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# How to deal with scales from 0 to 10 in Geometric Data Analysis ?

## The case of the European Social Survey

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# Issues

*Analytical issue* : what are the main structuring cleavages\* upon which the electorates oppose (on dimensions such as politics, Europe and globalization, ethnocentrism, institutions, economy) ?

*Methodological issue* : how to solve the Guttman effect, a well-known problem in GDA and particularly in MCA ?

\* cf. the french debate about the tripartition of political space (Chiche J., Le Roux B., Perrineau P., Rouanet H. : « L'espace politique des électeurs français à la fin des années 1990. Nouveaux et anciens clivages, hétérogénéité des électors. », *Revue française de science politique*, Vol 50, n°3, 2000)

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  - Results
  - Comparison Round2/Round3
- Conclusion

# **Presentation**

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# Data

- First analysis about merged data of ESS R2 and ESS R3
- Choice of common variables for the both rounds

# Structure of questionnaires

<i>ESS Round 2</i>	<i>ESS Round 3</i>
<p>A : Media ; social trust</p> <p>B : Politics</p> <p>C : Subjective well-being ; social exclusion ; religion ; discrimination ; national &amp; ethnic identity</p> <p><b><i>D : Health &amp; medicine</i></b></p> <p><b><i>E : Economic morality</i></b></p> <p>F : Socio-demographic profile</p> <p><b><i>G : Family work &amp; well-being</i></b></p> <p><b><i>PK : Political knowledge</i></b></p> <p>I : Interviewer self-completion questions</p>	<p>A : Media ; social trust</p> <p>B : Politics</p> <p>C : Subjective well-being ; social exclusion ; religion ; discrimination ; national &amp; ethnic identity</p> <p><b><i>D : Timing of life ; the life course</i></b></p> <p><b><i>E : Personal &amp; social well-being ; helping others ; feelings in the last week ; life satisfaction ; satisfaction with work</i></b></p> <p>F : Socio-demographic profile</p> <p><b><i>G : Human values scale</i></b></p> <p><b><i>H : Test questions</i></b></p> <p>I : Interviewer self-completion questions</p>

# Choice of individuals

- French data only
- Individuals aged of more than 18 years old
  - Variable AGE (Round 2 & Round 3)
- Individuals eligible to vote for the legislative elections of 2002
  - Variable VOTE (Round 2 & Round 3)



3302 individuals (1599 for Round 2 & 1703 for Round 3)

# **Specific MCA**

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# Variables by theme

<i>Theme</i>	<i>Active questions</i>	<i>Supplementary questions</i>
Politics	A2+A4+A6 : indicator political informations B4 : trust in the national parliament* B7 : trust in politicians* B27 : satisfaction with democracy*	B1 : political interest B11a : presidential election 2002 B12a : legislative elections 2002 B20b : political party you feel closer B23 : left/right scale*
Europe & Globalization	B9 : trust in the European Parliament* B10 : trust in the United Nations* B34 : European unification*	
Ethnocentrism	B38 : immigration good for the economy* B39 : immigration good for the french culture* B40 : life better or not cause of immigration*	
Institutions	B5 : trust in the legal system* B6 : trust in the police* B26 : satisfaction with the government's job*	
Economy	B25 : satisfaction with the economy* B30 : take measures to reduce differences in income levels	
Socio-demographic profile		Age Gender Diploma

\* Questions initially coded as scales from 0 to 10.

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# Recoding of variables

- A2+A4+A6: indicator about informations on politics
  - 4 classes: 0-30 minutes, 45-60 minutes, 75-120 minutes, >120 minutes
- B30: take measures to reduce differences in income levels
  - 5 classes: from 'disagree strongly' to 'agree strongly'
- Others: scales from 0 to 10
  - 5 classes: 0 & 1, 2 & 3, 4 to 6, 7 & 8, 9 & 10

# Specific MCA results

Q = 15 active variables

K' = 61 active modalities

I = 3302 individuals

Cloud's variance = 3.0775

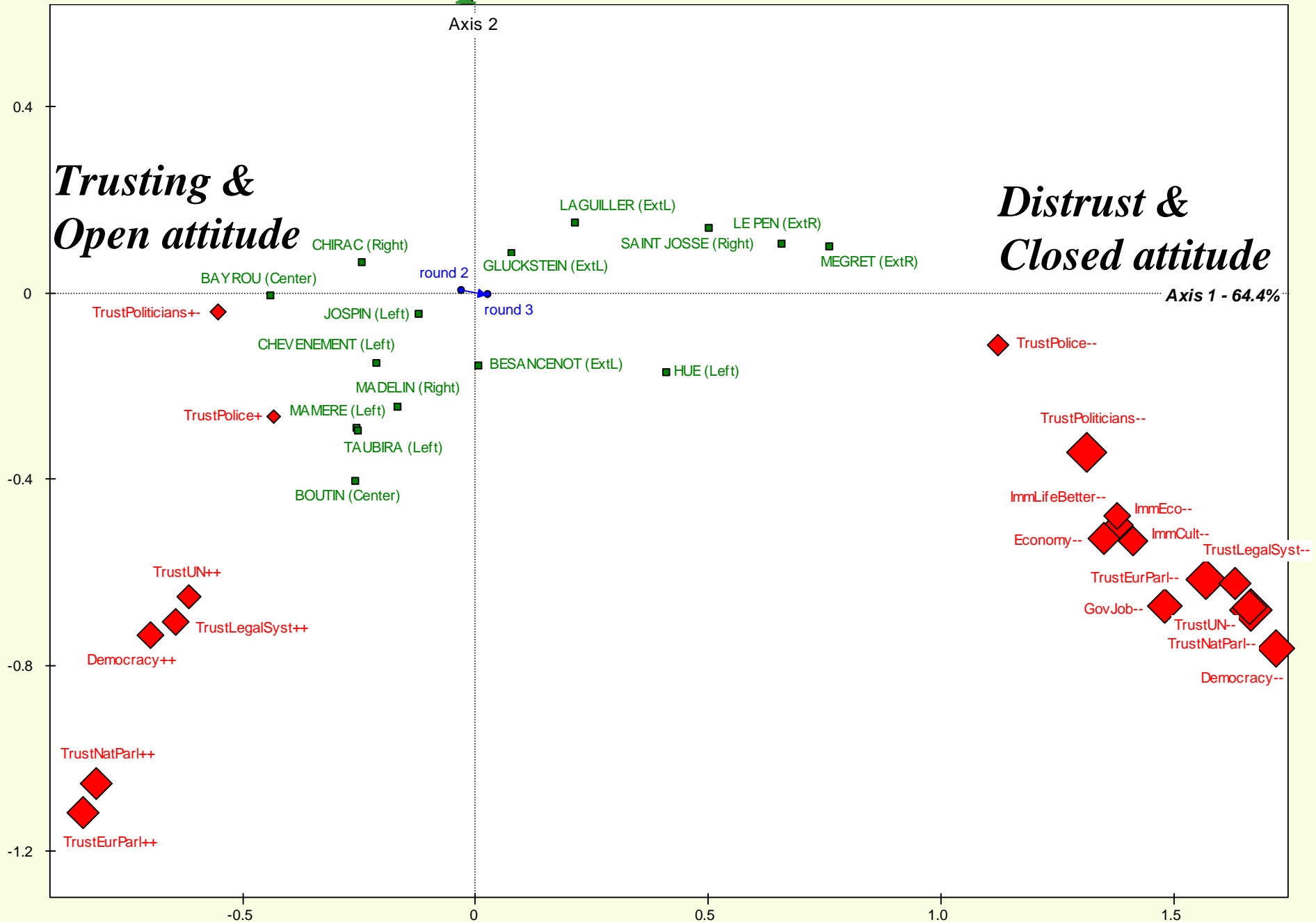
Eigenvalues' mean =  $\text{Variance}_{\text{Tot}} / (K' - (Q - Q'')) = 5.13\%$

<i>Axes</i>	1	2
<i>Eigenvalues</i>	0.3492	0.2097
<i>Inertia rates</i>	11.4%	6.8%
<i>Corrected rates</i>	64.4%	18.2%

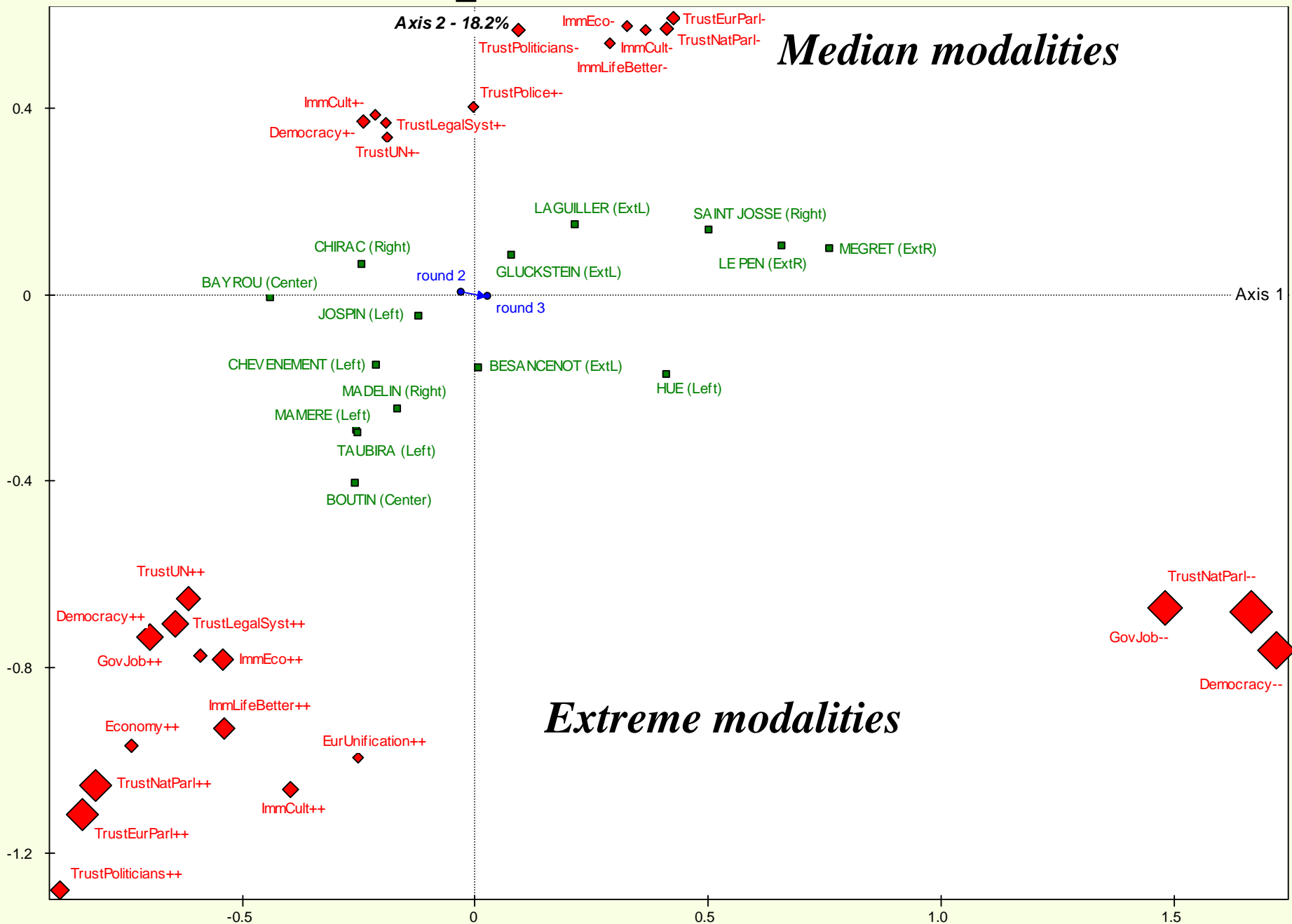
# Themes' contributions

	Axis 1	Axis 2
Politics	<b>30.1%</b>	<b>27.3%</b>
Europe & Globalization	<b>22.8%</b>	<b>24.3%</b>
Ethnocentrism	<i>19.1%</i>	<b>24.6%</b>
Institutions	<b>20.6%</b>	<i>18.5%</i>
Economy	<i>7.4%</i>	<i>5.3%</i>

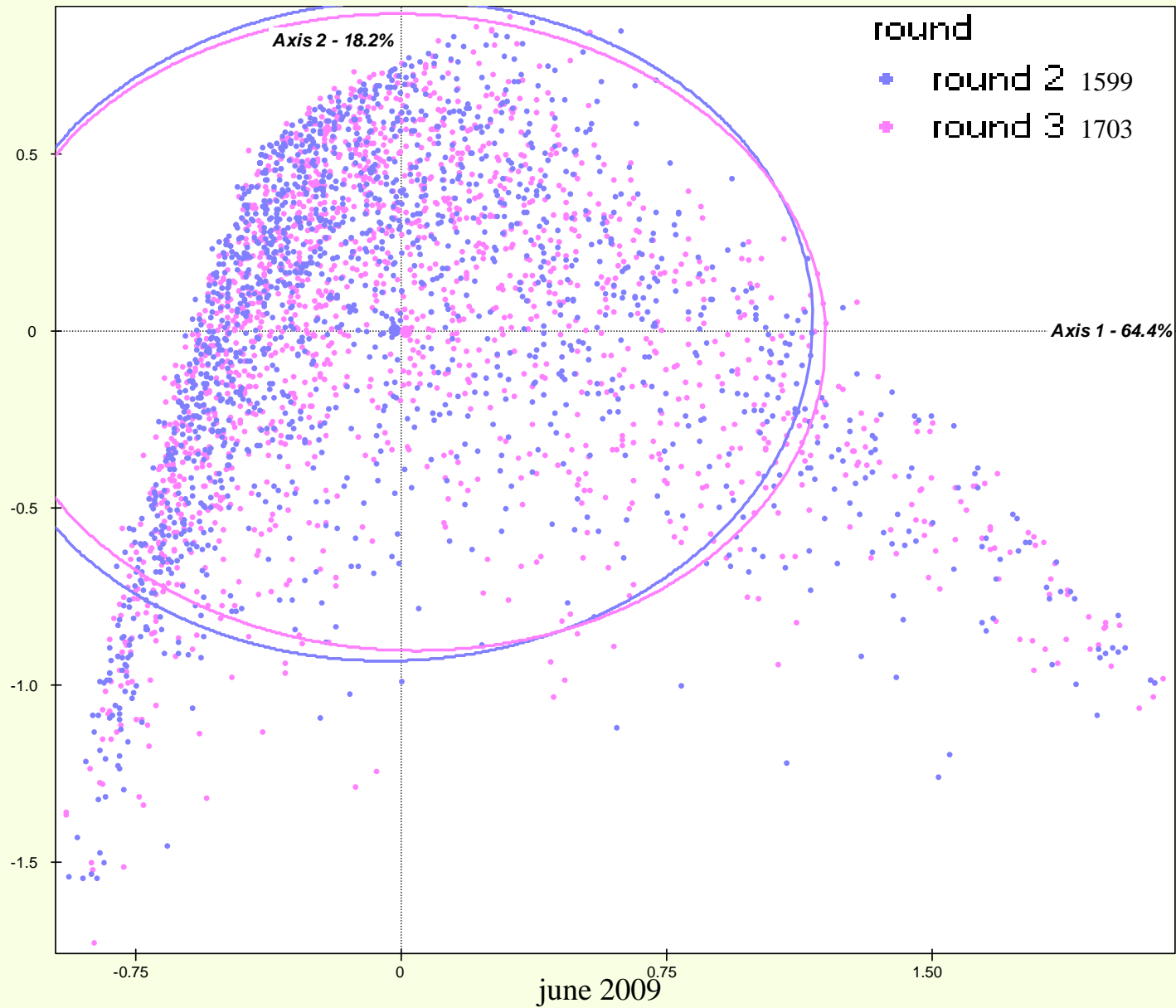
# Interpretation of axis 1



# Interpretation of axis 2

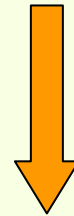


# Cloud of individuals plane 1-2



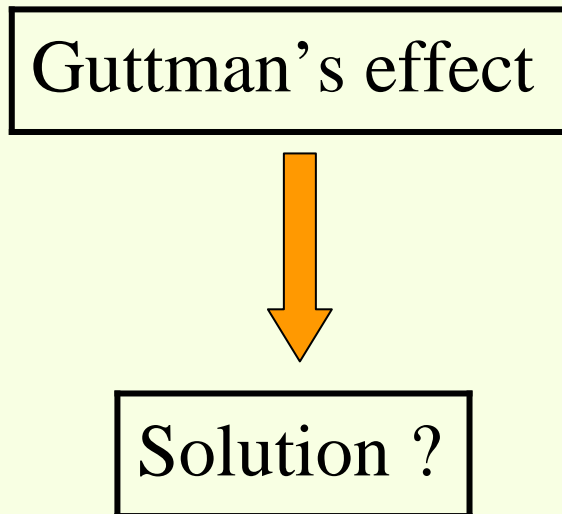
# Conclusion of MCA

<i>Axes</i>	<i>Corrected rates</i>	<i>Interpretation of axes</i>
1	64,4%	Trust VS Distrust
2	18,2%	Extreme answers VS Median answers



Tripartition of political space ?

# Methodological conclusion



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# Solutions

Variables' dichotomy



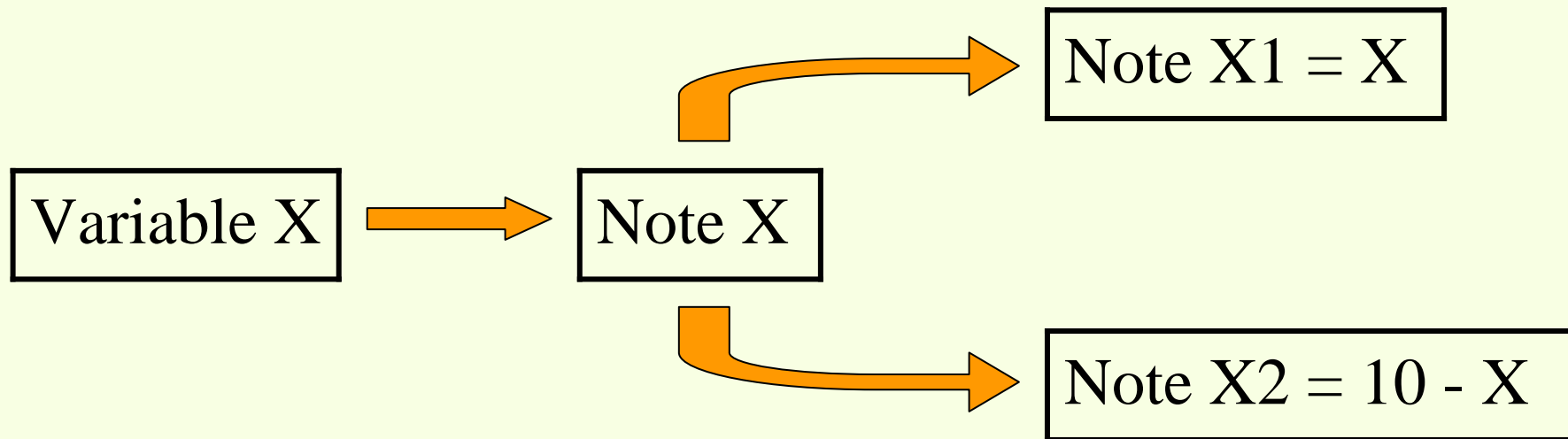
Not very natural

Doing a correspondance analysis (CA) using a double score coding



**Chosen solution**

# Double score coding\*



\* cf. J.-P. & F. Benzécri, « Tableau des notes obtenues par les candidats à l'école polytechnique : analyse avec dédoublement des colonnes [concours X] », *Pratique de l'analyse des données. 1- Analyse des correspondances. Exposé élémentaire*, Dunod, 1980.

# Variables by theme

<i>Theme</i>	<i>Active questions</i>	<i>Supplementary questions</i>
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Socio-demographic profile		Age Gender Diploma

\* Questions initially coded as scales from 0 to 10.

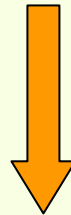
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# Recoding of variables

- A2+A4+A6: indicator about informations on politics
  - 4 classes:
    - 0 = 0-30 minutes
    - 3 = 45-60 minutes
    - 7 = 75-120 minutes
    - 10 = >120 minutes
- B30: take measures to reduce differences in income levels
  - 5 classes:
    - 0 = 'disagree strongly'
    - 3 = 'disagree'
    - 5 = 'neither agree nor disagree'
    - 7 = 'agree'
    - 10 = 'agree strongly'
- Others: scales from 0 to 10

# First double score coding CA

Indicator about political informations represents  
96.3% of the variance of the axis 2.



New CA without this variable.

# 2nd double score coding CA Results

$J = 14 (=7 \times 2)$  variables

$I = 2985$  individuals

Cloud's variance = 0.2265

Eigenvalues' mean =  $1/J = 7.14\%$

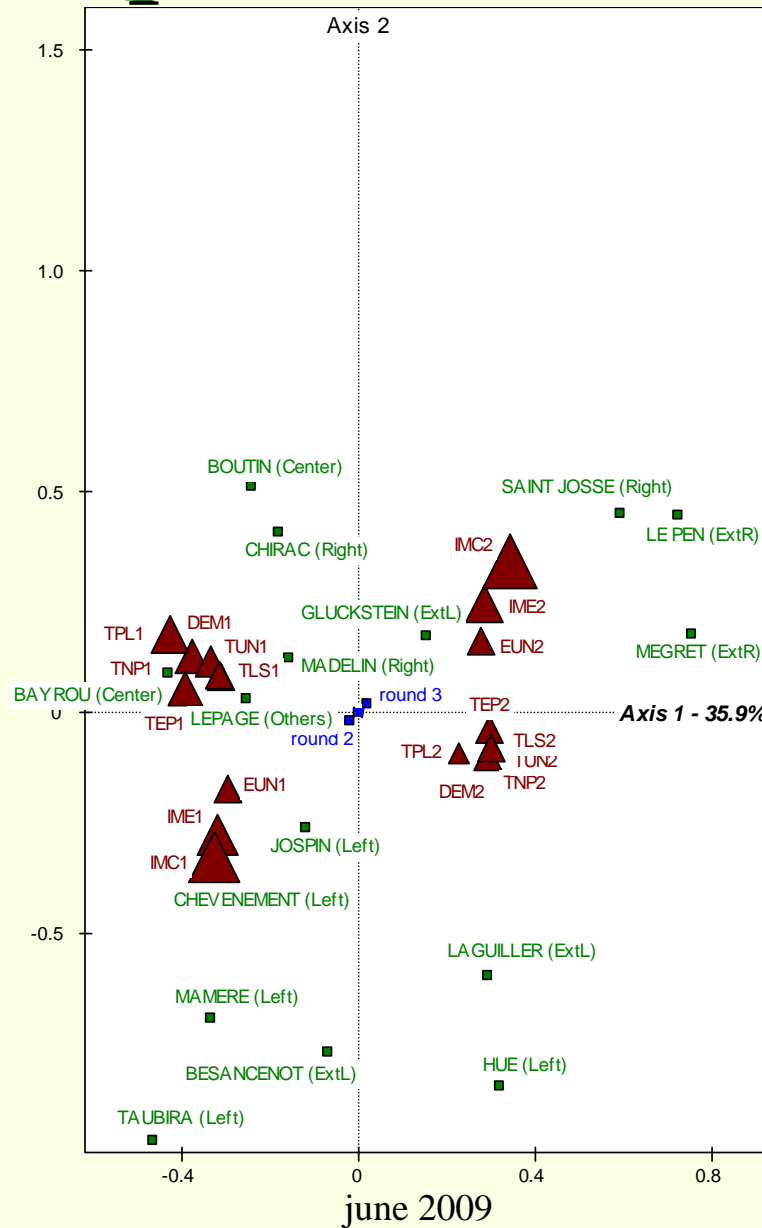
<i>Axes</i>	1	2	3	4
<i>Eigenvalues</i>	0.0813	0.0333	0.0258	0.0147
<i>Inertia rates</i>	35.9%	14.7%	11.4%	6.5%

The contributions of variables are :

		Coordinates				Contributions			
Initial variable	Name	Axis 1	Axis 2	Axis 3	Axis 4	Axis 1	Axis 2	Axis 3	Axis 4
<i>Trust in national parliament</i>	TNP1	-0.38	0.13	0.07	0.02	5.47	1.54	0.57	0.10
	TNP2	0.29	-0.10	-0.05	-0.02	4.22	1.18	0.44	0.07
<i>Trust in politicians</i>	TPL1	-0.43	0.18	0.13	0.01	5.54	2.32	1.53	0.02
	TPL2	0.22	-0.09	-0.07	-0.01	2.90	1.22	0.80	0.01
<i>Satisfaction with democracy</i>	DEM1	-0.33	0.11	0.02	-0.03	4.58	1.30	0.03	0.25
	DEM2	0.29	-0.10	-0.01	0.03	4.03	1.15	0.03	0.22
<i>Trust in European Parliament</i>	TEP1	-0.39	0.05	0.08	-0.01	5.85	0.26	0.81	0.01
	TEP2	0.30	-0.04	-0.06	0.00	4.43	0.19	0.61	0.01
<i>Trust in United Nations</i>	TUN1	-0.31	0.08	0.09	0.07	4.20	0.68	0.98	1.08
	TUN2	0.30	-0.08	-0.08	-0.06	4.01	0.65	0.94	1.03
<i>European unification</i>	EUN1	-0.30	-0.17	-0.03	-0.41	3.72	3.09	0.16	39.75
	EUN2	0.28	0.16	0.03	0.38	3.47	2.88	0.15	37.09
<i>Immigration good for the economy</i>	IME1	-0.32	-0.28	-0.11	0.06	4.24	7.71	1.49	0.85
	IME2	0.28	0.24	0.09	-0.05	3.75	6.82	1.32	0.75
<i>Immigration good for the french culture</i>	IMC1	-0.33	-0.33	-0.09	0.11	4.81	11.73	1.18	3.16
	IMC2	0.34	0.34	0.10	-0.12	5.03	12.28	1.24	3.31
<i>Life better or not cause of immigration</i>	IML1	-0.30	-0.30	-0.07	0.10	3.40	8.69	0.55	2.07
	IML2	0.23	0.24	0.05	-0.08	2.70	6.90	0.44	1.65
<i>Trust in the legal system</i>	TLS1	-0.32	0.09	0.09	0.09	4.30	0.77	1.13	1.89
	TLS2	0.30	-0.08	-0.09	-0.08	4.04	0.72	1.06	1.77
<i>Trust in the police</i>	TPO1	-0.19	0.14	0.07	0.05	1.88	2.36	0.86	0.80
	TPO2	0.26	-0.19	-0.10	-0.07	2.56	3.21	1.17	1.08
<i>Satisfaction with the government's job</i>	GOV1	-0.28	0.22	0.02	-0.07	2.70	4.12	0.07	0.85
	GOV2	0.19	-0.15	-0.02	0.04	1.82	2.78	0.05	0.58
<i>Satisfaction with the economy</i>	ECO1	-0.31	0.15	-0.01	-0.07	3.20	1.71	0.02	0.90
	ECO2	0.19	-0.09	0.01	0.04	1.90	1.01	0.01	0.53
<i>Take measures to reduce differences in income levels</i>	DIN1	0.06	-0.13	0.29	-0.01	0.28	2.86	18.46	0.04
	DIN2	-0.22	0.45	-1.01	0.04	0.97	9.89	63.88	0.14

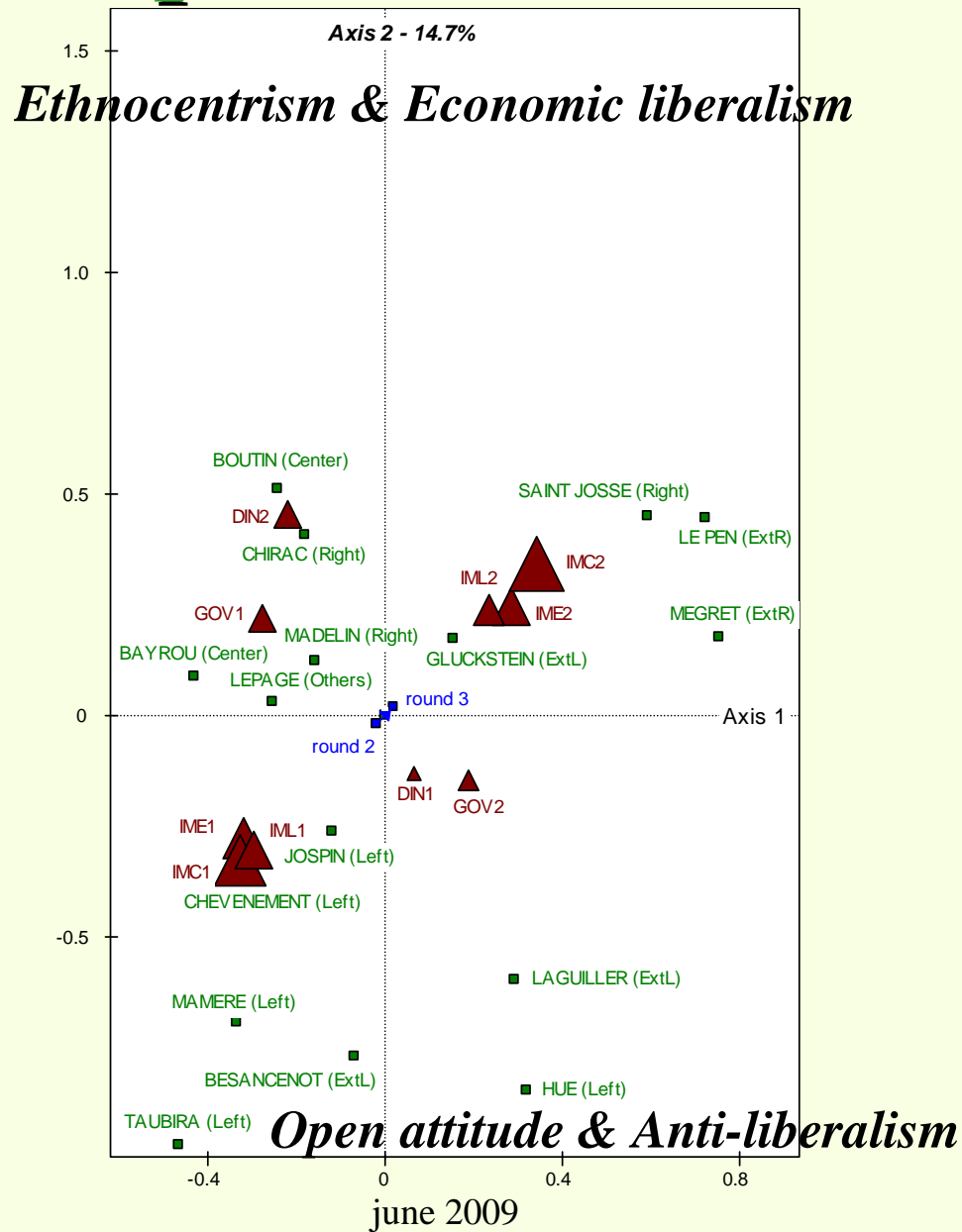
# Interpretation of axis 1

*Trust & Open attitude*

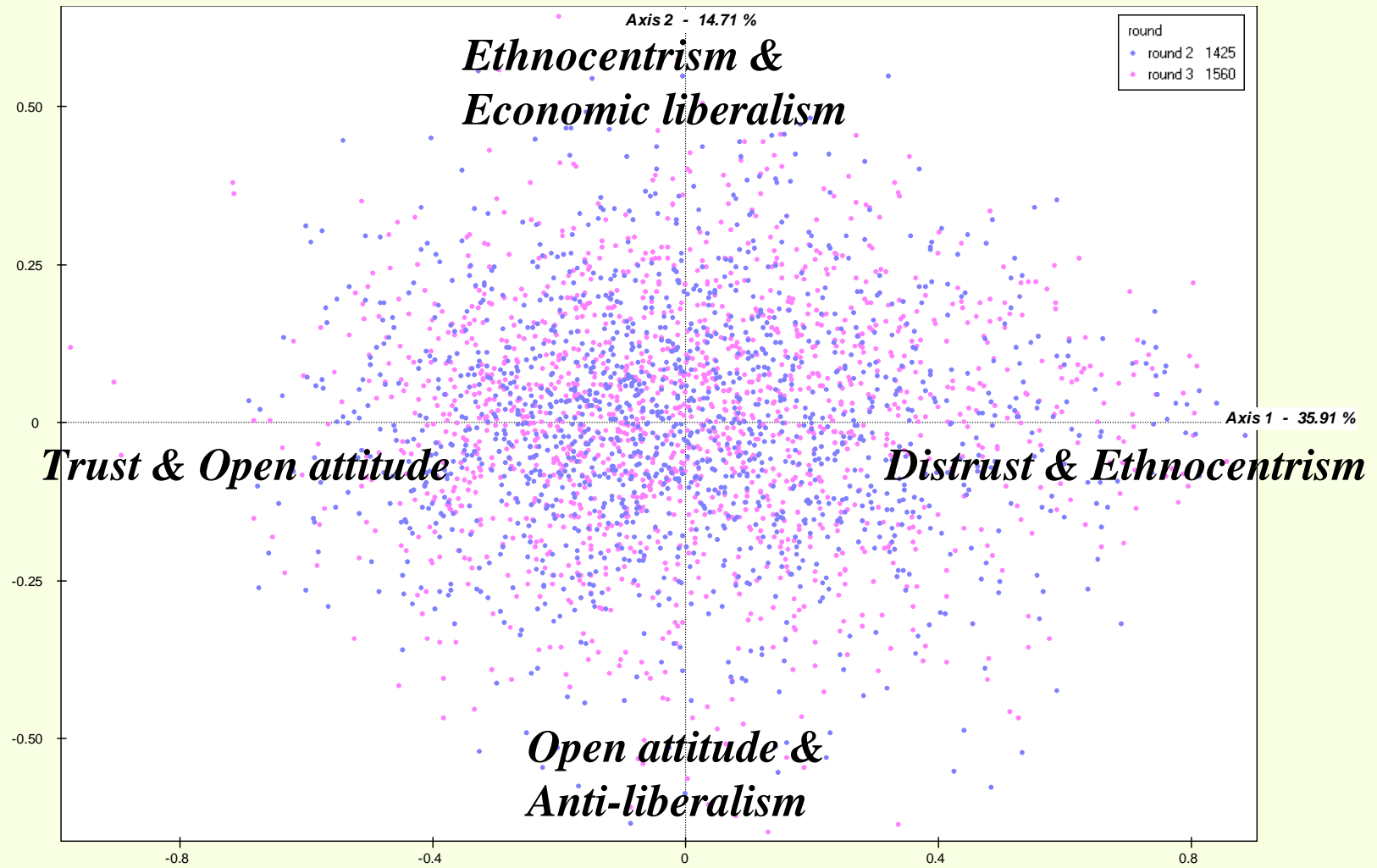


*Distrust & Ethnocentrism*

# Interpretation of axis 2



# Cloud of individuals plane 1-2



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# Conclusion of the analysis

<i>Axes</i>	<i>Inertia rates</i>	<i>Interpretation of axes</i>	<i>Political variables</i>
1	35.9%	Trust VS Distrust	Government's parties candidates VS Extreme left and extreme right parties candidates
2	14.7%	Open attitude and anti-liberalism VS Ethnocentrism and economic liberalism	Left VS Right



Tripartition of the french political space

# Methodological conclusion

- Indicator about political informations ?
- Hard to deal with scales from 0 to 10 in GDA...

**Thank for your attention !**

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