# Relational methods and space

Frédéric Lebaron (university Paris-Saclay, ENS Paris-Saclay, IDHES, INVENT project)

Summer School Relational Spatial Methods, Berlin 12-15 September 2022

#### Introduction: relational (methods)

- "Thinking in relations" (Bourdieu, referring to Ernst Cassirer, 1910) as a central methodological guideline for social sciences.
- A polysemic notion: "relation" is both a very concrete and potentially very abstract concept.
- Concrete: interpersonal interaction, "personal" relation.
- And abstract: any sort of link between two objects (formal, mathematical).
- The "social" is often understood as based on relations between individuals (see for example Alain Testart, 2021: each type of society ~ a type of formal relation, slavery...).
- Relational methods: all methods taking *relations* as starting points ; one could add that they contribute to *relational sociology* (Emirbayer, 1994).

#### Introduction: space

- A physical concept: three-dimensional, "material". The space in which we live *and perceive* material reality. **Distance**.
- Cognitive science point of view: children develop a representation of physical space, first topological then Euclidean: see Piaget, Inhelder, 1956.
- A metaphorical concept: a major metaphor at the heart of various cognitive processes (Lakoff, Johnson, 1980). Example: time is *spatialized* in all cultures (Lakoff, Nuñez, 2000).





#### Introduction: social space

- The "social" is spontaneously spatialized: top/down, centre/periphery
  oppositions between groups are very general (at least since medieval societies);
  interpersonal relations defined in terms of proximity/distance.
- In politics, since the French Revolution, left *versus* right is a common division of the political *space*. In economic world, ubiquitous opposition between big and small objects (companies, states, etc.).
- Social space: Pitirim Sorokin, Social Mobility. New York: Harper, 1927. Pyramidal.
- Surveys show a variety of representations from one country to another (Hjellbrekke).
- Discrepancy between physical space and social space: Jean-Claude Chamboredon, Madeleine Lemaire, « Proximité spatiale et distance sociale. Les grands ensembles et leur peuplement, Revue française de sociologie, 1970, 11-1 pp. 3-33. (See also « Effets de lieux » in *The Weight of the World*).

SOCIAL and CULTURAL MOBILITY

By Pitirim A. Sorokin





L'organisation sociale féodale en trois ordres



# Introduction: relating space and relational methods

- <u>Question</u>: how to relate spatial and social structures (in both directions)?
- First step: spatial concepts are needed. We have seen that the society is described spatially, usually on a vertical line, as a pyramid, or a sphere, with a centre and a periphery, etc. In parallel, the physical space can be socially interpreted.
- <u>Second element</u>: methods are tools which help organizing the data. To what extent is the spatial representation of the data necessary in this direction? How to construct relevant spatial variables interpretable sociologically?
- <u>Third element</u>: is the spatial representation of the social world useful to qualify and quantify *relations*? Conversely, how to "sociologise" spatial physical variables?
- <u>Example of Geometric Data Analysis</u>: constructing Euclidean multidimensional spaces from a set of variables in order to create a reference-space. Clouds of points (individuals and categories).

# 1. Mapping the social world

 Mapping is one of the major cognitive operations in knowledge production and diffusion: example of the brain, one of the most complex objects.



- Whatever the method used in empirical research, one of the obvious objectives is to map the social world (or its sub-set under study), for example to represent it on a plane or with the help of three-dimensional figures.
- Geographical maps are a very frequent way to represent certain aspects of social reality, like the distribution of wealth, health or votes. "Direct" operation of spatialization: from a representation of the space to a representation of the social structure.
- Multilevel issues: from the very local to the global, with the issue of *boundaries*. (Ex: a border as a political boundary).



Régionales 2004 : comparaison entre le vote FN (1er Tour) et le taux de chomage des régions



Fond de carte copyright Groupe ARTICQUE Solutions 2010 - tous droits réservés

# 1. Mapping the social world

- Relational methods ~ "indirect" spatialization methods
- Geometric Data Analysis: it became a largely diffused practice in the 1970s through the diffusion of graphs. Points and distances in a Euclidean space.
- Social Network Analysis: part of its attractiveness is also to allow showing the object under study from (another) spatial point of view.
   Nodes, ties, distances...
- Other methods: "Galois lattice", visualize connections between objects



#### Two visual relational methods





Figure 15: Clusters de l'ACM spécifique dans le nuage des individus sur le plan factoriel

# <u>Source</u>: Maxence Dutilleul, Master's thesis on the ECB researchers, PSL university, September 2022.

# 2. Qualifying relations

- Relational methods are asked not only to *show* relations but also to *qualify* and *quantify* them by the help of spatial representations or constructions.
- Qualify:
- In SNA, for example to interpret the position of an individual in a network as *central*, which presupposes to define centrality, the (meaningful) distance between two points in the network ; all depending on the type of tie investigated, etc.;
- In GDA, interpret the distance between two points on an Axis presupposes the interpretation of the Axis based on the study of contributing categories (variables): a social relation based on the *statistical* opposition? A dimension = a relation? Symbolic struggle, domination. Needs to be substantiated.

#### From statistical to sociological interpretation

Distance between *i* et *i*' for question q:i choses k, i' choses  $k' \neq k$  $n_k = number of individuals choosing k;$ 

$$d^{2}(i,i') = \frac{1}{\frac{n_{k}}{n}} + \frac{1}{\frac{n_{k'}}{n}}$$

This is a purely statistical relation, which needs to be interpreted sociologically.

# 3. Quantifying relations

- Measuring the "degrees" (again a physical metaphor) or the "size" of a certain object/reality.
- Assessing the intensity of *effects* (experimental concept which can be extended with caution to observational data: never as simple as direct as in experimental designs).
- SNA: density, centrality, etc.
- GDA: importance of axes and importance of effects.
- The case of *supplementary elements* as a central way to assess *effects* (cf. *dependent variable* in a regression model).



The Picardie region in 2008 (study by Lehingue, Lebaron, Delacourt, 2009)

Standard PCA, weighted by population

- Active individuals : 129 "cantons picards" (geographic unities)
- Active variables : % for 42 PCS = socio-occupational groups (1999 census)
- Axis 1:28,4% of overall variance
- Axis 2 : 14,3% of overall variance



Amiens8\_N

0

4

Creil\_S

-4



Amiens6\_S

Facteur 1

Amiens5\_SE

8



Supplementary variables : Votes at presidential elections in 1995, 2002, 2007 4. The example of Geometric Data Analysis in Bourdieu's sociological tradition

- « 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 » (Bourdieu, Preface of *Le métier de sociologue*).
- GDA : a conscious and systematic choice. A critique of the "sociology of variables", forgetting both individuals (*habitus*) and their relations (*spaces* and *fields*). Including for technical reasons: quasi-collinearity.
   Social: a lot of not very strong correlated effects.

# From multidimensionality to geometry

 Structuralism as a theoretical frame in the 1960s. André Weil and Claude Levi-Strauss on kinship relations. Purely formal relations (see also Testard, 2021).



- Genesis of a theory of capital(s): cultural capital, economic capital, social and symbolic capital (all are used and defined in 1971).
- The spatialisation of the social (and the reverse), from *La maison kabyle* to various texts, including an analysis of the left/right political division of the space. The Durkheimian/Maussian legacy. <u>Homology</u>.
- Social capital and SNA: a first import without concretization (beg. 70s).

« L'anatomie du goût », P.Bourdieu and M. de Saint-Martin, Actes de la recherche en Sc. Soc., 1976.

Main elements of the geometric data modelling :

- Individuals X Variables tables.
- Construction of a relevant distance by the choice of active variables.
- The space of individuals as central tool for describing social reality.
- Study of sub-clouds of individuals. **Simultaneous representation**.
- Homology between the space of lifestyles and the space of social positions. Actually one single space.



Fields as sub-spaces

- In the middle of the 1960s, first formulation of the concept of *field* (first article: 1966) in the sense of a sub-space of the social space.
- Theory of fields, 1966, 1971, 1979. A set of constitutive concepts such as autonomy, specific capital (symbolic capital being central), *illusio*.
- The Geometric Data Modelling is a way to combine statistical analysis and the notion of field : « Those who know the principles of MCA will grasp the affinities between this method of mathematical analysis and the thinking in terms of field » (Bourdieu, 2001, p.70).

#### Fields as sub-spaces

- P.Bourdieu and M. de Saint-Martin, « Le patronat », Actes de la rech. Sc. Soc. (1978).
- A systematic investigation of various fields: *Homo Academicus* (1984), field of "grandes écoles" (1989), field of real estate companies (1990), field of publishers (1999)...
- More qualitatively: The Rules of Art and the analysis of *Sentimental Education*, by Flaubert; and the theoretical text "Effets de lieu" in *La misère de monde*.

#### A sociological relational and spatial research program

- Describe the field as a constraining or framing relational structure: an extension of the metaphor of the physical space. **Position**.
- Assess the relations between positions and position-takings strategies, editorial decisions, discourse. Reciprocally, position-takings have a feed-back effect on **positions**.
- Interpret the dynamics of the field, using MCA, Euclidean Clustering (concentration dynamics, forms of competition...) or other relational methods.

#### A sociological relational and spatial research program

- To show the structure of fields
- To assess the relative autonomy of a field
- To study structural homologies between fields
- To study sub-fields inside a global structure
- To study the dynamics of a field
- To assess the importance of field effects
- To substantiate inferential interpretations of effects

GDA and other methods: towards an integrated reflexive methodology

- SNA and GDA: coming back to social capital (beginning of the 70s). Combining both techniques is definitely possible (provided the data allow it) and to some extent desirable. Boltanski, multipositionality, 1973. See Denord, 2015, for an example of integration, from the point of view of GDA, and Dutilleul, 2022.
- Geography and GDA: example of electoral sociology. PCA / cartography. De-naturalise the space. Comparative research on well-being. **Two matrix cases**.

GDA and other methods: towards an integrated reflexive methodology

- Regression techniques and GDA techniques: toward a more integrated use? Dealing with quasi-collinearity, which relates to the ubiquity and heterogeneity (not to say contingency) of social relations.
- Multi-level approach: analysis of variance as a general tool.
- Reflexivity and sense of symbolic issues remain the central methodological line, in the research practice: construction choices as each step of a research.

#### Conclusion

- Spatial-relational methods (cartography, SNA, GDA...) are complementary, and can be used together in an integrative perspective, provided they are used reflexively.
- Social space is a *scientific metaphor* in Lakoff's sense, which does not mean it is arbitrary. Space can be socially qualified.
- From the spatial to the social? We can rely on the ubiquity of *symbolic structures*. The scientific issue is to *relate (by a certain function or relation)* diverse *symbolic structures*, the symbolic structure of the space and the symbolic structure of the society, the group, etc. Example of the brain.