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Battles and crossings of methods. Sequence Analysis and Geometric Data Analysis for the study of professional careers

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Résumé

Cet article discute l'utilisation exploratoire de deux méthodes quantitatives : d'une part l'analyse de séquences combinée à des méthodes d'appariement optimal ; d'autre part l'analyse géométrique des données, plus précisément l'analyse des correspondances multiples et l'analyse en composantes principales, combinées à des classifications ascendantes hiérarchiques. L'objectif n'est pas de déterminer si une méthode est plus efficace qu'une autre, ni de les opposer. Il s'agit d'identifier les similitudes et les différences et, plus généralement, de réfléchir à l'utilisation croisée des méthodes quantitatives. L'approche est résolument pratique et réflexive. Elle consiste à ouvrir la cuisine de la mise en œuvre à travers une étude de cas : la construction d'une typologie des devenir professionnels des assistants parlementaires au Parlement européen. L'article défend l'idée que les typologies sont des outils et des étapes de l'analyse. Cette mise à l'épreuve des méthodes vise à interroger plusieurs aspects, à suggérer des pistes d'analyse et à souligner la nécessité d'explorer les données à l'aide d'outils variés. Ce texte est une invitation à comparer et à combiner les méthodes, à les utiliser de manière réfléchie et non mécanique, en tenant compte de leurs forces mais aussi de leurs faiblesses, qui sont autant d'enseignements.

Abstract

This article proposes to discuss the exploratory use of two quantitative methods: on the one hand sequence analysis combined with optimal matching methods, and on the other hand geometric data analysis, more specifically multiple correspondence analysis and principal component analysis, combined with hierarchical ascending classifications. The aim is not to determine whether one method is more effective than another, nor to pit them against each other. The aim is to identify similarities and differences, and, more generally, to reflect on the cross-use of quantitative methods. The approach is decidedly practical and reflective. It consists of opening up the kitchen of implementation through a case study: build a typology of the professional futures of the accredited parliamentary assistants at the European Parliament. The paper defends the idea that typologies are tools and stages in analysis. Putting these methods to the test in this way aims to highlight several issues, suggest avenues of analysis, and highlight the need to explore the data using a variety of tools. This text is an invitation to compare and

combine methods, and to use them in a considered and non-mechanical way, taking into account their strengths but also their weaknesses, which are also instructive.

Mots-Clés

Typologie; Comparaison de méthodes; Analyse de sequences; Optimal matching; Analyse géométrique des données; Analyse des correspondances multiples; Analyse en composantes principales; Classification ascendante hiérarchique; Carrières professionnelles; Carrières dans les métiers de l'Europe

Keywords

Clustering; Comparing methods; Sequence Analysis; Optimal Matching; Geometric Data Analysis; Multiple Correspondence Analysis; Hierarchical Ascendant Classification; Principal Component Analysis; Professional paths; EU careers

Introduction

Quantitative methods are generally associated with a specific research objective: e.g. to analyse a text, to highlight explanatory factors 'all other things being equal', etc. However, their cross-referencing and comparison is rarely considered. And yet the rare discussions of pairs of methods are particularly heuristic, such as the debate on the opposition between correspondence analysis and logistic regression (Desrosières 1995). The mutual discussion of these two methods helps to overcome the "paradigm dispute" (Rosental, 1997: 195) between the descriptive method of correspondence analysis associated with Pierre Bourdieu's sociology and the explanatory method of generalised regression in economics, and to highlight their complementarity (Des Netumières, 1997): logistic regression makes it possible to "separate influences" and factor analysis to "combine influences" (Biland et al., 2008). Researchers have continued the discussion by combining geometric data analysis with network analysis to take a little more account of social connections (de Nooy, 2003; Bühlmann, David and Mach, 2012; Denord, 2015; Eloire, 2018) or with sequence analysis to assess time or longevity (Rossier and Fillieule, 2019; Toft, 2022).

In this vein, this article launches a discussion on the exploratory use of two quantitative methods with the aim of constructing a typology: on the one hand, sequence analysis associated with optimal matching methods, and on the other hand, geometric data analysis, more specifically multiple correspondence analysis and principal component analysis, combined with hierarchical ascending classifications. The aim is not to determine whether one method is more effective than another, nor to pit them against each other, but to identify similarities and differences, to encourage analysts not to be satisfied with a result obtained at first sight and to work on typologies and, more generally, to reflect on the cross-use of methods. Our approach is decidedly practical and reflexive. In other words, we put ourselves in the position of researchers exploring a corpus of career data, seeking to construct a typology and questioning the contributions and limitations. The aim of putting these methods to the test in this way is to highlight a number of issues, to suggest avenues of analysis and to emphasise the need to explore the data using a variety of tools. In other words, this text is an invitation to cross-fertilise methods and, more generally, to use them in a considered and non-mechanical way, taking into account their strengths but also their weaknesses, which are also instructive.

The practical case that supports this reflection relates to a database carried out as part of the PolEco project, which proposes to conduct a sociology of revolving doors - i.e. passages from a position of regulator to a position of regulated in the commercial sector - within the European Union (EU). The study looks at the career paths of accredited parliamentary assistants to MEPs in the European Parliament (EP) during the 7th parliamentary term (2009-2014). The 720 MEPs from the 27 EU Member States employ almost 4,000 parliamentary assistants, either in their constituencies - who work to position their elected representatives in their local and national political territory - or in the EP (in Brussels and Strasbourg) - where they help to position their MEP in the parliamentary arena and prepare legislation (Michon, 2014). While constituency assistants are often long-standing members of their elected representative's party, EP assistants (called accredited parliamentary assistants) are less so, and most of them are EU specialists (Michon, 2019). For a large proportion of them, an EP assistantship is their first relatively stable job after completing their studies and after internships and short-term contracts in Brussels. Many accredited parliamentary assistants (APA) see it as a stepping stone to EU careers. A study of the career paths of APAs reveals several types of movement of these EU auxiliaries, not only within European politics, within the public sector or towards the private sector, but also at national level. The construction of typologies aims to order these careers in a reflexive way. It is not a matter of mechanically applying a method, but of considering a

typology of careers as "a stage of analysis" (Robette, 2021) and of understanding different ways of proceeding.

The article describes the process of constructing a typology using two methods: sequence analysis combined with optimal matching methods and geometric data analysis. After presenting the case study, it analyses the dataset using each method, attempting to identify the themes and specific operations, and then compares the results. The comparison and reflection on the differences between the methods highlight the points of attention in the uses and ways of analysing careers and constructing typologies. The text is thus an invitation to work on the construction of typologies and to introduce more often time into the analysis and more often reflexivity. The paper defends the idea that typologies are tools and stages in analysis.

Case study: the career paths of parliamentary assistants at the European Parliament

The study combines two pairs of methods - sequence analysis and geometric data analysis - on the basis of a dataset on the career paths of parliamentary assistants at the EP (or APAs).

The research that led to the creation of this dataset is part of a reflection on the movements of these auxiliaries of political work within the professions in and around the European institutions, EU careers or EU jobs (Georgakakis, 2002; Michon, 2019), more specifically from the perspective of revolving doors in the EU. By this we mean the movement from parliament to the private sector and interest representation, i.e. from a position on the side of the regulators to a position on the side of the regulated (i.e. Blanes i Vidal, Draca and Fons-Rosen, 2012; Orchard, Gouglas and Pickering, 2024). An interest in the future of former APAs should enable us to situate these movements within the general economy of careers. The aim of the study is to take a step back from the revolving door debate, which has generally been discussed in relation to cases of former MEPs (Beauvallet, Michon and Robert, forthcoming) and European Commissioners (Vaubel, Klingen and Müller, 2012), and to shift the focus from those who are well known and present on the media scene to the close collaborators of MEPs who contribute to the work of the EP from behind the scenes (Busby and Belkacem, 2013; Michon, 2014; Pegan, 2017) and whose movements to the private sector are more frequent than those of Members of European Parliament¹. Turnover in these positions is not negligible, especially at the end of the legislative period (MEPs are elected for 5 years).

The analysis of a database on the careers of former APAs² allows us to highlight the patterns of movement of them and their variability in the field of Eurocracy. The population is made up of the APAs in the EP during the 7th parliamentary term (2009-2014). This target makes it possible to identify people who have had the opportunity to take up other professional activities in the 8 years since the end of the legislature. In order to sample this population and to vary the profiles and sectors of public action involved in the EP, only APAs working for an MEP active in six of the twenty parliamentary committees were selected: Agriculture and Rural Development (AGRI), Industry, Research and Energy (ITRE), Employment and Social Affairs (EMPL), Internal Market and Consumer Protection (IMCO), Economic and Monetary Affairs (ECON), Environment, Public Health and Food Safety (ENVI). These six committees cover sectors of public action that are emblematic of situations of conflict of interest - as reported in the press - such as health and finance, but also sectors where the EU has more or less significant

¹ Only 6% of MEPs who were not re-elected in 2014 went through the revolving door in the five years following their mandate, becoming consultants in a firm specialising in financial regulation, European projects, medical, energy or agri-food lobbying, or in companies (Lepaux, Michon and Monicolle, 2020).

² The database was created by Valentin Behr and Sébastien Michon as part of the PolEco project funded by IDEX (Investissements d'avenir, University of Strasbourg).

prerogatives (IMCO and ECON versus EMPL) and a more or less assertive presence of lobbyists (ENVI and ECON versus EMPL and AGRI). IMCO, ENVI and ECON are seen by many EP officials as quite central in terms of Europeanisation, while AGRI and ITRE are seen as dealing with technical issues – between national interests and European logic – and EMPL is one of the least Europeanised and therefore least prestigious committees.

The MEPs involved in these committees were identified using the Directory of MEPs (Michon and Wiest, 2021)³. A list of APAs who had worked for an MEP in one of the six committees in the EP during the period under study was compiled from the lists of APAs by MEP, which were put online by the EP. The indicators were selected on the basis of available sources. Each APA is described by a series of indicators relating to the employing MEP (nationality, parliamentary committee, political group, length of service in the EP, holding of managerial posts) and to the APA himself/herself (gender, nationality, education and career). The careers before, during and after the EP experience were coded year by year, making it possible to establish indicators of longevity (time spent in this or that type of organisation, in Brussels, in the EP, etc.), to carry out sequential analyses and to establish a typology of these careers.

Several sources were cross-referenced: the Directory of MEPs, the list of APAs during the 8th and 9th parliamentary terms (2014–2019 and 2019–2024, respectively), which provides information on the stay in the EP, institutional and professional websites, online CVs on LinkedIn. The online CVs on LinkedIn were invaluable. Although it is not a source suitable for all social and professional groups, it is very rich in terms of former APAs. Most of them are listed and their biographies are often well detailed, providing information or clues to guide the search for traces on the web (name of an employer). Despite some difficulties in completing the biographies of all former employees year by year, it was possible to gather good quality information on the biographies before and after the period under consideration for almost three quarters of them (439 out of 612)⁴. The composition of the sample is in line with what we know about APAs (Michon, 2014). They are slightly more likely to be women than men (55% of the sample) and, like the professionals of European policy, the vast majority are recruited with a Master's degree in a discipline related to public policy: political science (43%), law (21%), economics and management (33%), European studies (31%); some have degrees in several disciplines. Although not all of them specialise in the EU, the majority have degrees in Community law, European law, comparative law or international law, and even more in European studies, European politics or European affairs.

For less than one in five APAs (16%), the EP assistantship is their first job at the beginning of their career. It is often followed by traineeships or short-term contracts at the end of their studies: at national level in an NGO (6%), an institution (16%), a local authority (7%), a company (26%) or as an assistant to elected representatives (13%); in Brussels, in a European institution other than the EP (13%), a private interest group (14%), an NGO (4%) or a local authority (3%). Specialisation in the EU is thus not only the product of studies but also of professional experience, particularly in Brussels. To sum up, jobs as APA represent a possible orientation for young people who have a training linked to public action and language skills, as well as more specific knowledge and know-how for an activity in the European political area: general knowledge of the EU and the construction of a European political area, mastery of the functioning of the European institutional triangle, familiarity with European policies and European issues, legal background in Community law.

The futures of APAs are relatively varied (Table 1). At the end of the parliamentary term, almost 9 out of 10 continue their careers in Brussels, if only for the first year of the term. Careers then become more diversified: 57% stay in Brussels for the 8 years studied and 31%

³ Data available in the data warehouse Zenodo : <https://zenodo.org/record/5036957>

⁴ Some people for whom some information is missing – generally at the end of the sequence – have been retained.

register first in Brussels and then at national level or, more rarely, at national level before returning to Brussels. From 2014 onwards, it is mainly the EP (two thirds of the sample) where Brussels careers take place. They often extend their experience as APA (for one third with the same MEP, for the other two thirds with another elected official) and gradually leave the institution: 10% stay for 1 or 2 years, 10% between 3 and 4 years, 14% between 5 and 7 years. In the end, only 27% stay for the full 8 years.

If not in the EP, careers are pursued in the European institutions (13%), including the European Commission, and in interest representation: consultancies (5%), economic interest groups (11%), NGOs (5%) or local authorities (2%). At national level, careers are also pursued in positions related to public action, but not necessarily related to the EU. These are positions as political aides (member of a minister's cabinet, parliamentary assistant to a member of national parliament, etc.) (10%), project managers in institutions (ministry, administration, etc.) (13%) or local authorities (13%), or even interest representatives: consultancy firms (4%), private interest groups (13%), NGOs (5%). Finally, a minority of assistants continue their career in the private sector, in a position less directly linked to public action (10%).

The careers examined here are relatively comparable to others (leaving education, entering the labour market after specific training, returning to employment, etc.). However, two salient points should be highlighted. Firstly, if the trajectories start from the same position (the EP), not all individuals leave the EP during the period, and when they do, it is more or less delayed. On the other hand, careers are more or less differentiated: linear for some (anchored in the EP throughout the period), much less so for the majority: between 2014 and 2021, 46% of former APAs occupy a single position (potentially as an EP agent), 32% two positions and 22% more than two positions.

Table 1: Futures of APAs of the 7th legislature (2009-2014) during the period [2014-2021] (several possible futures over the period)

Location	Futures	Number	%
Brussels		384	87
	Agent of the European Parliament	270	62
	Agent of a European institution other than EP	55	13
	Agent of a representation of economic interests	48	11
	Agent of a consulting firm	21	5
	Agent of an NGO representation	21	5
	Agent of a local authority representation	7	2
	Agent of a think tank	2	0
	Lawyer	1	0
	Journalist	1	0
National		189	43
	Political collaborator	42	10
	Agent of an institution	58	13
	Agent of a local authority	34	8
	Agent of a consulting firm	17	4
	Agent of a company	44	10
	NGO agent	21	5
	Agent of a representation of economic interests	57	13
	Journalist	4	1
	Lawyer	5	1

	Total	439	100
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Reading: 87% of APAs in the corpus have held a professional position in Brussels at some point between May 2014 and December 2021.

Exploration with Sequence Analysis and Optimal Matching

Sequence Analysis (SA) combined with Optimal Matching (OM) is a method originally developed in genetic research to compare DNA sequences. The American sociologist Andrew Abbott used the method to construct a more contextual and historical quantitative sociology (Abbott, 2001). SA and OM methods have been used in sociology to analyse the order of sequences corresponding to different programmes or decisions in different countries related to the welfare state (Abbott and DeViney, 1992), but also career musicians (Abbott and Hrycak, 1990) or Chicago lawyers (Abbott, 1995). Since then, AS and OM have benefited from crucial methodological and technical developments (Aisenbrey and Fasang, 2010; Blanchard et al., 2014). The introduction of the TraMineR software and package has greatly facilitated their adoption (Gabadinho et al., 2009, 2011)⁵. Apart from Abbott's most original studies, sequence analysis has been used mainly in the study of careers and life courses (Robette, 2021).

Focusing on a sequence - e.g. a career, an educational trajectory, a schedule over several weeks - without isolating events (as event history analysis does), AS is a descriptive tool: an "exploratory tool whose main objective is to reveal the structure of the data" (Lemerrier and Zalc, 2008: 95). It is adapted to relatively complex sequences with successive states (e.g. non-rectilinear careers with successive states such as employment, study, unemployment, training, temporary work, sick leave). The sequences are then compared using optimal matching techniques to obtain a typology. The comparison of one sequence with another is based on the number of operations that make it possible to obtain the same sequence: insertion of an element, deletion of an element, substitution of an element by another. Each operation has a cost. The closest sequences are those with the lowest transformation costs. Determining transformation costs is an important step (Stovel et al., 1996), which can be done in several ways (Lesnard and Saint-Pol, 2008; Robette, 2011; Robette and Bry, 2012). An ascending hierarchical classification (AHC) then allows the extraction of a typology. Nested systems of classes, represented on a tree or dendrogram, AHC iteratively groups the most similar individuals according to a predefined similarity (or aggregation) criterion. This involves minimising heterogeneity within classes (which amounts to maximising heterogeneity between classes). As it is based on a precise coding of careers, AS allows the production of precise indicators (longevity in occupational states/positions, proportion of time spent in this or that position, matrix of transitions between states, etc.).

The SA is the first tool used to explore the dataset on the professional careers of APAs. The SA involves reasoning about the states that make up careers. The operation consists in recoding the future (Table 1) into a reasonable number of states: too large a number tends to artificially multiply the classes and confuse the graphical representations; conversely, too small a number limits the interest of such an analysis. The choice of states is not easy because the

⁵ Especially since the 2010s, SA and optimal matching methods have been used in French sociology. Most manuals on quantitative methods in sociology do not mention them (Blöss and Grossetti, 1999; Martin, 2006; Lebaron, 2006; Combessie, 2007; Selz and Maillachon, 2009; Bréchon, 2011; Bugeja and Couto, 2021). Pioneering studies on the members of the Parisian consular institutions in the 19th century (Lemerrier, 2005), on the desynchronisation of the working hours of dual-career couples (Lesnard, 2008) or on the organisation of the French evening and the place of the dinner (de Saint Pol, 2007), as well as seminars, training courses (CNRS QuantiLille summer school, ECPR winter school) and manuals (Lemerrier and Zalc, 2008, and more Robette, 2011, 2021), have contributed to the initiation of researchers.

situations encountered are more or less varied and are likely to change frequently. In order to construct types of professional careers according to the experience of APA, the professional positions were recorded, year by year, for the 8 years of the period considered (2014 to 2021), according to 12 strictly exclusive states. They distinguish different positions depending on the location (Brussels or national) and the type of organisation (European Parliament, consultancy firm, etc.) (Table 2). For example, in Table 3, line 1 details the case of a person who remained in the EP in 2014, joined a Brussels public relations firm specialising in the representation of economic interests (Brepint) in 2015, and then the European Commission (IE) in 2019. Line 4 corresponds to an APA who left the EP after the 2014 European elections to join a consultancy firm in his country (consult). After 3 years in this firm, he worked for a year in the economic interest representation still in his country (repint), before becoming a political collaborator to the mayor of the capital of his country (collab).

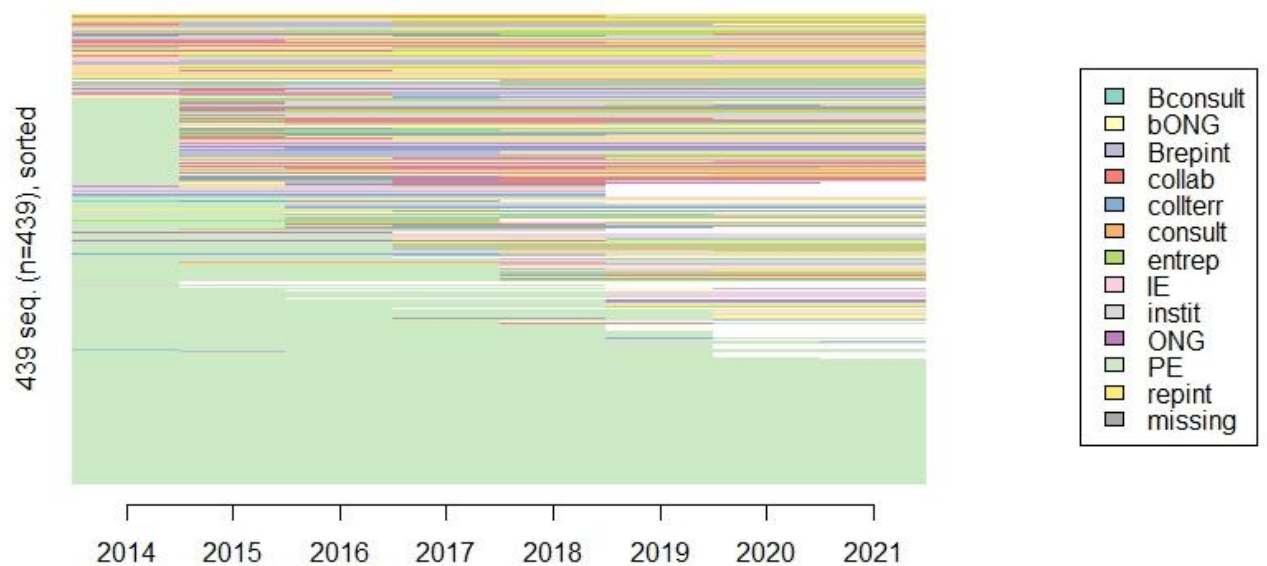
Table 2 - the 12 states used for coding careers between 2014 and 2021

	State abbreviation	Location	Futures
1	PE	Brussels	Agent of the European Parliament (APA or agent of a political group)
2	Bconsult	Brussels	Agent of a consulting firm or law firm in Brussels
3	bONG	Brussels	Agent of an NGO representative office with European institutions, or a think tank office in Brussels
4	Brepint	Brussels	Agent of an economic interest representation office in Brussels
5	IE	Brussels	Agent of a European institution (other than EP)
6	Collab	National	Political collaborator within a political staff (political party, parliamentary staff, etc.)
7	collterr	National	Agent of a local authority in an EU country
8	consult	National	Agent of a consulting firm in an EU country
9	entrep	National	Agent of a company in an EU country
10	instit	National	Agent of an institution in an EU country
11	ONG	National	NGO agent in an EU country
12	repint	National	Agent of an interest representation in an EU country

Table 3 - Four professional career sequences (2014-2021) of former APAs

	2014	2015	2016	2017	2018	2019	2020	2021
1	PE	Brepint	Brepint	Brepint	Brepint	IE	IE	IE
2	PE	collterr	collterr	collterr	repint	repint	repint	repint
3	PE	PE	PE	Brepint	Brepint	Brepint	Brepint	Brepint
4	consult	consult	consult	repint	collab	collab	collab	collab

Figure 1 : Idex plot of former APA careers (2014-2021) (N=439)



The SA, conducted using the TraMineR package (Gabadinho et al., 2011), describes a relative diversity of careers (Figure 1). The graphical projection highlights the non-linearity of careers. A career typology is extracted using an OM method. It is based on the calculation of the distance between individual trajectories taken two by two according to their degree of similarity. The implementation of OM is based on the determination of substitution and insertion-deletion costs. There are two main types of substitution costs: constant costs (whatever the change in sequence, the cost is the same); and costs based on the probabilities of transition between states observed in the sample.

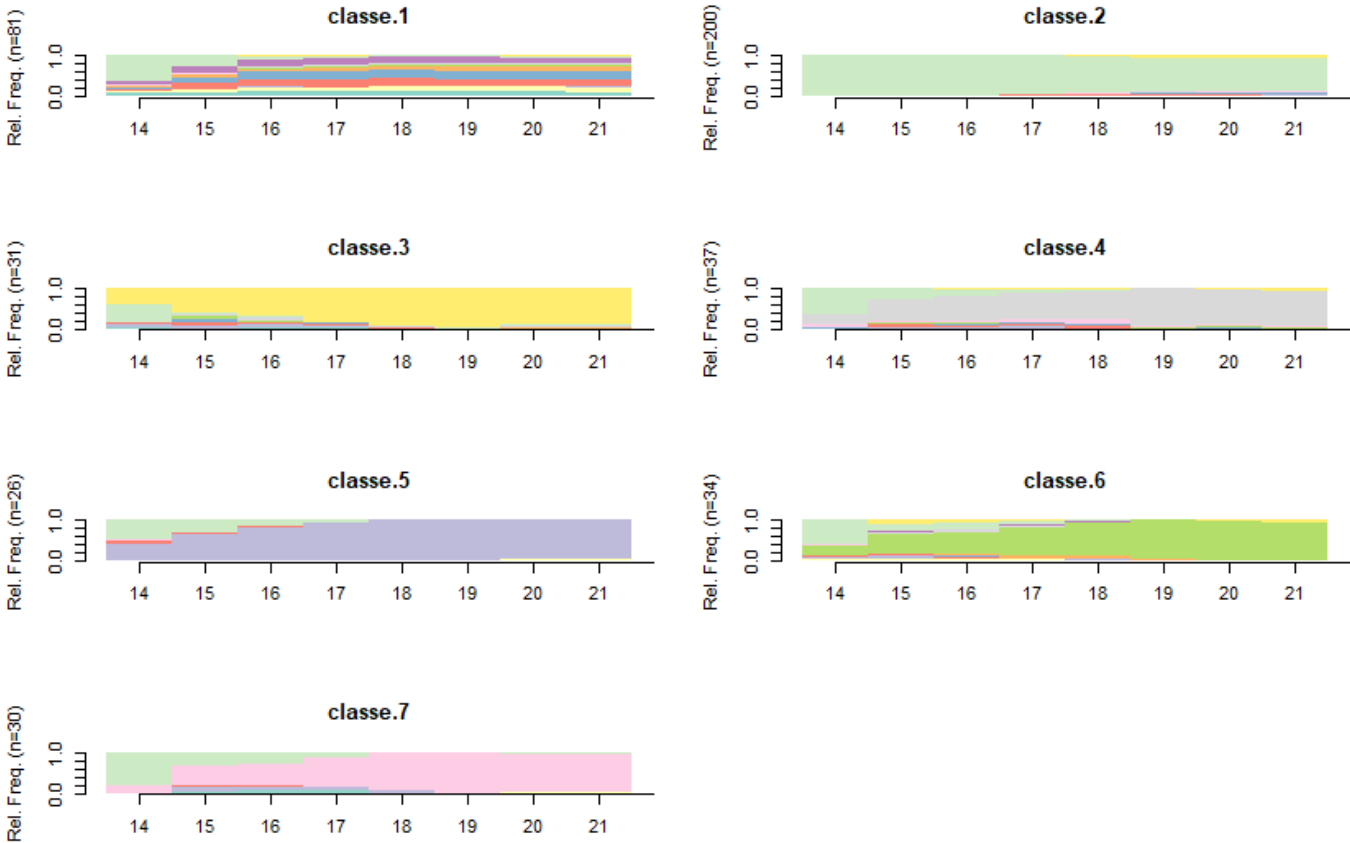
It is quite common to set the substitution cost to 2 and the insertion-deletion cost (indel) to 1.1, i.e. with a value of the second slightly more than half the value of the first (Robette, 2011)⁶. Reading the tree or dendrogram obtained after an ascending hierarchical classification invites us to maintain a division into 2 or 7 classes (Figure 14 in the appendices). The division into 7 classes is maintained in order to provide a greater variety in the typology: 3 classes centred on positions in Brussels, 3 classes at national level and 1 last class comprising positions in Brussels or at national level (Figures 2 and 3).

In detail, the largest class brings together careers in the EP (class 2; 46%): those who pursue their career as an APA or, more rarely, as an agent of a political group in the EP. The people grouped here tend to stay in the EP for the long term and become permanent members, which is not an insignificant possibility as it represents almost half of the respondents. Remaining in the EP illustrates the interest in assistant positions in terms of material and working conditions. The other two classes, relating to other positions in Brussels, are more limited. One (class 7; 7%) brings together those who join a European institution other than the EP: the European Commission (policy officer in a Directorate-General, advisor in a Commissioner's office), a permanent representation, the European Committee of the Regions,

⁶ Consistent with previous findings (Robette and Bry, 2012), the variation in costs yields similar results. For insertion-deletion costs of 1 or 1.5, between 5% and 7% of individuals are arranged differently.

a European agency or the European Court of Auditors. The other (class 5; 6%) brings together those who have demonstrated their knowledge of the EP within economic interest groups and the European institutions. Three other classes describe careers at national level, illustrating movements towards the national level and a return to the country of origin, most often at the end of the EP experience. We find careers in an institution (class 4; 8%), in interest groups (class 3; 7%) or in a company (class 6; 8%), without there necessarily being a link between the post and the EU. Finally, a final category (class 1; 18%) brings together the other future actors, both at European level in consultancies and NGO representations, and at national level in local authorities, political staffs or even NGOs and consultancies. Finally, the classification divides the respondents between PE (46%), other positions in Brussels (13%), national (23%) and, less precisely, national or Brussels (18%)⁷.

Figure 2 : Index plot of former APAs careers (constant costs)



⁷ The typology can then be cross-checked with various variables on the areas of public action previously worked on: career moves to Brussels lobbying are more frequent among those whose deputies were members of the ENVI, IMCO and ITRE committees, i.e. the most Europeanised sectors (Table 18 in the appendices).

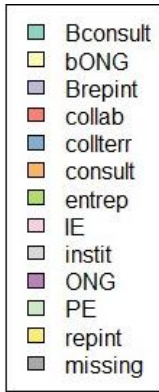
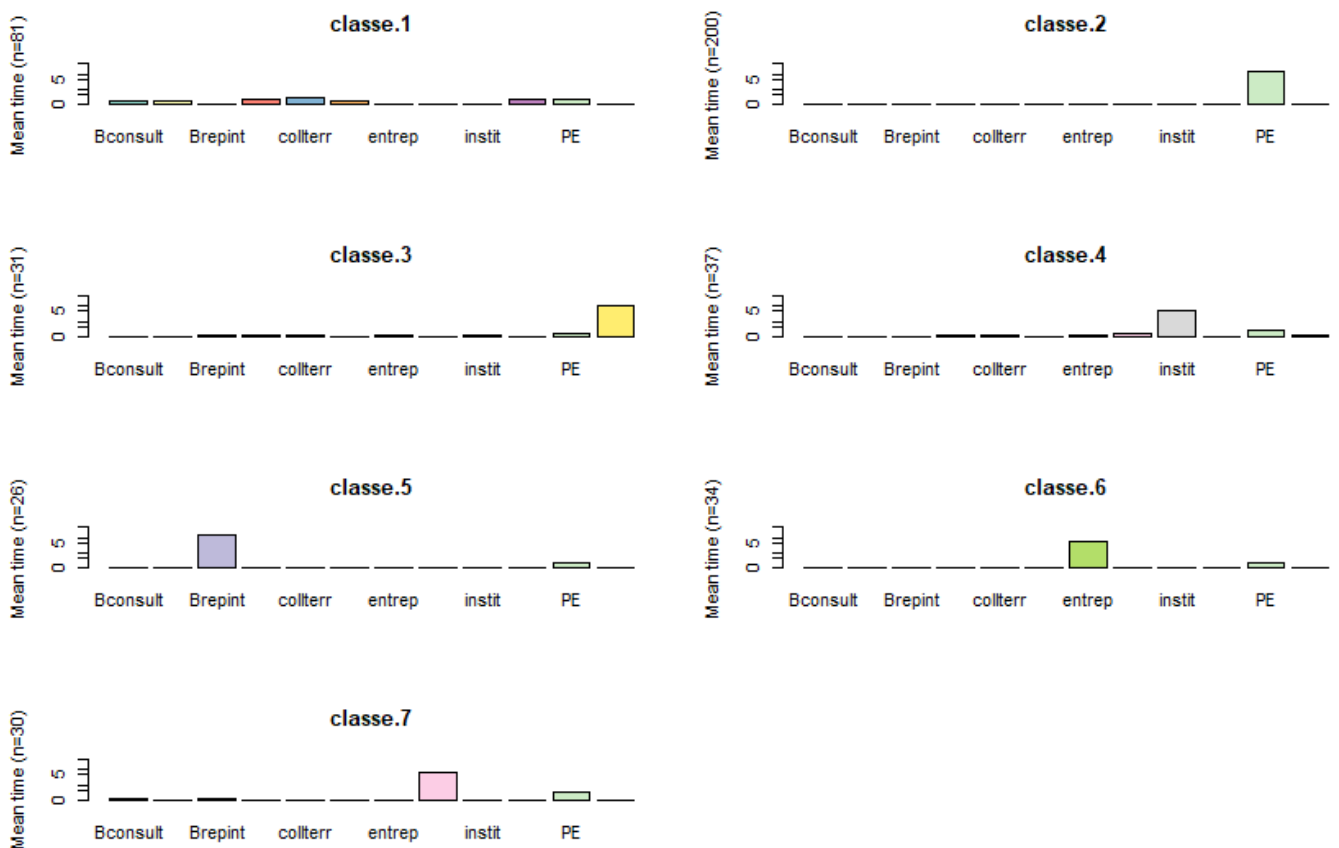


Figure 3 : Average durations in states by class (constant costs)



An alternative to this operation of constructing a typology from the SA is to determine substitution costs from the transition matrix (Table 16 in the appendices). The idea is to let the data determine the costs based on the transition probabilities between states (Rohwer and Pötter, 1999). The substitution cost between two states is higher as the probability of transition between these states is low (Robette and Thibault, 2008). As before, we set the insertion-deletion cost to 1.1. The dendrogram (Figure 15 in the appendices) and the classification thus obtained are very close to those obtained with constant costs (Figures 4 and 5): 3 classes for jobs in Brussels, 3

classes at the national level and 1 class for these two labour markets. The only differences concern the class sizes of the first two classes: with the costs linked to the transition matrix, 28 people initially placed in class PE with constant costs are now in the class "other positions", which groups together positions both nationally and in Brussels (Table 3).

Figure 4 : Index plot of former APAs careers by class (costs linked to the transition matrix)

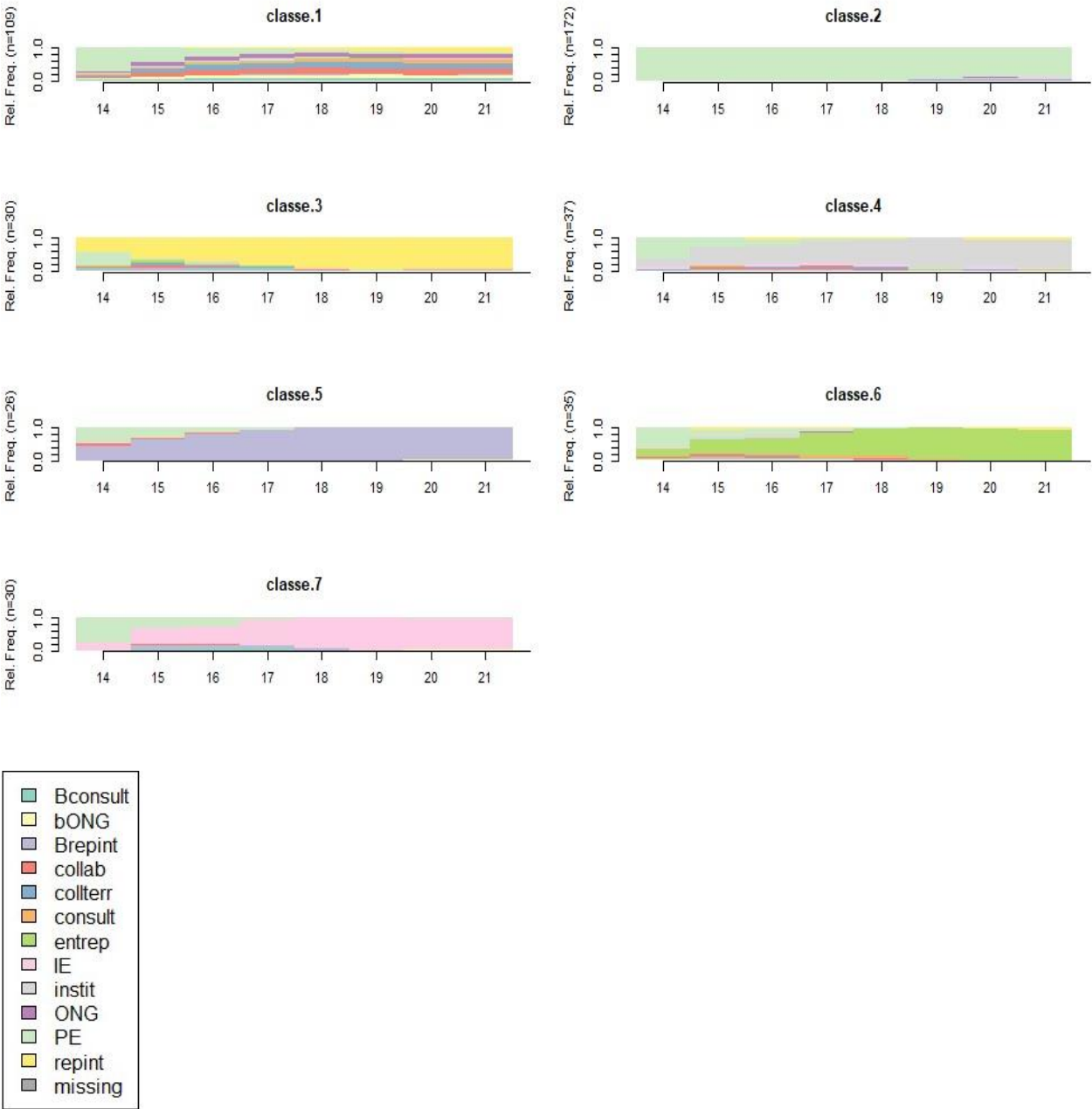


Figure 5 : Average durations in states by class (costs linked to the transition matrix)

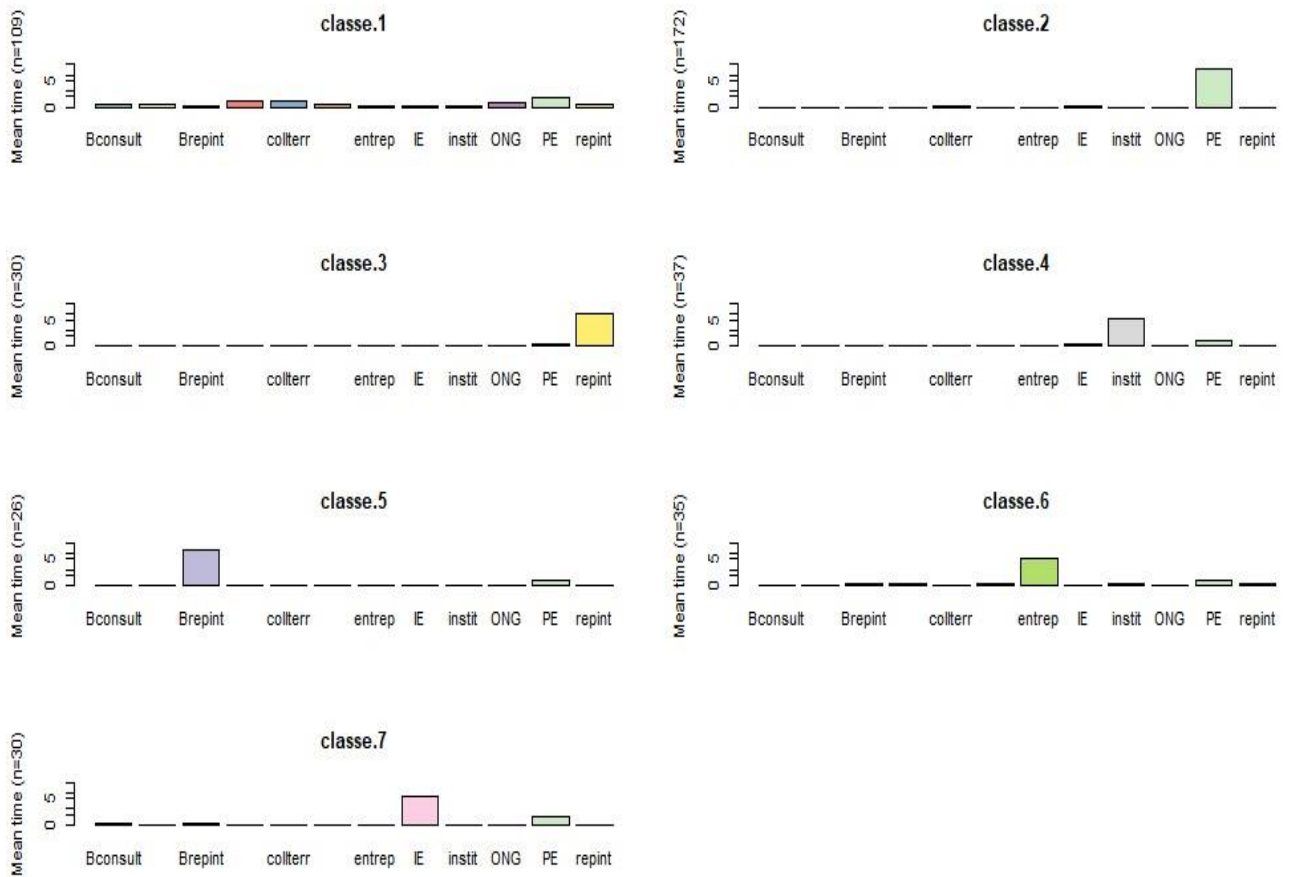


Table 3 : Comparison of typologies with constant costs and costs from the transition matrix

Classes				Constant costs		Costs from the transition matrix		Number difference in the class between constant costs and costs from transition matrix	
				Number	%	Number	%	Number difference	
				Indel=1,1		Indel=1,1			
Class 1	National and Brussels	collab consult ONG Bconsult Bong	At national level: political employee, agent of a local authority, agent of a consultancy firm or an NGO.	81	18	109	25	+28	

			In Brussels: agent of a consultancy firm, agent of an NGO office					
Class 2	Brussels	PE	Agent of European Parliament	200	46	172	39	-28
Class 3	National	rep int	Agent of an economic interest grouping	31	7	30	7	-1
Class 4	National	instit	Agent of an institution	37	8	37	8	0
Class 5	Brussels	B rep int	Agent of an economic interest group in Brussels	26	6	26	6	0
Class 6	National	entrep	Agent of a company	34	8	35	8	+1
Class 7	Brussels	IE	Agent of a European institution (other than the EP)	30	7	30	7	0
			Total	439	100	439	100	

The small variations observed between AHCs according to the cost option indicate that the classification seems less certain when the situations are the most complex. The cases with different rankings refer to two situations. On the one hand, there are sequences with a sequence of three, four or five different states (for example, id 10 to 13 in Table 4). This is the case of the former French APA (id 10) who worked successively in the EP, a local authority, an institution, a company representing private interests, before becoming a parliamentary assistant of a MPs in the National Assembly. These are also sequences with unusual successions of states within the corpus (for example id 20 and 21 in Table 6), like this APA (id 20) who works nationally in a local authority, then in a company, before returning to the EP in 2019.

Table 4 : Example of divergent cases with constant costs and costs from transition matrix

id	2014	2015	2016	2017	2018	2019	2020	2021	Class with AHC constant costs Class with AHC costs transition matrix	Class with AHC constant costs Class with AHC costs transition matrix
10	PE	PE	Collterr	instit	repint	repint	collab	collab	PE	collab collter consult ONG Bconsult Bong
11	PE	collab	Collab	collab	collab	entrep	entrep	entrep	collab collter consult ONG Bconsult Bong	entrep
12	PE	PE	PE	PE	collterr	collab	collab	collab	PE	collab collter consult ONG Bconsult Bong
13	PE	PE	PE	ONG	collab	collab	repint	repint	PE	collab collter consult ONG Bconsult Bong
20	collterr	collterr	Collterr	collterr	entrep	PE	PE	PE	PE	collab collter consult ONG Bconsult Bong
21	PE	PE	PE	PE	PE	collab	collab	collab	PE	collab collter consult ONG Bconsult Bong

Exploration with geometric data analysis

Geometric data analysis (GDA), based on factor analysis, also makes it possible to construct a career typology. Developed in psychology at the beginning of the 20th century by Charles Spearman to synthesise test results (Martin, 1997), factor analysis has developed since the 1960s within the French school of data analysis founded by the mathematician and statistician Jean-Paul Benzécri. Its growth has been favoured by the possibilities offered by computers and automatic data processing. Several manuals (Rouanet and Le Roux, 1993; Lebart et al., 2000; Lebaron, 2006; Le Roux and Rouanet, 2010; Le Roux, 2014; Lebaron and Le Roux, 2015), as well as seminars and training courses, have contributed to its use. Pierre Bourdieu played a crucial role in the dissemination of GDA and, more specifically, multiple correspondence analysis (MCA) in sociology (Lebaron, 2015; Duval, 2017). MCA is a central tool of his field theory: it allowed him to show the homology between social space and the space of tastes at the heart of the chapters of *La Distinction* (Bourdieu, 1979), to objectify the space of the *grandes écoles* (Bourdieu, 1989), the intellectual field (Bourdieu, 1984) or even those of housing policy (Bourdieu and Christin, 1990) or publishing (Bourdieu, 1999).

The MCA "applies to generally large tables that provide a set of 'qualitative' characteristics for a population of statistical individuals (i.e. 'biological' individuals, but also, in certain cases, institutions, countries, collectives, etc.)." (Duval, 2017, p. 1). It aims to process large amounts of data. It makes it possible to synthesise and prioritise the information contained in a corpus and to visualise the results in the form of factor maps showing the similarities and differences between individuals. When MCA deals with qualitative data (profession, gender, etc.), Principal Component Analysis (PCA) is adapted to quantitative variables (salary, age, longevity, etc.).

Like SA-OM, MCA and PCA can be combined with classification methods: "It is assumed that certain groupings must exist or, on the contrary, we demand that certain groupings be carried out. In other words, we are not satisfied with a flat and continuous visualisation of statistical associations, and we manifest, implicitly or explicitly, an interest in highlighting classes of individuals or characters" (Lebart et al., 2000: 145). Among the classification techniques, Euclidean classifications are the most used with MCA or PCA, more precisely AHC⁸. "The second part of the geometric analysis of the data", the classification methods aim to "summarise the initial data" by forming coherent classes that are different from each other (Le Roux, 2014: 321). As explained by Lebart, Piron and Morineau, classification techniques complement the results of factorial analyses by correcting certain disadvantages associated with the use of graphical representations resulting from factorial methods: difficulties in interpreting axes or factorial plans; lack of robustness associated with certain anomalous observations⁹; and finally, the illegibility of the graphs (Lebart et al., 2000: 185-186).

Even if several handbooks specify the contributions of the AHC to the analysis, the combination MCA-AHC or PCA-AHC in publications is much less systematic than that between SA and OM. In Bourdieu's own work, AHC was only mobilised at the end of the 1990s to differentiate between types of publishers in the analysis of the field of publishing (Bourdieu, 1999). Nevertheless, the combined use of AHC and factor analysis seems to have become more common recently. De facto, several recent studies combine MCA and AHC: to distinguish disciplinary groups in the academic space (Renisio, 2015), socio-professional categories (Amossé and Pénissat, 2019), profiles of organisers of evaluation in the human sciences and social issues in France (Laillier and Topalov, 2017), the representations and uses of human

⁸ On the advantages and limitations of other methods, see Le Roux, 2014: 324.

⁹ Which refers to the "distinction" effect pointed out by Cibois, 1997.

rights by French local elected officials in relation to their characteristics and those of their community (Le Bris and Weill, 2022), or even types of cultural practices in Norway (Hjellbrekke et al., 2015) or in the UK (Savage et al., 2015). The rare studies using PCA in sociology often combine PCA and AHC. Thus, Rémi Sinthon (2019) identifies four major social classes in France by crossing a PCA (carried out on a set of numerical variables relating to the working and employment conditions of the people who exercise them, their income, their studies, their housing situation, their property assets, etc.) and an AHC. On the other hand, a PCA at the level of the polling stations of thirty-five central cities, then an AHC that distinguishes seven standard profiles of offices, allows Jean Rivière (2017) to highlight the organisation of the electoral space of large French cities.

The GDA makes it possible to synthesise the structuring links between the modalities of several variables. For Lemerrier and Zalc, this method is not the most suitable for processing longitudinal data: "One of the shortcomings of factor analysis in the processing of historical sources is due to its rather "static" character: to the extent that it is interested in the relationships between a set of variables all treated identically, it restores the results in a "cartographic" format and struggles to highlight the changes" (Lemerrier and Zalc, 2008: 69). Nevertheless, it is possible to introduce time into the GDA: by comparing a social space over time (Coulangeon, 2013; Rosenlund, 2019; Ginsburger, 2022), by inserting a classification of trajectories obtained from a SA into the active variables (Toft, 2022), or, as we will see below, from temporal variables such as career stages or the proportion of time spent in different professional positions.

We propose three successive analyses. The first is an MCA based on the same 12 states of the SA, recoded dichotomously into 12 variables. The second is an MCA based on the same variables, with one exception: the passage through the EP is replaced by another more precise variable. The third is a PCA using the time spent in each of the 12 positions.

Carry out a MCA with the 12 states of SA

A first MCA (MCA1) is carried out. The same 12 states of the SA, recoded dichotomously into 12 variables (having occupied this or that position after 2014: yes/no), are considered as active variables of this MCA. Variables related to the career progression are placed as additional variables: the number of years in the EP (EP is the common point of the careers), the position each year in the period 2014-2021, the last professional position in the sequence. The first three axes of this MCA are the most relevant. The table of contributions (Table 5) shows that the passage of the EP after the 2014 elections, which concerns 62% of the population studied, divides the two axes (contribution of 29.6% and 21.2% respectively)¹⁰.

The first axis of the MCA1 represents 13.9% of the total inertia. It pits those who pursue their careers in Brussels, particularly in the EP, against those who turn to national positions (agents of an economic interest group, a company, an institution or a political aide). The second axis (10.4% of the inertia) tends to represent a private-public or regulated-regulated axis, differentiating positions in the representation of interests (agent of economic interests, agent of an NGO) from those in national institutions (agent of a local authority) or in the EP¹¹. The east pole of the regulators corresponds to the west pole of the regulated, characterising those who are likely to correspond to the image of the revolver that has borrowed the revolving door. The position within a European institution (mainly the European Commission) is an exception, since it is located close to the interest representatives in Brussels, which reflects the frequency of experience in the public and private sector for those who have access to the European Commission and those who do not. In other words, the accumulation of experience in the field, both in the institutions and in the representation of economic interests, seems to be a resource for access to certain positions in the European institutions, mainly in the Commission. The third

¹⁰ See the cloud of individuals, see figure 16 in the appendices.

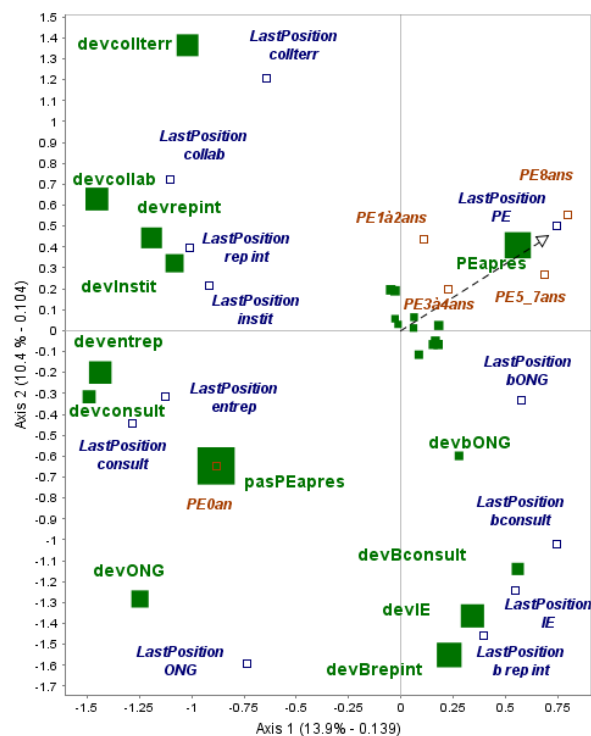
¹¹ Modified Benzécri rate of 93.2% for the first two axes.

axis (9.6%) distinguishes careers in NGOs (Brussels or national) from careers in the institutions (European or national). Careers in NGOs do not particularly lead to positions in the institutions (unlike positions as representatives of economic interests).

Table 5 : Contributions of variables on the first three axes of the MCA1

Location	Futures	Variable	Axis 1	Axis 2
Brussels	Agent of a consulting firm or law firm in Brussels	devBconsult	0,9	5,2
Brussels	Agent of an NGO representative office with European institutions, or a think tank office in Brussels	devbONG	0,2	1,4
Brussels	Agent of an office representing economic interests in Brussels	devBrepint	0,4	23,7
Brussels	European institution (other than EP)	devIE	1,0	21,4
National	Political collaborator within a political staff (political party, parliamentary staff, etc.)	devcollab	13,4	3,4
National	Agent of a local authority in an EU country	devcollterr	5,2	12,6
National	Agent of a consulting firm in an EU country	devconsult	5,4	0,3
National	Agent of a company in an EU country	deventrep	15,6	0,4
National	Agent of an institution in an EU country	devinstit	10,7	1,3
National	NGO agent in an EU country	devONG	4,7	6,6
National	Agent of a representation of economic interests in an EU country	devrepint	12,7	2,4
Brussels	Agent of the European Parliament	PEapres	29,6	21,2

Figure 6 : Projection of the first two axis of the MCA1 (active and supplementary variables, points proportional to their contribution)



The projection of supplementary variables reflects the proximity between the last position and the occupation of a professional position, which suggests a relatively limited mobility. The presentation of careers, which are often non-linear, does not involve the superposition of points. Reading the graph composed of the first two axes (Figure 6) reveals career configurations that can be defined more precisely by an ascending hierarchical classification. The AHC carried out according to the Ward criterion produces a dendrogram (Figure 17 in the appendices) which suggests a division into 7 or 3 classes. In order to compare the typology extracted from the MCA1-AHC with that extracted from the SA-OM, the classification into 7 classes is maintained. The AHC (Table 6 and Figure 18 in the appendices) distinguishes between career configurations that are geographically located in Brussels (67%) or nationally (33%)¹². On the other hand, there are four classes related to the career in Brussels: consulting firms or NGOs (class 4; 8%), economic interest groups (class 5; 8%), European institutions outside the EP (class 6; 11%) and finally the EP (class 7; 39%). From the point of view of scope, therefore, we find in Brussels more or less the 3 classes of the typology resulting from the SA-OM, with the addition of a class with careers in consulting firms or NGO representations. Another difference is that, although the EP career class is also the most consistent with the MCA, it is less so than with the OM (39% against 46%). On the other hand, there are three classes of national careers: the first class includes careers in an NGO (5%), the second in a company or consultancy (9%), the third in an institution, a local authority, an economic interest group or as a political aide (19%)¹³.

The limitation of this analysis is that it does not sufficiently take into account the time or the moment of leaving the EP. The EP point is very specific because it is the starting point for the vast majority of trajectories: respondents left the EP in 2014, or year after year, or for some are still there at the end of the period. If the placement of temporal variables as additional variables makes it possible to introduce time into the analysis, it is only in a secondary way, as they do not structure the MCA1.

Table 6 : Classification from MCA1-AHC

	Location	Futures	Number	%
Class 1	National	NGO agent	21	5%
Class 2	National	Agent of a company or consulting firm	41	9%
Class 3	National	Agent of an institution, a local authority, political collaborator, representative of economic interest	85	19%
Class 4	Brussels	Consultant or representative of an NGO to European institutions	35	8%
Class 5	Brussels	Economic interest representative to European institutions	36	8%
Class 6	Brussels	Agent of a European institution other than EP	48	11%
Class 7	Brussels	EP agent (APA or agent of a political group)	173	39%
Total			439	100%

¹² The classification obtained by the SA-OM is also spatially located with the exception of one class: the first which brings together national positions (political collaborator, agent of a local authority, an NGO or a consulting firm) and in Brussels (representation of an NGO or consulting firm).

¹³ This typology can also be crossed with different variables on the areas of public action worked on beforehand (Table 18 in the appendix).

Refine the MCA by introducing longevity

One way to remedy this is to propose a second MCA (MCA2) structured on professional positions held after 2014 and on the number of years spent in the EP from 2014; this more precise variable with 5 modalities¹⁴ replaces the EP variable (having worked in the EP after 2014 or not). The comparison with the MCA1 leads to several observations. First, the cloud of individuals is less homogeneous than in the MCA1 (Figure 19 in the appendices). Second, the inertia rates on the first two axes are slightly lower (12% and 8.8%)¹⁵. Thirdly, the axes are more hierarchical due to the variable on the EP (here the number of years in the EP from 2014): 38.3% of contributions on the first axis, 25.5% on the second, 43.2% on the third. Fourthly, the weight of this variable has an impact on the axes (Figure 7): on the first axis, the modalities of this variable are ordered from west to east; on the second axis, the extreme modalities (0 year and 8 years) tend to oppose the mediating variables (1 to 2 years; 5 to 7 years). The MCA2 thus shows a Guttman effect¹⁶.

It isolates the people who moved to the national level from 2014 (north-west of the map, Figure 7), who are the least "Europeanised" former APAs (Michon, 2014), and those who remained in the EP throughout the period (north-east). A third pole emerges: that of people who stay in the EP for a few years before moving on to represent interests in Brussels. The dendrogram suggests a division into 8 classes (Figure 20 in the appendices).

The classes obtained with the AHC are quite close to the previous AHC (Table 8). However, the classes are not only structured by positions, but also by longevity in the EP. For example, the second class is mainly made up of former APAs who have moved to another European institution, but they make up only half of the staff. In fact, this class is also structured by longevity in the EP, between 5 and 7 years. The MCA2, with the inclusion of the variable of time spent in EP, is therefore no more convincing.

Table 7: Variable contributions on the first three axis of the MCA2

Location	Futures	Variable	Axis 1	Axis 2
Brussels	Number of years at the EP after 2014	NbAnneesPEapres2014	38,3	25,5
Brussels	Agent of a consulting firm or law firm in Brussels	devBconsult	0,0	12,1
Brussels	Agent of an NGO representative office with European institutions, or a think tank office in Brussels	devbONG	0,1	7,6
Brussels	Agent of an office representing economic interests in Brussels	devBrepint	0,1	19,1
Brussels	Agent of a European institution (other than EP)	devIE	0,1	25,9
National	Political collaborator within a political staff (political party, parliamentary staff, etc.)	Devcollab	12,9	3,1
National	Agent of a local authority in an EU country	devcollterr	6,3	1,9
National	Agent of a consulting firm in an EU country	devconsult	5,0	0,0
National	Agent of a company in an EU country	deventrep	11,8	2,4
National	Agent of an institution in an EU country	devinstit	11,7	0,0
National	NGO agent in an EU country	devONG	2,5	0,1
National	Agent of a representation of economic interests in an EU country	devrepint	11,2	2,3

¹⁴ 0 year at EP between 2014 and 2021, 1 or 2 years, 3 or 4 years, 5 at 7 years, 8 years.

¹⁵ Modified Benzécri rate of 86.5% for the first two axis (compared with 93.2% for the previous MCA).

¹⁶ "Noncorrelation between main variables excludes linear dependence, but does not exclude nonlinear dependence. A cloud can show a quasi-functional relationship (evoking a "parabolic shape") of axis 2 as a function of axis 1" (Le Roux, 2014: 277).

Figure 7 : Projection of the first two axis of MCA2 (cloud of modalities, points proportional to their contribution)

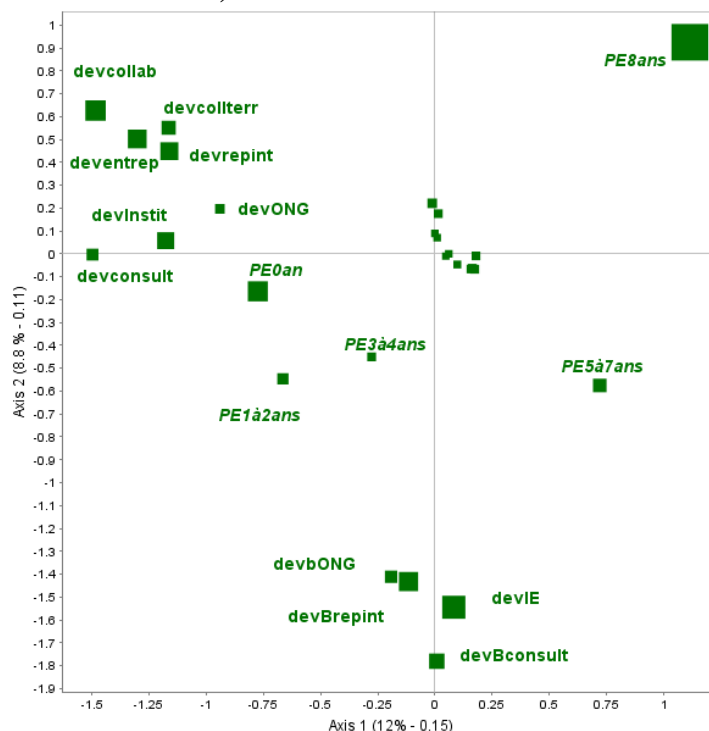


Table 8: Characteristics of MCA2-AHC classes

Class	Terms characteristics	Names	% modality in the class
Class 1/8	devBconsult	Agent of a consulting firm or law firm in Brussels	54,5
	devbONG	Agent of an NGO representative office with European institutions, or a think tank office in Brussels	51,5
	PE1à2ans (EP 1or2 years)	1 or 2 years at the EP	27,3
Class 2/8	PE5à7ans (EP 5-7 years)	5 at 7 years at the EP	62,7
	devIE	Agent of a European institution (other than EP)	52,0
Class 3/8	devONG	NGO agent in an EU country	100,0
	PE0an (EP 0 year)	0 year at the EP	90,0
Class 4/8	devBrepint	Agent of an office representing economic interests in Brussels	100,0
	PE0an (EP 0 year)	0 year at the EP	62,8
Class 5/8	devrepint	Agent of a representation of economic interests in an EU country	81,1
	PE3à4ans (EP 3or4 years)	3 or 4 years at the EP	37,7
Class 6/8	deventrep	Agent of a company in an EU country	73,7
	devconsult	Agent of a consulting firm in an EU country	39,5
	PE0an (EP 0 year)	0 year at the EP	78,9
Class 7/8	devInstit	Agent of an institution in an EU country	54,4
	devcollterr	Agent of a local authority in an EU country	36,8
	PE1à2ans (EP 1or2 years)	1 or 2 years at the EP	40,4

	devcollab	Political collaborator within a political staff (political party, parliamentary staff, etc.)	36,8
	PE0an (EP 0 year)	0 year at the EP	57,9
Class 8/8	PE8ans (EP 8 years)	8 years at the EP	97,5

Construct a PCA on time spent in the different positions

The alternative chosen is to construct 12 quantitative variables of the same type (one for each occupation), combining occupations and time spent over the period. For each individual, the proportion of time spent in each job is calculated over the 8 years of the sequence [2014-2021] (Table 9). A person who worked in the EP for 8 years over this period has therefore spent 100% of their time in the EP. Another, who worked for 2 years in the EP and 6 years in Brussels representing economic interests, spent 25% of the period in the EP and 75% in interest representation. These quantitative variables can be analysed using principal component analysis (Table 10, Figure 8, Figure 21 in the appendices).

Table 9 : Proportion of time spent in the 12 occupations over the period [2014-2021].

Over the period 2014-2021, proportion of time spent	[2014-2021]	%
At EP	PartPostPE	49
In another European Institution	PartPostIE	6
In interest representation in Brussels	PartPostBrepint	6
In consulting in Brussels	PartPostBconsult	2
In an NGO in Brussels	PartPostBong	2
In the representation of interest	PartPostRepint	7
In consulting	PartPostConsult	2,5
In a company	PartPostEntrep	6
In a role as a political collaborator	PartPostCollab	4
In a local authority	PartPostCollter	4
In an NGO	PartPostONG	3
In an institution	PartPostInstit	7

Table 10: Contribution of active PCA variables to factorial axes (%)

	Contribution	Axis 1	Axis 2	Axis 3	Axis 4	Axis 5
PartPostPE	8,3	62,6	1,3	0,2	0,1	0,0
PartPostRepint	8,3	7,0	15,9	1,0	6,7	20,1
PartPostBrepint	8,3	3,4	9,0	18,0	26,6	9,4
PartPostCollab	8,3	4,4	4,9	3,3	0,0	8,2
PartPostCollter	8,3	2,0	2,6	1,1	27,6	7,8
PartPostConsult	8,3	3,0	0,1	1,2	12,2	1,2
PartPostBconsult	8,3	0,4	6,4	6,4	9,6	3,0
PartPostEntrep	8,3	7,2	7,0	5,3	2,0	9,8
PartPostIE	8,3	0,9	50,6	6,3	0,0	2,0
PartPostBong	8,3	0,3	0,8	9,4	14,8	0,4
PartPostONG	8,3	1,7	0,6	9,7	0,4	37,5
PartPostInstit	8,3	7,0	0,8	37,9	0,1	0,5

The first axis of the PCA (13% of inertia) contrasts the variable of time spent in PE with the other variables (Figure 8). The first axis of distinction is that of the time spent in the PE. The second axis (9.5%) indicates careers in Brussels (especially in IE) and at national level. The third axis (9.3%) (Figure 9) is an axis of differentiation between careers in the public and the private sector: it distinguishes more precisely careers in institutions and, more generally, in the public sector from careers in the representation of private interests.

The AHC dendrogram (Figure 22 in the appendices) leads to a classification into 8 classes (Figures 10 and 11). Four classes relate to national careers: interest representation (class 1), company (class 2), local authority (class 4), consultancy or political staff (class 5). Two classes are centred on Brussels: interest representation in Brussels (class 7) and PE (class 8). Finally, two classes span Brussels and the national level: a career in an NGO (national or Brussels) or in consultancy in Brussels (class 3); and a career in a national institution or in a European institution in Brussels¹⁷.

The classification obtained with the PCA (Table 11) highlights the proximity of careers in NGOs and consultancy on the one hand and in national, international or European institutions on the other. By breaking down the rather heterogeneous class (Instit, coll terr, collab, rep int), it isolates careers at national level in interest representation, local authorities and companies. From this point of view, it seems a little more readable than the AHC of the MCA1 (Table 12).

Figure 8: Projection of the first two axes of the PCA (cloud of active variables)

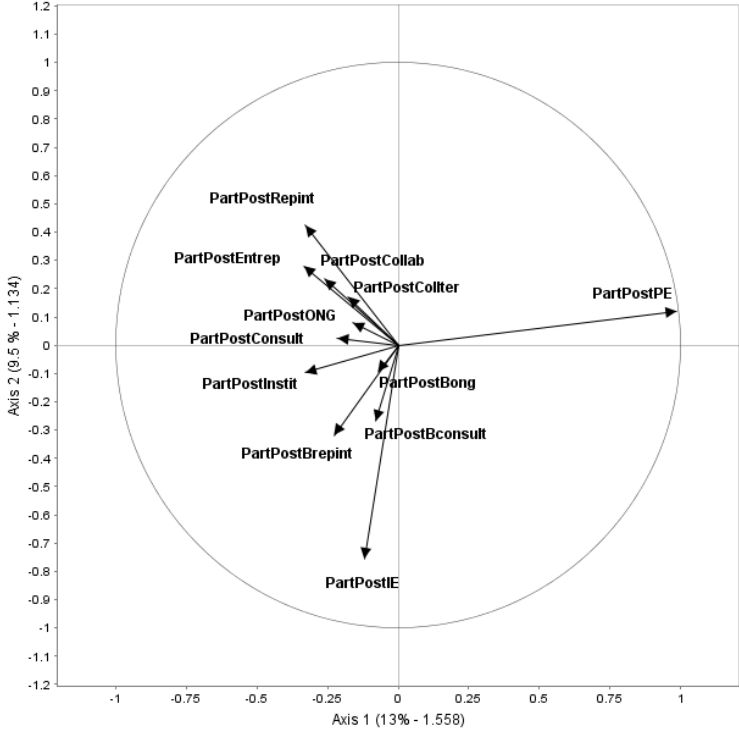


Figure 9 : Projection of axes 2 and 3 of the PCA (cloud of active variables)

¹⁷ On the cross-section of the typology with the original parliamentary committees, see Table 19 in the appendix.

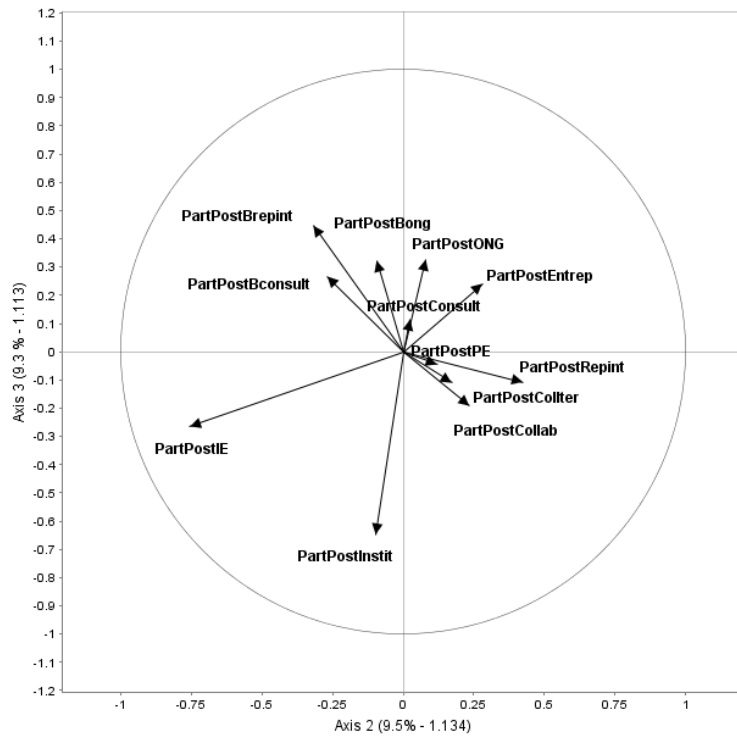


Figure 10 : Projection of the classes from the PCA (axis 1 and 2)

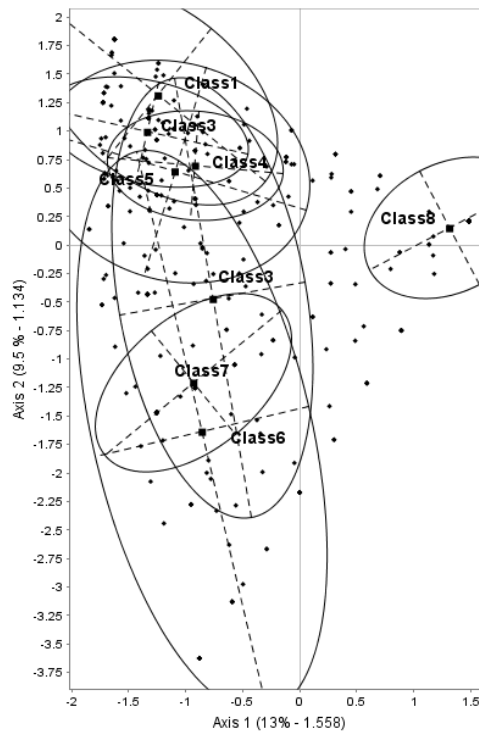


Figure 11 : Projection of the classes from the PCA (axis 2 and 3)

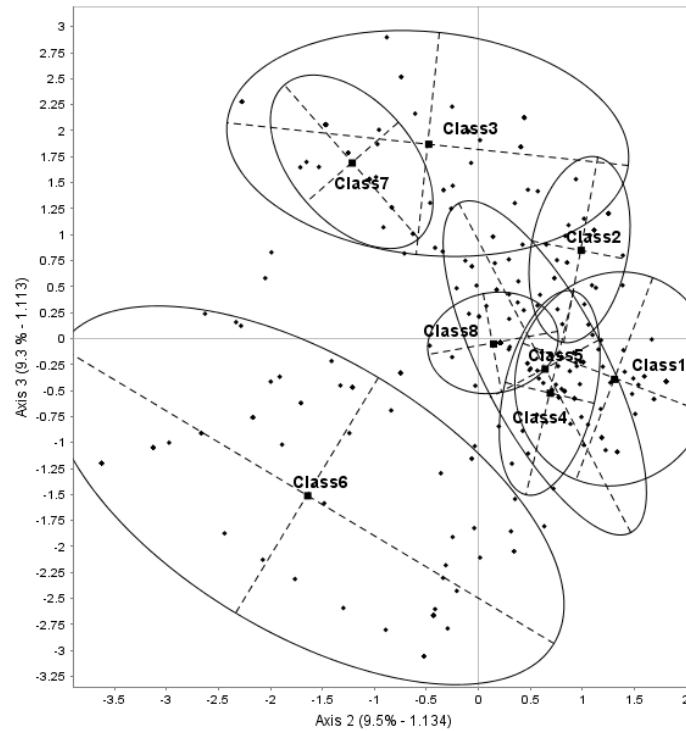


Table 11 : Description of the classes from PCA-AHC

	Abbreviation	Location	Name	Number	%
Class 1	Rep int	National	Agent of a representation of economic interests in an EU country	38	9%
Class 2	Entrep	National	Agent of a company in an EU country	32	7%
Class 3	ONG B ONG B consult	Brussels National	Agent of an NGO representative office with European institutions, or a think tank office in Brussels NGO agent in an EU country Agent of a consulting firm or law firm in Brussels	32	7%
Class 4	Collterr	National	Agent of a local authority in an EU country	21	5%
Class 5	Collab Consult	National	Political collaborator within a political staff (political party, parliamentary staff, etc.) Agent of a consulting firm in an EU country	37	8%
Class 6	IE instit	Brussels National	Agent of a European institution (other than EP) Agent of an institution in an EU country	59	13%
Class 7	Brepint	Brussels	Agent of an office representing economic interests in Brussels	29	7%
Class 8	PE	Brussels	Agent of the European Parliament	191	44%
Total				439	100%

Table 12 : Comparison of classes obtained with MCA1-AHC et PCA-AHC (*differences are highlighted in italics*)

		MCA1				PCA		

	Location	Abreviation	Number	%		Abreviation	Number	%
Classe 1	National	ONG	21	5%				
Classe 2	National	Entrep consult	41	9%	Classe 2	Entrep	32	7%
Classe 3	National	Instit, coll terr, collab, rep int	85	19%	Classe 5	Collab consult	37	8%
					Classe 1	Rep int	38	9%
					Classe 4	Collterr	21	5%
Classe 4	Brussels	B consult et B ONG	35	8%	Classe 3	B ONG B consult ONG	32	7%
Classe 5	Brussels	B rep int	36	8%	Classe 7	Brepint	29	7%
Classe 6	Brussels	IE	48	11%	Classe 6	IE Instit	59	13%
Classe 7	Brussels	PE	173	39%	Classe 8	PE	191	44%
Total			439	100%	Total		439	100%

The benefit of a comparison between typologies

Very close schedules

The classes obtained by the different methods overlap to a large extent (Tables 13 and 14). If we compare the SA-OM (constant costs) and MCA1-AHC typologies, only 16.4% of respondents have a very partial or even no agreement. In more than 80% of the cases, the classes are either identical (with a slight difference in the numbers) (54.9% of the cases) or very similar (28.7% of the cases). In detail, three classes correspond in terms of scope, with a slight difference in numbers (EP, European institutions, interest representation in Brussels). One class corresponds partially (class 2: agent of a company at national level). Finally, the last three classes overlap partially or very partially. The SA-OM typology, with substitution costs fixed by the transition matrix, corresponds slightly less, but even here the highly divergent cases represent less than one fifth of the cases (18.7%).

The classes from the SA-OM overlap even more with the PCA-AHC (Figure 12 and Table 14), since the cases are divergent in less than 10% of the cases (6.6% with constant costs; 8.4% with costs from the transition matrix). The PCA based on variables constructed on the time spent in the main positions thus tends to give results very close to the SA-OM.

This case study therefore shows that the choice of method, between MCA, PCA and SA, and the options (costs) have limited implications at this stage (Table 13).

Figure 12: Comparison typology obtained by SA_OM (constant costs) with MCA1_AHC and PCA_AHC

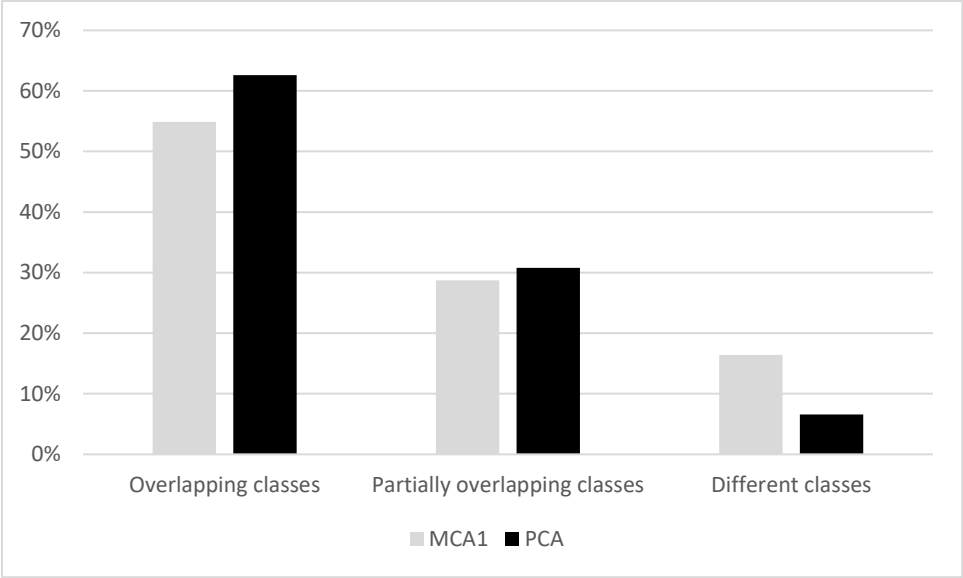


Table 13: Comparison of the typologies obtained by SA-OM, MCA1-AHC and PCA-AHC (differences are highlighted in italics or crossed out)

SA-OM				Constant costss	Costs from transition matrix	MCA1-AHC				PCA-AHC		
	Location	Name	Abbreviation	number	number		Name	Abbreviation	number		Abbreviation	number
Class 2	Brussels	Agent of the EP	PE	200	172	Correspondence (with small difference in numbers)	Agent of the EP	PE	173	Correspondence (with small difference in numbers)	PE	191
Class 5	Brussels	Agent of an office representing economic interests	B rep int	26	26	Correspondence (with small difference in numbers)	Agent of an office representing economic interests	B rep int	36	Correspondence (with small difference in numbers)	Brepint	29
Class 7	Brussels	Agent of a European institution (other than EP)	IE	30	30	Correspondence (with difference in numbers)	Agent of a European institution (other than EP)	IE	48	Partially correspondence (<i>instit in addition</i>)	IE instit	59
Class 6	National	Agent of a company	Entrep	34	35	Partially correspondence (<i>not consult</i>)	Agent of a company or a consulting firm	Entrep, consult	41	Correspondence (with small difference in numbers)	Entrep	32
Class 1	National & Brussels	Political collaborator within a political staff, Agent of a local authority Agent of a consulting firm,	collab collter consult ONG Bconsult Bong	81	109	Very partially correspondence with class 4, 1 et a bit of 3	Agent of a consulting firm or law firm in Brussels, Agent of an NGO representative office with European institutions, or a	B consult et B ONG collab collter consult ONG	35	Partially correspondence sur ONG, Bong, Bconsult	ONG B ONG B consult collab collter consult	32

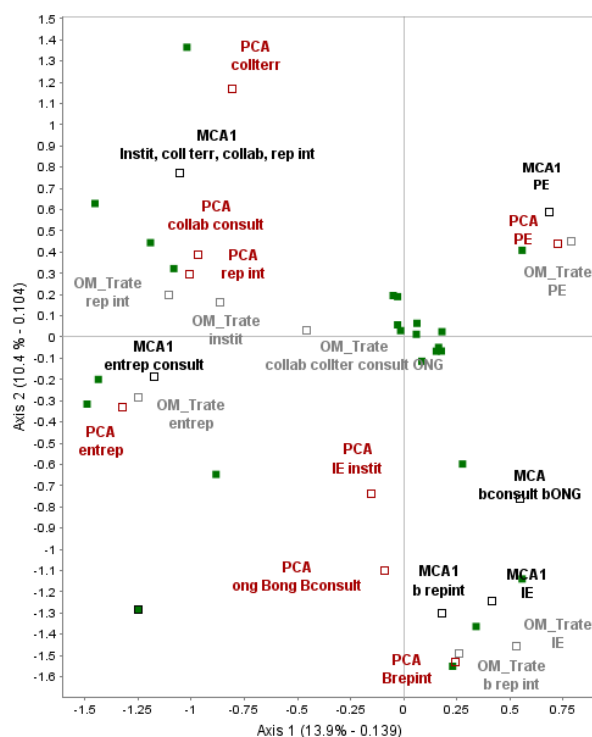
		Agent of a NGO, Agent of a consulting firm or law firm in Brussels, Agent of an NGO representative office with European institutions, or a think tank office in Brussels					think tank office in Brussels					
											Collab consult	37
											Collterr	21
Class 3	National	Agent of a representation of economic interests	rep int	31	30	Very partially correspondence with class 1	Agent of a NGO	ONG rep int	21	Correspondence (with small difference in number)	rep int	38
Class 4	National	Agent of an institution	Instit	37	37	Very partially correspondence with class 4	Agent of an institution, Agent of a local authority Political collaborator Agent of a representation of economic interests	Instit, coll terr, collab, rep int	85	Is partly linked to IE	Instit	

Table 14 : Crossing of typologies obtained by S1-OM with those obtained by MCA1-AHC and PCA-AHC

		OM constant costs (Constant)		OM costs from transition matrix (Trate)		SA-OM Trate	SA-OM Trate	AHC
		number	%	number	%	Average entropy	Turbulence	distance to class center on AHC ¹⁸
MCA1								
Overlapping classes	Same classes as MCA-AHC	241	54,9%	223	50,8%	0,06	1,59	0,166
Partially overlapping classes	Different class scope but classes which overlap with MCA-AHC	126	28,7%	134	30,5%	0,23	3,06	0,56
Different classes	Different classes with MCA-AHC	72	16,4%	82	18,7%	0,25	3,49	0,591
Total		439	100%	439	100%	0,147	2,251	0,349
PCA								
Overlapping classes	Same classes as PCA-AHC	275	62,6%	260	59,2%	0,09	1,84	0,62
Partially overlapping classes	Different class scope but classes which overlap with PCA-AHC	135	30,8%	142	32,3%	0,23	2,98	2,28
Different classes ⁴	Different classes with PCA-AHC	29	6,6%	37	8,4%	0,27	3,85	1,52
Total		439	100%	439	100%	0,147	2,251	1,21

¹⁸ With SA-OM Trate.

Figure 13 : Projection on the plan of the first two axes of the MCA1 of the classes from MCA1, PCA and SA-OM with the transition matrix



Read : PCA results with PCA-AHC ; MCA1 results with MCA1-AHC ; OM-Tratre with SA-OM with Tratre Costs (transition matrix costs).

Heuristic divergences

The different results between the typologies highlight the classification logics reinforced by the methods used.

On the one hand, the SA-OM and the PCA-AHC tend to prioritise the most frequent state and the longevity of states (Table 15) and to standardise the information in a certain way. The disadvantage of the most frequent position over time is that it does not take into account the last state which, for the population studied, provides information on the dynamics of the trajectory. The last position held is particularly important in the analysis when the respondents have little chance of changing status, such as the respondents who became European civil servants (grouped in the IE status), whose conditions are particularly sought after on the Brussels job market.

On the other hand, the MCA1-AHC places more emphasis on the exception, i.e. a step that distinguishes the sequence from other identical steps, possibly over short periods of time. For example, the career sequences in the second part of Table 15 (161, 169, 210, 313) characterise this situation. During the 8 years considered, these 4 people worked 7 years in the EP and only 1 year in a consultancy firm in Brussels, a representative office of an economic interest group or an NGO, or even in a European institution. The MCA1-AHC typology places them all in the class corresponding to the year spent outside the EP, unlike the SA-OM and PCA-AHC typologies, which place them in the PE class. Although these career stages are not without interest in terms of showing a non-linearity of careers and temporary withdrawal situations or waiting positions in the representation of interests, the whole sequence still seems to be centred on the EP, which is reported by both SA-OM and PCA-AHC.

Table 15: Some sequences when SA-OM and MCA-AHC typologies are different

Id	2014	2015	2016	2017	2018	2019	2020	2021	Typology SA-OM	Typology MCA-AHC	Typology PCA-AHC
536	PE	PE	PE	PE	PE	IE	IE	IE	PE	IE	PE
543	PE	PE	PE	PE	PE	PE	IE	IE	PE	IE	PE
553	PE	PE	PE	PE	PE	PE	bONG	bONG	PE	B consult B ONG	PE
559	PE	PE	PE	PE	PE	IE	IE	IE	PE	IE	PE
593	PE	PE	PE	PE	PE	PE	IE	IE	PE	IE	PE
621	PE	PE	PE	PE	PE	PE	IE	IE	PE	IE	PE
654	PE	PE	PE	PE	PE	IE	IE	IE	PE	IE	PE
161	PE	Brepint	PE	PE	PE	PE	PE	PE	PE	B repint	PE
169	Bconsult	PE	PE	PE	PE	PE	PE	PE	PE	B consult B ONG	PE
210	PE	PE	PE	PE	PE	bONG	PE	PE	PE	B consult B ONG	PE
313	PE	PE	PE	PE	PE	IE	PE	PE	PE	IE	PE

In a similar way to the variations by type of cost (above), the divergent cases between AS-OM, PCA-AHC and MCA1-AHC correspond to more complex or less obvious order sequences. From this point of view, three indicators are consistent and informative to identify such situations (Table 14): the distance from the centre of the class for MCA1-AHC and PCA-AHC, and the measures of entropy (Shannon, 1948) and turbulence (Elzinga and Liefbroer, 2007; Elzinga 2006) for SA-OM. First, the smaller the distance to the barycentre of the class from the MCA1-AHC and the PCA-AHC, the less likely it is that there are gaps between the typologies: the distance is much smaller when the classes converge (Table 14). Second, the entropy of the classes obtained with SA-OM, which is an "equivalent of the variance for discrete variables" (Morand and Toulemon, 2009), is very low - there is little diversity between states - when the classes overlap. Third, the measurement of sequence turbulence takes into account the variability of the time spent in each successive state and the number of non-repeated and distinct sub-sequences. The average turbulence of the sequences is significantly higher when the classes diverge.

Imperfections as a means of analysis

The results also invite us to understand and analyse the limitations of the tools, as they allow us to deepen our knowledge of the processes studied. The "other" classes, initially of limited analytical interest, illustrate this point.

The classifications obtained by sequence analyses and geometric analyses of the data tend to group a part of the individuals with less frequent characteristics in an "other" class. With regard to the professional future of APAs, the SA-OM tends to group together positions which are partly national (collab, collterr, consult, NGO) and partly Brussels (Bconsult BONG) and which are very rarely linked over the period considered. This distribution does not necessarily seem relevant in view of the juxtaposition of this type of career (which is also highlighted by the MCA1): the positions of political collaborators, those in NGOs, in municipalities, or even those in the representation of economic interests are brought together. When the MCA1-AHC distinguishes between careers in Brussels in consultancy firms and NGO representations, or nationally within NGOs, it tends to bring together national careers partly linked to the public

sector (institution, local authority, political staff) and partly linked to the private sector (representation of economic interests).

This "other" class, which is common in SA-OM typologies, is not without interest. It tends to bring together people for whom the experience of being an APA is the only one in the professions of political Europe. On the one hand, these are young people at the beginning of their careers, who have a short experience in the EP at the end of their studies before moving on to another labour market. On the other hand, there are older people with more atypical careers, for whom the EP seems to be a parenthesis in a career. Among them are those who have made a career as national political collaborators and who symbolise the activist pole of the APA space (Michon, 2014). They are not specialised in European issues when they enter the EP, but were recruited by the elected official in line with their political experience. The case of APAs who are not socialised in the EU before entering the EP, and who return to the national at the end of the EP experience, distinguishes those for whom the position of APA does not represent a springboard for a career in European public policy.

Conclusions

Sequence analysis and geometric analysis of data are powerful tools for exploring and ordering trajectories, making it possible to construct robust typologies. The typologies obtained from sequence analysis combined with optimal matching techniques, correspondence analysis or principal component analysis combined with classifications provide relatively precise indications of the dynamics and homogeneity of the data analysed.

Although the case study developed here is not without its peculiarities - the sequences of the careers considered are relatively short and involve relatively frequent changes of state - it highlights the relative convergence of the results obtained from an SA, an MCA and an PCA, while pointing out specificities. It shows the interest of comparing the typologies: both in terms of how they differ from each other and in terms of their limitations. It therefore suggests that a considerable amount of time be invested in the construction of typologies, that several tools be used, that possible typologies be compared and that they be cross-referenced more systematically with complementary indicators. From this point of view, it is a question of exploiting the richness of career coding with sequence analysis in order to produce suggestive and precise indicators: both the number of positions held (indicator of career dynamics and short or medium-term registration), the position held the longest, longevity in positions, or even the last position held. Finally, it invites us not to hide the limitations of the tools and to consider them as information to be analysed, capable of perfecting the analyses. This is the case for the "other" categories, which should not be ignored but, on the contrary, should be analysed in detail.

In addition to studies that integrate SA typologies into MCAs (Toft, 2022), this analysis therefore calls for a reflexive use of quantitative methods. The tools should not be applied automatically and without reflexivity. On the contrary, analysts have every interest in multiplying the tests, varying the criteria (substitution costs for SA), grouping similar states, constructing adjusted indicators (proportion of time spent in this or that position), cross-referencing the methods, analysing the typologies obtained through the prism of class cohesion indicators (distance from the class centre, turbulence measure, entropy measure), and questioning the gaps and other variations. In this sense, the typologies obtained automatically - even more so as a first intention - should be considered more as stages of analysis and reasoning than as definitive results. For a typology to be relevant, it must be the subject of thoughtful construction, step by step.

Declaration of conflicts of interest

The author declares that he has no potential conflict of interest in relation to the research described herein, copyright and/or the publication of this article.

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Appendices

Figure 14 : Dendrogram SA-OM (constant costs)

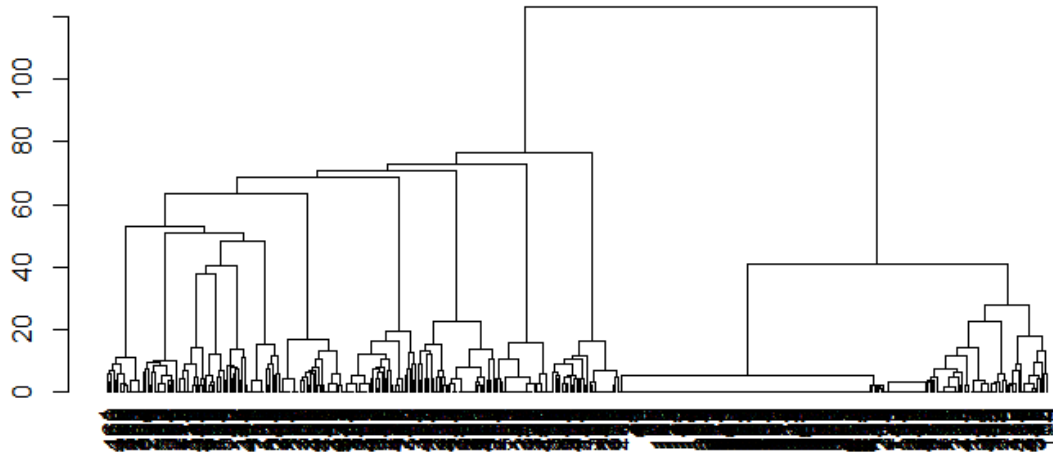


Table 16 : Transition matrix (SA-OM)

	[Bconsult ->]	[bONG ->]	[Brepint ->]	[collab ->]	[collterr ->]	[consult ->]	[entrep ->]	[IE - >]	[instit ->]	[ONG ->]	[PE ->]	[repint ->]
[Bconsult ->]	85	2	2	0	2	2	2	5	0	0	2	2
[bONG ->]	2	87	3	0	0	2	0	0	0	2	2	3
[Brepint ->]	1	1	91	0	0	1	1	2	1	1	1	2
[collab ->]	0	0	2	81	2	1	2	1	6	2	1	4
[collterr ->]	0	1	0	2	86	1	2	0	5	1	1	2
[consult ->]	0	0	2	0	0	87	6	0	0	0	4	2
[entrep ->]	0	0	0	2	2	1	90	1	1	0	1	3
[IE ->]	0	1	1	1	0	1	1	92	2	1	2	0
[instit ->]	0	1	0	1	2	1	3	3	84	0	1	5
[ONG ->]	0	0	0	4	0	0	5	0	0	90	1	0
[PE ->]	1	1	2	1	1	0	1	2	2	1	88	1
[repint ->]	0	0	0	2	0	1	1	0	3	0	0	92

Figure 15 : OM dendrogram with transition matrix costs

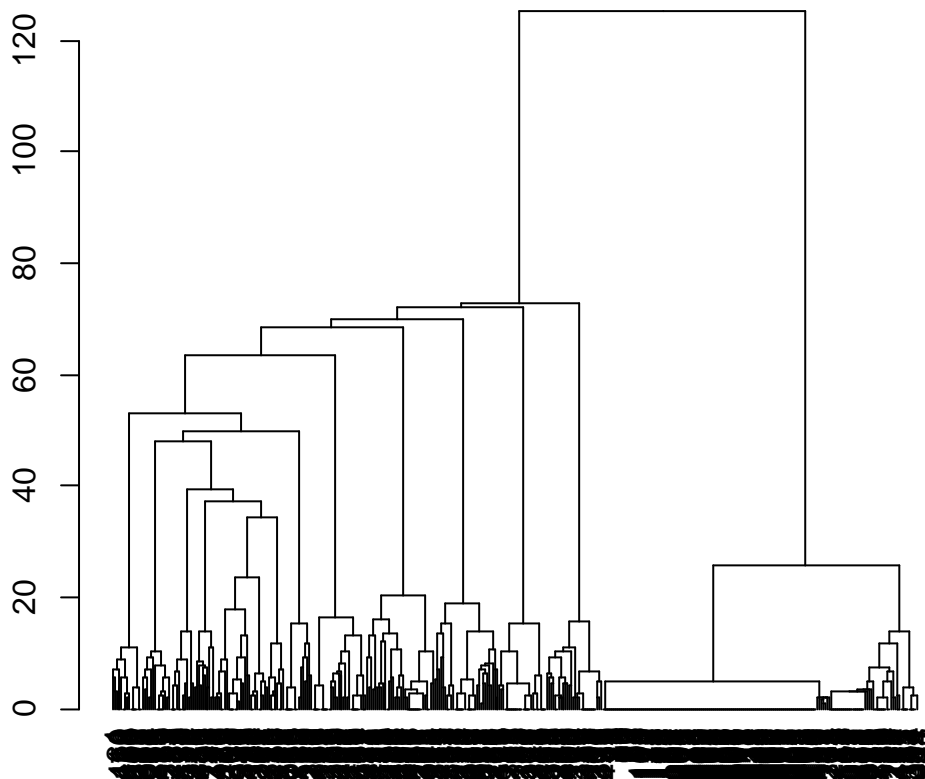


Figure 16 : Projection of the first two axes of the MCA1 (cloud of individuals)

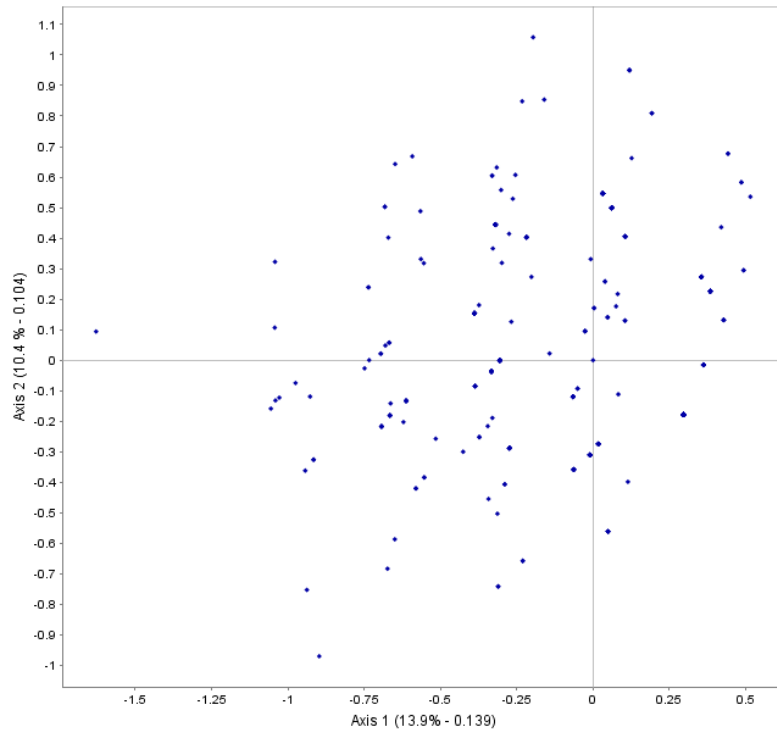


Figure 17 : Dendrogram from MCA1-AHC

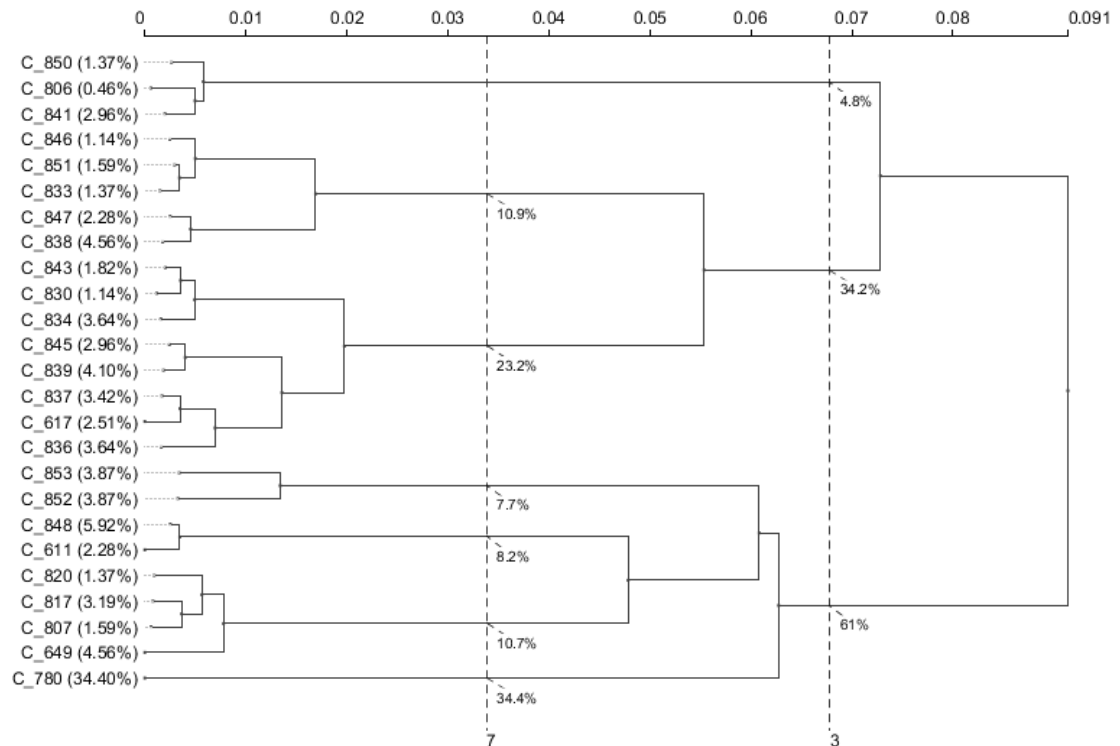


Figure 18: Projection of AHC classes carried out from the MCA1 on the cloud of individuals

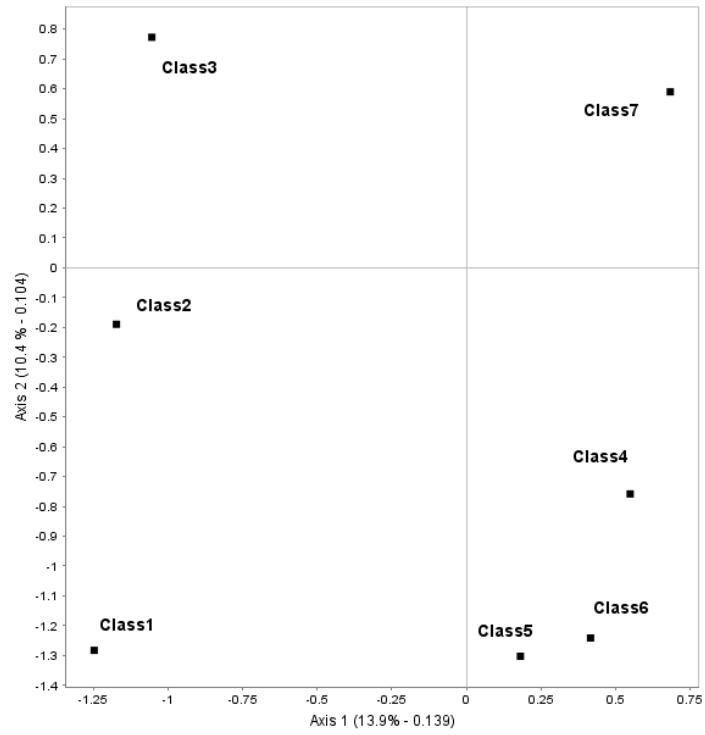


Figure 19: Projection of the first two axis of the MCA2 (cloud of individuals)

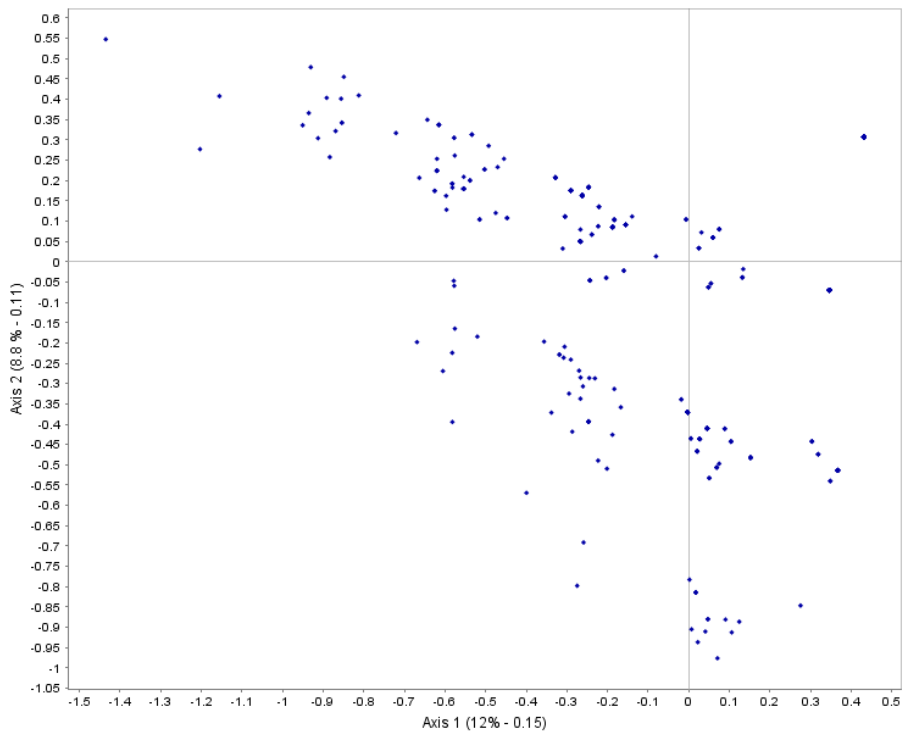


Figure 20 : Dendrogram from MCA2-AHC

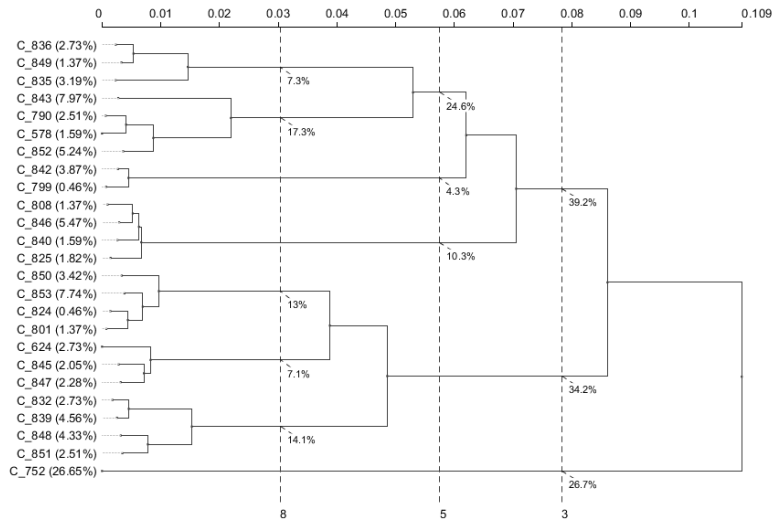


Figure 21: Projection of the first two axis of the PCA (cloud of individuals)

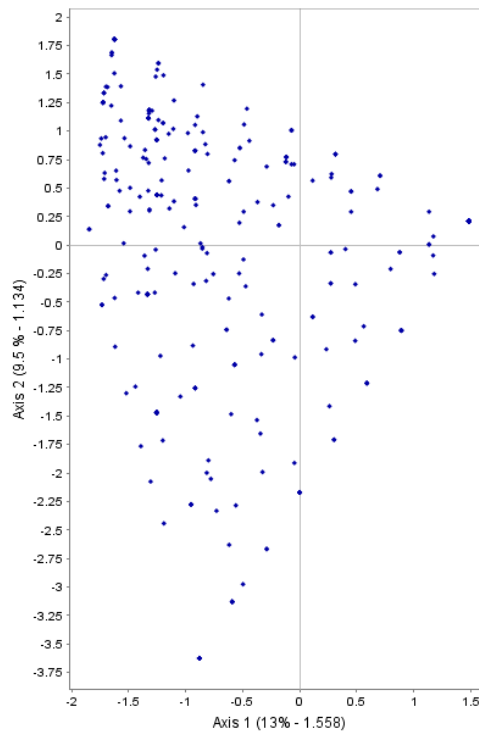


Figure 22: Dendrogram from PCA

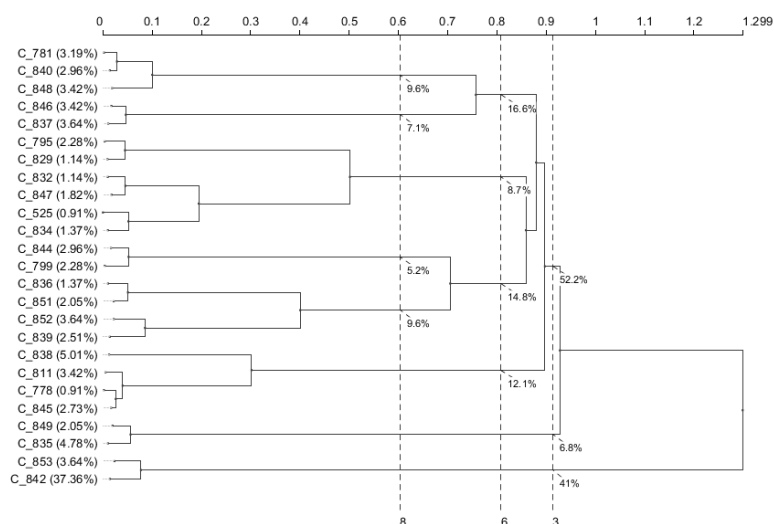


Table 17 : Distribution of SA-OM classes (constant costs) according to the original parliamentary committee

SA-OM	Abbreviation	Description	AGRI	ECON	EMPL	ENVI	IMCO	ITRE	Total
Class 1	collab collter consult ONG Bconsult Bong	At national level: political employee, agent of a local authority, agent of a consultancy firm or an NGO.	16	10	12	27	12	22	100
Class 2	PE	In Brussels: agent of a consultancy firm, agent of an NGO office	20	9	18	17	9	28	100
Class 3	rep int	Agent of the European Parliament	16	19	10	19	10	26	100
Class 4	instit	Agent of an economic interest grouping	16	8	22	22	5	27	100
Class 5	B rep int	Agent of an institution	4	12	8	35	19	23	100
Class 6	entrep	Agent of an economic interest group in Brussels	18	15	21	12	15	21	100
Class 7	IE	Agent of a company	27	23	10	7	13	20	100
		Total	18	11	15	19	11	25	100

Table 18 : Distribution of MCA1-AHC classes according to the original parliamentary committee

MCA1-AHC	Abreviation	Description	AGRI	ECON	EMPL	ENVI	IMCO	ITRE	Total
Class 1	ONG	NGO representative	5	0	29	29	24	14	100
Class 2	Entrep consult	Agent of a company or consultancy	17	17	17	17	12	20	100

Class 3	Instit, coll terr, collab, rep int	Agent of an institution, a local authority, a political collaborator, a representative of an economic interest	15	14	18	15	9	28	100
Class 4	B consult et B ONG	NGO adviser or agent to European institutions	26	11	9	23	6	26	100
Class 5	B rep int	Agent of an economic interest to the European institutions	8	14	6	31	17	25	100
Class 6	IE	Agent of a European institution other than the EP	21	19	13	13	17	19	100
Class 7	PE	Agent of the EP (parliamentary assistant or political group representative)	21	8	17	20	8	28	100
Total			18	11	16	19	11	25	100

Table 19 : Distribution des classes PCA-AHC selon la commission parlementaire d'origine

PCA-AHC	Abreviation	Description	AGRI	ECON	EMPL	ENVI	IMCO	ITRE	Total
Class 1	Rep int	Agent of a representation of economic interests in an EU country	16	16	13	21	8	26	100
Class 2	Entrep	Agent of a company in an EU country	19	13	22	9	16	22	100
Class 3	ONG B ONG B consult	Agent of an NGO representative office with European institutions, or a think tank office in Brussels	9	6	19	25	19	22	100
		NGO agent in an EU country							
		Agent of a consulting firm or law firm in Brussels							
Class 4	Collterr	Agent of a local authority in an EU country	19	0	10	29	14	29	100

Class 5	Collab Consult	Political collaborator within a political staff (political party, parliamentary staff, etc.) Agent of a consulting firm in an EU country	19	19	8	35	3	16	100
Class 6	IE instit	Agent of a European institution (other than EP) Agent of an institution in an EU country	24	15	14	14	12	22	100
Class 7	Brepint	Agent of an office representing economic interests in Brussels	3	17	7	31	21	21	100
Class 8	PE	EP agent	20	9	18	16	8	29	100
Total			18	11	16	19	11	25	100