ADVANCES IN ORGANIZATION STUDIES

Edited by
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Niklas Luhmann and Organization Studies

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Advances in Organization Studies

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Introduction: Luhmann's Organization Theory

David Seidl and Kai Helge Becker

Niklas Luhmann (1927–1998) was without doubt one of the most interesting social thinkers of the twentieth century. Not only in German-speaking countries, but, meanwhile, also among researchers in the English-speaking academic world, Luhmann's work is considered of equal rank and standard to that by such prominent social theorists as Bourdieu, Giddens, Habermas and Foucault. Drawing on very diverse strands of thinking within sociology and philosophy, and combining them with research in cybernetics, chaos theory, and biology, Niklas Luhmann developed a very distinctive and challenging new way of theorising about the social, which has stimulated research in various academic fields such as media studies, the political sciences, theology, philosophy, literature, pedagogics, sociology, and particularly in organization studies.

Until very recently, most of this research was conducted almost exclusively in German-speaking countries while hardly any efforts were made anywhere else. In the last few years, however, there has been a growing interest in Luhmann's ideas among European organization-theorists: his works are increasingly referenced also in international journals of organization studies. Yet the gap between the various levels of research is still enormous. In view of that, efforts to introduce Luhmann's approach and the existing research to the international community of organization scholars seem long overdue. As a first step towards this objective, this book will explain the basic concepts of Luhmann's theory and will demonstrate its potential for studying organizations.

Some important aspects of Luhmann's theory

In view of the innovative character of Lumann's work and the variety of new concepts that he developed, it is simply not possible to provide a meaningful summary of Luhmann's achievements in this introduction. In fact, this entire volume is intended to demonstrate the exuberance of ideas that can be found in Luhmann's writings and the novel perspectives they have to offer, even on well-known phenomena. Nevertheless, we want to highlight here at least some general aspects of his systems theory that we consider to be of particular importance.

Probably the most striking among Luhmann's conceptual achievements – which is also the most controversial aspect of his work – is the development of a theory that clearly differentiates between social and psychic phenomena. The social and the psychic domains are conceptualised as two clearly demarcated systems with no overlap of any kind: in other words, "social systems" and "psychic systems" constitute "environments" for each other. While at first it may seem completely counterintuitive, this conceptualisation allows us to analyse the social – and the logic of the social (hence also organizations) – in its own right, thereby shedding light on the genuine dynamics that social phenomena possess, independently of individual psychic processes. This does not mean, however – and this is where the controversy started – that the human being (the psychic system) is considered irrelevant to the social system; on the contrary, as Luhmann stressed over and over again, it only underlines the relevance of the two systems for each other.

A second aspect that deserves to be mentioned is Luhmann's specific kind of constructivist epistemology, which is closely linked with his concept of social and psychic systems. In particular, it focusses on the schemes of meaning, or "distinctions", that social (and psychic) systems employ to make sense of themselves and their surroundings. When it comes to analysing the form and functioning of organizations and the processes of decision making, this approach leads to a range of interesting new insights into the way in which organizations construct themselves, establish their boundaries, and observe their environments.

A third point that merits attention is that, on the basis of his general theory of social systems, Luhmann has developed an extensive theory of modern society. In short, his approach accounts for the different kinds of rationality, or rather internal logics, that underlie the different domains of modern society, such as the economy, politics, religion, science, or art. This perspective provides a framework for analysing the various kinds of relationships between organizations and their societal environment as well as between different parts of modern society and their specific types of organization.

Fourth, in conjunction with the aspects mentioned above, Luhmann has also managed to develop his own innovative concepts to go beyond many of the traditional dichotomies that have troubled social theorists for so long. On the basis of his unique way of theorising social phenomena, Luhmann provides new insights into theoretical issues such as micro/macro, structure/process, structure/action, continuity/change, and consensus/conflict.

A fifth aspect must be considered of particular significance in the context of the present volume: Luhmann was not only a sociologist who has developed a unique perspective on social phenomena in general, and modern society in particular, but, in contrast to other social theorists, he has also contributed directly to organization studies. During the past decades, the classi-

cal notion of organization as static and hierarchical entities that coordinate labour in a rational way has increasingly been seen as inadequate for accounting for the variety of organizational phenomena. Building on his general theory of social systems Luhmann has developed his own perspective on organizations that offers an original, inspiring and elaborated alternative to approaches that are meanwhile considered unsatisfactory.

A final achievement of the theory that we would like to stress here is its self-referentiality. Since the theory aims at including *all aspects* of the social, it consequently has to include also itself. In other words, the theory does not claim the position of an extramundane observer, but treats itself also as a social phenomenon in need of an explanation. Accordingly, the concepts of Luhmann's theory are such as to allow us to analyse – and relativise – the very theory itself as a social phenomenon that takes place in the social domain.

The reception of Luhmann's work on an international level

In view of all that, and given the fact that Luhmann's theory has been a classical *topos* of even undergraduate courses in sociology within German-speaking countries for more than a decade, it appears very surprising that his works have received comparatively little serious attention within the international field of organization studies. In addition to the language barrier and the time necessary for translating his works into English, the main reasons for the rather hesitant reception so far probably lie in the theory itself. One reason is certainly the complexity of Luhmann's works and the enormous amount of topics and theoretical traditions they cover, which make it very difficult for first-time readers to access his works unaided by commentaries. Moreover, Luhmann developed a very distinctive terminology to express his concepts, which presents an additional hurdle. Because of that, it is often said that when starting to read Luhmann it takes a hundred to two hundred pages before one actually understands anything. This is quite a big investment in time and effort, considering that one can never really know beforehand what one will get out of it.

As a first step towards removing the reservations towards Luhmann's works, this book aims at introducing Luhmann's way of theorising and at demonstrating its potential for organization and management research. For this purpose the book provides, on the one hand, a detailed, step-by-step introduction to Luhmann's theory of social systems in general and his organization theory in particular, in which his central concepts and ideas will be carefully outlined. On the other hand, it demonstrates how this theory might be fruitfully applied to different areas and questions of organization and

management studies. In this way the potential of Luhmann's theory for providing new perspectives on issues of organization and management and for generating a rich variety of challenging new insights in these areas will hopefully be revealed.

The structure of Luhmann's œuvre

Luhmann's œuvre, which comprises more than seventy books and several hundred articles, can be divided into two parts: the early Luhmann before, and the late Luhmann after the so-called "autopoietic turn", which took place in the early 1980s. His early writings can be characterized as an adaptation and further development of the works of Talcott Parsons, whom he met personally during his stay at Harvard University in 1960–1961. By contrast, in his late writings Luhmann developed his own "grand theory" with its characteristic and often very bold way of theorising. Although he had already been a widely recognized sociologist in German-speaking countries since the beginning of the 1970s, Luhmann himself referred to his early works as merely a "series of nils in [his] theory production" (Luhmann 1987a, p. 142). In line with that view, this book will mainly focus on the later stage of his work.

The starting point of Luhmann's late theory can be seen in his concept of the *autopoietic system*. An autopoietic system is a system that reproduces its own elements on the basis of its own elements. Luhmann took this originally biological concept, modified it, and applied it to the social sciences. For him the social domain has to be conceptualised as consisting of autopoietic social systems, which reproduce themselves self-referentially on the basis of their own specific logic. This concept allowed Luhmann to draw on the existing body of social theory and to reorganise it in such a way as to gain completely new insights into the functioning of the social. Luhmann wrote about the concept of autopoiesis: "Autopoiesis, as a concept, has no empirical explanatory value. Its potential lies rather in the fact that it forces other concepts into adaptation" (Luhmann 2000c, p. 49; our translation). This can be clearly seen in Luhmann's organization theory. While Luhmann drew heavily on the classical theories by Herbert Simon, James March and the like, he produced a very innovative new theory, whose implications were at times diametrically opposed to the conclusions of his predecessors.

With regard to its subject, Luhmann's late oeuvre can be divided into two parts: on the one hand, there is his theory of social systems in general, where Luhmann developed his unique perspective on social phenomena. In those works he elaborated the general notion of social systems as self-reproducing systems consisting of communications. Here, his descriptions and explanations deal with a variety of social phenomena on a rather abstract

level and are unspecific with regard to the different types of social systems. The central book in this area is *Social Systems* (1995f), which was originally published in German in 1984.

On the other hand, there are his theories that focus on the different *types* of social systems. In these works the general theory of social systems is specified with regard to the different types of system: society, interaction and organization. Of those three, the societal system occupies by far the greatest part. Not only did Luhmann write about society as an autopoietic social system – the main book here being his *Gesellschaft der Gesellschaft* (1997a) – but he also wrote separate books on the different sub-systems of society, which were themselves conceptualised as autopoietic systems. There are, for example, works on the system of economy (*Die Wirtschaft der Gesellschaft* 1988a), on the system of science and humanities (*Die Wissenschaft der Gesellschaft* 1990c), on the system of art (*Art as a Social System* 2000d), on the political system (*Die Politik der Gesellschaft* 2000b), on the system of religion (*Die Religion der Gesellschaft* 2000d), on the system of education (*Das Erziehungssystem der Gesellschaft* 2002a), and on the legal system (*Law as a Social System* 2004).

In contrast to the societal system, the interactional system, as the second type of social system, received comparatively little attention. Luhmann wrote merely a couple of articles on them. The most important book on interaction systems, *Kommunikation unter Anwesenden* (1999), was eventually written by André Kieserling as a PhD thesis under Luhmann's supervision.

The organization, as the third type of social system, occupies a special place in Luhmann's oeuvre: in his earlier career, Luhmann had worked in public administration for several years and much of his early theory was based on his own experiences there. In fact, he began his life as a sociologist by publishing eight books on public administration and organization between 1963 and 1969. Two of these, *Funktionen und Folgen formaler Organisation* ("Functions and consequences of formal organization"), published in 1964, and *Zweckbegriff und Systemrationalität* ("The concept of ends and system rationality"), published in 1968, are considered milestones in organization studies, as they anticipated many important issues that have only recently started to receive appropriate attention. From the groundwork of those early publications, Luhmann gradually shifted the focus of his research to the project of his "grand theory" – however , without ever completely abandoning his interest in organization. It might be justified to say that Luhmann's general sociological approach is strongly influenced by his detailed knowledge of organization on both the theoretical and the practical level. Towards the end of his life Luhmann eventually revisited and rewrote his former publications on organization theory, now on the basis of his theory of autopoiesis, thereby integrating the former into the framework of

his grand theory. The result of this was published posthumously in 2000 under the title *Organisation und Entscheidung* ("Organization and decision").

The contents of this book

As the content of the first chapter is taken for granted in the later parts of the book, readers who are not familiar with Luhmann's theory are strongly advised to read that first before going to other parts.

Part I of this book is dedicated to Luhmann's theory of social systems in general. The first chapter, "The Basic Concepts of Luhmann's Theory of Social Systems" (David Seidl), provides a general introduction to and overview of Luhmann's theory. Here, his central concepts are introduced and carefully explained. The chapter starts off with an account of the originally biological concept of autopoiesis and Luhmann's modification of it as a transdisciplinary concept, which is equally applicable to psychic and social phenomena. The second section of the chapter focuses on the application of the concept of autopoiesis to the social domain. For Luhmann, social systems are communication systems which reproduce themselves self-referentially. This conceptualisation is based on two other important concepts: first, Luhmann has a very particular definition of communication. In contrast to the standard notion, communication is not conceptualised as the transmission of meaning from a sender to a receiver but as an emergent phenomenon arising from the interaction between different human beings. As such, communications are not the "product" of individual human beings but of their interaction. Second, Luhmann clearly distinguishes between social systems and human beings (*psychic systems*): social systems reproduce themselves on the basis of communications, and psychic systems on the basis of thoughts. Both systems are operatively closed to each other and can merely cause mutual perturbations in each other. In the following two sections the three types of social systems are described: *society*, as the all-encompassing communication system which includes the other two types of system; (*face-to-face*) *interaction*, as the social system consisting of communications that are based on the perception of the physical presence of the participants; and *organization*, as the system consisting of decision communications. The chapter closes with a description of Luhmann's reading of the calculus of distinction, which was developed by the British mathematician George Spencer Brown, and on which Luhmann drew heavily in his latest writings. It should be mentioned that this last section is not absolutely vital for understanding the central aspects of Luhmann's theory, and for that purpose might be skipped; reading it, however, might help appreciate the finer details of his writings.

The second chapter, "The Concept of Autopoiesis" (Niklas Luhmann), is a translation of a chapter from *Organisation und Entscheidung*. In this text Luhmann provides a very concise and clear description of his general concept of autopoiesis. This text is generally considered as the best explanation of that concept. In the third chapter, "The Autopoiesis of Social Systems" (Niklas Luhmann), Luhmann shows how the concept of autopoiesis can be applied to social systems.

After the general introduction of Luhmann's systems theory in the first part of the book, **Part II** focuses on Luhmann's organization theory. Three concepts form the core of this theory: *decision*, *organization* and *paradox*. These concepts will be introduced and critically discussed, and their potential for empirical research will be demonstrated. According to Luhmann, organizations have to be conceptualised as systems reproducing themselves on the basis of decisions; they are nothing other than a network of decisions. However, the notion of "decision", as Luhmann has shown, is basically paradoxical: *decisions are ultimately undecidable*. Thus, Luhmann places a paradox at the heart of his organization theory. Consequently, all issues in organization studies are somehow or other shown to be ways of handling, or symptoms of, this paradox.

The first chapter of the second part, "The Paradox of Decision Making", is a paper by Niklas Luhmann himself that was published in German in 1993 and has never appeared in English before now. In this text Luhmann develops his concept of "decision" as a paradoxical communication. This serves as a starting point for unfolding his entire organization theory.

The following chapter, "Displacing the Paradox of Decision Making" (Morten Knudsen), demonstrates how Luhmann's concept of decision as paradoxical communication can fruitfully be applied to empirical research on organizations. On the basis of an in-depth case study of the changes in the Danish health-care system, the chapter shows how the paradox of decision is handled differently under different circumstances. Apart from its insights in organizational change, the text provides a host of examples of the practical implications of Luhmann's theory.

In the last chapter of this part, "On Gorgon Sisters: Organizational Action in the Face of Paradox" (Barbara Czarniawska) Luhmann's concepts of (organizational) paradox and *deparadoxification* are discussed and compared with those of other writers – in particular with those of Lyotard. The chapter shows that paradoxes, if faced, lead to paralysis. The chapter discusses strategies for evading the paralysing effects of paradoxes. In order to demonstrate the fruitfulness of this way of theorising, the concepts are applied to an empirical case from the Swedish public sector.

Following the elucidation of Luhmann's organization theory in the second part, **Part III** focuses on the relation between organization and the other two types of social systems: interaction and society. The first chapter,

"Organization and Interaction" (David Seidl) explores how the relation between organization and interaction system can be conceptualised. On the basis of Luhmann's writings about the two types of system and his few remarks on their interrelation, a systematic account of interactions within and around organizations is developed. Apart from elaborating on an almost neglected aspect of Luhmann's theory, the chapter makes a valuable contribution to research on organizational interactions in general.

The following chapter, "Organization and Society" (Thomas Drepper), attempts to clarify the relationship between organization and society. Proceeding from a critique of classical organization theory, numerous aspects of the relationship between both kinds of system are discussed and brought together from various parts of Luhmann's oeuvre. In this way, the chapter provides a comprehensive overview of the subject as covered in Luhmann's theory of social systems.

In the last chapter of this part, "The Design of Organization in Society" (Dirk Baecker), the relation between organization and society is addressed a second time. However, rather than presenting Luhmann's own theorising about their relation, the chapter presents an attempt to take Luhmann's organization theory a step further, first, by systematically basing it on the calculus of distinctions by Spencer Brown, and second, by using it as a starting point for a *societal* theory of organization. Organizational design is thereby presented as a mechanism of structural coupling between organizational communication (social system) and perception (psychic system). While this chapter might prove a difficult read for people without prior knowledge of Luhmann's theory, it nevertheless provides an excellent example of the way in which certain scholars work on developing Luhmann's theory further. As the chapter draws on the calculus of distinctions, the readers not familiar with it are strongly advised to read beforehand the relevant sections of the first chapter in this volume, in which the calculus is briefly introduced and explained.

In **Part IV** Luhmann's organization theory is being confronted with and compared to other strands of theorising in organization studies. By addressing the similarities and differences of systems theory with other approaches, the chapters in this part aim at making transparent the particularities of Luhmann's theory. Moreover, this part addresses the strengths and weaknesses of the theory of social systems as well as possibilities for combining it with other theoretical traditions.

In the first chapter of this part, "Luhmann's Systems Theory and Theories of Social Practices" (Kai Helge Becker), Luhmann's approach is contrasted with a strand of social theory that has received particular attention within organization studies in the past few years: theories based on the notion of "social practice". At first, the chapter shows that systems theory and theories of social practices have two basic assumptions on the nature of social

phenomena in common: their focus on culture and the theoretical move of the "de-centring of the subject". Proceeding from these insights, it compares the ways in which both strands of theorising conceptualise some social theoretical fundamentals, namely agency, structure, the role of material phenomena and the body. In doing so the chapter aims at providing a better understanding of the conceptual logic inherent in Luhmann's theory. Moreover, on the basis of assessing the particular strengths and weaknesses of both systems theory and practice-based approaches, it is argued that these two strands of theorising can be seen as complementary perspectives.

In the second chapter, "Systems Theory and New Institutionalism" (Raimund Hasse), Luhmann's theory is compared to another strand of theorizing that has become particularly influential in recent times: the New (Sociological) Institutionalism. The chapter addresses in particular the macro-sociological aspirations of both systems theory and the New Institutionalism and shows the differences in perspective that characterise the two approaches. Moreover, it is argued that systems theory offers a micro-foundation of organizational processes that can complement the institutionalist approach.

The following chapter, "Luhmann's Systems Theory and Postmodernism" (Jochen Koch), shows that the widely held assumption, that Luhmann's theory is an exemplar of modernist (in contrast to postmodernist) thinking, is inappropriate. Proceeding from the typical characteristics of postmodern epistemology, it carefully elaborate that fundamental aspects of Luhmann's approach have strong parallels in postmodern theorizing. The chapter identifies areas of commonality and of difference between the logic underlying Luhmann's systems theory and postmodern theorising.

The last chapter of this part, "Luhmann's Systems Theory and Network Theory" (Veronika Tacke), confronts Luhmann's systems theory with the network approach in organization studies. The term "network" has become one of the most widespread – and even most fashionable – terms within organization research and is sometimes presented as being at odds with the conceptualisation of organizations as "systems". Drawing on some of the insights of the network approach, the chapter takes up this issue and demonstrates that Luhmann's concept of systems theory not only does not contradict the idea of networks, but can even serve as a common frame of reference that allows the integration of insights of both network theory and other strands of organization theory.

While the first four parts of the book aimed at explaining Luhmann's systems theory in general and his organization theory in particular and at placing it in the context of other important strands of theorising, the following two parts will demonstrate the application of the theory to concrete research questions. **Part V** shows how different forms of organization can be analysed on the basis of Luhmann's systems approach.

In the first chapter, "Analysing Forms of Organization and Management" (Fritz Simon), Luhmann's systems theory is used for comparing two different types of companies: stock companies and family businesses are distinguished on the basis of the specific ways in which they observe (construct) their relevant environments, i.e. the ways in which they represent the system/environment distinction internally. The second chapter in this section, "On Defining the Multinational Corporation" (Darnell Hilliard), discusses the concept of the multinational corporation from a systems-theoretical perspective. The "multinationality" of an organization is redescribed as the specific way in which an organization observes its environment. On the basis of such an approach, it can be shown that the concept of "multinationality" is itself ambiguous and, in view of current societal developments, inappropriate. Instead of the "multinational corporation" the concept of the "world corporation" is suggested to describe a corporation that observes (constructs) its environment as a single horizon of worldwide business opportunities and risks.

In **Part VI** the potential of Luhmann's theory for questions of management and consulting is demonstrated. Since Luhmann himself has written very little on those issues, these chapters have to be read as *possible* applications of Luhmann's theory.

The first chapter of this part, "Communication Barriers in Management Consulting", is a text by Niklas Luhmann that was published in 1989 in German and has been translated for the purposes of this book. In this text Luhmann describes the implications of conceptualising the organization as an autopoietically closed system for management consulting. According to Luhmann's theory, consulting firms and their client organizations have to be conceptualised as operatively closed to each other. As a consequence, consulting firms have no means of influencing any organizational processes directly – despite what they claim. They can, however, cause perturbations in their client systems, triggering internal processes in the systems themselves. Yet, the outcome of this process is beyond the consulting firms' control.

The second chapter in this section, "Strategic Management from a Systems-Theoretical Perspective" (Jan-Peter Vos), uses Luhmann's theory to analyse the self-referential logic of strategic management. It argues that the existing approaches to strategy fail, as they are not aware of – or if they are, deny – the circularity of their underlying logic: organizations are only defined through their environment and the environment is only defined through the organization. Since organization and environment recursively constitute each other, organizations cannot find a starting point for defining their strategies – ultimately, any starting point would necessarily be arbitrary. In contrast to the existing approaches, Luhmann's theory is shown

to offer the possibility of developing a theory of strategy, in which the recursive constitution of organization and environment is acknowledged.

In the last chapter, "Management Accounting from a Systems-Theoretical Perspective" (Tobias Scheytt), the perspective of Luhmann's systems theory is used for criticising the traditional view of management accounting as representing the organizational world in a neutral and objective way. Instead, it is argued that management accounting produces context-dependent observations, which constitute constructions about the organization by the organization itself. In systems-theoretical terms, management accounting can be conceptualised as an internal representation (re-entry) of the system/environment distinction within the system. As such, these observations can be shown to be paradoxical, requiring particular mechanisms for handling them.

Finally, **Part VII** offers a useful glossary of the central terms in Luhmann's theory and an annotated bibliography of selected books and articles by Niklas Luhmann.

PART I

*The Theory of Autopoietic
Social Systems*

The Basic Concepts of Luhmann's Theory of Social Systems

David Seidl

The central concept around which the theory of social systems, as developed by the later Niklas Luhmann, is built is the concept of autopoiesis, originally developed by the two Chilean biologists Humberto Maturana and Francisco Varela. Autopoiesis (< *Greek*: autos = self; poiein = to produce) means self-(re)production. Thus, autopoietic systems are systems that reproduce themselves from within themselves, as for example a plant reproduces its own cells with its own cells. Luhmann argued that the *basic* idea of autopoiesis applied not only to biological but also to a large number of non-biological systems. He thus appropriated the originally biological concept, modified it and applied it to the social domain. In a similar way to biological systems, social systems were thus conceptualised as systems that reproduced their own elements on the basis of their own elements.

In this chapter, Luhmann's concept of autopoietic social systems will be introduced, starting with the originally biological concept of autopoiesis by Maturana/Varela and Luhmann's modification of it as a general systems concept (first section). Luhmann's concept of social systems as a specific type of autopoietic system will then be explained on that basis (second section). The third and fourth sections will describe and explain the three existing types of social systems: societal system, interaction system and organizational system. In the fifth section the mathematical calculus of distinction by George Spencer Brown will be introduced, which Luhmann drew on extensively in his later writings, and its relevance to Luhmann's theory will be shown. Readers who just want to gain a basic understanding of Luhmann's theory might skip this last section.

The concept of autopoiesis

a. The original biological concept of autopoiesis

The theory of autopoiesis was developed by the two Chilean cognitive biologists Humberto Maturana and Francisco Varela in the sixties and early seventies. They were trying to answer the question: What is life? Or: What distinguishes the living from the non-living? Their answer was: A living system reproduces itself. This self-reproduction they referred to as autopoiesis. They defined the autopoietic system as a system that recursively reproduces its elements through its own elements.

Central to the concept of autopoiesis is the idea that the different elements of the system interact in such a way as to produce and reproduce the elements of the system. That is to say, through its elements, the system reproduces itself. A living cell, for example, reproduces its own elements. Proteins, lipids etc. are not just imported from outside:

> Consider for example the case of a cell: it is a network of reactions which produce molecules such that (i) through their interaction [they] generate and participate recursively in the same network of reaction which produced them, and (ii) realize the cell as a material unity. (Varela et al. 1974, p. 188)

In contrast to allopoietic systems (< *Greek*: allos = other; poiein = to produce), the elements of autopoietic systems are not produced by something outside the system. All processes of autopoietic systems are produced by the system itself and all processes of autopoietic systems are processes of self-production. In this sense, one can say that autopoietic systems are *operatively closed*: there are no operations entering the system from outside nor vice versa.

A system's *operative closure*, however, does not imply a closed system model. It only implies a closure on the level of the operations of the system in that no operations can enter or leave the system. Autopoietic systems are, nevertheless, also open systems: all autopoietic systems have contact with their environment (*interactional openness*). Living cells, for example, depend on an exchange of energy and matter without which they could not exist. The contact with the environment, however, is regulated by the autopoietic system; the system determines when, through what channels, and what type of energy or matter is exchanged with the environment (of course there are certain external forces that might influence the system directly – e.g. radioactive radiation might destroy parts of the system – but these influences can never determine what *operations* come about).

This simultaneous (interactional) openness and (operative) closure of the autopoietic system becomes particularly important when considering cognitive processes. For Maturana and Varela the concept of living is directly linked to the concept of cognition.

> Living systems are cognitive systems, and living as a process is a process of cognition. (Maturana and Varela 1980, p. 13)

In this sense, the operations of an autopoietic system are defined as its cognitions; life and cognition are one and the same. Hence, everything that has been said about life applies equally to cognition: cognition is a self-referential, autopoietic process. This stance is generally known as Radical Constructivism (also: Operative Constructivism) and expresses the idea that all cognitions (ideas) are constructs of the respective cognitive system and do not in any way reflect any kind of external reality.

In the light of this, we might take a further look at the relation between system and environment. The operative closure of the cognitive system means that the environment cannot produce operations in the system. Cognitions are only produced by other cognitions of the same system. The operative closure does not, however, imply a solipsistic existence of the system; on the contrary. As Maturana and Varela argue: operative closure is a *precondition* for interactional openness. On the level of its operations, the autopoietic system does not receive any inputs from the environment but only perturbations (or "irritations"), which then might trigger internal operations in the system. In other words, external events may trigger internal processes but cannot determine those processes. In this respect, Luhmann (2000c, p. 401) speaks of a "trigger-causality" [*Auslösekausalität*] instead of an "effect-causality" [*Durchgriffskausalität*]. For example, if one puts one's finger on the flame of a candle, the rapid movement of the atoms in the flame will trigger an electric impulse in the nervous system, which will lead to the cognition of "heat". Thus, what can be seen very clearly in this example is the clear distinction between cognitive system and environment. The events in the environment do not enter the cognitive system; the rapid movement of the atoms triggers operations in the system that are qualitatively completely different. This triggering is only possible because the system has produced specific structures, that is to say, nervous sensors, which can be stimulated by the rapid movement of electrons (in the same way as they would be stimulated e.g. by acid). From this the nervous system *constructs* the sensation of heat – the heat does not exist in the flame; in the flame we only have the rapid movement of atoms. If the eye, for example, was moved into the direction of the flame, due to the specific structures of the nervous system in the eye, the nervous system would *construct* the experience of light and specific colours. Again, light and colours as such do not exist in the flame; in the flame there are merely electromagnetic waves.

The theory of autopoiesis clearly distinguishes between, on the one hand, the reproduction of the system as such, and on the other hand, the structures according to which this reproduction takes place: in order to "survive", an autopoietic system has to produce constantly further elements. If this

(re-)production stops, the system disappears. For instance, if a plant stops producing its cells it is considered dead. It is irrelevant what concrete cells are produced; whether the plant produces a new leaf, extends its roots or grows a blossom does not matter – as long as any new elements are produced the plant is still alive. The fact of the reproduction as such – independently of the concrete elements reproduced – is referred to as the *autopoiesis* of the system. The likelihood of the continuation of reproduction, however, depends on the concrete elements reproduced. For example, if a flower stops producing leaves and instead only extends its roots it looses its viability; that is to say, its ability to produce any further elements at all. What concrete elements are produced at any moment is determined by the structures of the system (the system in this sense is structurally determined): for example, the stem of the plant restricts where new leafs can grow. The structures themselves, however, are not pre-given in any sense, as in structuralist theories, but are themselves the product of the autopoietic system. In other words, in its reproduction the system produces and reproduces its very own structures of reproduction. This aspect, i.e. the self-determination of its own structures, is referred to as *self-organization*. Thus, while autopoiesis refers to the reproduction of elements as such, self-organization refers to the determination of structures (Luhmann 2000c, p. 47).

A central element within the theory of autopoiesis is the concept of *structural coupling*, which refers to the relation between systems and their environments. As explained above, environmental events can trigger internal processes in an autopoietic system but the concrete processes triggered (and whether any processes are triggered at all) are determined by the structures of the system. For example, some animals have certain neuronal structures that allow certain electromagnetic waves in their environment to trigger internally the sensation of certain colours; other animals, again, possessing other structures might not be stimulated by such waves or might be stimulated by them in other ways. A system is said to be structurally coupled to its environment (or to other systems in its environment) if its structures are in some way or other "adjusted" to the structures of the environment (or to systems in the environment); in other words, if the structures of the system allow for reactions to "important" environmental events. For example, animals living above ground are structurally adapted to a different environment from those living underground. The former have structures that can be stimulated by electromagnetic waves, which leads to different impressions of colour, while the latter might have structures that can be more easily stimulated by vibrations, which leads, respectively, to equally differentiated impressions.

b. Luhmann's general, transdisciplinary concept of autopoiesis

There have been many attempts by social scientists to apply the concept of autopoiesis to the social domain (for an overview of different applications see Mingers 1995). Most of them, however, failed as they had tried to transfer the original concept directly from one domain to the other. In contrast to most others, Luhmann did not apply the original concept directly to the social domain but (in line with the general systems tradition) tried to abstract from the originally biological concept of autopoiesis a *general, transdisciplinary concept of autopoiesis*. This transdisciplinary concept of autopoiesis should then be open to re-specifications by the different disciplines, e.g. sociology, biology, psychology. In this respect, Luhmann wrote:

> [I]f we abstract from life and define autopoiesis as a general form of system-building using self-referential closure, we would have to admit that there are non-living autopoietic systems, different modes of autopoietic reproduction, and general principles of autopoietic organization which materialize as life, but also in other modes of circularity and self-reproduction. In other words, if we find non-living autopoietic systems in our world, then and only then will we need a truly general theory of autopoiesis which carefully avoids references which hold true only for living systems. (Luhmann 1986b, p. 172)

Luhmann suggests that we speak of autopoiesis whenever the elements of a system are reproduced by the elements of the system itself. This criterion, as he points out, is also met by non-biological systems. Apart from living systems, Luhmann identifies two additional types of autopoietic systems: social systems and psychic systems. While living systems reproduce themselves on the basis of life, social systems reproduce themselves on the basis of communication, and psychic systems on the basis of consciousness or thoughts, their elements are not physical substances but elements of meaning (for explanations see below). Furthermore, social systems can be differentiated into the three subtypes: societies, organizations and interactions (Figure 1).
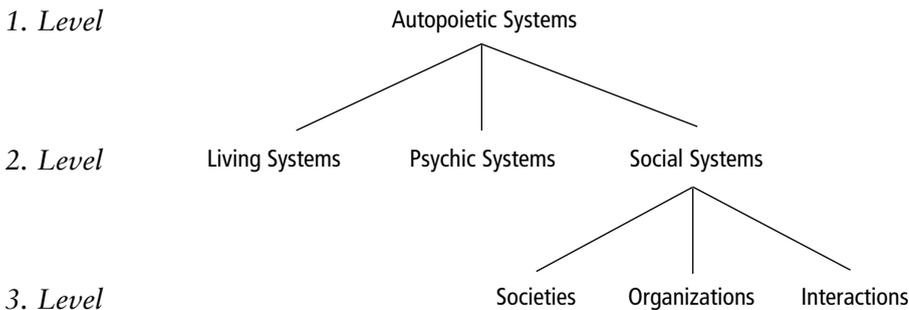
Figure 1: Types of autopoietic systems.

On the basis of this typology of systems one can derive a hierarchy of three levels of analysis. On a first level we find statements which concern autopoietic systems in general without reference to any particular mode of reproduction. On this level we can find the general concept of autopoiesis. Statements on this level are equally valid for living as for psychological and for social systems (and their subtypes). On a second level we find different applications of the general theory of autopoiesis. There are three such areas: research concerned with the particular characteristics of (1) living systems, (2) psychic systems, and (3) social systems. Most of Maturana's and Varela's research can be placed on the level of living systems. It produces general statements concerning living systems, which, however, are not applicable to social or psychic systems. Psychological research is concerned with the particularities of systems that are reproduced on the basis of consciousness. Sociological research on this level is concerned with the particularities of systems that reproduce themselves on the basis of communication. Statements produced in this area concern all three types of social systems. On a third level one can find research in the social field concerning the particularities of societies, organizations, and interactions. That is to say, for each type of system the particular mode of reproduction has to be defined and the consequences of the particular mode of reproduction analysed. Thus, for social research in particular, one can find four different areas of research: research on the general level of social systems (e.g. Luhmann 1995a) and research on the particular types of social systems – on societies (e.g. Luhmann 1997f), on organizations (e.g. Luhmann 2000c), and on interactions (e.g. Luhmann 1993j, pp. 81–100).

Against the backdrop of categorisation of analytical levels, the transformation of the original autopoiesis concept to a concept applicable to the social domain becomes clear. Instead of being transferred directly from the field of biology into the field of sociology, the concept is first abstracted to a general concept on a transdisciplinary level, and then re-specified as social autopoiesis and the autopoiesis of particular types of social systems. We cannot examine the abstraction of the concept of autopoiesis in detail here, but merely want to highlight two important modifications: the temporalisation and de-ontologisation of the concept of element (if this modified, general concept of autopoiesis were to be re-applied to the biological domain, Maturana's and Varela's original theory would have to be modified accordingly).

Luhmann's general concept of autopoiesis *radicalises the temporal aspect* of autopoiesis. While Maturana and Varela originally conceptualised the elements of their biological systems as relatively stable chemical molecules, which have to be replaced "from time to time", Luhmann conceptualises the elements as momentary events without any duration. Events have no

duration but vanish as soon as they come into being; they "are momentary and immediately pass away" (Luhmann 1995f, p. 287).

> Events are elements fixed as points in time. […] They occur only once and only in the briefest period necessary for their appearance (the "specious present"). (Luhmann 1995f, p. 67)

Through this shift from a reproduction of relatively stable elements, to a reproduction of momentary events, Luhmann radicalises the concept of autopoiesis. Because the elements of the system have no duration the system is urged to produce constantly new elements. If the autopoiesis stops, the system disappears immediately.

In addition to temporalisation, Luhmann *deontologises* the concept of element. Elements are defined as elements merely through their integration into the system. Outside or independently of the system they have no status as elements; that is to say, they are "not ontically pre-given" (Luhmann 1995f, p. 22). Elements can, of course, be made up of different components, which could be analysed independently of the system, but as elementary units they are only defined through their *relation* to other elements and (in this sense) through the function they fulfil for the system as a whole. Luhmann writes:

> [W]e have deontologized the concept of element. Events […] are not elements without substrate. But their unity corresponds to no unity in the substrate; it is created in the system through their connectivity. Elements are constituted by the systems that are composed of them […]. (Luhmann 1995f, p. 215)

As a consequence of deontologising the concept of element, the concept of "production" (as in "self-re*production*") gets a functional meaning. "Production" refers to the use of an element in the network of elements. The important point in this conceptualisation is that the element and the use of the element are not two different issues, but two sides of the same coin. It is not that we first have the element and then the system makes use of it: only by being used, i.e. by being related to other elements, does the element become an element. Thus, one can say: the element is produced as a result of being used (Luhmann 1997a, pp. 65–66). One can, of course, analyse the substratum, on which an element rests, and find a whole range of causal factors that are involved in bringing the element about, but the particular unity, as which the element functions in the system (i.e. the characteristics that make it an element of the system), can only be produced by the system itself.

Social systems

a. Communications as the elements of social systems

The first decision Luhmann as a theoretician had to make for constructing his general *sociological* theory of autopoiesis (which on this level of analysis is still unspecific with regard to the three types of social systems: society, organization, interaction) was, what he should treat as the basic elements of the social system. The sociological tradition suggests two alternatives: either persons or actions. Luhmann rejected both as incompatible with the concept of autopoietic social systems. Instead, he chose a completely different element: communication (or more precisely: the communicative event), suggesting a "conceptual revolution" (Luhmann 1986b, p. 178). He writes:

> Social systems use communications as their particular mode of autopoietic reproduction. Their elements are communications which are recursively produced and reproduced by a network of communications and which cannot exist outside of such a network. (Luhmann 1986b, p. 174)

In order to understand this conception of social systems, we have to clarify Luhmann's *concept of communication*, which differs considerably from the conventional notion of communication as an asymmetrical process of transferring meaning or information from a sender to a receiver. Building on the speech theories of Karl Bühler (Bühler 1934), Luhmann conceives of communication as a combination of three components: (1) information, (2) utterance and (3) understanding, each of which Luhmann conceptualised as a selection.

In accordance with Shannon and Weaver (1949) he defined *information* as a selection from a repertoire of possibilities. Every communication selects *what* is being communicated from everything that could have been communicated. With *utterance* Luhmann refers to the form of and reason for a communication: *how* and *why* something is being said. One can say, the utterance is the selection of a particular form and reason from all possible forms and reasons. *Understanding* is conceptualised as the distinction between information and utterance. For a communication to be understood, the information has to be distinguished from the utterance: what is communicated must be distinguished from how and why it is communicated. For example, if alter says to ego: "I am tired", ego has to distinguish the information ("I am tired" and not e.g.: "I am very energetic") from the utterance (the words alter is using and the reason why alter is saying it: for example, here alter wants to indicate that ego should leave him alone; he is not saying it in order to get any advice on what to do about his tiredness). Thus, *understanding* can be defined as a selection of a particular distinction between utterance and information.

While most communication theories refer only to the first two elements – information and utterance – in Luhmann's concept, the third element – understanding – plays a central role. Instead of approaching a communication from an "intended meaning" of the communication, Luhmann reverses the perspective: (the meaning of) a communication is ultimately determined through the understanding. Luhmann (1995, p. 143) writes: "Communication is made possible, so to speak, from behind, contrary to the temporal course of the process." This is also called the "principle of hermeneutics":

> [This principle states] that not the speaker but the listener decides on the meaning of a message, since it is the latter whose understanding of the set of possibilities constrains the possible meaning of the message, no matter what the speaker may have had in mind. (Baecker 2001, p. 66)

A central point in Luhmann's concept of communication is that the three selections form an "*insoluble unit*"; undoubtedly, this unit can be divided *analytically* into its three components (for example by other communications), but only as a unit does it constitute a communication. Because of that, a communication – as this *unity* of the three selections – cannot be attributed to any *one* individual (psychic system). Instead, communication constitutes an *emergent* property of the interaction between *many* (at least two) psychic systems. As Luhmann writes:

> Communication is a genuinely social – and the only genuinely social – operation. It is genuinely social insofar as it presupposes the involvement of a multitude of psychic systems but, or better: *because of that*, it cannot be attributed as a unit to a single psychic system. (Luhmann 1997a, p. 81; my translation)

Thus, although psychic systems are *necessarily* involved in bringing about communication, the communication (as this unit) cannot be understood as the product of any particular psychic system.

In order to render more precise Luhmann's concept of communication we have to take another, closer look at his concept of understanding. Understanding, as we said above, is the distinction between utterance and information; but whose understanding is of relevance here? Again, for Luhmann it is *not* the psychic system that is of interest. Instead, it is the understanding *implied* by the ensuing communications – in the same way as the concrete meaning of a word in a text is only defined through the words following it in the text. Thus, the meaning of a communication, i.e. what difference a communication makes for later communications, is only *retrospectively defined through the later communications*. For example, whether a "Yes" is understood as approval or as a question or as a neutral acknowledgement of the given information is only determined through the reaction

of the connecting communications; e.g. "I'm happy you agree", "You don't believe me?", or "What is your own opinion?" (again, the meaning of *those* communications is itself only defined through the communications connecting to *them*). In other words, Luhmann is not referring to any form of psychic understanding, but to an understanding on the level of the communications. What the "involved" psychic systems think during the communication processes, i.e. how the psychic systems understand the communication, is (at first) completely irrelevant to the communication. For example, the psychic systems might understand the "Yes" as a question, while the ensuing communications might treat it as approval. Of course, what the psychic systems think about the communications might ultimately influence the communications because of the structural coupling between the two systems: different thoughts about the communications might lead to the psychic systems causing different perturbations in the social system, and thus might ultimately lead to different communications coming about. But it has to be stressed again that the psychic systems cannot determine what communications come about.

This retrospective determination of the communication through ensuing communications is connected with a fourth type of selection. With understanding, a communicative event, as the synthesis of the three selections (utterance, information and understanding), is complete. However, if the social system is not discontinued, a fourth type of selection will take place: acceptance or rejection of the meaning of the communication. This fourth selection is already part of the next communication. It is important not to confuse the third and fourth selections: understanding does not imply acceptance! For example, a pupil understands when the teacher says: "do your homework", but he might still reject the communication, answering: "No, I won't". There might be communicative structures which make acceptance more likely than rejection, but the *concept* of communication is not focussed on acceptance – in contrast, for example, to Habermas's (1987) concept of communication. On the contrary, every communicative event provokes the *selection* between acceptance and rejection. This distinction between understanding (as part of the first communication) and the selection acceptance/rejection (as part of the ensuing communication) adds a dynamic element which bridges the gap from one communicative event to the next.

This leads to a very important point: the (re-)production of communications. In accordance with the general concept of autopoiesis, communications only "exist" as communications through their *relation* to other communications; as explained above, a communication is only defined through the ensuing communications. This does not mean that without the relation there is nothing at all (there are, for example, words and sounds), but they have no status as communications. In this sense one can say that it is the

network of communications that "produces" the communications. In other words, it is the context of other communications that makes a communication count as such at all. Luhmann thus famously said: "*Only communications can communicate.*"

So far we have explained the autopoiesis of social systems, i.e. the reproduction of communications through communications. We have explained *how* communications produce communications but not *what* communications are produced, which is a question about the *structures* of social systems. Luhmann conceptualises social structures as *expectations* (Luhmann 1995f). In every situation certain communications are expected and not others. For example, a question about one's wellbeing is *expected* to be followed by an answer on this issue and not by a statement about the latest weather forecast. The expectation to a certain extent preselects the possibilities for further communications: it makes certain communications more likely than others (it does not, however, exclude any possibilities completely). These expectations are recursively reproduced through communications. Whenever a specific expectation is met by an adequate communication, the expectation is confirmed and thus likely to continue to function as a structure. However, if the expectation is repeatedly not met, it might be changed. The *topics* of communication are an important form of social structure. Topics provide preselections of all, in principle, possible communications: certain possibilities of communication fit a specific topic and others do not. For example, in a conversation about social theory one would not expect a communication about cooking. However, if such a communication came about, the topic of communication might be changed.

b. Interpenetration: the relation between social and psychic systems

The relation between social system and "human being" is a very controversial aspect of Luhmann's theory; it is also the most misunderstood aspect. For an adequate appreciation it is thus necessary to outline this relation carefully.

In Luhmann's theory the "human being" is not conceptualised as forming a systemic unity. Instead, it has to be understood as a conglomerate of organic and psychic systems. The former consists of biochemical elements, the latter of thoughts. Both systems are operatively closed towards each other: neither system can contribute elements to the other system. The systems are, however, structurally coupled; that is to say, their respective structures are adjusted to each other in such a way as to allow mutual perturbations.

Although the "human being" does not constitute a systemic unity, the social system treats it as such: it constructs it as a *person*. In other words, "persons" do not exist as such: they are not systems but a construct of the

social system with which this system refers to the conglomerate of organic and psychic systems. A social system might, for example, construct the person "John Smith". Whenever the "corresponding" conglomerate of organic and psychic systems causes perturbations in the social system, the social system will refer to it as caused by "John Smith". In the course of time a social system will develop certain expectations about when and how this conglomerate might cause perturbations. These expectations become part of the construct "John Smith". Ultimately, we could say that a person is nothing other than a complex of expectations that a system has vis-à-vis a specific conglomerate of organic and psychic systems. Luhmann defines "person" in this sense as the "social identification of a complex of expectations directed toward an individual human being" (Luhmann 1995f, p. 210).

Particularly important for the social system is the psychic system. Like social systems, psychic systems are meaning-constituted systems. However, in contrast to social systems, the meaning events do not materialise as communications but as thoughts. In other words, psychic systems reproduce themselves on the basis of consciousness: only thoughts can produce thoughts. Not even events in the brain, i.e. electric impulses, can take part in the autopoiesis of psychic systems: a nerve impulse is not a thought. Psychic systems are not only closed with regard to other types of systems but also with regard to each other. No psychic system has direct access to another psychic system; my thoughts can never enter your psychic system.

As operatively closed systems, psychic and social systems constitute environments for each other: thoughts cannot become communications and communications cannot become thoughts. Mutual influences are restricted to the structural level. There merely exists a relation of structural coupling: both types of systems are *structurally* adapted to each other in a way which allows for mutual perturbation (see our explanations on structural coupling above). Luhmann calls the specific structural coupling of social and psychic systems *interpenetration*. Luhmann speaks of interpenetration if

> an autopoietic system presupposes the complex achievements of the autopoiesis of another system and can treat them like parts of the own system. (Luhmann 1995g, p. 153; my translation)

The simultaneous (but separate) autopoieses of psychic systems is constitutive for the autopoiesis of the social system. Without psychic systems social systems are impossible – and probably vice versa. Every communicative event presupposes "parallel" events in the psychic systems. For the perception of utterances, the social system depends at any rate on the psychic system: the social system cannot hear spoken words, nor read letters. Furthermore, psychic systems serve as a memory as they can remember communicative events beyond their momentary point of existence. Because of their structural coupling, social systems can expect their communications to

cause perturbations in the psychic systems and to receive perturbations from the psychic systems when necessary. They can, for example, count on psychic systems to trigger further communications after every communication. Although psychic systems trigger communication processes and vice versa – we repeat this point, since it is very important – the processes of the psychic system and the social system *do not overlap in any way*.

The most important evolutionary achievement for the coupling of social and psychic systems is language – this does not, of course, mean that communication is possible only with language. Language ensures that psychic systems are *perturbed* through the communication processes. Articulated speech, for example, normally disturbs people who are not involved in the communication more than mere noise does. As Luhmann writes:

> The differentiation of specific objects of perception, which stand out and fascinate as they have no resemblance at all with anything else perceptible, is crucial [for the coupling between social and psychic systems] […]. Language and writing fascinate and preoccupy consciousness and in this way ensure that it comes along, although the dynamic of consciousness does not necessitate this and always provides distractions. (Luhmann 1995g, p. 41; my translation)

Language is a purely social phenomenon (psychic systems do not think in language) but thought processes can be structured in a way that is complementary to language, particularly during communication processes: thoughts are broken down into chunks equivalent to those of sentences and words. In other words, psychic processes are synchronised with communication processes and, in this way, they "know" when to contribute perturbations to the communication process in order to make the reproduction of the social system possible.

Although Luhmann's strict distinction between social and psychic systems runs counter to our everyday beliefs and almost all social and psychological theories, it has one important theoretical advantage. It allows for a concept of the social realm which is clearly distinguished from the psychological. Consequently, social and psychic phenomena can be analysed in their own right. This does not lead to a marginalisation of psychic systems for social systems – as has often been criticised. On the contrary, through this differentiation it can be clearly shown that, and in what way, both types of system *depend* on each other. The treatment of human beings as environments of the social system (and not as part of it), as Luhmann writes,

> does not mean that the human being is estimated as less important than traditionally. Anyone who thinks so (and such an understanding underlies either explicitly or implicitly all polemics against this proposal) has not understood the paradigm change in systems theory.

> Systems theory begins with the unity of the difference between system and environment. The environment is a constitutive feature of this difference, thus it is no less important for the system than the system itself. (Luhmann 1995f, p. 212)

c. Communication and action

While Luhmann suggests treating communications – and not actions – as the elements of social systems, the concept of action does not become completely irrelevant. On the contrary, Luhmann assigns it an important role in the reproduction of the system. The very fact that not only sociologists but all social systems use the concept of action means that it cannot be ignored.

Often communication is treated as some kind of action; in this sense Habermas (1987), for example, speaks of "communicative action". But Luhmann's communication – and this is very important – is not a kind of action. As explained above, communication is constituted as a synthesis of a threefold selection of utterance, information and understanding. The concept of action cannot account for all three selections. It might capture the first two selections but certainly not the third: understanding.

> [T]he perfection of communication implies understanding and understanding is not part of the activity of the communicator and cannot be attributed to him. (Luhmann 1986b, p. 178)

Thus, a central element of Luhmann's concept of communication would be missing if interpreted as action. Apart from that, the original intention of an action is not important for the communication. For example, looking at one's watch might be understood as communicating one's boredom, although one only wants to know what time it is.

Luhmann suggests treating action as a (fictive) construct of social systems for *observing*, and communicating *about*, their communications: social systems observe their communications not as communications but as actions, which they causally *attribute* to "persons" ("actors"). As explained above also the "person" is a construct of the social system, with which the system refers to the human being as the conglomerate of psychic and social systems. This attribution of communications to persons as actions is deeply ingrained in language: our sentences are usually based on a subject-object logic – "somebody is doing something". In other words language forces the attribution of communication to *someone*; it is almost impossible to speak about communications as something that is not "done" by someone.

In this way, the social system constructs an image (self-description) of itself as a nexus of actions. This self-description constitutes a simplification of the system and this is also where its function lies. The simplified version of itself serves as a means of orientation for its (re-)production, which has several advantages: first, actions are easier to recognise and deal with than

communications. While an orientation according to communications pre-supposes a clear distinction between utterance, information, and under-standing, an orientation according to action only has to deal with the specific rules of attribution.

> The simplification lies in the fact that only actions and not fully communicative events serve as connective points, in that an abstraction suffices to communicate action or simply connective behaviour, and in that one can to a great extent omit the complexities of the complete communicative occurrence. The fact that one need not examine (or need examine only under very specific conditions) which information an utterance referred to and who understood it takes some of the load off. (Luhmann 1995f, p. 168)

Second, the description of communication processes as connections of actions leads to clear-cut temporal relations between different elements. While communications are completed only after understanding has taken place, that is, the communicative occurrence is "held in suspense" between utterance and understanding (Luhmann 1995f, p. 169), actions mark one point in time (determined by the utterance).[1] As a consequence, the different communications are also much more clearly differentiated: while communications are heavily entangled with each other – with later communications retrospectively defining the meaning of earlier ones – actions appear to be self-defined and do not presuppose other actions.

Society and interaction

According to Luhmann we can distinguish three types of social systems: society, face-to-face interaction and organization. All three systems are social systems insofar as they reproduce themselves on the basis of communications. They are, however, different *types* of social systems insofar as they reproduce different types of communications. In the following we will give a brief description of Luhmann's concept of society and interaction system; the organization as the third type of social system will be dealt with afterwards in a separate section.

a. Society

For Luhmann society is the system that encompasses all communications; all communications that are produced are part of society and as such reproduce it. Hence there are no communications outside society. The borders of society are the borders of communication. Luhmann thus writes:

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[1] The phenomenon of "suspense" is particularly extreme in the case of communications by letter where the utterance and the understanding are usually drawn far apart.

> [S]ociety is the all-encompassing social system that includes everything that is social and therefore does not admit a social environment. If something social emerges, if new kinds of communicative partners or themes appear, society grows along with them. They enrich society. They cannot be externalized or treated as environment, for everything that is communication is society. Society is the only social system in which this special state of affairs occurs. (Luhmann 1995f, p. 408)

As a consequence of this conceptualisation society only exists in singular: there is only one *world society*. For Luhmann, society is thus "the auto-poietic system par excellence": all elements (communications) are produced by the own elements (communications) and cannot get out of this network of elements (society).

Amongst the three types of social systems, society is a very particular one as it encompasses the other two systems – interaction and organization. As the system including *all* communications, it also includes the specific inter-actional and organizational communications. Or, the other way around, all interactional and organizational communications always also reproduce society.

In the course of its evolution society has undergone three major structural changes; that is to say, changes of how societal *communications* were structured (Luhmann 1997a). In archaic times society was differentiated into equal subsystems (*segmentation)*, e.g. different tribes, clans or families. This was replaced later on by a differentiation according to the logic of *centre and periphery*: the differentiation between city and country. In late medieval times a hierarchical form of differentiation emerged with different social strata or classes (*stratification*). With the emergence of modern society, around the 18th century, that was replaced by the current, *functional* differentiation, where we find several societal subsystems specialised in serving specific societal functions; for example, law, science, economy, art, religion. Each of these *primary* forms of differentiation can be combined with the other forms of differentiation on a *secondary* level: for instance, in stratified society the various strata were often differentiated internally into equal subsystems (segmentation) or on the basis of centre vs. periphery. Similarly, the various functional subsystems might be differentiated internally into equal subsystems, into centre and periphery, or hierarchically.

While Luhmann has written extensively about all four types of differentiation, the functionally differentiated society, as the present form of differentiation, is of most interest to us here. It is characterised by the existence of different functional systems. All of these systems are communication systems that are themselves operatively closed on the basis of a specific *binary coding*. That is to say, all communications taking part in the reproduction of a particular functional subsystem "carry" a specific code. For example, the code of the legal system is legal/illegal; the code of the economic system is

payment/non-payment; the code of the system of science is truth/untruth; the code of the political system is power/non-power. Each of these systems communicates about itself and its environment according to its specific code: for example, for the legal system something is either legal or illegal, or has no relevance at all; for the economic system something is either a payment or a non-payment, or has no relevance to it: that is to say, whether something is legal or illegal is irrelevant to the economic system. Each communication of a functional system relates to other communications of the same function system on the basis of the function-specific coding. For example, a communication of the legal system relates to other legal communications as either legal or illegal communication. A legal ruling refers to another legal ruling (as a legal ruling) in order to substantiate itself – it cannot, however, refer to payments being made (economic system). These functional systems are operatively closed in the sense that only communications carrying the function-specific code can take part in the reproduction of the function system. Thus, only legal communications can reproduce the legal system, while economic, scientific, political etc. communications cannot; only scientific communications can reproduce science, and so on.

The functionally differentiated society combines extreme inclusiveness with extreme exclusiveness. On the one hand, each function system includes *all* function-specific communications. Thus, all legal communications are part of the legal system; all economic communications are part of the economic system; all scientific communications are part of the scientific system, etc. On the other hand, these societal functions are exclusively served by the respective function system: only the legal system can provide justice (legality), while the economic or scientific system cannot; only the economic system can produce payments; only the scientific system can produce truth. Thus, each of these systems has an enormous reach as each refers to the entire world society. At the same time, however, each system's range is also very narrow as each deals with only one function.

Functional systems constitute environments for each other. The systems cannot "exchange" their communications: an economic communication cannot take part in the scientific system, a political communication cannot take part in the legal system etc. Each system reproduces itself self-referentially and registers communications of other function systems merely as perturbations, which it processes according to its own logic. The economic system, for example, would register legal communications merely with regard to their consequences on payments/non-payments. No function system can control any other function system; no system – not even the political system – is dominant over any other system. In this sense there is no centre to the functionally differentiated society. The different systems are merely structurally coupled to each other; that is to say, their structures are adjusted to each other in such a way as to allow them to react to their

respective operations. For example, the legal system and the economic system are structurally coupled through sales contracts. For the legal system the sales contract is a legal communication re-distributing legal rights and duties; for the economic system it is an economic (i.e. different) communication re-distributing payments. In other words, the sales contract is two different communications for the two different function systems, but it allows the two systems to somewhat "co-ordinate" their respective processes.

b. Interaction

Like all social systems (face-to-face) interactions are systems that reproduce themselves on the basis of communications. In contrast to society, however, these communications are of a particular kind; namely, communications that are based on the perception of the physical presence of their participants.

There is no doubt that perception as such is clearly a psychic phenomenon – communications cannot perceive. However, *reflexive* perception gives rise to communication as Luhmann argues:

> If alter perceives that alter is perceived and that this perception of being perceived is perceived, alter must assume that alter's behavior is interpreted as communication whether this suits alter or not, and this forces alter to control the behavior as communication. (Luhmann 1995f, p. 413)

Thus, every communication refers to the fact that all participants perceive each other as present – a face-to-face contact is thus a precondition. However, not everyone who is physically present will also be treated as present by the communication. For example, people at other tables in a restaurant, although physically present, might not be considered present by the interactional communication. Similarly, not all perceptible behaviour will necessarily be treated as perceptible, i.e. treated as present, by the interaction; for example blowing one's nose. In other words, every interactional communication distinguishes between what to consider present and what to consider absent. Making this distinction qualifies the communication as interactional. One could also say, the interactional communications carry the code "presence/absence" analogously to the function codes described above.

Like functional systems, interactional systems are operatively closed insofar as only communications carrying the code "presence/absence" take part in the reproduction of the interaction system. Communications in an interaction can only connect to other communications that are treated as present and not to those treated as absent (e.g. the communications of another communication at the next table; unless those communications are treated as present and thus as part of the same interaction system).

What communications are treated as present or absent depends to a certain extent on the structures of the interaction. Like all social systems,

interactional communications are structured through the topics of communication. These topics often make a pre-selection of who to treat as present. For example, if the managers of a company sat in a pub to discuss the company's strategy, the interaction would probably treat only the managers as present and all other visitors of the pub, who might even happen to sit with them at the same table, as absent. However, if the topic changed to football new persons might be included in the interaction, while some of the initial participants might be excluded again.

Organization

a. Decisions as the elements of organizations

Luhmann conceptualises organizations as social systems that reproduce themselves on the basis of decisions. In other words, organizations are

> systems that consist of decisions and that themselves produce the decisions of which they consist, through the decisions of which they consist. (Luhmann 1992a, p. 166; my translation)

But what is a decision? Luhmann argues that the standard definitions of "decision" are not very helpful. Mostly, a decision is defined as "choice". This, however, means that a decision is defined through a synonym that is equally unclear. Sometimes the definition is specified somewhat more as "a choice among *alternatives*". This, however, does not add much as the concept of alternative is itself only defined in relation to choice: alternatives are those possibilities among which one can *choose*; in other words, the choice defines the alternatives. Thus, one only finds tautological definitions.

Building on, and modifying, the existing definitions Luhmann suggests conceptualising decision as a specific form of *communication*. It is not that decisions are first made and then communicated; decisions *are* communications. As has been said about communications in general, decision communications too are not produced by "human beings" but by the social system, the organization.

What is particular about decisions is that they are "compact communications" (Luhmann 2000c, p. 185), which communicate their own contingency ("contingency" here in the sense of "also possible otherwise"). In contrast to an ordinary communication, which only communicates a specific content that has been selected (e.g. "I love you"), a decision communication communicates also – explicitly or implicitly – that there are alternatives that could have been selected instead (e.g. "I am going to employ candidate A and not candidate B"). As such, decision communications are always *paradoxical* communications: the more they communicate that there are *real* alternatives to the one that has been selected, the less the selected alternative

will appear as justified and thus the less the decision will be accepted as "decided". Equally, the more the selected alternative is being justified as the right selection, the less the other options will appear as alternatives and thus the less the decision will appear as "decision". Or, to put it in linguistic terms, every decision communication contains a performative self-contradiction: the "report" aspect and the "command" aspect (Ruesch and Bateson 1951) of the decision communication contradict each other. The more clearly the decision is communicated as a selection among possible alternatives (report aspect), the less the decision will be accepted by later communications as a decision (command aspect).

Because of their paradoxical nature, decision communications are subtly calling for their own deconstruction by the ensuing communications. Without any other communicative provisions, decision communications would have a very high "failure rate". So, why does organizational communication not break down all the time? Luhmann gives two answers to this question. First, organizations totalise decisions as the organizational form of communication – organizations are operatively closed on the basis of decisions. Thus, even the deconstruction of a decision in an organization has to be communicated as a decision. In other words, the rejection of a decision can itself only be communicated as yet another decision, otherwise it would not be part of the organizational autopoiesis (Luhmann 2000c, p. 145). Furthermore, decision communications in organizations can usually refer to other (successfully completed) decisions ("decision premises"; see below) to stabilise the decision, i.e. decisions prohibiting the rejection of certain other decisions (Luhmann 2000c, p. 142).

As Luhmann pointed out in his later writings (Luhmann 2000c), the operative closure of organizations on the basis of decision communications must not be misunderstood, in the sense that there are no other communications "in" organizations: there are, of course, also other communications, such as gossip. These communications take place in the organization but ultimately do not contribute to the autopoiesis of the organization. Luhmann illustrates this idea with an example from biology:

> In living cells there are also some minerals [...] which do not take part in the autopoiesis of the system, but which nevertheless serve important functions. (Luhmann 2000c, p. 68; my translation)

b. Uncertainty absorption

Within organizations, decision communications are always integrated into a process of connecting decisions – the actual autopoiesis of the organization. Every decision is the product of earlier decisions and gives rise to ensuing decisions. Luhmann describes this process of decisions connecting to each

other using the concept of uncertainty absorption, the idea of which he takes from March and Simon:

> Uncertainty absorption takes place when inferences are drawn from a body of evidence and the inferences, instead of the evidence itself, are then communicated. (March and Simon 1958, p. 165)

For a decision to be made, information is needed on the basis of which one alternative can be chosen over the others. An investment decision, for example, is based on information on the availability of financial resources, on current interest rates, on current market demand etc. Formulating this the other way around, one can say that a decision is "inferred" from the given information. Yet, the important point is that no decision can rely on complete information; some uncertainty inevitably remains. In our example, there is uncertainty concerning future market demand, investment projects of competing firms, future inflation figures etc. All this uncertainty, however, is absorbed by the decision: all given information and all remaining uncertainty is transformed into the selection of one alternative over the other ones. Uncertainty absorption now takes place in the *connection* between decisions. As decisions do not inform about the uncertainties involved in making the decision – they merely inform about selected and excluded alternatives – ensuing decisions connecting to them cannot "see" the uncertainties. That is to say, from the perspective of the connecting decisions orienting themselves toward the first decision, the uncertainty of the first decision is absorbed.

On the basis of such a processual understanding of decisions, we can distinguish between two "states" of a decision: before and after subsequent decisions have connected to it. A decision is only completed when subsequent decisions connect to it. Before that, the decision is merely *virtual* (Baecker 1999c 9, p. 138). The decision is virtual because the realisation of the decision in subsequent decisions is expected but not yet realised. For example, the organization decides to manufacture a particular new product – in contrast to producing another new product or not producing anything new at all. This decision is only virtual until subsequent decisions have completed it as a decision by orienting themselves according to it. The marketing division, for example, might decide on the advertisement of this new product. This can be understood in analogy to the relation between different communications, as described above, where a communication is only completed once another communication connects to it by defining its meaning retrospectively.

c. Decision premises

A concept closely related to uncertainty absorption is that of decision premises, originally introduced by Herbert Simon (Simon 1957, p. 201). The concept of decision premises refers to the structural preconditions that define – or create – a decision situation; for example, the alternatives given, the objectives of the decision, and so on. While one could include in the term everything that influences the situation, Luhmann argues that such a concept would not be very fruitful. Instead he restricts the term – in a first step – to those structural preconditions that are themselves the "result" of other decisions. In other words, a decision takes previous decisions as decision premises, or, formulated the other way around: every decision serves as a decision premise for later decisions. With regard to the previous section we have reversed our perspective: we are not looking at the transformation from the viewpoint of the initially chosen situation towards the connection of subsequent decisions, but are looking "back" from the viewpoint of a decision towards previous decisions and ask about their relevance to it. From this viewpoint they serve as decision premises. To bring the concepts of uncertainty absorption and decision premise together we can say: uncertainty absorption takes place when a decision is used by subsequent decisions as a decision premise.

An important aspect of the concept of decision premises is its double function as both creating and restricting the decision situation. Decision premises create the decision situation in the first place: they define the decision situation as such. Without decision premises there is no occasion for decision making. At the same time, decision premises restrict the decision situation by creating a particular decision situation and not a different one. If decision premises define a decision situation as a choice between alternative A and alternative B, one cannot decide between X and Y.

The concept of decision premises becomes particularly interesting when the concepts of decision and decision premise are applied recursively to each other. Apart from the factuality of every decision becoming a decision premise for subsequent decisions, decisions can decide explicitly on decision premises for other decisions, that is to say, they function as decisions on decision premises. The crucial point of this is that a decision can decide on decision premises which are not only binding for immediately succeeding decisions, but for a multitude of later decisions. They serve as "a sort of anticipated, generalised uncertainty absorption" (Luhmann 2000c, p. 261). In this way decisions can influence other decisions that take place much later in the decision process. Luhmann now suggests restricting the term decision premise – in a second step – to those far-reaching decision premises. He distinguishes three types of such decision premises: programmes, communication channels and personnel.

Programmes are decision premises that define conditions for correct

decision making; they are often also called "plans". There are two different kinds of programmes: conditional programmes and goal programmes. *Conditional programmes* define correct decision making on the basis that certain conditions are given. They generally have an "if-then" format – "if this is the case, then do that". *Goal programmes*, in contrast, define correct decision making by defining specific goals that are to be achieved (e.g. "profit maximisation"), and in this way structure the given decision possibilities. Neither type of programme, however, removes the uncertainty from the decisions that they bring forth – neither decides the decisions (otherwise they would not be decisions). In the case of conditional programming there is uncertainty about whether the conditions are actually met by the decision situation – there is always some scope for interpretation. In the case of goal programming the main uncertainty concerns the causal link between alternatives and the goal; for example, which alternative maximises profit. Apart from that, there is in both cases uncertainty on whether the programmes should actually be applied to the decision situation – reasons for making an exception can always be found.

The decision premise of *personnel* concerns the recruitment and organization of personnel. Organizations decide, on the one hand, on the commencement and termination of membership and, on the other hand, on the transfer of members to different positions within the organization, both with and without promotion. *Personnel* is a decision premise insofar as it makes a difference to the question of who is in charge of a decision. An experienced manager is likely to "give rise" to different decisions from those of a newcomer (this recognition of different individuals making a difference to the organization does not contradict the concept of autopoiesis. Different individuals are only considered for the difference in perturbations that they cause). In this sense, organizations have expectations about the behaviour of different persons, which serve as a basis for selecting their personnel.

The decision premise *communication channels* concerns what can be called the organization of the organization. Usually in an organization not everybody can communicate with everybody at any one time, but the communication is restricted to certain channels. The classic case is the hierarchical structure, in which the communication channels only run vertically. Decisions on one level only inform decisions on the next lower or next higher level, but not decisions on the same level. That is to say, decisions can only use other decisions on the vertical line as decision premises and not ones on the horizontal line. Apart from the hierarchy, there exists a multitude of other forms of communication channels – for example the matrix-organization.

The three decision premises – programme, personnel and communication channel – are coordinated through the creation of *positions*. Positions are nodes at which the three decision premises meet and are specified with

regard to each other. Every position executes a particular programme, is filled by a particular person, and is located somewhere in the communication network. Positions coordinate decision premises in two respects: on the one hand they coordinate them with regard to concrete decisions. On the other hand they serve as an orientation for decisions on new decision premises: only such new decision premises can be integrated, which fit into the existing structures of positions, or for which new positions can be created.

In his latest writings Luhmann (2000c) introduced another type of decision premise: the so-called *undecidable decision premise*. In contrast to the decidable decision premise described above, these are premises that have not been explicitly decided but are merely some sort of "by-product" of the decision process. These premises are undecidable since the organization does not see their contingency and thus takes them as "necessary" and unchangeable. There are two types of undecidable decision premises. The first one is the *organizational culture*. Decision premises of this type refer to the way in which an organization deals with its own processes of decision-making. For example, if the organization always produces the same kind of decision (e.g. recruiting merely male candidates) this might condense into an undecided decision premise for future decisions – in the sense of "we have always done it this way". The second type of undecidable decision premise is the *cognitive routine*, which refers to the way the environment is being conceptualised by the organization. Cognitive routines, for example, inform about characteristics of the customer.

d. The double closure of the organization

Like all autopoietic systems organizations can be said to be doubly closed (on this point see particularly Baecker 1999c, p. 147 ff.): closed on the level of their operations and closed on the level of their structures. The first closure refers to the conceptualisation of organizations as reproducing themselves *exclusively* on the basis of decisions. No external operations can take part in the network of decisions nor can any decisions get out of this network. In other words, on the basis of its operations, the organization has no contact to its environment whatsoever. Decisions are only oriented according to other decisions and nothing beyond the decision network. Thus, the individual decisions are "blind" with regard to anything outside the organization. On this operative level the only thing that is important is the continuous reproduction of decisions out of decisions – regardless of which decisions. As long as *some* decisions are produced, the autopoiesis of the organization is continued.

The "blindness" of decisions is, however, compensated through the decision premises, i.e. the structures of the organization (structural level). These decision premises (in particular: decision programmes, communication channels, personnel) determine which decisions are produced. For example,

a recruitment programme will lead to certain recruitment decisions and not to decisions on the colour of wastepaper baskets. In other words, the decision premises channel the reproduction of decisions. In this sense, the orientation according to decision premises serves the decisions as a substitute for the orientation according to the environment. But even on this structural level of decision premises the organization cannot get out of the decision network; even there it does not get into direct contact with its environment. This is the second closure. Decision premises are not in any way given from outside but are themselves the product of decisions. Decisions and decision premises are recursively reproduced – compare Giddens's (1984) concept of structuration. Thus, neither on the level of its operations (first closure) nor on the level of its structures (second closure) is the environment directly taken into account in the reproduction of decisions.

The double closure of the organization has a twofold implication. On the one hand, double closure implies autonomy: it is the organization itself that determines its own structures and operations. Without the ability to decide on its own structures, the organization would be the mere continuation of its environment. On the other hand, double closure implies unavailability. As the organization can only operate on its "inside" and cannot distance itself from itself (i.e. it has no other mode of operation than decisions), it is captive of its own processes and thus does not have (complete) control over itself.

e. The paradox of decision at the heart of Luhmann's organization theory

In this last section on organization I want to come back briefly to the paradox of decision in order to highlight how crucial it is for Luhmann's way of theorizing about organizations. Particularly in his later writings, (1993d; 2000c) Luhmann makes the paradox of decisions the starting point for unfolding his entire organization theory. Independently of the conceptualisation of decisions as communication, Luhmann argues that the very idea of decisions is paradoxical. In this respect, he quotes Heinz von Foerster (1992, p. 14), who famously wrote: "Only *those* questions that are in principle undecidable, *we* can decide" – everything else would be mere calculation. In other words, in a *real* decision situation the given alternatives are all *equally* valid; there are no better or worse alternatives – otherwise these would not be *real* alternatives. If the "alternatives" were of different value (in which case they would not be real alternatives) there would be no need to decide between them any more – the decision situation would have already been decided. In a real decision situation with real alternatives, however, there is no valid reason for choosing one alternative over the other – otherwise the alternatives would not be of equal value. Thus, at the heart of every decision there is undecidability.

In order to prevent a paralysis of decision situations, the paradox of decision has to be *deparadoxified*; i.e. the paradox has to be deferred to another place. This deferral does not mean that the paradox disappears but that it is just moved "out of sight". For example, the undecidability of the decision might be shifted to the selection of a decision rule; e.g. "choose the alternative that is least risky". This decision rule might allow a clear ranking of the different alternatives and in this way the decision rule can be said to "decide" the original decision situation. In this case, the original decision paradox has been deferred to the decision on which decision rule to choose. There exist many different decision rules, which themselves constitute alternatives between which one needs to decide. Again, this decision situation is itself undecidable and thus paradoxical. The paradox might thus have to be deferred to yet another place, e.g. to the decision about a meta-decision rule. Ultimately, the paradox can only be deferred but never solved. This might lead to an infinite regress, unless the paradox ends up in a place where it is not "noticed". For Luhmann most organizational phenomena can in one way or another be traced back to this undecidability of decisions: most problems in organizations are directly or indirectly linked to the decision paradox, and most structures and processes function as a means of deparadoxification.

Luhmann's theory of social systems as a theory of distinction

In his writings – particularly the later ones (e.g. Luhmann 2000c) – Luhmann drew heavily on the calculus of distinctions, *The Laws of Form*, by the British mathematician George Spencer Brown. This calculus allowed him to describe the self-referential logic of autopoietic systems in an extremely stringent and analytical way. While it is possible to comprehend Luhmann's theory of social systems also without Spencer Brown, a deeper appreciation of it presupposes an at least rudimentary familiarity with Spencer Brown's basic ideas. Some of Luhmann's followers have even tried to translate Luhmann's theory completely into the language of the calculus, aiming at making the theory of social systems "calculable" (in particular Dirk Baecker).

In the following, we want to introduce the central elements of Spencer Brown's *Laws of Form* and explain the way in which Luhmann used it in his systems theory. It should, however, be noted that our explanations of Spencer Brown are based on Luhmann's own reading of him, which differs from other readings.

a. Observation as basic concept

Spencer Brown suggests treating *observation* as the most basic concept of any analysis. As a concept it is supposed to be even more basic than e.g. that of thing, event, thought, action or communication. This means, of course, that the concept of observation is not restricted to its usual sense of optical perception – optical perception is just one type of observation, the observation of psychic systems. Instead, its level of abstraction is such that it refers to any operation from communications to thoughts and even to operations of machines; even the observer himself is an observation.

Spencer Brown's concept of observation does not focus on the object of observation but on the observation itself as a selection of what to observe. In this sense, the underlying question is not: what does an observer observe, but how does an observer observe; how is it that an observer is observing what he is observing, and not observing something else.

Every observation is constructed from two components: a distinction and an indication. An observer chooses a distinction with which he demarcates a space into two spaces (synonymously: "states" or "contents"). Of these two states he has to choose one that he indicates. That is to say, he has to focus on one state, while neglecting the other. It is not possible for him to focus on both. In this way, the initially symmetrical relation between the two states becomes asymmetrical. We get a *marked state* and an *unmarked state*.

Spencer Brown illustrates this rather abstract idea with an example: let us imagine a uniform white piece of paper. On this paper we draw a circle. In other words, we draw a distinction which creates an "inside" of the circle and an "outside" of the circle. It is important to note that it is the act of drawing the circle which establishes the two different states: without us drawing the distinction, the two states as such do not exist. We can now indicate one of the two states: either the inside or the outside. Let us choose the inside. The inside becomes the marked state and the outside the unmarked state. While we can see the marked state, the unmarked state remains unseen. With the metaphor of figure and ground we can say: the inside becomes figure and the outside ground.

Spencer Brown calls the distinction with both sides the *form* of the distinction. Thus, in contrast to the common use of the term, form does not refer merely to the marked state. The form of something is not sufficiently described by the defined – the marked state – but the unmarked state is a constitutive part of it. The marked side cannot exist without its unmarked side. In our example, the form of the circle is the inside together with the outside of the circle. In this context, Spencer Brown declares:

> Distinction is perfect continence. (Spencer Brown 1979, p. 1)

A distinction, thus, has a double function: like any boundary it both distinguishes and unites its two sides.

Spencer Brown introduces a specific notation to refer to the distinction, "the mark of distinction" or the "cross" (synonymously: token, sign, mark):

Marked state | Unmarked state
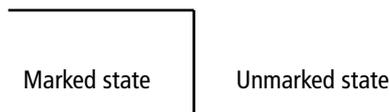
Figure 2: The mark of distinction.

This sign symbolises the distinction separating the two sides. Connected with this sign is the instruction to cross the boundary from the right to the left side; a process by which the left side becomes the marked state and the right side the unmarked state.

It is important to understand that the "cross" has *two* meanings: an operative and a descriptive meaning. Firstly, the cross stands for an *instruction* to cross (!) the distinction from unmarked to marked state. Secondly, the cross stands as a *sign for* the result of crossing; the marked state. In our example, the cross can be meant as an instruction to draw a circle or stand as a symbol of the result of drawing, i.e. stand for the circle itself. In this context, Spencer Brown writes:

> In the command
>> let the crossing be to the
>> state indicated by the token
> we at once make the token doubly meaningful, first as an instruction to cross, secondly as an indicator (and thus a name) of where the crossing has taken us. (Spencer Brown 1979, p. 81)

In terms of the calculus, the cross is used both as operator and operand: on the one hand, it gives instructions to calculate and, on the other hand, it is the element that is calculated. This double meaning might be confusing, but as Spencer Brown writes:

> It is the condensation [of the two meanings into one symbol] which gives the symbol its power. (Spencer Brown 1979, p. 81)

Another important element of the *Laws of Form* is the "unwritten" distinction (*unwritten cross*), which defines the space – context – within which the distinction is drawn. In our example from above, the unwritten cross is constituted by the border of the paper. As the border of the unmarked state, it remains as unobserved as the unmarked space itself. Now we have a complete unit of observation: a space defined by an unwritten cross is divided by a distinction into two states; the relation between the two states becomes asymmetrical by indicating one state as the marked state in contrast to the other, which becomes the unmarked state (Figure 3):

Figure 3: *Observation as distinction and indication.*

The central point in this concept of observation is that once you have drawn a distinction you cannot see the distinction that constitutes the observation – you can only see *one* side of it. As Heinz von Foerster (1981, pp. 288–309) pointed out, this can be referred to as the "blind spot" of observation. The complete distinction with *both* its sides (the inside *and* the outside), can only be seen from *outside;* if you are inside the distinction you cannot see the distinction.

We can now distinguish two orders of observation: first-order and second-order observation (von Foerster 1981). So far we have been explaining the operation of a first-order observer, who cannot observe the distinction he uses in order to observe. The second-order observer is an observer who observes another observer. He uses a different distinction from the first-order observer: in order to observe the observer, he has to draw a distinction that contains the distinction (the marked and the unmarked state) of the first-order observer in *his* marked state. The second-order observer can see the blind spot – the distinction – of the first-order observer. He can see *what* the first-order observer cannot see and he can see *that* he cannot see. Particularly, he can see that the first-order observer can see what he sees, because he uses one particular distinction and not another. He sees that he could also have used another distinction and, thus, that the observation is contingent. In this sense, a second-order observation is more than a first-order observation, because it not only sees its object – the first-order observer – but it also sees what he sees, and how he sees; and it even sees, what he does not see, and sees, that he does not see, that he does not see, what he does not see (Luhmann 1993k, p. 16).

Since the second-order observer needs a distinction to observe the distinction of the first-order observer, he himself is a first-order observer, who could be observed by another second-order observer. In this sense, every second-order observation is only possible as a first-order observation and as such knows as little about its own observation as every other first-order observer.

For Luhmann, the most interesting element of Spencer Brown's calculus of form is the *re-entry* describing the operation of *self*-observation. As explained above, an observer can only observe the marked side, and not the unmarked side or the distinction itself. In order to observe the other side he

would have to "leave" the marked state and cross to the other side of the distinction. This, however, would mean that it would no longer be possible for the initially marked state to be observed; one can either observe the one or the other side of the distinction but not both at the same time. As such, self-observation, that is to say, observing one's own observations, would be impossible. Spencer Brown's "solution" to the problem is the re-entry of the distinction into the distinction; i.e. the original distinction contains a copy of the distinction (with marked and unmarked states) in its marked state. This, however, constitutes a *paradox*: the unmarked state is both unmarked state and marked state (as it is contained in the marked state) and the marked state is both marked state and unmarked state (as it contains the unmarked state). In other words, the observer can see his blind spot, but then, if he can see it, it is not his *blind* spot any more. Spencer Brown unfolds this paradox claiming that the re-entered distinction is never exactly the same as the original distinction.

b. Autopoietic systems as distinction processing systems

On the basis of the calculus of forms, Luhmann described autopoietic systems as distinction-processing systems. Every operation of an autopoietic system constitutes an observation, i.e. a distinction and indication. Take, for example, communications: every communication communicates something (marked state) while at the same time having to leave everything else out – in particular, all other possible communications (unmarked state). These other possibilities of communication, however, are not just other communicative options, which just happen not to have been realised, but they are *constitutive* for the realised communication. That is to say, the meaning of the communication depends to a large extent on what *has not* been communicated. In other words, one needs to know what could have been communicated (i.e. the context of the communication) in order to establish the meaning of the communication. These other possibilities are on the unmarked side of the communication, as they have not been communicated. Other communications (second-order observation), however, can communicate about the communication (first-order observation) and its unmarked state, but only at the cost of producing yet another unmarked state. Thus, the communication can never fully communicate about its own conditions of communication.

Not only the operations but also the system itself can be conceptualised as an observation, i.e. as a distinction and an indication. A system is constituted as a distinction between system and environment, of which the system is the marked state and the environment the unmarked state. In accordance with Spencer Brown's concept of observation, the system and the environment are the two sides of the same distinction and as such are constitutive for each other.

While an observer can draw his distinctions where he likes and thus define what to treat as a system and what as an environment, the concept of autopoiesis assumes that the system/environment distinction is not drawn by an external observer but by the system itself. Luhmann writes in this respect:

> If we describe [something] as an autopoietic system, we are dealing with the production and reproduction of a distinction (in terms of systems theory: the distinction of system and environment), and the *concept* of autopoiesis says that an observer using it assumes that the difference is produced and reproduced by the operations of the system itself. (Luhmann 2000c, p. 55; my translation)

How are we to understand this reproduction of the system/environment distinction? Every operation of an autopoietic system constitutes a distinction between that which it is, i.e. an operation of the system, and that which it is not, i.e. an operation of the environment. Let us take the organization, for example: the operations of that system are decisions (decision communications). Every decision constitutes a distinction between that which it is (marked state), i.e. a decision and thus an element of the organization, and that which it is not (unmarked state), e.g. a "normal" communication or a thought. In this sense, every single decision (re-)draws the distinction between system and environment. Thus, in actual fact, the reproduction of decisions is the reproduction of the distinction decision/non-decision; that is to say, of the distinction organization/environment. According to this conceptualisation every single operation of a system reproduces the "boundary" of the system. In this sense we do not distinguish between "boundary elements" and elements taking place "inside" the boundary, as the classical notion of systems suggests.

This conceptualisation of the system's boundary, as reproduced by every single operation, implies an operative closure of the system: every operation constitutes a distinction between the operation and everything else (i.e. between system and environment). It can only be this operation as the one side (marked state) of the distinction and not the other one (unmarked state). For instance, a decision is only a decision (marked state) to the extent that it is not something else (unmarked state). In this sense, operative closure of a system means that the system (i.e. system/environment distinction) is only reproduced by operations that are themselves constituted as a system/environment distinction. For example, the "decision system/environment" distinction (organization) can only be reproduced by operations constituted as decision/non-decision distinctions and not by other distinctions – for example thought/non-thought (decision is here included in the unmarked space). The integration of other distinctions, in which decision is included in the unmarked space, would dissolve the organization/environment distinction and thus dissolve the system. In other words, the system

cannot enter its environment nor could the environment enter the system, otherwise the distinction between system and environment would disappear.

While the system can only operate on the marked state of the system/environment distinction, other observers outside the system might observe the system/environment distinction by including this distinction in their marked state. Consider, for example, an organization: the organization as a system of decisions is constituted by the distinction "decision network/social environment". While the organization can only operate on its inside, – that is to say, it can only produce and reproduce decisions and cannot enter its environment, which consists of all kinds of other communications – the societal system, which consists of the distinction "all-encompassing social system/non-social environment", contains the organization/environment distinction in its marked state. Society can thus observe the distinction of the organization and can thus see what the organization itself cannot see.

Although autopoietic systems can only operate on their inside (marked state) and have no contact to their outside (unmarked state), the system/environment distinction can re-enter the system. We can distinguish two re-entries: first, every single operation distinguishes between other operations of the same system and other events outside the system. In other words, every operation has a *self-referential* aspect and an *other-referential* aspect. Take, for example, communications as elements of a social system. Every communication can be divided into, on the one hand, the utterance, i.e. how and why something is expressed, which is (treated as) determined by the communication system (self-reference), and on the other hand, the information, i.e. what is expressed – (treated as) referring to events in the environment (other-reference). For example, A says to B: "My dog is dead". Here we can distinguish the utterance (i.e. the words A uses, what other communications this communication is referring to etc.) as the self-referential aspect, and the information about a dog being dead as referring to something outside the communication network (other-reference). The important point here is that the re-entered distinction is not identical with the distinction itself: (1) the utterance/information distinction is not the system/environment distinction – a communication is not a system – and (2) the information about the dog being dead is not the dead dog.

A second re-entry takes place on the structural level of the system. Structures "represent" internally the system/environment distinction to the system. As explained above with regard to organizations, the operations of a system cannot observe their environment. Instead, they observe the system's programmes as a substitute for the environment and orient themselves according to them. Take, for example, a business programme of a corporation. This programme refers, on the one hand, to the market situation, possible moves by competitors, characteristics of consumers, or something similar, and on the other hand, to the necessary decision processes in

the organization. By taking the programme as a decision premise decisions orient themselves according to the two aspects of the programme *as if* to the organization/environment distinction itself. Again, here we have to note that the programme represents the system/environment distinction but is not identical to it.

These few comments on the application of Spencer Brown's calculus of distinctions to Luhmann's systems theory have to suffice for now. While our descriptions and explanations have been very selective, the basic ideas should hopefully have become clear so far.

Conclusion

In this chapter we have tried to present the basic concepts and ideas of Niklas Luhmann's theory of social systems. We started with Luhmann's general concept of autopoiesis explaining how it was derived from the originally biological concept by Maturana and Varela. We went on to explain the concept of the social system as an autopoietic system of communications, where communications reproduce communications. We highlighted as one of the central ideas in this context the clear distinction between social and psychic systems. We have tried to clarify this often misunderstood idea. From there we went on to describe the three types of social systems – society, interaction and organization. In our last section we introduced the calculus of distinction by Spencer Brown and demonstrated how it could be and has been applied to the theory of social systems.

The Concept of Autopoiesis

Niklas Luhmann

For several years now, there has been a lively discussion about "autopoiesis".[1] Unlike in physics, however, in the realm of knowledge, sound, as Jean Paul wrote, moves faster than light.[2] Therefore, the word "autopoiesis" is indeed familiar but the discussion is far from understanding the concept sufficiently. And in turn, one encounters formulations without the word "autopoiesis" that say the same thing but whose significance is not recognized.[3] In the following we want to outline briefly our understanding of the conceptual complex of self-reference, autopoiesis, and operative closure in general and with regard to organizations in particular.

The theory of self-referential systems abstains from determining its object (in our case, organizations) by means of assumptions about its essence. Experience shows that such assumptions lead to irresolvable differences of opinion as soon as different observers offer different definitions of that, which they take for the essence of the matter – regardless of the matter at issue, be it the essence of law, of politics, of the family, of religion, or, actually, of organizations. Therefore, we begin with a circular definition: an organization is a system that produces itself *qua* organization. Now, we only have to define in what way this happens. However, this next step requires a series of theory decisions that could be made differently if it were possible to show how an alternative of the same quality would look.

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[1] For a topical survey, see especially Mingers (1995). Cf. also Robb (1989); Fischer (1991), in't Veld et al. (1991), Bardmann (1994), *passim* but esp. pp. 72 ff. and on the connection with the discussions about "organization culture" pp. 365 ff.; Bailey (1994), pp. 285 ff. The publication of individual essays can barely be surveyed any longer. On the application to organizations cf., e.g., Kirsch and zu Knyphausen (1991); Kickert (1993); Willke (1994a); Wollnik (1994).

[2] Paul (1961): "In the realm of knowledge – different from the physical realm – sound always arrives earlier than light" (1014).

[3] Thus one reads, "Any enterprise's first product is itself," in Bausor (1994), p. 181. There is also talk about "autogenesis"; cf. Drazin and Sanderlands (1992). If one is referring to the Greek sense of these words, however, then it is preferable not to proceed from an "origin" but from the "product". For a system is its own origin, only insofar as it is its own product. The question concerning the origin is better left to theology.

Here, we are going to offer a concise synopsis that lists the most important of these assumptions that have the effect of concretization and break the circle:

1. The basal unit of an autopoietic system has the temporal form of an event – that is, of an occurrence that makes a difference between "before" and "after" and therefore can be observed only if one's observations are based on the distinction before/after. Whenever we are concerned with results, we also speak of the "operation", and in the case of organizations of the "decision". In the context of a comparison of theories, it is important to keep in mind this foundation on events (and not on substances).[4] From this it follows that the theory proceeds from the presumption of discontinuity, the presumption of a steady decay, and takes continuity (thingness, substance, process) to be in need of an explanation.[5] A theory of autopoietic systems constructed in this manner finds itself in radical opposition to all types of process theories, including the dialectical ones. Such a theory rejects any kind of "essentialism" and requires, on the contrary, that every event (or in our area: every decision) leave all that follows to a subsequent event. Forms of essence are but instructions for a repetition of the selection. The theory of autopoiesis also stands in opposition to theories of action. For theories of action revert to the ideas (intentions, purposes) of an actor in order to connect their "unit acts". By contrast, events – e.g., communications – that constitute autopoietic systems produce surpluses of possibilities so that in a further step something suitable may be selected. It is not necessary that the selected possibility was anticipated; the decision about this selection is made typically and better in retrospect, in light of an event that has already taken place.
2. A system that has produced itself must be capable of observing itself – that is to say, it must be capable of distinguishing itself from its environment.[6] Occasionally, this is disputed. But since "organization" cannot mean the whole world, it is necessary to provide a criterion that serves to delimit that which is designated as an organization. Under these circumstances, the theoretically decisive question is whether this delimitation is put into effect by the organization itself or not; in the negative case, the question is, who or what else would put it into effect.

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[4] For a rather rare conception of this kind see Allport (1940; 1954; 1967). The relations to Alfred North Whitehead's cosmology are quite obvious.

[5] Ingold (1986), p. 24 provides the appropriate formulation: "Process is to event as continuity is to discontinuity."

[6] This requirement, taken by itself, need not lead to a theory of autopoiesis. Similar discussions can be found in the context of a distinction between "matter" and "symbol". See, e.g., Pattee (1982). But in such a case, these concepts must be clarified, especially in regard to the concept of reference.

3. In the process of self-observation, an organization does not observe itself as a stationary object whose qualities can be recognized. Instead, the organization uses its own identity only for the purposes of continuously attaching new determinations to it and subsequently giving them up again.[7] For this reason, autopoietic systems can also create variations in their structures (this is called "self-organization"), insofar as such variations are compatible with the continuation of autopoiesis. All reflections on identity that propose stable self-descriptions by means of content-related properties must therefore proceed in a highly selective manner; in the process, they commit themselves to exacting normative demands and usually remain controversial.

4. The variability of the "self" that is introduced in each case as the fixed point is guaranteed by the fact that the organization observes itself observing. Already the organization system operates at the level of second-order observation; it diagnoses its own observations continuously (albeit not in every individual case). The *theory* or organization must therefore be placed at the level of *third-order* observation. Such a theory observes a system that observes itself; in consequence of this arrangement, it is capable of extending its observations to circumstances that are inaccessible to self-observation. Here, we touch on the classical sociological problem of latent structures and functions.[8]

5. Accordingly, autopoiesis is possible only as long as the system finds itself in a constant state of uncertainty about itself in relation to its environment, and as long as it can *produce and control this uncertainty by means of self-organization*. The system cannot transform the built-in (we will also say: the self-produced) uncertainty into certainty. The absorption of uncertainty can happen only as a transformation of the form of uncertainty that is relevant in each moment. Such absorption happens as an adjustment to the changing states of perturbation. Even reflection and self-observation cannot change this. Every "transcendental" identity could endanger the continued self-reproduction of the system.

6. The best possibility of coming to terms with uncertainty is to stick with all that has already happened. For this reason, organizations clarify the meaning of their actions to a large extent retrospectively. This, however, tempts them to pay little attention to the state of their environment at any given moment. This differentiation at the operative level must be balanced at the structural level. Preferably, decisions about the appropriateness of structures (such as decision programs or the typical length

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[7] For the same argument regarding the self-consciousness of psychic systems cf. Churchland (1984), p. 73: "… self-consciousness involves the same kind of *continuously updated* knowledge that one enjoys in one's continuous perception of the external world."

[8] For a synopsis see Merton (1957), pp. 60 ff.

of time of operations) will therefore have to be made with regard to the environment.

7. Concepts such as self-reference, self-observation, and self-description presuppose operations that produce in reality that which they mean. These operations must take place in the system (where else?). If one also considers that this is not possible in the form of unconnected, singular events, one comes up against the problem of the recursive interlacing of these operations. In order to make itself possible, every operation presupposes the recourse to and anticipation of other operations of the same system. Only in this way can connections be identified and the boundaries in relation to the environment be produced and reproduced. It is for this very reason (aside from the fact that the biologist Humberto Maturana gave this state of affairs this name) that one speaks of "autopoietic" systems.[9] Therefore, a first application to the case of organizations was preventively and explicitly marked as a "metaphor".[10] A concept of cognition that was too broad, and a tie to biochemical realization that was too tight often influenced and misguided the subsequent discussion.

8. In light of the complex and often confused discussion, a few explanatory remarks on this topic are in order:

    (a) As the concept of "poíesis" indicates, we are dealing with the production of something: namely, the creation of the system as its own product. Of course, this does not mean that the system itself has at its disposal all of the causes that are necessary for self-production. A causal theory simply has no place for such a combination of all causes in a system (except in God). For concepts such as product, production, and reproduction this already applies at the conceptual level. In fact, only if a system does not simply exist but must reproduce itself by means of its own products can it depend on its environment in precisely this sense. However, it is important that the system has at its disposal a sufficient range of disponible causes (e.g., in the case of an organization this would be members that are subject to the instructions of the organization), so that it can secure its own reproduction under regular circumstances.

    (b) The concept "poíesis" does not emphasize the rule-bound, and even less the absolute, certainty of production. Instead, it emphasizes reproduction – that is to say, the production by means of its own products. Following Heinz von Foerster, one can therefore also speak of a "historical machine" – that is to say, of a system that

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[9] See especially Maturana and Varela (1975 and 1987). At this stage, the development of the theory was strongly conditioned by epistemological questions and presupposed biochemical processes insofar as the autopoietic operation itself was concerned.

[10] In Morgan (1986).

produces its subsequent operations in the state in which it finds itself due to its previous actions.

(c) According to all this, the concept of autopoiesis is defined formally. For this reason, it leaves open *qua* concept the material operations by which the autopoiesis is executed. These operations may be biochemical or neurophysiological; they can also be conscious attentive dispositions or communications. Here, we are neither arguing by means of analogy nor metaphorically.[11] Rather, it is a matter of different applications of a general theory.

(d) The mere concept of autopoiesis serves as the distinction and indication of a corresponding state of affairs. As a concept, it has no empirical explanatory value. The effect of this concept consists first and foremost in constraining and adjusting other concepts, e.g., the concept of evolution or the understanding of the relationship between system and environment. All further consequences depend on the operations and the structures resulting from evolution and learning, by means of which autopoiesis is materialized.

(e) The autopoiesis of the system is realized at the level of *operations*. Therefore it is compatible with all structures that make a connection from one operation to another possible. Here, the concept of structure is a concept that correlates with autopoiesis, not, as is usual in another context, a concept that correlates with the division of labor. Structures are produced (and reproduced or perhaps varied or even forgotten) by operations for the use in operations.[12] For this reason, one cannot infer structural conservatism from the concept of autopoiesis.[13] On the contrary, it is precisely the closure vis-à-vis the environment that offers the system opportunities for structural

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[11] Besides, it would cause no damage but be only of little use if we agreed that a metaphor is at stake in our use of the term "autopoiesis". For this would apply to all approaches to organization theory (see, e.g., Morgan 1980); and, since the concept of metaphor (from "metapherein") is a metaphor, it would merely amount to the requirement that every universalistic theory must be reminded of the necessity of an autological self-foundation.

[12] We find ourselves in full agreement here with Anthony Giddens's theory of "structuration" – with the single exception that Giddens rejects a systems-theoretical foundation of this concept. See Giddens (1986).

[13] As do, apparently, Kickert (1993) and many others who associate "autopoiesis" with a conservative ideology. Management consultants also tend to describe autopoietic systems as structurally conservative in order to supply arguments in support of the function, if not necessity, of specific interventions from the outside. See, e.g., Wollnik (1994). The thesis regarding structural conservatism does not teach us something about the theory of autopoietic systems but rather about those entities that present this thesis: that is, about the autopoiesis of firms and the educational institutions of management consulting; alternatively, we could say with Maturana, *loc. cit.*, p. 64: it does not tell us anything about the area that is being described but rather about the observer who produces or uses such a description.

variation, which it could not have under the condition of immediate linkages with the environment. Autopoietic modes of operations are typical one-time-only inventions of evolution that have tended towards structural diversification in the course of history. Thus "autopoiesis" merely designates a barrier for structural variations. However, as evolution extending over long times and expansive spaces teaches us, it is precisely the difference between inner and outer that leads to the acceleration of changes. Of course, it also teaches us that these changes do not accord with the wishes of certain observers, which has the effect that to them, these systems may appear as rigid and inflexible.

(f) The recursive interlacing of operations follows neither logical nor rational rules. It only creates connections and holds out a prospect of connectivity. Thus, sales figures may be taken as proof of success and of the quality of a given organizational structure. Thus, information may trigger the suspicion of distortions caused by specific interests and motivate further attempts at confirming this suspicion. Thus, in the international relations between organizations ecological criteria for products may be interpreted as trade barriers. Hence recursions actually secure the preservation and reproduction of repressed paradoxes. Something determinate is always also something different.

9. Autopoietic systems are *operatively closed* and precisely in this sense *autonomous* systems.[14] The concept of operative closure does not allow for any gradation; in other words, it does not permit that the system operates in its environment or, vice versa, the environment in the system. A system cannot be more or less autopoietic;[15] but it can be more or less complex. Operatively closed autopoietic systems cannot be described via input/output functions; this much is clear for mathematically demonstrable reasons.[16] From this result descriptions

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[14] Cf. for a very narrowly circumscribed segment Varela (1979).

[15] This is a contentious point. Especially Gunther Teubner (1987a; 1987b) has introduced the opposing viewpoint into the discussion. For the application to organizations see Kirsch and zu Knyphausen (1991). If one decided to take this path in the formation of concepts, one would, however, need a conception of the unity of the system that can be produced without depending on the concept of autopoiesis. Moreover, this version would have to abandon the rigid connection between autopoiesis and decision in the case of organizations. Then, "autopoietic" systems would be systems in which autopoiesis also happens (among other occurrences). This, however, would not explain the unity of the system. Perhaps in such cases it would be better to replace the concept of autopoiesis by the old concept of circular causality. In any case, from Maturana's point of view, reflections on gradation pertain exclusively to the area of the structures of systems and precisely not to the area of autopoiesis itself.

[16] On this topic and the reasons it provides for the necessity of a "blind spot": that is, the necessary opacity of the system to itself, cf. Heinz von Foerster (1993a, pp. 21 ff.; 1993b).

and impressions such as: freedom, arbitrariness, and opacity. The concept of operative closure also abstracts from causal assumptions. In no way does it claim a causal isolation (even if it were merely relative). It is possible that a system (say, a brain) is operatively closed and at the same time depends to an extreme degree on the continuous supply of resources of a very specific kind (in our case this would be the circulation of the blood). Operative closure merely means that the system can operate only in the context of its own operations and that it depends in this process on the structures that are being produced precisely by these operations. It is in this sense that one speaks of self-organization or, with reference to operations, of structural determination.

10. These theory stipulations have far-reaching consequences for the relation between system and environment. In this case, operative closure does not mean that an organizational system cannot maintain any contacts with its societal environment. Society, on the one hand, makes it possible to communicate within society across the boundaries of subsystems. On the other hand, an organization cannot participate in communication without observing itself as a participant. *Qua* recipients of communications, the organization's own structures regulate the information by which the system lets itself be perturbed and incited to undertake its own information processing. *Qua* sender of communications, the organization decides what it wants to communicate and what not. To this degree, the organization's environment remains the organization's own construction, which is not to say that its reality is denied. On this point, we agree with Karl Weick.[17] Whatever is observed in the organizational system as environment is always itself a construction: that is, a filling-in of the external reference (other-reference) of the system.[18] In a manner of speaking, the environment validates the decisions of the system by providing the context that makes possible to determine retrospectively how one has decided (Weick speaks of action). The environment makes possible the externalization of unpleasant causes of one's own decisions – that is to say, it makes possible a sort of "punctuation" of one's own operations. Thus, the environment is a collecting area for problems that allows the system to disregard its own participation in the creation of these problems. To sum up, one might say that the environment provides the possibility of referring one's own operations to a "niche" without posing the question of how it is that the world and society in particular contain such niches. Nothing else is expressed by the old concept "milieu".

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[17] See Weick (1977a; 1979, pp. 147 ff). Cf. also Smircich (1983), pp. 229 ff.

[18] "The 'outside' or 'external' world cannot be known," one reads in Weick (1977), "The outside is a void, there is only the inside" (p. 273).

11. Although biology bestowed the concept of autopoiesis upon us, we can safely leave open whether or not and in what way one could understand the reproduction of relatively stable large molecules in cells as "autopoietic." Perhaps one might do so, because such reproduction is possible only in cells, or perhaps because we are dealing here with extremely unstable units that must be continuously replaced. In the case of social systems, autopoiesis can be recognized much more easily, and it is structured quite differently, in any case. For we are not dealing here with units that need to replicate and must be replaced continuously. Rather, social systems (and conscious systems as well) consist merely of events that are about to vanish as soon as they have come about and must be replaced not by the same but by *different* events. The steady transition from one element to another, the steady reproduction of difference, can in fact be understood only in terms of autopoiesis; for it presupposes the connectivity that is produced in and by the system itself. No environment could inject something fitting for the system as quickly as is necessary. Only the system can arrest its own decay as it happens from one moment to the next. At the same time, this situation makes very specific demands on structures; repetition is precisely what they must not aim at; instead, they first and foremost must regulate the transition from one element to the next. To this purpose, a *meaning* that is rich in reference but nonetheless determinable must provide the necessary orientation, as I have explained elsewhere.[19]

12. Autopoiesis depends on the fact that a system is capable of producing internal improbabilities and thereby deviating from the usual. In such a case, structurally restricted contingencies function as *information* in the system. In fact, they function as information that is not derived *from* the environment, since the system cannot contact its environment. At best, they function as information *about* the environment (and even this is not the case in biological systems such as cells, immune systems, and brains but only in systems that can distinguish between themselves and their environment in the medium of meaning). Thus, an autopoietic system can only inform itself; and in the system, information has the function of selectively restricting the possibilities for the continuation of its own operations combined with the additional function of being able to decide relatively quickly about connective possibilities.

13. *Closure* in this *operative* sense is the condition of a system's *openness*. Especially in regard to the law of entropy in thermodynamics, the older type of systems theory spoke of "open systems" in order to be able to

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[19] See Luhmann (1995f), pp. 59 ff.

explain how order is created and preserved through a contrary tendency. But the question of what actually makes a system capable of being open was not posed. In other words, one did not ask what degree of systemic order had to be given so that a system could afford its own openness and, if necessary, even increase the complexity of those aspects that buttress its openness. This question was not asked because empirical examples and the input/output model, respectively, provided the orientation of this theory. The older type of cybernetics had already spoken of systems that are closed in regard to information but open in regard to energy. But only the more recent theory of self-referential systems states clearly that operative closure is the condition of openness.

14. The theory of autopoietic systems distinguishes strictly between the continuation of autopoiesis and the preservation of certain structures that serve the safeguarding of sufficient redundancy and connectivity and thus, in one way or the other, make autopoiesis possible in the first place. Thus, structures are presupposed as functional, as contingent, and as also possible under different circumstances and in different forms. Seen from the viewpoint of the theory construction, this allows for an understanding of the ambiguity, the need for interpretation, and the possible avoidance of specific structural arrangements. To put it differently, one might say that the theory of autopoietic systems above all points out to the observer that structures have *meaning* and therefore must be constituted within open horizons of referring to other possibilities, while the system's own autopoiesis is not under consideration in autopoietic systems. With these insights, we find ourselves in the vicinity of theories of "symbolic interactionism" or of theories of the hermeneutic "interpretation" of reality – but without having to resort to behaviorist (Mead) or subjectivist assumptions. In the case of organizations, we see that uncertainties must be reduced and ambiguities in the decision process must be clarified. At the same time, however, we also see that uncertainty and ambiguity must always also be regenerated in the processing of meaning. Particularly the autopoiesis of organizations is kept going precisely by the fact that uncertainty is not only reduced but also renewed.

The impressive gain achieved by means of this complex maneuvering of concepts consists in the transformation of the fundamental problem of systems theory: *the preservation of existence* is turned into *the preservation of a difference*. This also means that we no longer speak of "existential" necessities (e.g., an organization can exist only if …)[20] but of the conditions of the pos-

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[20] Many – too many – items could be enumerated as such existential necessities, not just "goals" or other "essential" structures ("functional requisites") but also humans capable of action, fresh air, constant laws of gravity, etc.

sibility of observing organizations. Whenever we describe organizations as autopoietic systems, it is always a matter of the production and reproduction of a *difference* (in systems-theoretical terms: between system and environment). The *concept* of autopoiesis means that an observer who uses it presupposes that this difference is produced *by the system itself* and is reproduced through the system's own operations.

– Translated by Peter Gilgen

Acknowledgements

The Autopoiesis of Social Systems

Niklas Luhmann

Meaning and life as different modes of autopoietic organization

The term "autopoiesis" has been invented to define life. Its origin is clearly biological. Its extension to other fields has been discussed, but rather unsuccessfully and on the wrong premises. The problem may well be that we use a questionable approach to the issue, "tangling" our "hierarchies" of investigation.

At first sight it seems safe to say that psychic systems, and even social systems, are also living systems. Would there be consciousness or social life without (biological) life? And then, if life is defined as autopoiesis, how could one refuse to describe psychic systems and social systems as autopoietic systems? In this way we can retain the close relation between autopoiesis and life and apply this concept to psychic systems and to social systems as well. We are almost forced to do it by our conceptual approach (Maturana 1980; Hejl 1982; Bunge 1979). However, we immediately get into trouble in defining precisely what the "components" of psychic and social systems are whose reproduction by the same components of the same systems recursively defines the autopoietic unity of the system. And what does "closure" mean in the case of psychic and social systems if our theoretical approach requires the inclusion of cells, neurophysiological systems, immune systems, etc. of living bodies into the encompassing (?) psychological or sociological realities?

Moreover, because it is tied to life as a mode of self-reproduction of autopoietic systems, the theory of autopoiesis does not really attain the level of general systems theory which includes brains and machines, psychic systems and social systems, societies and short-term interactions. From this point of view, living systems are a special type of systems. However, if we abstract from life and define autopoiesis as a general form of system-building using self-referential closure, we would have to admit that there are non-living autopoietic systems, different modes of autopoietic reproduction, and general principles of autopoietic organization which materialize as life,

but also in other modes of circularity and self-reproduction. In other words, if we find non-living autopoietic systems in our world, then and only then will we need a truly general theory of autopoiesis which carefully avoids references which hold true only for living systems. But which attributes of autopoiesis will remain valid on this highest level, and which will have to be dropped on behalf of their connection with life? The text that follows uses this kind of multi-level approach. It distinguishes a general theory of self-referential autopoietic systems and a more concrete level at which we may distinguish living systems (cells, brains, organisms, etc.), psychic systems and social systems (societies, organizations, interactions) as different kinds of autopoietic systems (see Figure 1).
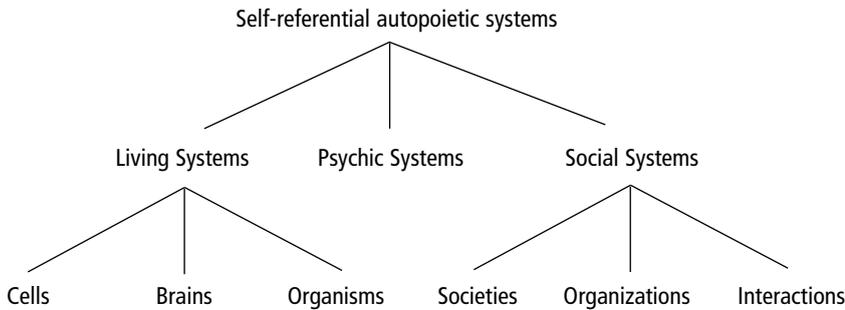

Figure 1: Types of self-referential autopoietic systems.

This scheme does not describe an internal systems differentiation. It is a scheme not for the operations of systems, but for their observation. It differentiates different types of systems or different modes of realization of autopoiesis.

This kind of approach is usable only if we are prepared to accept its anti-Aristotelian premise that social systems, and even psychic systems, are not living systems. The concept of autopoietic closure itself requires this theoretical decision, and leads to a sharp distinction between *meaning* and *life* as different kinds of autopoietic organization; and meaning-using systems again have to be distinguished according to whether they use *consciousness* or *communication* as modes of meaning-based reproduction. On the one hand, then, a psychological and a sociological theory have to be developed which meet these requirements; on the other hand, the concept of autopoiesis has to be abstracted from biological connotations. Both tasks are clearly interdependent. The general theory of autopoietic systems forms the foundation of the theories of psychic and social systems; the general theory itself, however, is meaningful only if this implementation succeeds, because otherwise we would be unable to determine which kind of attributes are truly general.

Communications as the basic elements of social systems

To use *ipsissima verba*, autopoietic systems "are systems that are defined as unities, as networks of productions of components, that recursively, through their interactions, generate and realize the network that produces them and constitute, in the space in which they exist, the boundaries of the network as components that participate in the realization of the network" (Maturana 1981, p. 21). Autopoietic systems, then, are not only self-organizing systems. Not only do they produce and eventually change their own *structures* but their self-reference applies to the production of other *components* as well. This is the decisive conceptual innovation. It adds a turbocharger to the already powerful engine of self-referential machines. Even *elements*, that is last components (in-dividuals), which are, at least for the system itself, undecomposable, are produced by the system itself. Thus, everything which is used as a unit by the system is produced as a unit by the system itself. This applies to elements, processes, boundaries and other structures, and last but not least to the unity of the system itself. Autopoietic systems, of course, exist within an environment. They cannot exist on their own. *But there is no input and no output of unity*.

Autopoietic systems, then, are sovereign with respect to the constitution of identities and differences. They do not create a material world of their own. They presuppose other levels of reality. Human life, for example, presupposes the small scope of temperature in which water exists as a liquid. But whatever they use as identities and as differences is of their own making. In other words, they cannot import identities and differences from the outer world; these are forms about which they have to decide themselves.

Social systems use communication as their particular mode of autopoietic reproduction. Their elements are communications which are recursively produced and reproduced by a network of communications and which cannot exist outside of such a network. Communications are not "living" units, they are not "conscious" units, they are not "actions". Their unity requires a synthesis of three selections: namely, information, utterance[1] and understanding (including misunderstanding).[2] This synthesis is produced by the network of communication, not by some kind of inherent power of consciousness, or by the inherent quality of the information. Also – and this goes against all kinds of "structuralism" – communication is not produced by language. Structuralists have never been able to show how a structure can produce an event. At this point, the theory of autopoiesis offers a decisive

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[1] In German I could use the untranslatable term, "Mitteilung".

[2] The source of this threefold distinction (which also has been used by Austin and Searle) is Karl Bühler (1934). However, we modify the reference of this distinction. It refers not to "functions", and not to types of "acts", but to selections.

advance. It is the network of events which reproduces itself, and structures are required for the reproduction of events by events.

The synthesis of information, utterance and understanding cannot be pre-programmed by language. It has to be recreated from situation to situation by referring to previous communications and to possibilities of further communications which are to be restricted by the actual event. This operation requires self-reference. It can in no way use the environment. Information, utterances and understandings are aspects which for the system cannot exist independently of the system; they are co-created within the process of communication. Even "information" is not something which the system takes in from the environment. Pieces of information don't exist "out there", waiting to be picked up by the system. As selections they are produced by the system itself in comparison with something else (e.g., in comparison with something which could have happened).

The communicative synthesis of information, utterance and understanding is possible only as an elementary unit of an ongoing *social* system. As the operating unit it is undecomposable, doing its autopoietic work only as an element of the system. However, further *units* of the same system can distinguish between information and utterance and can use this distinction to separate hetero-referentiality and self-referentiality. They can, being themselves undecomposable for the moment, refer primarily to the content of previous communications, asking for further information about the information; or they can question the "how" and the "why" of the communication, focusing on its utterance. In the first case, they will pursue hetero-referentiality, in the second case self-referentiality. Using a terminology proposed by Gotthard Günther (1979), we can say that the process of communication is not simply auto-referential in the sense that it is what it is. It is forced by its own structure to separate and to recombine hetero-referentiality and self-referentiality. Referring to itself, the process has to distinguish information and utterance and to indicate which side of the distinction is supposed to serve as the base for further communication. Therefore, self-reference is nothing but reference to this distinction between hetero-reference and self-reference. And, whereas auto-referentiality could be seen as a one-value thing (it is what it is), and could be described by a logic with two values only, namely, true and false, the case of social systems is one of much greater complexity because its self-reference (1) is based on an ongoing auto-referential (autopoietic) process, which refers to itself (2) as processing the distinction between itself and (3) its topics. If such a system did not have an environment, it would have to invent it as the horizon of its hetero-referentiality.

The elementary, undecomposable units of the system are communications of minimal size. This minimal size, again, cannot be determined independent

of the system.[3] It is constituted by further communication or by the prospect of further communication. An elementary unit has the minimal meaning which is necessary for reference by further communication – for instance, the minimal meaning which still can be negated. Further communication can very well separate pieces of information, utterances and understandings and discuss them separately, but this still would presuppose their synthesis in previous communication. The system does not limit itself by using constraints for the constitution of its elementary units. If need be, it can communicate about everything and can decompose aspects of previous communication to satisfy actual desires. As an operating system, however, it will not always do this to the extreme.

Communication includes understanding as a necessary part of the unity of its operation. It does not include the acceptance of its content. It is not the function of communication to produce a consensus as the favoured state of mind. Communication always results in an open situation of either acceptance or rejection. It reproduces situations with a specified and enforced choice. Such situations are not possible without communication; they do not occur as natural happenings. Only communication itself is able to reach a point which bifurcates further possibilities. The bifurcation itself is a reduction of complexity and, by this very fact, an enforcement of selection. Automatically, the selection of further communication is either an acceptance or rejection of previous communication or a visible avoidance or adjournment of the issue. Whatever its content and whatever its intention, communication reacts within the framework of enforced choice. To take one course is not to take the other. This highly artificial condition structures the self-reference of the system; it makes it unavoidable to take other communications of the same system into account, and every communication renews the same condition within a varied context. If the system were set up to produce consensus it soon would come to an end. It would never produce and reproduce a society. In fact, however, it is designed to reproduce itself by submitting itself to self-reproduced selectivity. Only this arrangement makes social evolution possible, if evolution is seen as a kind of structural selection superinduced on selectivity.

Societies and interactions as different types of social systems

Social systems, then, are recursively closed systems with respect to communication. However, there are two different meanings of "closure" which

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[3] This argument, of course, does not limit the analytical powers of an observer, who, however, has to take into account the limitations of the system.

make it possible to distinguish between *societies* and *interactions* as different types of social systems. Societies are encompassing systems in the sense that they include all events which, for them, have the quality of communication. They cannot communicate with their environment because this would mean including their understanding partner in the system, understanding being an essential aspect of the communication itself.[4] By communication they extend and limit the societal system, deciding about whether and what to communicate, and what to avoid. Interactions, on the other hand, form their boundaries by the presence of people who are well aware that communication goes on around them without having contact with their own actual interaction. Interactions must take into account environmental communication, and have to acknowledge the fact that persons who are present and participate in the interaction have other roles and other obligations within systems which cannot be controlled here and now.

But interactions also are closed systems, in the sense that their own communication can be motivated and understood only in the context of the system. For example, if somebody approaches the interactional space and begins to participate, he has to be introduced and the topics of conversation eventually have to be adapted to the new situation. Interactions, moreover, cannot import communication ready-made from their environment. They communicate or they do not communicate, according to whether they decide to reproduce or not to reproduce their own elements. They continue or discontinue their autopoiesis like living systems which continue as living systems or die. There are no third possibilities, neither for life nor for communication. All selections have to be adapted to the maintenance of autopoietic reproduction. Something has to be said, or, at least, good and peaceful (or bad and aggressive) intentions have to be shown if others are present.[5] Everything else remains a matter of structured choice within the system. Some of its structures, then, become specialized in assuring that communication goes on even if nothing of informative quality remains and even if the communication becomes controversial and unpleasant (Malinowski 1960).

The relation between action and communication

Confronted with the question of elementary units, most sociologists would come up with the answer: action. Sometimes "roles" or even human individuals are preferred, but since the time of Max Weber and Talcott Parsons,

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[4] For problems of religion, and particularly for problems of "communication with God" (revelation, prayer, etc.), see Niklas Luhmann (1985).

[5] This again is not a motive for action but a self-produced fact of the social system. If nobody is motivated to say anything or to show his intentions, everybody would assume such communications and they would be produced without regard to such a highly improbable psychological environment.

action theory seems to offer the most advanced conceptualization.[6] Communication is introduced as a kind of action – for example, as "kommunikatives Handeln" in the sense of Jürgen Habermas (1981). Usually this conceptualization is taken for granted, and classical sociological theory finds itself resumed under the title of "Theory of Action" (Münch 1982). Controversies are fought over headings such as action versus system, or individualistic versus holistic approaches to social reality. There is no serious conceptual discussion which treats the relation of actions and communications, and the important question of whether action or communication should be considered as the basic and undecomposable unit of social systems has not been taken up.

For a theory of autopoietic systems, only communication is a serious candidate for the position of the elementary unit of the basic self-referential process of social systems. Only communication is necessarily and inherently social. Action is not. Moreover, social action already implies communication; it implies at least the communication of the meaning of the action or the intent of the actor, and it also implies the communication of the definition of the situation, of the expectation of being understood and accepted, and so on. Above all, communication is not a kind of action because it always contains a far richer meaning than the utterance or transmittance of messages alone. As we have seen, the perfection of communication implies understanding, and understanding is not part of the activity of the communicator and cannot be attributed to him. Therefore, the theory of autopoietic social systems requires a conceptual revolution within sociology: the replacement of action theory by communication theory as the characterization of the elementary operative level of the system.

The relation of action and communication has to be reversed. Social systems are not composed of actions of a special kind; they are not communicative actions, but require the attribution of actions to effectuate their own autopoiesis. Neither psychological motivation, nor reasoning or capacity of argumentation, constitutes action, but simply the attribution as such, that is, the linking of selection and responsibility for the narrowing of choice.[7] Only by attributing the responsibility for selecting the communication can the process of further communication be directed. One has to know who said what to be able to decide about further contributions to the process. Only by using this kind of simplifying localization of decision points can the process return to itself and communicate about communication.

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[6] See the discussion of "The Unit of Action Systems" in Parsons 1937, pp. 43 ff., which had a lasting impact on the whole theoretical framework of the later Parsons.

[7] To elaborate on this point, of course, we would have to distinguish between "behaviour" and "action". A corresponding concept of "motive" as a symbolic device facilitating the attribution of action has been used by Max Weber. See also Mills (1940); Burke (1945/1950); Blum and McHugh (1971).