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Localised learning

Why are inter-firm learning patterns institutionalised within particular localities?

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Abstract

In this speculative paper, it is argued that learning is an evolutionary process, operating at the level of the individual, the firm, and organised markets. Why these latter may be localised is investigated. Learning as such is depicted as an interactive process of reproducing and/or creating knowledge through communication, and learning patterns are seen as institutionalised in different contexts. Different possible such contexts are discussed, and industrial districts are proposed as relevant. Patterns of inter-firm learning may evolve and become institutionalised in an industrial district, because two important spatial properties of localisation - proximity and coherence - are combined here. As a result, some industrial districts possess higher-order capabilities with respect to localised inter-firm learning.

Key words

Organisational learning; institutional learning; culture; innovation systems; economic geography; information cost; communication; proximity; industrial districts

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Introduction

This paper seeks - by means of theoretical speculation - to contribute to an answer to the question:

Why does interactive (inter-firm) learning in certain cases seem to be localised, i.e. institutionalised within particular localities?

All the problems with an eclectic approach withstanding¹, the paper manoeuvres within and in between the economics of organisation² and economic geography. It has a evolutionary ring, because its first main interest is learning, because it propose learning patterns which evolve over time, and because it emphasises cumulative causation. Unlike much evolutionary economics, however, focus is not on "hard" (market) selection, rather on the cognitive aspects of information cost and communication. These aspects are discussed in a spatial perspective - the second main interest of the paper.

The paper is structured as follows: In section 1, selected aspects of the process of learning and how it is constituted are highlighted. Different contexts for institutionalisation of learning patterns are proposed. Interactive (inter-firm) learning is paid special attention. In section 2, the importance of a spatial perspective when trying to theoretically grasp such contexts is proposed. Two spatial properties of "localities" are outlined. In section 3, an explanation is proposed of how localities may become a frame for cumulative learning. The two spatial properties of localities are related to the process of learning, and the localised institutionalisation of patterns of interactive learning is sketched out.

¹ For contributions on the possible fruitfulness of - and the certain difficulties in - unifying themes within economics and economic sociology, see Granovetter (1985)(a sociologist's view), and Foss (1997)(an economist's view).

² By "economics of organisation", I mean the broad range of work on how co-ordination is achieved under different organisational regimes - spanning from hierarchical to market forms. Whereas a dominant body of literature focuses on incentives and contracts, I emphasise the growing number of works focusing on information, knowledge and competencies.

1. Learning

In this section, the process of learning - reproduction and creation of knowledge - will be outlined. Rather than taking a mainstream (i.e. strategic) view on organisational learning, an evolutionary perspective will be utilised to focus on particular aspects of the learning process. This perspective makes it possible to understand how patterns of learning are institutionalised. First, a few words to define the meaning of the basic notions *information* and *knowledge*.

1.1. The role of information and knowledge

Information

The notion of *information* (“signals” or “observations”) has for long played a significant - albeit problematical - role in economics and economics of organisation, and has further gained in importance over the years. Seeking to sophisticate neo-classical assumptions, e.g. Akerlof (1970) and Arrow (1962; 1973; 1974) have emphasised *uncertainty*: That information is scarce, sometimes absent, and where present, often asymmetrically distributed between agents and firms³. In more recent views of competition, acquisition of information is to a growing degree regarded as a value-adding process (Machlup 1962), as both production processes and products are taken to become increasingly information-intensive. In addition, information itself has arguably been turned into a commodity by particular service-providing firms (Boisot 1995). It may be argued that even if economists have become increasingly aware of the importance of information, a basic problem of developing methods of understanding the pricing of it (Arrow 1962) persists. Similarly, the growing recognition of the importance of information to economic processes in general⁴ is not reflected in the development of tools that allow economists to internalise it into analyses (Boisot 1995).

Knowledge

Albeit in much literature, the two concepts have often been confused, the way “*knowledge*” is presently being used in literature⁵ implies some qualitatively different characteristics than the more classic term “*information*”. Usually, it is viewed as more *aggregated* than information (making up an aggregation of information), more *stable* over time (institutionalised), and strongly *context-dependent*. To avoid confusion, I shall consistently use the term “*information*” about signals or observations, and refer to the process of sharing such information between agents as “*communication*”. “*Knowledge*” will be used

³ When information is extremely scarce or absent, information problems are not distribution problems: All agents are faced by the same ‘real’ uncertainty.

⁴ This recognition was spurred by e.g. Hayek (1937) and Richardson (1960).

⁵ Although the use of the term naturally mostly is highly ambiguous.

about institutionalised and aggregated information that may not be communicated as such.

A growing number of writers within non-mainstream economics⁶ (especially economics of organisation) assume that a *knowledge base* underlies organisation in a broad sense, and argue that research into the origin, development, and functional and cognitive effects of such knowledge is a viable way ahead for economics. The basic assumption can be traced back to classical economics and sociology. It is now being brought back into economics by eclectics drawing upon work within organisational and behavioural studies (e.g. Cyert and March 1963; March and Simon 1958; March 1988) and works of philosophers (e.g. Polanyi 1966; Popper 1972) or social psychologists (e.g. Berger and Luckmann 1966; Blumer 1969). It is today most prominent within the growing field drawing upon evolutionary and resource-based perspectives. Within the economics of organisation, it is frequently argued that knowledge like information has turned into a commodity, and knowledge-creation (see e.g. Nonaka 1994; 1995) has become a key aspect in newer views on the nature of the firm.

1.2. Information exchange and knowledge (re-) production

Learning involves handling and processing of information and aggregation of it into knowledge (Boisot 1995)⁷. I shall deal with aspects of information handling first.

Information may be closely related to empirical events, but information signals as such are constituted only through human observation and interpretation of these events. This happens with the aid of a cognitive frame. Research within cognitive psychology or sociology of knowledge (e.g. Berger & Luckmann 1966; Blumer 1969) supports the observation that individuals need some cognitive structures to make sense of the world around them. It may be argued with Kant (see Popper 1972) that "synthetic" information⁸ cannot be derived without the foundation of a priori knowledge structures. Information may derive from knowledge itself, actually, as it may be representations (albeit fragmentary) of knowledge. Thus, *creation* of information signals is strongly dependent on already existing knowledge, because it may be created from knowledge, and because knowledge functions as an institution relative to it, a cognitive framework for *understanding* and *utilisation* of it.

Knowledge (re-) production

⁶ By "mainstream economics" is meant the orthodox neoclassical tradition dominant within economics since the Second World War.

⁷ Boisot describes the process of individual information handling or *processing* as *codification* and *abstractation* (*generalisation*). I do not utilise these terms similarly.

⁸ Kant used the term "knowledge" for what I refer to as "information".

When information is created, understood, and utilised, it may be aggregated into knowledge. This, being a highly complex process, is often described as depending on continuous practice, "learning-by-doing". "Doing", in this respect is usually described as "trial and error" (Garud & Van de Ven 1992) or, quite similarly, learning by "doing, using, and failing" (Maidique & Zirger 1985)⁹. However the learning process is conducted, its result may be of more or less radical nature. First, learning may simply mean *reproduction* and/or augmentation of existing knowledge. This can be called "first order" learning or "exploitation" (March 1991), when individuals learn to "do things better". Knowledge needs reproduction: What is not utilised, may to some degree be "forgotten" (Johnson 1992). Knowledge is, as Hirschmann (1984) argues, a resource that grows with use and which may fade away if not used. Using knowledge implies continuously referring it to other knowledge. As information signals is the only thing that can be exchanged between individuals, reproduction of the knowledge of an individual depends on him exchanging information with his environment, e.g. with other individuals.

Second, learning may mean production of totally *new* knowledge, sometimes on the expense of old (which is "creatively destroyed"). This is what is called "second-order" learning or "exploration", "doing new things" or even "learning how to learn". Communication is, similarly, a necessity for production of knowledge.

1.3. The evolution of learning patterns

Because learning of knowledge is dependent on information, and creation, understanding, and utilisation of information depends on knowledge that has already been learned, it can be described as a *cumulative* (co-evolutionary) process, where learning rests upon the institutionalised *knowledge base* - a result of earlier learning processes - and where the existing knowledge base is continuously learned and transformed over time through communication¹⁰. I shall argue that the result of such a process is *context-dependent learning patterns* where knowledge bases, patterns of communication between actors, and the following reproduction and/or creation of knowledge evolves.

What are the contexts in which learning patterns evolve? The evolution of such contexts depends on the degree to which learning is *interactive*. From the

⁹ This perspective of learning contrasts to earlier theories of management, because learning basically is seen as non-planned (Langlois 1995; Weick 1979). The perspective of learning has had a huge impact, and has been frequently used in a growing amount of work on strategic management and business culture. Here, prescripts of how best to learn are frequently given. The good advice is in serious danger of being muddled, however, by the growing confusion of what the term "learning" really means.

¹⁰ Thus, communication can be seen as an important ingredient in an evolutionary explanation "of the functional mold" for both consistency and change of knowledge (Ullmann-Margalit 1978).

definition of learning follows that communication (information flux) between an individual "learner" and his environment is of great importance for both reproduction and creation of knowledge. The contexts in which learning patterns are institutionalised are therefore the contexts in which people (or other social actors, such as firms) interact the most. The contexts for learning are also the institutional contexts that best allow communication (information exchange and knowledge (re-) production) between the interacting actors or firms. I shall return to the communication problem in section 3. In the following, I shall merely outline the contexts for learning that have been focused upon in research.

Individual learning

As a result of cumulative processes of interactive learning, learning patterns may arise in the micro-level context of the *individual*. They can be traced in the - admittedly varying - "fit" between the reasoning and actions of individual actors and the environment in which they operate. For an individual, the knowledge base of the language he speaks, his education, training, and socialisation is used when making sense of the information he receives, and for communicating with other actors. At the same time, however, he learns and changes this knowledge base, albeit slowly, by interacting with others.

Firm-level learning

In the economics organisation, several possible contexts have been proposed in which patterns of *organisational* learning (see e.g. March 1991) may be institutionalised. In the resource-based perspective, an appropriate institutional set-up for knowledge accumulation is that of a *firm*. In this perspective, an explanation for the existence of firms should not be found solely in the lowering of transaction costs (Coase 1937; Williamson 1975)¹¹. The perspective draws on Penrose (1959), but also on e.g. Arrow (1962; 1973; 1974) in emphasising the capabilities of firms to accumulate knowledge. Interaction between actors within the firm - and thus communication - is crucial for the accumulation process.

By analogy to individual learning, some of the knowledge that resides in firms functions as a cognitive frame for interpretation and utilisation of the information signals that are transferred to - and within - firms. The notion of routines (Nelson & Winter 1982) may be used to describe the existing knowledge base for further learning. Routines is knowledge built through trial-

¹¹ That the function of institutions is minimisation of transaction costs is a basic assumption within the so-called "new institutional economics" (which should not be confused with "new" work within the perspectives of the "old" institutionalism. See Hodgson (1988)). While Williamson emphasises transaction costs, the original work of Coase includes a much broader range of functions of the firm as an institutional set-up. The role of the entrepreneur as a knower and a processor of information is a central observation in the article. See also Casson (1997).

and-error learning of how problems were best solved so far. Firms base further actions on this knowledge¹². Thus, the relatively stable knowledge base that is contained in routines constitutes an institution of cognitive nature (DiMaggio & Powell 1983): It defines the problems that should be solved and how to solve them, and make up an institutional framework for communicating.

Learning in markets

Creation of the knowledge that is contained within firms depends heavily on their interactions with other firms. Communication takes place between actors across boundaries of firms, and stimulate *inter-firm* interactive learning (Lundvall 1985). The ability of a group or population of firms to learn interactively is an important example of what may be called "higher-order capabilities" (Foss 1996): Resources that are collectively produced and utilised by a number of firms. A possible context in which constitutions of interactive learning are institutionalised could be that of the traditional alternative to the set-up of the firm: Competition and trade in the *market*. In spite of the high number of interactions between buyers and sellers on the market, it must, however, be seen as having only limited ability to propagate communication (Simon & March 1958; Lundvall 1985)¹³. Thus, the context of the pure market possesses few higher-order capabilities with respect to learning. However, as North & Thomas (1973) argue¹⁴, "institutional environments", such as the legal frameworks, norms, or culture of society, supplement "institutional arrangements" such as firms. Within such advanced institutional frameworks, interaction between firms may be much more complex - and co-operative - than on the pure market (which should be seen mostly as a thought construct of neoclassical economists). The capabilities of real (and imperfect) markets for processing information and propagate interactive learning are much larger.

Learning in organised markets

Not all such "organised markets" (or "disintegrated organisations", depending on perspective) possess similar higher-order capabilities with respect to learning. Much research within the institutional or historical realm of economics has sought to uncover the ability of different institutional environments to distribute information between actors, lead to knowledge building, and hence serve as contexts for institutionalisation of learning patterns. Lundvall (1992) emphasises *the nation state* as an institutional framework for learning, because of its homogeneity with respect to culture (including language), technical and educational institutions, and historically built relations between actors and firms. Other research that emphasises such relations include studies of *national*

¹² By acting according to the knowledge comprised in routines, they avoid being deadlocked in an attempt to achieve all the information they need to act "rationally" (March & Simon 1958). On decision-making on the basis of information alone, see Marschak (1974).

¹³ This point of view contrasts to that of Hayek (1937).

¹⁴ In the spirit of Veblen (1919).

business systems (Whitley 1992; Whitley & Kristensen 1996) "*industrial clusters*" (Porter 1990), "*development blocks*" (Dahmén 1988), "*territorial production systems*" (Scott 1988a; Walker 1988, Crevoisier & Maillat 1991), or "*industrial districts*" (see Marshall 1891; and e.g. Becattini 1990; Brusco 1992) . To some extent, cumulative evolution and reproduction of a common knowledge or technology base (Pavitt 1984; Malerba & Orsenigo 1996) is assumed for firms that operate within these organised markets.

2. Proximity

Several of these contexts for institutionalisation of learning patterns are related to geographical space. Why is it so that *proximity* (localisation) in some cases seems to matter when institutionalisation of patterns of interactive learning takes place? Are higher-order capabilities with respect to interactive learning in some cases confined to localities, and if so: What is the reason for this localised efficiency of information exchange and learning? In the present section, some aspects of organised markets are discussed. It is suggested that some contexts for institutionalisation of learning patterns exist by virtue of their localisation. To account for this trait, some properties of space are investigated.

What *is* at all *space*? In much literature within economics as well as geography, the most essential property of space is that it functions as a "social fact", an external environment for actors. Arguably, the functioning of space is closely related to that of *institutions*¹⁵: It influences social action and is influenced by it. According to conviction¹⁶, researchers have treated space as either explanans or explanandum with respect to social action: Spatial characteristics enable, constrain, or mould social action - or vice versa. The purpose of this paper is neither regarding space as an explanans nor explanandum for social action. Quite the opposite, it is seen as only one half of a dynamic dialectic between space and social action. In the end of this section, how this process may be described is commented in further detail. In the following, I shall leave the question of causation be to concentrate on the properties of space that may make it an external structure relative to social action - and thus learning.

2.1. The role of spatial distance

¹⁵ Actually, it can be argued that space-consistency along with time-consistency are the two basic aspects of "institutions". In section 1, the metaphor of "institution" was used for the notion of knowledge, because of its consistency over time relative to information. In addition, knowledge was seen to constitute a cluster of information. To be an institution relatively to information, knowledge thus implies some aggregation/clustering over time and "space".

¹⁶ This conviction, of course, has much to do with whether one is inclined towards structuralism or voluntarism.

The classical notion of space is that it represents physical distance. Actually, in search for a focus, (human) geography has been defined as a "discipline of distance" (Johnston 1991). For many human geographers (or economists with interest in the importance of space for economic or other social processes) that perceive distance - or its opposite, *proximity* - as *the* property of space, spatial localisation of social actors (in a broad sense, including e.g. firms) is described mainly as distance between them, and spatial systems of social actors mainly as distributions expressed by distance (and, in some cases, direction). Much work on spatial distribution (such as land use or localisation of firms) or *interactions* (linkage studies or studies of spatial systems) has been carried out in this realm.

Distance as a constraint

Distance is emphasised because of its alleged *constraining* role for interactions between social actors: Distance may hinder or make expensive exchange of goods or information through trade or communication. This constraining feature of proximity is usually referred to as "the friction of distance", and - depending on what is to be exchanged or transported, and the available technology - this friction may even greater if the distance includes some physical obstacles like mountains, rivers, etc. Distance (including physical obstacles) as such does not imply costs - it is the transport of goods, people, and information over distance that implies costs. These transport costs arise as material costs; time costs (Hägerstrand 1968; 1975; Pred 1978; 1984); and information costs (uncertainty). The greater the distance, the greater the consumption of materials (such as transport or communication equipment, gasoline, or power) and time (of agents involved in carrying out the transport as well as delay of goods, information, or persons transported)¹⁷.

Focus on distance in the social sciences

Where, in early economic geography or transport economy, materials costs have occupied a main role, the importance of time have been strongly emphasised in geographical work in the 1960s and 1970s (Hägerstrand 1968; 1975; 1984, and e.g. Pred 1973; 1978; 1984a; 1984b; 1984c). Physical interactions of persons - and other actions that imply movement in space - have been seen as being constrained by the time available for the movement. Thus, for actors, their interactions - their life, actually - can be significantly constrained to (or rather, created within) a particular area. In this perspective, the extent of such an area is determined not by distance alone, but by the combination of distance and available time, in a "time-space prism" (Hägerstrand 1975; 1984). Later, with the focus of the late-1980s geographers on Japanese JIT-production techniques (e.g. KANBAN), aspects of the low time expenditure in proximate "flexible manufacturing systems" were heavily emphasised (see e.g. Sheard 1983; Estall 1985; Sayer 1985; Holmes 1986; Schoenberger 1987; 1988).

¹⁷ Given the present transport technology, costs of transporting goods does not always increase proportionally to distance.

Overemphasis on distance?

To some researchers, emphasis on the physical properties of space has led to structural determinism. In some cases, it is neglected to account in detail for the alleged causation between physical structure and human actions¹⁸. This may lead to "physicalism", or even "spatialism": The explanation of spatial features purely from other spatial features. In much research - especially during the positivist revolution in the 1960s - realism¹⁹ was but abandoned in order to provide spatial positivist laws of social and economic development in space with strong inspiration from positivist laws in natural science.

2.2. The role of spatial coherence

I shall argue that in addition to the constraining role to action of physical space, the human *perception* of space in many cases plays just as important a role. As mentioned above, in most cases physical distance constitutes an upper limit for interactions between persons: Some proximity may be necessary for interactions to be physically feasible. In most cases, however, interactions do not take place between any actors just because they are physically feasible.

Coherence as enabler

Research with a phenomenological approach to space suggests that how actors perceive the distance between each other may be of crucial importance. Human beings perceive some distances shorter than other - even if physical distances are the same. Within the limits of physical space, it is the perception - the socially constructed distance - that leads to action. Thus, the perception of proximity between actors who are not cut off from each other by physical space may *enable* interaction between them. Following Durkheim (1893), interaction between actors is most often determined by whether they are outsiders or insiders to a social grouping. This suggests that socially constructed space should be described by an analogy of delimitation or obstacles rather than by

¹⁸ For example, Hägerstrand's time-geographic work has been accused of explaining human actions only from physical constraints of the environments and the human body itself. Like much other behaviourist work in the positivist realm, this leaves little room for freedom of action. See Giddens (1984).

¹⁹ I argue that the - somewhat problematical - notions of distance and time be approached from a (critical) realist stance that allows you to include both "physical" and "socially constructed" facts into an analysis. This means that while treating space as a physical fact, a geographical structure that - whether given by nature or created by man - in some way influences the actions of man, one must also treat socially constructed facts as important for human action. In the case of time-geography, physical distance has little importance in itself: It is the combination of the physical fact of distance with social facts like the need to travel and transport goods; the need to do so within certain time limits; and the available technology to do so that make distance constraining to action.

an analogy of distance²⁰. In this perspective, many interactions are enabled because participants reside within the same socially constructed coherence. Such a coherence is constructed by actors that - in some respects - have a common project.

Common projects are social in a broad sense: They may have to do with private, professional, or political life. For example, the functional economic linkages in "local markets" of subcontracting, between a group of interacting user and producer firms, may create a functional interdependence that can lead the producers to construe themselves as a unit or group, in some respects delimited from the rest of the economy. Hence, the functional coherence may be supplemented by a common discourse, or even a common language, a common history and thus a "cultural" coherence.

Focus on coherence in the social sciences

Much research within newer economic geography, sociology, or anthropology (e.g. "cultural studies") has been carried out under the heading of delimited social coherence. In geography, descriptions of the functioning and delimitation of social processes endogenous to particular geographical areas encompass work on local institutions or local culture. Here, a larger role is ascribed to social processes than to physical distance in making some features local. E.g. Storper (1992: 435) strongly emphasises practices, routines, agreements and their associated informal and institutional forms that partly shapes regional worlds (of importance for localised production systems). In local communities (Taylor 1982), systems of social norms (Elster 1989) and regulation (Lorenz 1992) promote coherence between actors. In such communities, actors that do not adhere to the conventions of practice are punished, e.g. by social exclusion. Incentives to comply to such conventions may well be internalised through socialisation: A long life of being brought up in and living within such a community provides the actors with similar reference points, and promotes a common culture that have as many cognitive as normative aspects (see March & Olsen 1989).

Overemphasis on coherence?

Viewing perceptions, social coherence, or other purely socially constructed features as facts, have misled positivists to construct laws (often infused with economic determinism) that project idealised social features directly onto space. Neo-classical theories of convergence ascribe assumptions of rationality and maximising behaviour of actors spatial results (convergence of regions), and Marxist theories of polarisation ascribe spatial results to economic unevenness

²⁰ Although it is common to speak of "cultural distance", a more precise term would be "low cultural coherence".

(exploitation between regions), or lately, to economic specialisation (spatial divisions of labour). For some other researchers, assumptions of the role of social facts have led to quite different results. E.g. researchers with a phenomenological approach ascribe actors much freedom, and emphasise uniqueness of social processes, and thus, of places. Taken to its social constructivist extreme, however, such an approach may lead to pure psychological or metaphysical speculation²¹.

2.3. The case of localities

At first glance, there seem to be numerous contexts for institutionalisation of economic or socio-economic patterns where the two properties of space do not seem connected. First, coherence may not always appear with proximity. The proximity of inhabitants of metropolises does not necessarily make them a coherent social group. On the contrary, they may never interact apart from by pure coincidence. Second, coherence may exist regardless of distance. The contexts for institutionalisation of learning patterns mentioned above (firms, industrial clusters, development blocks, production systems) are - albeit to different degrees - examples of groups of interacting social actors that make up social organisations of some coherence. They are not all examples, however, of physical proximity of actors within organisations. Firms or networks of co-operating firms may be truly global. For organisations with less pronounced traded interdependencies - e.g. with little physical exchange of e.g. goods -, coherence depends even less on proximity. This is the case for networks of social actors within global organisations, or international social or political communities.

When institutional contexts for social processes - such as learning - are described empirically, usually only *one* of the above mentioned properties of space is taken into account. Very often, groups of coherent (or, at least, interacting) social actors are described without addressing the - for geographers - obvious and necessary dimension of proximity, even when analysing explicitly *national* or *regional* innovation systems or business systems. The solution to this analytical deficit in many economic or socio-economic analyses is not, however, moving to the other extreme: The emphasis above all of distance and spatial delimitation (spatial fetishism)²².

The combination of the properties of space in localities

²¹ Because what is inside the heads of actors cannot be studied as such, *theorisation* of underlying ideep structuresⁱ (preferences, cognitive structures, etc.) has been seen as a solution (see Johnston 1991). Such theorisation cannot, however, stand alone. Observations of the *outcomes* of what one thinks is inside actorsⁱ heads must follow. Interestingly, the very foundations of the allegedly highest achievement of scientific method, neoclassical economics, rests on strong behavioural assumptions that seem to have no other origin than such metaphysical speculation.

²² A point of departure far too often employed by geographers.

The most interesting basis for analysis arise, I shall argue, when the two properties of space are *combined*, in what may be called analysis of *localities* (or 'territories', see Rokkan & Urwin 1983; Scott & Storper 1986; Dear & Wolch 1989). Most constitutions of - and co-operation between - firms as well as social or political communities, take place within particular geographical boundaries. National or territorial elements are strongly present in national innovation systems, national business systems, development blocks, territorial production systems and (a textbook example): Industrial districts. To varying degrees, the two spatial properties are combined in these meta-organisations.

Localities and time

The two different perspectives on space imply two different views on time. The emphasis on the constraining role of distance (e.g. exemplified by the perspective of time-space prisms) imply an emphasis on "micro-time": The chopping up of the time of individual actors by particular fixed points into short chunks of available time. In some cases, these time-chunks may be unique and of varying length, such as time reserved for one-time projects, lead time for custom-made products, etc. In many cases, however, time-chunks are actually occurring cyclically, such as daily routines, work schemes, production cycles, etc.²³ The somewhat cyclical view of time implied by the emphasis on the physical properties of space is contrasted by the view on time inherent in the more social constructivist view on space: Here, emphasis is on linear time, because the evolution of coherence is seen as a historical process. Over time, actors create social groups and build perceptions of space that influence their actions.

Giddens (1984) refers to particular proximate areas²⁴, *locales*, where interactions take place and daily lives are lived. Here, social processes are repeated - and slowly evolves over time. Thus combining the two perceptions of time, Giddens emphasises that within such localities, repetition of social processes leads to some degree of local coherence. This is a process of *localised learning*. How such localised processes function, and how they are cumulative, is described in the concluding section.

3. Localised learning

In this section, the relationship between proximity and learning is discussed. The two above mentioned properties of space are utilised as explanans for (efficiency of) learning, and this argument is used to take an evolutionary view on localised learning.

²³ However, as any actor is likely to frequently shift from one project to another without finishing it in just one time-chunk, calculation of consumption of time on each project and estimation of remaining available time is made a difficult task to undertake for an observer.

²⁴ Actually, Giddens draws heavily on Hägerstrand's time-geography.

3.1. The importance of proximity for learning

As mentioned, the process of interactive learning depends on communication. Knowledge is created through aggregating information, and interactive learning may be seen as a process of representing knowledge in information signals by a sender, transmitting the signals, and re-aggregating them into knowledge by a receiver. In the following, I shall concentrate on the medium for communication (interaction), while the processes of representation and re-aggregation of information signals (cognition) will be dealt with in the subsequent section.

Information channels

Exchange of information between individuals (or individuals in firms) take place through information *channels* (Lundvall 1985). Information may be shared through channels like requisition of books, reports, or through communication technology such as fax, phone, EDI, etc. In this respect, important elements of an enabling environment for learning are business services, educational facilities, universities, communication infrastructure, etc.

In general, *personal interaction* is assumed to be a central information channel (Melody 1988; Sweeney 1991). Even in the age of electronic communication, meetings, face-to-face discussions, and visits persist to be important channels through which information is shared in the business world. Often information encompass visual presentation, text, speech, and gestures presented simultaneously. In order to grasp such a "cluster" of information, personal contact may be necessary. One can distinguish between information shared in "dyads" (Håkansson 1989) and information shared through third parts. The latter can be compared to what Granovetter (1973) calls "weak ties". Actors that besides their "strong ties" (family, friends, or partners) are coupled to a network of people that interact because they have common acquaintances, get access to a much broader range and quality of information than those who are "confined to the provincial news and views of their close friends" (Granovetter 1982: 106). Because of their large capacity for making information "social" amongst a larger group of actors, patterns of weak ties or third-part-relations are an important aspect of a context for interactive learning.

Proximity matters as a context for interactive learning, because it stimulates dense networks of personal relations that couple actors through both dyads and weak ties.

Proximity stimulates dyads

First, regarding dyads: The functioning of interactions between single actors may be more efficient and cheaper due to proximity. Even if business meetings

of strategic or formal nature can be held at conference centres or fancy hotels, discussions of practical nature as well as less formal interaction between actors in co-operating firms often must take place as daily contact. In this respect, proximity lowers transport costs and time costs considerably. Thus, transaction costs are generally taken to be lower with some physical agglomeration of firms (see e.g. Scott 1988b; Scott & Storper 1986). Because of these cost advantages of proximity, dyadic interactions may be sustained or initiated.

Proximity stimulates weak ties

Second, regarding weak ties: Proximity makes the possibilities of creating third-part-relations much larger, as casual interactions between employees or business managers are more frequent if living and working close to each other²⁵. Third-part-relations are created both during and after working hours, and Sweeney (1991: 367-368) explicitly refers to distance as limiting to networks of interactions: As the main effect of distance is the time consumption when travelling it, many networks of interaction are allegedly confined within a "half-an-hour information contact potential". Within this time/space delimitation, both dyads and weak ties are frequent, and potential for information exchange thus large.

3.2. The importance of coherence for learning

As mentioned in section 2, it is not sufficient for interaction not to be constrained by distance - it should also be enabled by coherence. There are both normative and cognitive aspects to coherence in this respect.

Coherence lessens transaction costs

Firstly, actors mostly co-operate if they see a reason for it, and mostly interact within the social group to which they belong. Thus, social coherence enables information channels in the shape of personal interactions. In the new institutionalist perspective in economics (Williamson 1975), transaction costs actually occur because the actors focus on risk, not because of physical constraints. Risk is typically of significance when there is a lack of social norms or social regulation between actors. Thus, transaction costs may more fruitfully be related to lack of coherence than to physical distance or time, a point that was but ignored by Scott and Storper in the 1980s. Costs induced by lack of social coherence seems to become even higher relatively to costs induced by physical distance or time with the rise of new transportation technologies.

What I shall emphasise in the following, however, is the important cognitive aspects of coherence: It allows representation and re-aggregation of knowledge from and into knowledge.

²⁵ Already Marshall (1891) noted this.

The problem of codification

Interactive learning does not only demand information channels and interaction be present. It also places demands to the cognitive abilities of the actors participating in the interaction. The by now classic distinction between which knowledge can be expressed with ease (Wittgenstein 1922) and what is *tacit* (Polanyi 1966) is helpful when discussing communication problems.

Especially with the last centuries' penetration of the natural sciences into the business and social spheres, much knowledge is being *codified* by language or symbols. Hence it is made explicit and structured in a way that makes it possible to store, reproduce, communicate - and trade (Dosi 1988). Examples of such codified knowledge are product specifications and descriptions; but also 'scientific' knowledge encompassed in laws; rules; methods; heuristics etc.

When knowledge is to be interactively learned - that is, transmitted between individuals or organisations -, it must be broken down by the 'sender' to less complex information signals which a 'recipient' puts together to form a knowledge similar to the one the sender meant them to represent. A *communication process* thus encompasses not only a problem of *interaction* (the parties must actually interact, and information must actually be 'sent'), but also a problem of *cognition*. The latter cognitive problems of communication can be divided into problems of technical accuracy, semantics, and efficiency (Shannon and Weaver 1949). Codified knowledge poses few cognitive problems regarding communication, as it may relatively easy be represented by and reconstructed from information signals which can be transferred by means of EDI, fax, reports, books, CD-ROMs, etc.

Even in the so-called 'information society', much knowledge is still *tacit*. Much knowledge is not codified, because it is closely related to the activities in which it is learned and used. Examples are skills, routines or behavioural rules. Such knowledge may persistently be non-codifiable (Lundvall 1995), because holders of it are rarely aware themselves of the nature of their knowledge. Even if much determination is put into e.g. translating tacit know-how into codified procedures, e.g. in order to build it into a machine (Nonaka 1994; 1995), the resulting codified knowledge may fail to contain all the aspects of the tacit knowledge. Tacitness of knowledge hence relates to its origin (see section 2.1.4), its aggregated nature (it is constituted of aggregated bits of information, the interdependencies of which may be ambiguous to an observer), but also its embeddedness in humans or organisational contexts (see section 2.1.5): It is impossible to exchange between individuals - or organisations - as such: It is "sticky" (von Hippel 1994).

In this way, tacitness of knowledge aggravates the basic cognitive problems of communication problems, because it cannot be directly broken down to information signals and exchanged. Two possibilities exist: To codify the

knowledge in order to express it fully through information signals - or to communicate it as imperfectly expressed by information signals, as an “understanding” (Schelling 1960). The first possibility is, as mentioned, not always possible.

Coherence as a code key

The second possibility encompasses that the sender transmits only a limited range of codified information signals - but still making the recipient put together the correct knowledge, even if the information he receives does not completely represent it. This whole process is not one of deliberate codification and exchange of information signals, rather, codification and reconstruction of knowledge happens ‘intuitively’, when sender and recipient interpret information signals the same way, and the recipient is able to ‘fill out the blanks’ in the message he receives. This demands that sender and recipient possess a knowledge base that is similar in particular respects, making it serving as a common cognitive framework.

This common cognitive framework then functions as a ‘code key’ for communication. Agents who have such similar code keys may exchange signals that to outsiders contain little information and lead to little knowledge. To insiders, however, the information signals contain hidden references, symbols, and other types of information that - put into the cognitive framework of the code key - may unfold and take meaning, and hence lead to communication²⁶. In this way, quite complex knowledge may be shared - without actually communicating anything but its ‘germs’²⁷.

Paradoxically, to share tacit knowledge thus demands communicating agents to already have some knowledge in common. An existing *knowledge base*, institutionalised through experience and learning may function as a cognitive framework for communication. Code keys may be provided by e.g. education or training. It takes professionals to understand the information contained in journals or to build knowledge on the basis of a demonstration of others' skills - because professionals know the relevance of the information they get and know to ask the right questions. Common knowledge can also be shared by agents that have lived together in a community of some sort - and have a common history, similar experiences, and same reference points (Schelling 1960).

Hence, *coherence matters* as a context for interactive learning, because it can function as code key. An important part of the environment for interactive

²⁶ The code key may be compared to a ‘program’ that ‘unzips’ a text that has been ‘downloaded’ in compressed form.

²⁷ This point implies that the process through which tacit knowledge is transferred between agents by means of codified information signals can be described by analogy to radio transmission: The tacit knowledge is a signal that is modulated into the ‘carrier’ signal comprised by codified information.

learning is the tool for representation, codification, and understanding of information that is made up by an institutionalised knowledge base comprised in culture (Casson 1991; Boisot 1994; 1995), habits (Veblen 1919), or routines (Nelson & Winter 1982). Social coherence can function as code key, as it lead people to construe their experiences the same way (Kelly 1963; Boisot 1994). If culture is sufficiently specific (e.g. to participants in subcultures) it can facilitate sharing of quite sophisticated knowledge. To understand the word on the street amongst bikers, you need to be a part of the biker subculture yourself²⁸. The same applies for participants in local cultures: To understand what's going on in local politics, you need to be a part of the local community yourself²⁹. Relevant aspects of culture as a communication device is language, differences in which can lead to misunderstanding of information, and "prominence" (Schelling 1960). Differences in what actors conceive as important (prominent) and sense-making can lead to misinterpretation of information.

3.3. Localised learning

The knowledge base contained in culture, habits, or routines in an organised market³⁰ may function as the basis for further interactive learning processes within this context. Thus, learning patterns may evolve in what has been described as national or regional systems of innovation and production. Here, a group - or population - of firms within the same or related industries enjoy the higher-order capability of efficient interactive learning as a result of some stable knowledge base. This base is itself learned in earlier "rounds" of interactive learning³¹ within the context, and the knowledge may be passed on between firms or actors, i.e. "inherited" through interactive learning³².

What is interesting in the case of national or regional contexts, is that here, the properties of space - proximity and coherence - are combined, and this further enhance the capabilities for interactive learning for populations of firms within these contexts. Evolution of interactive learning patterns within a locality may be called *localised learning*. This process can be compared to Giddens' notion of "structuration". His approach to human geography - and sociology - had a strong evolutionary twist: Locales were seen as a result of a structuration process, the dialectic relationship between a local environment and its local

²⁸ A subculture may be even more specific than this: If you are riding the wrong bike - or are a member of a competing club - you may still not understand what the others are talking about. In any case, you would most likely be shut out from their talk.

²⁹ A local subculture can also be very specific: Some would say that you not only need to be a local, but also a local *politician* to understand what is going on.

³⁰ I propose that also organisational routines can be of "higher-order": Existing at the level of groups of firms, in particular organised markets (actually, routines is an important organising factor).

³¹ Although learning is a continuous process, it is fruitfully described in "rounds". This is akin to a perspective of "layers" of historical and economic development within regions recently prominent within economic geography.

³² The process of "inheriting" knowledge (culture, norms, know-how, etc.) through interactive learning may be described as "transmission" (Nelson & Winter 1982).

actors, i.e. between structure and action, over time. Below, I shall shortly depict some reasons why localised learning may be cumulative.

Cumulative socio-spatial processes

First, cumulative causation may exist between the social fact constituted by space and the social action which it influences: Proximity and coherence lead to interactions and learning, and interactions and learning may enhance proximity and - especially - coherence.

The initial condition for this spin-off must be proximity³³. Within localities, interactions of individuals stimulated by proximity³⁴ lead to coherence, and the coherence then enables further interactions. Interactions may further enhance the proximity: As interactions enabled by proximity are developed over time, means of communication and transport are developed accordingly. Roads may be built or obstacles may be removed that make the costs of physical distance - or even distance itself - less³⁵. Further, coherence and interactions may enhance each other: As stated above coherence is needed in many cases to make interactions happen. On the other hand, social coherence is created by interaction of individuals (Veblen 1919; Johnson 1992; Boisot 1994; 1995. See also Blumer 1969). E.g. social norms or rules - an important part of culture or social coherence - can be said to evolve over time in groups of interacting individuals (Sugden 1986). Further, the efficiency of social regulation according to such norms and rules depends on frequent interactions between individuals (Lorenz 1992).

Cumulative learning processes

Second, the knowledge resulting from earlier learning may serve as the base for further learning: Learning serves as its own institutional framework. It guides interactions, because knowledge contained in social norms or conventions may propagate interactions, and because, when actors know each other, and know who to co-operate with if necessary, interactions may be more frequent³⁶. As a

³³ In this respect, proximity (or interactions stimulated by proximity) is an important element of an "evolutionary explanation of the aggregate mould" for territorial learning (see Ullman-Margalit 1978).

³⁴ It may be debated what may be called "proximate". What to some researchers is "local", is "regional" or even "international" to others. Whether "proximity" exist or not must depend on the nature of the social processes that are described: For some industries, "local" means nations, where for others, it means districts. This point serves the argument of this paper well: It makes little sense to analyze anything in the perspective of physical distance *alone* - the social context must always be taken into account.

³⁵ In physical planning, planners have traditionally built roads or bridges because the frequency of interactions (transport) made it desirable to lessen the costs of distance. In present-day Danish planning, however, this logic is turned upside down: Political pressure has lead to construction of bridges over ÿresund and Fehmarn BÉlt (to Sweden and Germany, respectively), hoping that interactions will follow.

³⁶ "Know-who" is a basic capability of managers. Se Lundvall (1996).

result of the easiness of local interactions that follows local knowledge (and reproduction and augmentation of it), the frequency of interactions may stay high³⁷. The existing knowledge also serves as a base for further learning, because it functions as a code key for operation of information.

An interesting proposition that follows is that communication technology has actually hardly made communication non-spatial. If sufficient code keys are provided by social coherence, efficient information exchange can take place through other channels than face-to-face interactions, e.g. through phone or fax. However, as such social coherence is often built within proximate localities, even producers that mainly communicate through phone or fax, may do so within the local area, because they utilise "software" (local code keys provided by their local history) together with the hardware provided by telecommunications companies³⁸. This hardware may allow them, however, to communicate with less effort, because they already have spent time socialising.

The result of these cumulative causation relationships within particular localities may be persistently high second-order learning, creation of new knowledge. This may lead to competitiveness of firms. It is frequently debated, however, whether localised learning may actually mostly encompass reproduction of knowledge, i.e. exploitation. Even if this leads to great social coherence within local communities, it could mean organisational or political path-dependence or lock-in for the local firms and other actors³⁹. Whether competitiveness can be sustained for firms that continue to utilise a particular local knowledge base (firms that learn locally), is subjected to heated discussion. It may not be a problem for firms within all industries⁴⁰.

Localised learning in industrial districts

Following the outline of section 1, it should now be possible to investigate the contexts for localised learning at different levels, starting with the individual, and continuing to organisations, markets, and organised markets. A discussion of the importance of proximity at these different levels will be reserved for another occasion, however. What remains of the paper will concentrate on one particular case: Industrial districts.

³⁷ An element of an "evolutionary explanation of the functional mould" (Ullman-Margalit 1978), as interactive behaviour is *selected* (Alchian 1950).

³⁸ It remains to be tested whether particular phone (and fax) patterns are still locally concentrated, as in Sweden in the 1960s (see Hägerstrand 1968).

³⁹ A study of continuation of norms and patterns of action in Italian regions (which are not industrial districts) (Putnam 1993) suggests that also distrust and non-cooperativeness may be cumulative. Whether this is the result of low capabilities for learning to co-operate or high capabilities for learning to distrust, remains to be investigated.

⁴⁰ The discussion forum on *Non-Cost Competitiveness and Low-tech Learning* (see Lorenzen 1997a; Maskell 1998a) deals explicitly with this problem for the furniture industry.

Success stories of localised Italian, German (or Danish) producers of mechanics, electronics, consumer goods, or crafts, suggest that within particular industries⁴¹, localised learning can be prosperous. In these industries, the notorious "industrial districts" constitute valuable example of contexts for localised learning. The ideal industrial district is not only a localised production system of profound specialisation and dense interaction between firms, but also a socio-economic environment of skills, habits, norms and culture which allegedly makes specialisation and co-operation between firms possible. In the perspective of the present paper, inherent in the socio-economic environment is a strong, localised common knowledge base which itself is created and reproduced by the communication that follows interaction patterns between firms (Lorenzen 1997; 1998).

Originally, what was noted as the main higher-order capability⁴² of industrial districts was what was "in the air" (Marshall 1891): The knowledge that was contained in skills, habits, norms, and culture in the districts. Later, as a consequence of the huge impact of new institutional economics of the Williamsonian variety on many parts of the social sciences, the high frequency of economic transactions between local firms in industrial districts was emphasised heavily (see e.g. Scott 1988a&b; Scott & Storper 1986). In this research, it was assumed that the main capability of the institutional environment in a industrial district simply was that it made local transactions cheap, or - in the case of "flexible integration" (Schoenberger 1987) - that it made them time-efficient. However, within the last years - especially since Piore & Sable (1984) followed in Marshall's footsteps - notions of what is untraded (Storper 1993), such as knowledge and learning, have returned with a vengeance to research of institutional environments in general, and industrial districts in particular (see Harrison 1992). Within such "institutionalist" geography of an "old" (Veblenian) variety - drawing on the critical realist view on structuration processes as a "socio-spatial" interplay (Soja 1980, Scott & Storper 1986; Dear & Wolch 1989) - notions of the "institutional thickness" (Amin & Thrift 1994) of industrial districts encompass not only patterns of interactions between firms and other local actors, but also the ongoing creation and utilisation of a local knowledge base that is both their result and their precondition. Industrial districts are assumed to possess great capabilities for propagating interactive learning amongst local firms (and thus process and product innovations) while sustaining a common knowledge base that makes up an institutional frame for further learning. This knowledge base constitutes a higher-order capability because of its non-ubiquitous nature: It is tacit, and difficult for non-local entrepreneurs to utilise or imitate (Maskell 1998b). It is reproduced because it is utilised interactively through inter-firm co-operation and other interactions in the local area (communication is abundant), and

⁴¹ Within particular "technological trajectories" or "sectors" (Pavitt 1994; Malerba & Orsenigo 1996).

⁴² This particular term was not used, as it was introduced by Foss (1996).

because such communication is "cheap"⁴³: It happens seamlessly with the aid of a highly specific - but highly penetrative to the local economic actors - local culture (Lorenz 1992) and highly specific local skills (Brusco 1990; Sweeney 1991).

Even if not explicitly stated, many studies of industrial districts that have been undertaken hitherto have a strong emphasis on evolutionary perspectives of cumulative causation. The path-dependence of some industrial districts (see e.g. Glasmeier 1994; Herrigel 1996) suggests that even if learning is propagated by the local institutional context, it may have too strong an emphasis on exploitation. Empirical research in the vein of the present paper could uncover whether the industrial districts that presently prosper achieve their competitiveness through cost advantages - possibly through exploitation - or through higher-order capabilities for *explorative* learning.

Conclusion

In this paper, I have theoretically discussed processes of learning within localities. By combining different theoretical arguments, the cumulative nature of learning processes and of spatial processes was emphasised: Localities enables learning, and learning augments the institutions that make localities local. By emphasising the importance of cognitive institutions for learning, the paper is a contribution to introducing notions within "old" institutional theory into newer (business) economics. Doing this, the approach also draws heavily on communication and organisational science.

Great unsolved problems remain with the approach. Is it at all possible to combine arguments from theoretical fields with different underlying assumptions? Even if single theories do not correspond with perfection to reality as they are, do we get any further by combining them with still other theories - or do we just undermine their internal coherence and logical structure? In any case, one may argue that economics is already taking a turn towards re-incorporating institutional perspectives from without the neoclassical sphere of the field, and that this has greatly enhanced its explanatory power (albeit, as some would say, at the expense of its coherence and method). The very foundations of evolutionary economics are behaviourist assumptions originating from e.g. cognitive psychology that are far from the neoclassical *iHomo Economicus*. To supplement perspectives of "economic" multiplier effects with "sociological" multiplier effects from structuration theory can only speed this departure from a method that is still highly acclaimed within the most prominent circles of economics.

⁴³ Particular knowledge is "selected" according to the costs of communicating it.

Despite recent attempts to making economic geography adhere to the neo-classical epistemology, geographers continue to have a lesser inclination to orthodoxy than most economists. Thus, they may actually have an opportunity of contributing to a significant development within the social sciences by following some of the perspectives I have summarised in the present paper. If approaches to the problem of learning based on perspectives of space - or approaches to the problem of space based on perspectives of learning - are to be developed, a huge theoretical work of conceptualisation lies ahead. The present paper has only suggested possible couplings of theories that may not all be well suited for the purpose. Empirical work is also necessary: Even if much work has already been done within economic geography on the importance of time for space, it has partly suffered from (too) strong behavioural assumptions. New work - with the somewhat relaxed assumptions hinted at in this paper - may be fruitful. Further, even if the importance of social coherence for learning has been widely illustrated empirically, the coupling to proximity and time has not been much explored.

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