

1 Proximity Relations: Elements for an Analytical Framework

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Introduction

The objective of this paper is to emphasize some main topics concerning the theoretical definition of proximity relations. It focuses on the integration of the spatial variable within a framework of economic analysis in order to reveal the links between industrial and spatial economics. This area of research developed quite late in France compared with other countries, but now involves a growing number of researchers, and is an important part of French economic thought.

This paper describes the analysis of enterprise and space in French regional thought, especially the work of an informal group of about thirty industrial economists. This group focuses on 'Proximity Dynamics', the spatial dimension of enterprise and organization, and carries out collective work aimed at uncovering coherence and consistency in the new economic space approaches. Their point of departure is that space matters in industrial economic analysis. Consequently, the objective of these 'Proximity Economists' is to clarify the role of space as an endogenous variable in economic theory.

This article characterizes the theoretical choices of this research group, which are grounded in the interaction between theoretical discussions and empirical research. There are several common research themes adopted by this group: relations between actors, the institutional dimension, the innovation process, infrastructure, and the territorial problem of the firm. In fact, all of these deal with the causes and effects, positive or negative, of proximity. There are four analytical themes in our research domain. This paper is organized around these domains: geographical proximity versus organizational proximity, the central role of various forms of interaction, economic co-ordination, and theoretical confrontation with other analytical approaches dealing with the same spatial phenomenon.

Geographical proximity versus organizational proximity

Our research does not blindly defend the virtues of proximity. We are aware of the advantages and the dynamism that proximity relations can bring about, but also note that they can be a factor in mistrust or a brake on economic activity. The proximity approach also deals with the consistency of the proximity notion, and we approach the notion as an emerging concept, grounded in the disciplines of the participants in the proximity dynamics research group.

An Open Question

Our discussion of the proximity notion emerged because of its recent utilization in the economics literature, and especially in work dealing with the spatial dimension of economic activity, such as the literature on industrial districts, or technopoles. Moreover, this growing interest in proximity relations concerns research on:

- the innovation processes and the relations between science and industry (Jaffe et al, 1993, Audretsch and Feldman, 1996);
- the producers-users relations as well as the national systems of innovation (Lundvall, 1992, Nelson, 1993) ;
- the question of the area specificities in the frame of the transaction costs economy (Joskow, 1985) ;
- the recent researches within the frame of geographical economy (Fujita and Thisse, 1997).

For us, the proximity concept has both an academic dimension and importance in terms of societal questions like ‘proximity employment’, and ‘proximity banks’. The debate is sharply grounded on the existence of continuous proximity links between actors. This position contradicts the classical hypothesis that globalization implies a vacuum of local relations. Our empirical inquiries contradict the thesis that the growing importance of distant communication leads to decentralized relations (telecommuting as an example), and the disappearance of a local economic dimension. In fact, we have empirical evidence of the opposite, that local associations of various

types continue to be important. As already pointed out by others (e.g., Bellet and Alii, 1993), proximity matters, whether it is considered as a cause or an effect of human activities (Gilly and Torre, 1998).

The Two Proximity Notions

The proximity notion emerges in both economic and social contexts. This notion deals both with the geographic separation of the individual or collective agents endowed with various resources, and with their close position in an economic problem resolution process. Thus, our spatial-industrial problem has two dimensions, one geographic and one organizational.

The organizational proximity is based on two types of logics:

- according to the adherence logic, the actors close in organizational terms belong to the same space of relations (firms, networks,...), that is, they are in interactions of various nature (see after);
- according to the similarity logic, the actors close in organizational terms are quite alike, that is, they have the same reference space and share the same knowledges. In this case, the institutional dimension matters.

Concerning the first logic, adherence depends on the effectiveness of coordination, while in the second case, similarity depends on the closeness of the world representations and functioning modes. These two logics can both be involved. For example, when an adherence relation based on horizontal intra-industrial relations implies the emergence of interdependencies between organizations, characterizing a similarity relation (or institutional proximity) between actors.

While organizational proximity deals with economic separation and relations in terms of the organization of production, geographical proximity deals with the separation in space of relations in terms of distance. Geographical proximity refers to the notion of geonomic space, in the sense of Perroux. That is, it deals with the localization of enterprises and involves the social dimension of economic mechanisms, sometimes called 'functional distance'. In other words, reference to physical and natural constraints in the

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definition of proximity are not sufficient. Geographic proximity also implies some aspects of the social construction. For example, the transport infrastructure, which can modify access time, or the financial means to utilize information technologies.

The articulation of these two main components of proximity (organizational and geographical) brings about and justifies the relevance of the 'Proximity Dynamics' group research. Our research object involves these two types of proximity, because space also matters in relations of an organizational nature. Our empirical studies confirm this analytical position. For example, an industrial district combines the two types in its definition: the enterprises involved in the district are linked both in terms of adherence and similarity. However, these enterprises also have a functional distance between them. When an enterprise looks for specific external know-how, both the surrounding productive environment and the choice of enterprises having the required competencies matters.

Besides these two basic definitions, the proximity concept can be analyzed according to some additional dimensions. For example, the 'circulation dimension' of proximity depends on the characteristics of the market and of the production process (intermediary or final product). Information and people have to circulate implying transport costs and time but also quality, liability, and security. This dimension captures the link between the two types of proximity (organizational and geographical), including the spatial aspect of accessibility, and the organizational aspect of the operation of the flows and their interconnection. Moreover, another dimension, the 'relational dimension', interacts with the circulation dimension because transformation activities and activities concerning individual-individual interaction are distinguished. This last dimension takes into account the relations between individuals (social networks), considered as the basis of organizational relations.

The Central Role of Interaction

The definition of proximity refers to the existence of interactions between economic actors, and also between actors and objects. These interactions have a spatial as well as an organizational nature. This is the very ground of the proximity notion, which refutes exclusive reference to

transport costs as in orthodox analyses. Accordingly, the relation established by Marshall, Young and Becattini between the division of labor and the localization of enterprise is at the heart of our recognition of both the social and economical dimensions.

Various forms of interactions can be distinguished. They can be formal or informal, market or non-market, and they can refer to agent-agent relations (in the adoption and diffusion of innovations for example), or agent-innovation relations (collective innovation activities), or innovation-innovation relations (technological complementarities). These interactions are sometimes distinguished by whether they are intentional (e.g., market exchange, contracts, co-operation, partnership) or unintentional (e.g., because of technological externalities). There is a frontier between these elements depending on the actors' actions (intentional interactions) and elements depending on technical or distance conditions (unintentional interactions). This distinction grounds proximity analysis in the actions of economic actors, while also including factors such as the existence of non-rival goods, environmental factors, or diversity.

Unintentional Interactions

We refer here to a very old tradition originated in the works of Marshall and Hoover having to do with the regional analysis of agglomeration economies. The notion of externalities behind this analysis is also addressed in recent economic literature. A set of interactions including both the spatial and industrial dimensions is highlighted by this notion. Moreover, this notion, added to the two types of proximity, highlights the process of development and agglomeration at the local level.

According to the debate on externality, two tightly linked dimensions can be identified. These two dimensions concern either market relations or non-market relations. Technological externalities, external to the firm but internal to the industry, are non-market interdependencies. Numerous studies can be found in the literature dealing with spatial and regional economic problems, and especially their inter-sectoral dimension. The path dependence property is a key factor in this literature. This property reveals that agglomeration and localization factors result from the external effects between firms, and can quickly have an irreversible dimension within a given territory. In these conditions, the success of the adoption of a specific

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trajectory (right or not) depends on an assay-error process rather than on the intrinsic superiority of the selected technological scheme. For example, when firms settle down within a production area in order to take advantage of local external effects, the path dependence constraint can prevent them from reaching their objective.

Paradoxically, according to recent research carried out by some economic geographers, financial externalities can be taken into account in the analysis of transport costs. In fact, they refer to market relations, and especially to price effects, which are more tangible than non-market externalities. This is interesting in the frame of our analysis because it reveals the polarization capacity of large enterprises or groups of enterprises at the local level. These enterprises have traditional relations like buying, selling, subcontracting, or else a relation between the production of the firm and consumption by employees.

Intentional Interactions

This aspect concerns the basis of agents' action, whether individual or collective. First, the frequency of the interactions is a dynamic factor contrasting with the static aspect of firms' localization motives. The evolution of the system, the attraction/repulsion processes between agents, organizations and activities depend on the density and the length of the interactions. The density of interactions implies the number of interactions, but also their duration, and their degree of transitivity. The density level changes through time. It is a proximity indicator concerning organizational proximity, spatial proximity, or both. The analogy with some of the technological innovation process analysis (especially in the work of Rosenberg) is quite noticeable. These analyses consider that the existence of tight interactions is a key to identifying the proximity links between actors. Consequently, we can say that geographical proximity is associated with tight interactions. However, as Granovetter demonstrated, there is a high value for unique information even in the case of low interaction. Consequently, if density is a proximity indicator, it also reveals the limits of proximity in the case of its exclusive utilization.

Concerning the intentional interaction schemes structured by agents' strategies, our approach focuses on those that imply some

relationship with other partners, but not competition or threats. They can be relations of co-operation, confidence, technical exchange of information, partnership, etc. Some of them are only grounded on a relational basis (for example the confidence of ones neighbors), but some can also ensure the neutrality of a third partner in an economic activity. The relations on whom we focus have a productive or organizational dimension because the firms, their strategies, and their environment are concerned.

The interactive natures of proximity as well as the density of the interactions are involved in our analyses when we examine co-operative relations, partnership relations, and the exchange of technological know-how. These phenomena are based on an iterative process, which implies not only the limited rationality of actors but also the cognitive dimension and the specific characteristic of knowledge. The difference between information and knowledge (tacit and codified) introduced by Polanyi and Machlup, and then summarized by Nonaka (1994), is involved in the analysis of innovation and its relationship with a territory. This difference has two consequences.

First, it reveals that information refers to the capacity of emission, circulation and reception of messages flows, whereas knowledge refers to individual actions that begin a process of comprehension of the information received, and implying that learning takes place. In this frame, the difference between tacit and codified knowledge leads to a distinction between knowledge that can be communicated in a formal way, and knowledge which cannot because it is difficult to formalize. Tacit knowledge is involved in the exchange of information, but it cannot be exchanged in a market.

Second, it reveals the importance of learning processes, which can take various forms according to the literature (e.g., practising, using, etc.). Because of their interactive character, these processes concern both the individual and groups of individuals, whether inside the firm (between departments) or outside (social networks). They are at the core of innovation processes, defined as processes of new knowledge creation or as processes of existing knowledge combined in a new way. In the frame of an adapted organizational and institutional context, geographical proximity implies cognitive interactions. Thus, the innovation process analysis is the result of complex and changing relations between organizational proximity (conceived of as the adoption of behavior norms, social rules) and geographical proximity.

Space and Time

All of these analytical positions are relevant for proximity analysis. They contradict the hypothesis that relations involving tacit knowledge imply a geographical proximity, while the relations based on codified knowledge can cope with distance. Such a suggestion is grounded on a limited conception of the relationship between proximity/distance, and ignores:

- the frequent cohabitation between tacit and codified knowledges within enterprises or networks;
- the time factor in the proximity effects (the various stages as appropriation, learning, decodification, recodification of the information);
- the successive steps of the process of acquisition and transfer of know-how which concern more the tacit knowledges or those which concern more the codified knowledges.

Proximity and economic co-ordination

These various elements (and particularly the enlarged conception of interaction including the spatial dimension) lead to a renewal of co-ordination problem analysis, involving proximity relations. Our approach is close to that of other authors who take into account the localization aspects, or at introduce space into orthodox economic analysis. However, our approach is different in the sense that it is not only based on the price co-ordination system. It also:

- in introducing off-prices co-ordination elements, but various external effects, in the relations of agents;
- in taking into account the collective action phenomena and particularly the groups behavior;
- in pointing out the often essential role of institutions.

The objective is to describe a situated agent, being both 'here' and 'somewhere else'. Here because of its localization within a geographic and an economic space, and somewhere else because the agent interacts with other economic entities. A relevant case of this approach to co-ordination is the construction of a specific and territorialized resource, that is a resource tightly linked to its organizational and institutional context. Neither available, nor reproducible somewhere else, this resource is the result of local co-ordination of actors and of the role played by 'external constraints' (either economic or legal). Such local co-ordination is based on the three dimensions discussed above. It can only emerge when there is a similarity between the actors, and when there is an agreement on a common system of collective representations often built partly by formal institutions.

Non Market Co-ordination

In our approach co-ordination between actors goes beyond the information given by the prices. This co-ordination can be appreciated at two levels:

- a set of other modalities of co-ordination exist beside the interaction based on the prices: co-operation relations, **trust** relations, technological interaction relations, ... This position is close to the game theory postulate concerning the 'direct' communication (as called by Kirman) rather than the communication based on the prices;
- the reference to the information notion appears too restrictive (see above). The various co-ordination forms depend, in the analysis we suggest, on the cognitive dimension. Therefore, there is an impact on our analysis on proximity relations implying directly the spatial dimension (see the scheme of the interaction between the geographical proximity and the organizational proximity).

In this frame, the relations between actors, technological transfers, and the co-operation between actors are analyzed in their spatial dimension. This

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analysis appears especially relevant when there is a dilemma between spatial competition and proximity localization of the enterprises. This problem is one of key debate in the literature about space and industry. Is it more attractive for a firm to be localized far from other firms in the sector in order to take advantage of monopolistic power resulting from transports costs, or is it more attractive for a firm to be localized in geographic proximity to other firms in order to take advantage of the externalities generated by knowledge, information and technology transfers?

This question leads to the issue of enterprise nomadism and territorial implementation. To avoid the contradiction implied in this issue, the idea of 'productive meeting' between a firm and its territory is introduced. This implies a common process of learning and construction of specific territorialized resources (see above). This firm-territory dialectic occurs at the intersection of geographical proximity and organizational proximity. This leads to the emergence of an interaction dynamic, characterizing the firm and its territory. This point of view on the problem of complex relations between firm and territory stands in contrast to the orthodox position, which postulates the anteriority of productive questions on spatial questions. We instead postulate that the productive and spatial components are tightly associated.

Collective Action

The standard Walrassian model is also questioned in our analysis of collective action forms. In identifying spatial inequality, the difference between the individual level and the social order can be pointed out. All individuals or enterprises are in various positions concerning geographic proximity as it is revealed by the two following examples: the handicaps of the isolated subscriber of a network, or the handicaps of outlying areas. But these actors can take advantage of the spatial dimension in carrying out collective actions. These behaviors question the relation between the micro- and the macro-levels. At least, those relations involving agents that have not only individual logics (even if their environment influences them), but also group strategies. These approaches partly refer to the work of Hayek (and especially his notion of 'yellow brick road'), to the work of Schelling pointing out that the behaviors are often based on imitation, and to the work of Kirman (1996) on the mimetic evolutions.

These works suggest three main ways to analyze the emergence of local dynamics in local systems of production and also the emergence of collective action:

- the notion of situated networks of actors is used to analyze the local functioning of producers. The network functioning avoid the possible isolation, make easier the transmission of informations and learnings, and define in a collective way the common norms and rules concerning the products properties or the knowledges exchange;
- the **trust** relations and/or the co-operation relations are used to study the systems organised by not formalised norms, in which the emergence endogenous dynamics are not formalised by explicit common rules. The processes of local interactions are analyzed by the evolutionary game theory, the genetic algorithms or the neuronal network modelizations. These approaches demonstrate the importance of recurring actions between neighbours, as well as the quickness of opinions or behaviours diffusion within small groups weakly connected;
- the local systems endowed with explicit common rules (like OCA or POI¹), changing through time. In this case, the local actors agree on a set of common rules excluding other agents of the system. The struggle for power within these systems, as well as the problem of rules interpretation can lead to the instability of the system.

The analysis of situated agents according to the diptych of organizational/geographical proximity leads to a conception of non-deterministic micro-macro relations. Collective action is embedded in historic economic structures and social institutions. However, individual or collective actors are always able, when there is a crisis, to collectively transform the existing macro-structures. This approach leads us to analyze intermediary socio-economic spaces where the structural forms (inherited from the past) and the collective action of situated agents (anticipating the

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future) are articulated and regulated in the resolution of a productive problem. The territory is then a specifically constructed intermediary space. It is the result of the interactions between local actors, and between local actors and non-local actors (e.g., firms, unions, syndicates, banks, the State). In this complex dynamic of interactions, the key actors are those who play a mediation/hybridization role between the local level and the global level, taking part in the adaptation process between geographical proximity and organizational proximity.

Such an approach was developed in the analysis of the spatial dynamic in industrial models, which accept that technical, organizational and social systems are coherent and adapted to their environment. In these models, the emergent phase involves a process of organizational and institutional learning implying geographical proximity. Their diffusion into new spaces needs a hybridization process that ensures compatibility with the existing practices within these spaces.

The Role of Institutions

A third argument takes into account space and proximity notions in the analysis of co-ordination, and the role of institutions in co-ordination. This is the domain of the governance of territories. We have already pointed out the influence of institutional processes, whether the institutions are formal or not. In this approach, the territory is defined as a process of recovering organizational and geographical proximity. If a territory exists because of its capacity to resolve a productive problem with localized collective action, then a common vision of local actors is necessary. This vision demonstrates the institutional dynamic and specifically territorial governance, variously defined as contractual co-ordination (Williamson, 1985), legal-political co-ordination (Kooiman, 1993), or as social co-ordination (Granovetter, 1973).

Our concept of governance implies productive and institutional mechanisms, both in the local dimension (geographical proximity versus organizational proximity) and in the local-global dimension (local institutional proximity versus global institutional proximity). Territorial governance constitutes a process of recovering and hybridizing institutional proximities. As a result, there is an 'alliage' (in the sense of Dumont) of various representation systems. This 'alliage' reveals and

activates the productive potential of geographical and organizational proximity. In other words, the territory is built on the interstice of the two proximities leading to the emergence of localized productive regularities.

This notion of territorial governance is not only an endogenous process. It also involves the relations between formal and informal local institutions and global institutional forms. In this frame, there is neither determinism in terms of micro-economic behaviors issued by the macro-structures, nor the emergence of a spontaneous order issued by individual agents behaving in a structureless world. In fact, governance is characterized by local-global mediation that ensures diffusion (from the global to the local) when the economy is stable, or emergent principles (from the local to the global) in case of crisis. Lastly, we emphasize the important role of formal institutions, and especially territorial collectivities, which influence the behavior of agents, and the viability of territorial governance. Institutional density is a characteristic of territorial governance, in terms of interactions between institutions, contributing to the territorial dynamic in complement with organizational density.

We recommend analyzing the co-ordination modalities of actors on this basis. Our approach refers to the spatial variable and to the situated agent, depending on its productive and relational environment as well as on the spatial interactions and neighborhood. Space and time are then both questioned. Any analysis of co-ordination denying the unique role of market prices is confronted by the inheritance of the past as well as the limited capacity to predict the future. For example, technology exchanges within a localized network depend on the inherited past relations which specify interactions forms and the acceptance of some rules, as well as on the willingness to conceive a common future within a group in the frame of an identified territory.

The Proximities - Theoretical Confrontations

The research carried out by the proximity dynamics group is part of the renewal of French regional thought, and also a wider worldwide research movement. This has two specificities:

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- First, we refer to the various works between the industrial economy and the spatial economy. These analysis lead to a collective book concerning the technological phenomena (Rallet and Torre, 1995).
- Second, we refer to the domain of geographic economy, and then to the renewal of the traditional spatial approaches, especially on the indivisibilities and the **increasing** returns.

If our approach comes along these debates, it also appears important to confront our acception of industrial and spatial phenomena with other researches carried out in the human sciences domain.

The various research domains Our research domain concerns the interface between the space economy and the industrial economy (including the analysis of innovation processes). Various related theoretical domains have been examined. For example, game theory, the French ‘conventions’ approach, innovation theories, French regulation school analysis, and research on industrial districts. The key points for comparison are the:

- the analysis of the competitive conditions at the local level;
- the involvement of externalities in the analysis of proximity effects;
- the innovation and technological change dimensions;
- the relations between the firms localization and the spatial division of work;
- the competition between territories;
- the organization between local institutions and global institutional forms;
- the correspondence between territorial and industrial organization forms.

Our research focuses on these themes in order to analyze the link between the problem of localization on one side and the problems of production, competition, innovation, organization and institutions on the other side.

Moreover, there is the recent confrontation with economic geography. This analytical domain concerns the spatial dimension in economic analysis, focusing on agglomeration problems, proximity, increasing returns,

externalities (financial or technological), and even social determiners. In comparison, our approach is not grounded in a paradigm that only considers price co-ordination. Lastly, we agree on the importance of historical reference, on the multi-disciplinary approach taken by some of economic geographers, and on the willingness to analyze productive or urban problems according to spatial condition constraints.

The confrontation Interdisciplinary confrontations are today crucial in debates over economic science because they bring about new questions and problems. The research domains concerned are mainly Legal Science, Sociology, Geography, and Mathematics:

- in the Legal Science domain, the main questions concern the property, the regulation, the public actions, the rules determination, the infrastructure management;
- the Sociology is one of our main source of confrontation, concerning especially the relations between individuals, the actors strategies, the analyse of groups, or the relations between the science and the technique;
- the researches carried out in Geography concerning the conception of the space, the territorial representations or the physical networks;
- the mathematical aspect concerns mainly the formalization of the connexity relations and the spatial interaction phenomena.

These various confrontations are either involved in economic analysis or take a trans-disciplinary form. They can both deepen previous analysis and suggest new questions. Some of these domains undoubtedly hold additional material for us, for example, with respect to questions about notions of space and time, or questions about the role of institutions in the definition of local policies (especially technology policy). Our ambition is to launch research programs on broader societal questions, for example employment issues, furthering application of the proximity notion.

Conclusions

The objective of this chapter was to describe the theoretical background of the proximity notion in the work of the French school of proximity dynamics. Four main results were pointed out. The first and main result is related to the definition of geographical and organizational proximity. It was demonstrated that organizational proximity is based on two main logics, which are similarity and adherence (economic actors being involved in an organizational proximity relation when they belong to the same relational framework or when they share the same common knowledge and capacities). It was also demonstrated that geographical proximity deals with the spatial separation between economic actors (in reference to physical factors but also to social constructions such as transport infrastructures or telecommunication technologies).

Second, we stressed the central role played by various interactions, both between actors and of a technical nature, based on spatial or organizational relations. These informal and formal interactions are differentiated, and include the voluntary character of the relation.

Third, we developed the role played by co-ordination problems in the analysis of proximity relations. Three main points are underlined. The non-market co-ordination between economic agents, the collective action processes (groups and networks behaviors), and the essential role played by local and non-local institutions in the spatial dimension of the economic process.

Fourth, we drew a comparison with similar research performed by various researchers belonging to parallel or closely related schools of thought. Most of these works are in the frame either of regional science or the (re)birth of economic geography. A long research agenda still remains in the domain of proximity analysis, concerning local public policy, employment, and the city. All of these themes have high research potential.

Notes

- 1 Original Controlled Appellations and Protected Original Indications, including the local producers in order to protect the products quality of the territory.

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