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Geometric Data Analysis as a Tool for Reflexivity

*Frédéric Lebaron**

Abstract: »*Geometrische Datenanalyse als Mittel der Reflexivität*«. In this article, I propose a reflection on the use of geometric data analysis (GDA) as a tool allowing for a higher degree of reflexivity regarding data collection, data analysis, and their sociological interpretation in the case of “social space” studies. I will especially stress the fact that the subject of observation and of analysis can be integrated in the constructed objects dealt with in GDA studies (namely clouds of points). Hence, subjects of observation or analysts can be visualized as projections in a geometric sense in the constructed space(s). This simple geometric technique can allow for a more systematic and relational appraisal of various potential biases at various stages. These biases usually relate to the sociological trajectory – and hence internalized and largely unconscious dispositions – of the analyst, which can also be seen by that way as relational properties in a multidimensional space. I illustrate this epistemological and methodological perspective with examples taken from my proposographical study on the field of French economists and an analysis of European surveys on social inequality.

Keywords: Geometric data analysis, social space, economists, inequality in Europe, Reflexivity.

1. Introduction

In this article, I propose a reflection on the use of *geometric data analysis* (GDA) as a tool allowing for a higher degree of reflexivity regarding three successive aspects of sociological research: data collection, data analysis, and data interpretation as they are conceived in the particular case of “social space” studies (Blasius et al. 2019). This conception of reflexivity therefore logically and practically implies different stages and types of scientific practice.

I will particularly stress the fact that the *subject of observation and of analysis* can be integrated in the constructed objects dealt with in GDA studies

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(namely *clouds of points*). Hence, subjects of observation or analysts can themselves be visualized as *projections* in a geometric sense in the constructed space(s). This simple geometric technique can allow for a more systematic and relational appraisal of various potential biases and operationalizes it at the various stages of research. These biases usually relate to the social trajectory – and hence dispositions – of the analyst, which can also be seen by that way as relational properties in a multidimensional space.

In a first section, I present the general methodology of geometric data analysis; then, in a second section, I argue in favour of its use for reflexive purposes. Finally, in a third section, I illustrate this epistemological and methodological perspective with two examples taken from my proposographical study on the field of French economists and an analysis of European surveys on social inequality.

2. What is GDA and How Does It Relate to Reflexivity?

Geometric data analysis methods (GDA henceforth), developed since the 1960s (Le Roux and Rouanet 2004, 2010) is a set of tools and a general methodological perspective. First, GDA methods are based on an in-depth multidimensional description of a large set of variables that are always interconnected in the concrete reality of a society. Secondly, they allow us to construct a consistent representation of both variables and individuals, which seems more realistic than the various usual deductive representations. Thirdly, they systematically connect statistics to more qualitative observations, and base theorization on a large amount of diverse empirical investigations, in a more inductive way. For these three reasons, as we will see, they can provide a practical tool for a reflexive perspective.

After a short non-technical presentation of this family of methods – which is also a conception of statistical methodology and, hence, to various degrees a conception of reflexivity (section 1) – I describe the ways GDA methods have been used by Pierre Bourdieu for specific sociological purposes in which reflexivity was always central (section 2); finally, I develop two concrete examples of personal research where I have tried to implement a particular reflexive way of thinking (section 3) and try to infer a more general reflexive approach from these particular cases.

GDA designates both a family of statistical methods and a larger methodological perspective in statistics. It has been particularly developed on the basis of the work of Jean-Paul Benzécri in France during the first half of the 1960s, beginning with *correspondence analysis* (Benzécri 1973). As Brigitte Le Roux and Henry Rouanet have shown, these methods are based on three “key-ideas”: geometric modelling; formal approach; “description first” (Le Roux and Rouanet 2010).

2.1 Geometric Modelling: Reflexivity as a Geometric Projection

Geometric modelling refers to the central objects that are produced in GDA, namely clouds of points. “The elements of the two sets indexing the entries of [a two-way table] become points in a geometric space, defining two clouds of points” (Le Roux and Rouanet 2010, 1). In GDA, researchers construct a geometric representation of their dataset and proceed in this sense to a particular and original scientific construction of their research object. This constructivist conception is in line with the methodology of social sciences as it is presented in Bourdieu, Chamboredon, and Passeron’s classical book, *The Craft of Sociology (Le métier de sociologue; 1968)*. From a research question, we derive a way to organise the relevant data. A reference to theoretical stakes and theory-based representations is implied by this constructive operation, far from the usual “positivist” conception of methodology.

It is the concept of distance¹ between individuals that enables, precisely, the expression of the specificity of this conception. The construction of a field, from the empirical sociology viewpoint, consists in geometrically mapping the “social distances” between individuals. The Euclidian distance obtained does not depend on the links as understood in network analysis, but rather on the sharing of properties pre-selected as active questions in the analysis. On the basis of an *individuals x variables* table, the first step in the GDA consists in the construction of a cloud of points representing individual persons. The next step consists in reducing the size of the cloud by researching its main axes or dimensions.

If the variables are questions, that is to say, categorical variables whose values are categories (or properties), the preferred method of analysis is Multiple Correspondence Analysis (MCA). MCA is directly applicable (that is, without prior coding) to *persons x questions* tables, when for each question the respondent gives one and only one reply; otherwise, prior coding is required. MCA provides a *geometric model* of the data, that is, it constructs a cloud of points, each representing one person (*cloud of individuals*) and a cloud of points representing modalities (*cloud of modalities*). To fully grasp the adequacy of the method for sociological data dealing with a field, it is essential to understand what the definition of the distance between individuals implies for the construction of clouds and their interpretation.

If two individuals give the same answer – the question is described as a matter of agreement – the distance between the two individuals in respect of this question is zero. If they give two different answers, the question is described as a matter for disagreement. In this instance, this question creates a distance between the individuals, particularly when the frequency of these answers for the population as a whole is low.

¹ This paragraph is based on Lebaron and Le Roux 2015.

If we designate by f and f' the frequency of the (different) answers given by two individuals to a same question, the distance is equal to

$$\sqrt{\frac{1}{f} + \frac{1}{f'}}$$

The global distance between two individuals is the average of the squares of the distances due to each question.

The greater the similarity in answers, the closer the points representing them. If their answers differ, the distance between individuals will depend on the frequency of their answers; an individual whose replies are not very common will be located at the edge of the cloud. On the basis of the distances between individuals, a cloud of points representing these individuals is defined in a geometric space of large dimension. The cloud is then adjusted by a cloud “projected” onto a space that is smaller in dimension; in other words, the principal directions of the structure of the cloud are sought. For example, among all the spatial axes, the first axis is the one for which the variance of the cloud projected onto this axis is the biggest. The three stages of an MCA are the following:

1. The choice of “active” questions (that is, those that are used to define the distances between individual and the recoding of the modalities);
2. The choice of the number of axes to be used to best summarize the data;
3. The interpretation of the axes;
4. The exploration of the cloud of individuals with the help of structuring factors.

The clouds of points obtained through the use of GDA methods are not only illustrations or “graphical displays” of the data, as they are often described in statistical textbooks. They constitute a genuine geometric modelling, which forms a basic and fundamental step of the scientific process as we understand it: it is composed of description, interpretation, and finally causal inference. And if we can see a point as a particular representation of the object of sociological analysis, namely individual agents, we can immediately also see it as a way of representing the subject of analysis, in the sense that any subject of analysis is reflexively seen as an object, either as part of the studied object or as potentially related to it in various ways. Positioning the analyst as a (potential) point in the constructed space is hence a simple and practical way to operationalise reflexivity. Technically, the main choice in this operation of construction is, as Benzécri claimed, the careful choice of the data table to analyse. It implies a theoretical decision regarding the geometric modelling of the particular object (for example, a market or a set of relevant professional actors or institutions, and so on).

From this choice derives the relevant information about the subject of analysis itself. In this sense, *geometrisation* can be seen as a first “practical” way of positioning the analyst in the analysis, seeing her as a point in a cloud. Behind this operation, one can infer a more formal operation, which consists in seeing the subject of research as a potential “part” of the object or at least as a reality that is not heterogeneous and purely external to the object, an operation closely linked to the theoretical idea of reflexivity. I will first present this operation in more formal terms before exemplifying it later.

2.2 Formal Approach Reflexivity as a Formal Operation

The mathematical theory behind GDA is linear algebra. Benzécri once stated: “All in all, data analysis, in good mathematics, is simply searching for eigenvectors; all the science (or the art) of it is just finding the right matrix to diagonalise” (Benzécri 1973, 1). GDA is then the search of eigenvectors of a particular well-chosen dataset, followed by its statistical and sociological interpretation, which summon numerous other statistical operations. This leads to the creation of new dimensions of the object called “principal axes” or “principal dimensions,” which can be seen as a particularly relevant (or optimal) summary of the data, but also as a space of reference from which the object is (now) perceived.

Reflexivity can hence be seen more generally as a particular formal operation by which the subject of the analysis (the sociologist) is *projecting* herself onto this geometrically constructed object. This projection implies a more general operation of self-positioning, which does not actually depend on a particular method (qualitative, namely ethnographic, or quantitative). This approach clearly evokes the work by the epistemologist Jean Piaget, for whom formal operations are the very basis of every form of the conquest of “subjective-objective” knowledge. Reflexivity can be seen as a particular cognitive and formal operation by which the self “projects” itself in the object of analysis.

2.3 Description First: Reflexivity as Self-Description

Geometric modelling is a preliminary step before any inferential procedure. Descriptive statistics always come first, and then they can (or not) be followed by inferential operations: “The model should follow the data, not the reverse!” (Benzécri 1973, 6). Descriptive statistics do not depend on the size of the sample. Describing one individual, in a more biographical way, has always been a potentiality of this method, as illustrated at various occasions. It more precisely implies describing a trajectory as a move, or various moves, in a multidimensional space, which is itself changing over time.

2.4 The Three Paradigms of GDA and Their Developments: Tools for Social Space Construction

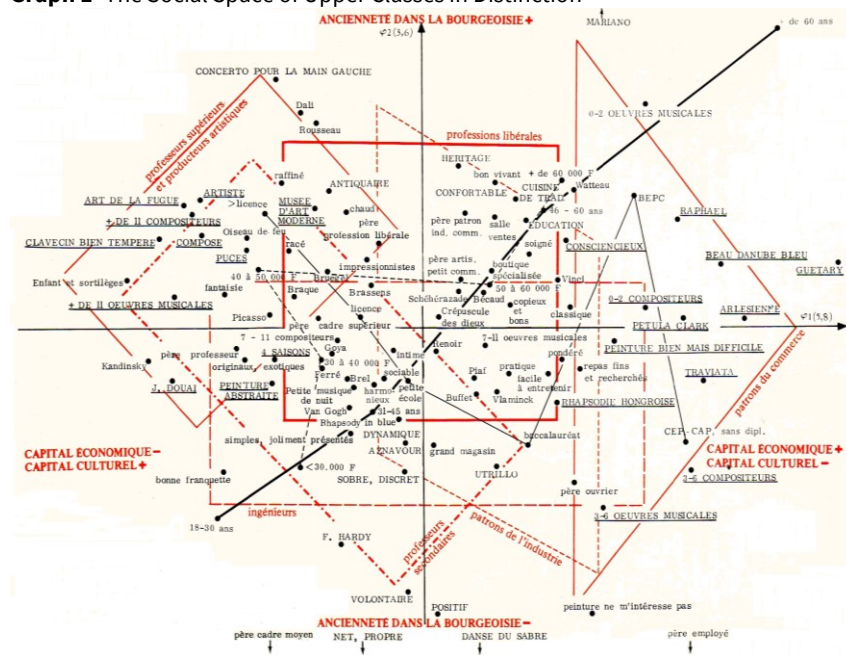
The three paradigms of GDA correspond to three different types of tables:

- Simple correspondence analysis is used to study contingency tables;
- Principal component analysis (PCA) is used to study indicators x numerical variables tables;
- Multiple correspondence analysis (MCA) and its variants are used to study indicators x categorical variables.

In each case, we obtain two clouds of points corresponding respectively to lines and columns of the table. In the case of PCA and MCA, one cloud is the cloud of individuals, the cloud of variables (PCA), or the cloud of categories (MCA). In the GDA tradition, a whole set of tools has been developed to help us interpret the results: contributions of points and deviations, supplementary elements in the cloud of variables (PCA) or categories (MCA). In the cloud of individuals, the descriptive notions of the analysis of variance (like the between and within variance decomposition) are applicable. Mean points of supplementary elements in the cloud of individuals (called category mean points) can be studied descriptively and inductively in a second step. This methodology has been extensively developed by Brigitte Le Roux and Henry Rouanet, especially in Le Roux and Rouanet (2004, 2010).

It is particularly interesting from a theoretical point-of-view, but it has practical implications: colleagues have proposed a small programme allowing researchers to “locate oneself” in a particular analysis by use of the projection of an “external” individual in the cloud of individuals. Locating oneself is a simple and nice application of a reflexive attitude, provided it is followed by some interpretation of potential biases or blindness. I have used this technique in order to locate myself in the following constructed spaces (but I will not display the resulting graphs).

Graph 1 The Social Space of Upper Classes in Distinction



3. A Relational and Reflexive Approach: Bourdieu and the Construction of the Research Object

When the geometric approach of data analysis, which was developed by Jean-Paul Benzécri and his school of thought based on correspondence analysis, emerged in the 1960s, Bourdieu rapidly turned to this approach as being the method that had most “elective affinities” with his own theory (see Rouanet et al. 2000; Lebaron and Le Roux 2015).

In parallel, he developed the theme of self-analysis as a precondition for the progress of social science, but he rarely connected these two scientific investments, whereas it can rather easily be done on the basis of his own work. This posture was, for example, illustrated by Yvette Delsaut’s “socio-analysis” in various articles recently published as a book (Delsaut 2020). I want to stress in this second section the profound affinity between the use of GDA and the practice of reflexivity in sociology.

3.1 A Relational Approach and the Myth of A Priori Neutrality

Bourdieu has given a first reason for his commitment to GDA, which lies in the fact that it is essentially a relational procedure, referring here to a philosophy opposed to “substantialist” representations of reality: “I use Correspondence Analysis very much, because I think that it is essentially a relational procedure whose philosophy fully expresses what in my view constitutes social reality. It is a procedure that ‘thinks’ in relations, as I try to do it with the concept of field” (Preface to the German edition of *Le métier de sociologue*, 1991).

This need for a more structural conception obviously relates to the strong influence of “structuralism” in French social sciences in the 1960s, especially with the models of linguistics and anthropology around Claude Levi-Strauss. For Bourdieu, it is also based on the opposition between “substantialist” and “relational” conceptions of reality, developed by the philosopher of science Ernst Cassirer.

In this relational approach, there is no a priori neutral position inside the social space, a constantly changing structure, and the subject of analysis is also part of the system of relations that she is studying. Part of what she sees may relate to a very particular position in the space, either dominated in a specific way (the lucidity of dominated) or dominant, allowing her to perceive fine differences between agents in a field for example.

It also leads to the idea of bias as a particular point of view on the structure implied by a particular situated position. This is a very common idea in Bourdieu’s sociology that every sociological point-of-view is “situated,” which implies a rupture with a naïve “first degree” positivism in favour of a more refined conception of objectivity. Objectivity, as stated in *Le métier de sociologue*, directly relates to reflexivity, but reflexivity should not be reduced to an individual self-critical attitude: Reflexivity must be living at the scale of the scientific field, that is, as a collective process. It has very strong implications that largely exceed the scope of this article.

3.2 Multidimensionality and the Complexity of Individual Trajectories

Since the first half of the 1960s, Bourdieu has stressed the necessity of a structural conception of sociological variables, taking into account the strong interdependence between all variables in the complexity of social realities. Here, he follows a long-living critique of the “all things being equal” conception in the context of social sciences and observational data. At the same time, he wants to show that economic factors are never isolated from a set of cultural and symbolic constraining elements, for example in the case of social inequalities as regards higher education.

Social causality amounts to the global effects of a complex structure of interrelations, which is not reducible to the combination of the “pure effects” of independent variables.² When I say “pure effects” I refer to the *all-things-being-equal* rhetoric associated with the coefficients obtained through regression techniques, but in practice, these effects are contingent to the specified model and often seem fragile and difficult to interpret in a context of generalized quasi-collinearity. That is the reason why practitioners usually stick to comments about the signs and significance of the coefficients and forget to insert these effects in a structural relational framework, which would be more appropriate for social and economic observational data. This multidimensional perspective is particularly relevant at the level of individual trajectories, which are never simple linear progressions, as Bourdieu clearly showed in his famous article about biographical illusion (Bourdieu 1986).

3.3 The Spatial Representation of Society as a Reflexive Framework

Another complementary element refers to the theorization of societies as social systems that can be described in terms of distances and “structural relations” between individuals. From the structuralist representations that refer to symbolic oppositions (like the gendered divisions in his work about kabylarian house), Bourdieu moved to a more spatial conception of the social system, where social spaces are structured along different dimensions (Lebaron and Le Roux 2015).

At the same time that he began to write about social and political spaces (as early as 1972), Bourdieu was using the concept of field precisely to insist on the fact that a society is composed of several autonomous subspaces, which are inserted in a global space. This spatial conception provides a general reflexive framework, which can be used at any stage of any sort of empirical sociological research.

3.4 Distinction: Sociological Reflexivity in Practice

The social space approach and field analysis will converge through the heuristic use of GDA methods and culminate in the distinction “paradigm.” A final reason for Bourdieu’s use of GDA methods can be found in the concrete practice of statistics in his work, which always strongly upholds in-depth and fine empirical description of all relevant actors in a particular, concrete social space. In this sense, the emphasis that GDA places on the cloud of individuals

² As Bourdieu firmly states in *Distinction*, “the particular relations between a dependent variable (political opinion) and so-called independent variables such as sex, age, and religion, tend to dissimulate the complete system of relations that make up the true principle of the force and form specific to the effects recorded in such and such particular correlation” (Bourdieu 1979, 103).

is probably the strongest incentive to use it more systematically in economic field research. This aspect was already present in the first use of GDA by Bourdieu and his collaborators, which was centred on consumers' tastes, especially as regards cultural goods.

L'anatomie du goût (Bourdieu and Saint-Martin 1976) is the first published application of geometric data analysis methods in Bourdieu's work, republished in 1979 in *La Distinction (Distinction)*. The data was collected through a survey on two complementary samples, using the same basic questionnaire. The scientific objective of the work was first to provide a synthetic vision of the French social space as a global structure and to study two subsectors more in-depth: the space of the dominant classes and the space of the middle-classes ("petite-bourgeoisie"), each study being based on the analysis of an *individuals x variables* table (taken from the respective sub-population).

The main elements of the geometric modelling of data were already present in this work, as Henry Rouanet, Werner Ackermann, and Brigitte Le Roux have precisely shown in an article of the *Bulletin de méthodologie sociologique* (Rouanet et al. 2000). The resulting global social space is three-dimensional: The three first dimensions are interpreted in terms of the volume of capital, composition of capital, and seniority in the class, respectively. When referring to the space of the dominant classes or the "petite-bourgeoisie" (bi-dimensional), the first 2 axes are interpreted in terms of capital composition (Axis 1) and seniority in the class (Axis 2).

The empirical analyses developed in *Distinction* show the variability of tastes in relation to lifestyles, and therefore can be seen as a way to integrate the social construction or production of consumers within the object of economic analysis, instead of considering it as "exogenously given." Economic actors make decisions and choices (of goods and services) on the basis of their social dispositions, habitus, and move in a multidimensional space that is structured by symbolic oppositions, like the opposition between "vulgarity" or "quality" and "selectiveness" on the other.

The strength of *Distinction* relates to the fact that it both implies an "objectivation" of the objectifying subject, which risks being too close to one side of the studied space and provides a potential objectivation of the reader herself. Many of the debates about *Distinction* would be much clearer if the readers and critics were providing their own self-analysis, taking into account their class, gender, and race background into the discussion and projecting themselves, at least by thought, into the social space and verifying (or at least taking into account) that they are probably situated on the side of the dominated fractions of the dominant class (see Graph 1).

4. Fields and Social Spaces: A Practical Reflexive Approach

From several experiences of research, I have suggested adopting a reflexive posture about the stakes and the problems of several stages of these inquiries and their analysis (e.g., the design of the device, the approach of collection of information, the management of the database, the statistical exploitations of the data) by putting forward the appeal to tools and potentialities of GDA. In the two presented case studies, the objective to represent statistically and visually the space or field stood out as a central and important stage to formalise and make this notion operational. In the following presentation, I mainly focus on the spatial representation of the field/social space as a potential basis for reflexive discussions, but one should never forget that reflexivity is implicated at various other steps of the analysis, from data collection to the choice of statistical techniques and, finally, to the theoretical interpretation of data.

4.1 The Field of Economists in France

A first study was developed in the field of French economists, for which I as an analyst was partly an “insider,” being trained as a master’s degree economist (maîtrise and agrégation de sciences économiques et sociales), and close to a particular sector of the field, namely “critical economists.” The study was based on a sample of 220 French economists, which was itself the product of a reflexive analysis, with a choice of sources (directories of associations, *Who’s who?*). The 27 active questions of the MCA (75 categories) were grouped into five headings: social properties (11 categories), trajectories and educational titles (22), professional positions and trajectories (20), association memberships (10), forms of prestige (5). They were chosen in order to construct a scientific field in Bourdieu’s sense, that is on the basis of specific species of capital allowing for locating an economist in a multidimensional space, on the basis of an ethnographic research.

4.1.1 The Structure of the Field

The questions that contribute the most to the variance of the first axis ($\text{Ctr}_q > 1/27$, 3.7%) are: the academic position (18.5%), studies in Polytechnique (12.3%), academic diploma in economics (11.7%), residence (10.9%), studies in the École nationale de la statistique et de l’administration économique (ENSAE; 6.9%), link with corporations (6.1%), bureaucratic position (4.3%), presence in *Who’s who in France* (3.7%), which represents a total of 74.4%. The categories that contribute the most to the first axis ($\text{Ctr}_k > 1/75$, 1.3%) are Polytechnique (9.6%), no academic diploma in economics (6.5%), university in

Province (6.3%), residence in Province (6.2%), ENSAE (5.7%), residence in the bourgeois quarter of Paris (3.9%), “agrégation” in economics (3.5%), no academic position (3.3%), did not study in Polytechnique (2.7%), member of the Société d’économie politique (2.6%), studied in école des Ponts (2.5%), industry or council (2.5%), bank or financial institution (2.4%), national responsibility (2.4%), Institut d’Études Politiques - Conservatoire national des arts et métiers (IEP-CNAM; 2.2%), studies or career in the United States (2.2%), member of the “appel des économistes pour sortir de la pensée unique” (“call of economists against unique thought”; 2.2%), Paris I -II (1.8%), more than 10 citations in the *Social science citation index* (SSCI) 1995 (1.7%), “doctorat” (1.6%), not in the *Who’s who in France* (1.6%), teacher in another “grande école” (1.5%), member of the Cercle des économistes (1.5%), teacher in “Ecole des Hautes Etudes en Sciences Sociales” (1.5%), Plan and similar institutions (1.3%), which is a total of 79.2%.

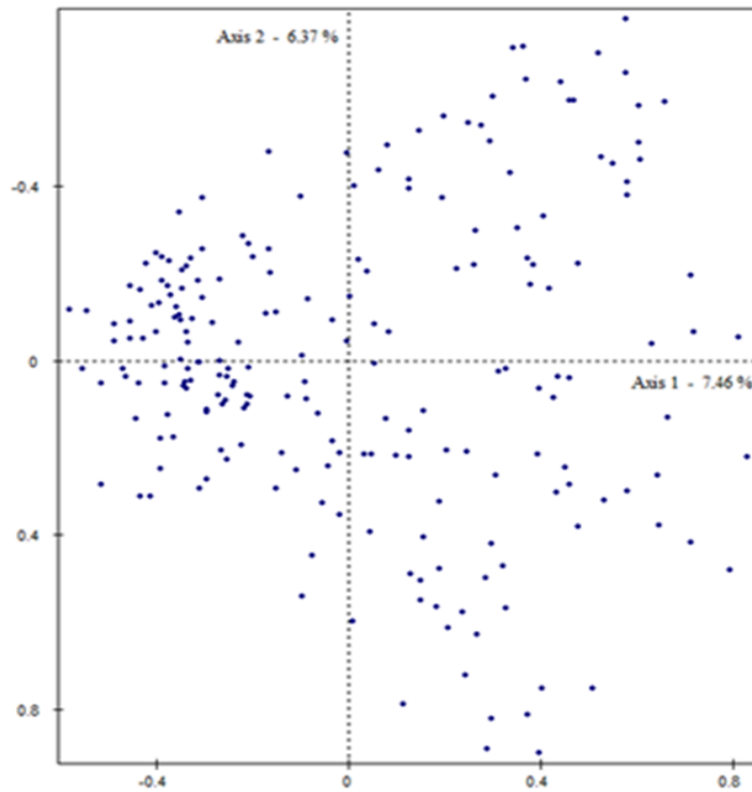
The questions that contribute the most to the variance of the second axis are link with corporations (10.7%), academic position (10.6%), bureaucratic position (8.9%), number of citations in the SSCI 1995 (8.7%), presence in the *Who’s who in France* (6.8%), academic diploma in economics (6.1%), studies in IEP de Paris (5.9%), studies in Polytechnique (4.8%), member of Cercle des économistes (4.5%), member of the Association Nationale des Docteurs ès Sciences Economiques et en Sciences de Gestion (ANDESE; 4.3%), studies in ENSAE (3.9%), which represents a total of 75.2%. The categories that contribute the most to the formation of the second axis are: more than 10 citations in the SSCI 1995 (6.7%), studies in IEP de Paris (4.8%), no academic diploma in economics (4.5%), teacher in Paris IX-Dauphine (4.3%), bank or financial institution (4.3%), industry or council (4.3%), member of the Cercle des économistes (4.2%), Institut national de la statistique et des études économiques (INSEE-DP; 4%), presence in the *Who’s who in France* (3.9%), member of the ANDESE (3.9%), studies in Polytechnique (3.7%), studies in ENSAE (3.3%), studies in École des hautes études commerciales (HEC; 3.1%), not in the *Who’s who in France* (2.9%), studies in the école des Ponts (2.2%), Centre national de la recherche (CNRS; 2.1%), no link with corporations (2.1%), not in the SSCI 1995 (2%), diploma in management (1.8%), IEP-CNAM (1.7%), object of article in *Le Monde* (1.7%), national responsibility (1.6%), presence in the *Bottin Mondain* (1.6%), École des hautes études en sciences sociales (EHESS; 1.5%), not administration (1.3%), member of the “appel des économistes pour sortir de la pensée unique” (1.3%), residence in bourgeois quarter of Paris (1.3%), which is a total of 80.1%.

Descriptively, three extreme zones appear on the first principal plan (see graph 2, cloud of individuals): a first one up to the right, a second down to the right, and a third one to the left. As will be seen in the sociological interpretation, this last zone itself is constituted of two differentiated poles, so that each

quadrant of the first principal plan is occupied by a specific kind of economist.

The first axis that structures the field corresponds to the volume of overall capital possessed by the economists. They distinguish them according to the relationship they have to the world of universities – with on one side, to the right, the category of no academic position and on the other side, to the left, university in Province – according to the kind of superior education they had – with Polytechnique, ENSAE, no academic diploma in economics to the right – and to the left “agrégation” of economics, according to the residence – with to the right the bourgeois quarters of Paris and to the left the residence in Province. An important part of the variance of the first axis corresponds to a multiform social opposition, in France, between Paris and Province, the “grandes écoles” and the university, the world of corporations, administration and politics, and the academic world.

Graph 2 Cloud of Economists in Plane 1-2



The second axis corresponds also to a principal that structures the field of power and the space of dominant classes, while distinguishing technical and intellectual powers from political and economic powers. One finds at one pole, up on the diagram, economists whose authority depends first on their personal work and to the other, down, the economists who are most linked to the economic and political powers (former or actual ministers, directors or managers, economists working in banks and financial institutions, and so on). The link with corporations and with the political field, the distance to the academic world and to administration correspond to a position linked with a kind of power partly independent of the production of theories or specific professional discourses. The rate of citations in the SSCI opposes those with a mostly internal legitimacy (obtained in front of their peers) to an external legitimacy, linked to multiple social demands (political, managerial, media, etc.) addressed to economics.

From a descriptive point of view, different poles of the field of economists correspond to the four quadrants of the first principal plan: to the north-east, the strongest possessors of a leading technical and intellectual capital; to the south-east, the strongest possessors of a leading economic and political powers; to the north-west, the weakest possessors of a leading technical and intellectual capital; to the south-east, the weakest possessors of a leading economic and political powers. I have checked, projecting myself in the first principal plane as a supplementary element, that, in the beginning of the 2000s, I was situated in the middle of the first axis (being a former student of a “grande école,” without a doctorate in economics), and clearly the more “intellectual and technical” pole. Even without this practical verification, it is clear that my affinities are situated in the plane.

4.1.2 Analysing Position-Takings

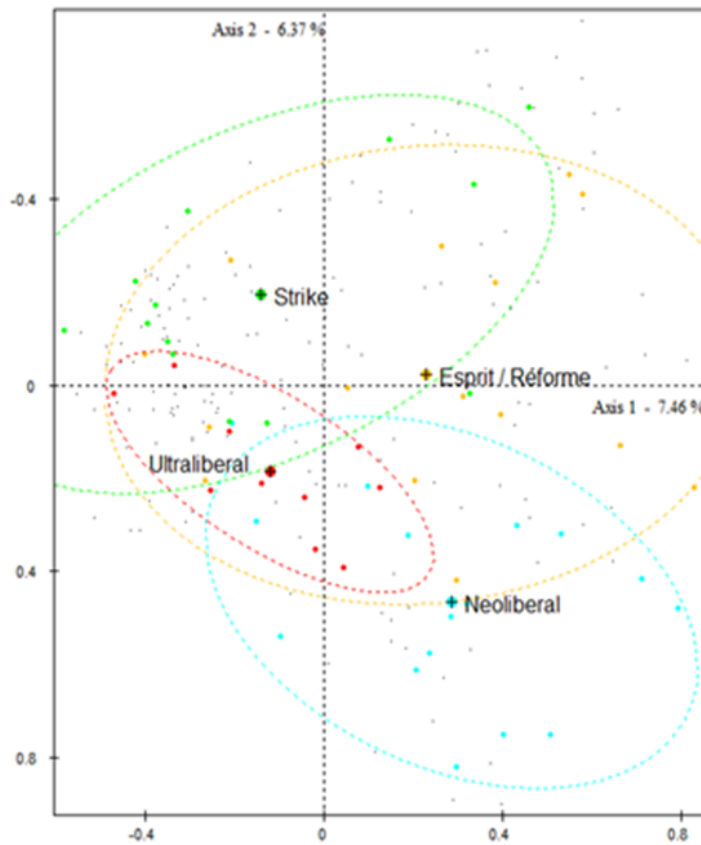
As a phenomenon to explain, I take a kind of position takings, built through the signature of petitions or the writing of articles in the press during the social crisis of November and December 1995. Among the 220 economists of my sample, 166 do not take any position (NoPosition). The others divide into four groups (there is no recovery between them): 15 support the petition of the journal *Esprit* (Esprit), which supports a union supporting the government; 13 are favourable to the social movement (Strikes); 10 are hostile to a rise in taxes (Ultraliberal); 16 support the economic and social policy of the Juppé conservative government (Liberal).

In the cloud of individuals, position takings can be represented as *structuring factors*³ (Rouanet, Ackermann, and Le Roux 2000) and for each position

³ By structuring factor, I mean an interesting variable that describes the individuals and was not necessarily used to build the space but allows for interpretation. The structuring factors are

taking, the corresponding category mean point can be deduced. These category mean points can be represented on the diagram of individuals structured according to the position takings (Graph 3). The derived cloud of category mean points show that the position takings are, from a descriptive point of view, relatively dispersed in the field, which suggests an important relation between positions and position takings. The category mean point NoPosition is close to the origin for each of the first three axes, and, in the first principal plan, the individuals who do not take any position are dispersed (Graph 3).

Graph 3 Cloud of Economists with Position-Takings



analogous to the factors of a plan in ANOVA. Here, the structuring factor does not constitute the space of positions.

From a descriptive point of view, the link is particularly clear in the first principal plan for the category Liberal and for the opposition between Strikes and Liberal. The position takings of an economist are produced inside a particular social microcosm: the field of economists. The economists are more or less distant in this field according to their characteristics. On the basis of their positions understood in this, their position takings are produced. The differences in position takings are linked to differences in social dispositions and to the related different positions in the field.

The economists who are richest in overall capital are closer to the established order, whereas the others are challenging this order. Their dissent can be either “social” (*Strikes*) or “corporate” (*Ultraliberal*), according to the position on the second axis. This second axis allows for distinguishing the position takings closest to the economic and political as those which are closest to the intellectual and technical powers. We find at the intellectual and technical pole the position takings *Esprit* and *Strikes*, competing to define the left intellectual point of view, whereas the position takings *Liberal* and *Ultraliberal* are at the other pole. This structure of position takings corresponds to the objective hierarchies of the field, themselves homologous to the structure of the field of power analysed by Pierre Bourdieu (Bourdieu 1989).

A reflexive discussion can be based on this structure; these investigations would have been biased without this general attempt to discover and interpret systematically and relationally the basic underlying structures behind position-takings, using reflexivity as a guideline at every stage of my construction of the research object. As a critical sociologist-economist, I would probably have spontaneously and unconsciously over-emphasized the more engaged pole around pro-Strike economists without paying sufficient attention to the diversity of situations in the rest of the plane. I actually left aside a very interesting third axis opposing the more international economists to the more national ones, which I see now as a mistake, since this opposition became rapidly central in the field in the 2000s.

4.2 The Social Space in Europe: A Reflexive Study of EU-SILC Data (2011)

In this second study, a contribution to the European ESS-net ESeG project (Eurostat), my approach consisted in using EU-SILC 2011 data⁴ to “test” various European socio-economic classification prototypes built from ISCO08 and

⁴ The procedure was tested for the first time in 2012 on EU-SILC 2010 data. The present study relies on the exploitation of the revised interim data (rev. 1) from the EU-SILC 2011 survey.

core variables (employment status, sector),⁵ while relying on geometric data analysis methodological tools – MCA – first and foremost.⁶

Following on from the Stiglitz, Sen, and Fitoussi report, in particular Part 2 devoted to “quality of life” (Stiglitz, Sen, and Fitoussi 2009), I reflexively built a *living conditions space of the occupied labour force (quality of life space)* in Europe in 2011 in order to test three different socio-economic classification prototypes (socio-economic categories, denoted SC hereafter) within the framework of this reference space. My theoretical aim was to reconsider the “quality of life” issue in light of Pierre Bourdieu’s capital theory and Amartya Sen’s capability (or “capacities”) approach (Sen 2010), and within this framework to study differences between socio-economic groups on the European scale.

From a technical viewpoint I tested the different SC prototypes by developing a structured data analysis, the procedure of which has been presented on various occasions in the ESeG project and in conferences and seminars.⁷ The analysis presented here is restricted to occupied workers for whom we have occupational information coded in the ISCO08 classification. The other individuals in the database are projected as supplementary elements of the geometric analysis.

A first task was to reconsider the “quality of life” issue in light of Pierre Bourdieu’s capital theory in conjunction with Sen’s capability approach (Sen 2010), and *within this framework* to study differences between European socio-economic groups. Are the differences between socio-economic categories linked to the differences in living conditions observed in Europe? Are potential “SC effects” on such and such an aspect of living conditions *important*? How do international differences and differences between socio-economic categories interact with each other? What other effects allow us to interpret the differences observed? Are they more, or less, *important*? In this way I address the issue of the “normative” interpretation of the space built, all of which raises certain methodological and theoretical problems, asking for a systematic reflexive perspective on the fuzzy and spontaneous ideas of “well-being” and “happiness.” The quality of life space gives an operational dimension to the multidimensional quality of life idea developed in the Stiglitz/Sen/Fitoussi (SSF) Commission Report (2009). Indeed, the principal

⁵ See Amar 2012.

⁶ See Le Roux and Rouanet 2010.

⁷ In particular, the Eurequa colloquium in Nantes on May 31, 2013, the “Reflexive Quantitativism” seminar at the ENS Cachan on November 15, 2013, the PRINTEMPS laboratory (UVSQ-CNRS) seminar of November 22, an ESS-net ESeG meeting in June 2013, and several meetings at the INSEE. I am grateful to Michel Amar, Monique Meron, and François Gleizes for helping us with the interpretation of my data. I would also like to thank Fanny Bugeja and Cécile Brousse for providing us with the SAS programmes and other studies. Lastly, my work was stimulated by discussions during the ESS-net ESeG project with participating colleagues. Any limits (and errors) in this work are of course my own.

dimensions of GDA can be described as orthogonal two-by-two (non-correlated) *composite indicators*. Incidentally, this conforms to an idea expressed as early as 1973 by Jean-Paul Benzécri (Benzécri 1973).

Once he or she has been situated in the quality of life space, any individual can also be characterised by his or her socio-economic position in one of the three classifications tested. Hence, we will see to what extent these classifications are appropriate for describing differences in the quality of life, leading us “naturally” to the problem of structured data analysis, a GDA extension of variance decomposition analysis (double variance decomposition). I can myself answer the questionnaire and become a point in the multidimensional space, projected onto the first principal dimensions of the cloud. As a professional living and working in France, I am clearly easily situated in the space on the side of relative comfort and stability of the space of quality of life. This consciousness leads to a general comment about the constructed space: It overemphasizes differences in the lower sector of the European social space and amalgamates very different situations at the top. This limitation is important since the space is represented here through a severe change. This methodology allows me to compare the variable of interest (SC) with another variable of interest, namely the country. I chose to focus more specifically on the effect of these two variables and their cross-comparison in order to describe the differences observed at the European level. The aim was to overcome the classical objections about national specificities in terms of social class structure.

Another important aspect of this approach is that I start by reflexively building a European living conditions space (and not, or at least not initially, a national space with which I could then compare the other countries). I therefore have to consider that the distance between individuals’ living conditions must first be defined on the European scale, irrespective of the fact that the widest gaps may turn out to be between the countries rather than between socio-economic classes or categories.

I therefore consciously opted to reject a form of “methodological nationalism” and to reap all the benefits of the existence of a Europe-wide survey, the EU-SILC survey, which, although complex, allows us to build an equivalence space (see Desrosières and Thévenot 2000) on the European scale. This decision to build a European space is relatively problematic when it comes to comparing quality of life elements such as access to healthcare, housing, and so on, in that the social policy institutions and legal frameworks vary greatly from one country to the next, sometimes making the responses to these questions difficult to interpret. I judged that the differences/divergences did not justify rejecting the construction of a European equivalence space out of hand. I also discarded the most problematic questions regarding variations observed between countries.

Of course, this choice is also debatable when it comes to comparing social groups, given the historical differences in the construction and definition of social groups, thus complicating the use of a single classification, the specific ways in which occupational groups are coded in the ISCO08 classification by the different national institutes of statistics. All these factors could justify a decision to conduct “national” rather than immediately “European” analyses.

To begin with, this study links the debate on “social classes” (or social groups) to that pertaining to living conditions, or “quality of life.” The SSF report rightly states the importance of measuring inequalities between “socio-economic groups” in terms of quality of life rather than looking at national averages of the main indicators of well-being (Stiglitz, Sen, and Fitoussi 2009). I can but subscribe to this point of view, in particular against a backdrop of a crisis that has tended to polarise societies, sharpening solidarity issues between groups (fiscal issues, and so on).

One of the difficulties here is the use of a reliable classification of socio-economic groups in Europe, which implies a reflexive analysis on classification schemes. European surveys (LFS, EU-SILC2011) now rely on ISCO08, from which I derived the three prototypes. Naturally, the aim was to assess their “relative performances” as regards the living conditions space. The idea of comparing different coding schemes for occupations/socio-economic categories has become commonplace in current works on cultural practices, where data from different countries are used in different classifications (see, for example, Lebaron and Le Roux 2015). Given that these classifications are not used to build the space, but instead (simplifying things here⁸) as *supplementary variables*, we can compare their respective abilities to account for the differences in living conditions between individuals, conditions which themselves are directly dependent upon the possession of capital (and of “capabilities”). To do so I use the structured data analysis methodology (Le Roux and Rouanet 2010).

My analyses are based on the capital theory (Bourdieu 1979) whereby each individual holds a set of resources of extremely varied natures (that cannot be confined to the monetary unit), expressed in as many possibilities for action or, if you prefer, “rights of access” to various “actions,” possibilities, and so on. Within this framework, the different types of capital are associated with access to different types of resources. Cultural capital is associated with access to cultural goods of various types. Economic capital in various forms (including housing, environment, and so on) affords access to material comfort, including items related to housing and consumer goods. Health, as a physical capital, guarantees the ability to carry out personal, social, physical, and intellectual activities. Lastly, the social and symbolic capital generated

⁸ In fact, they are studied in the cloud of individuals as “structuring factors” (Le Roux and Rouanet 2010).

by employment and labour conditions provides various forms of individual development as well as social pressure.

The three classifications I used correspond to the three prototypes tested as part of the ESS-net ESeG: a variant similar to ISCO08 level 1; a variant in which the group of “unskilled workers” is extended; a variant in which the group of “unskilled workers” is extended further in order to offer a better fit with the ESeC classification (Rose and Harrison 2010).⁹ The comparisons performed must allow us to study the relative suitability of the three classifications, but also to further explore another question, that of the relationships between national affiliation and class affiliation, which will be the central theme running through this report. On this latter aspect, the starting point of my analysis is the idea (assumption) that international differences and class differences combine: The configuration of the living conditions of “classes” – which obviously differs from one country to the next due to a structure or weighting effect (certain social groups are overrepresented in certain countries and, reciprocally, certain countries are overrepresented in certain social groups) – is actually relatively similar from one country to the next once this *structural effect* is removed. This would imply that the meaning of class affiliation is globally identical, or at least similar, from one country to the next. We should therefore find the same pattern of groups, that of the European space, but displaced in the global space according to the average position of the country. Comparisons within each socio-economic category should, reciprocally, allow us to study international differences within each group and to see to what extent we find the general “pattern” of the countries.

4.2.1 Data as a Reflexive Construction

I worked with the EU-SILC 2011 data after removing any “non-eligible” individuals. In EU-SILC, occupation is declared systematically only for economically active individuals who are in work. The databases were combined based on identifiers for households and individuals: for each individual, we have information available both on that person and on their household. I therefore have a sample consisting of 26 countries, as the data for Ireland did not appear in the sample we worked on. Data for Malta were recoded according to the methodology developed at INSEE as part of this project. I limited the survey to self-declared economically active individuals in work in order to compare socio-economic situations directly. As the databases were combined, analysis could be carried out at the individual level. Thus, individuals were within households, which were in turn “located” within their regions, which were themselves within the countries.

⁹ I checked that the distributions achieved by applying the required weighting variable (PB040) matched the distributions obtained in other studies carried out within the project. See the note by Michel Amar cited above.

4.2.2 Active Questions in the Analysis: A Reflexive Construction of the Space of Reference

To build my space of reference (choice of active questions), I focused on five groups of questions or “topics” that were covered in the EU-SILC 2011 survey: economic conditions and social exclusion; working conditions and employment status; housing; material environment and physical safety; health. The 5 headings and 15 active questions selected (with 37 active categories) were decided upon after several tests had been carried out, always with the main criteria being to portray the multidimensional nature of living conditions, and to maintain a balance between the topics selected (as we should remember, this balance is measured based on the total number of active categories).

These five topics represent as many types of capital that can be converted into “capacities”: strictly economic resources, resources associated with the employment situation (hours worked, job security, and organisational context, which is more a kind of “professional” social capital), those associated with housing (which refers to a particular aspect of economic capital, its “physical” characteristics, and the type of tenure), those associated with the social environment (which combines questions on the environment and physical safety and also measures resources linked with the immediate environment), and finally resources associated with health (that is, “physical” capital, partly “biological,” but associated with both cultural capital and economic capital). I would obviously have liked to include indicators relating to cultural, political, and religious practices and “competencies,” to personal and family (non-“professional”) social capital, and to political affiliations, and so on.¹⁰ These are not available in the EU-SILC surveys.¹¹

When compared with the list of dimensions for quality of life in the SSF report, what we have here is a fairly good description of the main dimensions considered to be fundamental. It is perhaps to be regretted that the data focusses very heavily on social exclusion and the major material deprivations, while leaving out other aspects of daily life, which are objectivised by the time they take up, especially concerning cultural habits.

Producing a normative interpretation for each variable – according to the definition of well-being – is not always easy to do: Owning one’s own home in Romania (the vast majority of the population) or in Sweden (where the opposite is true) certainly does not have the same meaning (given the history of housing policy in these two countries, and especially access to private property in the post-communist period). I preferred to confine myself to indicators that were as unambiguous as possible so that a positive description was

¹⁰ In order to produce a multi-level analysis, I could consider completing the database at country level, or at regional level, by adding various socio-economic indicators, or also legal, political, attitude indicators, and so on.

¹¹ They could be added, however, at country or even regional level.

possible before moving on to qualify the main themes and, if necessary, discuss their “normative” meaning. I was also careful not to use too many variables that were obviously very redundant as active variables, and I tried not to overlook any area of living conditions present in the database. Some active variables relate to households (housing, economic situation, environment), others to individuals (job and employment, health).

4.2.3 Space of Living Conditions: Main Dimensions of the European Society

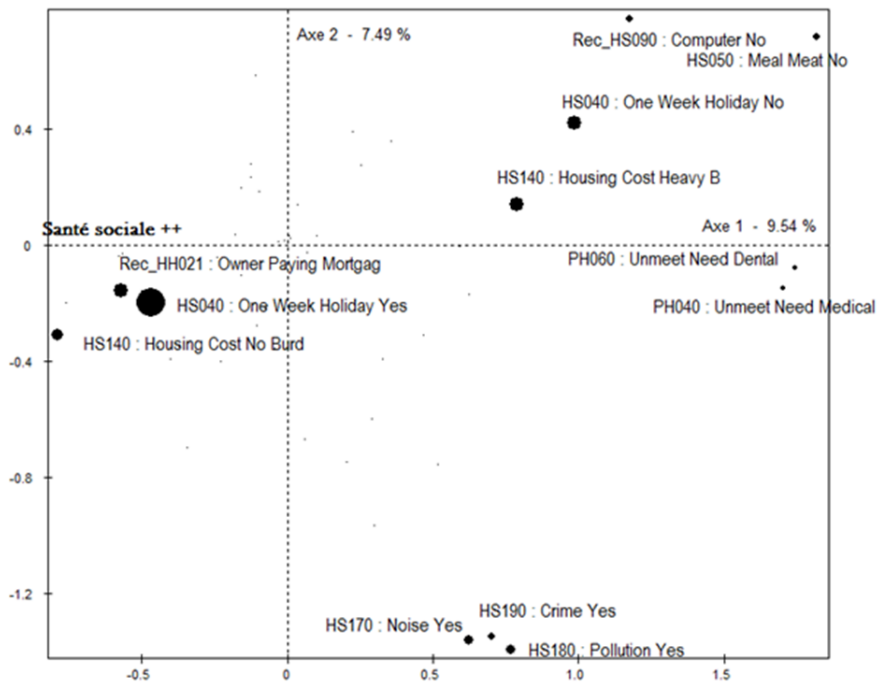
Here, I create a “map” of the living conditions space for the active population in Europe. It acts as a *reference space* in which to compare the different prototypes. For this I used a specific MCA for the n=214,186 individuals in the combined database, without weighting. There are a total of 5 topics, Q=15 questions, and K'=37 active categories. Using the decrease in eigenvalues as a base, we can select 3 axes or 5 axes. I shall first analyse the first three axes. They represent a cumulative modified rate of 68.5% (Table 1).

Table 1 Benzecri’s Modified Rate and Cumulative Modified Rates

Axis	Modified Rate	Cumulative Modified Rates
1	38	38
2	18.6	56.6
3	9.3	65.9
4	6.7	73.6
5	6.1	79.7

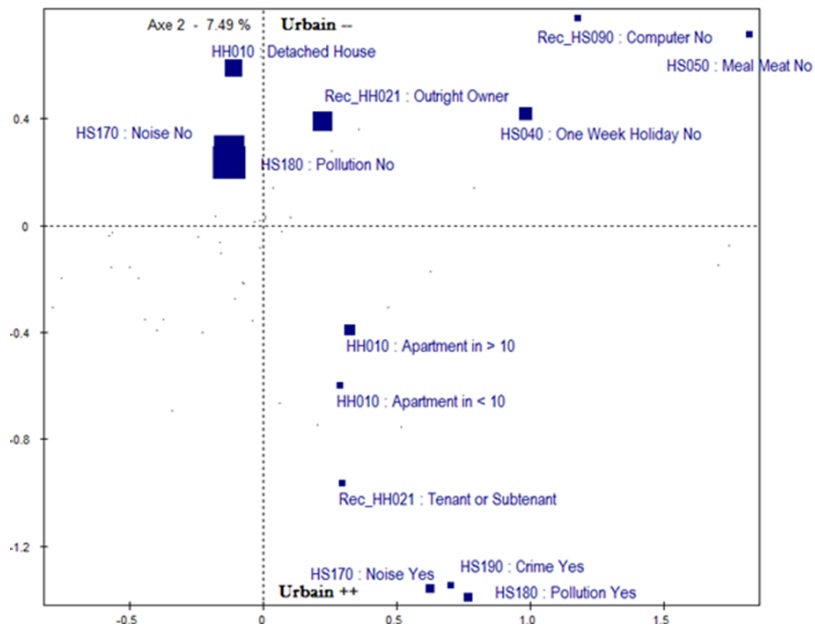
Each axis is interpreted according to the method of contributions to the headings, questions, and categories to the variance of each axis, using the table that shows contributions and coordinates. When considering the contributions of the topics, the first axis is an axis of poverty-exclusion and health. The second axis is defined by environment and housing. The third is based on health, employment-work and housing. To visualise the interpretation of each axis, the graph shows only the most contributory categories on the axis. The markers for each category are proportional to the weight (and hence to their frequency) of the category.

Graph 4 Most Contributing Categories on Axis 1, Represented in Plane 1-2



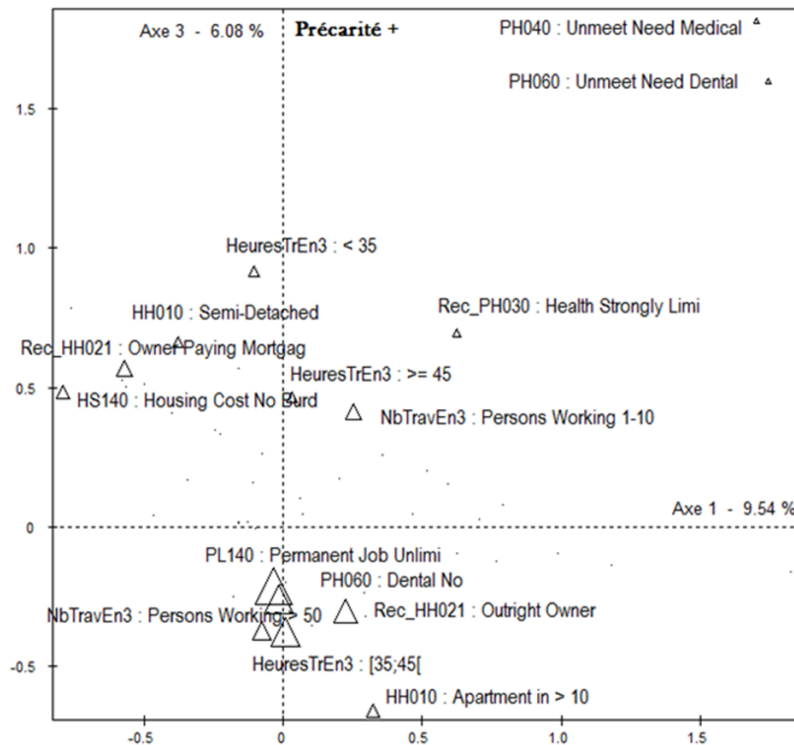
On the left are the categories for “poor social health,” which contrast with those for “good social health” on the right. This first axis thus provides an indicator of “poor social health” overall for individuals. The coordinates of a point can be used as a “general rating” for social health: thus, I have built a composite index of individual social health, which includes information relating to households. This can be calculated up to regional and country level.

Graph 5 Most Contributing Categories on Axis 2, Represented in Plane 1-2



The second axis differentiates two main forms of lifestyle (and of associated “social pathologies,” located on the left on axis 1): collective-urban at the top/individual-rural at the bottom. At the top, we can see the categories both of severe “material deprivation” (no computer, no meal with protein every second day, no holidays) and the categories showing house ownership and relatively well protected housing conditions. Indicators of urban pathologies are concentrated at the bottom (noise, criminality, and pollution) associated with life in apartments and the status of tenant.

Graph 6 Most Contributing Categories on Axis 3, Represented in Plane 1-3

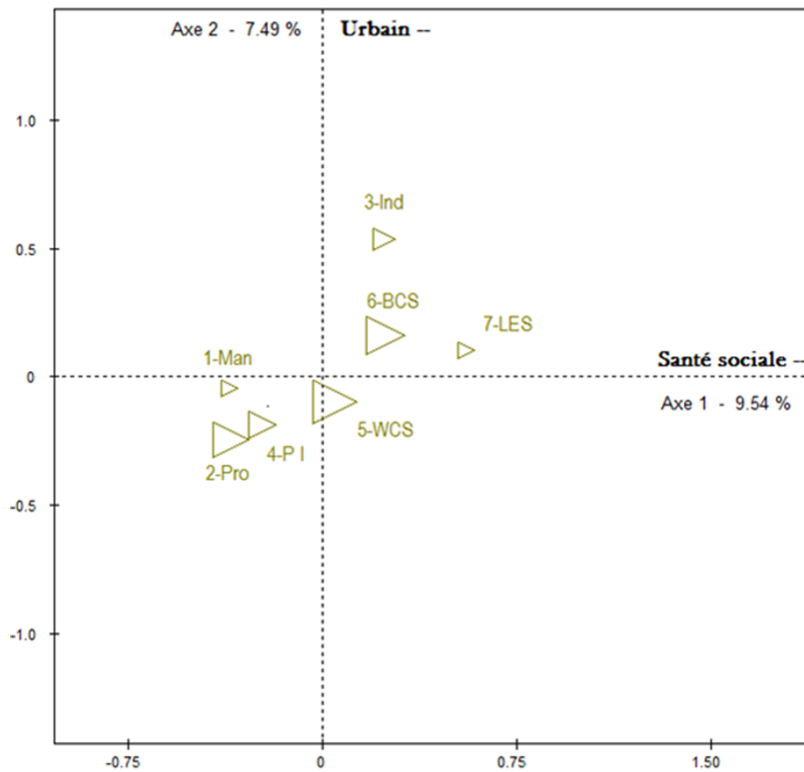


The third axis contrasts categories of “stable” and “typical” salaried jobs (open-ended contract, working hours between 35 and 45 hours, and so on) with atypical categories (less than 35 hours and more than 45 hours). There is also a contrast between an absence of pathology categories at the bottom and several pathology categories at the top, mainly related to health. This axis combines the *typical* wage system and relative “protection,” especially in terms of health.

To sum up, the first axis is associated with level of qualification, income, and various other social integration indicators (including marital situation). It clearly shows the opposition between situations of “severe material deprivation” (on the right) and situations of relative comfort, but also, more generally, unequal levels of social integration. This corresponds to an opposition between countries, which are distributed according to their overall level of “human development.” The second axis is strongly linked to the environment (urban / rural) and highlights the specific features of the agricultural and fishing sector and of certain Eastern European countries: Poland, Romania,

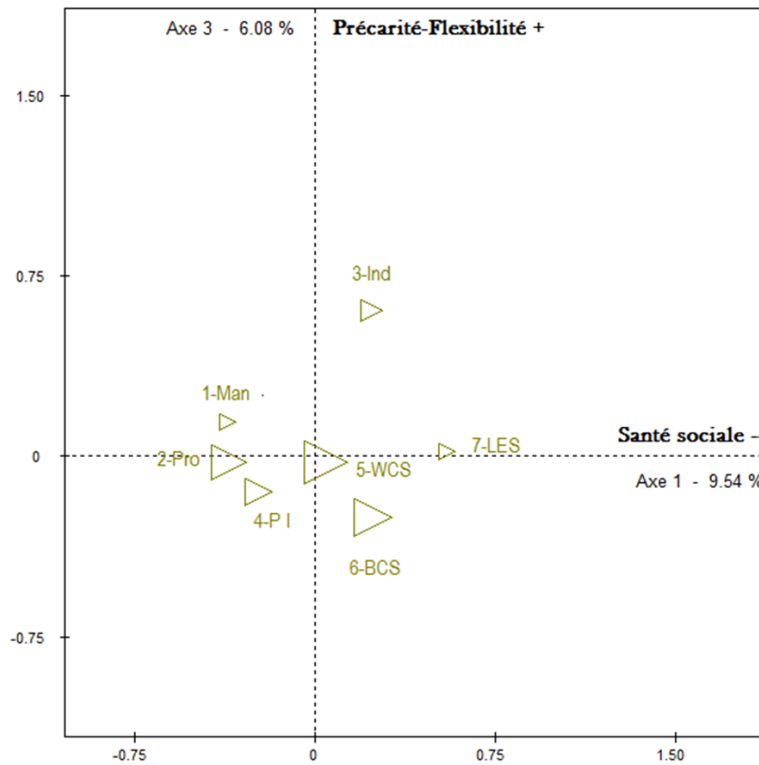
Bulgaria. The third axis contrasts “worlds of production” and degrees of flexibility, especially in working hours (with part-time work). For instance, we see a contrast between sectors that are fairly “public” (education, transport, public administration, energy, health, and so on) and those that tend to be “private,” and which are highly deregulated, informal, or flexible. I exemplify this by studying the first prototype of “social category.” In the cloud of categories there are 7 categories from the P1 (“prototype 1”).

Graph 7 Socioeconomic Categories in Plane 1-2



The separation between category 7 and the others is clear on the first axis: A category in a situation of relatively high social exclusion has been clearly identified. Axis 2 mainly contrasts category 2 (professionals) with category 3 (independents). Axis 3 contrasts category 6 with category 3 and, to a lesser extent, category 1.

Graph 8 Socioeconomic Categories in Plane 1-3



This analysis allows us to build inequality indicators on various axes: we can also directly study the deviation between the chosen categories in terms of coordinates (score of social healthcare) on the chosen axis, that is the numerical difference between the coordinates. On axis 1, the deviation between Professionals and Less qualified (P1) comes to 1.367 standard deviations in Bulgaria against 0.396 in Sweden. The deviation between the two extreme groups for Prototype 1 is between Bulgarian Less qualified and Managers: it is 2.761 standard deviations.

This leads to another “reflexive” comment: the level of inequality is very difficult to assess from one particular position in the social space, hence the need for a multidimensional set of indicators and a permanent critical attitude in regard to the chosen indicators. More generally, my perspective was constantly reflexive and directed to exchanges with more in-depth interview-based or ethnographic investigations of social classes in Europe.

5. Conclusion

I have illustrated my conception of reflexivity, generally defined as a critical attitude at every stage of concrete research practice: the design and process of data collection or choice of data bases in the case of secondary analysis; the decisions to select indicators and variables that will allow the construction of a “reference space,” that is a spatial visualisation of the data, which will allow an in-depth understanding of data structures; the projection of individuals, including the subject of the analysis, in the constructed space, allowing for a concrete assessment of the situation of the analyst; the interpretation of data analysis results by the help of a constant reflexive and critical attitude. I have come to empirical conclusions that are generalizable, provided they are themselves critically and reflexively assessed.

At each stage, reflexivity is an attempt to control potential biases by situating oneself in the object or in relation to the object. This perspective is made systematic by the use of tools, such as questions of potential “conflicts of interests” or investigation of situated viewpoints, and GDA may be seen as a concrete help in this process, through its reference to the object as a (social) space where the subject of analysis can be located, provided this operation is related to potential biased or specific representations of the object.

In this sense, reflexivity can not only be seen as a general qualitative approach, especially an epistemological rhetorical discourse essentially used to magnify an ethnographic perspective; it can *also* be operationalized through technical and even formal procedures while constructing methodically a research object. I have therefore tried to show that geometric data analysis can provide a set of concrete tools in that direction, and therefore have given general and specific arguments and developed examples for this perspective. Finally, I stress that I only see GDA methods as a tool for reflexivity among others, reflexivity being an attitude related to a broader scientific habitus and the related social scientific practices.

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