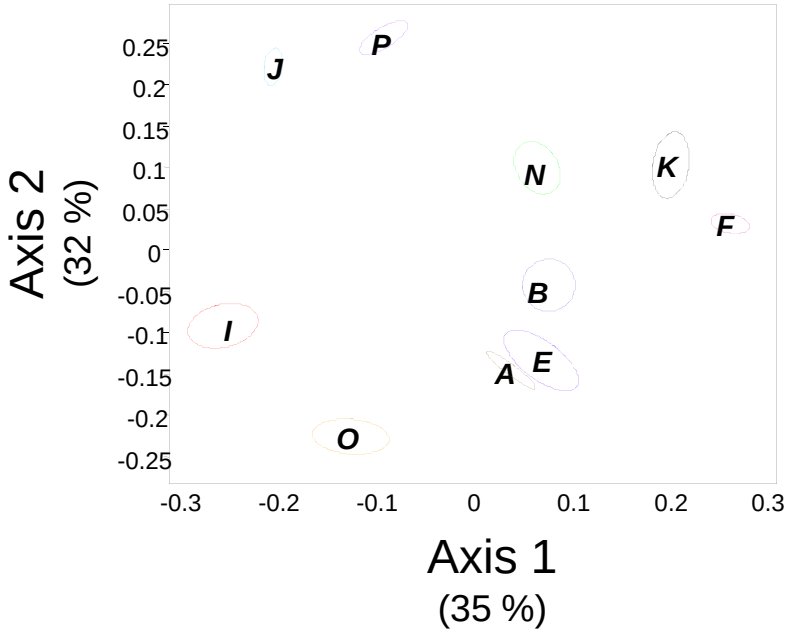

Axis 2
(24.86 %)
Axis 1
(30.5 %)
R²
Quadratic model

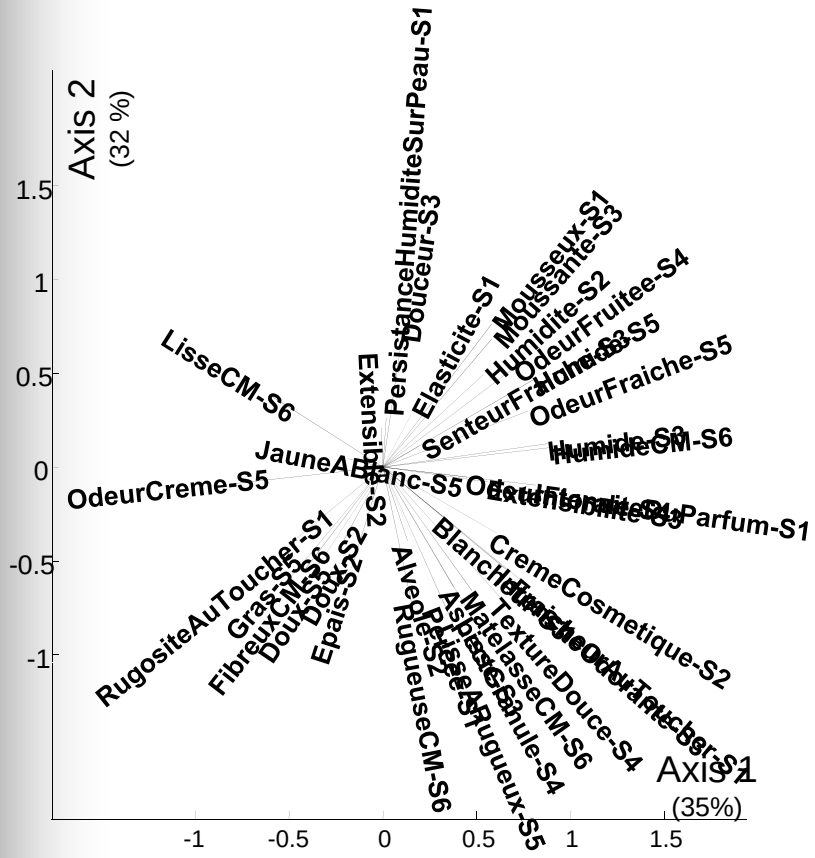

Axis n° 3
Axis n° 2
Axis n° 1
O
B
A
G
D
S E R
C
I
M
J
K
Q
L
H
F
N
P
D-Optimal subset
O
B
A
E
I
J
K
F
P

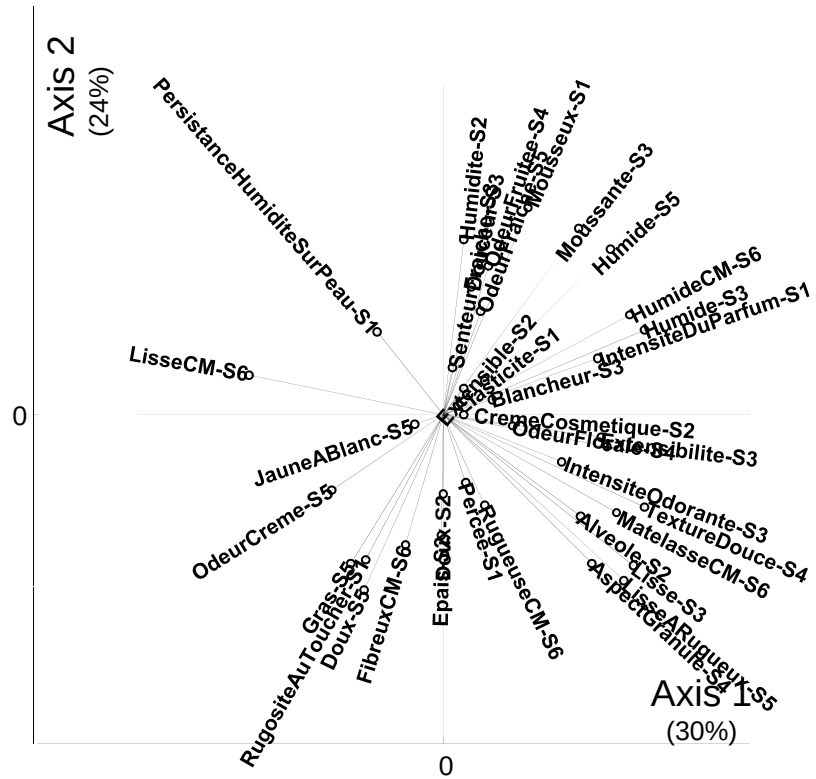
Consensus plot with all the products



Consensus plot with the 10 selected products

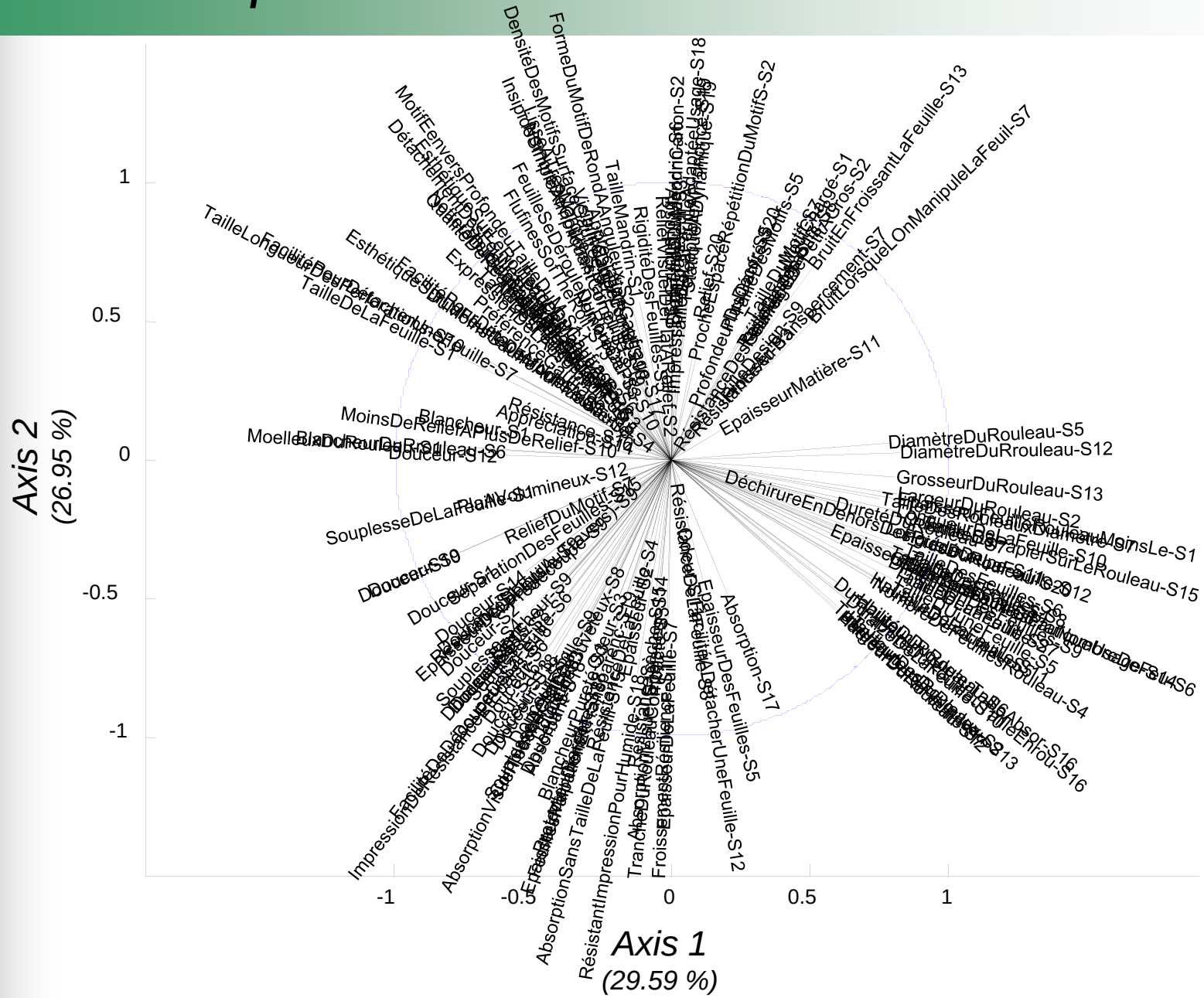



Axis 2
(32 %)
Axis 1
(35%)
1.5
1
0.5
0
-0.5
-1
-1
-0.5
0
0.5
1
1.5
LisseCM-S6
OdeurCreme-S5
PersistanceHumiditeSurPeau-S1
Douceur-S3
Elasticite-S1
Mousseux-S1
Moussante-S3
Humidite-S2
OdeurFruitee-S4
OdeurFraiche-S5
HumideCM-S6
CremeCosmetique-S2
TextureDouce-S4
MatelasseCM-S6
RugueuseCM-S6
Epais-S2
Doux-S2
FibreuxCM-S6
Gras-S6
RugositeAuToucher-S1

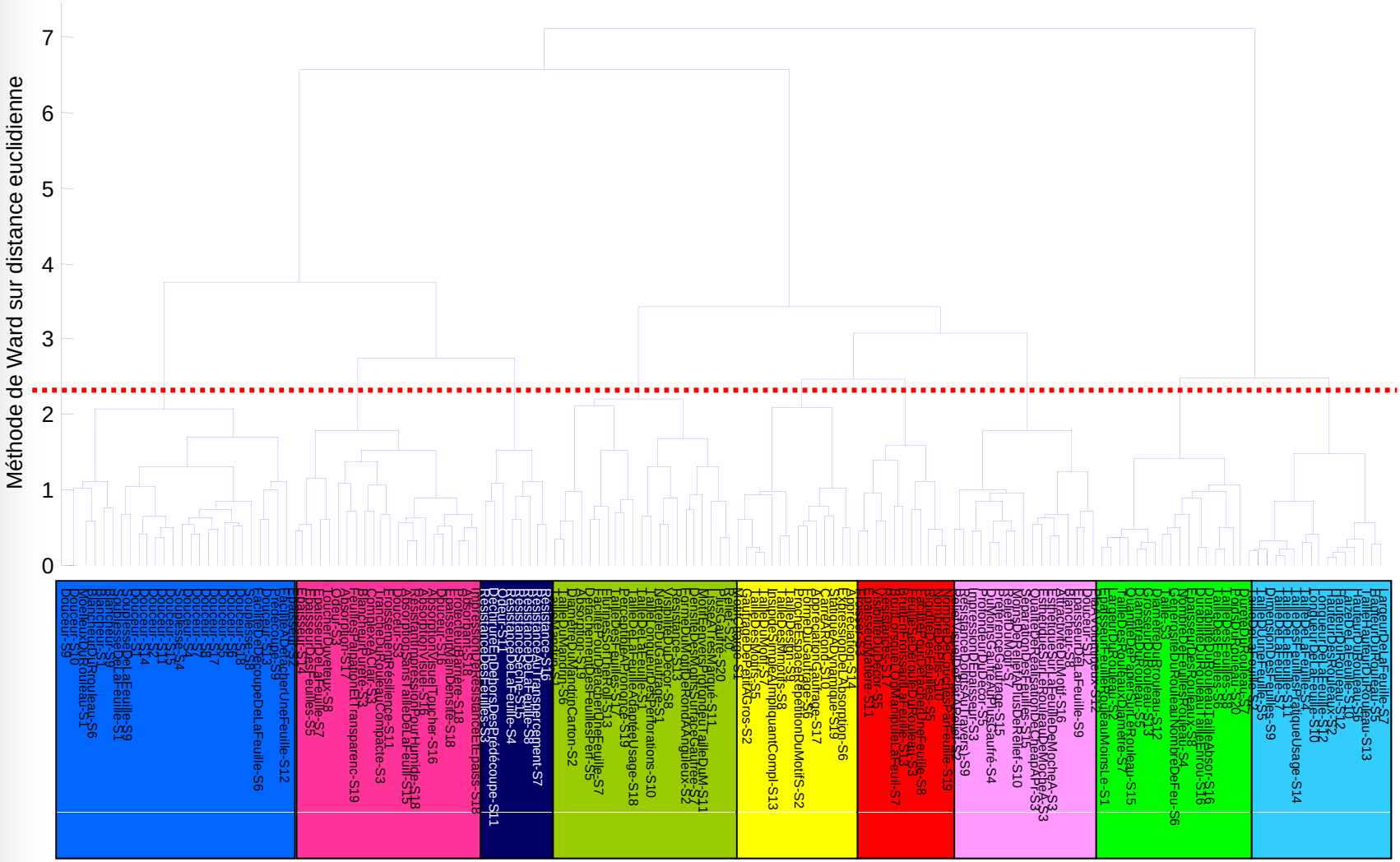

Axis 2
(24%)
Axis 1
(30%)
0
0
PersistanceHumiditeSurPeau-S1
LisseCM-S6
JauneABlanc-S5
OdeurCreme-S5
Humidite-S2
Mousseux-S1
Moussante-S3
Humide-S5
HumideCM-S6
Humide-S3
IntensiteDuParfum-S1
Elasticite-S1
Blancheur-S3
CremeCosmetique-S2
IntensiteOdorante-S3
TextureDouce-S4
MatelasseCM-S6
Alveole-S2
Lisse-S3
RugueuseCM-S6
Percee-S1
Epais-S2
Doux-S5
FibreuxCM-S6
Gras-S6
RugositeAuToucher-S1

Flash profile by consumers

Variable plot



CLUSTERING OF THE ATTRIBUTES



Froisser-S3
FeuilleSeDérouleDuRouleau-S3
RigiditéDesFeuilles-S5
VisibilitéDuDécor-S5
BruitLorsqueLOnManipuleLaFeuil-S7
FacilitéPourDétacherUneFeuille-S8
NombreDePlis-S10
EpaisseurMatière-S11
BruitEnFroissantLaFeuille-S13
Résistances-S17
NombreDeCouchesParFeuille-S19

Bruit/Epaisseur

MotifChargé-S1
ProcheEspacéRépétitionDuMotifS-S2
GaufrageDePetitAGros-S2
TailleDesMotifs-S5
FormeDuGaufrage-S6
ExpressionDeLAbsorption-S6
TailleDuMotif-S7
TailleDesMmotifs-S8
TailleDesign-S9
CarréARond-S10
InsipideSimpleAImpliquantCompl-S13
Appréciation-S14
AppréciationGaufrage-S17
StatiqueADynamique-S19

Taille motif

EpaisseurFeuilleRouleauMoinsLe-S1
LargeurDuRouleau-S2
Taille-S3
NombreDeFeuillesRouleau-S4
DiamètreDuRouleau-S5
TailleDesFeuilles-S6
GénérositéDuRouleauNombreDeFeu-S6
TailleDesRouleauxDiamètre-S7
DuretéDuRouleau-S7
EpaisseurDesRouleaux-S8
TailleDesFeuilles-S8
DiamètreDuRrouleau-S12
GrosseurDuRouleau-S13
QuantitéDePapierSurLeRouleau-S15
DurabilitéDuRouleauTailleEnrou-S16
DurabilitéDuRouleauTailleAbsor-S16
PoidsDuRouleau-S20

Taille rouleau

TailleDeLaFeuille-S2
HauteurDesRouleaux-S2
TailleDeLaFeuille-S4
TailleDUuneFeuille-S5
HauteurDuRouleau-S5
HauteurDuRouleau-S6
TailleDeLaFeuille-S7
LargeurDeLaFeuille-S7
DimensionDesFeuilles-S9
LongueurDeLaFeuille-S10
LaizeDeLaFeuille-S10
TailleDeLaFeuille-S11
HauteurDuRouleau-S12
LongueurDeLaFeuille-S12
TailleHauteurDuRouleau-S13
TailleDesFeuillesPratiqueUsage-S14

Taille

RésistanceDesFeuilles-S3
RésistanceDeLaFeuille-S4
RésistanceAuTranspercement-S7
RésistanceDeLaFeuille-S8
DéchirureEnDehorsDesPrédécoupe-S11
Odeur-S11
RésistanceSèche-S15
Résistance-S16

Résistance

Epaisseur-S2
Odeur-S3
BlancheurPureté-S3
TrancheDuRouleauCompacte-S3
ComplexeAClair-S3
Douceur-S3
EpaisseurDesFeuilles-S5
EpaisseurDeLaFeuille-S7
ToucherDuveteux-S8
FroissementRésilience-S11
Epaisseur-S14
AbsorptionSansTailleDeLaFeuill-S15
AbsorptionVisuelToucher-S16
AbsorptionVisuel-S16
Douceur-S16
Absorption-S17
EpaisseurMainDensité-S18
RésistantImpressionPourHumide-S18
ProtecteurBarrière-S18
Absorbant-S18
ImpressionDeRésistanceEtEpaiss-S18
FeuillesPalpationEtTransparenc-S19

Absorption
Epaisseur

ReliefVisuelDePlatARelief-S2
ImpressionDEpaisseur-S3
QualitéDeRéalisationDeCheapAPr-S3
EsthétiqueSurLaFeuilleDeMocheA-S3
EsthétiqueSurLeRouleauDeMocheA-S3
DuMoinsGaufréAuPlusGaufré-S4
ProfondeurDuDécor-S5
ReliefDuMotif-S7
Blancheur-S8
RésistanceDoigtsAuTravers-S9
EpaisseurDeLaFeuille-S9
MoinsDeReliefAPlusDeRelief-S10
PlaAVolumineux-S12
Douceur-S12
SéparationDesFeuilles-S15
PréférenceGaufrage-S15
AttractivitéDuMotif-S16

Gaufré

TailleMandrin-S1
TailleDeLaFeuille-S1
NettetéDuGaufrage-S1
DiamètreDuMandrinCarton-S2
FormeDuMotifDeRondAAnguleux-S2
DétachementDesFeuillesPerf-S5
TailleDuMandrin-S6
FacilitéPourDétacherUneFeuille-S7
DensitéDesMotifsSurfaceGaufrée-S7
VisibilitéDuDécor-S8
TailleLongueurDesPerforations-S10
MotifEenversProfondeuTailleDuM-S11
LisseATrèsMarqué-S11
Résistance-S13
FlufinesSofTheRoll-S13
TailleDesFeuilles-S17
TailleDeLaFeuilleAdaptéeUsage-S18
Absorption-S19
PerceptibleAPrononcé-S19
PlusGaufré-S20
Relief-S20

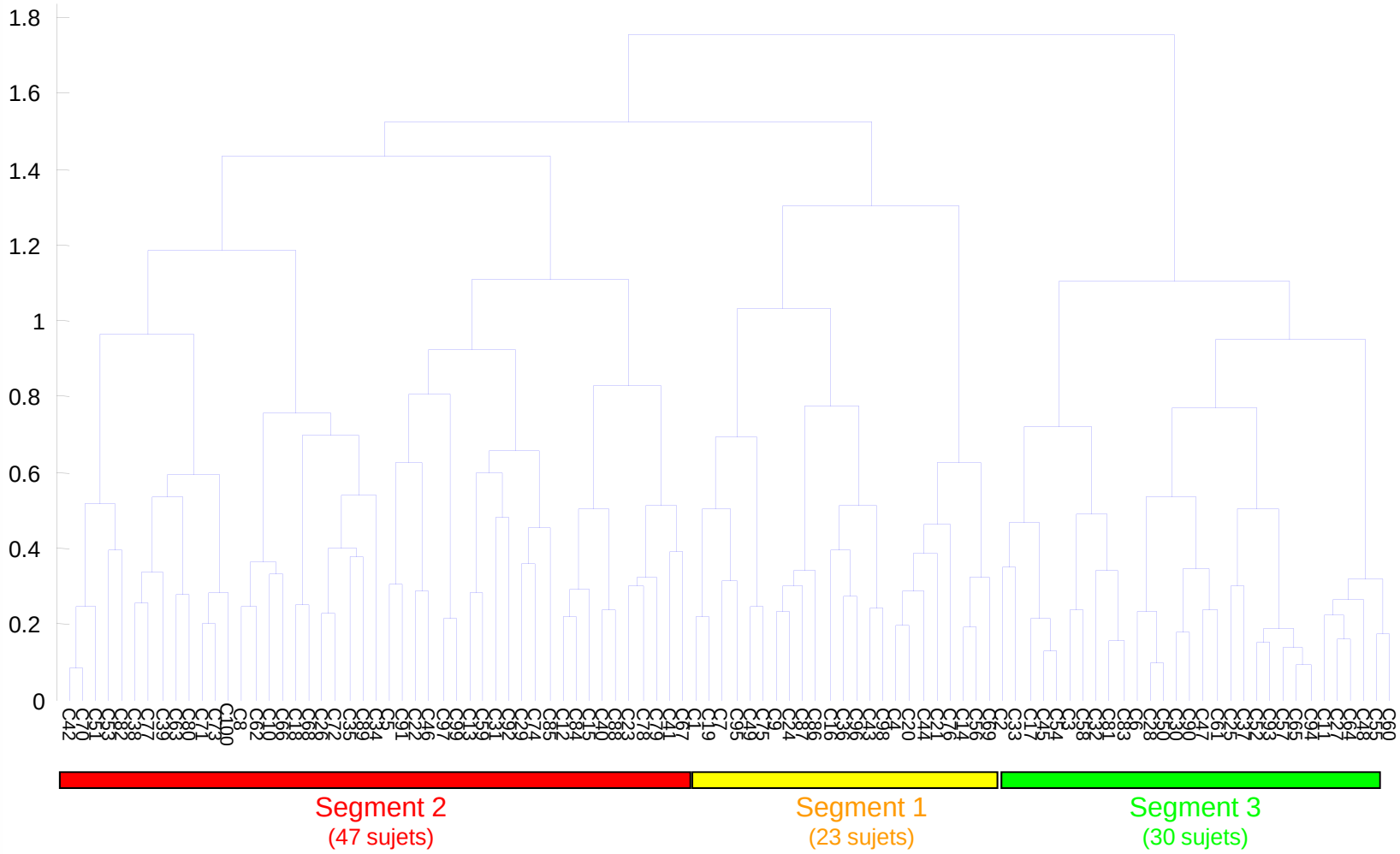
Taille mandrin

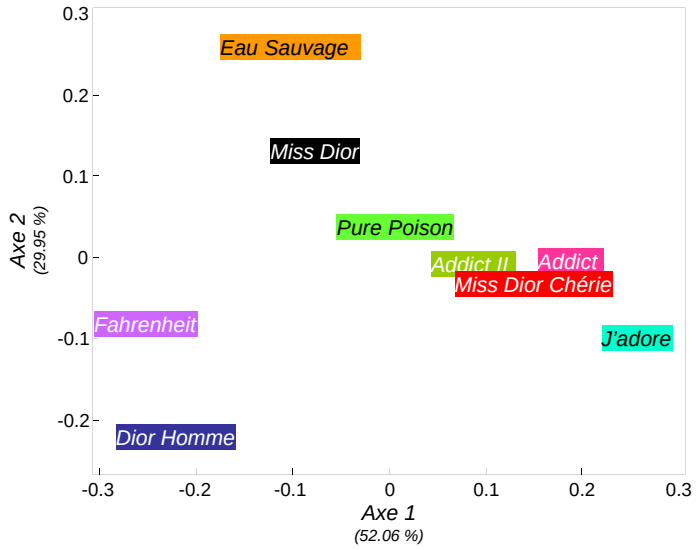
MoelleuxDuRouleau-S1
SouplesseDeLaFeuille-S1
Blancheur-S1
Douceur-S1
Douceur-S2
Souplesse-S4
Douceur-S4
Douceur-S5
BlancheurDuRrouleau-S6
FacilitéDeDécoupeDeLaFeuille-S6
Douceur-S6
Douceur-S7
Souplesse-S8
Douceur-S8
Blancheur-S9
SouplesseDeLaFeuille-S9
Prédécoupe-S9
Douceur-S9
Douceur-S10
Douceur-S11
FacilitéADétacherUneFeuille-S12
Douceur-S13
Douceur-S14
Douceur-S15
Douceur-S17
Douceur-S18

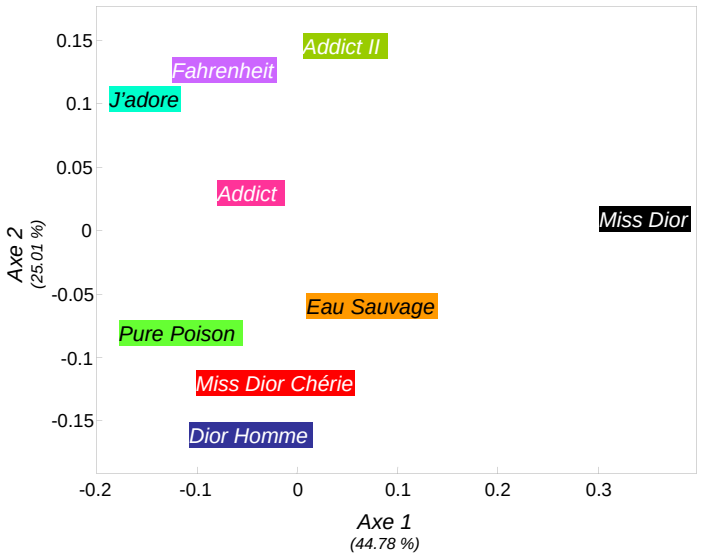
Douceur

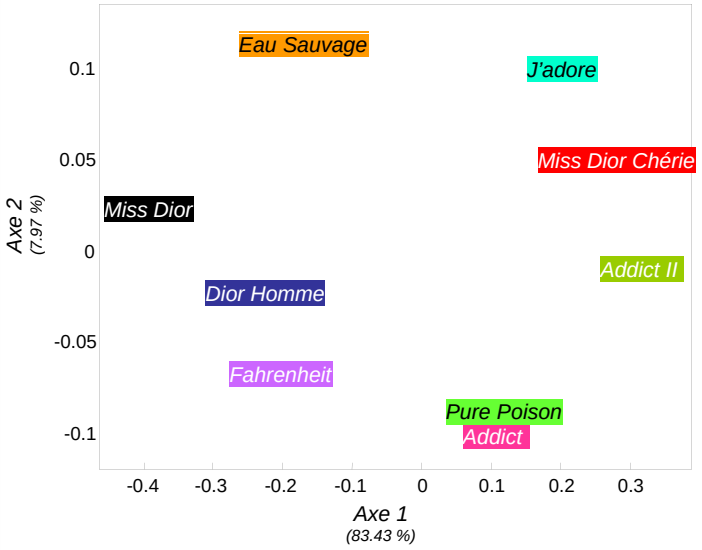
CHINA STUDY

Emotional description

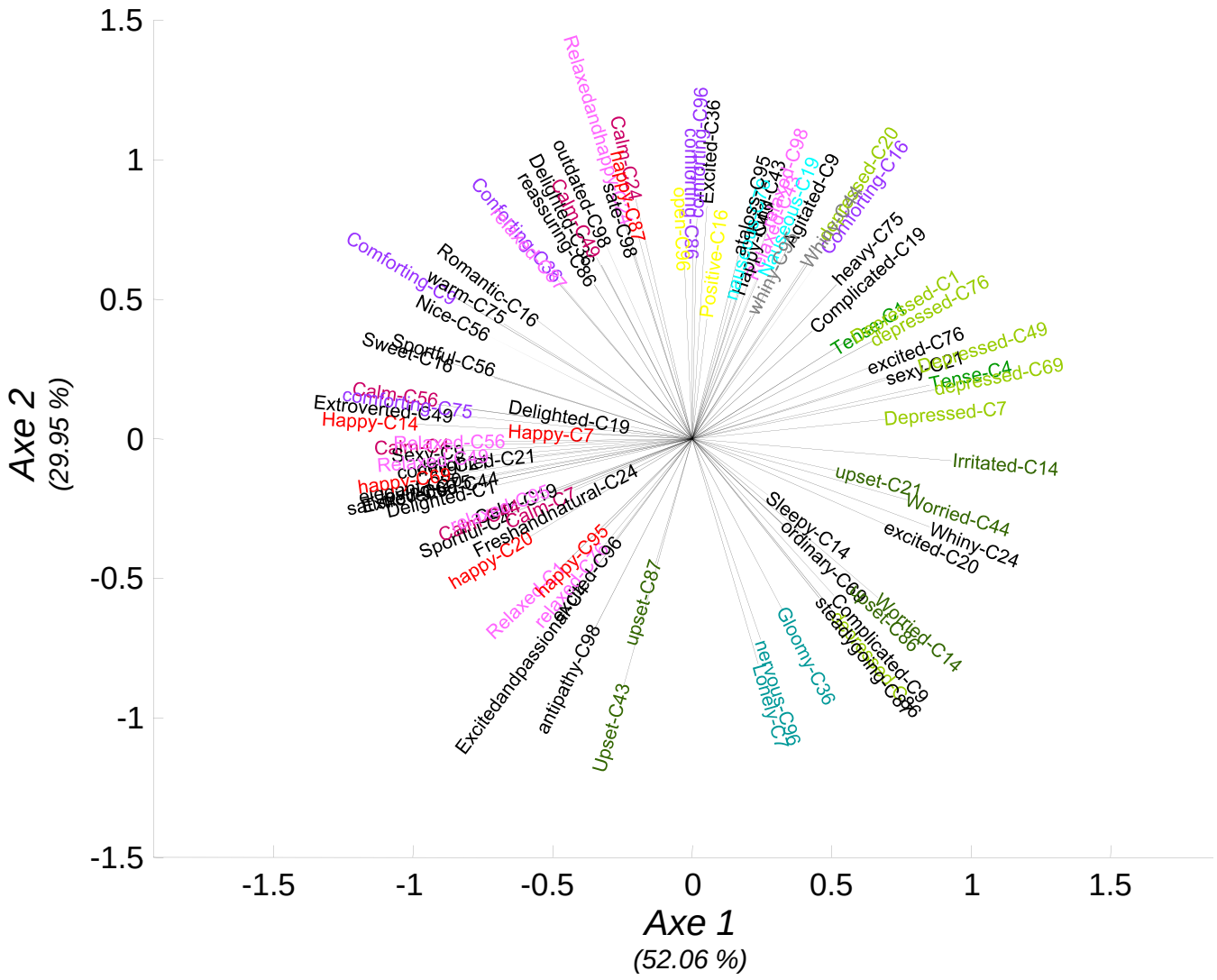



Eau Sauvage
Miss Dior
Pure Poison
Addict II
Addict
Miss Dior Chérie
Fahrenheit
J'adore
Dior Homme
Axe 2
(29.95 %)
Axe 1
(52.06 %)
0.3
0.2
0.1
0
-0.1
-0.2
-0.3
-0.2
-0.1
0
0.1
0.2
0.3

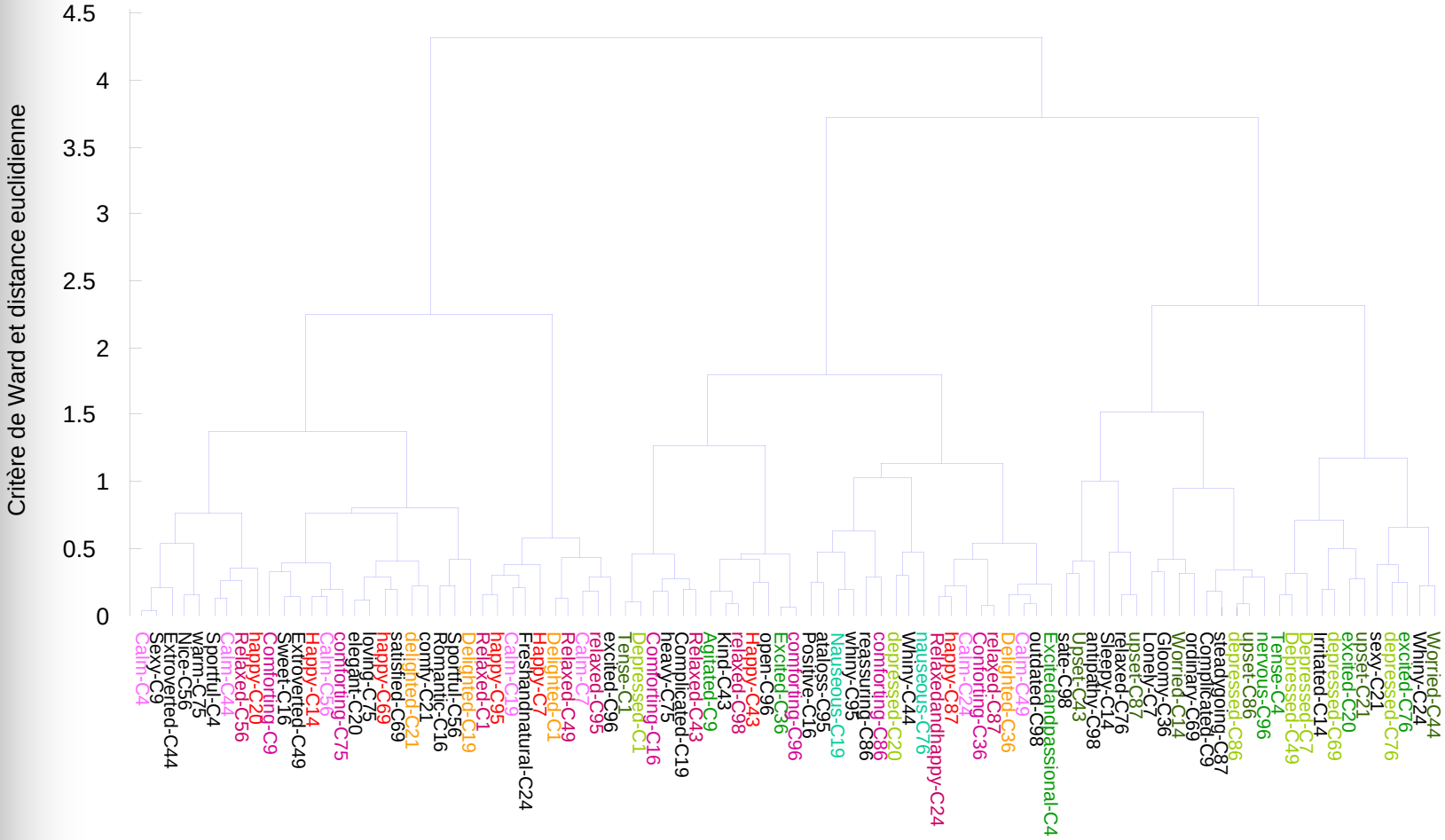

Addict II
Fahrenheit
J'adore
Addict
Miss Dior
Eau Sauvage
Pure Poison
Miss Dior Chérie
Dior Homme
Axe 2
(25.01 %)
Axe 1
(44.78 %)
0.15
0.1
0.05
0
-0.05
-0.1
-0.15
-0.2
-0.1
0
0.1
0.2
0.3


Eau Sauvage
J'adore
Miss Dior Chérie
Miss Dior
Addict II
Dior Homme
Fahrenheit
Pure Poison
Addict
Axe 2
(7.97 %)
Axe 1
(83.43 %)
0.1
0.05
0
-0.05
-0.1
-0.4
-0.3
-0.2
-0.1
0
0.1
0.2
0.3

CLUSTER N° 1


Axe 2
(29.95 %)
Axe 1
(52.06 %)
1.5
1
0.5
0
-0.5
-1
-1.5
Relaxedandhappy-C95
Calm-C24
Calm-C87
Excited-C36
Positive-C16
Comforting-C16
Comforting-C36
Comforting-C9
outdated-C98
Delighted-C98
reassuring-C86
Calm-C86
Safe-C98
Romantic-C16
warm-C75
Nice-C56
Sweet-C16
Sportful-C56
Calm-C56
Extroverted-C49
Happy-C14
Delighted-C19
Happy-C7
Relaxed-C56
Sexy-C9
Delighted-C21
Delighted-C7
Sportful-C21
Freshandnatural-C24
happy-C20
Relaxed-C1
Excitedandpassionate-C96
antipathy-C98
upset-C87
Upset-C43
Gloomy-C36
nervous-C96
Lonely-C7
Sleepy-C14
ordinary-C69
steadygoing-C86
Complicated-C9
Worried-C14
Upset-C56
upset-C21
Worried-C44
Whiny-C24
excited-C20
Irritated-C14
Depressed-C7
Tense-C4
depressed-C69
Depressed-C49
sexy-C21
excited-C76
depressed-C76
Tense-C1
Complicated-C19
heavy-C75
agitated-C9
Comforting-C16
Happy-C43
happy-C95
whiny-C96
nervous-C19
happy-C98
happy-C19
happy-C20

CLUSTERING OF THE ATTRIBUTES



Worried-C44
Whiny-C24
excited-C76
depressed-C76
sexy-C21
upset-C21
excited-C20
depressed-C69
Irritated-C14
Depressed-C7
Depressed-C49
Tense-C4
nervous-C96
upset-C86
depressed-C86
steadygoing-C87
Complicated-C9
ordinary-C69
Worried-C14
Gloomy-C36
Lonely-C7
upset-C87
relaxed-C76
Sleepy-C14
antipathy-C98
Upset-C43
sate-C98

Excitedandpassional-C4
outdated-C98
Calm-C49
Delighted-C36
relaxed-C87
Conforting-C36
Calm-C24
happy-C87
Relaxedandhappy-C24
nauseous-C76
Whiny-C44
depressed-C20
comforting-C86
reassuring-C86
whiny-C95
Nauseous-C19
ataloss-C95
Positive-C16
comforting-C96
Excited-C36
open-C96
Happy-C43
relaxed-C98
Kind-C43
Agitated-C9
Relaxed-C43
Complicated-C19
heavy-C75
Comforting-C16
Tense-C1
Depressed-C1

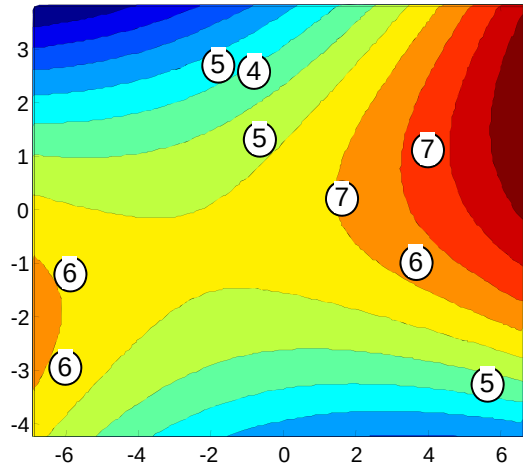
excited-C96
relaxed-C95
Calm-C7
Relaxed-C49
Delighted-C1
Happy-C7
Freshandnatural-C24
Calm-C19
happy-C95
Relaxed-C1
Delighted-C19
Sportful-C56
Romantic-C16
comfy-C21
delighted-C21
satisfied-C69
happy-C69
loving-C75
elegant-C20
comforting-C75
Calm-C56
Happy-C14
Extroverted-C49
Sweet-C16
Comforting-C9
happy-C20
Relaxed-C56
Calm-C44
Sportful-C4
warm-C75
Nice-C56
Extroverted-C44
Sexy-C9
Calm-C4

Thank you for your attention !

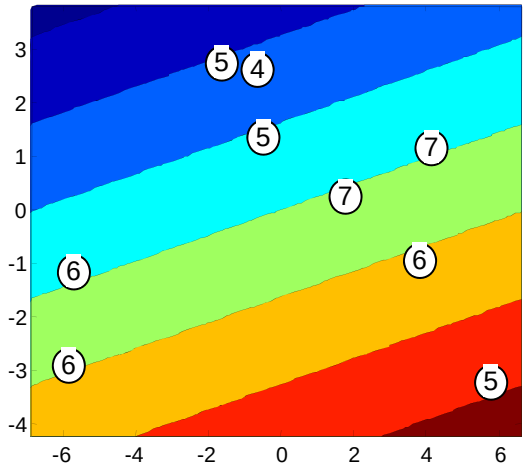
What is the importance of the significance of the coefficients of the model when you use response surface ?

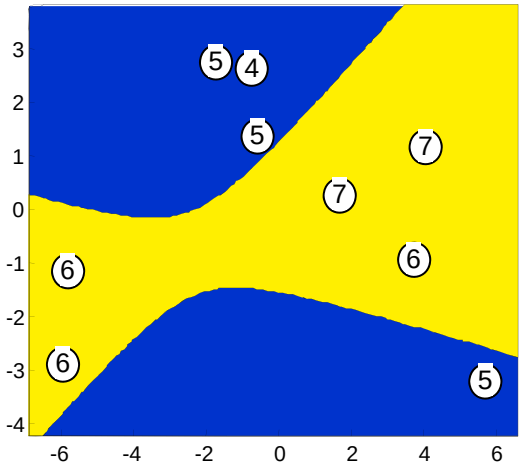
Consumer n° 179

Quadratic



Vectorial

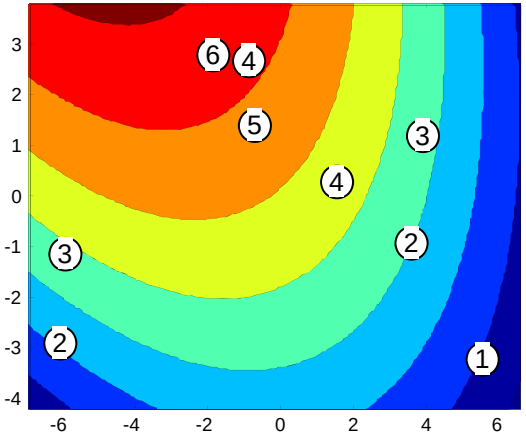




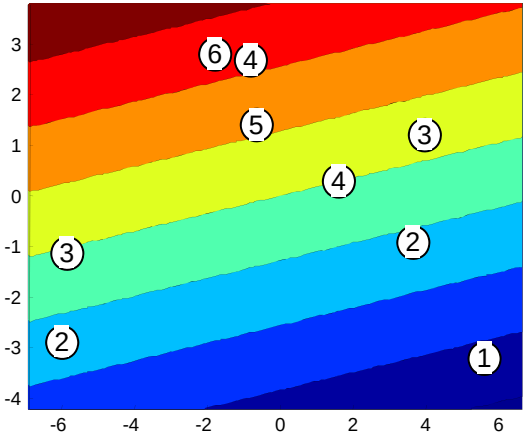
	p-value	R^2
vectorial	0.7552	0.2989
quadratic	0.3309	0.8669

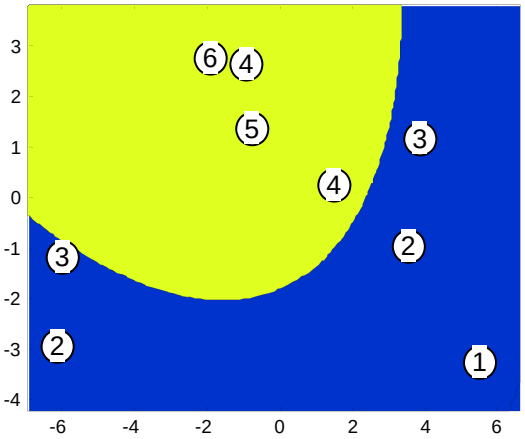
Consumer n° 179

Quadratic



Vectorial





	p-value	R^2
vectorial 2	0.0051	0.9102
quadratic	0.1148	0.9423

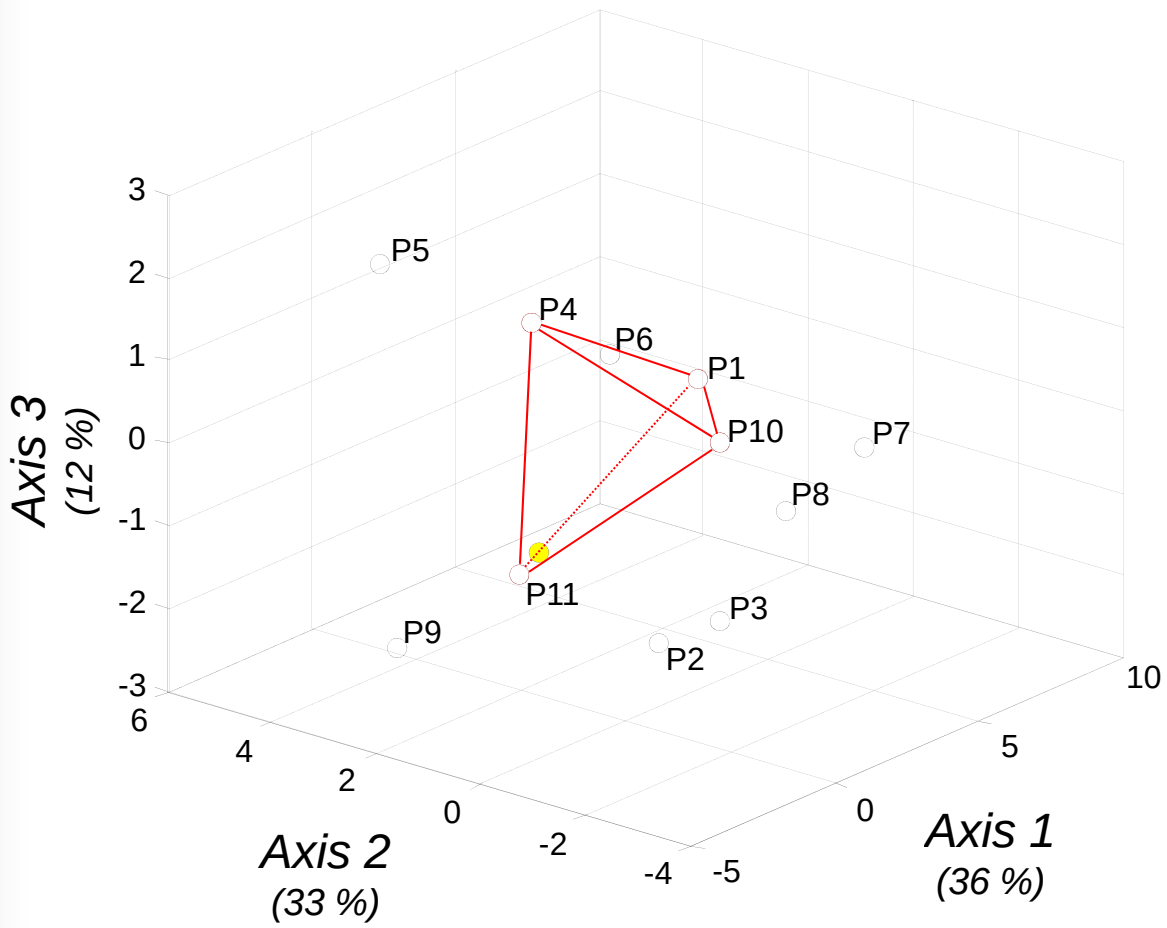
Quadratic preference mapping

Idem for vectorial preference mapping

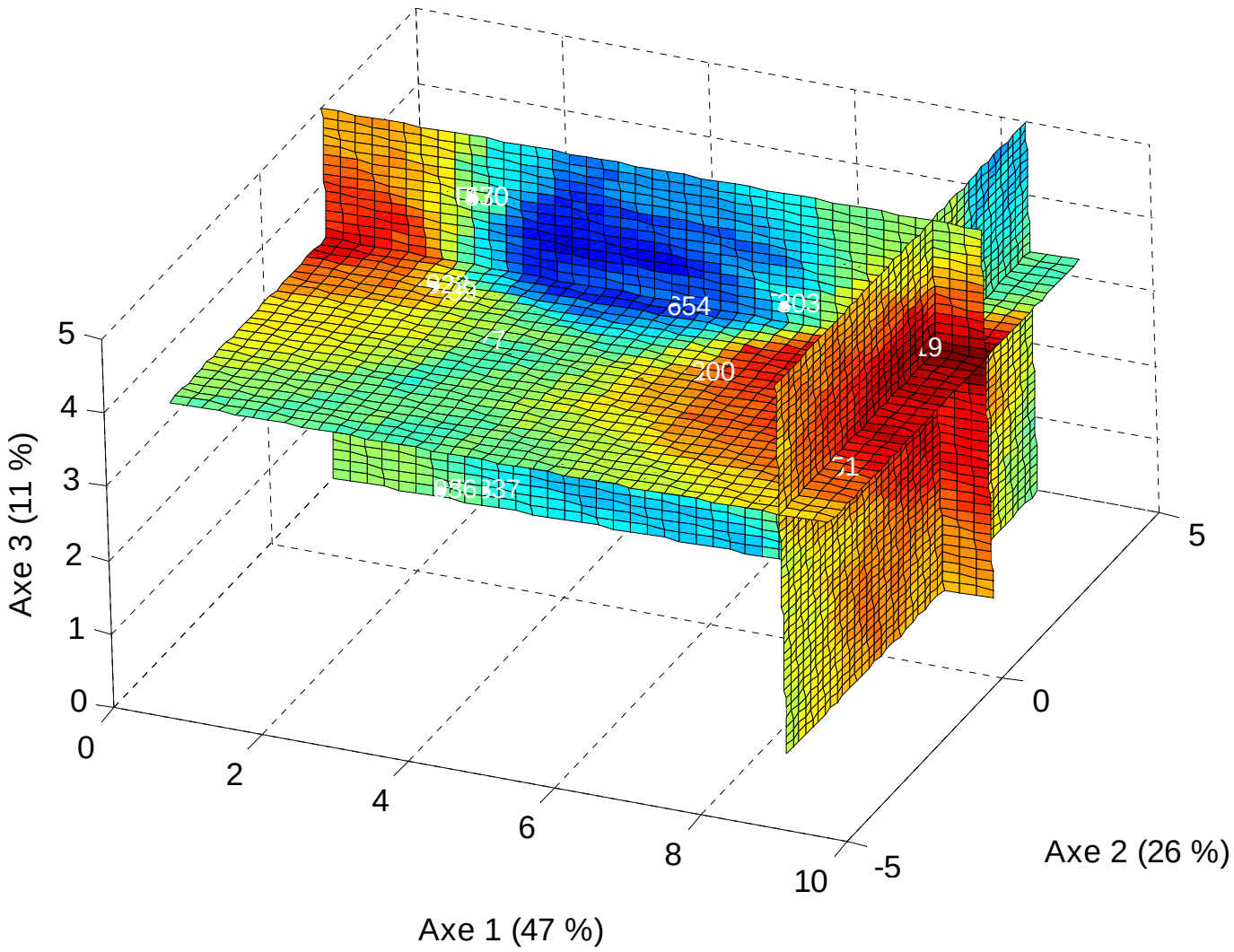
Use of different techniques to study the expert data

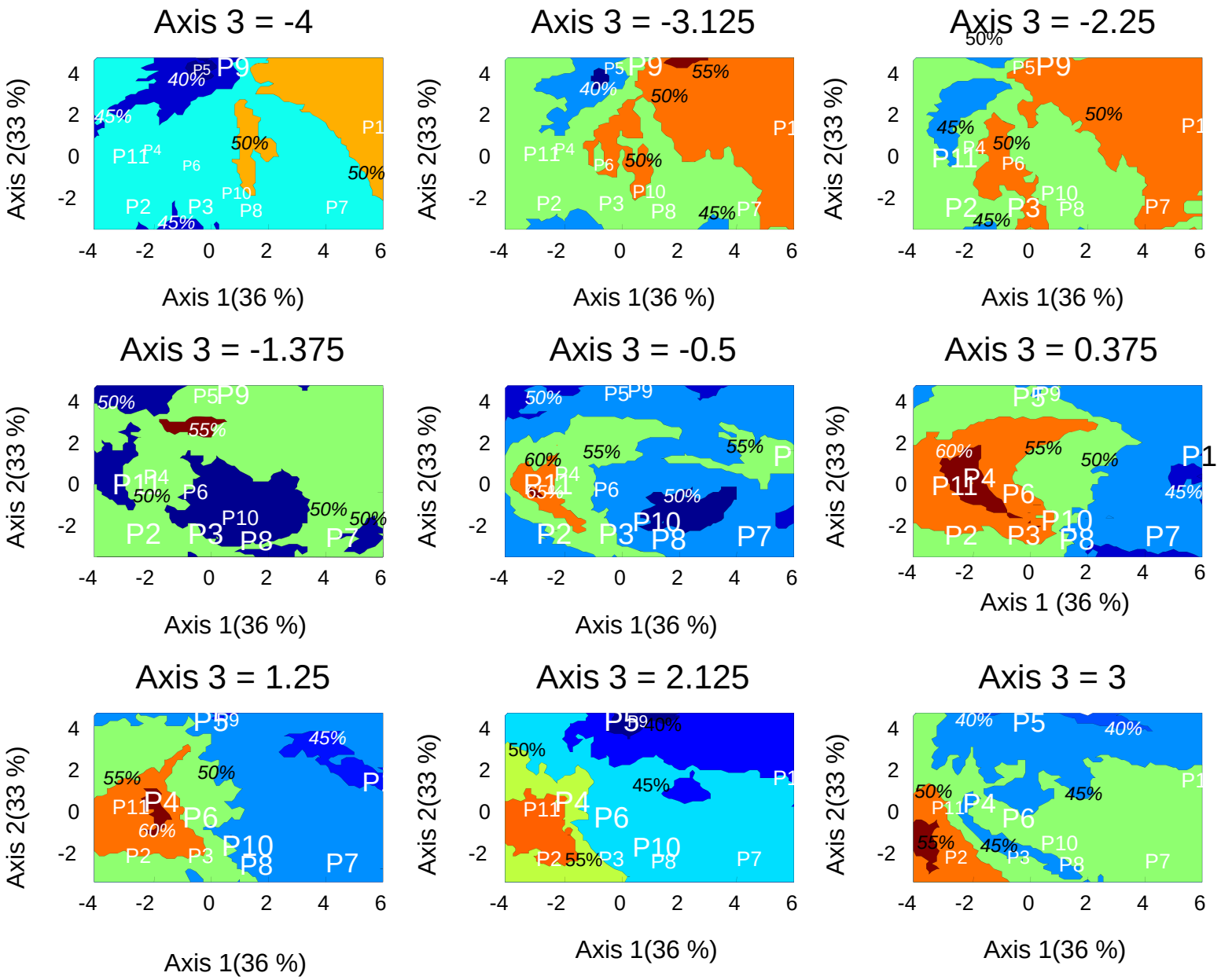
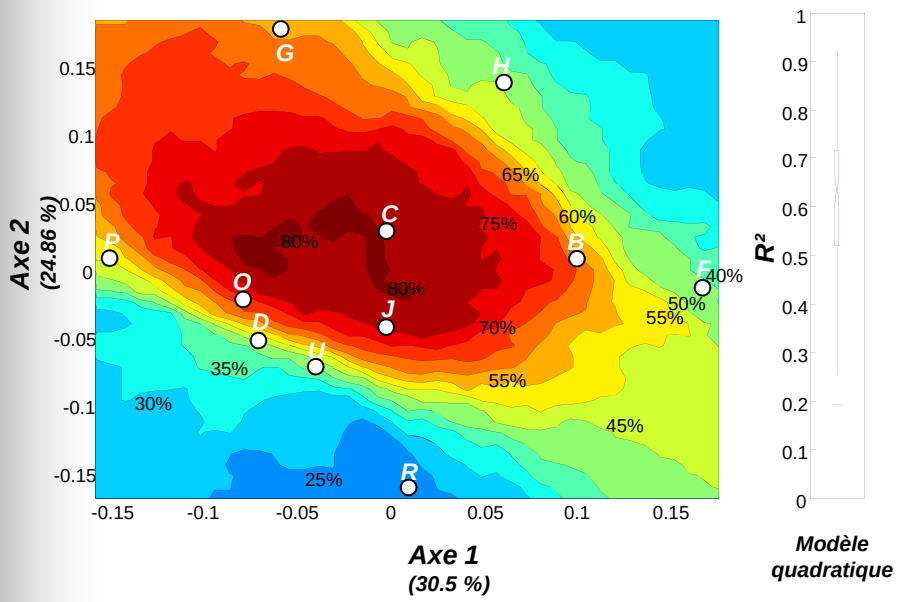
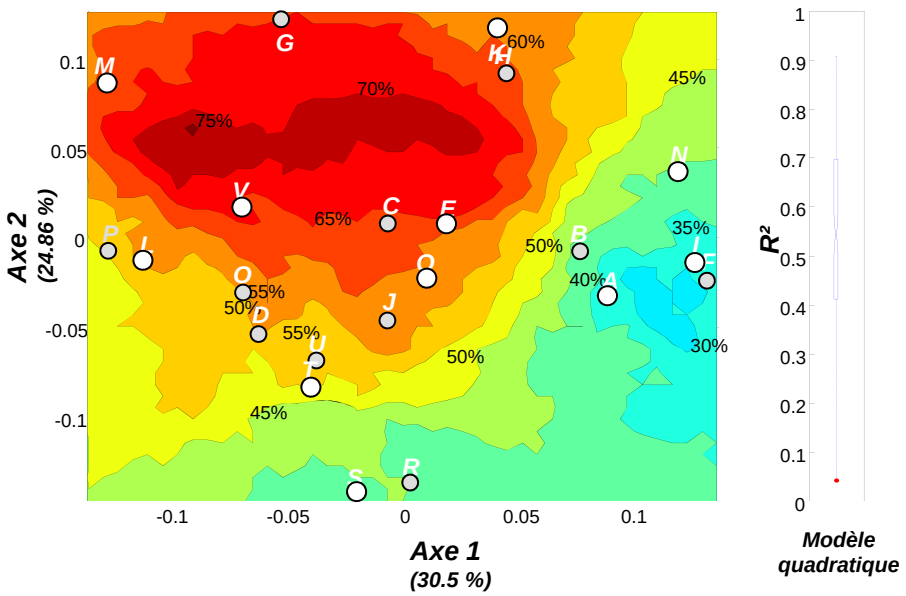
Work in more than 2 dimensions

Prefmap in 3D


Axis 3
(12 %)
Axis 2
(33 %)
Axis 1
(36 %)
P1
P2
P3
P4
P5
P6
P7
P8
P9
P10
P11
3
2
1
0
-1
-2
-3
6
4
2
0
-2
-4
-5
0
5
10

R^2
1
0.9
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0
Quadratic model


Axe 3 (11 %)
Axe 1 (47 %)
Axe 2 (26 %)
0
1
2
3
4
5
0
2
4
6
8
10
-5
0
5


Axis 3 = -4
Axis 3 = -3.125
Axis 3 = -2.25
Axis 3 = -1.375
Axis 3 = -0.5
Axis 3 = 0.375
Axis 3 = 1.25
Axis 3 = 2.125
Axis 3 = 3
Axis 1(36 %)
Axis 1 (36 %)
Axis 2(33 %)
P1
P2
P3
P4
P5
P6
P7
P8
P9
P10
P11
40%
45%
50%
55%
60%

Préférences des 119 consommateurs du groupe n° 1