

## THE SPATIAL CONCENTRATION OF KNOWLEDGE

Some theoretical considerations

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*Zusammenfassung:* Die räumliche Konzentration des Wissens. Einige theoretische Überlegungen

Wissen und berufliche Qualifikationen sind nicht ubiquitär vorhanden und räumlich nicht so mobil wie Informationen. Räumliche Unterschiede des Wissens und die räumliche Verflechtung von Wissen und Macht können bis in die frühe Menschheitsgeschichte nachgewiesen werden. Alle Herrscher haben sich mit Magiern, Weisen, Experten und in neuerer Zeit mit wissenschaftlichen Einrichtungen umgeben. Wissen ist die zentrale Dimension der Wettbewerbsfähigkeit und der sozialen Evolution. Wissen und Macht stützen sich gegenseitig und sind räumlich eng miteinander verknüpft. Angesichts der zentralen Bedeutung des Wissens in den modernen Gesellschaften müssen auch räumliche Disparitäten der Produktion, Verbreitung und Anwendung von Wissen mit räumlichen Ansätzen untersucht und erklärt werden. Der Aufsatz stellt drei theoretische Ansätze vor, mit denen man die räumliche Konzentration des Wissens erklären kann: die Organisations- und Kommunikationstheorie, die Symboltheorie und die Konflikttheorie.

*Summary:* Knowledge and professional skills are not ubiquitously available and not as mobile as information. Spatial disparities of knowledge and spatial proximity of power and knowledge can be traced back to early human history. Power and knowledge always tended to build coalitions. Almost all rulers had their advisers, their "houses of knowledge" or – in modern terms – their "think tanks". Knowledge is a primary dimension of competitiveness and social evolution. Knowledge legitimates power, power tries to control knowledge. Spatial structures and processes of the creation, diffusion, and application of knowledge and skills must be analysed and explained by a geographical perspective. The paper considers why work places for highly qualified decision makers, experts and intellectuals are so highly concentrated spatially with reference to organisation and communication theory, symbol theory and conflict theory.

### 1 Introduction

Knowledge<sup>1)</sup>, professional skills, creativity, and technological inventions have never been evenly distributed in space. Contrary to the views of some economists, most categories of knowledge and information are not an ubiquitously available public good. Rather, they display large spatial disparities which show a remarkable historical persistence. The assumption of neoclassical economic theory that each person has access to, or is easily able to retrieve, the knowledge necessary for his/her rational choice is wrong. Equally questionable are the prophecies of the "global-village-advocates" that modern technologies of telecommunication (e.g. the internet) will lead to a substantial decentralisation of work places involved with high levels of power and knowledge. Such interpretations neglect historical evi-

dence, the nature of asymmetric power relations, the endurance of symbolic action as well as the role and symbolic meaning of centrality and authority. There is no doubt, that new technologies of telecommunication change the structure and range of power relations and that they improve access to freely offered information, but they do not abolish the centre-periphery disparities in the distribution of knowledge and power. Knowledge is rooted in people, and various categories of knowledge such as competence, skills, and "the cognitive ability to generate knowledge" (STEHR 1992, 115) cannot easily be transferred from one person to another. Some categories of knowledge (tacit knowledge, personal experience) cannot even be communicated.

Spatial disparities of knowledge have existed since the division of labour developed in early human history. The need to coordinate, control and integrate the elements of a social system in space promoted the creation of centres (later cities) where power was concentrated. It was predominantly the vertical division of labour, the bifurcation of skills, control functions and decision making in a social system, that created and increased the disparities of knowledge and power between centres and peripheries. When the uneven distribution of knowledge and power surpasses a certain degree, it begins to function as a self-enforcing circle which influences the spatial diffusion of innovation

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<sup>1)</sup> The term knowledge is used in a general way. It is not understood as a search for truth, but as the capacity for social action, the competence in a given situation to solve a certain problem.

based on specialised knowledge; which affects the distribution of resources, incites selective migration (brain drain) and influences educational attainment. Nevertheless, the degree of spatial concentration<sup>2)</sup> varies according to the type of knowledge, the type (task, size and complexity) of organisations, the technologies to store and transmit information, the uncertainty of the environment, the autonomy of organisations and many other factors.

The aim of this paper is to offer some theoretical explanation as to why *work places* for powerful decision makers, highly skilled experts, counsellors and intellectuals tend to be spatially concentrated. It argues that centre-periphery disparities in the distribution of such work places should not be considered as transient and easily changeable by means of telecommunication or regional policy. The theoretical discussion focuses on organisation and communication theory, symbol theory and conflict theory.

## 2 *Centrality and authority*

### 2.1 *Relations between power and knowledge*

As long as knowledge remains an element of authority (power) it will tend to be spatially concentrated. Spatial concentration and proximity of power and knowledge are an outcome of their dialectical relationship. Power and knowledge need each other and transform each other reciprocally (BROWN 1993, 154). Knowledge is a means to gain, maintain and increase power. Power shapes, controls and deploys various forms of knowledge. The mutual dependency and coalition between power and knowledge can be traced back to early history. In pre-literate societies, the shaman, the sage, the dream interpreter, the prophet or later the priest were at the centre of power or represented themselves as the centre of the social system. Their claim to privileged knowledge, to be in connection with the gods or ancestors or to represent god's will on earth gave them a central and unique position in their social system. In later periods experts, scientists, ideologues, and think tanks took over the role of the shaman and fortune teller. This co-operation between "throne" and "altar" was, of course, famously describ-

<sup>2)</sup> Concentration of knowledge is here defined as the concentration of *work places* involved with the production, dissemination and application of specialized knowledge. It goes without saying that the bearers of knowledge are mobile and take their knowledge with them when they move.

ed by WEBER (1922) and MANN (1986; 1993). What are the forces and mechanisms leading to such spatial concentrations of power and knowledge? Why do existing centres attract intellectuals, experts, advisers, and artists like a magnet?

First, the maintenance of power is linked to success. A leader or social system without success loses resources and followers. Consequently, those in the top ranks of power depend in their decision-making upon the *analytical abilities*, knowledge, creativity and advice of experts and professionals. Both *instrumental* power, the capacity to make others act and the ability to control, regulate and dominate, and *associational* power, the power to do things by acting in concert or using institutional mediation (AGNEW 1999), have to rely on experts, scientists, intellectuals, priests, academies, and "think tanks" to achieve and sustain their position. Knowledge increases competitiveness, as well as political and military strength. New technologies to store and transmit information and to transport goods, have dramatically increased the potential of the division of labour. They have extended the spatial range of coordination, the possibilities of control and surveillance and increased the possible size and complexity of organisations.

Second, power needs *legitimacy*. As the legitimacy of rulers, dynasties and governments may be fragile and questioned and as authority should be acknowledged and accepted by subordinates, those in power require priests, experts, scientists, artists and intellectuals to legitimate their authority and to rationalise their decisions. In the past, legitimacy was created by producing myths about the divine origin of the ruling dynasty or by constructing narratives and images about the superior strength and deeds of the rulers. Today legitimacy is construed by narratives about the moral superiority of a party or a government, by belief systems and laws or by propagating the principle of meritocracy.

Third, social systems need a certain degree of social order, unity, cohesion and integration to achieve their goals. In order to prevent members of the system following their own individual interests, they have to be socialised to the norms, beliefs and ideologies of the system. Therefore, institutions of knowledge production and media have to create, disseminate and defend the norms, collective memories, symbolism, culture, identities and ideology that hold a social system or interest group together. They also construct prejudice and stereotypes about the "other".

Fourth, as power and knowledge have in many cases a rather ambiguous relationship, it is in the interest of power to bind knowledge into "networks of assent" (AGNEW 1999). In order to prevent fragmentation of their system and the creation of new power centres,

those in power have to integrate potential competitors and the best human resources available and affordable to them. This is the principle motive behind mergers and the attempts to create monopolies among economic enterprises.

One of the most obvious signs of power is its ability to attract and absorb the top ranks of human resources. Why have power and authority always fascinated and attracted intellectuals? Centrality in power relations determines access to valued resources, privileges, benefits and opportunities unavailable to those on the periphery of the network (IBARRA a. ANDREWS 1993, 279). Various forms of spiritual knowledge (religions, ideologies) may be fragile in political struggles and need the protection of political power. Proximity to power assigns to intellectuals importance and prestige. Most intellectuals are convinced that they have an important message for mankind. Network-centrality offers them a much better platform to announce their ideas and interpretations. Even critical intellectuals opposing those in power receive more attention if their criticisms are made at the centre and not at the periphery of the system. Professionals, experts or intellectuals striving for prestige, influence or success, sooner or later find their place of work in one of the centres or establish a new centre.

However, not all forms of knowledge attain proximity to power. In order to achieve centrality, knowledge must prove its *usefulness* to power. Many forms of new knowledge first of all have served the interests of those in power or of those striving for power. Arts and humanities had to represent themselves as useful to dominant groups by glorifying ruling dynasties before they were financially supported and institutionalised (BROWN 1993, 155). Literature, history and geography served those in power by creating national identities, stereotypes and historical memories that support the processes of nation building, imperialism and colonialism.

## 2.2 Social construction of centres and spatial representation of authority

Terms such as power, authority, dominance, control and influence are not characteristics of individuals, they describe asymmetrical social *relations* between agents, as well as in and between social systems. Centre and periphery<sup>3)</sup> display asymmetric power relations in space and are socially constructed. Centrality is the spatial representation of authority. The centre is the place where the highest authority of a social system is located and where the most important decisions are made. The periphery is represented by those who are at

the margin of society, who have little power, and who are excluded from major political, cultural and economic processes. Centrality is not "an accident of history" and marginality is not "an unfortunate dysfunction of an otherwise benevolent system" (BAILLY 1998, 294). Rather, both are the consequences of asymmetrical power relations. Large social systems display a hierarchical structure of authorities and control elements and consequently also a hierarchy of centres. Each social system has its centre, periphery and hierarchy of control and decision making. Single organisations may differ in their spatial representation of authority structures, but many of them prefer their centres to be in the same spatial context, which leads to a spatial clustering of centres. The hierarchy of a national system of central places represents the *cumulated* spatial pattern of authority structures of a large number of organisations. Empirical evidence that the knowledge and skills of the work forces are strongly related to their positions in the urban hierarchy (city size classes) has been published elsewhere (MEUSBURGER 1980; 1997; 1998).

Social systems may be classified as mobile or stationary and as sharing common space with competitors or as demanding exclusive territories. The first type of "stationary organisations with exclusive space" is represented by institutions such as public administration which by definition is exclusively responsible for a certain area (territory). It is a very rare exception that the same territory can be administered and ruled by two governments. The second type consisting of "mobile organisations with exclusive space" consists of organisations such as armies in war or nomadic tribes. They change their areas and range of activity at short notice but defend "their space" against intruders or adversaries. The third and most frequent type comprises "stationary organisations sharing common space with their competitors". Typical examples are economic enterprises, banks or retail shops. They have no exclusive territory of their own, compete with each other for the same customers, observe and imitate each other and regularly build spatial clusters with the same type of enterprise. The headquarters of competing banks for various reasons prefer the same location. The fourth type consists of "mobile organisations sharing common space", such as organisations of travelling salesmen.

Centres of organisations demanding their own territory can only build spatial clusters with centres of *other* realms, but never with the same kind of organisation. In this case competition leads to spatial separation of

<sup>3)</sup> The terms centre and periphery are not regarded as a dichotomy, but rather as a *gradient* of power, influence and attractiveness.

territories. With organisations sharing common space, competition leads to spatial clustering both within the same realm and with other branches.

It should be kept in mind that the concept of centre and periphery is applicable on any scale from the small group to the urban hierarchy of a nation state and an international settlement system. Moving between scales, almost every centre can be another centre's periphery (BAILLY 1998, 293) and a complex system may be the element of another larger system.

### 2.3 *Visibility of power relationships in the spatial dimension*

In order to minimise the number of conflicts in a social system, to maintain social order and to achieve cohesion and collective action, authority and power relationships (hierarchies) must be objectified and displayed. Abstract power relations are made visible by signs, symbols, titles, ceremonials and positioning in space. FOUCAULT (1972; 1980) was certainly not the first to study the relations between knowledge, space and control, but since he explicated his concept of disciplinary power, which was based on visibility and surveillance, this issue has been studied extensively in geography. In the *horizontal* dimension spatiality is expressed by distance, demarcation, exclusion or positioning in relative space; in the *vertical* dimension by elevation. Elevation of a throne, an altar or a speaker's platform, seating arrangements in a meeting, or the staging of a ceremony in many cases have the function of "status reminders" (HARPER 1985, 36). Status reminders function as a kind of *behaviour or action settings* (BARKER 1968; VEITCH a. ARKKELIN 1995). The display of power by rank signs, ceremonials and positioning in relative, three-dimensional space evokes certain "psychic states" (COHEN 1976, 4) in the minds of the participants; it hints at which behaviour is appropriate in a certain situation and triggers standing patterns of collective behaviour. "[...] Persons perform differently in different settings [...] variations in settings produce variations in behavior" (WILLEMS 1977, 52). Thus the display of power in the spatial dimension not only reflects authority, it actually recreates it.

The phenomenological analysis of sacred space and of places of worship has perhaps the longest tradition in the study of how space is an important category of human existence and expression. Some of the metaphors and mechanisms of sacred places may also be applied to the centres of modern organisations. The history of religions offers a large number of ritualistic constructions of centres. According to ELIADE (1969), in many religions the centre was a sacred place where the gods revealed themselves. The connection with

heaven and with the gods was initiated from the centre. A sacred place was the centre of man's life, the point of reference and orientation around which his world was built. The sacred place was the point of communication between heaven and earth, the gate to heaven and the house where the gods dwelt and revealed themselves when they dealt with men (TURNER 1979, 9–10). The meaning of the sacred place as the gate to (divine) power was soon transferred to centres in general. The translation of the name Babylon, one of the oldest centres in history, means "gate of the gods".

In centres, the divine or secular powers give meaning and direction to the system's actions, from the centre all else is orientated, guided, understood or valued, it is the anchor that gives security against threat or danger from outside (TURNER 1979, 19–20, 33). The centre creates and co-ordinates social systems in space, it defines and defends territories. The centre is the place, where important decision makers from different realms (politics, economy, science, culture) meet, communicate and decide.

Many social anthropologists and sociologists dealing with power have overlooked the fact that the representation of power requires not only symbols and ceremonials, but also spatiality. Many geographers have neglected power relations and symbolic action. Power can hardly be analysed without including the spatial dimension, regions and central places should not be conceptualised without considering power relations in and between social systems. We should keep in mind that the word *region* has the same etymological root as the words *rex*, *regulate*, *regime*, *regiment*, *regnal*, *register* or the German word "regieren". Governmentality is inherently and fundamentally spatial (HANNAH 2000). Authority operates within certain spatial limits, its influence concerns certain areas or specific spatial networks.

The first sanctuaries known in human history needed and used the spatial dimension both to represent social differences and to display gradations of sanctity, authority and status. The word temple has its root in the Greek word *temenos*, a precinct or demarcated area bounded in some way by lines, hedges or walls. The verb *temno* means cutting or marking. A holy district was a marked space (TURNER 1979, 15). The gradation of sanctity was expressed by separation and demarcation of spaces and by elevation of the sanctuary (altar). Sanctuaries call for respect; those who are ritually unclean are excluded from the sanctuary and can only enter after purification rituals.

The importance of spatiality in the representation of authority and in the construction of difference has not decreased in recent history. Spatiality is more than ever

integral to the production of society (MASSEY 1999, 28–40). Spatiality displays the “contemporaneity of difference” (MASSEY 1999, 35). Space is a structure of perception and “a means of intervention that controls the behavior of individuals” (FELDMAN 1997, 944; TOWNLEY 1993). In modern societies, authority also structures by demarcation, exclusion and elevation. The more power an interest group exerts, the more it tends towards spatial exclusion, secrecy, restriction of access and initiation rituals (e.g. freemasons).

### 3 Theoretical approaches explaining the spatial concentration of knowledge and power

At least three theoretical approaches can be used to explain the spatial clustering of knowledge and power: organisation and communication theory, symbol theory and conflict theory. Each of these approaches has some advantages and some shortcomings.

#### 3.1 Diffusion of knowledge in the spatial dimension – some preliminary remarks

Most of us will agree that human action is knowledge-based, that knowledge is “a capacity for social action” (STEHR 1992, 114) and that knowledge is an “anthropological constant” (STEHR 1992, 111). However, in a competitive society, it is not knowledge itself and not easily available routine knowledge that counts, but the possession of prior, specialised, unique or rare knowledge that justifies the role of experts and advisers, that makes knowledge attractive for those in power and gives knowledge “the leading dimension in the productive process” (STEHR 1992, 113). Advisers, counsellors, experts, priests, intellectuals as well as gatekeepers of ideologies and media deduce their power from the claim to know *better* than the majority of people or to be the only reliable and competent interpreters of important texts or events. However, it is very important to note that it is not an absolute amount of knowledge and experience that counts, but a relative advantage or time lag in comparison with others. Therefore, we see no point in the assertion that knowledge is “nonexcludable” (GRILICHES 1992, 31), i.e. that anybody has access to it, and that “new information has the tendency to become known” (DE BONDT 1996, 4). The crucial questions are: at what *point in time* does a secret information become known, are certain skills acquired or is new knowledge shared with competitors? It makes a difference whether an area became literate in 1850 or in 2000. As the possibility to know is limited and as

the search for and the acquisition of knowledge is never completed (GADAMER 1987, 245), the number of experts who really have an *advantage* or a short-time monopoly of (specialised) knowledge will always be small.

It is necessary to distinguish between knowledge and information. Concerning the *sender* of a message, the line between information and knowledge might become blurred. Regarding the *receiver* or *decoder* of a message, the difference between knowledge and information becomes quite distinct. Many categories of information can only be understood and evaluated by people with previous knowledge and experience. New knowledge (whether in the form of technologies or social values) is created in particular places and contexts and through interaction within space. Unlike information, which can spread all over the world in seconds, knowledge is *rooted*; it is bound to individual persons, positions, networks and intellectual contexts.

The speed at which new knowledge and information diffuses over space depends on the type of knowledge, its usefulness to those in power, its role in economic competition, the institution within which the new knowledge is produced, the interest of the producer (inventor) to share his or her knowledge, the previous knowledge necessary to understand the contents of the new information, the availability of technology necessary for the production and application of knowledge, and the inclination to accept the knowledge.

The first category of knowledge and information which is most quickly distributed in space is the kind of ‘public news’ which is easily understood by almost everyone, which does not require previous knowledge or expensive technology, and whose free distribution is in the provider’s best interests. This type of information and knowledge is highly *mobile*, can be spread around the globe in seconds and is easily available by telecommunication. Under the assumption that all countries and regions have the technical equipment and inclination to receive the message, such knowledge is theoretically ubiquitous. The reality, however, is that many countries and regions do not have the technical prerequisites to make use of even these simple forms of information. At the beginning of the 21st century, more than one billion people are not able to read a written text and hundreds of millions have no access to telecommunication.

With the second type of knowledge, it does not suffice to have access to it. This type of knowledge can only be communicated between persons or transferred from one area to another if the receiver’s training, experience, skills, and cognitive capabilities are broadly equivalent to that of the sender or if the receiving party

possesses the previous knowledge necessary to recognize, understand and evaluate the contents of the information. Previous knowledge necessary for a successful transfer of knowledge could be the knowledge of a code such as a foreign language or the knowledge attained by graduating in a scientific discipline. Many scientific disciplines use a specific code (formulas, technical language) which can be understood only by those persons who have invested a great deal of time and money to achieve the required knowledge. Previous knowledge may also comprise tacit knowledge, personal experience and skills that cannot be transmitted. Theoretically, the results of research in chemistry, physics or molecular biology are globally accessible once published. However, the proportion of the world population able to utilise this newly available information may be less than one percent. Within the relatively small proportion of persons who have the necessary training and experience, new knowledge of this type spreads very quickly, but it is not understood by the large majority outside this group. Even when the necessary code is known and the message can be read, recognition and evaluation of the importance of the information depend on experience, competence, and the level of educational achievement. Collecting information is much easier than assessing its value. The third level comprises knowledge and information which is kept secret as long as possible or necessary in order to obtain economic, political, scientific or military advantage.

These three forms of knowledge and information vary in the degree of their spatial concentration and in their speed of diffusion. Only the first type of knowledge (information), the least important for economic competitiveness and innovation, is (theoretically) ubiquitously available, assuming all places have the technical equipment and all gatekeepers an equivalent inclination to receive and distribute the message. Receiving a message does not imply acceptance of the communicated meaning. Knowledge (e.g. spiritual knowledge and historical narratives) can be rejected in certain areas (HAGEN 2000, 36). The second type displays a much higher spatial concentration in a few centres or areas, and often circulates only between the upper levels of the urban hierarchy (HÄGERSTRAND 1966; TÖRNQVIST 1968; 1970; PRED 1973). The third type of knowledge is most useful to power and shows the highest degree of spatial concentration.

The term 'spatial concentration' does not imply a tight and everlasting linkage to a certain place, but rather a spatial clustering of functions in a small number of places which may shift to new locations when power relations, access to resources and networks change.

## 3.2 *Organisation and communication theory*<sup>4)</sup>

### 3.2.1 *Knowledge and social evolution*

Why are some social systems successful and survive competition for long periods while others fail? In answering this question, one cannot avoid the issue of knowledge and information processing. Theories dealing with the dynamic change and development of economies and societies have to focus on knowledge, skills, communication and the ability to learn and adapt. Organisations or companies can be viewed as social systems that regulate, control and structurally adapt themselves to their declared goals via communication processes. Scarce resources, competition and the uncertainty of the environment constantly force social systems to be efficient, productive and innovative, to adjust to changing environments and to deal with new challenges. The arrangement of positions and skills in a social system is fluid and always in the state of becoming. Social systems which are not able to carry out these adjustments and learning processes, and which are not in the position constantly to reorganise themselves and acquire new knowledge and skills, run the risk of losing their competitiveness. Knowledge and evolution are closely interwoven. Acquisition of knowledge is a basic element of evolution.

As many forms of knowledge can only be evaluated *ex post* and as many knowledge systems compete with each other (e.g. the heliocentric system versus the geocentric system, market economy versus centrally planned State economy) the time dimension is extremely crucial; time is needed as a kind of arbitration tribunal which decides about the validity, acceptance and usefulness of competing bodies of knowledge.

From the perspective of organisation theory, knowledge, skills, training, experience, creativity and constant learning are regarded as necessary preconditions to survive in a dynamic environment. The acquisition of new knowledge, skills and information is regarded as the best means to cope with uncertainty. New knowledge, skills and information increase transparency and predictability, reduce complexity and overflow of information, create efficiency, induce self-organisation, contribute to maintaining flexibility, adaptation and competitiveness, and stabilise and legitimise power. Knowledge, training, skills, creativity and information

<sup>4)</sup> Communication theory and organisation theory to a large extent overlap in their approaches and objects of research and are often used as synonyms. Communication theory is a kind of reformulated systems theory.

are the preconditions for the so-called "noogenetic evolution" (BOULDING 1978).

This approach should not be misinterpreted as Social Darwinism; it is not the "fittest" that survive but those who constantly acquire new knowledge, skills and information and are therefore able to adapt quickly to new situations and challenges, those who change their behaviour or even transform their own environment. According to this approach, the amount of uncertainty, mistakes, wrong perceptions, wrong evaluations and wrong decisions can be reduced by acquiring new knowledge, new skills, information and expertise relevant for the solution of the problem. New knowledge and information can influence the orientation and goals of the people involved. New or erstwhile knowledge can be transformed into inventions, new technologies and new forms of organisation which may increase productivity, enlarge the range of control and ensure a competitive advantage. New knowledge allows access to and use of new resources. It may improve the degree of exploitation of resources. It also enables better judgement of a situation, helps to find alternatives, and to recognise unwanted or unintended results in time. A better knowledge of the environment (market, competitors, customers) also helps to avoid unintended negative results of actions.

Additional knowledge, new information and a deeper understanding of mutual relations and dependencies often raises new questions and creates new uncertainties which did not exist before. Reducing these *new* uncertainties requires once again new information and new knowledge. The never-ending sequence of knowledge acquisition and knowledge production is the basis of social evolution, which should not be mixed up with progress. "It is evolution through learning that clearly dominates and accounts for the major variations in human social behaviour" (MCCLINTOCK 1988, 60).

### 3.2.2 Architecture of social systems

An organisation (a goal-orientated social system) is an ordered arrangement of individual human interactions (TANNENBAUM 1969, 667). Any division of labour within a system and each additional growth of complexity requires new coordination and control. "Control is an inevitable correlate of organisation" (TANNENBAUM 1969, 667). It is the function of control to coordinate collective actions, to order the diverse interests and bring about conformity in order to accomplish a collective goal.

As the so-called span of control of a supervisor is confined, and since a single decision-maker does not have the cognitive capacity and time to absorb, process and pass on all the information necessary for the long-

term survival of an organisation, formal communication structures are hierarchically arranged. In the context of organisation theory, the term hierarchy is not defined as a command chain from top to bottom where every level has a differing amount of authority and privileges, but as a functional differentiation of a complex system. Once it reaches a certain size and complexity, no social system can exist without adopting hierarchical structures of communication and information processing. The main purpose of a hierarchy is to develop special knowledge and skills, to reduce the vast amount of information to those contents essential for the decision-making of a certain position, to accelerate information processing and decision making, to facilitate the coordination of activities and the evaluation of performance.

Organisation theory assumes that in difficult situations which fall outside the ordinary routine, the number of wrong decisions made by an individual is inversely proportional to his/her knowledge (competence, skills), experience and level of information. As functional specialisation makes a sub-system dependent on the operations, decisions and stability of other subsystems, incompetent decision makers in important positions may inflict serious damage on the whole system. Wrong decisions first of all undermine the stability of a system. Social systems can only compensate for a certain amount of incompetence and ignorance. The question of how many wrong decisions and how much ignorance a social system can afford depends primarily on the intensity of competition, on the uncertainty of the environment and on the available resources of the system. In a protected market, in a social system with unlimited resources or in a competition-free and stable environment a lack of skills, knowledge and competence does not have immediate negative consequences for the survival of the system. The acquisition of knowledge and skills is primarily a necessity in dynamic and uncertain environments and in periods of rapid transformation.

Since most organisations can only cope with a limited degree of incompetence for any extended period of time, they act in their own interest when they fill the key positions of information processing and decision-making with highly skilled, competent and experienced people. In particular, those positions and subsystems that are constantly confronted with uncertainty and/or those elements whose decisions have long-lasting consequences for the entire system require special skills and knowledge. In social systems skills and knowledge have a similar function as redundancy in technical systems. Redundancy is needed in non-routine situations, it reduces uncertainty and enhances stability in periods of

crisis and change. A stratification of stability is fundamental for the survival of social systems. Each higher level of an organisation has to rely on the stability of the lower levels and vice versa.

Since it is not knowledge or information per se but a lead in knowledge or a prior access to information that brings about success in a competitive society, the skills, experience, training and knowledge needed by the decision-makers in the highest ranks of a system will always be scarce and expensive commodities. Therefore the crucial question is, how to design the communication and authority structure of a social system and *where to locate* scarce skills, competence and knowledge within the social and spatial system. In which circumstances is centralisation of knowledge and decision-making more efficient and in which cases decentralisation? How many levels of hierarchy should a system have? Which subsystems (functions) of the social system are dependent on a certain place, a certain type of environment or context and which are not?

The architecture of a social system is not a matter of deliberate choice. It is rather the uncertainty of the environment, the task, age, autonomy (power, resources), size and complexity of a social system and the available technical means of information processing that decide about the optimal architecture of a social system.

According to MINTZBERG (1979) the task of an organisation can be defined as simple or complex, and its environment as stable or dynamic. The structure of an organisation can be bureaucratic or organic. A simple task and stable environment encourage a system to become a centralised bureaucracy. In a centralised bureaucratic system, the decision-making and problem-solving processes, research and development as well as planning and coordination will shift to the upper levels of the hierarchy. Consequently the lower levels of the bureaucratic system will lose competence and skills, and will only carry out routine work in production and administration according to fixed rules and regulations.

A complex task and a stable environment lead to decentralised bureaucracies (e. g. university) where coordination is not achieved by direct surveillance or numerous regulations but by highly skilled personnel, who are responsible for its actions. A simple task and a dynamic environment lead to a centralised organic structure (e.g. fashion atelier), where coordination is achieved by direct surveillance. A complex task and a dynamic environment are best managed by a decentralised organic structure, where coordination is achieved by mutual adjustment of highly skilled personnel.

If the subsystems at the lower levels of the organisation deal with constantly changing, unpredictable, one-

time transactions, then decentralisation of competence and authority is more efficient. Where control is decentralised, a large number of units can gather and process information independently and the greater openness of the system to its environment achieved in this way facilitates rapid adaptation to new situations and allows effective innovation (see GESER 1983, 172).

### 3.2.3 *Spatial clustering of knowledge and skills*

The proponents of systems and communication theory (e.g. MATURANA 1982; LUHMANN 1984; 1997; HAGEN 2000) regularly emphasise the importance of the environment, but pay little attention to places, spatial disparities and local contexts. They underlined the differentiation of society, but overlooked its differentiation in space which leads to spatial clustering and centre-periphery disparities in the distribution of knowledge.

The architecture of the authority structure of a social system has direct consequences for the *spatial* distribution of competence, skills, decision making and routine work. Large, bureaucratically structured organisations with a high degree of vertical division of labour and a centralisation of decision-making display among their workplaces large centre-periphery disparities of skills and educational achievement. Conversely, a decentralisation of decision-making tends to decrease the centre-periphery gradient for highly skilled labour force. The more authoritarian and dogmatic a social system, the more centralised is its decision-making (MEUSBURGER 1997).

Most social systems are not autonomous, nor are they entirely free to choose where to locate their subsystems. In many cases the local context is extremely significant for the decision-making, the operations and the success of the system. Many subsystems constantly need face-to-face communication with top ranks and specialists of other social systems. The "realisation and implementation of knowledge is dependent on, or occurs within the context of specific social and intellectual conditions" (STEHR 1992, 114) which cannot be found everywhere.

The higher the degree of uncertainty and competition a subsystem has to face, the more it depends on cooperative synergy, imitation of successful competitors, early access to crucial information, the trust of other systems and a "structural coupling" with a highly differentiated, dense and complex environment of specialists, high ranking decision makers and competitors. The concept of structural coupling was introduced by MATURANA (1982) and explains how a social system can be both operationally closed and dependent on the environment. The environment is not part of the

system, but very significant for the operations, success and survival of the system. Co-operation is not the opposite of competition. The combination of co-operative synergy and competitive strife are the basis of social evolution (CORNING 1983).

The question concerning which parts of an organisation and which services and professions are bound to high-ranking central places, as well as the question as to which economic activities or parts of an organisation can be moved to smaller cities or peripheral regions without a loss to efficiency and competitiveness, depends first of all on the importance and necessity of face-to-face contacts which play both a functional and a symbolic role. Before LUHMANN (1984) replaced action by communication as the basic element of social systems, a number of geographers (TÖRNQVIST 1968; 1970; THORNGREN 1970; GODDARD 1973; PRED 1973; GOTTMANN 1979; 1983) had shown that the need for and dependence on face-to-face contact is the main functional reason for the spatial clustering of knowledge and skills. The higher the professional status in an organisation, the greater the amount of external face-to-face contacts to decision-makers of other organisations, the higher the amount of contacts involving planning and orientation and the lower the proportion of routine and indirect contacts. In almost all economic branches, work places involving far-reaching decision-making authority and requiring a high level of education as well as frequent face-to-face contacts with other highly qualified specialists show a strong tendency toward spatial concentration in a few centres.

Routine activities are not supposed to learn from other systems but to follow the rules set by their own centre. Therefore, their communication streams are mostly directed to elements of the *same* system. If they do have external contacts, these serve predominantly routine activities that do not need much face-to-face contact. Routine contacts for a number of reasons are less place-dependent, they can more easily be decentralised and co-ordinated by telecommunication. Theoretically, they can be situated in a great number of smaller cities or at the periphery, as long as the traditional location factors such as transportation costs, wage costs and so on make it feasible.

Uncertainty generally increases the need for, and the frequency of, face-to-face contacts with important decision-makers. The harder it is for decisions to be governed by guidelines, plans, regulations or so-called hard information and the greater the uncertainty about the consequences of a certain decision, about the future development and about the correctness of the methods and objectives, the more necessary it is to have face-to-face contacts with experienced and well-informed top

managers of other political, economic and cultural organisations.

The economic success of many top-level decision-makers, providers of specialized services and highly skilled professions depends largely on whether they can make on-the-spot face-to-face contacts with decision-makers of other social systems. Only major centres provide an environment that enables fast and spontaneous face-to-face contacts among decision-makers in government, large industrial corporations, research, finance and insurance, international news agencies and so on.

Proximity to these institutions provides senior management with an advantage when it comes to crucial information, thus facilitating their adaptation to new situations and developments. Early information is especially important in areas that have to deal with a high degree of uncertainty and where economic success often depends on fast, risky decisions. The most important reassurance against the uncertainties of business life is prompt knowledge of innovations, economic developments and political changes. This kind of information is not presented in business reports, press conferences, or by data banks, it is first revealed by rumour, by non-verbal communication in informal meetings and in small pieces of an information puzzle which have to be put together by the attentive observer. The potential for highly important face-to-face contacts with important decision-makers and highly skilled specialists of other systems, for imitating the successful and for structural coupling increases with the central rank of places and is highest in global cities.

The move from periphery to centre or from small rural villages to global cities is a direction from simple to more complex configurations and from a small to a large selection of alternatives, methods, approaches and role models. The most innovative, creative and advanced competitors, the largest density of cultural industries, the "hotbeds of creativity" (LANDRY 2000, 9), the highest multiplicity of viewpoints and approaches, the highest potential for learning, imitation and synergetic effects will be found in the centres of the relevant field. Large centres change the mindsets<sup>5)</sup> of people. "Creative capacity is not generated in isolation" (LANDRY 2000, 106). Creativity involves critical discourses, divergent thinking, looking for common threads amidst the seemingly disparate, bringing together unthought-of combinations that solve a problem (LANDRY 2000, 13–14).

<sup>5)</sup> A mindset is "the order within which people structure their worlds and how they make choices [...] mindset is the settled summary of prejudices and priorities and the rationalization we give to them" (LANDRY 2000, 52).

Why can such important information not be exchanged by telecommunication? In many cases powerful networks remain unidentified, because their members exchange important information and co-operate with each other in ways that are incompatible with their formal position in society (COHEN 1976, 67, 91). The more powerful an interest group the more secluded it will become. Getting access to crucial information and powerful informal interest groups and networks is a matter of mutual trust. If trust does not rely on kinship, it has to be earned and maintained by frequent and spontaneous face-to-face-contacts, frequent ceremonies, symbolic acts, conditioning of moods and sentiments, affinity of interests, shared ideology, financial interdependence, and a record of mutually useful performance (COHEN 1976; BROWN 1993). Trust, reliability and solidarity cannot be established by telecommunication, they develop by common practice, ceremonies and rituals in *certain places*. Access to organized crime, to the nomenclature of a communist system or admission to freemasonry cannot be organized by telephone or internet.

There is no doubt, that the functional approach of organisation theory can only explain a certain amount of the spatial pattern and that the borders between functional necessities and symbolic meanings are blurred. From the functional perspective, it does not matter whether the location of a company's headquarter varies by 200 metres, as long as the housing prices or rents are comparable. However, these 200 metres can make an enormous difference with regard to the symbolic value and prestige of the location.

### 3.3 Symbolic meaning of centres

As individual actors cannot cope with the information overflow encountered in a dynamic environment, they constantly have to reduce complexity to metaphors, analogies, symbols and signs. The difference between sign and symbol is a matter of degree. According to COHEN (1976, 24) a sign means one thing (e.g. a speed limit for drivers) whereas a symbol (Christian cross) can represent a very complex statement and holds different meaning to different persons and to the same person at different times. "Symbols are objects, acts, relationships or linguistic formations that stand *ambiguously* for a multiplicity of meanings, evoke emotions, and impel men to action. They usually occur in stylised patterns of activities, such as ritual, ceremonial, gift exchange [...] eating and drinking together, acts of etiquette, and various culture traits that constitute the style of life of a group" (COHEN 1976, 24).

The dialectical relation between power relationships and symbolic action has been extensively studied by social anthropology. Symbols objectify roles and social relations, they are needed for the establishment, stability and continuity of social order and are therefore of utmost importance for those in power (COHEN 1976). The importance of symbolic behaviour increases with the social status of a person and with the centrality of a place. The long persistence of centre-periphery disparities is to a large extent based on the durability of symbolic action. Rulers, governments and decision-makers may change, but the force of symbols remains.

The processes of conditioning, generalising and stereotyping ascribe to places positive or negative symbolic meanings which may stimulate associations and actions. A location can be a symbol for prestige, reliability, credit-worthiness, and power. However, another address may suggest danger, poverty or criminality. Terms such as centre, periphery and distance bear a great symbolic meaning and can evoke emotions, feelings and actions. The term "centre" is associated with social attributes such as power, authority, dominance, prestige, control, attractiveness and influence. Someone at the "periphery" is an "outsider"; he or she is marginalised, has less influence, fewer resources, and enjoys less prestige. The centre gives the system its identity. Being in or near the centre has important psychological significance. Proximity to the centre (either genealogical or via rank or close social relations to powerful decision-makers) offers security, priority of access to resources, and privileges, it indicates importance, competence and trustworthiness.

On the other hand, the periphery is not only defined by its distance from the centre. It also symbolizes dependency, marginality, alienation, weakness, backwardness and subordination. Innovations come late and investments tend to have a predominantly exploitative and colonial character, with limited positive spin-off (STRASSOLDO 1980).

### 3.4 Conflict theory

Knowledge is not only a key element in functional approaches. Various forms of knowledge (religious, ideological, national or ethnic narratives) and the institutions of knowledge production and knowledge dissemination (schools, universities, media) play an important role in conflicts. For Nietzsche and Foucault, reason is inseparable from power. Knowledge is used for social control and therefore is a subcategory of power. Facts and truth are socially created and power tries to dictate what is knowledge and what should be regarded as truth and reality. Science, schools and the

media enable a given discourse to attain a position of hegemony. Foucault-influenced organisation theory and conflict theory regard knowledge as a means of domination and as a capacity to control and manipulate physical and human nature (BROWN 1993, 154, 164). The rational person is seen as manipulated through a "massive and invisible structure of control" (DEETZ 1992, 37). A conflict-oriented approach focuses on how superior knowledge, higher skills or advanced technology are utilised in competition for resources, on how knowledge is used in dominating or exploiting other people, how power is applied to control the diffusion of knowledge.

"In modern societies the ability to facilitate or suppress knowledge is in large part what makes one party more powerful than another" (FLYVBJERG 1998, 36). For various reasons, people in power have always tried to exercise control over the production and distribution of knowledge. The news not produced, and the monuments not built are just as interesting as those which exist. Power uses knowledge to control, exclude, censure, deceive and falsify. According to FLYVBJERG (1998, 98, 228) people in power require rationalisation and not rationality. Rationalisation presented as rationality is a principal strategy in the exercise of power. Power "produces that knowledge and that rationality which is conducive to the reality it wants" (FLYVBJERG 1998, 36). "Power procures the knowledge which supports its purposes, while it ignores or suppresses that knowledge which does not serve it" (FLYVBJERG 1998, 226).

Those who have the opportunity to define reality, to construct histories, memories and narratives and to decide what is politically incorrect possess a very effective method of exercising power. Many historical memories are constructed according to the interests of dominant groups. Political elites invent traditions which legitimate their actions and provide national or regional identity: "The ways we know history are determined more by contemporary concerns than by history itself" (WILLIAMS 1973, 9). The greater the power, the greater the freedom to define reality (FLYVBJERG 1998, 37). The school system and the media were regularly used to support the national narratives and historical interpretations of those in power, to enforce and consolidate collective memories, to assimilate ethnic minorities and to support the ideology and goals of the dominant centre. Striking examples of how historical and social realities, national memories and regional identities are constructed by a few influential networks, are national centennial celebrations of revolutions, of civil wars or "glorious" founding moments of immigrant nations such as the United States or Australia, which usually ignore the history of aborigines and natives (see SPILL-

MAN 1998). Any interest group having the authority to interpret an important text (the Bible, the works of Marx or Mao) or an historical event has the power to define reality and to influence decision-making. Those in power have always tried to lay down how historical events should be represented, which memories should be passed over, and which books should be outlawed or even burned.

History offers abundant examples of founders of new dynasties falsifying chronicles and their lines of descent or constructing ancestral links with the most powerful and celebrated representatives of earlier dynasties (ANDERSON 1990, 39). The formation of "organised memories" (WERNER 1995) reached its peak in the twentieth century, when in communist systems the names and photos of previously famous politicians suddenly disappeared from encyclopaedias and history books. Even highly developed democracies often cling to narratives from the recent past which have little to do with historical truth.

Throughout history an actual or alleged advance in knowledge (e.g. a higher level of development) was used to justify colonization or civilization of "backward" people and regions. The concepts of colonialism, modernization, superior morality, cultural hegemony and development are intrinsically linked to the notion that those with superior knowledge can legitimately devalue, undermine and even destroy centuries-old traditional, unscientific or local knowledge. Power tries to monopolise the definitions and interpretations of what is real, rational, modern, correct, authentic and agreeable.

The distribution, control and suppression of information as well as the construction of realities, images and memories are guided by the centres or by a network of centres. The centre rules, controls, punishes, sets norms and standards, defines reality, rationalises decisions, dominates discourses, siphons off the profits, distributes resources and is the marketplace for the exchange of ideas. "People in position of power have less of a need to pay attention to subordinates. [...] one of the corrupting effects of power is that it leads the powerful person to feel that the needs and wants of the subordinate are unimportant relative to one's own" (HARRIS et al. 1998, 228).

However, nations or political unions (e.g. EU) are not monolithic entities and memory is never unitary, no matter how hard various powers strive to make it so. There are always sub-narratives, subjective truths and contests over dominance in memory building (OLICK 1998, 381). Other centres or peripheries build their own narratives and have their particular knowledge.

#### 4 Conclusion

Spatial disparities of knowledge, skills and power contribute a great deal to the enduring persistence of socio-economic disparities. They have never been resolved; they have only restructured themselves. Since the early history of human civilization, most of the important economic and social developments have been based on *new* knowledge. Towards the end of the 19th century, science, technology and inventive capacity and a skilled and educated labour force became a crucial factor determining economic competitiveness. In a knowledge society, skills, creativity, technical standards, research and educational achievement determine more

than ever before the performance and competitiveness of social systems and spatial units. Geography has produced a large number of Foucault-influenced philosophical and theoretical studies, but it should pay more attention to *spatial* disparities of knowledge production and knowledge application, to spatial patterns of literacy, educational achievement, professional skills, indicators of research input and output, inventiveness and to the role of knowledge in conflicts.

Theories explaining spatial disparities and hierarchies are well advised to focus on the spatial distribution of knowledge and power. By putting knowledge, skills, and creativity in the centre of scientific discourse, some of the gaps between various theoretical approaches could easily be bridged.

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