

The dialectic of bottom-up and top-down emergence in social systems

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Abstract

This paper focuses on how to theorize the relationship between emergence of social systems and individual emergence. As a point of departure it is assumed that self-organization on the level of social systems, seen from a hierarchical systems theory point of view, includes a bottom-up process as well as top-down. The bottom-up process refers to what sociology calls agency. The top-down process it calls structure. We will show that it is convenient to suggest these processes be linked in a dialectic way. In this respect we will discuss problems of determinism and indeterminism. This is the background against which we will try to clarify the notion of individual emergence. Our general considerations will be illustrated by how ideology, that is consciousness in a collective as well as an individual sense, is conceived by several theories and should be conceived when including aspects of self-organization. We will conclude with a statement that makes clear why consciousness is a property of individuals. It emerges only if individuals take part in society and why society emerges only if individuals are provided with consciousness.

Emergence and self-organization

Emergence has diachronic as well as synchronous connotations. In the literature they are usually separately referred to as specification and scalar hierarchies among others (Salthe 1996). But it can be shown that both hierarchies are only the two sides of the same coin. A stage concept of systemic evolution may reconcile both of them.

The first connotation of emergence refers to evolutionary lineages in which processes of self-organization convey so-called meta-system transitions (Heylighen). In the course of evolution one system is linked to another, a new one by emergence, that is, the first gives rise to the second and disappears (see figure 1).

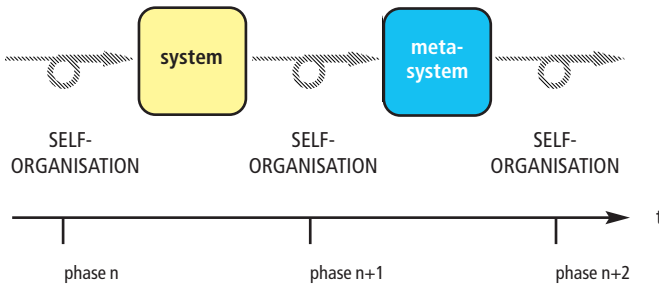


Figure 1 Diachronic self-organization

Emergence, as the forward loop of self-organisation cycles, creates the change from one system in one phase of evolution to another system in another phase. It moves the historical sequence of the systems.

The second connotation is applied to nested hierarchies of systems in which processes of self-organisation take place. The upward process links a system unit to a super-system unit by emergence, that is, by virtue of activities carried out at the level of the respective system unit new features appear at the level of the respective super-system. This kind of emergence is accompanied by a downward process. It is a kind of domination, of asserting superiority. In this way the super-system level constrains and makes activities at the lower system level possible (see figure 2).

The levels may also be referred to as system and subsystem levels. Emergence as an upward loop of self-organisation cycles effects the progression from one system level to a higher system level in encapsulated systems. It propels the structural build-up of systems.

The clue is that both meanings of emergence can be brought together insofar systems that produce other systems in diachronic processes do it by interlocking their behaviour. By coherent interactions; the new system has a hierarchical character enabling synchronous processes between the two levels – meta-systems turn out to be super-systems in which the systems that constitute the new holistic entity are, in the Hegelian sense, synchronously

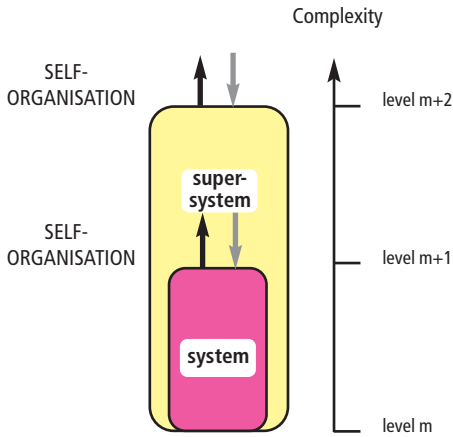


Figure 2 Synchronous self-organization

“sublated“ (“aufgehoben“) as its parts. Thus, a stage model which combines both so-called specification and scalar hierarchies can be sketched (see figure 3).

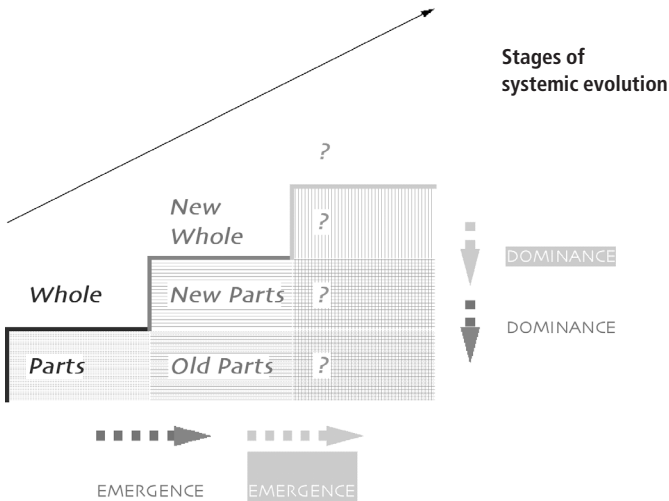


Figure 3 Stage concept of self-organization

It is a phase model and a layer model in one. The dimension left to right represents the synchronous aspects, the dimension bottom to top the diachronic. The shift from one

phase to a subsequent phase is tantamount to a shift into one more layer. The new system includes this additional layer. It encapsulates what previously were autonomous systems as subsystems and shapes them to reflect the dominance relation. But the newly formed system will always depend on the functioning of its subsystems. When they cease to support the system, it will break down. Emergence brings forth new systems and maintains them.

An as yet-to-be-developed theory of evolutionary systems will show reality to be the totality of systems that rise one from another, influence one another, and remain in a state of constant development. From this perspective of systemic evolution, the world may be understood as a system of systems that organises itself, i.e. it created itself and it continues to develop itself. The systems have subordinate subsystems and are components of higher level systems. Together they form a layered structure in which the systems that arose at later stages of the evolutionary process are found on higher levels, the older systems on lower levels. The higher levels of the systems rest on the lower ones both as processes and structurally. The lower ones open up the possibilities of further development on the same level. When the performance of system-specific functions reaches its limits, the higher organisation of the systems on the next level may or may not be realized by the systems. The lower development levels form quasi-potential preliminary stages for higher level development, but they do not determine it in detail.

Emergence and self-organization are contingent events. That is, a theory of evolutionary systems must rest upon a less than strict determinism.

As science has unravelled the natural world, strict determinism holds for systems at or near thermodynamic/chemical equilibrium only. It does not hold for systems exposed to fields in which the uneven distribution of energy density exceeds a critical level. Such field potentials force energy to flow in non-linear and interdependent ways. The systems demonstrate self-organisation, which is the build-up of order out of fluctuations via dissipation of entropy, as Prigogine (1980) discovered. A touch of indeterminism enters in causal relationships where self-organising systems are involved because the systems select one of several possible ways to react. Thus, an ontological quality gap remains between cause and effect that cannot be bridged by epistemological prostheses.

In strictly determined events mechanisms are at work that necessitate the transformation of particular causes into particular effects. Here *causa aequat effectum*, or – as Newton's dictum may be interpreted – *actio est reactio* (Fleissner and Hofkirchner, 1997).

In events that are not strictly determined, as is the case in self-organising systems, the effect is not predictable. This is because the system intervenes in the chain of cause and effect and introduces a degree of freedom that cannot be forced into a single alternative. The effect is emergent and promoted by the self-organisation of the system produces something new or some new whole. Thus, *causa non aequat effectum*, *actio non est reactio*. If the objective relationship seems to be non-mechanical, i.e. dialectical, then non-formal, i.e. dialectical, reasoning seems to be the adequate mental operation (see Hofkirchner, 1998). Dialectical reasoning, however, does not lead to clear-cut explanations or provide clear-cut predictions.

Emergence and social systems

The conceptualization of the central issue in social science – the issue of how agency and structure are to be related – in terms of dialectic, emergence and self-organisation resorts to and integrates important ideas and insights of recent attempts to overcome the dichotomy in social theory which (with the exception of, e.g. Artigiani, 1991) do not explicitly refer to an evolutionary systems theory of society (e.g. Giddens, 1984, Alexander, 1995, Mouzelis 1995, Reckwitz, 1997). It promises to bring a solution to the problem of how to deal with indeterminacy in the object domain of science.

According to how self-organisation is conceived, in the framework of an evolutionary systems theory (see figure 4) the self-organisation cycle working in social systems may be conceived as shown in figure 5.

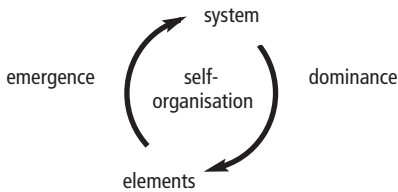


Figure 4 Self-organization in evolutionary systems

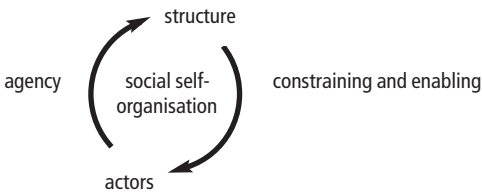


Figure 5 Self-organization in social systems

There are two levels. Located at the micro-level are the elements, namely agents, of the system. They carry out actions. By the interplay of the fluctuating individual actions they produce fairly stable relations among them in the form of rules, values, ethics and morals. Regularities that concern allocable and authoritative resources gain a relative independence from the interactions. Structures that emerge on a macro-level exist in their own right insofar as they, in turn, influence the agents. On the one hand, they constrain the individual agency by setting conditions that limit the scope of possibilities to act. On the other hand, just by doing so provide it with the potential for options it would not otherwise have. Structures do not cause directly. Therefore, they cannot determine completely whether or

not these options will be realized. The actions are mediated by the individual agents and dominance cannot control the outcome. The structures are inscribed in the individual agents by an endless process of socialisation and enculturation, but the engrams produced in individuals serve as cognitive tools for the anticipation and construction of ever new actions. They may or may not obey the rules, accept the values, recognise the ethics, follow the morals, may or may not fit the regularities or renew the allocable and authoritative resources. Therefore, the structures may or may not reproduce. Either way, interaction reflects upon the conditions of its own emergence and may consciously be directed at the structures to maintain or alter them. In this sense only, that is, because in their recursive actions the agents refer to the structures. These structures play the dominant role in this relation of bottom-up and top-down causation. Nevertheless, none of the relations in this causal cycle lead to plain results. Each influence has consequences that, due to inherent indeterminacy, cannot be foreseen. By this, and only this, qualitative change is possible.

Apart from this dialectical view of the relationship between individuals and society as refers to the underlying ontological assumptions, there are, seen ideal-typically, three one-sided views. They reduce society to (the actions of) individuals or project (system properties of) society onto individuals or one that dichotomizes society and individuals (see table 1).

	Ontological relationship between	
	Individuals...	and Society
Individualism, Agency theory, Constructivism	sufficient conditions	resulting processes or entities, properties, relations
Sociological, System theory, Structuralism	resulting processes or entities, properties, relations	sufficient conditions
Thinking in terms of individual-society duality	independent processes or entities, properties, relations	
Thinking in terms of individual-society dialectic	necessary, but not sufficient conditions	emerging processes or entities, properties, relations

Table 1 *Ways of relating individuals and society*

The generation of information in social systems

The individual in modern society

The current concept of the individual has had its rise with the emergence of modern, i.e. capitalist society. This concept is related to ideas that have been developed during the course of enlightenment such as, free will and rationally and responsible acting subjects.

The enlightenment formed an integral element in the process of establishing modern society. The concept of the modern individual has been made possible by questioning religious eschatologies of an unalterable and god-given fate of humankind. The rise of this modern notion of the individual has also been interrelated with the rise of free entrepreneurship in a free market society. Freedom has been conceived, in this sense, as an important quality and essence of the modern individual. The modern individual can be seen as a logical consequence of liberal-capitalist economies. According to this concept, morally responsible and autonomous personalities can develop on the basis of economical and political freedom that is guaranteed by modern society. It also stresses that society guarantees individuality by removing obstacles to individual freedom and rational reasonable actions. In modern society, individuality is clearly identified by economically following self-interest. Egoism and selfishness are often fetishized by assuming that they are natural characteristics of all individuals and that they emerge from rational and autonomous thinking. But it can also be argued that our modern society is not reasonable because it does not guarantee happiness and satisfaction for everyone. This is achieved only by the privileged elite.

Nowadays individuals are not only seen as having free will, it is also generally assumed that it will be used to gain ownership of material resources and capital. This makes it possible to realize individual freedom. So freedom is seen as something that can be gained individually by striving towards control of material resources. This shows that the concept of the modern individual is inseparably connected with the idea of private property. The idea of the individual as an owner has dominated the philosophical tradition from Hobbes to Hegel. It still dominates philosophical ideas about the essence of mankind. But this concept could never be applied to all parts of a society because the majority of the world's population do not have these idealistically constructed aspects of freedom and autonomy. The majority are confronted with the disciplinary mechanisms of compulsions, coercion and domination that have been considered typical of capitalist society by Foucault and others (see e.g. Foucault 1976). Hence, the modern idea of the individual can be seen as an ideology that helps to legitimize society. The idea of existing autonomous individuals may be a nice ideal, but nonetheless today it can be seen as nothing more than imagination and self-deception.

Constructivism, structuralism or interactive dualism

To explain how consciousness of an individual emerges, one must consider that individuals are social beings and can only exist as actors in social relationships. On the other hand, society is not possible without individual actors who relate their behaviour. How consciousness emerges is a question that is closely connected to how being and consciousness are interrelated and mediated. Friedrich Engels said that the basic question of philosophy concerns this relationship of being and consciousness: "The great basic question of all philosophy, especially of more recent philosophy, is that concerning the relation of thinking and being" (Engels, *Ludwig Feuerbach and the End of Classical German Philosophy*, MEW, vol. 21, 274). Engels used the term reflection for describing the materialist argument that being deter-

mines or dominates consciousness, but he did not work out an epistemological framework. But, nonetheless, he asked some basic questions that remain very important for epistemology today: "In what relation do our thoughts about the world surrounding us stand to this world itself? Is our thinking capable of the cognition of the real world? Are we able in our ideas and notions of the real world to produce a correct reflection of reality?" (Engels, *Ludwig Feuerbach and the End of Classical German Philosophy*, MEW, vol. 21, p. 275).

In relating the categories of thinking and being, there have traditionally been two positions: constructivism and structuralism.

An epistemological tradition that concerned itself with this question formed the types of epistemological constructivism represented e.g. by Humberto Maturana, Francisco Varela, Niklas Luhmann, Heinz von Foerster, Ernst von Glasersfeld and Paul Watzlawick. Constructivist approaches share the view that cognition is constructed in an autonomous manner and is not constrained by social relationships. Maturana and Varela (1984) have put forward their idea of living systems as autopoietic ones that can reproduce and maintain themselves and have laid the groundwork for Radical Constructivism in epistemology by describing the brain as structurally coupled to its environment. By structural coupling they mean that the brain works in such a way that the environment, i.e. society, can not determine cognition, rather it can only perturb structural changes of consciousness. Maturana and Varela conclude that consciousness can develop relatively autonomous from society, that reality is always a subjective construction and that there is no objective reality. Maturana criticises the view that traditionally scientific, religious, ideological and political institutions and movements have; that they can objectively claim what is true to legitimize existing power-structures (see Maturana, 1988). Maturana and Varela hold that the brain works autopoietically in such a way that one condition of the neurones leads to the next. Hence, it can reproduce itself and cognition and consciousness emerges.

Constructivism can be seen as a reductive conception that does not consider the dialectical relationship of the individual/consciousness and society/being. It does not take into account the restriction and structure of individual action and thinking by social relationships. If reality, cognition and consciousness are solely seen as autonomous constructions, existing social pressures, coercion, domination and manipulation are not taken sufficiently into account.

Structuralism conceives the relationship of being and consciousness in a structural manner by assuming that being determines consciousness. Structural Marxism and the theory of reflection can be seen as a type of Marxist epistemology that has influenced such assumptions very strongly. For example, Lenin assumed that an economic base of society determines superstructures and that economic structures are reflected in philosophy, religion, politics and individual consciousness.

The Frankfurt School also conceived this relationship in a structural manner. One of their main thesis was that capitalist society manipulates individual consciousness in such a way that the members of society more readily identify themselves with society. In this respect they stressed that ideological mechanisms of manipulation can be found in aspects

of mass culture and cultural industry. Horkheimer and Adorno (1972) analysed the mechanisms of cultural industry and concluded that it is the mechanisms that function to keep the masses in helplessness:

“The culture industry as a whole has moulded men as a type unfailingly reproduced in every product. All the agents of this process, from the producer to women’s clubs, ensure that the simple reproduction of this mental state is not nuanced or extended in any way. [...] Pleasure always means not to think about anything, to forget suffering even where it is shown. Basically it is helplessness. It is flight; not, as is asserted, flight from a wretched reality, but from the last remaining thought of resistance” (Horkheimer/Adorno, 1972).

In the Frankfurt School, Theodor W. Adorno saw the possibility of society being transformed by self-conscious individuals very pessimistically: “Human beings would be required in order to change the stiff conditions, but those have carried themselves so deep into the human beings – at the expense of their lives and their individuation –, that they hardly seem to be able to develop the spontaneity on which everything would depend” (Adorno, 1970, p. 147). He also stated that humans can not be seen as individuals in a capitalist society because an individuals could decide for themselves and it would be self-conscious. But in capitalism, Adorno does not see humans as self-conscious, that they are estranged from themselves and that they are not themselves, but others. He goes on to say that in modern industrial society, humans are persons, not individuals.

To describe being a person in modern society, Adorno uses Marx’s concept of the character mask¹. He says that there are no individuals in modern society, only persons that fulfil specific functions and roles in capitalism. The human as a person is seen “as a moment of the relationships, in which he lives, before he might be able to determine himself” (Adorno, 1956, p. 42).

“The fixing of the human as person implies that within the social relationships in which he lives, he always finds himself in specific roles next to others. By them he is what he is in relationship to others: the child of a mother, the pupil of a teacher, the member of a tribe, the bearer of a profession” (Adorno, 1956, p. 43).

Character or social masks, that have traditionally been seen as typical for capitalist society in Marxist theory, are the capitalists forced by economic structures to act in a way that guarantees the endless process of capital accumulation and self-expansion of capital as well as the workers forced to sell the only commodity they have – their working power – on the labour market to survive.

¹ In translating Marx to English, the German word *Charaktermaske* was not translated directly, so there is no English term for it in the English editions of Marx’ writings. But if you look up the parts where Marx used the term in the English editions, it is also clear what he meant with this term. E.g.: “No matter, then, what we may think of the parts played by the different classes of people themselves in this society, the social relations between individuals in the performance of their labour, appear at all events as their own mutual personal relations, and are not disguised under the shape of social relations between the products of labour” (Marx 1867: 91f). Or: “In the course of our investigation we shall find, in general, that the characters who appear on the economic stage are but the personifications of the economic relations that exist between them” (Marx 1867: 100).

If the theoretical problem of relating being and consciousness is solely resolved in a structuralized manner, the dialectical relationship of society and the individual is not sufficiently considered. Individual actions and consciousness are not only structured by society, they are also a basis for social change created by individuals socially relating their actions and thinking. Orthodox structuralism today seems to be a mechanistic and reductive method for solving the problem of how being and consciousness are related.

A third way of approaching the micro-macro relationship of consciousness is in the tradition of what is labelled “interactive dualism”.

Unlike the mainstream of mind-body philosophy, Popper draws a distinction between objective and subjective knowledge (Popper, 1972). He considers subjective knowledge as existing in each of us. It is related to the individual and his/her particular experiences and intellectual abilities. Objective knowledge, on the other hand, for Popper, is knowledge on a super-personal level. It is built up from an individual's background, but then acquires an independent existence and exists separately from the person. It develops further and then turns the tables, dictating the nature of the personal knowledge from which it arose. As understanding means nothing more than adopting super-personal knowledge for oneself, in effect taking down wisdom from a higher level for one's use, Popper never tired of saying that objective knowledge has a characteristic that subjective knowledge lacks. In his view, a new theoretical discovery trails a whole tail of related problems behind it. This gradually become apparent and we may never fully appreciate it.

Popper's objective knowledge belongs to World 3, his subjective World 2 of his three-world conception. The physical constituents make up World 1. Worlds 1 and 3 are connected only via World 2. Popper noted an upward and a downward causation, thus creating evolutionary and layer theories. The creation of the world can be genetically imagined with the help of upward causation. It is the world of physical objects, including living organisms (World 1). This brought about the world of sentience and self-awareness, as well as awareness of death (World 2). This led to the world of the products of human thought: language, artefacts, science and technology (World 3). These worlds are built up as layers, one on top of the other, marked by a downward causation.

However, the question may be asked whether the cosmos can be divided into the three parts. Popper envisaged; apart from this, the inconsistency between World 2 as a human creation and World 3 as the permanent home of the *intelligibilia*, cannot be overlooked. An analogous inconsistency holds for the relationship between Worlds 1 and 2. As a result of this inconsistency, he does not offer any resistance to the view that souls exist and that God's work is involved in the downward causation. In fact, he wrote a book supporting such a theory, the Catholic Eccles (Popper/Eccles, 1977). His theory has a dualistic shortfall. From traditional dualism, which postulates the separate existence of entities, there is a distinction to his dualism of only interaction, i.e. the expression of the interrelated possibilities for the entities to influence each other.

The problem of relating thinking and being cannot be solved sufficiently by constructivist, structuralist or dualistic approaches. A solution that takes into account the effects

that society has on the individual and those that the individual has on society can be achieved by a dialectical and emergent approach that brings together the concepts of information and self-organisation.

A dialectical and emergent view

Individual information

The problem of relating being and consciousness can be resolved dialectically by assuming that consciousness is neither solely a construction nor solely a reflection of society. We argue that cognition has an objective and a subjective character. On the one hand, individuals transform society by acting consciously. On the other hand, social structures influence consciousness. Contrarily to orthodox forms of Structuralist Marxism, Marx stressed the dialectical relationship of being and action/consciousness. Whereas, Engels emphasized objective economic laws that would determine the course of history. Marx often pointed out that society can and should be transformed by self-conscious and critically thinking/acting subjects. He clearly saw that individuals are objects of the structural categories of capitalism and that their thinking was influenced by these structures. However, he also stressed that these structures must be changed by subjects who become self-conscious to transform society and transcend capitalism. In his *Theses on Feuerbach*, Marx outlined this dialectical relationship of being and consciousness/action:

“The materialist doctrine concerning the changing of circumstances and upbringing forgets that circumstances are changed by men [...] the human essence [...] is the ensemble of the social relations [...] The philosophers have only interpreted the world, in various ways; the point is to change it” (Marx, 1845, *Theses on Feuerbach*)

Marx summarized this dialectical relationship of structure and action e.g. in a famous passage from “The Eighteenth Brumaire of Louis Bonaparte”: “Men make their own history, but they do not make it as they please; they do not make it under self-selected circumstances, but under circumstances existing already, given and transmitted from the past” (Marx, *The Eighteenth Brumaire of Louis Bonaparte*, MEW, vol. 8, p. 115).

Herbert Marcuse, was a representative of the Frankfurt School as was Horkheimer and Adorno, also conceived the relationship of being and consciousness/action dialectically. Concerning the emergence of critical consciousness and self-conscious subjects that can radically transform society, he was more optimistic than Adorno. He, like Adorno, stressed that ideological mechanisms manipulate individual consciousness (see e.g. Marcuse, 1967), that control what is exercised by society is introjected into individual consciousness and that this results in the direct identification of the individual with society as a whole (something he termed mimesis, see Marcuse, 1967, p. 30). But, he also pointed out that society, nonetheless, can be transformed by new, self-conscious and critical individuals, in such a way that a new society emerges. In it the happiness of mankind can be achieved, penury and famine can be overcome and more free time can be had by making use of modern technologies and by developing the forces of productivity in an ecologically and socially sustaining manner. The emergence of the revolutionary movements of 68 convinced Marcuse

that a sustainable and humanising transformation of society would be possible and a new subject of transformation was about to emerge (see e.g. Marcuse, 1969). Although basic social change may seem impossible today and the new movements of social change have been institutionalised in many ways, there is no need to be pessimistic about the possibilities of social change. In fact, it is necessary and realistic to remain optimistic, as was Marcuse. The rebels of 68 have revoked the idea of revolution from the continuum of oppression and connected it with its true dimension – the one of liberation“ (Marcuse, 1969, p. 243). The liberation of the individual and of society is still possible and necessary.

The emergence of individual consciousness can be best explained dialectically in the framework of a theory of self-organization and evolutionary systems. A yet-to-be-developed Unified Theory of Information (see e.g. Fenzl/Hofkirchner/Stockinger 1998, Hofkirchner, 1999b), based on the theory of self-organisation, seems to explain the emergence of individual and social information in a dialectical manner. We now want to point out some basic assumptions and theses that could form the initial part of such a unified theory (for further and more detailed explanations see Hofkirchner, 2000, Fuchs, 2000, 2001). In social systems individual values, norms, conclusions, rules, opinions, ideas and beliefs can be seen as individual information. It does not have a static character. It changes dynamically. E.g. individual opinions and values change permanently because of new experiences. This does not mean that individual information is necessarily always unstable and that e.g. the reflection of ideologies in individual information does not exist. Instead, new experiences enhance and consolidate existing opinions, but can also radically change them. Hence, individual information as a lower level of information in social systems has an unstable character. With higher levels (as we will see with social information that is constituted in social relationships) the complexity and stability of information increases.

The constitution and differentiation of individual information can be described as follows (see figure 6 as well as Hofkirchner, 1999a):

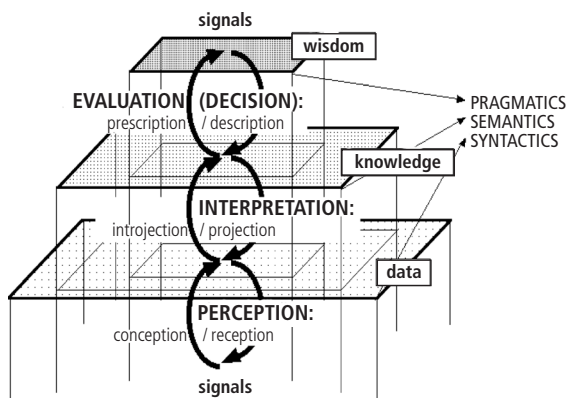


Figure 6 The processes of constitution and differentiation of individual information

Cognition is always connected to the outside world. A subject relates itself to events and states of its environment. The informational happening can be described as layered. Levels of higher and lower quality can be distinguished. A transformation of information from lower to higher levels takes place. The generation of individual information starts with the reception of signals from the environment. The update of the signals begins with a particular state of experience of the cognitive system. Receiving applies to the uptake of signals which come from the perceivable environment. Conceiving is devoted to the registration and bringing together of the signals to a “view” of some aspects of the environment. Perception unites conception and reception: it is an unceasing movement, an oscillation between reception and conception. An act of perception involves the reception of signals and the conception of impressions, i.e. a new whole that is called data. Perception is a process that reflects and potentially changes the current cognitive structure. The emerging structure is the starting point for the next perception. The whole can acquire a new emerging quality which the previous impressions did not have. So, the first level signals are made into impressions/data by perception: an act that involves reception and conception.

On the next level the data (impressions) is interpreted, meaning is given to the data and knowledge is formed. The process of interpretation involves an interplay of projection and introjection. It starts with a certain state of interpretation/knowledge, which is the basis for the emergence of new knowledge. Projection means that first the system is projected onto reality, i.e. the current state of knowledge is applied to the data. Introjection means that the data can be interpreted in such a way that the structure of knowledge changes – new knowledge emerges. The system has introjected reality into its structure. New areas of reality and new experiences have been brought into the system. On the first level reception and conception there are two opposing processes: projection and introjection. They are the motor of the endless movement of cognition.

The question now is whether knowledge is constructed relatively autonomous from the environment so that data, as perceived signals from the outside, can only perturb but never determine changes in the cognitive knowledge-structure or whether knowledge as a representation corresponds with the environment of the cognitive system. It can be said that the environment can never fully determine cognition, but knowledge is also not fully autonomously constructed without reflecting the environment. Arguing dialectically, we can say that reflection and construction contradict each other. The formation of knowledge as the interpretation of data involves projection as a moment of construction, as well as introjection as a moment of reflection. Knowledge, as the result of interpreted data, can be seen as the level which involves experiences and facts.

On the third level, knowledge is evaluated to make sense. Individual information such as values, norms, rules, opinions, ideas and beliefs are created by the subject putting their knowledge into the context of its goals. This action is evaluation. It is made up of the moments of description and prescription. The process starts with the current state of individual information in a particular situation where an individual must act to solve a problem. Description means that on the basis of the current individual information structure

the individual is looking for solutions. The situation and the solutions refer to the knowledge on the lower level which represents facts. In the prescriptive phase a decision is made to work on a solution. A solution which is seen as good, nice and fair is selected. On this upper level the process of cognition cumulates in individual wisdom. This is seen as individual information that allows individuals to create situations that they experience as good, pleasant, nice and fair. The existence of individual wisdom does not necessarily mean that the decisions taken by individuals are socially wise.

In solving problems by evaluating knowledge and in acting on the basis of experience and facts (knowledge) and the current individual information to select a good solution to a problem, new individual information can emerge. This is neither a necessity nor an impossibility. It is impossible that we act and try to find solutions without enhancing and changing our individual values and norms. In fact, this is the case in most of our actions. In such a case individual information remains unchanged. In other situations it might be differentiated, new individual values, norms, rules, opinions or beliefs emerge. They form the basis of new experiences by perceiving signals from the environment as impressions/data, interpreting the data as knowledge and establishing new individual values, norms, opinions and beliefs. Decisions are made based on this knowledge and the current individual information structure.

The signals on the lowest level can refer to trivial objects in our daily life, but the object of reference can be social information constituted in social relationships. This establishes a relationship between individual and social information.

When a sign is considered as the product of an information process, data, knowledge and wisdom can be seen as three types of interrelated signs that appear in the process of formation and differentiation of individual information.

Social information

We have to distinguish different levels of self-organisation, i.e. self-organisation has aspects that are common to all types of systems as well as those that are special to each concrete type of system. So self-organisation is related to a dialectic of difference and identity.

In physico-chemical system self-organisation means the spontaneous emergence of order in a system that is far from its thermal equilibrium. If a certain threshold of a specific control parameter is crossed, fluctuations intensify and order emerges. An example of this are the Bénard convection-cells. This process of self-organisation in physico-chemical systems is called dissipation because low-entropic energy is imported from the environment of the system and high-entropic energy is exported. This enables the system to build up order and energy is dissipated.

In living/biological systems, self-organisation refers to the autopoiesis of such systems. They can maintain themselves by reproducing their parts and, hence, the permanent unity of the system. An autopoietic system can maintain and reproduce itself and its own borders. An example of such a system is the brain. It works by the permanent self-reproduction of specific patterns of neurones.

In a social system, self-organisation refers to the re-creation of such a system. Re-creation denotes that individuals that are parts of a social system permanently change their environment. This enables the social system to change, maintain, adapt and reproduce itself. It can re-create itself permanently by individual actions that are related and co-ordinated socially.

A sign can be seen as the product of an information process. An information process occurs whenever a system organises itself, that is, whenever a novel system emerges or qualitative novelty emerges in the structure, state or behaviour of a given system. In such a case information is produced. It is embodied in the system and may then be called sign.

Pattern formation in a dissipative system is the most rudimentary form of producing signs. A stimuli from the environment of the system is reflected in the system's inner structure by the formation of patterns. This can be seen as the production of signs on a syntactic level.

In autopoietic, i.e. living, systems structures are not plain patterns, but something that contains a meaning for the system in question. This something is called a symbol. Thus, sign production on this stage of evolution turns from pattern formation to the formation of symbols. On this level of self-organisation the information that emerges has syntactic and semantic aspects.

In re-creative, i.e. social systems, self-organisation produce social information: The word "social" in social information denotes that the information is constituted in the course of social relationships of several individuals. According to Max Weber, a social relationship is established if an interrelated reference exists between two actors. Social acting is orientated on meaningful actions of other actors. Social actions are a necessary condition for a social relationship, but not a sufficient one because social acting doesn't necessarily require an interrelated reference of actors. One actor can refer to the actions of another without the latter referring to the former. We consider social norms, laws, values and rules (the latter do not need to be codified, they can also be established in the form of traditions or habits) which are constituted during the course of social relationships of several individuals as social information. These individuals must have a common view of reality. This is the basis for their social actions and interactions. They are elements of a social system. As a result of their interactions in social systems, social information emerges as a macroscopic structure. The interactions are mediated by acts of communication. Individuals act in such a way that associations and actions of other individuals are triggered. They co-ordinate their actions in such a manner that they can commonly produce a social information structure.

Social co-operation can be seen as a social relationship in which the mutual references of the involved individuals (these are social interactions) enable all of them to benefit from the situation. By co-operating, individuals can reach goals they could not reach alone. New qualities of a social system can emerge by social co-operation. The elements/individuals of this system are conscious of these structures which cannot be ascribed to single elements, but to the social whole which relates to the individuals. Such qualities are constituted in a

collective process by all concerned individuals and are emergent qualities of social systems.

Social competition can be seen as a social relationship in which the social interactions as well as the relationships of power and domination enable some individuals or social subsystems to take advantage of others. The former benefit at the expense of the latter who deal with disadvantages from the situation. New qualities of an observed social system can emerge by social competition. The elements/individuals of this system are conscious of these structures which cannot be ascribed to single elements, but to the social whole that relates to the individuals. But these qualities are not constituted collectively by all concerned individuals. They are constituted by subsystems of the relevant system that have more power than others, dominate others or can make use of advantages that derive from higher positions in existing social hierarchies. These qualities reflect relations of domination in social systems.

Social information can have a co-operative or a competitive character. This depends on how it is constituted. If social information is established by interrelated references of all individuals who are concerned by its application and if each involved individual has the same possibilities and means of influencing the outcome of information structures in his/her own sense and purpose, the resulting macroscopic structure is a form of co-operative social information. This type of information is collectively established by co-operation of the involved and concerned actors as an emergent quality of a social system in a process of self-organisation. We call this form of social information inclusive social information. Self-organisation denotes that the individuals concerned by the emerging structures determine and design the occurrence, form, course and result of this process. They establish macroscopic structures by microscopic interrelations.

If social information is not constituted in processes of co-operation by all concerned individuals, but by a hierarchic subsystem of the relevant social system that has more power than other subsystems, dominates others or can make use of advantages that derive from higher positions in existing social hierarchies, the resulting structures are types of qualities that result from social competition – we speak of exclusive social information. Exclusive social information is a new emergent quality of a social system. It is constituted by social competition and reflects relationships of domination and the asymmetric distribution of power in the relevant social system. We cannot say that exclusive social information is established in a process of social self-organisation because not all concerned individuals can participate in this process and influence it in the same way using equally distributed resources and means.

Considering dissipative systems, self-organisation can be seen as the spontaneous emergence of patterns from the interactions of the system's elements if a certain threshold of relevant parameters is crossed. We argue in favour of emergent evolution. It can explain new qualities of systems that emerge during the course of evolution and cannot be reduced to lower levels of organisation/systems. Hence, social systems are more complex than dissipative and autopoietic ones. Self-organisation cannot have exactly the same meaning as in less

complex systems. During the course of evolution of systems their complexity increased and new qualities of self-organisation emerged.. These qualities have some similarities with the old meanings in less complex systems, as well as new aspects. Hence, lower organisational levels have a broader meaning of self-organisation. On upper levels this meaning is more and more specific because complexity increases. Therefore, we argue in favour of an understanding of social self-organisation that not only considers relationships of elements, but also looks at the qualities of these relationships. So class relationships, as well as relationships of power and domination, have to be considered.

We have referred to the self-organisation of a social system as the permanent re-creation of it in a dialectical process where new social information emerges in a bottom-up-process and new individual information in a top-down-process. But there is another understanding of self-organisation in social system that has a more narrow and political sense. It refers to the emergence of true, good, wise and beautiful social information. Self-organisation I, termed re-creation, is a process that is typical for all types of societies and social systems. Whereas, self-organisation II, in a political sense, refers to the inclusive and co-operative process of the emergence of social information. Clearly – especially in modern society – not each emergence of new social and individual information is established in a co-operative manner. Hence, not all social systems and social processes are self-organising. Self-organisation II is a co-operative, inclusive and participatory type of social systems design.

Self-organisation II in social systems denotes that new qualities emerge from social interactions of individuals during the course of a social relationship and that the individuals concerned by the emerging structures determine and design the occurrence, form, course and result of this process of constitution or differentiation, They establish macroscopic structures by microscopic interrelations. With such an understanding of self-organisation exclusive social information cannot be seen as constituted or differentiated by social self-organisation.

A hierarchy is made up by a sequence which is ordered by a function of priority. Individuals in upper positions of a hierarchy have more power than those on a lower level. Hierarchies in society are characterised by the asymmetric distribution of power. Such unequal distributions are normally guarded by coercion. This is the specific character of relationships of domination. Social information is interrelated with questions of power and domination.

The distribution of power in our society is also maintained by the privileged access to and the control of knowledge and social information by ruling classes. It excludes others from this access and the chance to participate in the constitution of social information. Western society is politically formed by representative democracy and economically by capitalism. The asymmetric distribution of power in both areas (as well as in others such as privacy) prevails. This creates various relationships of influential and less influential classes. In the current form of society, competition dominates co-operation and exclusive social information is far more important than inclusive one.

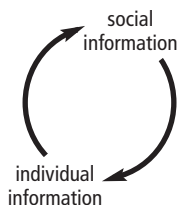


Figure 7 Self-organisation in social systems: The dialectical relationship of individual and social information

Self-organisation I of social systems can relate actions and individual consciousness of subjects socially. Hence, social information emerges. Social information can be seen as a type of social consciousness that emerges from the social relation of the individual consciousness of participating subjects in a social situation. A social system organises itself permanently to maintain itself and it permanently produces and changes social information. As shown in figure 7 this is a dialectical process: social information emerges from individual information. The subjects of society create and change social systems by relating their actions and their consciousness. New patterns emerge from this process. On the other hand, we have a process of dominance. Individual consciousness can only exist on the foundation of social processes and social information. Social information restricts and enables individual consciousness and action. In this dialectical relationship of individual and social information, we have the bottom-up-emergence of social information and the top-down-emergence of individual information. On the macroscopic level of the social system, new social information can emerge during the permanent self-organisation/re-creation of the system. On the microscopic level, social information takes its effect in a process of domination and new individual information can emerge. So domination can be seen as a type of top-down-emergence. The endless movement of individual and social information, i.e. the permanent emergence of new information in the system, is a two-fold dialectical process of self-organisation. It makes it possible for a social system to maintain and reproduce itself.

As already pointed out, in social systems individual values, norms, conclusions, rules, ideas, experiences and beliefs can be seen as individual information. Wolfgang Hofkirchner (2000) has pointed out that in the process of constitution and differentiation of individual information the signs data, knowledge and individual wisdom can be identified. On the basis of signals data is gathered (perceiving). This data is the starting point for gaining knowledge (interpreting). It is necessary for acquiring wisdom (evaluation). The semiotic triad of syntactic, semantic and pragmatic aspects of signs can be mapped to these three levels of individual information.

The signals, as the starting point in the constitution and differentiation of individual information, do not solely refer to objects of our environment. They also refer to social information. This is the way of establishing a relationship between individual and social information.

If cognition were solely determined by reflection, the exclusive social information existing in our society would almost necessarily be reflected as individual information by everyone. But in fact almost nobody agrees with all laws and political decisions. Everyone has a dynamically changing structure of individual information. But individual information often reflects dominant conditions, norms, rules, habits and values of society. This reflection is established in processes of socialisation.

Individuals are confronted with manipulation and disinformation by politics, media, economy, ideologies and personal relations. Because of the existing asymmetric distributions of power, the economically powerful classes control the channels that mediate information. Nonetheless, the establishment of and access to alternative channels which mediate less represented information is possible, if individuals experience alternative forms of socialisation. But these individuals are confronted with the asymmetric distribution of power in society. Alternative channels and alternative socialisation can trigger the constitution of individual information that does not reflect the dominating exclusive social information.

The epistemological aspect of information in social systems can be seen as the dialectical relationship of reflection and construction. Both are aspects of cognition. In our society, the reflection of social conditions in our individual structure of cognition dominates the construction of an individual self. But such a domination can never have a fully determining character. Today, individual information cannot be established in a self-conscious manner because diverse mechanisms of manipulation exist and estrange, as well as restrict the self. This means that repressive forms of social information, that are exclusive in character and form an integral part of modern society, dominate the self-conscious construction of individual information. The relationship of individual and social information is a dialectical one. But in our modern society exclusive social information dominates the inclusive and mechanisms of social manipulation dominate the self-conscious construction of individual information. Hence, in analysing the relationship of being and consciousness, structuralist approaches like those of Adorno and Marcuse seem to be more realistic than constructivist ones. Nonetheless, it is important to stress that today's social structures dominate self-consciousness. They do not determine them and consciousness cannot be constructed autonomously from social structures. If these assumptions are not made, one either does not leave room for the possibility of transforming society (as is the case of orthodox structuralism) or does not consider that society and individuality should be changed (as constructivism does).

Figure 7 shows the dialectical process of re-creation in social systems. In modern society the structuralist aspect of this two-fold process, i.e. the restriction of individual information by social information, dominates the possibility of individuals to participate in the bottom-up-process of establishing social information. In our society the process of creation and differentiation of social information is dominated by ruling classes and elites. This is a process that excludes the majority of the individuals that are affected by social information. This majority only participates in the bottom-up-process rudimentarily, but

nonetheless its actions and thinking are heavily restricted by the emerging exclusive social information.

Relating being and consciousness dialectically includes a two-fold emergent approach: On one side, it considers that society emerges from the social relationships of individuals who relate their individual social information-structures to establish or differentiate social information. This is a bottom-up process in which social information emerges from individual information. On the other side, social information transforms individual information in a top-down-process. It constrains and enables individual performance and thinking. Therefore, new individual information can only emerge in relationship to social information. This raises an important question. Is this relationship of individual and social information socially designed in an inclusive or an exclusive manner? This is clearly dependent upon social, political and economical relationships. In modern capitalist society, social information has an exclusive character and negatively constrains individual consciousness, information and action. It is important to stress that such a dialectical concept of relating society and individuality involves two types of emergent process: The bottom-up-emergence of social information and the top-down-emergence of individual information.

Thus far we have not accomplished getting rid of the diverse manipulations in society that trigger the domination of social competition and exclusive social information to become self-determining, autonomous and altruistic individuals that can choose and differentiate their individual and social information. As Marcuse pointed out, a society that allows individuality to be established in a free manner can only be established by self-organising II (in the political sense of self-organisation) individuals: "The individuals who shall live in the Great Society must be the ones who build it up – they must be free for it, before they can be free in it. No other power can impose or force their society upon them." (Marcuse, 1966, p. 187)

A self-organised II society would be one in which all individuals concerned by a problem have the same power to determine and design the occurrence, form, course and results of the constitution and differentiation of social information. It would have: a symmetric distribution of power in terms of resources and access to information, co-operation, inclusive social information and solidarity instead of competition, exclusive social information and egoism, a form of socialisation that enables individuals to establish a form of compatibility and satisfaction of their own interests and collective. Compatibility of individual and social interests and information means that each individual has a maximum of freedom that does not negatively influence the freedom of others and collective social interests. Free development is a necessary condition for the free development of all. Freedom of all is a necessary condition for freedom of the individual.

Individual and collective interests could be compatible without negatively interfering. Egoism is not a "natural" pattern of behaviour that is given by birth or encoded in the genes. It develops by processes of socialisation in a system dominated by exclusive social information, asymmetric distribution of power and competition. Individual and social

information could each have a character of freedom because social information would emerge as a quality of social co-operation by a process of self-organisation from individual information and the emergence of individual information would be possible by inclusive social information. Nonetheless, individual information would still dynamically change by new social experiences.

In another type of society there would be different type of individuality. This has been pointed out by Marx and Engels with their concept of the comprehensive and well-rounded individual (in German *allseitiges Individuum*) that is free and has enough free time to pursue different activities. They thought that in another society the free development of individual abilities will replace the submission of the individual to the division of labour. Individuals would be free to choose between different non-alienating activities.

“People will no longer be, as they are today, subordinated to a single branch of production, bound to it, exploited by it; they will no longer develop one of their faculties at the expense of all others; they will no longer know only one branch, or one branch of a single branch, of production as a whole. [...] Industry controlled by society as a whole, and operated according to a plan, presupposes well-rounded human beings, their faculties developed in balanced fashion, able to see the system of production in its entirety. The form of the division of labour which makes one a peasant, another a cobbler, a third a factory worker, a fourth a stock-market operator, has already been undermined by machinery and will completely disappear. Education will enable young people quickly to familiarize themselves with the whole system of production and to pass from one branch of production to another in response to the needs of society or their own inclinations. It will, therefore, free them from the one-sided character which the present-day division of labor impresses upon every individual. Communist society will, in this way, make it possible for its members to put their comprehensively developed faculties to full use.” (Engels, 1847, *The Principles of Communism*)².

The world is in a major crisis. This crisis has economical, political and ecological causes that cannot be reduced to a single cause. The complex interplay of diverse factors of the capitalist world system has led to a dynamic that endangers the survival of mankind. Global problems such as poverty, ecological crisis, war, pollution, wasting of resources, unemployment etc. have become a major threat for humanity. We are at a social and historical point of bifurcation. The future development of society is not pre-determined, but if the path of evolution does not change fundamentally, the end of mankind and the breakdown of the world system could be near. The global crisis is a major sign for the dangers we are facing. But mankind is not left to a determined fate, because alternative paths of evolution are possible.

² Marx pointed out the same principle of the well-rounded individual. E.g. he wrote in the German Ideology: “Wir haben ferner gezeigt, daß das Privateigentum nur aufgehoben werden kann unter der Bedingung einer allseitigen Entwicklung der Individuen, weil eben der vorgefundene Verkehr und die vorgefundenen Produktivkräfte allseitig sind und nur von allseitig sich entwickelnden Individuen angeeignet, d.h. zur freien Betätigung ihres Lebens gemacht werden können” (Marx/Engels, 1845/46, *The German Ideology*: 424).

Immanuel Wallerstein points out that this crisis can be seen as a point of bifurcation of the historical development of society: “[...] this structural crisis leads us into a dark period of struggle over what kind of system will succeed the existing one. We can think of this as a bifurcation, and therefore the beginning of a chaotic period, within which no one can predict the outcome, which is inherently indeterminate. There will be a new structure, a new order, but it may be either better or worse than the existing one. It depends on what we all do in the period of acute struggle and how clearly we understand the forces at work” (Wallerstein, 1999b, see also Wallerstein, 1997a, 1997b, 1998, 1999a, 2000, Hopkins/Wallerstein, 1996).

One of the factors responsible for this major crisis is the antagonism of co-operation and competition that is essential for modern/capitalist society. Competitive processes and the logic of commodities dominate inclusive and co-operative social relationships. Social information today is predominantly an exclusive one.

A way out of crisis that leads to a qualitatively new path of evolution which is socially and ecologically sustainable could be self-organisation (2) established by the individuals that are confronted with the negative effects of the global problems. The breakdown of the world system would mean the destruction of the permanent re-creation-process of society. To maintain the self-organisation I/re-creation of society, people that are excluded from the bottom-up-process of establishing social information and that are even exploited to maintain the exclusive character of society would have to organise themselves II in the political sense of the term. A change of dominance is necessary to solve the global problems and to save humanity from self-destruction. The dominance of co-operation by competition, of inclusive social information by exclusive social information has to be reversed. If this can be done, a fair, just and beautiful society may be established that can solve the global problems. The major principles and categories of organisation and re-creation of such a society would be social self-organisation II and inclusive social information.

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