To describe the basic characteristics of modern society, two levels should be distinguished: the structural and the cultural level. According to the late Talcott Parsons, the dominant value pattern of modern society is the cultural pattern of instrumental activism. What is valued in modern society is not passive adjustment to the exigencies of the environment, but increasing the freedom of action within the environment, and ultimately control over the environment. It is no longer adaptation to the environment, but adaptation of the environment to social needs. On the structural level, new patterns of societal differentiation have emerged. According to Niklas Luhmann, the pattern which characterizes modern society is one of functional differentiation. Functional subsystems impose their particular perspective on the world. The environment is perceived through different lenses (e.g. through a political, legal, economic, educational or scientific lens). These different perceptions are incommensurable. As a consequence, society cannot control its overall impact on the environment. Its structural and cultural characteristics limit its sensitivity vis-à-vis the environment. Copyright © 2005 John Wiley & Sons, Ltd.

Keywords systems theory; autopoiesis; ecology; Niklas Luhmann

1. INTRODUCTION

We have become increasingly aware of the fact that our society not only changes its environment, but also undermines the conditions of its own existence. The changes, which it currently brings about in the environment, hit back on social life and endanger society itself. This is not an entirely new problem. Similar phenomena occurred in earlier phases of social evolution, e.g. deforestation or exploitation and depletion of fertile soil by semi-sedentary tribes. But the intensity and the scale with which the ecological problems nowadays impose themselves make it impossible to ignore them any longer. Judged from the rise of interest in ecological issues (e.g. in the mass media, in the new social movements),
our society is currently alarming itself. Appropriate action is urgently requested. But what has science to offer in this regard? Has it developed the conceptual tools and instruments necessary to describe, understand, predict, explain and/or resolve environmental problems?

It is not difficult to see that the social sciences cannot fall back on an established record of knowledge about the ecological conditions of society. The social sciences are traditionally characterized by an ‘intra-unit orientation’ (Heilbron, 1995). They focus on internal points of view, i.e. on phenomena and relationships that are situated within society and that do not refer to society’s environment. This emphasis can, in part, be explained by the historical conditions of the emergence of this field of study. From the onset, the social sciences needed to establish themselves in opposition to the already well-established natural sciences. The distinction between both types of science was seen in terms of a repartition of the objective territory. The study of nature was left in the care of the natural sciences; natural objects were not the territory of the social sciences. This repartitioning of the territory of research objects also tended to carry on the distinction between nature and civilization (or culture) that emerged in Europe in the course of the eighteenth century (Rammert, 1999; Murphy, 2002).

Against this background, the question can be raised whether and how the social sciences and society itself might benefit from systems research. It is beyond doubt that systems theory can provide a fruitful perspective for studying the ecological problems. Applied to social systems, it allows us to discuss, understand and explain society’s awareness of the changes it brings about in its environment. It enables the social sciences to give due attention to society’s extra-social environment.

2. SYSTEMS THEORY

The distinction of system and environment can be clarified in terms of complexity. It is a classical finding of cybernetics that no system can maintain itself by means of a point-for-point correlation with its environment. No system can summon enough ‘requisite variety’ to match its environment (Ashby, 1964). For any system the environment is always more complex than the system itself; any system has to reduce environmental complexity, e.g. by means of selective system/environment relations or by perceiving its environment in a pre-formed way. A crucial question, which follows from this finding, can be put as follows: how can a restrictedly complex system exist in a much more complex environment and maintain and reproduce itself? The concept of autopoiesis, which was introduced by Humberto Maturana and Francisco Varela (1980), provides the answer to this question. An autopoietic system, such as the organic system of a cell, is constantly reproductive. It develops structures of its own for the continuation of its autopoiesis. An autopoietic system is both supported and disturbed by its environment. It forms its own structures in reaction to irritation from the environment in order to continue the autopoietic process, or it simply ceases to exist.

Autopoietic systems are systems that produce the elements out of which they exist by means of a network of these elements themselves. They are self-referentially closed systems. Autopoietic systems are defined as ‘networks of productions of components that (1) recursively, through their interactions, generate and realize the network that produces them, and (2) constitute, in the space in which they exist, the boundaries of this network as components that participate in the realization
of the network’ (Maturana, 1981, p. 21). Living systems do not import ‘life’ from their environment, but need to produce their own ‘life’. This does not imply that autopoietic systems are windowless ‘monads’ (Leibniz). The environment resonates in the system by means of the elements which the system itself produces. In this regard, one might also speak of ‘order from noise’. Autopoietic systems can be open, because they are closed. Very complex systems can develop in this way if forms of organization can be found that are compatible with greater environmental complexity, i.e. make corresponding reductions-of-complexity possible. These systems are geared towards the continuation of their own autopoiesis, and thus operationally closed. But complex autopoietic systems also become increasingly open, and thus sensible to changing environmental conditions. ‘Autopoiesis’ accounts for the non-reductive relation between the system and its necessary environment.

The autopoiesis ‘paradigm’ emerged in the field of the natural sciences. But can we move from the natural sciences to the field of the social sciences? Can we bridge the gap between both types of science? And if so: how? It is now well known that, following Niklas Luhmann, the concept of autopoiesis can be put to use in the field of the social sciences. It can be put to use with regard to social systems in general, and with regard to the encompassing system of society in particular (Bailey, 2001; van Gigch, 2002).

It is important to note that Luhmann’s adoption of the autopoiesis paradigm forced him to adapt his theoretical instrumentarium in a number of respects. In particular, it elicited a shift from action theory to communication theory (Tyrell, 1998; Stichweh, 2000). As Luhmann maintained, communications and not actions constitute the basic elements of social systems. It is indeed not at all simple to envisage an autopoietic social system that is closed on the basis of actions as its constitutive elements. Actions are very much individualized. Each single action also introduces a discontinuity into the social process. Either something ends or something new begins. An action is somehow isolated from its antecedents and its consequences; therefore it is difficult to envisage the production of something from its own products for an action system. That is very different with communications, where it is much simpler to perceive a continuous flow of communications, recursively returning to its starting-point. For communication, one always needs at least three terms: sender, receiver, and the information that relates them. Also, each communication reacts upon previous communications, and anticipates further communications. In this sense, it can be maintained that communications are produced and reproduced in a network that consists itself of communications. A communication unit is ‘the ultimate unity, with whose dissolution the social would disappear’ (Luhmann, 1995, p. 138).

Autopoietic systems are operationally closed systems because they produce their elements themselves. This goes, according to Niklas Luhmann, as much for organic and psychic systems as for social systems. Their respective mode of reproduction (life, consciousness, communication) is autonomous. These types of systems can be found in each other’s environment, but cannot participate in each other’s autopoiesis. One consequence of this view, viz.

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1To illustrate this tautological definition, an example may be helpful. Milan Zeleny provides us with the following example: ‘The cell of an organic system is a complex production system, producing and synthesizing macromolecules of proteins, lipids, and enzymes, among others; it consists of about \(10^5\) macromolecules on the average. The entire macromolecular population of a given cell is renewed about \(10^4\) times during its lifetime. Throughout this staggering turnover of matter, the cell maintains its distinctiveness, cohesiveness, and relative autonomy. It produces myriads of components, yet it does not simply produce something else—it produces itself. A cell maintains its identity and distinctiveness during its life span. The maintenance of unity and wholeness, while the components themselves are being continuously or periodically disassembled and rebuilt, created and decimated, produced and consumed, is called autopoiesis’ (Zeleny, 1981, pp. 4–5).

2According to Luhmann, a unit of communication consists of the coordination or synthesis of three different selections. These selections are: information, utterance and understanding (‘Verstehen’). Understanding (and understanding will almost inevitably contain some misunderstanding) concludes the communicative act. An understanding, however, needs to manifest itself. The receiver needs to show her understanding, by addressing herself to the information component (e.g. question what is said) or to the utterance (e.g. question the way something is said). Thus, a communication always necessitates a new communication. Communications conclude preceding communications and enable connecting ones. They organize their own renewal autopoietically.
that social systems do not consist of human beings or individuals (but of communications), has been heavily criticized in recent years (e.g., Mingers, 1995, 2002). At first sight, it seems to lead to the glorification of the system—with the connotations of: systematic, deterministic, inhuman—in systems theory. However, it should be seen that the sharp distinction between social systems and their environment offers the possibility of conceiving of human beings in a way that is both more complex and less restricting than if they had to be interpreted as parts of the social order. Because they are part of the environment of the societal system, human beings are conceded greater freedom (greater complexity) than social roles, norms and structures would allow. This can be clearly observed when the very emergence of social interaction as well as processes of socialization and education are studied (Vanderstraeten, 2000, 2002a, 2002b).

Of course, the human body and the human psyche seem to participate in communication and thus in social systems—while thoughts can be communicated by means of bodily gestures. But organic and psychic elements do not enter as such into social systems. They have to follow social rules; they are employed by social systems. Our muscular system is, for example, employed to write words and sentences. The muscle contractions that are needed to write the word ‘no’ do not appear in this word, and do not appear in the social system. Neither intrudes in the communication what you really think when you answer a request with a ‘no’. How would one otherwise be able to lie, and say ‘no’ but think ‘yes’? It is this logic that underlies Luhmann’s observations and remarks about the autopoiesis of social systems—especially with regard to the relation to their human environment.

In this light, the important question (which has, however, not yet received much attention in the literature) is how we can conceive of the relation between society and its natural environment. I have argued on the basis of existing systems research that complex, autopoietic systems develop their own dynamics. They do not isolate themselves from their environment, nor are they forced to adopt the best possible adaptation to their environment. As we now know, systems can even change their environment in such drastic ways that they place themselves in jeopardy. The exposure to ecological self-endangerment is part of the range of possibilities of evolution. Self-referentially closed systems are first of all directed towards the continuation of their autopoiesis. Typically, the next step in the process is more important for them than the concern for the future, which indeed is unattainable if their autopoiesis is not continued. In fact, they may thereby acquire the often unrealistic idea that the environment adapts to them, and not vice versa (Bateson, 1972; Adam, 1998; Hubbard, 2003). In the following, I will therefore focus more particularly on the questions of how the system of society adapts to its environment, and how it perceives the effects it brings about in its environment.

In a certain way, this article also seeks to complement Luhmann’s systems-theoretical approach. In a number of instances, Niklas Luhmann based his analyses on premises and concepts which he introduced as such, and which served as the point of departure of his analyses. One example is his definition of society as an autopoietic system. This approach implies that social autopoiesis is an either/or condition, and not one which is open to a reflection on the conditions and consequences of its gradual emergence. At some particular moment in the past, society has become an autopoietic system, Luhmann maintained, and this situation built the starting-point of his analyses. This theoretical strategy reminds one of that of Talcott Parsons—and the reactions Parsons’ approach elicited. Parsons took given social structures as the point of departure of his structural–functionalism and analysed the functions which these structures fulfilled. But critics pointed out that he could not question the structures themselves, and that his approach favoured the status quo. There is no such conservative bias in Luhmann. What I would like to explore, however, is how the emergence of autopoiesis at the level of society and its primary subsystems affect the relation between this system and its extra-social environment. In part, I will use in this regard the late works of Talcott Parsons, which can be read as
3. SOCIAL THEORY

In general terms, it can be assumed that—somehow and somewhere—society needs to thematize the connection between its own operations and its environment, if only because environmental changes can endanger the continuation of its autopoiesis. It is also clear that modern society no longer predominantly thematizes its ecological conditions in religious terms and categories (e.g. Divine Will). In the transition to modernity, the latent premises of a religious guidance of society have evaporated (Gorski, 2003). But how has this form been replaced? To gain insight into modern society’s handling of the environment, the following discussion starts with an analysis of basic changes in its cultural value system. Next, fundamental characteristics of the form of structural differentiation of modern society are discussed. This picture of cultural and structural changes makes it possible to discuss society’s chances for dealing with ecological problems communicatively.

3.1 Instrumental Activism

People orient themselves with the help of cultural values, norms or expectations. These cultural patterns may entail cognitive and normative components, such as making particular distinctions, following particular rules (e.g. conversational rules), and distinguishing between desirable and undesirable phenomena. They have a very general meaning; they are not tuned to specific social situations or individuals. People may use them to orient themselves in a multitude of situations. Moreover, they can bring about roughly the same type of orientation in anyone who happens to orient to these value patterns (Sperber, 1996; Fuchs, 2001). They may therefore fulfil important steering and control functions within society. How can we characterize the value pattern institutionalized in modern society? Which cultural value pattern structures modern society’s handling of its environment?

In his later works, Talcott Parsons has described the fundamental patterns of orientation in modern Western society in terms of ‘instrumental activism’ or ‘worldly instrumental activism’.³ To comprehend the meaning of this value pattern, which in my view aptly captures the nature of modern society, its components need to be distinguished. In Parsons’ approach, instrumental is defined in opposition to consummatory. Human action does not find its ultimate aim in itself. It is treated as instrumental to some interest or task imposed from outside its own sphere of interest. Within Europe, the emphasis on transcendental religious goals has been replaced by a strong emphasis on individuals as final reference point (hence worldly instrumental activism). According to Parsons’ analysis, modern society is seen to exist for the benefit of independent individuals. It tends to be judged in terms of its effectiveness in satisfying the independently given wants of individuals. The activistic component of instrumental activism, on the other hand, implies in a certain way a reverse perspective. Activism refers to the system/environment relations of society and of its subsystems, and points to the formation of value preferences that stimulate social systems to engage in an internal transformation of, and control over, objects in the environmentally given world. Modern society is not concerned with adaptation to the world, but with adaptation of the world to society’s needs. It is concerned with mastery over the world—as Max Weber pointed out with respect to Protestantism (Weber, 1988, pp. 17–206). The world is not something to be accepted or adjusted to, or to be escaped from, but to be mastered and controlled in the name of a transcendental ideal.

³As a consequence of the ‘critical’ turn in the social sciences, Talcott Parsons’ ‘structural–functionalism’ has for a lengthy period been exposed to very negative criticism, if not outright dismissal. In recent years, however, one can discern some indications of a Parsons’ revival. Partly as a consequence of the collapse of world communism and the subsequent disenchantment with 1960s-style radicalism, and partly owing to scholars attempting to better understand the theories of Jürgen Habermas and Niklas Luhmann, both of whom were deeply influenced by Parsons, the end of the twentieth century brought a resurgence of interest in Parsonian theory and books devoted to a reassessment of his work (e.g. Holmwood, 1996; Treviño, 2001). In line with this project for a re-evaluation of Parsons’ work, I here pay particular attention to Parsons’ later work on social and cultural change.
According to Talcott Parsons, the value pattern of ‘(worldly) instrumental activism’ found its most clear-cut expression in two episodes in the evolution of modern society. He pointed to the industrial revolution of the eighteenth century—and its emphasis on economic production, instead of on the extraction of natural resources. But the interest in knowledge, which became dominant in the second part of the twentieth century, also expresses this value pattern. Both the industrial and the post-industrial type of society are exponents of a similar value pattern. Both the industrial revolution and the educational revolution (i.e. the realization of mass higher education) are manifestations of instrumental and adaptive value patterns. The adaptive stress which gave, according to Parsons, something like primacy to economic production as the first priority in social development also legitimizes the concern with the cognitive complex, i.e. the development and dissemination of knowledge. Both the forms of economic production and cognitive development are to be subsumed under a more generally conceived valuation of enhanced adaptive capacity in the society (Parsons, 1973, 1991). This implies that the so-called modernization process leads to increasingly generalized, but not to fundamentally different, patterns of orientation.

From this point of view, it can be seen that society has become increasingly autonomous vis-à-vis its environment. Due to its preference for an activist and aggressive transformation of environmental objects, it has become able to produce its basic elements itself. This means—translated into contemporary systems-theoretical jargon—that society acquired the characteristics of an autopoietic system. It now organizes its own renewal; it now creates its elements itself. Parsons’ analysis thus readily fits in with the theory of autopoiesis (as applied to social systems). If we follow Talcott Parsons, this kind of society cannot be one that is primarily adaptively oriented to its situation. It must seek to master situational exigencies in the interest of its conception of the desirable. What is valued is increasing the freedom of ‘civilized’ action within the environment and ultimately control over this environment. This also means that, at a very fundamental level, modern society is not prepared for a sensitive, caring relationship with its extra-social environment.

3.2 Functional Differentiation

The preceding analysis of cultural value patterns needs to be complemented by a discussion of the primary structural characteristics of society, i.e. an analysis of society’s dominant mode of structural differentiation. In particular, the ecological problems of society are also a consequence of the way it stimulates internal structural differentiation. Today, society’s commitment to its ecological conditions is channelled towards particular function systems. Environmental problems disturb the internal dynamics and sensitivity of function systems like politics, economy, science, education, law or health care. Sometimes this happens directly when resources dry up or catastrophes threaten. But it also occurs indirectly via socially mediated interdependencies when, for example, the economy is forced to react to legal precepts even if it would attain better results following its own ideas. In this sense, the form of differentiation also produces its own problems; it produces effects in the system of society that are unlike the changes in the environment that originally triggered them.

Internal differentiation denotes the way in which a system builds subsystems, that is, repeats the difference between system and (internal) environment within itself. As Niklas Luhmann has pointed out, forms of differentiation differ in the way they establish internal boundaries between subsystems and internal environments. Modern society is no longer characterized by a stratification of lineage, clans and families, but by a differentiation of function systems. Modern society is differentiated into the political subsystem and its environment, the economic subsystem and its environment, the scientific subsystem and its environment, the educational subsystem and its environment, and so on. Each of these subsystems accentuates, for its own communicative processes, the primacy of its own function. Each establishes a specific,
highly selective set of system/environment relations. All of the other subsystems belong to its internal environment and vice versa. In this sense, it can be said that the function systems of modern society organize their own autopoiesis (Luhmann, 1997). On the one hand, this form of functional differentiation is possible through what Niklas Luhmann has called the ‘rejection of redundancy’, i.e. the rejection of multiple safeguarding. Function systems cannot step in for, replace, or even simply relieve one another. Politics cannot be substituted for the economy, nor the economy for science, nor science for law or religion, nor religion for politics, etc., in any conceivable relation between systems. Politics, for example, cannot take over the scientific search for new knowledge, if science would fail to give due attention to environmental issues. A function can only be fulfilled within the appropriate function system itself. The older, multifunctional institutions (e.g. large family households) have been dissolved, and cannot be revived under the present conditions. On the other hand, the progressive resolution and reorganization of the structural redundancies of society do not exclude several kinds of interdependencies between these function systems. Dependencies and independencies of functional subsystems can expand together. Every subsystem is, in as far as it gains freedom for its own function, dependent upon the fulfilment of the other functions elsewhere within society. Function systems support and burden one another reciprocally, precisely because they cannot replace one another. The consequences of adaptive changes of individual function systems to environmental problems are thus situated within a complex net of dependencies and independencies. Simple estimations and simple evaluations of the consequences of particular functional arrangements are, therefore, insufficient and inadvisable.

The working together of function systems is necessary in practically all cases. In a functionally differentiated society, the change of one system can have social effects for the other. For example, scientific research has made the construction of nuclear power plants economically possible, through a political decision about legal liability limitations. The world is not just constituted so that events generally fit within the framework of one function system alone. Function systems are not differentiated as regions of being, but by means of their modes of operating and observing (i.e. by their autopoiesis). As a consequence, a function system cannot transcend itself and act on higher orders. It cannot steer the operations of other systems, because these operations depend on the construction of differences in the context of these other function systems. There is no position from which one is able to supervise the operations of the different function systems. Theories of hierarchy, delegation or decentralization that begin from an apex or centre are incapable of grasping contemporary society adequately. They presuppose a channelling of the communication flow that does not exist nor can be produced.

Functional differentiation has been able to trigger enormous internal dynamics in the function systems. It is at the basis of the enormous growth of modern society’s performance and complexity. Whether this growth is equal to ‘progress’ (whatever that may mean) is not our issue. For sure, this evolution has by no means guaranteed a viable relation between the system of society and its natural environment. To the contrary, the evolution of the different functional domains within our differentiated society has brought about a very high degree of uncertainty with regard to the future. This makes it much more important than ever before to strengthen our ability to observe what is going on.

3.3 Ecological Communication

Modern society and its function systems use communication as their particular modes of
autopoietic reproduction. As we have seen, this condition does not imply that social systems exist without relations to their environment, or without observations of environmental states or events. A complex autopoietic system is able to observe its environment. The autopoietic self-reproduction (or closure) is the condition of the system’s openness. But an autopoietic system can only resonate on the basis of its own frequencies. There is no point-for-point coordination with environmental changes. The system uses its boundaries to screen itself off from environmental influences and produces only very selective interconnections between itself and its environment. It needs to make use of distinctions or differences to observe its environment, such as the distinction between a normal, structurally anticipated course of operations, and a situation in which the connection of further operations is uncertain. This distinction makes it possible to define environmental changes, for example, as problems that need to be tackled, or as elements of uncertainty or ambivalence that can be allowed to rest (Luhmann, 1989).

Within the system of modern society, the observation and resonance of environmental changes need to be studied in connection with the principle of ‘rejection of redundancy’ (Luhmann) that is characteristic of its form of functional differentiation. This principle defines more exactly how environmental complexity is reduced, and where the boundaries of possible resonance in the society lie. In important regards, the current form of functional differentiation narrows society’s attention span. Because every function system is solely and completely responsible for its own function, it tends to observe its environment only in as far as this environment is relevant within its programmatic perspective—for example, as something that is worthwhile from a scientific point of view, as something that is of importance with regard to economic performance, as something that can be used to produce a work of art, or as something that might bear upon political success. Each function system employs some of its own operations to reduce the complexity of society’s environment, but these different reductions cannot simply be added to obtain a complete picture of the environment.

Due to its principle of ‘rejection of redundancy’, society itself, as the encompassing social system, is ill prepared to observe the range of effects it elicits in its environment.

Modern society mainly reacts to environmental problems through its function systems. Its renouncement of redundancy conditions the way it is able to observe and react to environmental dangers. These structural barriers and limitations cannot be removed if we do not want to give up the advantages of modern society. As will be discussed in the concluding section, an optimization of modern society’s reaction capacity will be dependent upon an improvement of its ability to recognize the limitations of its own observations. However, the form of functional differentiation also elicits other effects. It does not just narrow society’s attention span. As function systems depend upon each other, changes in one function system can also be reflected or echoed in other subsystems. There is no guarantee that these secondary reactions are proportionate with the original cause. In fact, through resonance small changes in one system can trigger great changes in another. Payments of money to a politician in amounts that are insignificant, when compared to the hundreds of billions of dollars or euros that are transferred back and forth daily in the economic process, can become a political scandal with enormous repercussions within the political system. Theoretically insignificant scientific discoveries can have agonizing medical results. Legal decisions that hardly have any effect on other decisions in the legal system itself can form roadblocks for entire political projects, etc. The amount of resonance that is due to the different kinds of interdependencies of function systems may in fact be much greater than the amount that results from society’s relation to its external environment. This disequilibrium is also a consequence of the autopoietic organization and internal differentiation of modern society.

In modern society, there is no supervening reason, no centre, no apex that would allow steering of the development of society and its connections with the environment. This structural limitation does not ignore the fact that the political system is often called upon to direct the
course of society, and that it often wants to fulfil such a role. But the political system cannot regulate other function systems. It can only influence them in an indirect way, if changes in the political system change the environment of other function systems. This situation has led Niklas Luhmann to a fairly negative appraisal of current environmental politics. Precisely because the political system cannot do anything immediately, it is likely to become the place where communication about ecological themes will find a home and expand. According to Luhmann, ‘there is nothing within the system to prevent this. Viewed from a purely political point of view, there is nothing that would correspond to legal, economic and scientific restraints and would forthwith reduce communication to what is possible. The system enables and promotes loose talk. As we can read in the newspapers, nothing prevents a politician from demanding, proposing, or promising the ecological adjustment of the economy. But a politician is not obliged to think and act economically, and so does not operate at all within the very system that his or her demand may ultimately bring to ruin’ (Luhmann, 1989, pp. 119–120). One might also formulate this insight in another, more positive way: claims about political rationality will have to include reactions to the effects of political decision-making in its calculations. With Heinz von Foerster (1982), one can argue that social rationality needs to be conceived of in terms of second-order observations.

4. CONCLUSION

Modern society is a global system; its communicative network spreads over the globe. Its boundaries can no longer be integrated by common territorial frontiers. This inclusion of all communicative behaviour into one social system is the unavoidable consequence of functional differentiation. Function systems are not committed to territorial frontiers (with the notable exception of the political system). Scientific truths, for example, do not lose their meaning if one crosses the boundary between, say, Germany and Poland. At the same time, this functionally differentiated world society sharply reduces its relations with the non-social environment. Reference to the natural world is filtered not only by the external boundaries of the encompassing system but also by the internal boundaries of the function systems. It is this that the conditions of ‘Western rationality’ hang on: the rationalization of intra-social arrangements, such as firms and bureaucratic administrations (Weber, 1988). But this also means that system rationality increasingly loses its claim to be world rationality. To put it sharply: to the extent that system rationality appears more realizable in society, it becomes less world-rational.

The attainment of a larger measure of environmental openness might depend upon society becoming aware of the way its reduces environmental complexity. From a systems-theoretical point of view, it can be maintained that society needs to ameliorate its capacity for observing itself; it needs to improve its potential for second-order observations (Gao et al., 2003). Within society, observations of social distinctions (or observations of observations) have almost always taken place. As soon as forms of differentiation together with their consequences are revealed, it is probable that they are observed within society itself. Society’s internal differentiation makes possible the observation of one subsystem by another. Nowadays, the politicians observe the economy, the lawmakers observe politics, the artists observe the mass media, the journalists observe the economy, etc. One system’s distinctions are thereby applied to other systems that do not use these distinctions to observe. This is the normal technique of reduction-of-complexity in the relation between system and environment. But it is not a critical observation of itself. It remains external to the function systems themselves; it does not immediately influence the system’s mode of autopoiesis. However, self-observations that make use of an ecological point of view may provide the necessary corrective (Vanderstraeten, 2001).

This would imply that we think of ‘rationality’ in relation to the distinctions which a system uses to operate and observe its environment (Willke, 2002). Rationality then results out of a reference to the ultimate difference of system and
environment, i.e. out of an ecological difference. Accordingly, a system attains rationality to the extent that it reintroduces the difference of system and environment within the system. Measured by this criterion, rationality would be attained when society could attribute the environmental effects of itself to itself. It would be attained when society could inculcate the consequences of its proper way of operating on the environment. And this principle would have to be respecified and reformulated for every function system in society.

Throughout this article, I have discussed a number of complex issues. This is inevitable. Social theory is highly complex, just as the phenomena it aims to describe and explain are highly complex. Before rushing towards answers, we need to carefully reflect upon the questions we pose, and upon the way in which we frame our problems. As indicated in the introductory section, our society currently alarms itself with regard to its environmental conditions. The situation seems to necessitate urgency and speed; alarm finally means à l'arme (take up the arms). Apparently, we do not have much time left. But this is also a self-protective device. We have, then, not enough time for reflection. The kind of reflection which this article aims at may not instantly solve our problems. As a scientific project, it seeks to clarify that the evolution of modern society is not a matter of an ‘iron law’ but rather one of the costs of increasing complexity. In this light, it makes sense to be guided by the Utopia of rationality: to see whether and how particular social systems can be used to provide solutions to problems that are more rational and include more parts of the environment.

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