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GEOMETRIC DATA ANALYSIS

Application to a racism survey

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Summary

- Introduction
- The Data
- The Cloud of modalities
 - The whole structure
 - A first interpretation
 - The NR modalities on axis 2
 - Modalities on plane 1 – 3
 - Examining the questions
- The Cloud of Individuals
 - The methods
 - The target effect on axis 2
 - The target effect on plane 1-3
 - Some specific questions
- Conclusion

References

- Benzécri J.P. (1992). *Correspondence Analysis Handbook*, New York, Dekker.
- Bonnet P., Le Roux B., Lemaine G. (1996). Analyse géométrique des données: une enquête sur le racisme, *Math. Inf. Sc. Hum.*, n° 136, 5-28.
- Greenacre M. (1984). *Theory and Applications of Correspondence Analysis*, London, Academic Press.
- Lebart L., Morineau A., Warwick K.W. (1984). *Multivariate Descriptive Statistical Analysis*, Wiley.
- Le Roux B., Rouanet H. (2004) *Geometric Data Analysis*, Boston, Kluwer Academic Publishers.

Introduction

The 1988 Euro-barometer Survey, with a specific questionnaire about minorities in four countries :

- France (2 targets): North-Africans (N.A.), Southeast Asians (As)
 - Great Britain (2 targets): Indian-Pakistanese, West Indians
 - Netherlands (2 targets): Turks, Surinamers
 - West Germany (1 target): Turks
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- Pettigrew T.F., Jackson J.S., Ben Brika J., Lemaine G., Meertens R.W., Wagner U., Zick A. - (1992). Outgroup prejudice in Western Europe, *European Review of Social Psychology*.

The Data : the French sample

932 individuals randomly divided into two groups:

- N.A. target: 448 individuals
- As. target: 484 individuals



target as a structuring factor

29 target questions:

- 5 response modalities
 - 4 ordered modalities
 - strongly positive
 - somewhat positive
 - somewhat negative
 - strongly negative
 - NR (No Answer)



type of response factor

see the handout

Brief Comments

- 29 one-way tables
 - NR rates: from 1.5 % [q30 Physical features] to 31 % [q31 Sexuality]
- 29x28/2 two-way tables
- ...Response patterns of 932 individuals.

GDA amounts to:

the synthesis of all two-way tables (modalities).

the representation of all response patterns (individuals).

Constructing the Clouds

A first MCA of the data table:

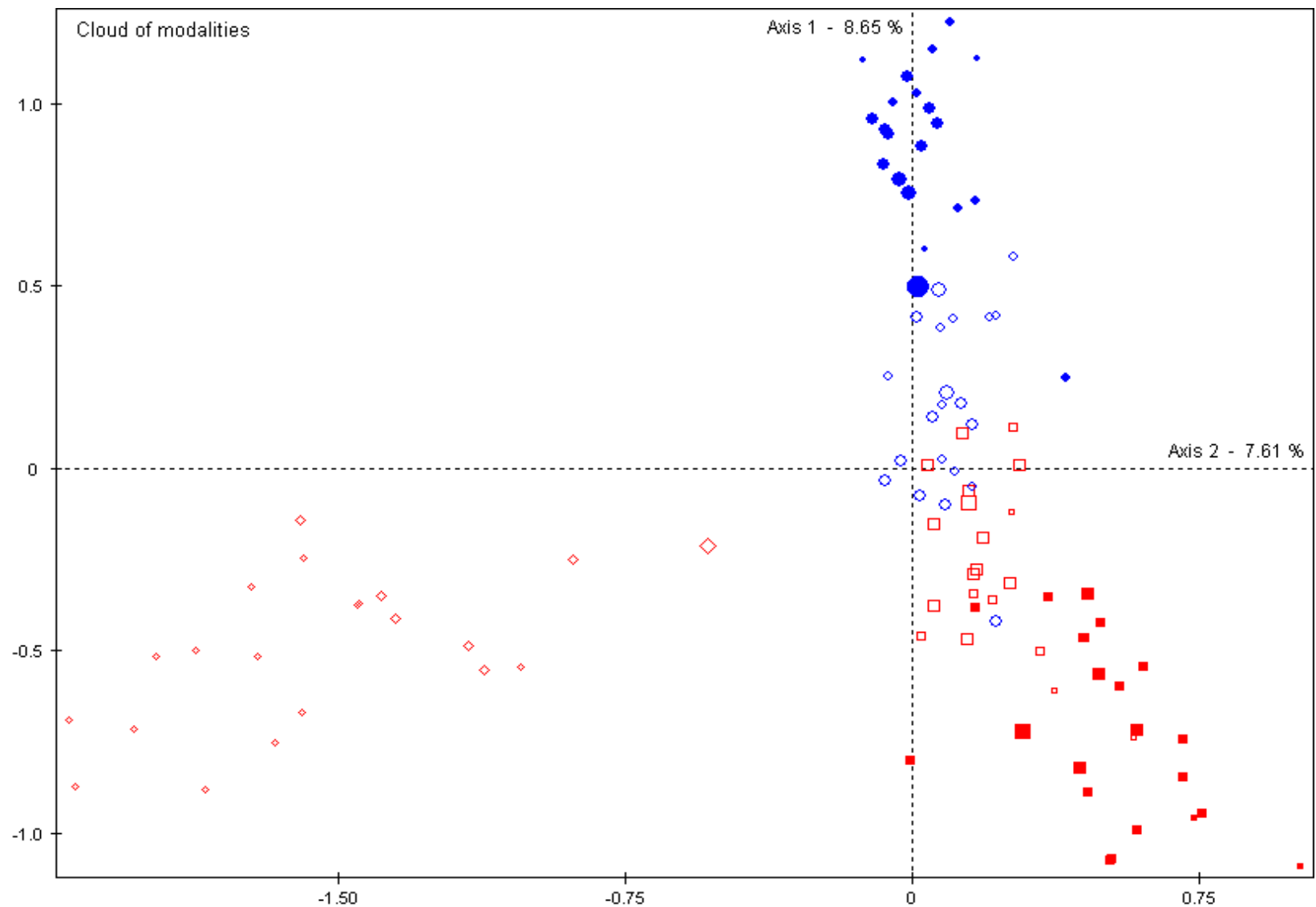
932 individuals and $29 \times 5 = 145$ modalities

Because of the non homogeneity of 8 questions out of 29

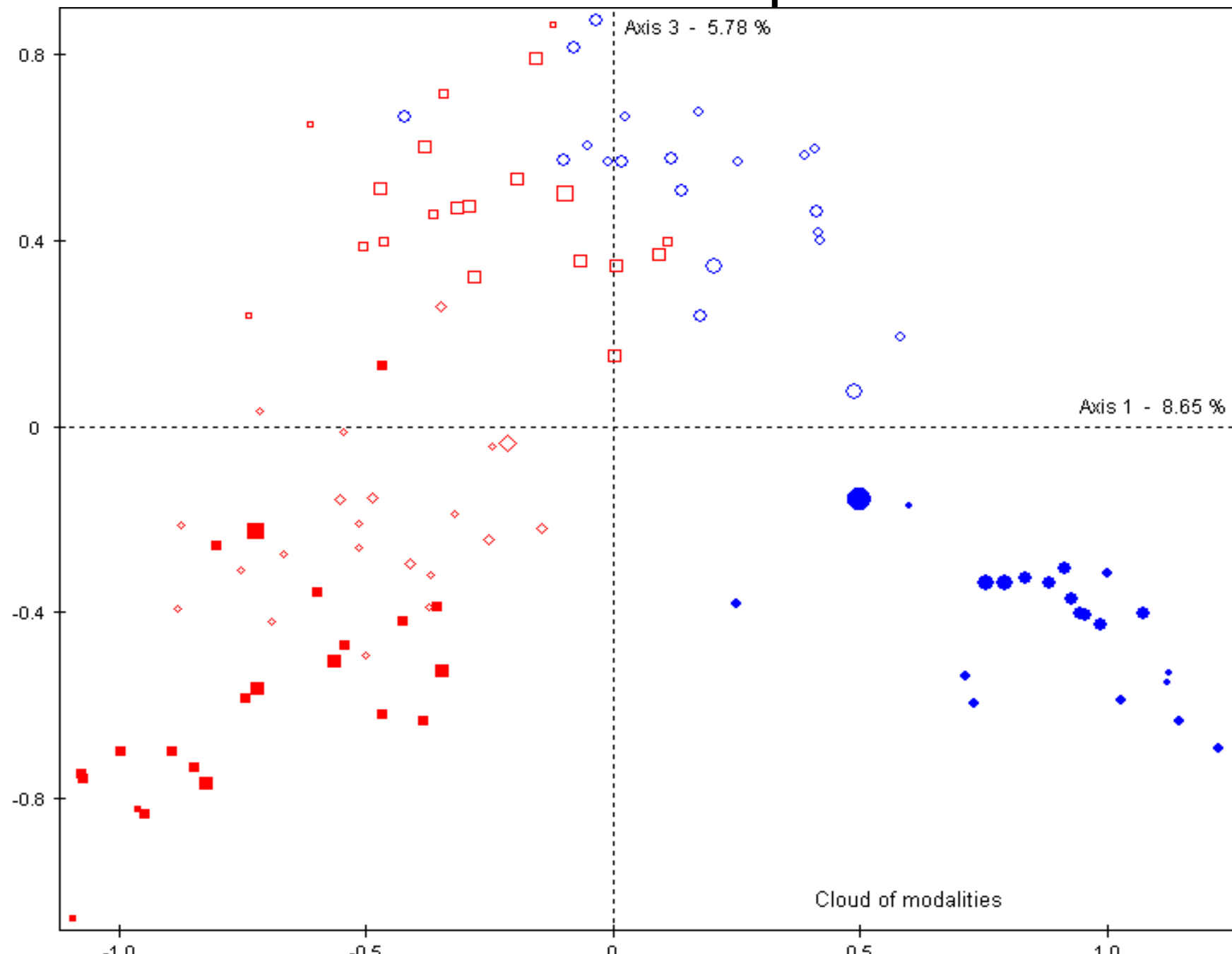
A second MCA of 932 individuals and 21×5 modalities with 5 supplementary individuals as landmark points

Modified rates : 45%, 33% and 17% (95%)

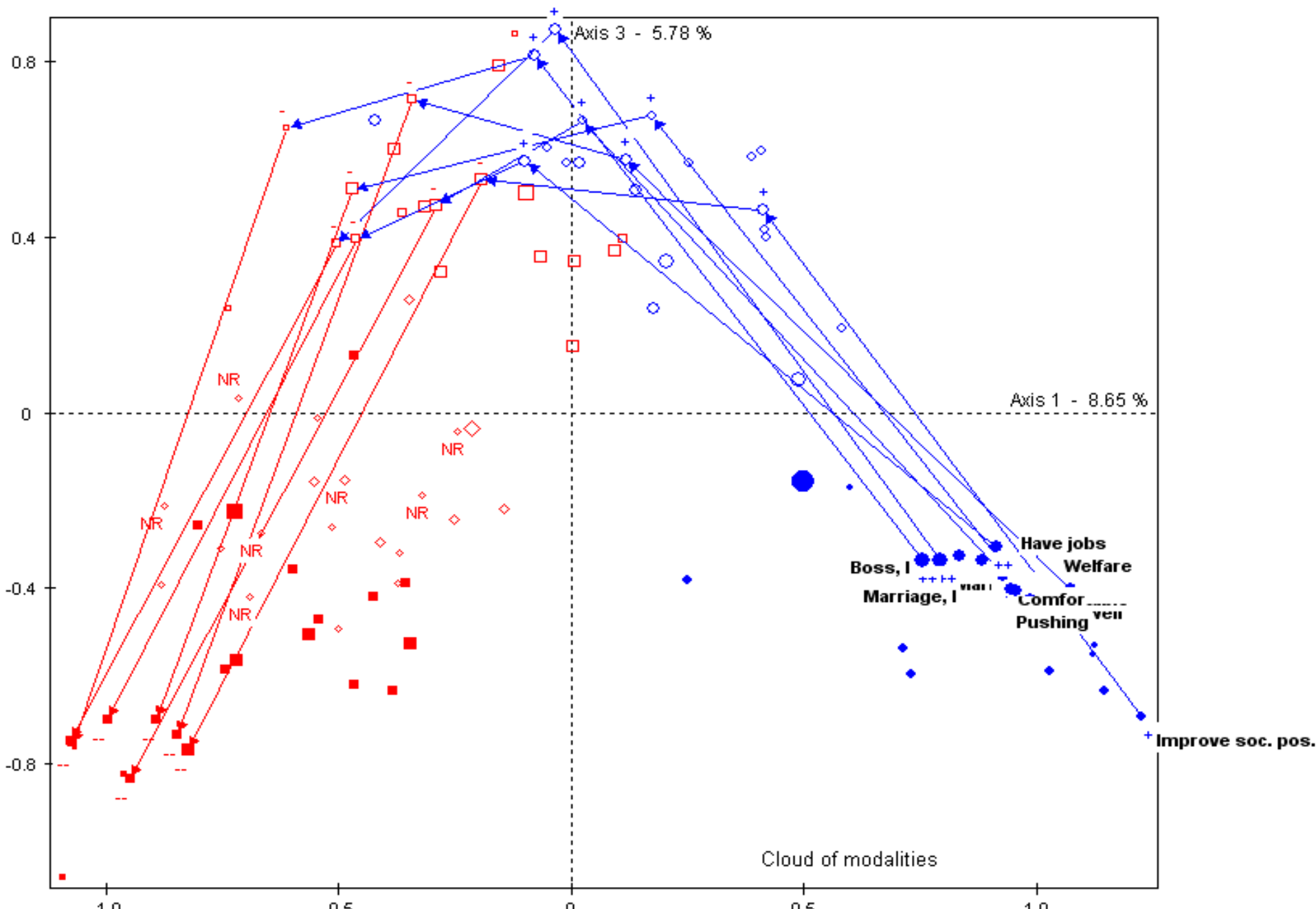
Cloud of modalities : the plane 1 - 2



Cloud of modalities : plane 1 - 3



Cloud of Modalities : plane 1 - 3



Cloud of Modalities : contributions

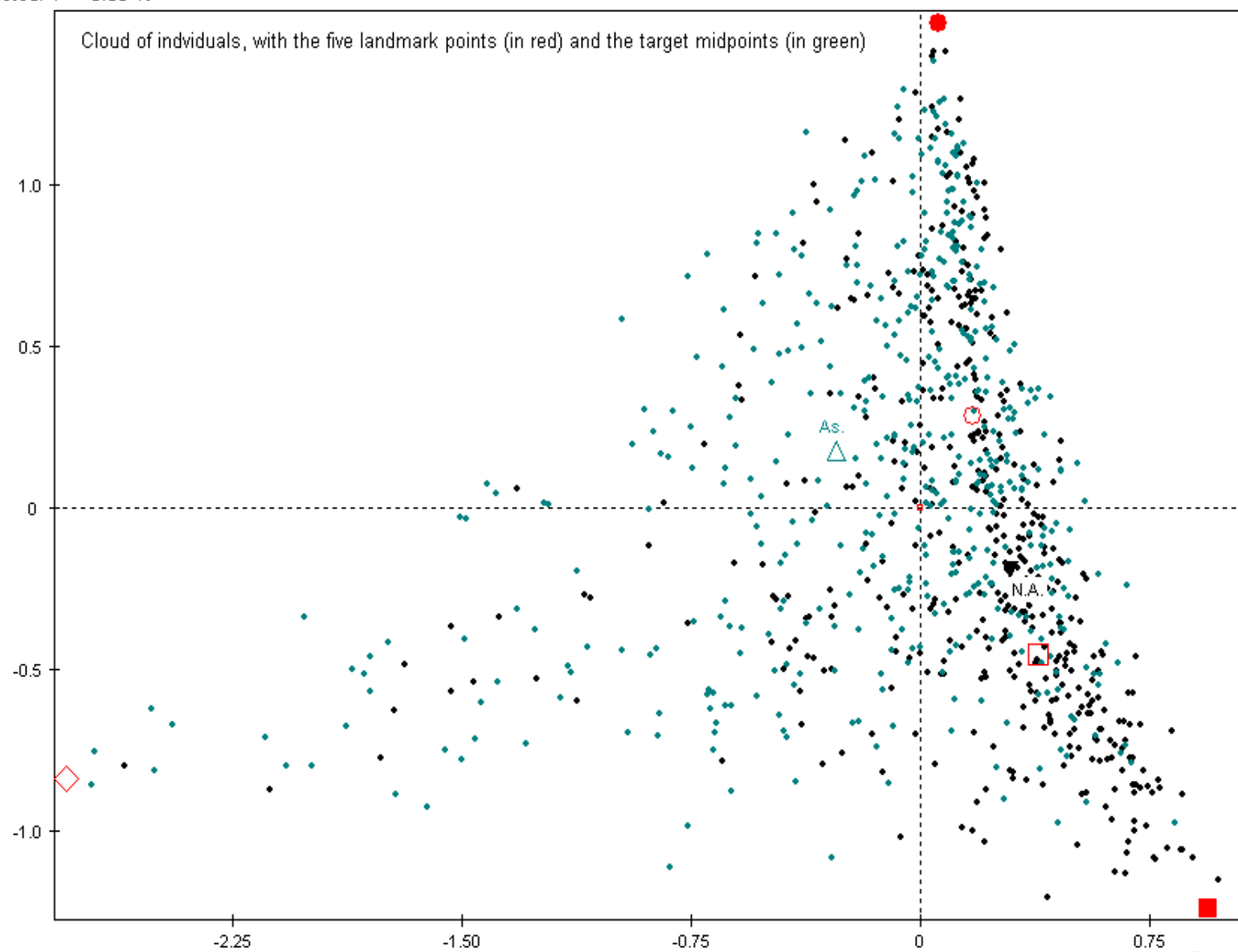
	Axis 1	Axis 2	Axis 3
Axes variance	0.346	0.304	0.231
subcloud NR	0.026	0.237	0.007
subcloud + +	0.177	0.003	0.037
subcloud +	0.019	0.003	0.069
subcloud –	0.020	0.010	0.051
subcloud – –	0.104	0.051	0.067

The space of individuals

- Helps for exploring data
 - supplementary individuals as landmark points
 - groups of extreme individuals (largest ctr)
 - correlations between explicative variables and principal variables
- Structuring the cloud of individuals
 - the target factor (experimental factor)
 - response type factor

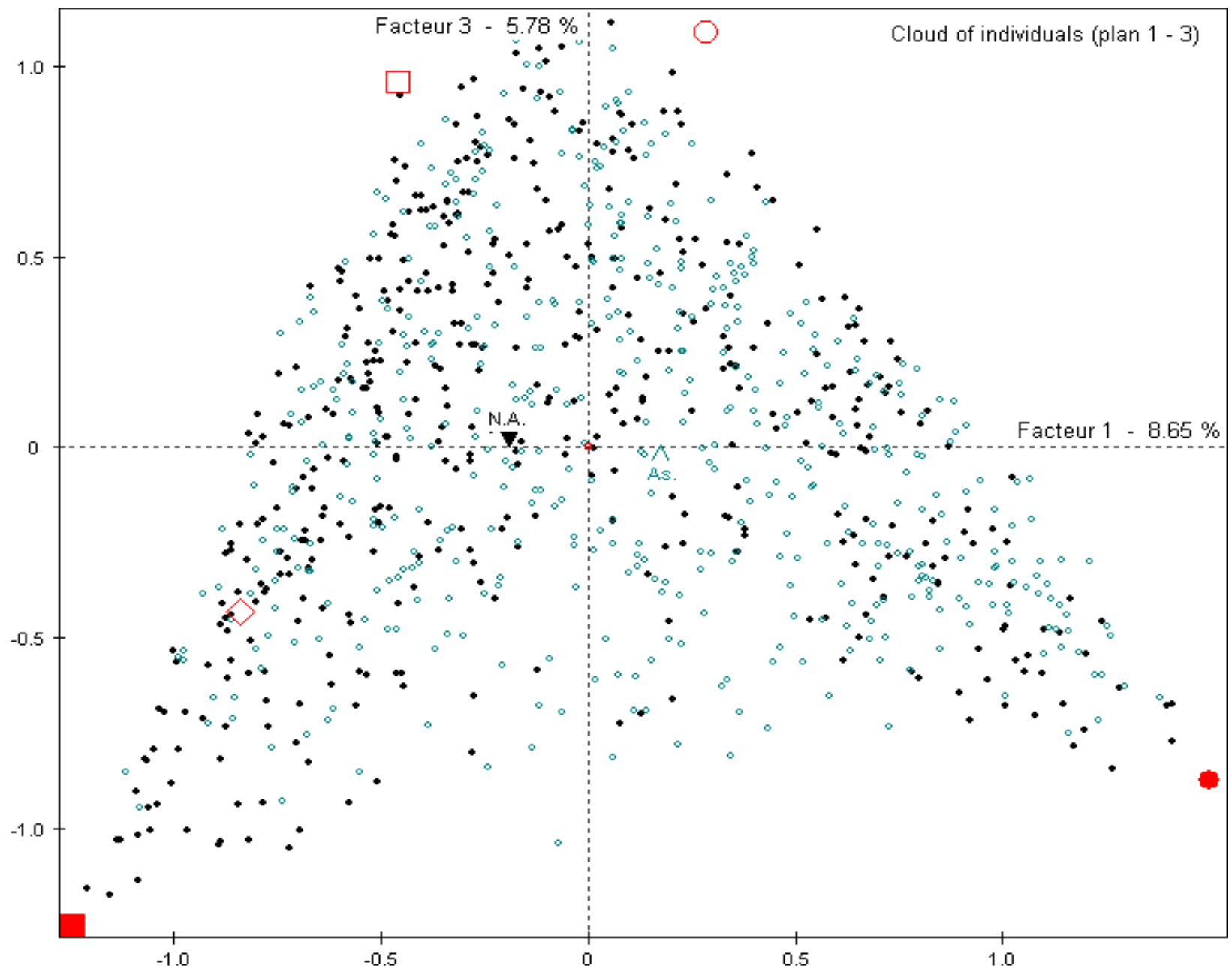
Cloud of individuals : axes 1 and 2

Facteur 1 - 8.65 %

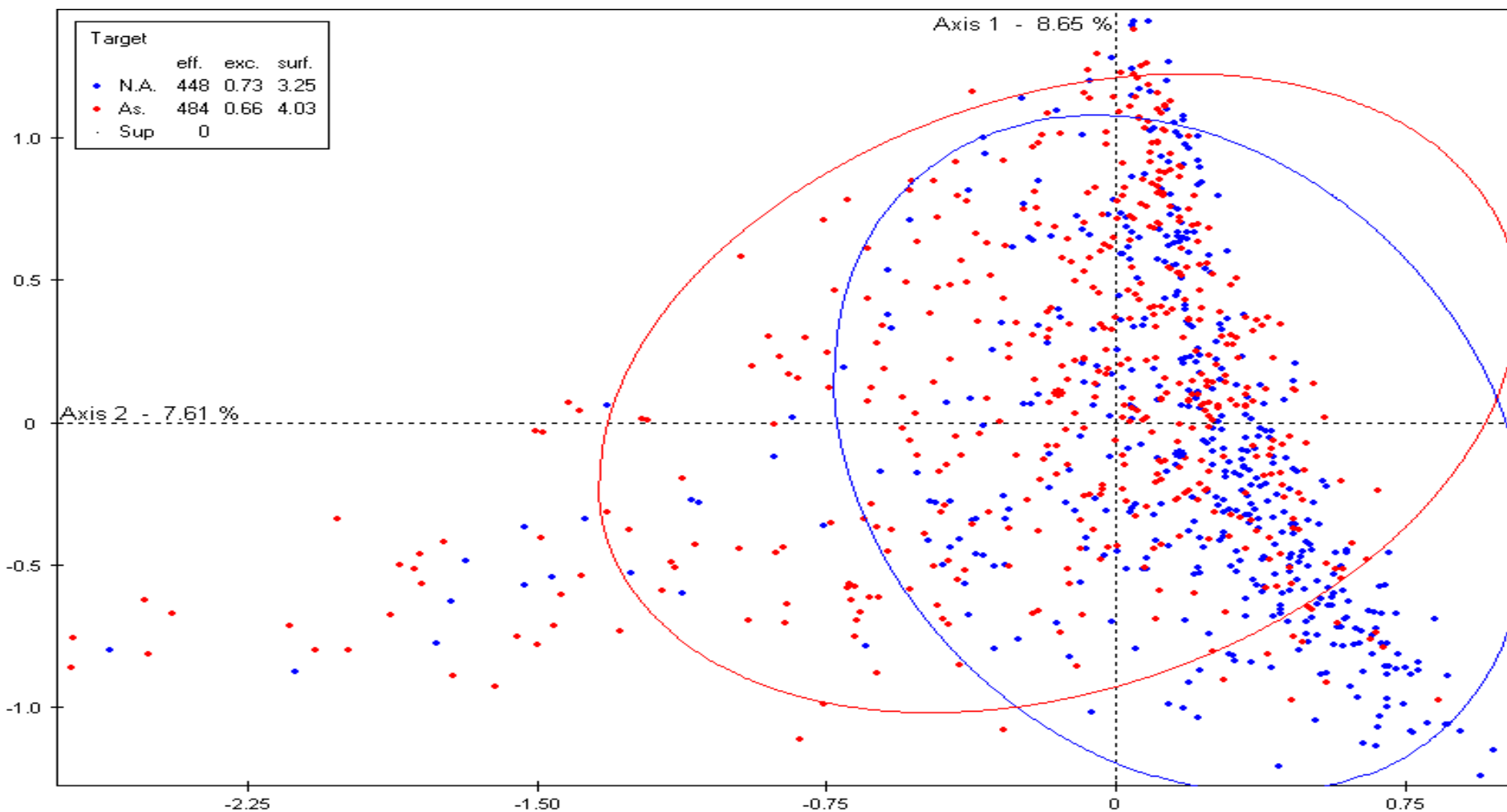


Facteur 2 - 7.61 %

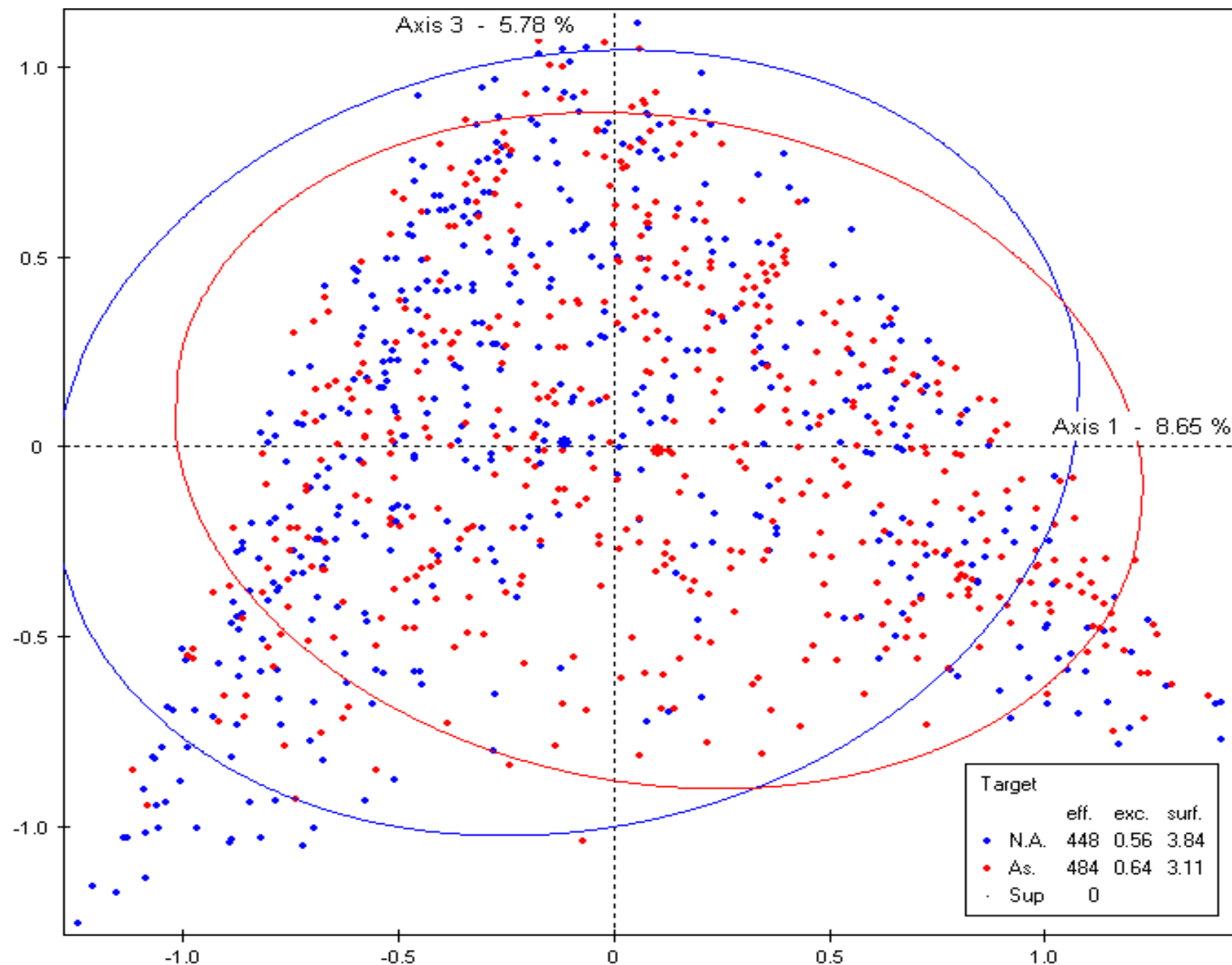
Cloud of individuals : axes 1 and 3



Cloud of individuals : plane 1 - 2



Cloud of individuals : plane 1 -3



Conclusions about racism data

Axis 1 : Attitude

Axis 3 : Intensity

Axis 2 : Non-response

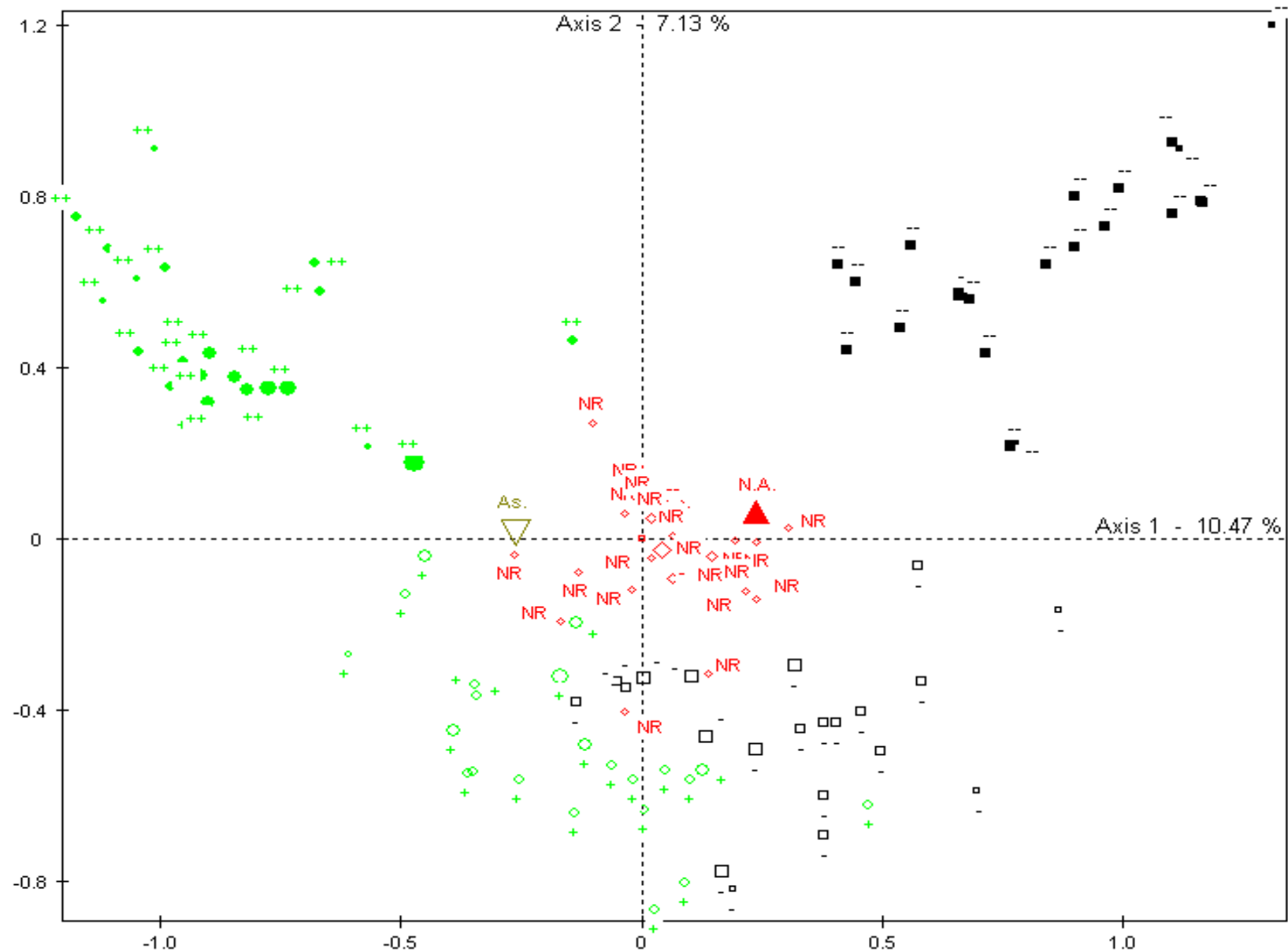
NR is between -- and -

- Numerical representation of modalities ++, +, -, --:
1,3,4,6 rather than 1,2,3,4 or 1,2,4,5
- Shifting between the two targets unfavorable to
N.A.

Concluding comments on GDA

- If there is a strong structure in the data, it is immediately revealed by GDA.
[Heterogeneous questions]
- Aids to interpretation
 - Supplementary elements
 - Supplementary questions
 - supplementary individuals (landmark points)
 - Calculus of contributions: part of variances accounted by sources of variation.

Racism:specific MCA



Racism:specific MCA

