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Reality, Society and Geographical/Environmental Organization: Searching for an Integrated Order

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PREFACE

The monograph "Reality, Society and Geographical/Environmental Organization: Searching for an Integrated Order" deals with general questions concerning the development of society as a component of the environment and setting it into the context of studies of the integrated order of reality. In a sense it responds to the lack of general balance in existing scientific ideas about the structure and evolution of reality. It also responds to the long-term absence of general geographical findings when these ideas were created. It is just such a study of sociogeographical (human geographical) systems, lying in the intersection of research of social and environmental structures, which may contribute to the development of integrated assessments of reality as it deals with the highest hierarchical levels of the organization of reality. At these levels there is an urgent need for holistic approaches, associated with the required content of substance. This is primarily directed to the study of differentiations and interactions of heterogeneous systems of phenomena and processes. Discovering order in this highly complex sphere offers, first, in-depth knowledge of hierarchical forms of the organization of real systems or reality as a whole. In establishing major types of hierarchical organizations one can also achieve an interconnection between the current, prevailing "atomized" cognition and comprehension of reality with its integrated perspective – to this point more searched for than found. From this viewpoint the crucial problem is posed by the understanding of the differentiation of parts and wholes as well as their relationship and the corresponding hierarchization of reality. Any solution to this problem cannot be only based on methodological (i.e. more or less relative) methods of assessment, but must also be conceived ontologically, i.e. in the sense of realism. Undoubtedly, the relationship between a whole and its parts differs at the level of man, a social system, a settlement system or a final environment. As a result, the distinction of real systems from the viewpoint of the degree of their completeness toward the contents of the total reality is necessary and leads not only to the establishment of a hierarchy of these systems/wholes, but also to finding fundamental regularities in the structure of reality.

The two basic directions of the study are also reflected in its organization. First, there is a focus on the universal problem of the organization of reality in the following sequence: the classification of real systems; the determination of basic regularities in their differentiation; the determination of interactions of basic types of systems and the resulting integrated view of the structure and evolution of reality (Chapters 2–4). However, in the framework of this general assessment, particular emphasis is placed on the results of sociogeographical generalizations. The second level of assessment is represented by an elaboration of the most general ideas focused on specific questions of the study of sociogeographical systems. In regard to the combined occurrence of social and environmental organizations when sociogeographical systems are formed, the stress is placed on broader circumstances as well as the meaning of sociogeographical analysis. These concerns are more meta-geographical problems rather than specific sociogeographical issues. Broader circumstances of sociogeographical organizations are assessed in two ways. First, there is an integrated assessment of society in the environment with an emphasis on mutual interactions of three basic structures of a broadly conceived society: homogeneity of the human kind; social organization; and the geographical organization of society (Chapter 5). Second, there is the assessment of the relationship of physical geographical and sociogeographical differentiation, especially from the viewpoint of the rank/scale organization of the geographical environment (Chapter 6). Finally, Chapter 7 is devoted to the classification of gradually established characteristics of hierarchical organizations of social and environmental systems.

The general description of the focus and organization of the entire study depicts the complexity of its content and its large scope. The difficult nature of the text is further accentuated by its concise form and the internal connection of the issues under discussion, which implies a necessary contextual nature of the relevant explanations. As the issues are "unusual" and necessary terminology is only gradually being created, it may be rather difficult to follow the meaning of the text. On the other hand, the entire assessment is only the initial, relatively superficial stage of the study and was deliberately simplified in a number of respects. The figures and empirical examples accompanying the study may partly overcome some limitations in communication. However, the main barrier to a complete "understanding" is the overly high specialization of many researchers and a relatively scant interest by too few scholars in broad questions of a synthetic type. One can therefore come to a paradoxical conclusion about the need to create a comprehensive syntheses from the viewpoint of science, but not from the viewpoint of researchers themselves. The following text was written bearing in mind this paradox and the impossibility of describing the whole scope of the problem under observation with sufficient depth. It was prompted by a belief in the necessity of a search for an integrated order, which must be at times preferred to the perfect, but only partial, cognition.

The study here is a modified and augmented text of a monograph of the same name in Czech (carried out within the grant 403/96/0258 of the Grant Agency of the Czech Republic) which appeared in 1998. Recommendations by reviewers and a follow-up discussion about its results prompted its redrafting and publication in English. The English version of the book was made possible by both the Grant Agency of the Czech Republic (403/99/1006) and the Ministry of Education, Youth and Sport of the Czech Republic (Research Plan J13/98: 113100007).

It is pleasant obligation of the author to express sincere gratitude to his collaborators for their important support in elaboration of various themes of this book and in its final publication. First of all, thanks are due to Professor Petr Dostál and Professor Zdeněk Pavlík, both at Charles University of Prague, for their uneasy task of reviewing of the text and for important recommendations they made. The author has also to emphasise the importance of his late university teacher Professor Jaromír Korčák whose key ideas have always been inspiring for the entire study. The author is also thankful to Dr. Pavel Vereš for his translation of the difficult text in English. Great complexity of analysed problems and particularly unconventional ways of some evaluations made it necessary to develop a new terminological apparatus. The author benefit extremely from the help of Professor George Demko, Dartmouth College Hanover, who invested much time in discussions of terminological issues, but also in final corrections of the text. Last but not least, the author is owing thanks to Eva Kuželová and Marie Lochmanová for their technical help and in particular to Dr. Boris Burcin for the typographical design and layout of this book.

Prague, February 2000 Martin Hampl

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Integrated Approaches In Science And Geography: Holistic Vagueness Versus The Biased Clarity Of Reductionism?

It is certainly correct to state that the influence of science on social development has constantly increased in the modern era and it has gradually assumed a dominant role. With its rapid growth science has evidently outstripped all other basic types of human activities. Nevertheless, at present one can often encounter criticism or sometimes downright rejection of all scientific efforts and the sense of science as a whole. If ubiquitous, potential irrationality in the minds of people and the abuse of this potential by biased ideologists, dreamers and cheaters are set aside (see, e.g., the discussion on scepticism in the public and the creation of anti-science and pseudo-science in a survey by Drenth, 1999), there are two main sources of mistrust. First, there are various existential and ethical aspects which usually confuse problematic aspects of science with the problems when treating the results of science. Understandably, discussion on this requires a broad foundation in which science itself can only play of a specific participant. One can see here an evident link with the creation of the hierarchy of human values, which means with real sociocultural development. As a result, from the viewpoint of science major importance is acquired by other sources of mistrust which can be primarily associated with the enormous and still growing **unevenness in acquired knowledge and with the absence of a comprehensive and integrated scientific picture of reality.** In a number of respects these facts make difficult both the internal development of science and its external application, which helps foster the mistrust of the first type. So far science has been unable to provide a solution to complex problems of an integral type such as the management of society or environmental protection. May efforts from this sphere have led to failures and often to unfair identification of the scientific approach with a technocratic approach. Many technological miracles achieved thanks to scientific knowledge are being praised, but in their in sum they tend to be perceived as one-sided and partial contributions. And, if there is insufficient verification, they may result in both social alienation and, possibly, in social and ecological crises.

However, unevenness in the development of scientific knowledge logically stems from "uneven complexity" of reality itself. Since the process of learning partial and simple phenomena is relatively easy, in this sphere, too, science is rapidly advancing into the higher level of cognition while examination of complex and "holistic" structures is difficult. Due to this, science has not made great progress in this study or it has even dropped such study. These facts have led to increasing disintegration of science and its transformation into several partial systems of knowledge. On the one hand, special branches of science are increasingly interconnected within the framework of these partial systems thanks to reductionist methods, especially in natural sciences (see the increasing impact of physics and chemistry on biological science and the development of border sciences), while differences between basic groups of sciences are becoming more intensified. The dualism of natural and social sciences is strengthened, while the dualism of classical empirical sciences and new (environmental and ecological) sciences, defined by the problem they deal with, is being gradually formed. The efficiency of reductionist approaches brings about potential dualism in natural sciences in the sense that the study of material substance of natural phenomena and processes has priority, while the study of holistic organization of these phenomena, based on information structures, is lagging behind.

Undoubtedly, the disintegration of science is most obviously visible in the loss of a synthesizing (generalizing) role of philosophy. On the one hand, its scientific function is reduced to the methodology of science, while on the other hand "traditional" philosophy is being pushed outside science, where it has assumed the position of a poorly informed critic of science. Typically, this is exemplified by the currently fashionable notion of postmodernism. However, this process is unavoidable because "specialization into generalizations" is impossible due to its separation from the empirical foundation and due to the split of the inductive method. What remained is the possibility of the isolation of the process of creating deductive systems, which may be, however, only of a speculative type in relation to reality. The loss, although temporary and problematic of the "umbrella" function of philosophy to science also means the loss of a platform for scientific generalizations of the highest order and for the creation of an integrated scientific picture of reality. One can therefore ask how and whether an integrated syntheses can ever be created. Previous holistic attempts have failed because they did not find the required regularities in the overall organization of reality. General proclamations about the need for a holistic picture, about a general interconnection of phenomena or autonomy of the structure of the whole as an organization of relationships between elements (and not as a simple summary) cannot provide a sufficiently solid foundation for the creation of an integrated picture of reality. On the other hand, there is no doubt that the methodological contribution, mainly derived from general systems theory (e.g. von Bertalanffy, 1969), was considerable. However, if systemic study does not have real content or if there is not a large-scale ontologization (in the realistic sense), this approach is simply methodology and not a synthesis of content. What remains is the opportunity to create a higher syntheses in individual, special sciences – syntheses whose validity extends across the borders of these sciences.

However, the creation of such syntheses is extremely rare, although extremely important. This is evidenced by evolutionary theory and related assessments of the evolutionary classification of both, real phenomena and empirical sciences.

The previous discussion has in a number of respects placed stress on the need for the cognition of integrated systems and relationships between a whole and its parts. This process is, of course, also fraught with difficulties. However, previous failures in attempts to reply to these questions prove that a one-level, general description of this problem cannot succeed. It has been repeatedly stated that the hierarchical nature of the organization of reality and its partial systems (see, e.g. Scott, 1987, p. 84) enforces primarily the distinction of wholes and the definition of dimensions of their differentiation. It is correct to assume that specific qualities of "holistic organizations" will be considerably well developed at higher hierarchical levels. They are mainly represented by environmental and social systems, i.e., very complex wholes, whose study through reductionist methods is probably unsuitable or possible only in a limited way (see, e.g., experiments in "social physics"). At the same time, the absence of regularities discerned at these levels of organization of reality is primarily responsible for the unevenness of current scientific knowledge about reality as a whole.

Increased interest of this type of research in sociogeographical issues focuses additional assessments mainly on questions of the geographical organization of society. However, in exceptional cases they can also be relevant when the above-mentioned general problems are considered because sociogeographical systems contain both, interrelated environmental and social structures. As a result, the following brief outline of the development of geographical (sociogeographical) thought can serve to graphically illustrate the difficulties encountered when structures of the highest forms of holistic organizations are studied. At the same time, the contradictory nature of alternating concepts generates crucial questions in this study.

The development of geographical thought can be generally characterized by discrepancies when compared to other social sciences as well as the natural sciences. Given the necessary generalizations, it is correct to stress the progressive and cumulative directions in the progress of natural historical knowledge. By contrast, regarding social (as well as philosophical) knowledge, alternative approaches and concepts (schools) are dominated and have developed in parallel. The development of (socio) geographical thought is typified by a succession of alternative (often very different) concepts. This alternation is primarily based on the polarity of idiographic and nomothetic approaches to geography which, in a number of respects, corresponds with the polarity of holistic and reductionist approaches in its specific and mediated form.

The first significant concept in the modern (post-descriptive) era appeared as geographical/environmental determinism (mainly from von Humboldt and Ratzel). It assumed that society and its geographical organization and progress were basically determined by natural conditions. At the end of the 19th century and at the beginning of the 20th century this overly general and one-sided reduction of the complexity of geographical reality was gradually replaced with the concept of the French school of "geographical possibilism" (mainly via Vidal de la Blache). It stressed the activity and alternative behavior of humans in relation to the natural environment, although it discerned no evident system of regularities reflecting the character of interactions between nature and society. This led to the dominant role of regional synthesis as the climax of geographical study and synthesis a focused on defining the peculiarities of individual regions. This trend toward a holistic and pronounced idiographic concept of geography continued in the research conducted by Hettner (1927) and Hartshorne (1939, 1959). In the 1950s there was another basic change. Influenced by positivism and development of the modern methodology of science as well as the disappointment with the descriptive nature of geography, a young generation of American and British geographers developed geography as a spatial science. The reduction of content complexity of geographical systems to mere spatial structures simultaneously created conditions for the mass quantification of geography (see, e.g. Bunge, 1962, Haggett, 1965, Harvey, 1969). This meant, in a sense, a return to an older school of "location theories" (Christaller, 1933, Lösch, 1940) and to the original ideas of the neoclassical economic school. However, these attempts failed to bring expected results in terms of laws of spatial organization.

The concept of geography as a spatial science was soon criticized, especially because of the loss of qualitative content in such analyses. The criticism highlighted the absence of human activities and human subjectivity. Since the late 1970s there has been another turn toward the creation of "postpositivist" geography characterized by a diversity of research methods and problems. In the case of social geography there is a pronounced sociologization and transformation of social geography into a "purely" social science (see, for example, comprehensive assessments – Cloke *et al.*, 1991, Holt-Jensen, 1988, or concepts of a realistic social science – Sayer, 1984). Paradigms of the social sciences and the polarity of structuralist and realistic approaches on the one hand, and whereas voluntaristic approaches on the other have been adopted as well. The social sciences in recent years have seen an expansion of postmodernism into geography. This has further weakened the tendency to search for regularities as well as to search for order in geographical reality. Moreover, the very exchange of the "geographical" for the "social"necessarily limits the opportunities of sociogeographical explanation itself because the "geographical" only becomes a complementary perspective on social problems. This perspective mainly focuses on ascertaining variability of social structures and processes caused by specific local/regional conditions. This has meant to a degree a partial, though latent, return to the idiographic approach and to a sort of radical idiographic social geography (see also the strong influence of critical theory – Habermas, 1975, and many other authors).

The succession of epistemologies in geography can also be understood as movement in a circle – a return to initial questions. This unsuccessful movement also complicates the question about the relationship between physical and social geography, and the possibility of an integrated geographical knowledge. Typically, when examining the unity of geography, positivist and postpositivist schools, (which criticize each other) are also contradictory. Postpositivist geography, which is strongly holistically defined, emphasizes the dualism of geography (see the assertion that social geography is a pure social science), while reductionist positivist geography "boasts" of overcoming this dualism. However, the assumed integrity of geography by positivists was only achieved as a result of the reduction of both natural and social forms to mere "spatial" forms. Erstwhile discussions in the former Soviet Union, dealing with the problem of the unity of geography (see for example the discussion between monists and dualists, such as Anučin, 1960), did not successfully resolve this crucial question either. In this case, however the failure was caused primarily by the dogmatic insistence on Marxist tenets (dualists stressed that a study of natural and social forms of the movement of mass within a special science was "impossible") on the one hand and speculative philosophising about geography by monists on the other.

For all the generalizations noted above, describing the development of geographical concepts, one can arrive at several conclusions of a general type. Immediately, there is, of course, the pessimistic conclusion that there is an insufficient level of current geographical knowledge. However, it is better to stress the complexity of geographical reality, especially in the sense of a hybrid form of phenomena and processes. These cannot, of course, be arranged into a simple causal chain. However, the complexity and qualitative heterogeneity of phenomena and interactions in the geographical environment does not seem to allow an in-depth comprehension of environmental organization and limits the opportunities for study to the mere description of situation. As a result it is possible to identify fundamental questions both the concept of the very object of geography and the concept of order in the organization of geographical systems. In the former case, the objective is to find specificities of geographical structures as a certain hierarchical level in the organization of reality. While the definition of "object" of geography does not involve any problems (the landscape sphere of the Earth), the concept of its subject (what and how it comes under observation) is unclear (see the above-mentioned extremes of "only spatial structures" on the one hand and the all-inclusive concept of regional syntheses on the other). The other crucial question is posed by the existence/non-existence of geographical regularities. Is geographical organization really a result of random, more or less non-replicable, combinations of phenomena and their relationships or are these combinations ruled by some hidden principles? The enormous complexity and peculiarity of geographical entities (towns, lakes, regions) is often considered as their principal quality (idiographic geography), while partially ascertained recurrence do not have general validity or can be explained at simpler levels of organization of reality (alternation of day and night and seasons as well as vertical and horizontal zonality). Finally, the concept of the organization of the "whole" is unclear as well. This can be understood "only" as a superstructural (holistic) and relatively autonomous structure or as an all-inclusive (integrated) structure, embracing parts and interactions of parts and the whole.

In geography the importance of the problem of ascertaining complex wholes and relevant conditional principles is probably felt as an intense issue, but similar questions have also arisen in the case of biology, the social sciences, earth sciences and of course in the case of synthesis of science in general. However, from the viewpoint of overall science, it is better to stress first the initial polarization of efforts to integrally seize reality, represented by physical reductionism on the one hand and holistic philosophy on the other. In the former case there is an emphasis on the fundamental, cognitive role of physics (see, for example, Zeman, 1985) and its methodological advancement (as a model for all empirical sciences). The universal validity of physical laws was expressed by Barrow (among others) in the title of his book (Barrow, 1991 – "Theories of Everything"). Since all "complex" structures can be reduced to a physical substance, they have only a superstructural nature of secondary importance. However, the specificity of complex wholes, expressed by their autonomous qualities integrated by the relationship with their environs, and the organization of their elements from the viewpoint of ensured functioning of a whole, etc., has also suggested other approaches, which have often posited the whole against the outside parts. Until now, various "philosophies of wholes", especially of holism, have been justified more by explaining the incomplete nature or insufficiency of reductionism rather than a search for something new or substantial. The understanding of the whole has remained vague and mysterious. As a result, the main contribution of holistically oriented philosophies is limited to critical reviews which can of course provoke new ideas and raise new and vital questions.

Based on various sources (many special sciences) the basic polarity described above has been developed and, in certain respects also surpassed by a combination of "certainties" gained by reductionist methods and "impulses" stemming from the criticism of incomplete knowledge and speculatively established possibilities of autonomous functioning of "wholes". Basically, one can distinguish methodological and ontological orientations of this development – see also Figure 1. In the former case these efforts resulted in the emergence of a systemic science, initiated by von Bertalanffy. Originally, an effort was devised to build a picture of reality as a hierarchy of structural levels. In this case the crucial role was played by both holistic impulses and empirical results, especially from the sphere of biology. At the same time, there was an emphasis on the need for a precise description of structures, interactions and holistic qualities of systems. On these grounds, methodological approaches, the content of which was meagre, took precedence over empirical approaches. Nevertheless, a number of results has at least suggested possible specific qualities of "holistic" organizations (e.g. equifinality behavior), and there was postulated the basic difference among the energetic, material and informative organization of systems, while some analysis of real systems have also enriched previous ideas in the sphere of classification of both, empirical sciences and levels of complexity in reality (e.g. Boulding, 1956). Applications in the partial sphere of empirical research have often facilitated a desirable combination of reductionist and holistic or, more correctly, systemic approaches (the need for this combination was stressed by Lüttge, 1966, among others).

Regarding ontologically oriented efforts, it is correct to distinguish various tendencies in the natural and social sciences. Holistic and systemic approaches are undoubtedly essential in social sciences as complex hierarchical systems are most clearly developed in this arena and informatively conditioned organizations prevail over energetic and material organizations, etc. Relative autonomy of societal superstructures and interactions of parts and wholes (such as citizen–state) are also significant in this sphere especially because of the activity of partial as well as holistic structures. This pronounced systemic nature of social reality basically rules out the possible use of reductionist methods because an isolated study of "simplified" elements can lead neither to any understanding of the organization of the whole or to the understanding of the role played by elements themselves. Instead, this tends to intensify differences in the concept of regularities of natural and social reality rather than lead to their unification and to the finding of general order. At the same time, since the complex and stochastic nature of structures and interactions in society render it difficult to find a general model, there is a dominance of alternative and insufficiently convincing hypothetic constructions, while relative uniqueness of social phenomena or systems is often stressed. As a result, an integral examination of social reality is largely based on the definition of the problem. This is clearly seen in the stress on the scale viewpoint (see for example globalization, global problems) or on an ecological viewpoint, which widens the sphere of the social sciences to include ecological questions and interactions of society and nature. In this respect, there was an outstanding stimulus provided by research sponsored by the Club of Rome. It combined systemic approaches with a social and natural awareness of problems. This occurred through an integrated effort focusing on problems, which meant a more or less pragmatic approach (see, for example, Meadows *et al.*, 1972, Meadows *et al*., 1982). The recommendations resulting from these studies have been more or less centered primarily in the decision-making sphere and toward a change in the global policy of the human community (an example with geographical involvement can be seen in the conclusions of a conference held in Dartmouth College; Young *et al*., 1991).

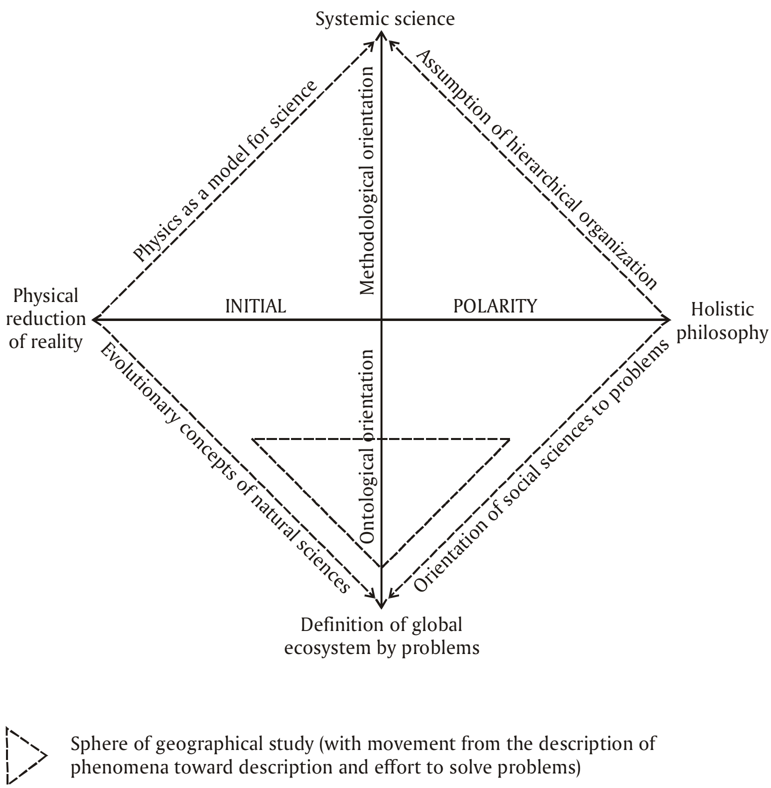

Figure 1: Types of Integrated Approaches in Science

Other sources of movement toward integrated knowledge of reality can be found in the sphere of natural science. Here, the decisive role is played by an evolutionary approach when assessing natural reality, both at individual levels of evolutionary complexity of nature (cosmological, geological and biological) and at the level of the totality of nature, which also embraces in certain respects the development of society (special importance can be attributed to research in the sphere of the biosphere and noosphere – Vernadskij, 1944, 1988, Teilhard de Chardin, 1956). These scientific research trends also created a broad philosophical construct, e.g. naturalism, and sparked the emergence of ecology and environmental sciences as well as the development of interdisciplinary approaches in this sphere. Afterwards, the evolutionary principle related to the differentiation/classification of real phenomena and empirical sciences since the time of Saint-Simon and Hegel was also applied to entire (geo)spheres (see classification by Kedrov, 1955, 1961, which extends Engels' linear understanding of the succession of forms stemming from the movement of mass). This work has embraced in a more variegated way the evolutionary unity of reality (in geography or in geosciences see, e.g., Kruť, 1978, Ljamin, 1978). The contribution of this research was vital to the analyses of environmental systems, including the planetary or global order (the circulation of elements, energy flows, food chains, etc.). Nevertheless, a "one-sided" progression from part toward the whole was still the dominant trend. The whole was only understood in a certain sense such as a large segment of reality, but having the same quality as study of the parts. Moreover, there prevailed a stress on the energetic and material substance of internal interconnection of the global system.

From the latest efforts to combine natural and social knowledge major attention must certainly be paid to the creation of sociobiology as a border science in which cognitive ambitions are enormously broad and eventually result in an emphasis on a need as well as possibility of the unity of knowledge (Wilson, 1998 – but Wilson views the path toward integrity as simply reductionism). Analogous to the transfer of biological information is an assumption of similar cultural mechanisms (culturegenes). Social development is conceived as a complex combination of biological and cultural forms (the concept of "co-evolution"), while the biological foundation is not only one of "potential" of cultural activities but also a basic source of evolutionary orientation (Wilson, 1975, 1978). However, since the growth rate of societal evolution is one order higher than that of biological evolution, the concept of sociobiology is challenged by most social scientists. In addition, social institutions are in some respects superstructural organizations oriented to humans and their link to the biological substance of people is mediated in a complicated way and probably weakened by the development process. On the other hand, this reveals major factors of biological and social behavior. From the viewpoint of the natural sciences there have also been attempts to surmount the dualism of natural and societal as well as partial/specialized and unified/synthesizing knowledge which involved integrated knowledge of reality. However, such diverse efforts and currents when creating a synthetic picture of reality have only been a sign of the need for and importance of such a synthesis. The discovery of an order in the organization of reality in all of its qualitative variety and complex structuration is still lacking. This creates conditions for doubts as to whether syntheses and comprehensive scientific knowledge are possible and also conditions for the combination of scientific and nonscientific approaches (such as the esoteric concept of the movement "New Age", Capra, 1984).

At the close of this chapter it is crucial to critically comment on the sense of the previous observations as well as a program of future research. First, it should be stressed that the range and complexity of the selected issues render the usual way of discussing literature almost impossible. This is why the opening section was deliberately reduced only to a framework outline of diverse approaches to the search for theories, or often only concepts, in a search for the creation of a synthetic scientific picture of reality. Understandably, this simplification was enforced by the writer's inability to reach the level of a polymath. There were also other reasons. First and foremost, one has to conclude that there is an absence of obvious scientific constructions of an integrating type and the relevant systemization and hierarchization of existing concepts leading toward synthesis. The previous simple outline of literature has made it sufficiently clear that previous attempts have been relatively isolated. The example of the polarity of holistic speculations and (physical) reductionism was just one of many examples of this type. A similar polarity can be seen in the largely methodologically oriented, and therefore very abstract, study of the relationship between parts and whole in the system analysis and in the "ontologized" study of qualitatively specified of types of wholes and their parts. Obviously, since the relationships of the type, atom–molecule; molecule–organism; organism–biological species; man–society; society–nature, etc., are in a number of ways very different. In order to understand them, one must find not only joint, but also specifying, characteristics. Undoubtedly, the set of distinguishing characteristics can also be systematically organized. There is the immediate possibility of an organization in the sense of the polarity of the general and specific. Quite a different type of the hierarchization of these differences is offered by the differentiation of parts/wholes from the viewpoint of "completeness" of their content, scaled from its highest level which is represented by the entire reality. What place is assumed in such a hierarchy by the "environment" itself? What kind of whole is the environment? In a number of theories of critical importance, such as Darwin's theory, the environment is conceived of as an entity of principal importance but is not further defined. Does the environment have any specific organization or is it just a random summary of everything? Should the environment be understood as the “environs” of elements such as biological organisms or as an all-inclusive system?

One might ask a large number of such questions. The very question of what is and what is not a real whole is controversial. The variability of real wholes from the viewpoint of their integrity is also obvious. Understandably, an attempt to answer the questions above requires multilevel research. First, there is a need to draw up a basic classification of real wholes, which cannot, however, be understood as a simple determination and labeling of their type sets. In this case a major role is played by the search for substantial principles differentiating real systems and principles of their hierarchization. The principles serve not only as the classifying distinction of partial wholes, but also the expression of structuration/hierarchization of the entire reality. Since there can be, of course, more principles of hierarchization, an effort will be made to distinguish their importance and to combine them mutually. In further stages such a study will gradually search for regularities in the differentiation of qualities of real systems and there will be a discussion of the causes of these differentiations and interactions between and among various types of systems, etc. However, the range and complexity of the whole issue on the one hand and a specific interest in the sociogeographical issue or the problem of society in the environment on the other hand enforce to distinguish two levels of assessment. This is why the method described above was first implemented at a general level (Chapters 2–4) and then at a relatively specific level (Chapters 5–7). The organization of the entire study is therefore largely oriented “from above” or from the general toward the specific and from the integral to the partial. Priority is given to the general issue concerning science as a whole, while sociogeographical questions alone tend to fill the role of stimuli for the study and illustrate its possible elaboration toward special problems.

2

TYPES OF HIERARCHIES AND THE CLASSIFICATION OF REAL SYSTEMS

When studying specific parts of reality every scientific discipline initially wants to gain a sufficient information set about real phenomena and subsequently sort them into a form of classification (systemization). The biological taxonomy or periodic table of elements are examples of this procedure. However, a similar systemization of all elements, subsystems, partial systems, etc. in reality is still lacking. This is also the cause of an unsatisfactory orientation when reality is studied in an integrated way. The one-level "philosophy" of relations between the whole and parts conflicts with the multilevel nature of the hierarchy of reality, with the step-like nature of partial/holistic forms. Sometimes, there is tension in this relationship in terms of scale perspective (microregion–macroregion) or, instead, in terms of a qualitative perspective (homogeneous part–heterogeneous whole). There is also the omission of the assessment of the integrity of wholes as well as of the distinction of an "only holistic" and all-inclusive (integrated) structure of wholes. The hierarchy of levels tends to be associated with developmental complexity rather than with the distinction between parts and wholes. There is also an insufficient specification of the hierarchization in terms of the relationship, general–specific, from the viewpoint of its possible ontological content.

Finally, the crucial and initial role of the classification of real phenomena/systems in the process of an integrated study of reality was emphasized at the close of Chapter 1. At the same time, it was suggested that, since this classification is multidimensional, it cannot be only reduced to the polarity of the parts and the whole. However, it is not only correct, but also necessary to start forming this classification simply by determining various levels of completeness of wholes (parts) as they express primary structural organization and hierarchization of reality. The determination of this differentiation with a certain form of hierarchization of reality implies that this will be an ontologizing (realistic, naturalistic) concept of the classification of wholes and their parts. The basic distinguishing criterion, i.e., the criterion of "completeness" of wholes can be measured in relation to reality as a final, all-inclusive whole, meaning the whole of the highest order. In this sense the polarity of a whole and parts is expressed in a concentrated way by distinguishing individual, qualitatively specific phenomena (molecules, organisms, people, etc.) on the one hand and their co-existential grouping constituted by the environment or its relatively autonomous parts/sub-systems such as regions, eco-systems, etc. on the other. Accordingly, two basic types of wholes, different in their order, as well as their types of relationships between the whole and its parts, will be subsequently distinguished (see also Hampl, 1989, 1994, 1998a, Hampl *et al.*, 1999):

(i) Elements which can be generally described as bearers of basic, specific qualitative forms of material organization such as atomic, molecular, biological or (bio)social forms. The integrity of these wholes is relatively stronger and primarily conditioned by internal links between parts. Furthermore, in a broader context, one must stress the evolutionary conditionality of this integrity, i.e., also the "internal" integrity of individual elements with their type/generic set, expressed by the homogeneity of this set. The integrity of these types of sets, too, is of an evolutionary nature as it reflects the links of all elements to the same "lower elements," like their emergence, etc. Elements, individual people, plants, molecules, atoms or elementary items may be regarded as "basic units" studied by individual empirical sciences in which the degree of knowledge is relatively sophisticated, including also a sense of the cognition of their internal structuration (whole–part). This structuration also varies in importance in a number of ways at various levels of evolutionary complexity of elements: in particular the inclusion of lower elements into higher ones in the inorganic realm (elementary items–atom–molecule) on the one hand, and the "evolution" of entire elements (organisms) in the biosphere on the other. The extreme frequency of elements, the strong integrity and autonomy toward the environs, and the considerable evolutionary specificity of their internal organization make it possible to exclude subelementary levels of differentiation from the following assessment which focuses on discerning the integrated organization of reality. As a result, the level of elements will be considered in additional observations only at the most detailed level of the structuration of reality. The inclusion of lower elements into higher elements noted above within the inorganic and related "primitive" biological reality (see molecular biology) sufficiently explains this simplification because differences between basic elements also largely express the nature of subelementary structurations.

(ii) Environmental systems are here generally conceived as systems of relatively autonomous elements, systems integrated not only by interrelationships of these elements, but also by relationships with the broader environmennt or the organization of the whole reality. The degree of integrity of these wholes is relatively low and the character of their internal and external conditioning links can be identified as a co-existential (environmental) type. The set of environmental systems is internally greatly differentiated first, from the viewpoint of the multilevel structuration of the relationship element–environment. As a result, the main distinguishing criterion appears in terms of the comprehensiveness

> of these wholes, expressed first by the extent of qualitative diversity of both elements included in them and influential (conditioning) external factors. This step-like arrangement is exemplified by the series: man–social system–sociogeographical system–the final environmental system. When the substantive level gradually increases, genetic connections between "parts" are basically supresed while the dominance of co-existential/ecological influences intensify. This basically results in the replacement of internal influences (conditions, factors, impacts) with external influences or of integrity based on evolutionary way (elements) with a co-existential or ecological integrity (environmental systems).

Differences in the concept of elements as "lower" wholes and of environmental systems as "higher" wholes are shown in Figure 2 in a simplified form, where another, substantial distinction in the concept of whole or its conten is illustrated. In fact, two definitions are possible here. Either the content of a whole is understood in **its completeness** – thus involving "internal" structures and innfluences of its parts (see integrated reality in Figure 2) or simply the resultant organization of parts within a whole while internal structures of parts are not noted (environmental systems in Figure 2). In the latter case, **the holistic structure of a relevant whole as a specifically autonomous organization** with an external (superstructural) position regarding included parts is specified. Both concepts of the content of a whole are often confused in science, leading to a great lack of clarity (see for instance the discussion of relationships between social structure and indivuduals in critical realism, structuration theory and institutional economics – Hodgson, 1999). Hence the need to emphasize this difference and to coin relevant terms. The text also employs the adjective **integrated** to denote the former concept of wholes with a complete content. As regards the latter concept, prevalent in science, no special term is introduced. The distinction described above can be illustrated by the example of society as a concept. The case of the concept of a complete content – integrated society – includes three basic levels of organization of society: the human population/mankind; social organization; the geographical organization of society; and their mutual impacts. In contrast, in the specific concept there are three autonomous structures: the set of people as a relatively homogeneous type of (bio)social element; a social system with internal hierarchization such as the distribution of wealth and power among social groups; a sociogeographical system consistent with the hierarchical organization of the settlement system. In distinguishing the two concepts it is also possible to express in a dual form the relationship of parts and wholes and, at the same time, to "surmount" the methodological relativity in this concept. In the former concept it is correct to note first the "inclusion" of parts into a whole (people–integrated societal system–integrated reality), while in the latter the hierarchization of levels of organization (elements–partial environmental systems–final environment or final structure of reality) should be noted.

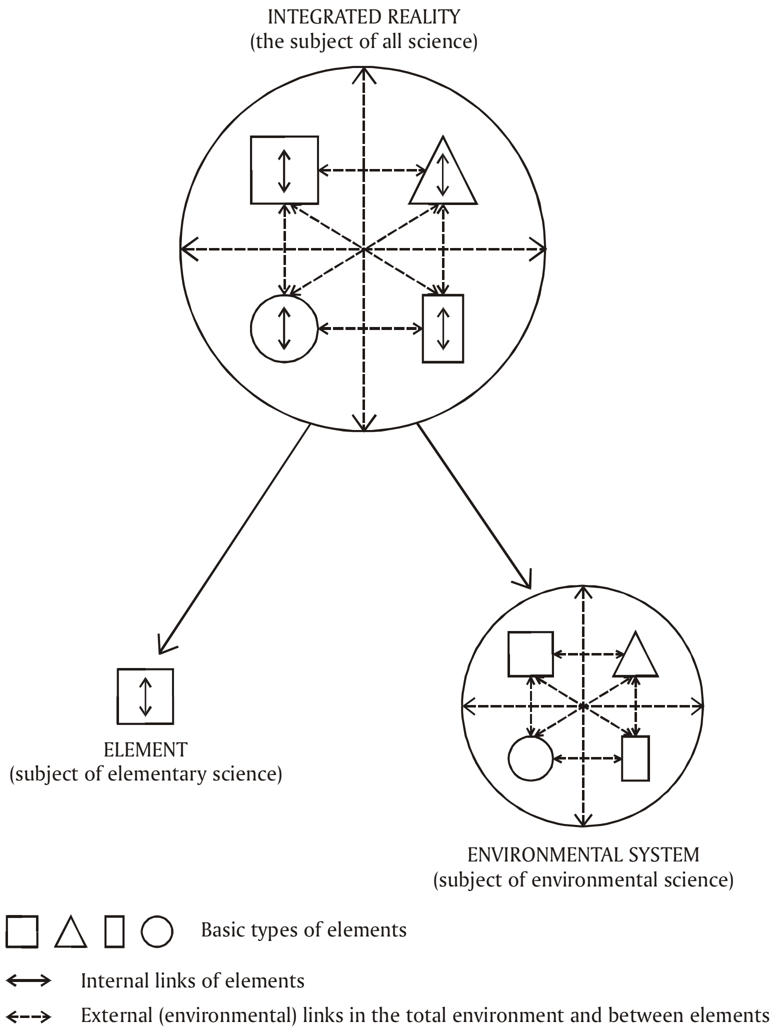

Figure 2: Reality, Elements and Environmental Systems

Source: Hampl, 1994

The concept of an **integrated** whole and the **specific (autonomous)** organization of the whole, depicted in Figure 2, also characterizes the difference in the subject of all science (integrated reality) and the subject of partial sciences.

The earmarked special sciences are of a dual type: elementary, consistent with the usual concept of empirical sciences (chemistry, biology, etc.), and environmental, corresponding with geosciences and ecological sciences which have been difficult to classify. The scheme also expresses the substance of the specialization concerning both types of science. Elementary sciences center on the knowledge of internal conditions shaping individual basic qualitative types of phenomena and not taking into consideration their external environment comnditions (influences). By contrast, environmental sciences do not take into consideration internal nature conditions of elements, the study of the nature of their external interactions, and the creation of ecosystems as well as the final organization of the environment.

It has already been stressed that the relationship between parts and the whole (elements and the environment) consists of several levels and reflects the structural hierarchization of reality. In this sense one must speak about a basic classifying and hierarchization principle, which can be denoted as the **principle of structural complexity**. One can note that real systems were differentiated along this principle, on the one hand (see the succession: man–social system–sociogeographical system–final environmental system mentioned above), while hierarchical levels of structural organization of reality were distinguished on the other. As a result, the principle described expresses both the differentiation and the integration/hierarchization of reality. The level of structural complexity of real systems has a criterion: **qualitative heterogeneity of phenomena that are included and qualitative heterogeneity of external factors (conditions, influences) which shape their organization**. It is, for example, possible to assess the same set of people from the viewpoint of both its demographic structure (relatively independent from the environment) and its geographical structure (conditioned by a set of external factors). In the former case, it will be a structure of a demographic system, whereas in the latter, a structure of a sociogeographical system e.g. a system with a higher level of structural complexity. A total of four basic levels of structural complexity were determined for the classification of real systems. This is basically sufficient when major features of the observed differentiation are to be expressed. They are also chosen because harmonization of divisions at various development levels can be achieved as well. Extreme cases in these divisions are represented both by the **elements** or elementary systems (the lowest level) and **final environmental systems** (the highest level). Together with the total environment they also include relatively autonomous "parts" of the environment which contain all the basic qualitative types of elements at the relevant development level of reality (such as geographical regions).

It is less easy to define two meso-levels in the division described above. In both cases these are systems of elements with a qualitatively limited differentiation or elements of the same basic evolutionary level: inorganic, biological or social. However, the character of interrelationships of these elements and the nature of integrity of these systems must be distinguished. At the lower level of structural complexity these are mainly mutual ecological relationships of these elements themselves, while at the higher level influences of external environment on these relationships are included, too. In the former case the integrity of the system based only internal interactions of its part (internal to the system but external from the parts/elements). In the latter case the integrity of the system is based on mutual relations of its parts shaped under external circumstances. The distinction thus described is illustrated by the social system in its narrow, usual definition or biocoenosis on the one hand, and the sociogeographical system or geobiocoenosis on the other. To denote the former systems (the lower level of structural complexity) the term **ecosystems** was used whereas for the latter, the label **partial environmental systems** was used, because these are "immediate" subsystems of final environmental systems.

However, the use of the notion, ecosystem, is questionable in two senses. On the one hand, content is reduced in the understanding of the ecosystem or its relationships to the wider environment is excluded (they are only included in the partial environmental system which could be therefore called a "geoecosystem"). On the other hand, the notion, ecosystem, was used at a general level, i.e. also for social wholes (social system) and especially for inorganic wholes (such as rocks). There is need, to take into account a number of terminological problems and their probable changes in the future. In this context it is correct to mention differences in the terms used in previous studies (such as Hampl 1994, 1995, Hampl, Pavlík, 1977), in which Czech terms were converted into English terms in a simplified form. The very principle of structural complexity was denoted as the principle of complexity or qualitative completeness, the succession element–ecosystem–partial environmental system–final environmental system was denoted with the terms element–semi-complex–special complex–final complex. However, despite the terminological vagueness, one can assume sufficient comprehensibility of the core of the described division, because of the examples of successions that were presented (see Figure 3).

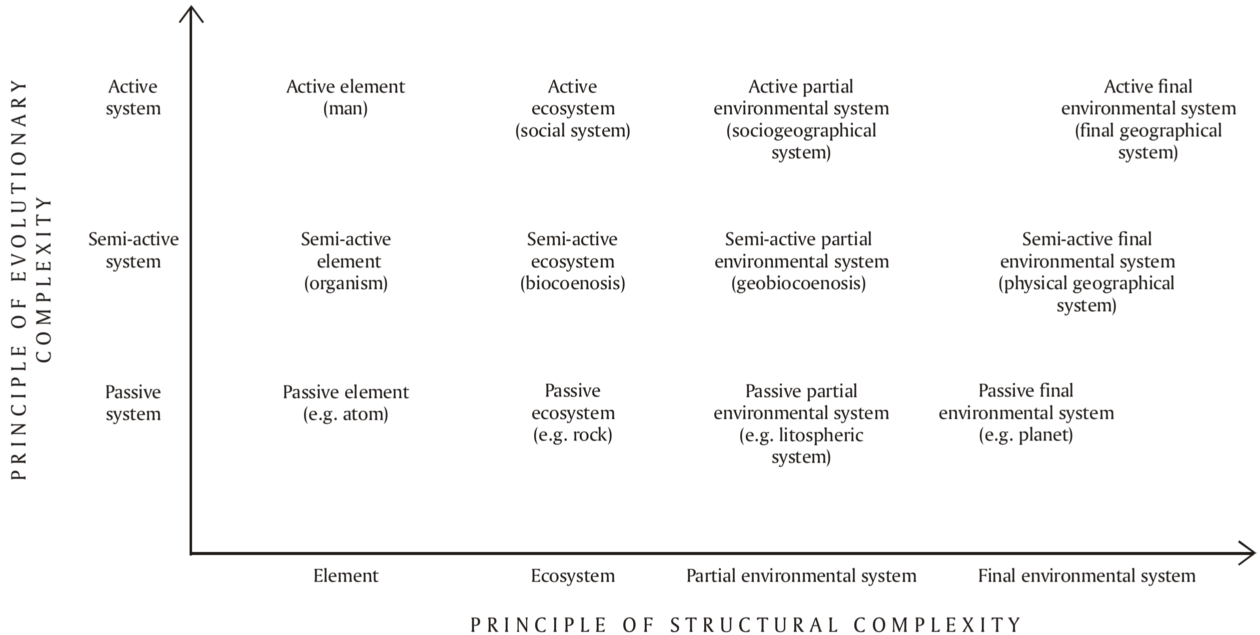

Figure 3: Primary Classification of Real Systems

Note: Organization of final environmental systems expresses a simultaneous increase in their structural and evolutionary complexity.
Source: Hampl, 1989, 1995; Hampl *et al.*, 1999

The basic classifying degrees of structural complexity that were established can be applied both on individual real systems/wholes and their type sets. Understandably, due to the varying frequency of systems at various levels of structural complexity there will be enormous differences in both type differentiation and the range of type sets between individual classifying categories. However, the differences will only be observed in later sections of the text because they are part of the assessment of the "content" when real systems are classified. Similarly, questions concerning individual types of real wholes will only be reviewed in the following chapter because the very concept of a real whole is a matter of discussion or it can be relative. However, a general assumption of relative autonomy (toward the environs) and specific qualities in real wholes is sufficient for the current classifying scheme. As already suggested when characterizing elements on the one hand and environmental systems on the other, there are large differences in the degree of the above-mentioned autonomy and specific signs of various real wholes and in the degree of their integrity. This range of variation can therefore be understood as a variable quality of real wholes which must be further assessed – e.g., from the viewpoint of the dependence on the degree of structural complexity of wholes.

Finally, the issue of classification of real systems from the viewpoint of relationships between parts and wholes must be complemented by including a scale analysis. In the principle of structural complexity a qualitative criterion, (qualitative heterogeneity) was stressed, while the criterion of quantitative scope of a system was regarded as of secondary importance. This is certainly correct because, from the viewpoint of scale there is little and leads only to a form of mechanical classification. Moreover, applying various scales is appropriate (as will be shown later) primarily within the framework of sets of systems at the same basic level of structural complexity. However, it is still vital to consider this form of the relationship between parts and wholes as well: the corresponding classifying principle was denoted as **rank/scale** (microsystem–macrosystem). Although only secondary importance has been ascribed to this principle on the grounds noted above (and it is therefore not used in the primary classification of real systems – see Figure 3) it is necessary to stress the complex nature of this distinction of importance or its dependence on the evolutionary complexities of systems under consideration. Obviously, just the scale organization is significant at a low level of evolutionary complexity (see also various "aggregate" physical charts – e.g., Barrow, 1991).

Given the comments above it is possible to open the evolutionary issue and start assessing another type of hierarchization of reality. Usually, there is a general discussion about the hierarchy of levels of complexity, but the evolutionary differentiation of wholes is only a certain, though concentrated, form of such a hierarchy (a whole is more complex than its parts also). However, the evolutionary differentiation of real systems is undoubtedly among the primary dimensions of structuration/hierarchization of reality, though it is not directly related to the polarity – whole–part – and it only expresses various levels of this polarity. This is why much more attention has been paid in science to evolutionary than to the differentiation along the principle of structural complexity. **The principle of evolutionary complexity** has become the basis both for the classification of sciences (Kedrov, 1955, 1961, Boulding, 1956 and others) and for the integrations of ideas about the evolution of reality (Vernadskij, 1944, 1988, Teilhard de Chardin, 1956 and others). As a result, broadly conceived evolutionary theory can be denoted in a number of ways as the most important result in the history of scientific knowledge of reality. However, it should be stressed that, at this point within the assessment of hierarchical organization of reality the objective is not to ascertain its evolution, but the outcome of this evolution. Evolutionary differentiation is therefore considered as a basic dimension of the structuration of reality. One can immediately suggest a combination of the principle of evolutionary complexity and the principle of structural complexity when a **primary classification of real systems** is drawn up – see Figure 3. On the one hand, this classification characterizes the most substantial differences between real systems and, on the other, both their evolutionary and structural integrity.

The selected division of levels of structural complexity and evolutionary complexity, of course, simplifies in the classification under observation. This was caused by the need to ascertain only the most significant levels of differentiation and at the same time the need to preserve proportionality in combining both primary dimensions of structuration. If the divisions were more detailed, there would be a loss of linear character of relevant successions (especially of various evolutionary branches) and a different step-like nature, displayed by the hierarchization of the type – part–whole – at various evolutionary levels. In this sense one may note types of differentiation with secondary importance and only a partial effect. These two types can be basically described within the study of specific sections of reality and relevant special sciences. In the case of evolutionary differentiation only three basic levels are observable: inorganic–biological–social. Since, at the level of final environmental systems (environment) one can observe the coexistence of phenomena of all qualitative types, the following labels were used for the classification: passive, semi-active, active. This classification is, of course, only relative and is primarily designed to express the differences in substantial qualities of systems: activity in relation to the environs; activity conceived as a sign of development dynamism and variability. In the process of the evolution of reality one can see the emergence and development of new elements at a higher evolutionary stage. This implies a qualitative "enrichment" of final environmental systems. As a result, this leads to a simultaneous increase in both structural and evolutionary complexity in these systems. This vital fact is depicted in Figure 3 by a "shift" of final environmental systems which differ both in their level of evolutionary and structural complexity.

It was stressed above that the primary classification of real systems only expresses substantial differences between wholes and substantial forms of the hierarchical structuration of reality. In a generalized way, levels of secondary importance in both types of differentiation (including subelementary structurations and the rank/scale differentiations) also been suggested. By contrast, it is also possible in a similar way to simplify the primary classification and establish only its most general features. In this sense it is convenient to stress not only the possibility, but also the necessity to ascertain the differentiation of wholes and hierarchization of reality **at various levels of generality**. As a result, the basic system of scientific knowledge of reality is characterized by three basic principles/dimensions, as it is schematically expressed in Figure 4. However, the contents of the designated space is an unending cognitive process. This research can only indicate a general orientation in the systemizing the results of this process.

Because simplifications are associated with any generalization, it may be still correct to consider the three dimensions of the organization of reality and its knowledge as the most substantial. However, the very conclusion that, what matters is both the organization of reality itself and the knowledge concerning this reality, requires further explanation. Although any general scheme of this type is naturally only a certain epistemological construction of order in reality, the dimensions/hierarchization employed can acquire a different ontological (realistic, naturalist) content or sense. This is valid for this scheme, too. **While the principle of structural complexity and the principle of evolutionary complexity distinguish real systems themselves, the principle of generality only distinguishes the signs of these systems**. It is therefore convenient to identify the former two principles (and the corresponding differentiation or hierarchization) as ontological, while the principle of generality (the relationship of general–specific–unique) as epistemological that is, in the narrow sense as a methodological principle. However, if the principle is applied in the real world or if signs of real phenomena are distinguished along the degree of generality (extent of validity, substantiality), then this organization, too, acquires, at least in a mediated way, "ontological content." If one can specify for example the hierarchy of types of elements from the viewpoint of their evolutionary succession and connection, implying an "ontological" viewpoint, one can also use the other (epistemological) dimension to establish a certain hierarchy of types reflecting the degrees "subclass–class–superclass." In the latter case the objective is to distinguish the level of significance in differences or genetic proximity of types of elements to find various important levels of evolutionary successions. At the same time, the evolution of the hierarchy of types, involving the development of type differentiation, is ontologically conditioned as it depends primarily on the frequency of the systems under consideration. As a result, at the level of elements the hierarchy of types will be considerably developed with many degrees and, at the level of a final whole it will be nil (uniqueness of a universal whole). This asymmetry, too, is expressed in Figure 4, in which the "general" is not expressed by a point, but by an abscissa. This indicates another major fact: if the general is to be conceived as substantial and shared, it must involve not only shared signs of "everything" (material homogeneity of reality), but also the most substantial signs of the hierarchical organization (differentiation) of everything.

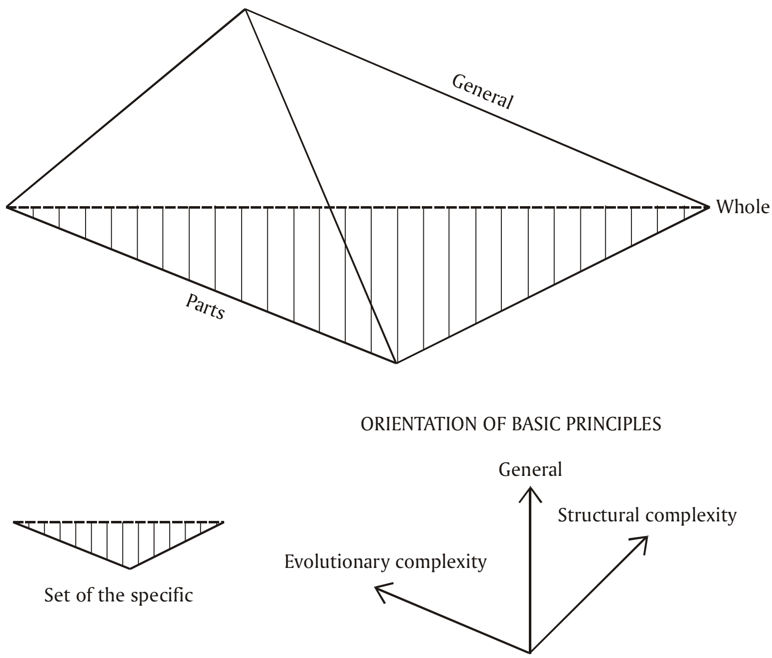

Figure 4: Scheme of Systematization of Knowledge About Reality
Source: Hampl, 1989

The observation of factors shaping the hierarchical organization of reality may be accomplished by repeating the main dimensions of this organization and its relationships and the general nature of entire hierarchy. First of all, not only the multilevel, but also the multidimensional character of the hierarchical organization of reality should be emphasized. In the ontological sense a critical role is played by the "structural" hierarchization along the polarity part–whole (mainly via the principle of structural complexity), which evolves in terms of development in the second dimension – the principle of evolutionary complexity. Various substantial/general signs of both hierarchizations are eventually arranged by the third (epistemological) dimension oriented according to the relationship – general–specific–unique. When gradually specifying an assessment there occurs also a certain proliferation of differentiating dimensions which correspond to potential modifications of primary ontological principles; see the rank/scale principle or parallel of evolutionary successions.

As all basic types of hierarchies have some common signs, these hierarchical organizations can be further characterized in a general way. The first general quality appears in the form of **internal polarization**: part–whole; lower–higher; small–big, non-substantial–substantial, etc. The second feature appears as an **asymmetric relationship** of these polarities from the viewpoint of the distribution of frequencies of cases: many minimums–few maximums, i.e., for example, many parts and a single whole. Finally, there is the general sign of **the trivial** nature of this asymmetry: if possible combinations of parts are not assessed, but only their materialized combinations (i.e., real wholes), there must exist more parts than wholes. Similarly there must be many specific and few general signs. In the case of evolutionary differentiation also one can speak of the necessity of an asymmetry in the frequency of the" lower" and the "higher" – if we take into account the inclusion of the lower in the higher (organisms are also physical phenomena and are subject to physical laws). Theoretically however, if what is lower in terms of evolution is not included into the higher in terms of evolution, the asymmetry noted above does not necessarily occur. The fact that in "our reality" it does occur, is proof of the selective orientation of the evolution of reality which must be explained by some other reasons. In fact, one can note in partial spheres of reality examples in which this progressively oriented selectivity is not valid (e.g., the evolutionary perfection of a certain biological species "as a whole" or the degeneration of a certain type). The importance of **distinguishing the trivial nature of basic types underlying the hierarchization of reality on the one hand, and perhaps the non-trivial nature (conditioned by specific factors) of hierarchical differentiation of partial sets of real phenomena on the other** are further explained in the next chapter.

3

HIERARCHICAL LEVELS AND THE ORGANIZATION OF REALITY

In searching for the order in reality a classification of real systems and a definition of basic principles/dimensions of the organization of reality was needed. However, the mere arrangement and labeling of various wholes in reality do not reveal much about the deep nature of the organization of reality. Therefore, it is critically important to search for regularities in this organization and their eventual clarification. Understandably, the existence of basic regularities must be associated with basic principles of the differentiation of real systems, with the two ontological principles emphasized earlier. However, knowledge of regularities associated with these principles has been strongly unbalanced. While the evolutionary differentiation as well as evolutionary continuity of real phenomena (mainly elements) have been, in a number of respects, ascertained and synthetically classified, knowledge of basic structuration is still quite insufficient as regards the relationship between the whole and its parts. As a matter of fact, the structuration of a given type plays a primary role, both in the sense of describing integrated organization of reality and differentiation of levels of organization between elements and the final environment as an original basis of evolution in general. There is the question of how environmental systems develop and the role played by the interaction of elements in the environment for total evolution, etc. The solution to understanding the relationship between the whole and its parts (elements and the environment) requires two levels of assessment. First, one has to specify the character of regularities bound to the sets of elements on the one hand and to environmental systems on the other. It is only via the next step that the interaction of both types of organization can be assessed or their general unification (see Chapter 4). However, at both levels of observation there will be an evident need to find possible regularities of environmental systems because they are the main "unknown value" here. In fact, it is due to the uneven degree of scientific knowledge that current "holistic" ideas are mainly derived from reality, which is being studied in a fragmented way and is therefore also perceived as such. In the sense of classification assessments in previous chapter one can describe reality, conceived in a fragmented way, as a set of homogeneous sets of elements organized along an evolutionary principle and therefore also along a set of degrees of generality or along a hierarchy of types (kind–order–phyllum–universal set), that have been methodologically established. At the same time it is convenient to describe the hierarchical organization of types as a step-like differentiation relating to the extent of homogeneity of relevant sets, yielding a conclusion about "the material homogeneity of everything." One can note here an emphasis on the homogeneity of sets as an expression of the interrelatedness of their elements (or, directly, their evolutionary similarity or proximity). This emphasis is immediately linked with the orientation of inductive methods and therefore with the usual approach to regularities as a repetition (similarity) of phenomena (see also Ashby, 1956, who stresses that science searches for repetition).

In contrast, an examination of reality from the other side, from the viewpoint of the whole environment, is disorganized and full of uncertainties. The ideas of environmental sciences, mainly geography itself which studies the most complex development forms of the environment, are often of a strongly descriptive and vague nature. The organization of the geographical environment tends to be dominated by differentiation and individual specificities of phenomena (settlements, rivers, geobiocoenoses) rather than obvious similarities. Hence the repetitive claims in geography about its idiographic nature and doubts whether regularities in "total organization" really exist. As a result, **repeatability of phenomena seems to dominate at the level of elements**, but not at the level of environments, meaning that at the level of co-existing (environmental, ecological) "combinations of elements." However, it is also possible that in the case of environmental systems repetition relates to other signs or structures usually observed in contemporary science. Despite the considerable vagueness of all definitions of geography, almost all of them stress the study of the differentiation of the environment and distribution of elements. **Should not repeatability/regularity be searched for in the differentiation of geographical (environmental) phenomena, which means similarity in the differentiation of total sets (systems) of these phenomena?** Despite the limits of previous geographical generalizations one can conclude that the most important results have been achieved in the sphere of observed regularities in differentiation (horizontal and vertical zonation, the rank-size rule, etc.).

The essential importance of the extremely asymmetric form of the differentiation of geographical sets was stressed by Korčák (1941, 1973). His work, however, has not been sufficiently acknowledged. In his research Korčák collected many empirical examples adequately verifying his generalizing conclusion. Many further examples and an elaboration of Korčák's original ideas have been presented by Hampl, 1971, 1989, Hampl, Pavlík, 1977, Charvát *et al.*, 1978. A number of illustrative examples are summed up in Tables 1 to 4.These examples also take into account the special questions of how the organization of environmental phenomena, or real phenomena in general, are assessed. First, one has to stress **the general validity regarding asymmetric differentiation of the sets of environmental phenomena** noted above. Every sufficiently large geographical system (set) is therefore internally organized in this way: the settlement system (set of towns and villages) in the Czech Republic, the USA, Pakistan, etc. just as are the sets of geobiocoenoses, rivers or lakes. A similar character is displayed by the geographical distribution of precipitation, temperatures, jobs or banks. In all of these examples there is a certain type of asymmetry; the asymmetry is positively oriented. The extent of asymmetry can differ **depending on the level of structural complexity and the rank/scale of a system**. At the highest level of "entirety" one can see a positive, extremely asymmetric organization (see Figure 5). This is exemplified by the distribution of population on land or the distribution of mass in the solar system or in the whole universe.

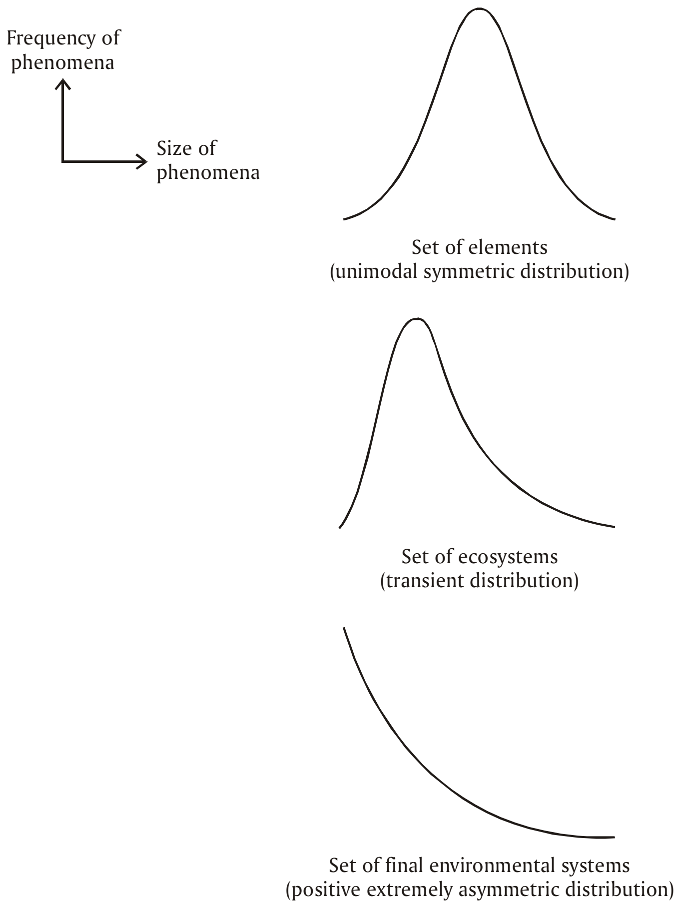

Figure 5: Statistical Distribution of Size Signs of Units in Type Sets with Varying Level of Structural Complexity

Table 1: Variability of Districts in the Czech Republic According to Demographic, Economic and Geographical Characteristics of the Population

	Frequencies according to groups of variation										Variation range, % of average
	1	2	3	4	5	6	7	8	9	10	
Proportion of child population (1991)	1	1	10	9	20	14	11	4	4	3	27
Births per 1,000 inhabitants (1991)	3	1	8	5	20	17	10	7	3	2	39
Average wages of employees (1996)	24	26	9	7	6	2	1	1	0	1	46
Population number per km^2 (1996)	71	1	0	1	0	1	2	0	0	1	1,827

Notes: Variation groups were defined as 10% of the variation range. The total number of districts is 77, but 76 for the number of births (due to the later establishment of the Jeseník district).

Sources: Statistical Yearbook of the Czech Republic 1997, Internal Documents of Terplan and internal publications of the Czech Statistics Office

Table 2: Comparison of Variability of a Selected Set of States According to Demographic, Economic and Geographical Characteristics

	Relative frequencies according to variation groups (%)							
	1	2	3	4	5	6	7	8
	Number of deaths per 1,000 inhabitants							
European countries	-	-	-	52.9	47.1	-	-	-
African countries	-	-	3.1	40.6	56.3	-	-	-
States of the USA	-	-	2	46	52	-	-	-
	Economic standards of population							
European countries	-	5.9	11.8	23.5	58.8	-	-	-
African countries	-	-	21.9	34.4	37.5	3.1	3.1	-
States of the USA	-	-	-	52	48	-	-	-
	Population number per km^2							
European countries	11.8	5.9	11.8	35.3	17.6	17.6	-	-
African countries	18.75	15.65	18.75	18.75	21.9	3.1	-	3.1
States of the USA	18	12	22	24	12	4	8	-

Notes: In this assessment various groups were defined asymmetrically: the limits of intervals were related to the average, gradually to one-eighth, one-fourth, and one half of the average, one value, the double value, four times the value and eight times the value of the average. This may have distorted the curve of the distribution, but it stressed the differences in the level of variability of sets according to the observed signs. The indices of mortality and population density are related to 1974. The economic standard was expressed either as GDP per capita (European countries for 1974, African for 1967) or as income per capita (USA as of 1975). The set of European countries is composed of the former capitalist states, including Turkey, the set of African countries includes 32 units. In the USA the set included 50 units (the District of Columbia was merged with Maryland). Tables are taken from a study by Charvát *et al.*, 1978.

As a result, general features of the organization of environmental systems and sets are analogous with hierarchies of a trivial type described earlier. However, the asymmetric relationship between the frequency and size of settlements, for example, has not a trivial but rather a conditioned nature; “in theory” settlements could be analogous in their size. The substance of this conditioning can be caused by the influence of external conditions, the competition of settlements, etc. However, only the final part of this chapter is devoted to an attempt to explain this situation. Suffice it here to emphasize these facts of general importance:

(i) Environmental sets of phenomena and environmental systems are organized hierarchically (but not in a trivial way). This means „many minimums–few maximums";

(ii) This organization is somewhat contrary to the homogeneity of type sets of elements (the general sense of "normal" statistical distributions when "real types" are ascertained was stressed by Quételet, 1848);

(iii) The difference between both types of organizations of mass phenomena at least proves the probability of autonomy and specificities of both holistic (environmental) and partial (elements and their types) structures in reality and the existence of two fundamental types of regularities.

Table 3: Selected Examples of Variability of Sets of Natural Phenomena

	Length of cuckoo eggs								
Variation groups	1	2	3	4	5	6	7	8	Total
Frequency of phenomena	3	22	123	300	201	61	6	1	717
	Length of main tributaries of 12 selected rivers								
Variation groups	1	2	3	4	5	6	7	Total	
Frequency of phenomena	835	277	60	8	5	1	1	1,187	
	Average amount of precipitation in Czechoslovak districts								
Variation groups	1	2	3	4	5	6			
Relative representation of districts (%)	34	21	25	12	5	3			
	Differentiation of land (without the Antarctic) according to altitude								
Groups according to altitude (m)	–200	201–500	501–1,000	1,001–1,500	1,501–2,000	2,001+			
Proportion of land (%)	27.8	29.5	21.2	9.7	5.6	6.2			
Adjusted relative frequency for the interval of 500 m	69.5	49.2	21.2	9.7	5.6	0.5			

Sources: Fabian, 1963; Korčák, 1950; Hampl, 1971; Korčák, 1963, Staszewski, 1957

However, the two basic forms of organization of mass phenomena described here cannot be regarded as two, more or less mutually isolated, structures. This is verified by a number of sets of "transient type," especially by the sets of phenomena of ecosystems (such as social systems). However, differing variability and form of organization of various types in the same set of phenomena are evidence of the combination of both types of organizations. This is best discernible in population which displays relative homogeneity according to biological and demographic signs as well as signs of potential, social and economic, qualities (such as IQ – see Thorndike, 1928). However, considering signs of economic and social achievement – derived from their position in the social system, i.e., in an social ecosystem – people display considerable differentiation. The resulting shape of this differentiation – a positively partially asymmetric distribution of frequencies – see Samuelson, Nordhaus (1989), when they describe a difference in the distribution of abilities and incomes among individuals, is of a transient type. Finally, from the viewpoint of geographical distribution of people or their grouping into settlements, one can always discern a positive, extremely asymmetric distribution. This is illustrated by the examples of variability of a demographic sign (the number of births per 1,000 inhabitants), an economic sign (average wages), and a geographical sign (population density) of the population according to districts of the Czech Republic – see Table 1. An analogous comparison is provided by Table 2, this time at the level of states. A number of examples of this type for natural phenomena are provided by Table 3.

However, in this case the limited availability of statistical information about natural phenomena obstructs description at the ecosystemic level. Nevertheless, it may also be represented to a degree by geographical characteristics at the microregional level of differentiation, which means at a lower level of the holistic principle even, though it is primarily determined by its scale. Here, the distribution of natural phenomena is uneven in a limited way (see differences in average volumes of yearly precipitation according to the districts of the former Czechoslovakia – however, this phenomenon should be reviewed according to climatic microregions).

It is clear from all of the examples of both natural and social reality that there is a striking polarity marking the homogeneity of sets of elements or the sets characterized by elementarily conditioned signs on the one hand and hierarchically organized differentiation of environmental phenomena or those conditioned in an environmental way on the other. As a result, various degrees of the occurrence of both forms (principles of organization) of ecosystems, partial environmental systems and lower scale systems reflect both the multilevel nature of these intermediate degrees (and their tentative specification) and the mixed conditioning of their organization. These qualities play a major role in the case of social ecosystems, especially in the sense of the possible evolution of variability of this transient feature.

When assessing the peculiarities distinguishing the two observed types of organization and arranging the sets of real phenomena and their combination there arises another extremely important question: **the distinction of size and structural signs** of phenomena. In some signs the sets of environmental types, too, display a relative homogeneity of a "normal" type. This must, of course, relate to the signs defining the types of these phenomena – such as internal polarity of the center and hinterland in a "type" of nodal regions. However, in general this also concerns other structural characteristics which were not used when defining a type of environmental phenomena. For example, the degree of integrity of nodal regions (the strength of the relationship between the center and hinterland related to the strength of relationships with external centers) or the ratio between the size of the center and hinterland are signs in comparison with which the set of relevant regions seems to be relatively homogeneous. In contrast, the population size of these regions is strongly, hierarchically differentiated – see Table 4. On the other hand, when it comes to the set of elements, their homogeneity is displayed according to both types of characteristics – see the comparison between variability of demographic indices "the proportion of children in the population" (a structural sign) and "the number of births per 1,000 inhabitants" (a size or intensive sign) in Table 1. From the viewpoint of structural signs one can therefore speak about relative autonomy and about internal conditioning when creating both these elements and environmental systems, which means when the"type" principle plays a role in general.

Table 4: Variability of Size and Structural Signs of Commuting Microregions in Bohemia (1967)

	Frequencies according to size groups										Variation range in % of average
	1	2	3	4	5	6	7	8	9	10	
Population size	113	1	1	0	0	0	0	0	0	1	1,642
Ratio between the size of hinterland and core	3	6	10	20	18	23	15	10	8	3	178
Level of integrity of microregions	11	14	20	21	14	9	16	6	0	5	225

Notes: Commuting microregions were defined according to the prevailing destination of commuting for work. The index of integrity takes into account the representation of the communities in the hinterland of a centre according to the intensity of working contacts.
Source: Hampl *et al.*, 1978

The statement above about the general nature of the "type" principle requires further explanation. First, it should be stressed that this principle is linked (or even identified) with the principle of universality (general–specific) and, therefore, also with the criterion of repeatability whose occurrence "must" be general (though with the conditioning of the frequency of phenomena and, therefore, in the extreme case of the unity of general and unique in the "only," universal whole described earlier). As a result, the definition of any type always results from a generalization (a lower or higher degree of generalization) based on the observed repeatability of a certain way of organization of (partial) wholes. The existence of this type-specific organization is simultaneously evidence of the relative autonomy and integrity of the relevant wholes. However, the way of internal organization is characterized only by structural signs and is therefore not connected with the variability of size signs of the phenomena of a given type. The fact that, for example, nodal regions are extremely asymmetrically differentiated as regards their size, similar to settlements – internal parts of these regions – is not significant when the type of nodal regions is defined. **What matters is that this manner of differentiation repeats itself**. At the same time, the very differentiation of settlements and their hierarchical organization and a dominant position of the center of a region, characterizes their internal organization and therefore also its type of specificity (its structural specificity).

If one can find in reality, on the one hand, types of phenomena with homogeneity with both structural and size signs, and, on the other, types of phenomena only displaying homogeneity according to structural signs but heterogeneity according to size signs, there is no reason to distinguish between so-called true and untrue forms of types. In fact, the core of this matter is connected with another differentiating dimension than the type principle or the principle "general–specific"; this is the ontological principle and the polarity part–whole or element–environmental system. Nevertheless, in certain regards it is correct to speak about the evident and developed type differentiation in the sphere of elements and about a "blurred" type differentiation in the sphere of environmental systems. However, in this case too, the causes are of an ontological nature and are bound to the polarity, element–environmental system. Regarding the degree of development (variety of type differentiation in the sense of its multilevel nature) it has already been stated that this depends on the frequency of phenomena (there are few wholes, but many parts). However, there is also another underlying factor, which is, at the same time, **the other fundamental sign distinguishing elements and environmental systems**. **It is the varying degree and nature of their integrity**. When there is a transition from the elementary level to the supra-elementary (relatively environmental) level, internal and genetically created factors shaping the integrity of wholes are replaced with factors from the sphere of co-existence (ecological in the broad sense). There is also a multilateral, mutual effect of elements which differ in their evolution, while their relatively considerable autonomy is preserved. At the same time, the creation of environmental systems is considerably influenced by their broader environs because environmental systems, in fact, make up a direct "part" of the universal environment – see Figure 6. All of this extends into their lower autonomy, their loosened integrity as well as the vague boundary toward the neighboring area (see Hartshorne, 1964, and his comment on oscillating borders of regions). Similarly, as individual regions are insufficiently delineated, the same is true for their types of sets due to high individual variability of environmental systems and to the fact that repeatability is limited to general features of their internal structure.

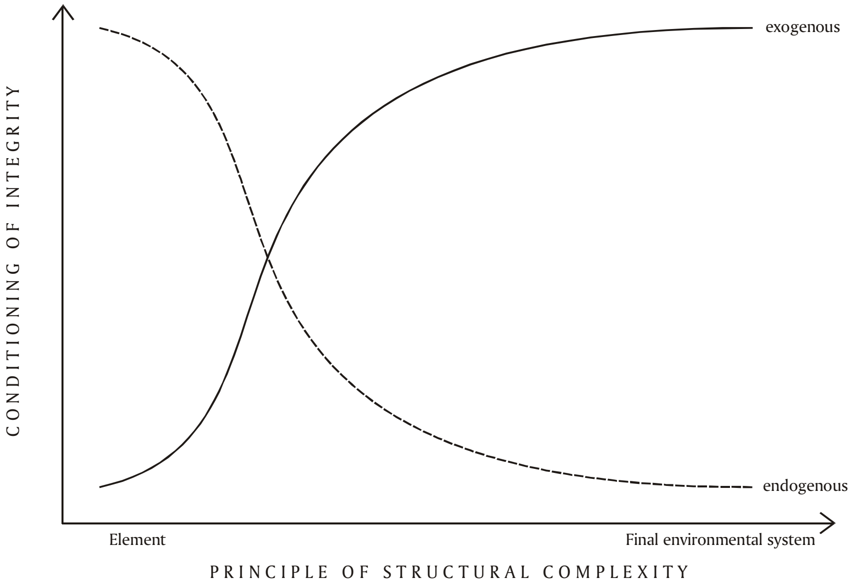

Figure 6: Conditioning of the Integrity of Wholes by Endogenous and Exogenous Factors

This conclusion can be verified again illustratively by the creation of nodal regions. Their internal organization is based on the similar general principles: the spatial division of functions between the core and the hinterland, and the associated development of integration processes (commuting to work, services, etc.). However, there is also simultaneously competition between the centers, a "struggle" for the domination of the biggest possible hinterland, the achievement of the greatest possible development, etc. This competition has an extremely uneven impact due to variously favorable positions, varying quality of economic agents, variously suitable natural conditions, etc. Therefore, one can note a gradual hierarchical differentiation of centers according to their size, importance and scope of their hinterland, though the same type of internal organization of relevant regions is maintained. This preserves their nodality (type) while their "success" (size) is differentiated along hierarchical lines. There are two sources of this uneven result of the "pluralism of the same efforts." First, it is the exogenous conditioning (competition of neighboring centers, differences in position and local natural conditions) noted earlier. However, there is also a certain "internal exogenous nature" of nodal regions (or environmental wholes in general) which reflects an insufficient or loose integration of these wholes and therefore also the conservation of relatively considerable autonomy of its parts (e.g., its individual settlements). It is the autonomy of internal parts which limits the unity of the impact of a region on its environs, enabling the "transition" of individual settlements into the sphere of influence of other, stronger, centers, etc. At the same time, the multiplicity of relatively autonomous parts (settlements) can be – at least partly – integrated into the form of a region by a certain force, which is borne in this case by its largest part, i.e., the center itself. **As a result, the hierarchical principle is not only a certain external differentiating force, but also an internal, unifying (integrating) and organizational force**. Evidently, if settlements (parts of environmental systems) were equivalent, they could not be integrated into a regional system (an environmental system).

The integrating and organizational role of hierarchical principle described earlier is also connected with the dual form of asymmetric distributions from the viewpoint of the size of observed "units." On the one hand, this involves relatively autonomous and integrated units such as settlements, rivers or entire regions, i.e., units in the true sense. On the other hand, this only concerns areas determined by their scale in which the intensity of a certain phenomenon is assessed such as the population per km^2, the volume of precipitation per a unit of area, etc. The resulting characteristics describing the distribution of phenomena under observation are analogous in both cases but the sense of results differs. The unevenness in the spatial occurrence of a certain phenomenon itself is to a large extent only a superficial expression of geographical differentiation. Only if such uneveness is connected with the extent of autonomy and integrity of "real" units, and if the integrating relationships and external interactions of these units are involved does the whole assessment acquire a true value. This remark is vital for geography which is often restricted to phenomenological description, that prefer spatial forms of organization. The substance of an environmental (hierarchical) organization is deeper; it is of a qualitative type and its spatial expressions are of only secondary importance. Given the superstructural nature of environmental wholes and their loose integrity, geographical regularities are of only a general/framework nature and are only "visible" by significant signs of differentiation. This is why hierarchical differentiation and often also "irregular" spatial forms of this differentiation are always found in geographical systems. As a result, efforts to describe regular spatial forms in the distribution of geographical phenomena exactly have not been successful (see, e.g., the central place theory).

Although empirical foundations as well as applied methodological instruments of previous observations are undoubtedly simplifying, it is possible to consider the such results as sufficiently general in order to describe the nature of the relationship between parts and wholes in their ontological specification, i.e., as the relationship among elements, partial environmental systems, final environment and reality as a whole. The selected empirical examples were also illustrative rather than verifying. The ensuing discussions have hopefully sufficiently proved a deeper sense of the differentiation described earlier which, thanks to its essential importance, "must" also be identifiable through simple empirical characteristics. This is connected to the interrelatedness of the assessment of mass phenomena (type sets) and individual phenomena (representatives of these sets). But, while major signs of differentiation as well as conditions of step-like levels of the relationship between elements and the environment have been defined an assessment of the evolutionary differences in this relationship is still lacking. Compared to the knowledge of the differentiation of the type whole–part, acquired knowledge of the regularities guiding the evolutionary differentiation of real phenomena is considerably richer though largely only at the level of elements. On these grounds one can focus further observation only on assessing whether the evolutionary differentiation of elements and environmental systems agrees according to the most general features of this differentiation. Special questions of the evolution and evolutionary differences in ecosystems and environmental systems will be dealt with in an independent observation.

The primary question to be posed is whether there is a "reproduction" of the polarity element–environment at higher evolutionary levels. Empirical examples from Tables l to 4 verify similar polarities of this type both in nature and society. Similarly, one can highlight the possibility of specifying relatively autonomous wholes with varying degrees of structural complexity at all levels of evolution – see Figure 3. In this sense it is basically correct to establish "symmetry" in the development of the polarity noted above as well as **the reproduction of the homogeneity of types of elements and hierarchical differentiation of final environmental systems or their sets**. The "disturbances" of the symmetry, which are of secondary importance, are of dual type. First, there is the cumulative nature of the evolution of final environmental systems in which there is a simultaneous increase in both evolutionary complexity and internal qualitative heterogeneity – this asymmetry is also depicted in Figure 3. However, the cumulative nature of development can also be attributed to a limited extent to ecosystems and partial environmental systems because this is generally the evolution of co-existenting/ecological interrelationships between elements of diverse genetic lines. The second "disturbance" appears in the form of a varying richness of type differentiation and evolutionary ramification generally conditioned by an increasing frequency of wholes depending on the declining level of their structural complexity.

Second, it should be emphasized that an evolutionary progression has **a general selective orientation**. From the viewpoint of the whole reality this orientation is undoubtedly true because, compared to the weight of the inorganic world the weight of live organisms, let alone humans, is tiny. This is true for the frequency of elements distinguished according to their quality (evolutionary levels). However, it is also true for the scope of the environment with the occurrence of various evolutionary forms as regards both final environmental systems and elements. There is a tremendous difference between the inorganic and live worlds, but a relatively small difference between the scope of the geobiosphere and geosociosphere. Moreover, one can discuss questions of defining the geosociosphere either as permanently inhabited land or as a spatial framework for the movement of humans. However, we still do not know whether there is life on other planets, other galaxies, etc.

Finally, it is correct to conclude that there is also an agreement in basic signs expressing the complexity of the organization of elements and final environmental systems at the same evolutionary level. In social or sociogeographical systems, too, one can ascertain a highly active relationship to the environment and, a higher complexity of internal organization, including the strong effect of competition (see the competition of centers, already discussed) and cooperation (the social and spatial division of labor), and the extreme rate of change in development, etc. In contrast, in biocoenoses and similar systems the signs noted above are of a type at a lower order, and their relationship with their environs is only of an evidently adaptive type. When making these comparisons it is beyond doubt that inorganic environmental systems must be labeled relative passive. However, as their nature is cumulative in the sphere of development, the evolutionary differences have some specificities in final environmental systems. In the process of evolution their qualitative heterogeneity increases while the heterogeneity of associated hierarchical organizations rises.

The basic regularities, bound to the differentiation of systems according to the holistic principle (structural complexity and scale) and the evolutionary principle, may have been "found" in the course of previous observation, but have not been sufficiently explained. However, given the current state of knowledge it is very difficult to explain why the size differentiation of phenomena within type sets of elements is limited whereas within type sets of environmental systems it is extremely and hierarchically organized. Why is integrity of environmental systems relatively weak and that of elements relatively strong? Why is the evolution of elements and environmental systems selectively oriented? All of these are questions of vital importance which should determine the direction of further research. It is possible to suggest some assessing priorities which might be useful. Basically, one can distinguish two types of aspects: those mainly stressing formal or quantitative viewpoints and those primarily emphasizing the content or qualitative viewpoints.

The formal approach centers initially on the question of the varying frequency of phenomena and associated probabilities of their repetition. There is an evident link to the basic dimensions of structuration of reality and corresponding trivial hierarchies. The frequency of elements is enormous, while that of environmental systems is limited a situation which conditions **the varying probability of their repetition**. It is also important to note the relative simplicity (or a limited number of signs) of elements, as well as the relative complexity of environmental systems as a combination of elements. In the case of environmental systems there is therefore a significant difference between the number of potential possibilities of their organization (combination of elements) on the one hand, and the number of achieved organizations in reality itself on the other; as a result, with the growing complexity of wholes, the probability of repetition decreases. These statements explain the basic difference between the homogeneity of the types of elements and the heterogeneity of types of environmental systems, but not the form of differentiation of type sets of the other type. In the case of the set of environmental phenomena this may sufficiently explain their minor (blurred) type differentiation (limited repetation according to structural signs, though with the conservation of their relative type of homogeneity), but not the "regularity" of a pronounced hierarchical differentiation according to the signs expressing size or importance. There is basically a need to explain the scarcity (low probability) of the creation of "maximum" environmental systems and the mass occurrence (high probability) of "minimum" environmental systems. However, in this respect, too, one can exploit the relationships of a trivial type such as the fact that the whole can be divided into many small or a few large parts. Through the aggregation of all possible distributions of this type one can obtain a positive, extremely asymmetric distribution.

This is illustrated by the following example. If there are six elements such as inhabitants (n = 6) and a whole divided into three parts such as regions ® = 3), the likely distribution of people in regions can be determined in two ways according to the formulation of the principle of maximization of entropy selected. One can either start "from elements" and assume the same probability of the presence of every inhabitant in every region: this will result in the distribution 2 – 2 – 2 (thus a homogeneity of distribution). Or, one can start from the whole structure (this corresponds with the approach to the whole as an environmental system) and assume the same probability of all possible distributions of the whole (the "integral" set of 6 people) into parts (regions). In this case, the distribution 2 – 2 – 2 will only be one of several possible distributions, with the same probability as the distributions 6 – 0 – 0, 0 – 0 – 6, 3 – 2 – 1, etc. The number of possible distributions is given as

$$\binom{n + r - 1}{n}$$

In the case that $n \geq r$ and $r > 2$, the **probability of a "dense" settlement of a region will always be smaller than the probability of a "weak or zero" settlement of a region**. With the increasing values of **n** and **r** the hierarchical distribution of probability will deepen (see also the diagonal succession in Pascal's triangle).

Finally, another illustrative example of the scarcity of "maximums" is given in central place theory which stresses extreme advantages of central location and the growing extent of spaces (concentric zones) with a gradual increase in the peripheral nature of their position. Assessments of this type can also be applied for the polarity of a qualitatively diverse or homogeneous environment or an environment favorable or unfavorable for development, which means for the explanation of the selective orientation of total development (see, e.g., Hampl, 1989, pp. 28 to 29). Undoubtedly, the previous description of quantitative relationships only gives a partial account of the substance of the underlying factors observed. They are primarily of a qualitative nature although not studied, in a comprehensive way by a large number of empirical sciences. In this respect, the research should be based on knowledge from physics – especially on scale hierarchy, when types of fundamental forces and differentiated strength of corresponding interactions are measured. This hierarchy also involves considerable differences in the integrity of elements and environmental systems such as atoms and molecules on the one hand, and astrophysical systems organized along the principle of gravitation on the other (see Zelmanov – according to Zeman, 1985, and some studies in the compendium, Pattee, ed., 1973). The importance of integrity and its evolutionary conditioning in live elements (organisms) is also confirmed in biology (see the crucial importance of genotype and the "secondary" importance of ecotype as well as the general accordance of ontogenesis and phylogenesis). At a general level of assessment it is therefore correct to explain the lower integrity of environmental systems both with their association with the final organization of universal environment and the "necessity" **to ensure sufficient space for relative autonomies of partial wholes, primarily elements themselves**. If there were a dominance of a single, total structure, there would be a one-sided determination of parts by a whole in general, suppression of the "internal" evolution of parts, interactions of the type, part–whole, and therefore the loss of evolutionary mechanism in general.

Comments above suggest the need to link the question of explaining the defined regularities with the assessment of the integrated organization of reality, the nature of interactions of partial and holistic structures as well as their role when creating evolutionary impulses. However, this broad problem requires independent observation – see Chapter 4 and also Chapter 5 devoted to specific forms of these interactions in the case of "society in the environment." Similarly, Chapter 6 includes an independent observation of the question of the formation of the hierarchical organization in environmental systems (with a main focus on geographical systems). In this case evolutionary processes have been quite understood insufficiently. However, it can be generally stressed that when hierarchical systems are formed the external environment has a considerable influence; undoubtedly, there is also a certain importance of internal impulses and processes – see the role of competition and cooperation when the system of nodal regions is formed as described above. However, given the current absence of a special and empirically founded study the degree of influence of internal and external factors is very difficult to establish or discern in the sense of both evolutionary levels and specificities appearing at the level of ecosystems and environmental systems.

4

INTEGRATED STRUCTURE AND EVOLUTION OF REALITY

While in the previous chapter the assessment focused on the description of basic forms with which reality and related regularities are differentiated, the objective of this chapter is to present an integrated picture of reality. It is also possible to base the assessment on the distinction of two basic (ontological) dimensions of the organization of reality – the principle of the structural complexity and the principle of evolutionary complexity. Both of these dimensions also express the substance of structural and evolutionary integrity of reality. Just, the assessment of these problems requires the definition of basic types of interactions between various real systems. In distinguishing this, the characteristics of real systems can be further enriched and "dynamically" expressed.

In the sense of the regularities in the organization of reality established so far it is correct in the case of its integrated structure to emphasize, on the one hand, **the pluralism of homogeneous sets of partial phenomena**, **elements in particular** (a fragmented picture of reality), and **a hierarchically differentiated universal environment** ("merely" the total picture of reality) on the other. The interaction of both of these structures can be generally described as **a repetition of partial phenomena in differing external conditions**. This interaction can be conceived as a primary source of the movement of reality, its "functioning," and therefore, also of its evolution. At the same time, given favorable conditions, an extremely asymmetric differentiation generally explains the dominantly **selective orientation of evolution** and the qualitative development of reality. The role of both structures is "indispensable" because homogeneity is a condition of interrelationship and communication, while heterogeneity is a condition (impulse) for movement and organization in the broadest sense. A systemic, interactively based unity of the duality of structures of reality also expresses in one sense the unity of internal (evolutionary) and external (co-existenting, ecological) as well as in a certain, spatial and temporal, sense. The nature of the interaction described here is basically dual. On the one hand, there is a prevailing unevenness of the environment and partial phenomenon (element), and therefore also **a determination of the part in the whole in the sense of external adjustment or subordination of the element to the environment**; see hierarchically organized unevenness of spatial distribution of all types of elements as well as a qualitatively unspecified mass in general. On the other hand, elements distinguish themselves with considerable **autonomy a fact displayed by the maintenance and reproduction of its internal organization**, the homogeneity of its type sets and summarily by relative autonomy of its genesis, i.e., by the relative autonomy of sub-elementary forms of organization. Given these facts, the nature of the hierarchy of the universal environment can only be described as a “framework” providing the necessary space for autonomous existence and evolution of elements. At the same time, the existence of the pluralism of partial autonomies and heterogeneity of partial elements simply call for **a hierarchical form of environmental organization or total organization in general**, i.e., a unification and integration based on unevenness of the whole and its parts as well as on the unevenness of the parts themselves.

The expression of the integrated structure of reality and general form of interactions through the polarity of type sets of elements on the one hand and hierarchical organization of universal environment on the other is, of course, simplifying. However, it is justified when essential signs of this structure and associated interactions must be identified. Elements constitute basic forms of qualitative organization of the mass – they are internally connected through an evolutionary process and exhibit significant autonomy as well as borders against their environs. In contrast, since supra-elementary systems, ecosystems and environmental systems are typical of loose integration and their dependence on external environment is considerable, they can largely considered as part of a single universal environment. Their type differentiation, too, is underdeveloped. An uneven differentiation according to size signs, which is of primary importance, explains their aggregate characterization as heterogeneous–hierarchically organized–systems (sets). Finally, it should be highlighted that the polarity of elements and the whole environment, expressed in a simplified way, reflects in a concentrated way the integrated interaction of the partial and the “merely” total.

However, the previous remarks cannot mean that detailed ways of assessing interactions and integral interrelationships of various types of real systems are rejected. They only qualify another assessment as secondary as regards its importance. In this observation the first step can be made by further specifying the content of both basic forms of structuration of reality according to the results defined in the previous chapter. This means a combined description of their ontological hierarchy and methodological hierarchy based on the distinction of variously general signs of real systems or their type sets. In the case of elements this means their hierarchization from the viewpoint of evolutionary complexity and, at the same time, a hierarchy of types, distinguishing variously substantial structural similarities (species–order-phyllum, etc.). If the dimension of evolutionary differentiation of elements is left out of the assessment, the whole structure of reality depicted in an “atomized way” and will be expressed only as a hierarchy of types of sets of elements orientated according to only general or specific (hierarchy of structural similarities). If this assessment also includes supra-elementary wholes (ecosystems and environmental systems), we can also express asymmetry in the degree of development (step-like nature) of this hierarchy, corresponding to the gradual suppression of the type differentiation of phenomena, depending on the increase in their structural complexity – see Figure 7. On the other had a contrasting look at reality makes it possible to express the organization of a universal environment, which means reality is regarded as a final environmental system at the highest scale. Here the role of a dominant sign is played by hierarchically organized differentiation of a final environment as a unique, integrated and all-embracing whole. The basic orientation of this hierarchy is based on the polarity of the whole and its parts, taking into account size differentiation of parts within a whole. It can be expressed in two dimensions: according to the principle of structural complexity and the rank/scale principle. This hierarchy of differentiations is also depicted by Figure 7, including asymmetry in the occurrence of "differentiation" depending on the level of structural complexity of phenomena and the asymmetry in the advancement of type differentiation. This has a more complicated expressed dual structure of reality as a polarity of "hierarchy" of types of parts on the one hand and hierarchy of differentiations within the framework of an integrated universal environment on the other.

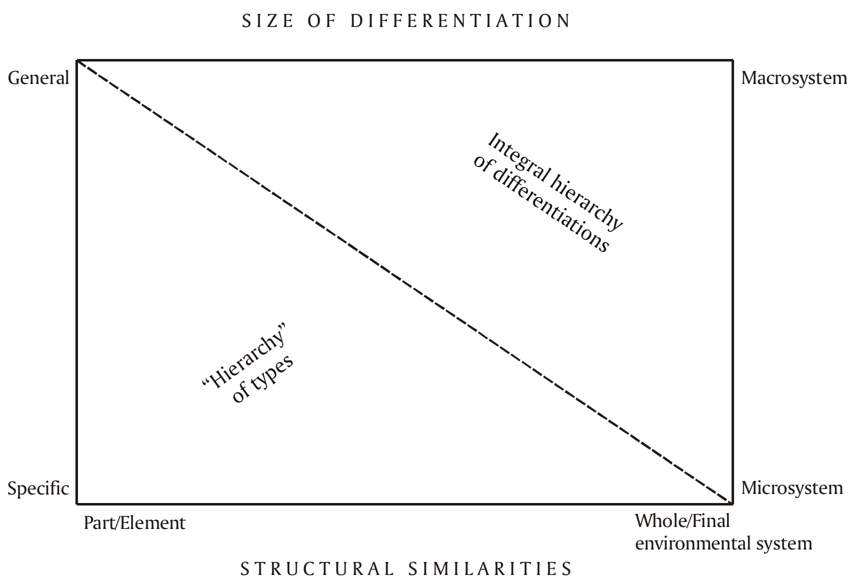

Figure 7: Asymmetric Relationship in the Organization of Structural Similarities and Size Differentiations of Real Systems

An insight into the signs of the integrated structure of reality must be primarily directed toward specifying the main types of interactions between various real systems. In a number of respects the nature of these interactions can be immediately derived from the character of systems influencing each other. This character, in its turn, results from the classification of systems according to the degree of their structural complexity or size and the degree of their evolutionary complexity involving broadly defined activity. In the former case, there will be an effort to distinguish the relative equality or inequality of systems. In the latter, this involves the distinction of passivity and activity in their interrelationship. However, there must be added a dual general concept of active impact: either hostile (competitive) or friendly (cooperative). By combining the two distinguishing aspects it is possible to draw up a sort of **primary classification of interactions** (see also Hampl, 1980). This classification adopts basic, evolutionary levels from the classification of real systems: passive, semi-active, and active. From the viewpoint of the relationship between the whole and the part one level of interactions of potentially equal wholes (represented by the type element–element) and two levels of interactions of relatively unequal systems were distinguished: either at variously structural complex wholes (element–environment) or for variously large wholes at the same level of structural complexity (macrosystem–microsystem). Given essentially different reactions from variously active systems to external determinations, there is a further characterization of forms of subordination and adjustment of elements and a possible secondary countereffect of a part toward a whole. A classifying overview is given by Figure 8.

However, the classification of interactions described here is in a number of respects simplifying in as much as it is devised to emphasize main differences both between the types of interactions themselves and the real systems between which the mutual effect appears. Generally, dominant types of relationships are stressed, while relationships of minor importance are excluded. For example, in the biological world there are both the types of determining interactions (inequality of organisms) and cooperative interactions (symbiosis, etc.). However, there is a dominance of the "Darwinist" competition within and between various species. In the inorganic world the deterministic nature of interactions is mainly conditioned by "passivity" of phenomena and not by their possible inequality (however, in this case it is problematic whether these features can be distinguished). It is also difficult to assess the extent of competitive and cooperative relationships between people because it is difficult to isolate these relationships from the mediating influence of social organization (which means organization of the ecosystemic type). Nevertheless, thanks to generally accepted ideas about qualitative specificity of variously complex systems regarding their evolution and their behavior and because of the classification of real systems and associated characteristics

Evolutionary levels of systems	CHARACTER OF INTERACTIONS AT VARIOUS LEVELS OF STRUCTURAL COMPLEXITY OF SYSTEMS		
	Equal systems (type element–element)	Unequal systems (type element–environment)	Unequal systems (type microsystem–macrosystem)
Active	Cooperation and competition	Offensive countereffect and pronounced adjustment of elements to determination by the environment	Offensive countereffect of microsystem toward determinations of macrosystemic organization
Semi-active	Competition	Adjustment of elements to determination by the environment	Passive acceptance of/adjustment to determinations of macrosystemic organization
Passive	"Pasive determination"	Passive "acceptance" of external determination by element	

Figure 8: Basic Types of Interactions of Real Systems

Notes: Further explanation in the text. Adjusted according to Hampl, 1980 established earlier, the schematic expression of the typology of interactions can be regarded as sufficiently understandable. There is, however, an exception – the nature of interactions between environmental systems that are unequal in their scale and to which insufficient attention has paid by science.

The character of interactions of environmental systems whose scale differ can be primarily derived from regularities in the geographical distribution of qualitatively different phenomena (see Hampl, 1971, 1980, 1994). If the degree of geographical concentration (unevenness, hierarchization) is assessed at various levels of rank/scale in a relative manner, one can find the existence of two basic types of organization. As regards natural phenomena – it is vital to stress the similarity of the distribution of inorganic as well as biological phenomena – the degree of unevenness continually decreases depending on the declining rank/scale. As a result, macrodifferentiation is determinating in this sense and limits (defines) the possible level of microdifferentiation. It is at least hypothetically correct to speak about **determination "from above," from a whole to its parts**, which is analogous to the relationship between the environment and an element. As far as the distribution of social phenomena is concerned, the situation is somewhat different, in two ways. First, the degree of unevenness rapidly changes (grows) at lower levels of the rank/scale, which means that it develops. Second, considerably uneven (hierarchized) structures, fundamentally different from the forms of organization of natural conditions (mainly nodal regions), are formed from microregional to mesoregional levels. This justifies the formulation of a conclusion on an important **"feedback" impact of microstructures on macrostructures** in the case of geosocietal reality (and similarly societal reality) and on the continual increase in this feedback impact. The given facts also reveal a difference in the "number" of major changes in the evolutionary complexity of elements on the one hand, and relatively environmental (supra-elementary) systems on the other. In the former case there is an appropriate increase in complexity in the case of both the emergence of biological and social elements. In the latter case, however, the basic qualitative shift is only caused by the emergence and development of societal and geosocietal systems.

It is also correct to attribute the specificities of interactions between geosocietal and societal systems with varying scales to the relationships between society and nature. In this case, too, one can see a continual "liberation" of society from external determinations by natural conditions, while new forms of internal (social) and external (sociogeographical) organization are being developed. At the same time, the whole of this process is conditioned by the development of cooperation between people, without which neither society would be created nor its external determinations would be successfully surmounted. As a result, in some respects, **external determinations bring about the development of internal social coopera-**

tion, meaning the mass development of qualitatively higher forms of interactions. In other words, social cooperation is enforced by external determinations, while from the viewpoint of internal conditions, in societies themselves interactions of a competitive type were primarily conserved. The exceptional combination of cooperative and competitive interactions within the framework of society also led to an exceptional position of society in the evolution of reality. In this respect, the complexity of social organization and its dynamic evolutionary rate should be noted, but also, first and foremost, the relative "identification" of the type of qualitatively highest elements (human population) with the ecosystem (social system) and the partial environmental system (sociogeographical system) or t**he unification of its genetic and co-existential (environmental) interrelatedness**. Compared with other partial units of the environmental, and especially ecosystemic, types in reality, the considerable integrity of social systems is a qualitative peculiarity of major importance in the organization of reality. This means among other things a partial transfer of the "bearer of evolution " from elements to ecosystems or interconnection of evolutionary routes – elements, ecosystems and environmental systems (geosocietal systems).

It is indispensable that the problem of interactions between various types of real systems discussed above involved aspects of evolutionary differentiation. This continually pushes the focus of observation from structural to evolutionary assessments. However, it must be stressed that the evolutionary differentiation of real systems is also a structural, distinguishing dimension as it primarily reflects the outcome of evolution and not its course. In this sense the previous observation represented a preparation for the formulation of general characteristics describing the integrated evolution of reality. At the same time, the characteristics embrace the form of a synthetic conclusion stemming from the entire previous observation of a general issue dealing with the integrated organization and movement of reality.

The first general conclusion is that the primary structural dualism of reality, expressed by the pluralism of homogeneities of type sets of elements on the one hand and hierarchically differentiated universal environment on the other, **is reproduced and simultaneously multiplied in the process of evolution in a selective (asymmetric) way**. The reproduction can be mentioned if the type of homogeneity of elements and hierarchical organization of environmental systems repeat at higher or all levels of evolution. One can note that the multiplication of this polarity in the sense of the creation of increasingly complex forms of both elements and environmental systems as well as the increasingly complex forms of their interactions. Interaction of dual structuration, which actually means the interaction of subelementary and supra-elementary organization, extends into a simultaneous evolution of type differentiation of elements and qualitative complexity of the environment. Increase in activity, and also evolutionary changeability, of types of elements is at the same time connected with a certain growth of their intra-type variability, though its "Gaussian form" is conserved. Afterwards, an increase in activity and changeability of hierarchical organizations of geosocietal and societal systems is connected with their partial separation from the primary hierarchization of the universal environment, which involves multiplication of hierarchical organizations and their development at lower scale levels. Finally, the selective orientation of the evolutionary process brings about the creation of higher developed forms of organization only in certain – gradually narrowed – spheres of reality. The fact that a number of "evolutionary lower forms" only gives rise to a limited number of "evolutionary higher forms" reflects the general scarcity of "maximums," an asymmetric differentiation of the environment from the viewpoint of favorable conditions as well as the indispensable conservation of a large scope of lower forms as an existential basis for higher forms. Due to the selective nature of evolution, in the total organization of reality one can see the creation of "another" asymmetric structure; an extremely asymmetric differentiation of the environment from the viewpoint of the size of phenomena and the density of their occurrence is multiplied by an extremely asymmetric differentiation in the qualitative variability of phenomena. In the former case, this is summarily expressed by the distribution of the mass in space whereas in the latter, by an extremely asymmetric qualitative differentiation of the mass.

The selective orientation of the evolution of reality is not only of a general nature ("a small quantity" of higher forms arises from a number of lower forms), but also displays a considerable regularity from the viewpoint of scale. In fact, **the creation of more complex structures is oriented to the "meso-structure"** of reality, as depicted in Figure 9. On the one hand, qualitatively higher forms of the environment (final environmental systems) are narrowed, while elements are enlarged on the other. Finally, this is stated by many physical descriptions of reality, although they may not directly introduce the evolutionary dimension (see, e.g., charts and related text in Barrow, 1991). However, the depiction mentioned above differs from the idea of Teilhard de Chardin (1956), who stresses the unidirectional humanization of reality (from micro to macro) and the creation of the noosphere. But one can easily provide empirical evidence, that from the scale viewpoint, the development of society and its feedback impact on nature take place in a differentiated and selective way and multidirectionally toward microstructures and macrostructures.

Although the succession of the wholes depicted in Figure 9 is primarily illustrative, in connection with the course of its curves it indicates the specificities of **three basic stages in the evolution of reality**. In the case of the evolution of the inorganic world there is a dominance of extraordinary "scale" shifts, both from the viewpoint of the structuration "from above" and the viewpoint of the creation of complicated elements through the integration of lower elements. In the case of live nature the decisive role is played by movement along the evolutionary (qualitative) dimension which symbolizes the accelerated "reproduction" of basic types of wholes, but at increasingly higher levels. Finally, the emergence and development of society brings a partial (but also gradually intensifying) interrelatedness of the evolution of environmental systems and elements and an increased importance and integrating role of (social) ecosystems. Due to the rapid development of society, the selective intensification of the qualitative differentiation of integrated reality is dramatically accelerated. However, this can also involve reduction of one-sided selectivity within the geosociosphere itself and the intensification of integrating tendencies within this framework. In a sense, one can therefore speak about the completion of biological selections by the "choice of a constant bearer of progression" and consequently about the development of its feedback impact on lower evolutionary forms of elements and environmental systems.

In this feedback system one can distinguish again three basic evolutionary stages and also three basic types of interactions. Their distinction results both from the gradually growing power of society, which involves its increased influence on nature, and the conservation of the existential dependency of society on nature. In the first (roughly pre-industrial) stage there was a dominance of an adaptive relationship of society to external natural conditions (see also geographical/environmental determinism). The development of modern (industrial) society has led to a strengthened, exploiting impact on nature, which can be therefore denoted as a competitive type. One-sided, and therefore ill-considered, exploitation of natural resources duly caused serious environmental disturbances which, with a relevant time lag, first harmed conditions of life on Earth and eventually the quality of the existential basis of humans themselves. As a result, the current (post-industrial) period is perhaps the necessary transition to the creation of a qualitatively higher relationship of society to nature, a relationship of a cooperative type (permanently sustainable development, environmental protection, etc.). There is, of course, the question of whether the human community will be able to surmount in time the one-sidedness of its especially economic, interests and subordinate them to more serious, strategic objectives. It is obvious, however, that the primary natural determination of society has remained conserved and will force a change in the environmental behavior of society. There is only the question of how drastic the enforcement will be.

The creation of an integrated system of "society in the environment,"embracing both humankind and its social and environmental organization, actually involves the creation of a "secondary" integrated organization within a primary (natural) organization. As a result, the specificity of a broadly conceived society does not lie only in the subjective and active nature of its elements, but in a quite new intensity and quality of the interrelatedness of these elements and in their multilevel relationships with organizational structures of all types of supra-elementary wholes. Finally, this results in cognitive difficulties of social sciences which cope not only with the "elusive behavior" of humans, but also with the very systemic nature of social realm. All of this suggests the need to continually observe the problem of an integrated organization at another – though special – level. This is the level of a broadly conceived society defined by the framework of geosociosphere (see Chapter 5, and partly also Chapters 6 and 7).

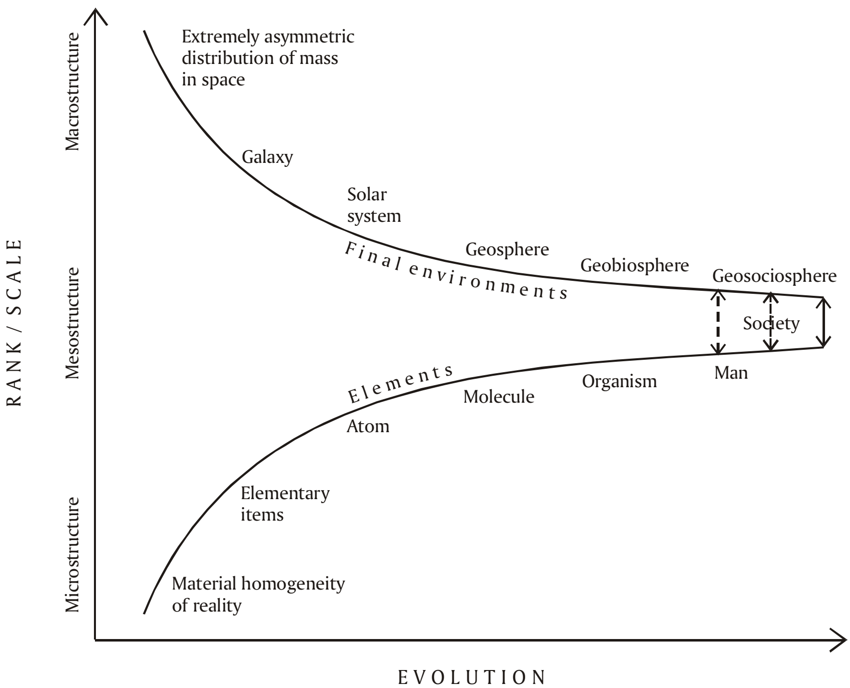

Figure 9: The Evolution of the Integrated Structure of Reality

Notes: The space between the two curves is "filled" with partial environmental systems and ecosystems. The given types of systems are of an illustrative nature. The form of curves is designed to express the "transition" from primarily quantitative/scale structuration of inorganic reality to the predominantly qualitative structuration at higher development levels. In the development of society one can see increased interrelatedness of elementary (human kind), ecosystemic (social system) and environmental (geosocietal system) of the organization of society.

Sources: Adjusted according to Hampl, 1976, Charvát *et al.*, 1978

5

Society In Environment: Structures, Interactions And Development Mechanisms

The integrated assessment of the structure and evolution of reality has given rise to a number of major characteristics specifying the most complex forms of the organization of elements, ecosystems and final environmental systems, which involves the forms of organization of society conceived broadly. If specificities of societal and geosocietal systems are to be ascertained, an integral issue must be "repeatedly" observed in a number of respects, though at a special level. It is integrated in the sense that it will be again a study of interactions of partial and whole organizations, and special in the sense that there is a limitation on the study mainly at the highest evolutionary levels. Interest will be centered on the observation of sociogeographical systems and therefore the geographical organization of society. However, since the sociogeographical issue lies at the intersection of social and environmental studies, it requires both the assessment of geographical and nongeographical forms of social organization and the assessment of the relationship of sociogeographical and physical geographical differentiation. As a matter of fact, the breadth of these questions requires their gradual assessment, which is divided into three chapters. This chapter will focus on the integrated issue of describing the structure and development of society from the viewpoint of the differentiation of the type, part–whole . Observation can be based on an emphasis on the crucial qualities distinguishing organizations and interactions in social and natural reality:

(i) The evolution of society brings about a gradual **interconnection of development tendencies** at various levels of structural complexity and a relevant intensification of interactions between these levels. These facts are externally reflected by a considerable feedback impact on nature by society and the broadening space for autonomous environmental/geographical organization of society. These facts are internally reflected by joint and mutual effects of homogenization and heterogenization (hierarchical) processes, while the isolated effect of basic forms of structuration of society (elementary systems, ecosystems and environmental systems) is weakened. Finally, there is a summary effect in the form of the increased development rate of society compared with the development rate of nature, conditioned not only by a higher level of activity of social elements in the narrow sense, but primarily by the ability to intensify these activities in an integrated form.

(ii) Understandably, in the development of an integrated activity of society, the crucial role was played by social organization and the corresponding **creation of the ecosystemic**

level of the structuration of society. Unlike the natural world, the role of ecosystemic organization is more important by one order within social reality. It is a level unifying evolutionary and co-existential factors, a level combining competitive and cooperative processes, and a bridge and active mediator between elementary and environmental forms of organization. In this sense it is possible to describe in a very simplified form interactions in natural reality as an unequal relationship between the environment (environmental level) and sets of elements without a major autonomous role played by ecosystemic structures. The nature of external determinations can be seen in the "spatial distribution" of elements, but not (or only in a limited form) in their internal evolution. On the other hand, in the case of social reality, a major role is played by ecosystemic structures. External determination is gradually, though only partly, surmounted by the feedback effect of active elements by means of their ecosystemic, and environmental, forms of integration.

(iii) It follows from the previous assessments that within social reality **internal structures of primary importance are widened** to include an ecosystemic "meso-structure," whereby the differentiation is developed from the viewpoint of the principle of structural complexity. However, all three basic levels of structuration, i.e., elementary, ecosystemic and environmental are interactively interconnected. This changes, however, neither the basic nature of the types/levels of structurations described above (homogeneity–limited heterogeneity–developed heterogenity) nor the indispensability of their role in the integrated development of society. On the other hand, this basically enhances the role of its interactive combined effect. In other words, isolated signs of the autonomy of these structures are decreasing, while their mutual influences are increased although not basically altered. For example, at the elementary level homogeneity of the humankind remains conserved or it is reproduced. But its evolutionary variability is increasing, while the role of external conditions is also growing when individual life routes are formed (in fact, from the viewpoint of elements, the role of the ecotype increases). At the level of environmental organization the priority of hierarchical conditioning remains conserved, but its external (natural) resources are gradually weakened and replaced with internal impulses. Finally, in connection with its gradual formation eco-systemic organization is reproduced as a "compromise" between the homogeneity of the human population on the one hand and heterogeneity of external opportunities for development on the other.

Understandably, the complexity and multilevel nature of the structuration of society and associated interactions are the main barrier to the development of social research. This is obvious in the various, more or less alternative, intellectual emphases over time in schools of social sciences where consecutive epistemologies are stressed. These facts are expressed by a dichotomy of structuralist and voluntarist approaches or preferences for structural or, contrastingly, historical aspects of assessments. This dichotomy corresponds in many regards, with an emphasis on the difference between nomothetic and idiographic attitudes to social reality, also. The recent period has a positive feature in the form of an increased interest in mutual interactions of individual and social structures (Bhaskar, 1979, Giddens, 1984, Sayer, 1984). However, there persists a "lack of interest " in the external (environmental) organization of society. To a large extent this results from the former vulgarize concepts of the external determination of society by natural conditions or "spatiality" itself ("geometric"determinism of positivist geography). Current attempts to involve geographical forms of organization into the framework of social systems tend to result in a kind of individualization of social issues. This is connected with a general emphasis on the co-existings (ecological) interrelatedness of diverse social interactions (see „space and time together" by Hägerstrand 1995, and the distinction of social and systemic integration by Giddens, 1984). There is perhaps a stronger role of geographical aspects in geopolitical assessments, especially in the case of the global (in fact, unique) system. But here, too, an outstanding advocate of the concept of a global arrangement on the basis of the polarity, core–periphery, Wallerstein (1979, 1984), argues that the relevant geographical forms of this polarity are of secondary importance. This is so because, "the geographical" is still being more or less identified with what is spatial and individualizing, not with what is environmental. The "laws" of the uneven distribution of power (size) of systems and hierarchical organization of integrated society are bound to environmental/geographical organization. As a result, the widening of social studies to include also external – environmental – structure can assist in understanding the broader factors underlying the development of society, the role and necessity of unevenness in this development, the effort to make the concept of social justice plausible and the possibilities of realistic fulfilment of this approach.

The following assessment of basic interactions, differentiation processes and regulatory mechanisms (see Dostál, Hampl, 1995, Hampl *et al.*, 1996) is an attempt to include geographical/environmental organization into an integrated societal system which involves elaborating an internal structuration of this system. However, the assessment is very simplifying and only describes substantial forms of structuration and types of created differences and associated reactions to these differences. A schematic depiction of this "model of societal movement" is provided by Figure 10 which, in some respects, tries to present an "ontologization" of the realistic epistemological model (Sayer, 1984).

The complex nature of the entire issue requires a more detailed description of the scheme noted above. It is based on the distinction of three fundamental forms of structuration (organization) within the framework of the integrated societal system:

(i) Elementary form, corresponding to the relative homogeneity of humankind/human population and also to the potential equality of people as regards their role in society, their needs, interests, etc.

(ii) Ecosystemic, corresponding to the hierarchization (though often limited) in the distribution of wealth and power in society from the viewpoint of individual people, their social groups, national communities, etc. This structure is conceived as the internal structure of society, e.g. such as societal structure in the narrow sense (social, economic or political structures).

(iii) Environmental, corresponding to the environmental/geographical (external) organization of society, which is typical of an extremely uneven, hierarchically organized differentiation regarding both the size of units and development conditions.

All three forms of structures are in mutual interaction, while the central (mediating) position is assumed by the ecosystemic structure. Depending on the degree of structural complexity of these organizations the general nature of mutual interaction has a heterogenizing or homogenizing orientation. **What basically matters is the creation of differences in the development of elements and partial systems and, simultaneously an effort to suppress these differences**. Interactions materialize through diverse mechanisms which can be generally divided into two types. In the case of differentiating processes at the level of parts within the whole, mechanisms of competitive type dominate. A classical example is posed by the market mechanism, but also any form of competition – political, cultural, etc. A similar situation appears at the level of "spheres of competition" – among people just as among regions or entire countries. In this sense Figure 10 employs the notions of social and geographical competition. There is also a second type: cooperative mechanisms whose role in differentiating processes themselves is only secondary and undirected. Cooperative mechanisms, which are characteristically exemplified by a social as well as a geographical division of labor, exert in some respects suppressing influences on competitive mechanisms whose role is primarily different: they have a positive influence in raising the efficiency and organic integrity of the whole, and also in its ability to compete with other wholes and to be successful in competition at a higher scale sphere.

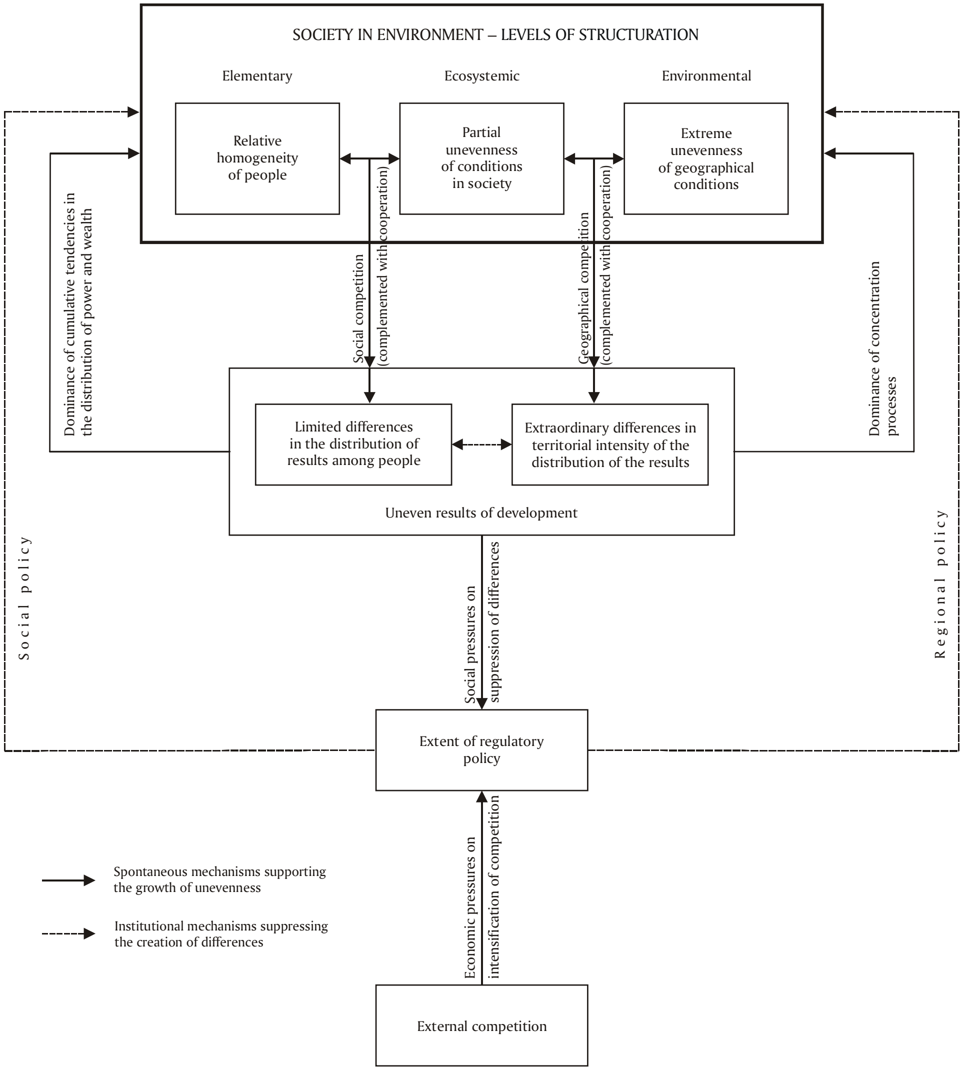

Figure 10: Structuration of Integrated Societal System and Development Mechanisms

The creation of social and spatial differences is the most important result of the impact of the (dominantly competitive) mechanisms described above. The uneven results are primarily caused by unevenness of external conditions for relatively even elements (people). It is, of course, taken for granted that the type homogeneity of elements, too, must only be understood as relative and that certain differences in individual efficiency exist here. The “minor differences" are intensified by the impact of competitive mechanisms (such as the influence of education which amounts, in fact, to external influencing of individual potential). Understandably, all of this provokes strong social tensions and efforts to redistribute the results of "competition." The differences that emerge are of **a dual type**, both as regards the extent of unevenness and the possibilities (but also needs) to suppress them. The sources of social disaffection are immediately linked to the differentiation of relative levels of income, the share of the wealth and power of people, their groups or even entire nations (the GDP per capita is a typical indicator). In contrast, people may not much care about differences in the spatial intensity of results or in their absolute volume in towns, regions or states (the GDP per km^2 is a typical indicator in this case). The differences of the former type are relatively limited because their conditional factors are primarily connected with ecosystemic differentiation. Since differences of the latter type are conditioned by environmental differentiation, they attain extreme values. It is very difficult to suppress them; from the viewpoint of economic efficiency of the whole, this is basically always disadvantageous. However, both types of differences cannot be approached in an isolated way because geographical forms of differentiation in the intensity of settlement or economic productivity on the one hand and differentiation in the relative wealth of population on the other are usually very similar. As a result, advantages of geographical position or the geographical combination of natural and social conditions often support the creation of social differences. At the same time, geographical differentiation in the relative wealth of people and general prosperity is an necessary impetus for migration of population and capital, and subsequently also the concentration tendencies which further intensify existing considerable differences in the spatial intensity of settlement and economic production. These processes of geographical redistribution, which are primarily those of concentration, simultaneously result in increased efficiency of an integrated societal system because they enhance the development of efficient forms of the spatial organization of labor (see, e.g., agglomeration advantages). They also support the efficient exploitation of territorial potential by creating suitable forms of economic specialization taking into account locational, natural and historical, spatial specificities.

The distinction of two types of created differences also gives rise to the distinction of two types of spontaneous reactions of people and their groups to these differences and subsequent processes (development mechanisms). However, in this case, the concept of spontaneity is narrowed to "immediate" self-regulatory processes, thus excluding organized (institutionalized) political lobbies devised to suppress differences (this issue will be described below). On these grounds, spontaneous processes are primarily assessed as those tending toward accumulation or concentration. In a way they are assessed as **positive feedbacks**,

strengthening the creation of differences. This orientation is clearly dominant as evidenced by the long-standing concentration of population and economy into cities or developed regions or accumulation of capital and monopolization tendencies in market economies. However, it is correct to highlight only the dominance, not the exclusiveness, of the orientation of these processes toward accumulation/concentration. Generally, it is possible to identify various adapting processes of a re-specialization type which help poor units achieve improved positions. Another example is posed by the strengthening of specialization within the framework of the advancing division of labor, which can also help weaker units via cooperation with leading units. In geographical reality there is also a limited role played by environmentally enforced tendencies toward deconcentration in the case of big cities or industrial concentrations. However, these are usually only a scale shift of the concentration processes (metropolitan regions). Finally, there are special types of processes with differing impact on the development of social differences on the one hand and spatial differences on the other. One outstanding process of this type is migration of population. Migration is the basic mechanism which increases the geographical concentration of population (urbanization). At the same time it is also the process within which labor force is transferred from less progressive and poorly paid jobs to progressive, better paid jobs. From the social viewpoint this results in suppressing differences, it is because the proportion of the population of rich regions is growing.

On the other hand, the very existence of differences, further intensified by unguided processes chiefly fueling their growth, provokes serious social tension and leads to social destabilization. This results in the emergence of strong social pressures on political elites, seeking the adoption of various **regulatory mechanisms and redistributive measures designed to suppress differences**. Generally, this only concerns differences in relative social and economic standards, and exceptional differences in spatial intensity (this is exemplified by the various regulatory measures devised to curb the growth of the largest cities). A package of these regulatory measures is usually labeled, in a sum, as social and regional policy. In fact, this process must also involve macroeconomic (macrosocietal) policy. However, endless discussions are being held about the forms and, in particular, the extent of political interventions. In a number of ways, there is a clash of two, seemingly quite contradictory needs: social stability and economic efficiency. When searching for viable political decisions about the degree and types of regulatory measures, an objective basis appears in the form of "internal" social (political) pressure in the relevant system on the one hand, and "external" economic (possibly also political) competition on the other.

However, the scheme described above cannot be considered universally valid. Nevertheless, it corresponds to a large extent to advanced democratic countries and their development in the era of modernization. In this sense it can perhaps be identified as the objective for the functioning of social systems, provided qualitative transformations of the content and forms of cumulative, concentration and regulatory processes are specified in the conditions of a postindustrial society. A special discussion may be required by the issue of scale specificities of these systems because the situation at the level of localities or microregions differs in a number of respects from the situation at the national and particularly at the global levels. Attention will be primarily devoted to these issues in the following chapters. Here attention must be paid primarily to the crucial conditions of the real operation of the model described above as well as development tendencies in its creation.

From the viewpoint of the discussions about current modern society and its operation attention is focused on the question of the extent and forms of suppression of the differences in the relative living standards of people. In other words, one can note whether and how much the ruling elite should assist the "weak" segments of society. However, if the question is taken out of a broad development context, solutions are difficult to find, to say the least. Admittedly, it is possible to stress, on the one hand, that social and regional policies are enforced by fears about the stability of social systems and appeals to the moral responsibility of society toward individuals resulting in strengthening the principles of solidarity, on the other. However, from a strategic, developmental viewpoint, there is another more important cause. This involves provoking, preserving and intensifying the active participation of people (elements) in the development of society. If people do not increasingly join social movements, these movements cannot be intensified. However, such activation can only be increased if there is a simultaneous elimination of monopolist structures which petrify the division of power and wealth, hamper the activation of people, and eventually bring about rigidity and stagnation if such one-sided dominance persists.

Given the previous remarks and from a broadly conceived evolutionary viewpoint, it is necessary to broaden the concept of negative feedbacks (suppression of differences) in the model of social movement described above. Given that approaches to social and regional policies are not only partial mechanisms but, first and foremost, they are also a relatively new mechanisms with a limited impact. Moreover, given the orientation of spontaneous processes, that primarily enhance the growth of differences, it would be impossible to explain the emergence of narrowly defined social and regional policies from an evolutionary viewpoint. As a matter of fact, policies must only be understood as specific signs of **a deeper and long-standing process which has led to the liberation from external determinations and to a situation in**

which an increasingly active role is played by parts within the whole. This has basically involved a continual transformation of a largely determinist organization into a self-development organization – a transformation of a rigid, "natural" organization into a dynamic, "social" organization.

However, the process of this transformation was extremely complicated and internally heterogeneous as it was based on a successive intensification of both competitive and cooperative mechanisms and their combined effect. When it comes to a relationship with nature, there was initially an increasing impact of society as a primary condition of the liberation from external determinations described above. However, this could only have been achieved through the development of both integration and activation of elements of the social system. This resulted in the development of social and spatial division of labor earlier emphasized which involved the development of "internal" cooperativeness of society for the sake of overcoming its "external" determinations. However, the development of these cooperative tendencies was obstructed by an internal, rigid hierarchical division of power and wealth, characterized by the model of a totalitarian society (in particular, slavery and feudalism). It was therefore indispensable to liberate people from a totalitarian hierarchy and to open correspondingly social structures, which involved the development of a broadly conceived democratization process (see also Popper, 1945, Dahrendorf, 1990). In the first stages liberation primarily brought about intensification of competitive processes (a market economy, political competition), whereby **a system of stabilized unevenness was to a degree replaced with a system of dynamically created unevenness**. This means that social hierarchy was to a large extent also created from below, while the final result in the division of wealth and power remained relatively preserved. Hence the liberation of people was largely reduced to a sphere of opportunities and, in only a very limited way, to a sphere of implementation. Moreover, unregulated competitive mechanisms always create conditions for monopolization involving a return to a rigid political and economic hierarchy.

However, because of its incompleteness, a singular emphasis on competitive mechanisms and monopolization processes, expressed in a concentrated way in a Marxist critique of capitalism, is in error. It is equally mistaken to give preference to a society based on the dominance of cooperative mechanisms. If there did not exist real competition and associated meritocratic principles the activity of people would diminish. It would also lead to a decreasing efficiency of society and its gradual degeneration. Hence there is an essential demand – the preservation of sound of competitive mechanisms, the prevention/obstruction of monopolization tendencies, and the preservation and widening of opportunities for an active role of the "majority" in public life. Naturally, this requires a certain degree, but only a "degree," of regulatory steps and assistance (in an active form) to the weak, a combination of competitive and cooperative mechanisms, etc. Generally, this is an effort to preserve the indispensable role of all three basic structures of society while activity in their interactively joined effect is strengthened. It should be stressed that what matters is not overcome or even abolish the hierarchical substance of the organization of environmental and ecosystemic systems, but **to create a more flexible and more open form of their hierarchical organization to a higher degree of evolution**. One can still note a basic transformation which may be achieved through social progress – a tendency to limit "excessive hierarchization" in the internal organization of society. In the past as now, there survives, at the global level in a number of countries with more or less totalitarian regimes, a basically environmental, not ecosystemic, type of hierarchization. In this sense social progression results in the creation of a "genuine" ecosystemic organization with partly limited internal hierarchization and great flexibility. This is expressed by a growing middle class in national communities or in the "semi-periphery" in the global system. From the integral viewpoint, this is as characterized above, an upgrading of the structuration concerning the relationship between partial and total systems from the type, element–final environmental system, to the type element–ecosystem–final environmental system. A "compromise" central position of ecosystemic organization simultaneously expresses the possibility of certain evolutionary changes in the extent and forms of its hierarchization.

Thanks to relevant generalizations the development transformations described above suggest the possibility of their relative identification with the principles of stage theories (Rostow, 1960, Bell, 1973, and others). The distinction of three basic stages, usually denoted as preindustrial, industrial, and postindustrial societies, corresponds with what has been written about the transformations of forms which shape hierarchical organization of society, the underlying mechanisms of their creation, and the nature of feedbacks in the life of society:

(i) The preindustrial stage covers the overwhelming segment of human history, with a relatively low development rate and a dominance of cyclical forms of changes, long periods of stagnation or disturbances, etc. Economic dominance of the primary economic sector and political dominance of totalitarian forms of rule result in low evolutionary variability. In relationships to nature there was a dominance of adaptive relationships and in the relationship between social organizations and individuals there was a one-sided, more or less deterministic interaction. **As a result, the hierarchical organization was of a "rigid" type, while feedbacks were very weak in the movement of society.** This is true both for spontaneous processes and efforts to improve social conditions.

The latter is largely in the form of social unrest or (in the case of relationships between organized communities), conquests. The effect was usually temporary and destabilizing.

(ii) Industrial society brings an essential, dynamic impulse to development, both in economic and political terms. Thanks to the development of industry economic activities are diversified, the social and spatial divisions of labor are deepened, the professional and geographical mobility of people is increased. As new conditions also bring about liberalization of political life, embryonic and early stages of democratization processes occur. The development of technologies is accompanied with partial overcoming of natural determination, while sources in nature are increasingly exploited (or competitive effect on nature develops, as noted above). In social movement there is a dramatic increase especially in positive feedbacks, while the accumulation of capital and processes of geographical concentration of people and their activities evolve. First of all, competitive mechanisms supporting new forms of hierarchical organization and the distribution of wealth and power prevail. **Relatively flexible forms also create considerable opportunity for the building of this hierarchy "from below" on the basis of free competition**. In the case of negative feedbacks (social efforts to suppress unevenness) one can note a number of conflictual and revolutionary upheavals, although their effects have a long-standing impact, enforcing gradual democratic transformations. Generally, this development stage was typical not only of a basic acceleration of social movement, but also of the major role played by quantitative changes: a growing spatial concentration of population, growing volume of mining and other production as well as a growth of population itself. As a result, it is correct to stress the extensive nature of this acceleration. There was another characteristic feature: the integrated nature of development changes – for example, the relatively parallel course and interconnectedness of industrialization, urbanization, demographic transition, etc.

(iii) The postindustrial stage brings further acceleration of economic development and a broadly conceived democratization of society. Extensive development tendencies are, in a number of respects, completed, giving way to intensive tendencies in which quantitative features, lose essential importance. For example, in geographical reality the concentration of population slows down while the concentration of information, and information "power" (see the creation of hierarchies of "global" cities) intensifies. Within the societal system the financial and ruling power is separated from economic production in a number of respects. At the same time, the regulatory role of the state and the related negative feedbacks oriented to the suppression of emerging social differences grow. In general, **proportionality in the representation of competitive and cooperative**

mechanisms increases. The same is true of the effect of spontaneous (positively oriented) feedbacks and regulatory (negatively oriented) feedbacks in social movement. In this sense internal interrelatedness of an integrated societal system strengthens. This involves further strengthening of the integrated nature of its development. This is illustrated by Figure 11, which expresses factors influencing the sectoral development of the economy and the development of geographical organization, both in the industrial era and in the postindustrial era (the concentration of people is substituted by the concentration of information and decision-making involving a concentration of organizational power). This also stresses the continuity of both development stages, i.e., the dominantly evolutionary, not revolutionary, nature of qualitative changes in a (modern) social system.

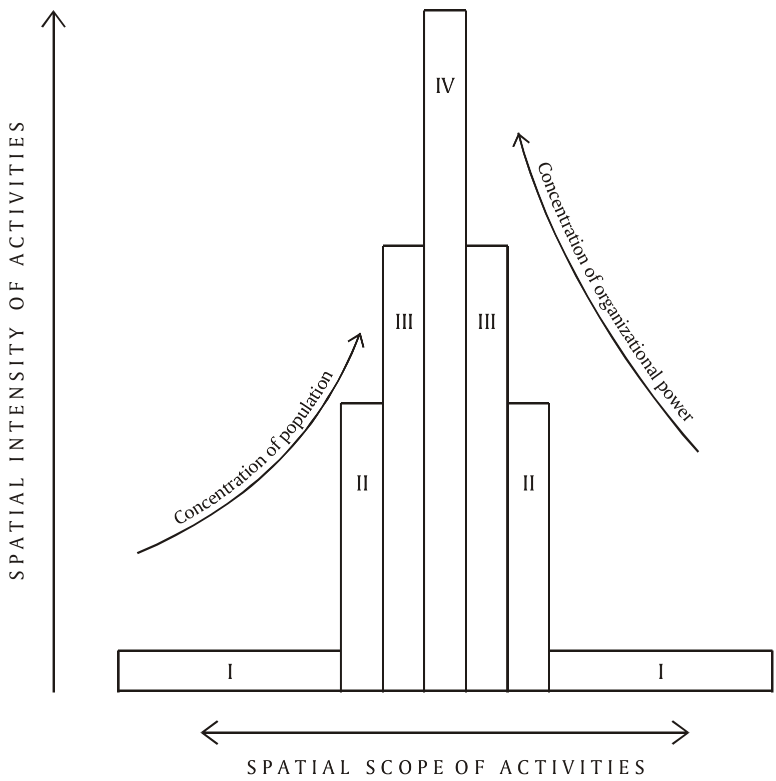

Figure 11: The Geographical Organization of Economic Sectors and Orientation of Concentration Processes

Note: I, II, III, IV – depiction of economic sectors
Source: Adjusted according to Korčák, 1973, Dostál, Hampl, 1994

To conclude the chapter, three examples are attached (Tables 5 to 7) which empirically illustrate the course of two significant (historically limited) processes in the era of industrial society. The former appears in the form of a falling birthrate which is perceived as a sign indicating the course of the demographic transition (selected European countries and districts in Bohemia are observed). The latter appears as the process of geographical concentration of population and is depicted in the growing differentiation of districts in the Czech Republic according to population density. These examples have several dimensions. First, relative homogeneity of the set of people (the humankind on the one hand) and heterogeneity (considerable hierarchical differentiation) of geographical organization, on the other are verified simply from a development viewpoint. In the former case, there is an evident reproduction of human popu-lations connected with changing quality of this homogeneity; at the beginning of demographic transition national and regional populations experienced high fertility and, at the end, low fertility (the demographic behavior qualitatively changes from "unplanned to planned parenthood"). In contrast, the development of geographical distribution of population (corresponding with geographical forms of urbanization), its considerable hierarchical differentiation was not only reproduced, but further intensified. This is evidence of the dominant role played by the concentration processes in the external organization of society (positive feedback).

Table 5: Fertility Trends in European Countries

Year	Number of countries in variation group							
	1	2	3	4	5	6	7	8
1850	-	-	-	2	3	8	6	4
1900	-	-	2	3	7	3	6	2
1930	7	4	5	2	3	2	-	-
1960	3	13	7	-	-	-	-	-

Source: Hampl *et al.*, 1990

If the temporal course of both types of processes is compared, one can note that they are relatively simultaneous; in this sense there is also an association with integrated, extensive acceleration of societal development in the industrial period. Moreover, there is a relative agreement in geographical forms of the diffusion processes of both the concentration and demographic changes (see also Hampl *et al.*, 1996, 1999). This is also true for the spread of industrialization. Finally, a notable example of the development of differences in population density of districts in the Czech Republic illustrates well the regularity in the course (in the temporal distribution of intensity of changes) of the relevant processes. Generally, the course of “historically limited” processes can be depicted with an idealized S-curve or a logistic curve, as suggested by Verhulst as early as 1838.

Table 6: Fertility Trends in Districts of Bohemia

Year	Number of districts in variation group											
	1	2	3	4	5	6	7	8	9	10	11	Total
1871	-	-	-	-	-	1	5	28	37	16	3	90
1881	-	-	-	-	-	2	22	32	27	7	-	90
1891	-	-	-	-	-	-	20	46	14	7	3	90
1901	-	-	-	-	1	11	45	26	7	3	2	95
1911	-	-	1	4	16	58	22	2	-	-	-	103
1921	-	-	1	16	54	23	7	3	-	-	-	104
1931	-	10	27	57	11	-	-	-	-	-	-	105
1950	-	2	51	42	13	14	8	6	-	-	-	136
1960	11	37	9	3	-	-	-	-	-	-	-	60
1970	-	23	33	4	-	-	-	-	-	-	-	60

Source: Hampl *et al.*, 1990

Table 7: The Development of Population Density by Districts of the Czech Republic

Year	Number of districts in variation group									
	1	2	3	4	5	6	7	8	9	10
1869	12	21	14	11	5	2	1	2	0	1
1910	23	30	6	2	4	1	1	1	0	1
1950	39	22	5	1	1	0	0	0	0	1
1991	42	19	4	1	1	1	0	0	0	1

Notes: Rural districts were merged with urban districts, Ostrava-město with Karviná and Frýdek-Místek. There were a total of 69 units under observation. Variation groups were defined as 1/10 of the variation range in a relevant year. The range was gradually increased: 176 inhabitants/km^2 in 1869, 434 in 1910, 723 in 1950 and 815 in 1991. The recent, smallest increase in the variation reflects the deceleration of the concentration process in the final stages of extensive urbanization.

Source: Statistický lexikon obcí České republiky 1992, Czech Statistical Office, Prague, 1994

6

Physical Geographical And Sociogeographical Organization: Rank/Scale Differentiation Of The Environment

There is another basic type of assessment focused on specifying sociogeographical systems: the distinction of regularities in the organization of natural and social geographical wholes, their hierarchical systems and the development of their interaction. Naturally, such a comparison is also general because it reflects in, a concentrated way, the evolutionary differentiations of environmental systems and substantial features as well as changes in the organization of the environment. Moreover, geographical assessment itself can be largely founded on a rich base of empirical material and related generalizations. In this sense a number of earlier established general characteristics will be rigorously verified with empirical evidence and further elaborated. Finally, special attention is devoted to the rank/scale differentiation of reality which until recently was only considered as a dimension of secondary importance when wholes and parts were distinguished. On the same, basic level of structural complexity (this relates to partial and final environmental systems) the rank/scale viewpoint becomes decisive when differentiating the extent of the holistic nature of systems. When combined with the evolutionary principle it creates a basis for the classification of environmental wholes. As a result, the entire assessment is based on ascertaining regularities in the geographical distribution of natural and social phenomena along the rank/scale principle. Attention focuses on a simple, but aggregate, characteristic of the geographical distribution of selected phenomena: the degree of spatial unevenness (concentration). Although this is a relatively superficial – phenomenal – characteristic, it is correct to suppose that it can sufficiently describe the level (extent) of hierarchical organization of relevant systems under observation. **When the evolutionary and scale distinction of systems are combined, a necessary comparative set is created in order to search for regularities in the differentiation of the level of observed unevenness/hierarchizations**. In other words, the method depicts the difference in the degree of hierarchical differentiation of both physical geographical and sociogeographical systems as well as systems at the microregional, mesoregional and macroregional levels. In the case of regular changes in the level of the differentiation of systems depending on both distinguishing dimensions one can infer the arrangement of underlying relationships between the systems under observation. A detailed description of methods used in the assessment was summarized into the following points:

(i) The degree of unevenness in the distribution of selected phenomena is defined as a point on the Lorenz curve corresponding to the relative size (%) of the area which includes the "dispersed" half of the relevant phenomenon. The indicator is denoted as H (degree of hierarchization or heterogeneity of the distribution) and it ranges between 50 (a quite even distribution) and 100 (the maximum concentration).

(ii) Since the scale of systems differs, a relativized indicator H, was introduced, which takes into account unevenness for individual scales of systems. This meant that the unevenness of a unit of the N order is only reviewed according to the differences between the included units of N^{-1} order (meaning that internal unevenness in the units of N^{-1} order is not included). The number of internal units was usually set at 10 to 15. This ensures the comparability of systems of various size because, if all systems were only assessed according to the same elementary units, only a trivial truism would be found: internal differentiation or unevenness in the distribution of phenomena would increase with size. The ratio between the units of the N and N^{-1} orders also produces the number of observed scale levels (6 to 7), while the highest level is represented by the land, including Antarctica (around 150 million km^2).

(iii) When the observed phenomena were selected, preference was given to their representative ability, i.e., their relative synthetic character from the viewpoint of geographical differentiation: population (also from the development viewpoint), altitude (the volume of mass above sea level) and forest (roughly expressing the volume of biomass). Some additional assessments concerning precipitation and jobs (including some selected spheres: industry, services, financial sector) were used. A detailed overview of the phenomena and units under observation has been given in earlier studies, including a discussion of the problems of availability and use of statistical data and an explanation of some complementing estimates (especially Hampl, 1971, and also Hampl, Pavlík, 1977, Hampl, 1981, Hampl *et al.*, 1987, Hampl, 1989; these studies include references to the original statistical fund or studies providing the necessary data).

It is obvious from the methodology described above that, although it is simple, its application was extremely difficult. This was caused by a lack of necessary information or the unsuitable spatial divisions (the problem of unsuitable spatial units such as administrative units or the problem of the uneven size of units at the same administrative level, etc.). The assessment required a tremendous effort because, in comprehensive data processing, tens of thousands of units are needed. It should be therefore stressed that there was a low frequency (e.g. representativeness) and some specifically assessed units or their sets (with the exception of the highest orders). This problem increasingly worsened at the lower scales of observation (at microregional levels the assessment largely related to the units in the Czech Republic). Taking into consideration such serious limitations, the results were only applicable for generalized assessments based on very considerable, regularly organized, differences in the level of unevenness/hierarchization of geographical systems. This finding can be roughly limited to the establishment of basic differences in the rank/scale differentiation of physical geographical and sociogeographical systems (or the representative natural and social phenomena) and to the development of changes in the rank/scale differentiation of social phenomena themselves. However, it is correct to call these regularities the most substantial ones: Figure 12 presents the generalized results. However, a detailed distinction of the differentiation concerning qualitative subtypes of geographical phenomena or specificities of this differentiation in individual regional subsystems of the world was not carried out. An elaborate assessment of this type would be very useful and at present even feasible (given satellite pictures and current computer capacities). It could also be extended to include higher (astrophysical) scales and specification of exogenously and endogenously conditioned physical geographical phenomena, etc.

As the empirically discerned values were not sufficiently representative, basic regularities of geographical differentiation of the environment, expressed in Figure 12, were not closely specified from the viewpoint of the H indicator. However, for the sake of basic orientation, one can present the following data for macroregional–mesoregional–microregional levels: 80–65–55 for physical geographical phenomena and 90–75–90 for sociogeographical phenomena. It should also be stressed that variability of real values increases along with the decreasing rank/scale of systems, while this variability generally depends on the specificity of the phenomenon observed and a concrete subsystem. However, this variability is of secondary importance and does not deny any substantial successions in the degree of geographical unevenness. In this context, one must stress a basic similarity in the rank/scale organization of the geographical distribution of inorganic and biological phenomena. Finally, this is confirmed by the original nature of the distribution of population.

These remarks suggest the formulation of the first general conclusion on **the primary unity of rank/scale organization (hierarchization) of the environment**. The character of this organization is expressed by the following differentional relationships: **strong macrodifferentiation–limited mesodifferentiation–weak microdifferentiation**. Consequently, while spatial units are gradually decreased, their homogeneity increases from the viewpoint of the internal distribution of representative phenomena.

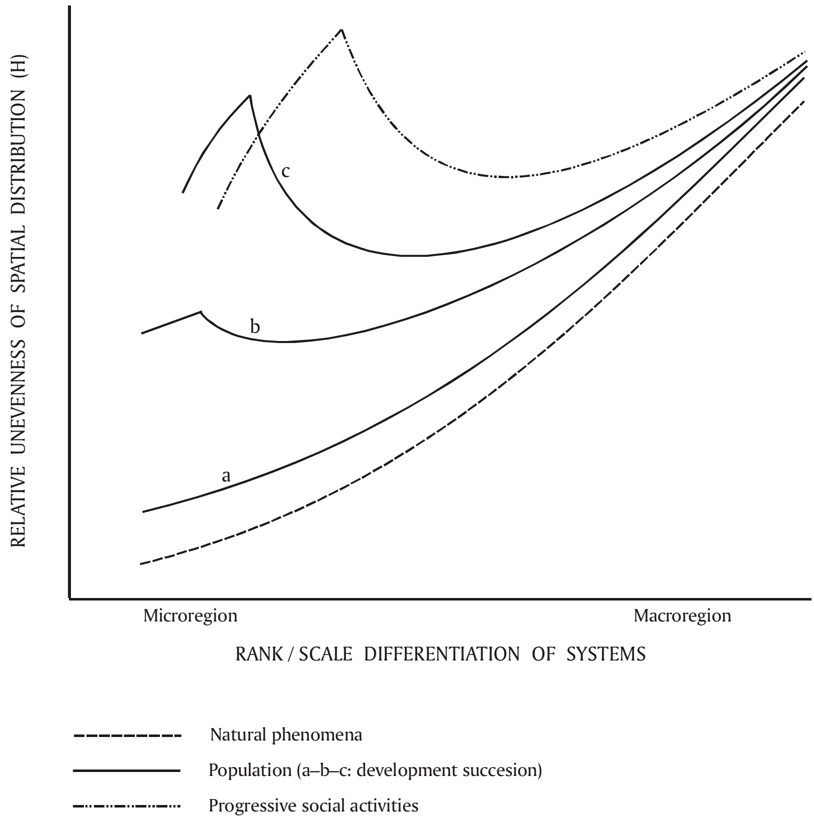

Figure 12: Rank/Scale Differentiations in the Level of Spatial Unevenness (Concentration) of Natural and Social Phenomena

Sources: Hampl, 1971, 1989; Hampl, Pavlík, 1977

This fact corresponds with the concept of physical geographical regionalization, stressing the need for the relative internal homogeneity of regions. However, the conditioning of this homogeneity largely depends on the effect of external factors: microhomogeneity is dominantly determined especially by macrodifferentiation as well as the mesodifferentiation of the situation in an environment. **In this sense it is correct to speak about a dominant organization of influences (conditioning) in the geographical environment "from above."** However, this relationship also concerns the organization of the universal environment. Astrophysical scale levels of differentiation are organized similarly and display (as higher scale levels than the landscape sphere of the Earth) more considerable unevenness in the distribution of phenomena (mass in general). At the same time, the planetary or supraplanetary organization basically conditions physical geographical forms of the differentiation of the landscape sphere – see horizontal zonation. A unified hierarchy of the environment and the corresponding hierarchy, organized "from above," also explain the weak integrity of partial and lower final environmental systems, their unclear separation from their environs as well as a relative dominance of continuity over discontinuity in the organization of the environment. In assessing the rank/scale differentiation of the distribution of geographical phenomena, one can provide additional evidence of earlier established general characteristics of the organization of the natural environment and of the primary interrelatedness of society and this organization.

The dominance of the total hierarchical organization of the environment on individual environmental systems, which actually means a dominance of the whole toward parts, has more complex causes. Their explanation lies in the field of natural sciences, in particular physics, geophysics and astrophysics. This survey can only indicate two associations of the rank/scale differentiation with differentiations of other types. First, it follows from empirical comparisons that components at a higher stage of evolution are relatively adjusted or subordinated in their environmental organization to the forms differentiating components at a lower stage of evolution (see the discussion on the distribution of biomass and initial distribution of population). This of course corresponds with the fact that a "lower form" is an existential basis (environment) for a "higher form." The orientation of conditions from macrostructures toward microstructures (from the whole to the parts) and from the lower to a higher stage of evolution is in relative agreement. This also expresses the principal connection of both differentiations, which were expressed earlier by the selective orientation of the evolution of environmental systems. The other connection also relates to the hierarchy mentioned earlier in the scale effect of basic types of physical interactions. The decisive importance of gravitational interactions for the differentiation of macrostructures is at lower scale levels, gradually and increasingly "complemented and relatively substituted" with the effect of electromagnetic interactions. This is expressed by the creation of two main spatial forms of physical geographical differentiations: zonal and azonal forms. Furthermore, this is reflected by a considerably stronger increase in the homogeneity of the distribution of exogenously conditioned phenomena from mesoregional to microregional levels than in the homogeneity of phenomena conditioned by endogenous factors. To some extent, this is illustrated by a lower value of H for the spatial distribution of precipitation in the regions of former Czechoslovakia (divided by districts), compared to a similarly established value of H for altitude (however, in the latter case, there is a combined effect of exogenous and endogenous factors – but at lower scale levels and in the specific conditions of Czechoslovakia one can consider the role of endogenous factors as more important) – see Hampl, 1971 (example 3a – p. 104).

Although the basic forms of rank/scale differentiations are (with the exception of modern stages of geosocietal organization) analogous for qualitatively different phenomena, there are also differences of significant secondary importance. They are connected with the evolutionary complexity of phenomena, and therefore also varying adjustment sensitivities to the differences in the external environment. Generally, empirical findings have confirmed that the geographical distribution of inorganic phenomena is somewhat less uneven than the distribution of biomass, which is, in its turn, less uneven than the original distribution of population. Similarly, it is true within the framework of "modern" geosocietal systems that progressive activities display higher degrees of spatial concentration than nonprogressive activities: population (settlement) is less concentrated than jobs; quaternary activities (banking, research and development, executive public and private offices) have the highest spatial concentration of all economic activities. Generally, one can speak about the positive correlation between the level of evolutionary complexity of phenomena and degree of unevenness (hierarchical differentiation) of their geographical distributions.

As stated earlier, this conclusion, too, only characterizes differences where significance is minor, because in all cases the same type of general rank/scale hierarchization is conserved. An essential change in this hierarchization stems from **the development of the geographical organization of society in later stages of evolution**. These changes lead to a major "reconstruction" of the original (natural) type of rank/scale hierarchy of geographical distributions. If the developmental succession of the curves characterizing the distribution of population at various scale levels is compared, **one can note that various forms of the distribution of natural and social phenomena were gradually distinguished depending upon the decreasing scales of the structures under observation**. The rapid development of the creation of this qualitatively new form of environmental organization must be above all associated with the period of industrial society and the onset of extensive acceleration of social development. This finding is empirically proven by the data on the development of observed unevenness in the distribution of population by territorial units in the Czech Republic whose rank/scale differed. The results, which involve the unevenness considered in a relativized way, are summarized in Table 8. The one-hundred-year period of observation (1869–1970) corresponds with the main stage of extensive urbanization in the Czech Lands. Simultaneously, it follows from successive changes in the values of H that the intensity of changes in time can be expressed in a generalized fashion by the shape of the S-curve (see assessments in the previous chapter) and that the greatest intensity of changes was reached in the Czech Lands before World War One.

Table 8: The Development of Spatial Concentration of Population (H) in the Czech Republic (1869–1970)

Observed unit	Number and type of internal units	1869	1890	1910	1930	1950	1970	Increase in H	Time median (year)
Czech Republic	13 regions	58.9	60.5	63.0	64.6	67.0	68.1	9.2	1925
Average region	13 districts	59.8	62.2	66.5	68.5	72.2	74.2	14.4	1917
Mladá Boleslav microregion	11subregions	66.3	68.0	73.6	77.1	78.7	81.0	14.7	1910
Average subregion	11 communities	64.1	65.3	65.4	65.5	67.6	67.9	3.8	(1935)

Notes: The assessment included regions and districts for 1949–1960, and urban districts were merged with relevant rural districts. The Mladá Boleslav microregion was defined according to commuting to work and its internal units (subregions) according to commuting for basic services. The time median was defined as a year in which there was a one-half increase in the H value for the whole period under observation.
Source: Hampl, 1989

When explaining the fundamental qualitative changes mentioned above in the development of environmental organization or fundamental qualitative "enrichment" of total environmental differentiation, one must stress two types of conditional factors. First, there is the strengthening of society itself and its impact on nature. This was a basic precondition for a relative liberation of society from natural environmental determinations. However, this overcoming of natural environmental influences was gradual and strongly differentiated from the rank/scale viewpoint. Logically, it strengthened its dependence on the declining rank/scale of systems, because of varying "quantitative" demands when external determinations are overcome (see the factor of distance) and the varying differentiation of natural conditions (see gradual declining of heterogeneity of natural conditions depending on the declining scale of natural wholes). The differentiation of scale influences when sociogeographical systems are activated described above has an impact (though to a limited extent) in the form of a feedback effect on the natural environment, specifically on the microregional structuration of the geobiosphere. The transformation of the natural landscape into a cultural landscape resulted in part in the disturbance of the original relative homogeneity of biogeographical microregions: hence the finding that major differences exist in the level of unevenness regarding the distribution of biological and inorganic phenomena at these levels (see Hampl, 1971).

The weakening of the influence of natural environmental conditions was also connected with the growing role of economic and, generally, societal factors. There was a dominance of agglomeration and concentration factors and the related efficiency of polarized forms of the spatial division of labor, mainly represented by the division of functions between the core and the periphery and the center and the hinterland. In fact, the societal factors underlying the creation of new forms of environmental organization in society explains the intrinsic (concentration) tendencies in the development of geographical distributions of social phenomena.

However, these tendencies have led not only to the construction of new forms of spatial sociogeographical structures, but also to a new quality of the integrity of sociogeographical systems. It has been increasingly based on competitive factors (competition among settlements, centers and whole regions) as well as cooperative factors (the spatial division of labor), not only "external" (see the importance of sociogeographical location, the position of the regional center in the hierarchy of a settlement system), but also internal processes occurring between the center and the hinterland (such as commuting to work and services) expressed by the internal division of functions. Finally, it is also expressed by the specification of a sociogeographical region as a functional region whose delimitation is based on a the maximum possible proximity (integrity) of relationships. In this sense one can see **the creation of a new type of integrity in the environmental system**. There, the importance of internal factors is basically strengthened which involves the extent of autonomy toward its environs. There is also a strong impact of integrative processes (competitive and cooperative) which are at a higher development stage. Since the processes of the creation of functional regions took place at various scale levels, entire hierarchical systems were formed. A certain culmination of the integration processes described above can be noted in the creation of states, whose autonomy (integrity) is – from the viewpoint of relatively environmental systems (not elements) – undoubtedly exceptional. This is the result of a unification of internal and external factors when states are created. There were strong influences of geographical factors – especially regarding the size differentiation of states as evidenced by data from Table 9 – as well as internal factors of social organization. As a result, states involve both societal and geosocietal systems, while the primary influence, when their size hierarchy was created was of an environmental rather than ecosystemic type.

Table 9: Size Differentiation of States (1992)

Category (rank of states by size)	Relative size of categories (First state = 100)		
	Territory	Population	Economic (GDP)
1.	100	100	100
2.–4.	169	115	111
5.–12.	189	80	79
13.–34.	174	90	62
Proportion in the world (%)	80.0	81.8	89.7

Note: Categories of states were defined according to their rank in the size series to make them about even along the rank-size rule principles.
Source: Dostál, Hampl, 1998

Furthermore, the example posed by the differentiation of states also serves as evidence of a gradual creation of active social agents of ecosystemic as well as environmental types at higher scale levels. Here one can note that the dominant influence of environmental organization by natural conditions persists. The relative subordination of social systems to natural differentiation only appears in the relevant forms of geographical distribution of social phenomena and size hierarchization of social systems (states, nations, etc.). The qualitative content and types of interactions influencing mesoregional and macroregional social units have been basically altered: there was a development of competitive and cooperative interactions. There was also increased integrity (autonomy, subjectivity) of these units, specifically in their ecosystemic aspect. The extreme size differentiation of states themselves and the prevailing competitive nature of their relationships verify that the competitive and, in part, cooperative effect does not only originate "from below" (as exemplified by nodal regions), but also "from above" (relations among states, including the global polarity of the type, core–periphery). As a result, qualitative changes in the character and rank/scale organization of relationships, which occur in the process of human history not only means that a hierarchy of natural factors organized "from above" is replaced with a hierarchy of social factors organized "from below." Natural determinations are overcome "from below," but the mutual effects of social agents of various scales are oriented both from below and from above. **In the scale hierarchization of societal and geosocietal systems one can therefore see a mutual, important activation of relationships (from above and from below), which is a new qualitative feature of major importance if compared with natural reality**. However, in these interactions there still survives an unevenness of relationships of the whole toward the parts (state–microregion) or the leading parts, dominating the whole, toward other parts (major power–satellite countries or core–periphery at the global level). However, the space for a feedback effect of parts is continually broadered (see the internal democratization of advanced countries and the initial democratization of relations at a supranational level).

If processes leading to the integration of societal and geosocietal systems are focussed upon, a different look at the rank/scale differentiation of the environment arises. One can determine individual levels of this differentiation only with a "scale" approach (the distribution of phenomena was reviewed in this way) or also "in a qualitative way" or according to the types of integrative processes and forms of legal independence or institutionalization of the relevant social entities. The other type of rank differentiation is exemplified by the hierarchy locality–nodal region–national system–global system. Although basic regularities of the rank/scale and rank/quality differentiation are relatively concordant, it is necessary to highlight the dualism of forms of this differentiation. In the case of a "mechanical" scale approach there is a general emphasis on spatial continuity, while the assessment only describes how the spatial intensity of the occurrence of phenomena is differentiated. As a result, it is much more important to highlight the rank/qualitative viewpoint which takes into consideration the autonomy and integrity of units, (see also this distinction described in Chapter 3). Moreover, the correlation between the scale and the qualitatively determined rank nature of systems is of a stochastic type. Also it is generally valid to note that a hierarchical differentiation of units is more developed than the differentiation related to spatial intensity of the occurrence of phenomena. This is strongly evidenced by the size differentiation of states characterized in Table 9. Significant extremes appear not only in the form of size differentiation of settlements, nodal regions, etc., but also as typologically defined physical geographical regions. In the sphere of social reality the territorial scope of nodal regions with large centres is basically always larger than that of nodal regions with small centres.

The question of qualitative determination of sociogeographical regions is connected with another interesting specificity. When the differentiation of the distribution of social phenomena is assessed according to the rank/scale principle, it is expressed by a "break" in the course of a relevant curve at the microregional level (see Figure 12). In fact, the break fully corresponds with **the creation of an elementary nodal region**, meaning a sort of elementary sociogeographical unit which is "relatively closed" in its relationships. It can be qualitatively characterized as a spatial framework of daily movements of a majority of the population, i.e., as a commuting region. In such a unit one can also see an elementary division of labor between the center and hinterland, and a corresponding basic "quantitative" polarization: the concentration of population and related activities in the center and their dispersion in the hinterland. However, the creation of units organized in this way requires a large area – roughly speaking at least several hundreds of km^2. While the spatial mobility of population and goods is increased on the one hand and the competition of centers is selectively oriented on the other, the spatial frameworks of daily movements of population are described above are broadened (the relationship between the rank principles determined by quality on the one hand and, by scale on the other, therefore evolves). Thus Figure 12 shows that in the course of development not only the "break" in the course of the curve is increasingly significant, but so is its scale shift. When unevenness of the distribution of population in spatial units smaller than in an elementary nodal region is measured, lower H values are found. It is so because they are functionally specialized, and therefore more homogeneous units, whose relationships are open, and therefore weakly integrated. This is empirically illustrated by a different development of unevenness within the Mladá Boleslav microregion divided according to subregions (a region with a strengthened center) on the one hand and an "average" subregion internally divided according to communities (units whose centers have gradually lost the functions of a center) on the other – see Table 8.

The previous observation, which focused on the development of new forms shaping geographical organization of society, was largely based on describing the extensive acceleration of this development in an industrial society. The question, is however, what will develop in the postindustrial stage? What will be the impact of the transformation of extensive forms of societal development on intensive forms from the environmental point of view? Empirical evidence have shown that in developed countries the classical process of geographical concentration of population has been considerably slowed or more or less stopped. It is correct to stress, of course, the scale shift of the concentration processes from the "nodal" to the "supranodal" level in the contemporary stage of development of the settlement system. The metropolization and the creation of urbanized macrostructures such as megalopolis (Gottmann, 1961, Doxiadis, 1968, and others) represents this scale shift. But, these processes have a number of limitations and a lower dynamic (slower growth rate) than classical urbanization. However, greater importance is attached to the structuration of the whole concentration process, which deepens the differences in the spatial concentration of various components, while the degree of concentration generally increases with the growth and progress economic activities – see Table 10 and Figure 12. This promotes the development of diverse regional processes from commuting and temporary migration of population increased information contacts. In other words, it can be characterized as the gradual transformation of the concentration of people (extensive process) into the concentration of contacts between people, social and economic subjects on the one hand and the leading centres on the other (intensive process). In this transformation a crucial role is played by the development of quaternary activities, especially in the sense of the development of its controlling effect on the whole regional system. **In this way, "quantitative" forms of concentration are replaced with "qualitative" forms** and the physical concentration of phenomena with the concentration of organizational power. This is most remarkable in the development of the hierarchically highest elements – global cities (see, e.g., Cohen, 1981; Hall, 1984) – when a supranational and global hierarchy of centers is created – see also Table 11. The basic orientation guiding the development of geographical organization of society is therefore maintained or further strengthened: hierarchization is deepened and hierarchically organized systems associated with integration processes are broadened. The development of these processes is illustrated by an emphasis on globalization processes, very trendy recently. However, the emphasis is too narrow and one-sided in a number of respects. In fact, barriers to globalization are underestimated (see, e.g., Holmen, 1997). Thus is also true for the existence of the hierarchical, multilevel nature of these processes (Hampl, 1997) and, in a summarized way, the rank/scale differentiation of their conditioning in dynamic as well as qualitative forms.

Table 10: The Development and Qualitative Structuration of the Size Hierarchy of Centers in the Czech Republic

Category (rank of centers)	Relative size (Prague = 100)					
	Population				CFS (1980)	Labor opportunities in non-productive sphere (1980)
	1869	1910	1950	1980		
1.	100	100	100	100	100	100
2.–4.	90	97	75	98	79	59
5.–12.	81	84	51	65	57	46
13.–34.	146	110	71	93	76	57
Proportion of 1.–34. in the Czech Republic (%)	15.0	26.0	35.5	41.0	50.3	60.3

Notes: CFS – complex functional size is an average of residential, working and service (non-productive) sizes. The categories were defined according to the same methodological principles as in Table 9.
Source: Hampl *et al.*, 1996

Table 11: Population and "Financial" Size Differentiation of Centers in Systems Differing According to Their Scale

Category of centers (rank size)	Assessed systems			
	Czech Republic	Central Europe	Europe	World
	a) According to population number			
1.	100	100	100	100
2.–4.	88	105	264	227
5.–12.	64	164	343	363
Proportion of 1.–12. in the system (%)	30.5	17.0	12.3	3.4
	b) According to capital of main banks			
1.	100	100	100	100
2.–4.	8	135	148	109
5.–12.	8	105	126	120
Proportion of 1.–12. in the system (%)	100.0	85.9	64.0	48.9

Notes: Central Europe was identified with the Czech Republic, Germany, Switzerland, Austria, Liechtenstein, Poland, Slovakia, Hungary and Slovenia; the whole of Europe does not include the former Soviet Union. The centers were defined as agglomerations (roughly in the sense of methods used by the U.S. statistics office for large agglomerations of the world). Population numbers refer to 1992 (in some cases estimates), capital either to the second half of 1994 or early months of 1995. This included the capital of the 1,000 largest banks in the world (in the case of the Czech Republic all banks were used). The distribution of 12 biggest centers into three categories was devised in order to make the size of these categories roughly similar to comply with rank-size rule conditions.
Source: Hampl, 1997.

Table 12: Size Differentiation of the Largest Metropolitan Areas in the USA According to the Population and Personal Income (1996)

Rank	Metropolitan area (main center/centers)	Population		Metropolitan area (main center/centers)	Personal income	
		% of USA	Relative size (1st unit = 100)		% of USA	Relative size (1st unit = 100)
1.	New York–Philadelphia	9.77	100	New York–Philadelphia	12.80	100
2.	Los Angeles	5.84	60	Los Angeles	5.84	46
3.	Chicago	3.24	33	Chicago	3.87	30
4.	Washington–Baltimore	2.70	28	San Francisco–San José	3.36	26
2.–4.		11.78	121		13.07	102
5.	San Francisco–San José	2.49	25	Washington-Baltimore	3.33	26
6.	Boston	2.10	22	Boston	2.71	21
7.	Detroit	1.99	20	Detroit	2.27	18
8.	Dallas–Forth Worth	1.73	18	Dallas–Forth Worth	1.90	15
9.	Houston	1.60	16	Houston	1.74	13
10.	Atlanta	1.34	14	Atlanta	1.48	12
11.	Miami	1.33	14	Seattle	1.44	11
12.	Seattle	1.25	13	Miami	1.31	10
5.–12.		13.83	142		16.18	126
1.–12.		35.38	363		42.05	328

Notes: Metropolitan areas of New York and Philadelphia were considered as one unit given their strong urbanization connection. In other cases U.S. official definitions were used. Compared to 1994 the proportion of the twelve largest metropolitan areas in the USA decreased by 0.10% in terms of population whereas in terms of personal incomes, it rose by 0.49%.

Sources: Statistical Abstract of the United States 1997 and 1998, U.S. Department of Commerce, Bureau of the Census, Washington D. C.

The described transfer of changes "from the distribution of phenomena to a relationship organization" therefore leads to a dynamic interconnection of elements as well as the entire partial systems of settlement and also necessarily to the intensification and expansion of the spatial division of labor. On the one hand, this loosens the links of geographical organization to the spatial factor, while its dependence on relationships/interactions among qualitatively different parts of environmental system is increased. On the other hand, there is an increase in importance of not only competitive, but also cooperative mechanisms. The classical polarity of the type large–small and rich–poor is thus partially replaced with the polarity of the type controling – controled (see also the growth pole concept by Perroux, 1950). This is the reason that the concentration of personal income exceeds that of population by a relatively small amount as evidenced by the example of the USA – see Table 12. However, when the mechanisms described above evolve, there is also a certain succession of time and scale. First of all, when elements of a system are interconnected (the proto-integration stage), competition intensifies and hierarchization is deepened in a selective way. This is caused, to a large extent, by the more rapid development of changes in the economy (which involves market mechanisms) than the development of a large collection of sociocultural components. As a result, a broadly conceived social integration, involving necessary, regulatory mechanisms, acceleration of diffusion processes, etc. usually only occurs with a certain lag in time and scale. A certain analogy is seen in the distinction of stages in the development of relationships between the core and periphery – Friedmann, 1966. At present, this advance of economic development and the ensuing emergence of social and political disturbances is felt or stressed especially at the global level (see, e.g., Taylor, 1989, Johnston, Taylor, eds., 1989).

All of the previous observations, which were focused on the creation of a qualitatively new geographical organization of society in the framework of a primary (natural) organization, suggests the following general conclusions:

(i) The gradual development of society has led to partially overcoming (natural) environmental determinations and to the development of new geographical forms of organization. These forms were increasingly influenced by societal factors and internal processes in relevant, partial sociogeographical systems at various scales or qualitatively established levels. One can note that relatively autonomous hierarchizations "from below" are created at various levels. In sum, the process can be described as **a development from a united, total hierarchy of the natural environment, a hierarchy in which influences/conditions are organized "from above," to a certain hierarchy of hierarchies with complex combinations of both natural and societal factors. The effect of societal factors originates both "from above" and "from below."**

(ii) The "multiplication" of hierarchical organizations described above results from the development of internal integrative processes that **basically strengthen the extent of autonomy of partial geosocietal as well as societal systems**. The weakening role of external influences gives rise to the development of more complex mechanisms and processes, that accelerate development. These processes are of a competitive and gradually also of a cooperative type. In fact, the development of these mechanisms and processes are of a cumulative nature and do not result in their substitution, but rather changes in their importance.

(iii) The entire development process is strongly differentiated from the rank/scale as well as temporal viewpoints. There is therefore **a general association of the development and rank/scale differentiations**. In this sense there is a need to stress the scale orientation of development toward higher forms of organization, **from microstructures to macrostructures**.

The development rate accelerates at lower levels of rank/scale while the differences in sociogeographical and physical geographical organization are intensified. In contrast, from the mesoregional levels (corresponding to units with an area of 0.1 to 1 million km^2 or units corresponding to medium-sized states) to the global level, the organization of sociogeographical and physical geographical differences is in relative harmony and a marked natural determination of the geographical organization of society persists.

(iv) In the case of the development of a final geographical system, its increased complexity is basically expressed both by the inclusion of a new (qualitatively higher) form of environmental hierarchization and by the multiplication (cumulation) of qualitatively varying forms of hierarchical organizations within its framework. In a simplified way one can conclude that the development progression of a final geographical system is basically characterized by a gradual **intensification of a dualism** of natural and social forms appearing in the rank/scale organization while their interactive, mutual effect is strengthened. At the same time, the intensification of this dualism is evidence of the formation and development of a secondary (social) integrated organization within the framework of primary (natural) organization emphasized above.

(v) Finally, it can be concluded that there is a general agreement in the polarity of homogeneity–heterogeneity both from the viewpoint of the principle of structural complexity (element–environmental system) and the rank/scale principle. However, the bi-dimensional expression of the relationships between the part and the whole is veracity because it leads to the finding of some vital specificities. The most important one is **the relatively higher hierarchization of "modern" sociogeographical microregions than mesoregions**.

7

TYPES, EVOLUTION AND PROBLEMS OF ASSESSING HIERARCHICAL ORGANIZATIONS

This chapter is devoted to the classification of characteristics of hierarchical organization that appear in real systems (environmental systems and ecosystems), which were gradually formulated in the previous observations. First, it focuses on creating a typology (classification) of real non-trivial hierarchies and on specifying the spheres of reality with a dominance of various types. Moreover, particular attention is paid to the formation and evolutionary successions of hierarchical organizations in societal systems. This complex issue was already discussed in the two preceding chapters, but from differing viewpoints which must be integrated. Moreover, because of its multilateral influences, the development of a hierarchy of social systems can serve as a suitable "summarizing" example of the complexity typical of the entire issue of hierarchical organizations. The discussion eventually introduces urgent questions of the current and future development of the global organization of society. Attention will focus on the question of hierarchical organizations because these forms of organization of real systems have only been dealt with by contemporary science in a limited way or, primarily in a methodological way (see, e.g., an overview by Wilson, 1969). It is therefore largely correct to speak of the problem of the hierarchy of real systems as a new problem of science. The previous observations has probably sufficiently verified that hierarchization is among the principal forms of organization in reality. And if it is not understood, it is impossible to create or explain, an integrated picture of structure and evolution of reality.

At the beginning of this final assessment it is necessary to restate the general characteristics of ecosystemic and environmental systems and to emphasize their mutual influences. What matters is the nature of the parts of these systems which can be expressed by notions of **qualitative heterogeneity, and therefore also inequality, and the pluralism of autonomies**. On the other hand, there is a focus on the general qualities of these systems as wholes. Thus, one can correctly use the notions of **hierarchical organizations and loose (relatively low) integrity**, and therefore, the increased role of external influences. The connection of these characteristics is evident. Frequency and relative autonomy of parts underlie not only the limited integrity of partial environmental systems, but also their strong interconnection with the whole environment and the related effect of influences of this environment. Afterwards, the pluralism of autonomies together with heterogeneity of parts of environmental systems can only be integrated into the whole of a higher order by some significant "force," ensuring at least the subordination of parts to the whole, meaning a force expressed by a hierarchical principle. Its effect can be based on the inequality of both: external conditions (determination by the environment) and internal conditions (inequality of parts). Previous observations of diverse types of environmental systems has basically proved that there is always some effect of both external and internal conditions of hierarchization, but in varied mutual relations. First, there is the obvious influence of the external environment – perhaps with the exception of the universal environment itself (see the problem of finality of the Universe). However, less evident is internal influences of natural ecosystems and environmental systems. In them, the dominance of external influence was stressed. The existence of diverse coexistential/environmental links between the parts of these systems and the increased sensitivity to external differences in parts of these systems at a more complex evolutionary levels, lead to a marked differentiation, evidenced by a certain importance of internal sources of hierarchization in these systems. In this sense it is possible to identify **hierarchization as an immanent quality of environmental (supraelementary) systems**.

If the extent of the effect of external and internal sources shaping the hierarchization of environmental systems and ecosystems is discerned, and, if various qualitative forms of internal mechanisms, which create hierarchy are established, there appears a basis for a typology of hierarchical organizations. The observations in previous chapters gave rise to the possible identification of four basic types of dominant sources of hierarchization as well as their evolutionary succession:

1. External determination – the decisive role is played by the asymmetric/hierarchical differentiation of the external environment which determines both the position (successfulness) of the parts within a system and the total organization of this system. This type can also be seen as the determination of the whole and parts by a super-whole.
2. Internal determination – the decisive role is played by the hierarchical organization of the relevant whole which dominates its parts. One can therefore note about the determination of parts by a whole. This is exemplified by the gravitational (total) organization of astrophysical systems. In terms of substance, which makes this type of hierarchy function, one can correctly assess, in an analogous way, the cases of a stabilized leading position of a minority of parts which dominate the whole. This is why this type includes totalitarian social systems.
3. Internal competition – the decisive role is played by a competition between parts, and the "hierarchical" outcome of this competition in particular. This organization has a qualitatively more complex feature: the relative openness of the competition mentioned

above (opportunity for all parts) and therefore a improved internal flexibility of the system. This corresponds with the creation of a hierarchy "from below."

4. Internal cooperation – in this case the decisive role is played by the division of functions between the parts and the distinction of the role of controlling (hierarchically higher) and controlled (hierarchically lower) parts according to the need for integrated benefit. The hierarchy is created again primarily "from below," but with an increased interconnectedness of parts and especially with the mutual benefit of their relationships.

Since types of hierarchical organizations were deliberately defined in a simplified way, it is correct to speak about certain **ideal types of hierarchies**. As a result, it must be emphasized that the specified forms of hierarchical principles only have a dominant and not exclusive effect in relevant organizations. It is also necessary to highlight the existence of transient forms of hierarchical principles or the varying possibility of their effect. This is exemplified by only the relative possibility of distinguishing relationships between internal determination and internal competition because inequality of the parts leads to their unequal competition and therefore to the creation of more or less determinative relationships. A similar question may be asked about whether cooperative relationships and the inequality of parts may be combined in the first place (each hierarchy "must" express an inequality of parts) and whether cooperation can be separated from competition. At any rate, this is an effort to emphasize in a schematic way certain aspects of hierarchical influences which appear in reality in integrated forms. This is partly accounted for by the typology of **real hierarchical organizations** which emphasizes the cumulative nature of the development of influences or conditions underlying hierarchical organizations associated with changes in the extent of effect carried by individual types of these forms of influences/conditions. Both typologies are characterized in parallel in Figure 13.

The typologies above (and the results of all of the previous observations) are immediately followed by the basic classification of hierarchically organized real systems – see Figure 14. Here too, one can see simplified patterns describing and deliberately stressing the most substantial differences between ecosystems and environmental systems (varying degree of hierarchization), and between natural, primary societal and secondary "target" societal systems (varying rate of development and increasing autonomy/integrity of societal systems compared with natural systems corresponding to the increasing the role of the internal sources of hierarchization). The classification is based again on the combination of basic ontological principles defined earlier.

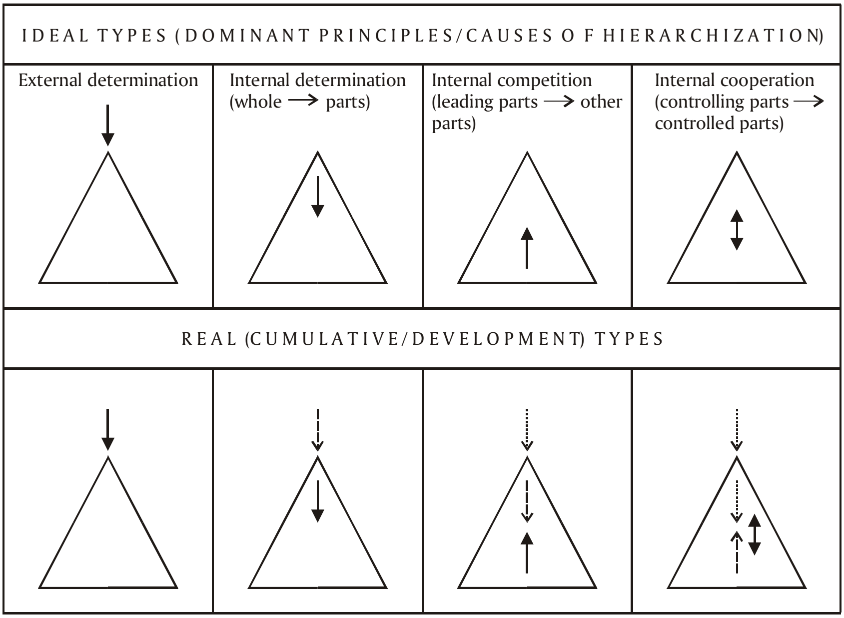

Figure 13: Types of Hierarchies

Note: Style of arrows expresses the importance and immediate effect of determinative, competitive or cooperative principles/causes of hierarchization.

The previous simplifying typologies can have a certain counterpart in the form of the assessment of the processes which shape the hierarchy of social systems and their development. If these processes are understood in a truly integrated way, one must combine the interactions of the type, humankind–external environment, as well as interactions of the type, microsystem–macrosystem, in a natural way in their development variations. In these combinations, the creation of social hierarchies, i.e. hierarchies of an ecosystemic type, can be considered as a result of two basic (differently oriented) processes. On the one hand, there is the continual arrangement of elements (human individuals) into a hierarchical organization of a social system: the creation of this organization simultaneously means the creation of this system itself. In this case the causes of the creation of a hierarchical organization are of a dual type. First, there exists a competition between people and the accumulation of advantages on the side of winners, while the integrity of the system is generally strengthened through its hierarchization for the sake of successful competition with the environment, both with nature and "alien" (e.g., tribal) communities. This actually results in the transformation of relationships between people: from **equal to unequal competition**, which is gradually institutionalized (petrified) and which eventually leads to the rule of a minority in the whole while largely competitive relationships between people are transformed into largely determinative relationships. The process of the creation of a hierarchy, a differentiation and an associated institutionalization described here was, in fact, enormously "lengthy" and it did not occur in a linear way (see, e.g., the development from a primitive to a transient society – Parsons, 1966).

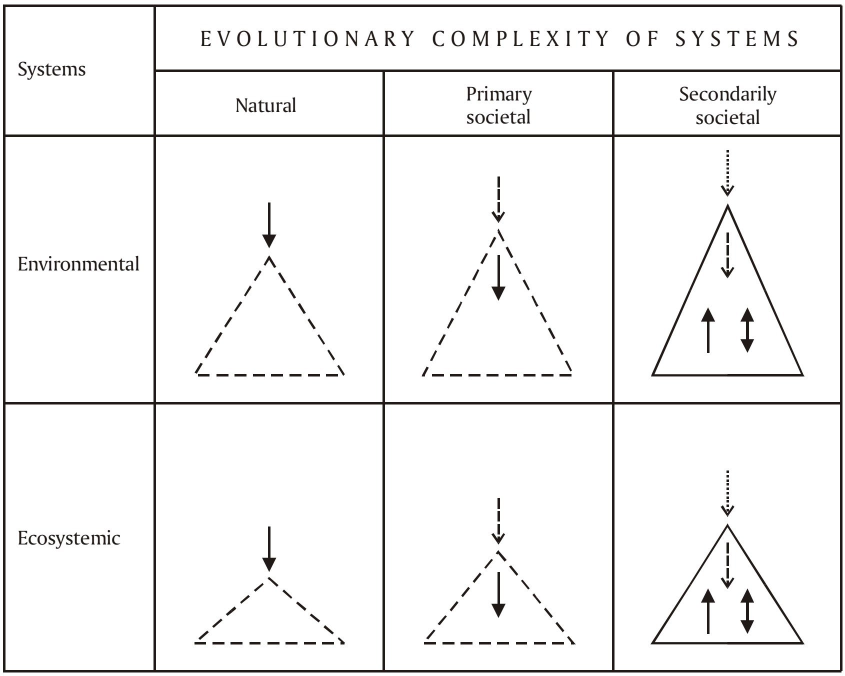

Figure 14: Classification of Real Hierarchical Systems

Notes: Types of organization of principles/causes of hierarchization are similar to those in Figure 13. The dashed delineation of triangles expresses a lower autonomy (integrity) of natural and primary societal environmental systems and ecosystems due to the major role of external influences when they are formed. It also expresses a certain increase in the hierarchization of a system depending on its evolutionary complexity.

On the other hand, one can speak about a process in which entire societies are formed. Here, the decisive role is originally played by external influences and by physical geographical differentiation. However, it gradually multiplied by competition between societies themselves. The size differentiation (and subsequently power differentiation of tribes, later nations and states in modern terms) was of **a "fully" environmental type**, **meaning they were extremely asymmetric.** This has continued to exist (see Table 9), while the power of differentiation is already less bound to population size and more to the economic power. The extremely asymmetric differentiation of "whole" societies that occurs is also decisive for the external differentiation of geosocietal environments of individual societies and, in itself, constituts a process that forms an asymmetric differentiation of this environment. Due to this "external" differentiation, the "internal" hierarchization of individual societies is simultaneously increased. This is an integrating force which increases the ability of a relevant society to succeed in competition with adjacent societies. As a result, this internal hierarchization of partial societies, also, embraces similar – "fully" environmental, non-ecosystemic – extremely asymmetric forms of differentiation approaching the differentiation of a global system to tribal/national societies. The creation of an internal hierarchy of social (ecosystemic) systems, in fact, proceeds **both "from above" – especially from final environmental macrostructures – and "from below," i.e., from ecosystemic microlevels**, and, in a modified way, from elements and their mutual interactions.

With regard to modern stages in the development of society, meaning the development of competitive and eventually cooperative mechanisms, such assessments are included in Chapter 5. In this case, there is emphasis on the scale orientation of this development, i.e., a prevailing movement "from below." This is in keeping with the conclusions, in Chapter 6, about the substantial connection of rank/scale as well as evolutionary differentiation and about the basic tendency toward the development of higher evolutionary forms of organizations from microlevels to macrolevels. The implementation of this evolutionary and scale shift is logically associated with the varying role and development rate of partial functional social spheres. Undoubtedly, the economy has always been the main engine of this movement. It has always enforced the opening of the original "rigid" totalitarian hierarchization of social systems which involves the freeing of elements from their determinants. At the same time, market mechanisms created opportunities for the building of a hierarchy "from below," on the basis of relatively free competition of elements. Understandably, a competitive mechanism dominated which may have accelerated the development of the whole, but mainly through largely selective tendencies. This resulted in strengthened social pressures on adequate regulations that hampered existing or increasing differences between people and their groups. They were also moving to the development of a broader sociocultural basis supporting the integrity as well as the hierarchical organization of the social system with inbuilt (institutionalized) principles of solidarity. Overcoming the relatively contradictory economic and social tendencies was, in a number of respects, possible because it was preceded by the rank/scale shift of economic competition to a higher level. This has been reflected in a continual increase in market frameworks from local, through regional, national, and supranational to global dimensions. A similar development/scale succession can also be found in critical forms of social conflicts or disturbances (from Marx's class struggle to the current wealth polarity of the North and South). They are being overcome through democratization and economic well-being with appropriate lags, although they are still far from completion.

Although general tendencies of social development are being, strongly eroded (complicated) by an enormous differentiation in the level of maturity of countries, particularly from a global perspective, the basic features of global development are determined by the situation in those countries with the greatest power. Simultaneously, the polarity of the advanced and backward countries is a major expression of the state of the global system. In this sense one can see the critical role of the North–South polarization or the core–periphery division on the one hand and the globalization of the economy with the scale delay of integrated societal coordination (still bound to the institutions of the state) on the other (see scale hierarchy in Taylor, 1981). From the viewpoint of the contemporary world, overcoming these "disproportions" is, to a large extent, unrealistic. Discrepancies in the wealth of countries are excessive (a differentiation of an environmental type), while the processes of political, social and cultural integration at a supranational level are slow and succeed partially only among the most advanced countries (the European Union, North American Free Trade Association). Even if a long-term optimistic prospect were fulfilled, i.e. if a broadly conceived integration of mankind occured, another serious question would arise. The current "anticipation" of economic integration and competition in a scale shift could not continue. In addition the "target" state of proportional, interconnected and flexible, integrated society – with the indispensable role of its elementary, ecosystemic as well as environmental structuration – has been, at least, only partially implemented in advanced countries, i.e. in a minority at the scale level of states.

Reactions to these facts in the academic community have been varied, but the dominance of pessimistic assessments of the future is not surprising. The successful 1950s and 1960s led to the broad acceptance of the theory of development stages by Rostow (1960). The fall of the Communist bloc in 1989 brought idealization of the path toward a democratic and market-oriented society of the Western type (Fukuyama, 1992). However, there is still a dominance of the criticism of developmentalism (e.g., Taylor, 1989), and the prevalence of the inequality of the core and periphery is emphasized (Wallerstein, 1979, 1984). This is also true in terms of the idea of a confrontational nature of macrodifferentiation of civilizations (Huntington, 1993, 1996). Naturally, there is an intensified appeal to the enlightened behavior of political elites (see, e.g., Kennedy, 1993) and to search for consensus in a combination of two the most important, civilizational models – a western and Asian models (e.g., Svenson, 1996). It is certainly difficult to forecast the human future, let alone devise scenarios with which to fulfil such a goal favorably. It is, of course, impossible to create any such real "plan" because the activities of social agents can never be controlled by human interests in a planned manner. However, it makes sense to search for mechanisms for their emergence and the subsequent influence of development by **creating right rules of the game**. They should basically respect spontaneity of social development but also spontaneity of a strategic type, which combines the principles of both merit and solidarity as well as the development of competitive and cooperative mechanisms. Undoubtedly, it can be aided by various regulatory mechanisms. However, they must be carefully checked lest they be abused by biased (one-sided) interest groups.

As a result, the future must be seen in a similar manner as the past – as a never-ending struggle advocating humanistic ideals of progress. It will be decisive to improve the quality of social organization and the "quality" of people. In the former case, it chiefly means increasing the interrelatedness of society as well as societies; a primary condition of the development of the division of labor and the growth of interdependence of parts–systems. In the latter case, there is needed a general increase in education and public activity by the population. An indispensable role will be played by education both in understanding regularities of hierarchical differentiation (toward the acceptation of reality, not at a fatalistic, but at a realistic level) and in activities which influence and control it. In this sense one can speak both about broadening and deepening of the democratization process (see the search for reasonable electoral systems, convenient mechanisms forming "universal" interest – majority versus elite, etc). However, historical experiences suggests scepticism about whether enlightened and altruistic behavior of people and social elites is possible. Hence there is a permanent need to rely on **the primary role of "coercive" mechanisms**, i.e., the threat of social destabili-zation from the viewpoint of internal influences and the threat of environmental collapse from the viewpoint of external influences of society. On the other hand, the previous assessment of the development of hierarchical organizations demonstrates that these coercive mechanisms have worked with sufficient efficiency and that spontaneous tendencies toward openness and flexibility along with the competitive and cooperative mechanisms prevail in society. However, their application is not easy or "linear" and does not rule out drastic phases in social development. How drastic these applications will be depends on both the quality of political elites and activities of citizens.

CONCLUDING REMARKS

At this point it is essential to make a number of substantive remarks about the sense of the search for an integrated order of reality as well as new problems of research, issues that this research generates. As a result, we do not and cannot formulate conclusions about our overall observations in the usual sense. This is so for two reasons. First, since this is the initial stage of the study of "an integrated issue," the formulation of conclusions would be premature to say the least. Second, the rich content and complexity of the issue are extraordinary and can only be ascertained via more thorough research. This is so because of the frequently discerned multilevel and multidimensional character of the integrated picture of reality directly enforces its complicated, structured expression. In this connection one must stress the duality of the synthesizing methods of scientific cognition. On the one hand, there is a "traditional" generalization whereas on the other, a "non-traditional" integration. It is non-traditional at least in broadly defined terms in the integrated knowledge of reality. This demands that the knowledge of the parts and the whole should be assembled into a unified system which must also depict the structuration of the whole into parts, the interaction of parts and wholes, etc. Moreover, all of this includes also a stress of importance of learning both similarities (homogeneities) and differentiations (heterogeneities) – see the two established basic forms of real organizations and related regularities. The topic of "differentiation" has been actually overlooked and underestimated by science and it should be recognized as a new, principal theme. In this respect just the study of environmental systems and, in particular, societal systems can prompt a new vision of organizations (a type of homogeneous sets as well as hierarchical systems) in reality.

The very question of hierarchical organizations or "differentiation itself" has been regarded as an important, but only partial part of an integrated study of reality. From the viewpoint of this analysis it is vital to study the interaction of elements and their type sets on the one hand, and hierarchical differentiation of the environment on the other (see particularly Chapter 4). If, in the course of entire previous observation these questions were described in a concise way for the sphere of social reality, they could only have been noted in the sphere of nature. The importance of rank/scale hierarchy when the fundamental forces appear are crucial if the primary arrangement and joint effect of wholes and parts are to be established at the physical, (e.g. initial) evolutionary as well as structural level. There is another interesting issue involving a thorough examination of the rank/scale structuration of reality, both in the sense of the interconnection of geographical and astrophysical levels of this differentiation and in the sense of specification of geographical types of this differentiation from regional and typological viewpoints. A significant contribution can be made by thoroughly assessing the evolution of the interaction of species among live organisms and whole systems of these species and environmental hierarchization. A study of asymmetries as a differentiation of types of sets within the framework of taxonomically higher wholes (see Willis, 1922) may be interesting as well. The existence of various forms (homogeneous and hierarchical) of structuration of mass phenomena and cases of their combined occurrence in the sets of a transient type, too, implies the possibility of creating a statistical classification methodology of mass phenomena. In its applied form it could be further "ontologized." Because of the dependence of the growth of structural complexity of systems, the levels of hierarchization of types of sets are growing, the rate of asymmetry of corresponding statistical distributions is an indicator of the share of external (environmental) conditional factors.

Many types of questions are also provoked by the study of the interactions of society and the natural environment. One can suppose, for example, that a basic orientation of a feedback effect of society on the environment is inversly related to the development of an integrated structure of reality as expressed in Figure 9. As the impact of this feedback influence grows, the same will undoubtedly occur for ecological/environmental risks and temporal opportunities for their elimination. Finally, there is a need for a deeper specification of "quantitative" as well as "qualitative" forms of hierarchization and their relationship both to natural and social reality in environmental (supra-elementary) levels of organization. At the physical level this can be illustrated by a different asymmetry in the spatial distribution of mass and asymmetry in the qualitative diversity of the physical environment as a crucial condition (potential) for the development of higher material forms in terms of evolution(see, e.g., the core of the Earth and the surface or geographical environment of the Earth). Similarly, in the geosocietal sphere one can stress differences in the location of concentrations of population on the one hand and the concentration of wealth on the other.

There are therefore many problems evident and if there are no answers one cannot interconnect the necessary integrated level of assessment with the knowledge set of the special sciences. However, the need to develop knowledge of this type seems indispensable not only from the parts to the whole, but also in reverse. Despite an initial level of cognition of an integrated order, existence of "autonomous" regularities in the organization of the whole reality as well as its environmental subsystems was perhaps sufficiently verified in the previous observation. As has been underscored, one can see the key to finding an integrated order simply in the knowledge of the interactions of wholes and parts. This also expresses the need for a combination of reductionist and holistic/systemic methods and their complete fulfilment and elaboration. In this sense it is desirable to suppress the duality of reductionism and holism, but also to reject the monopolistic position of the former. By contrast, one has not only to praise the results of reductionism, but also stress the problem of a relative paucity of results of a holistic study which would not, however, create a counterbalance to reductionist ideas, but rather enrich and complement them. From the viewpoint of the study of reality this actually requires at least an elementary knowledge of environmental organizations without which one cannot study interactions of the partial (elementary) and the holistic (supra-elementary) structures and create an integrated picture of reality.

All of these issues may be a task for a large set of research teams or science as a whole. Understandably, from the viewpoint of an individual, this task is not possible. In this context, this author must admit to an extraordinary uncertainty which accompanies his every contact with topics, in fields where he is just a lay person. His adventurous naivete can perhaps be excused by the significance of the topic and the necessity to search for integrating concepts of reality – a challenge that justifies such risky attempts.

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