

5. CONCLUSIONS: THE LOGIC OF EVOLUTION OR ARE THERE SOMETHING LIKE HISTORICAL LAWS?

5.1 THE THREE ORDERS OF SYSTEMS DYNAMICS

In a certain sense this essay deals mainly with the question of the special evolutionary path of Western societies, which started in the beginning of the Medieval Ages, i.e., the classic question of Max Weber. The reason for this concentration on the European way is, of course, not the Eurocentric opinion that history had its goal in the development of these societies. In the usual meaning history, like all evolutionary processes, has no goal at all but follows the logic of its evolutionary algorithms. Therefore it would be logically meaningless to speak of any historical goals and, in particular, it would be quite absurd to take the Western societies as an "end of history" (Fukuyama). The "end" of dynamical processes is, mathematically speaking, either a simple attractor, which means that by operating with *constant* rules the states of dynamical systems do not change any more, or it is a state that is reached and not left because the important rules of state changing are "switched off". In addition, mathematically things are even more complicated because systems with operating meta rules may also reach an attractor if the meta rules force the rules of interaction into a "meta attractor", i.e., a state of the rules of interaction where the rules do not change any more and generate attractors of the system (cf. Klüver 2000). Yet neither case can be observed in contemporary Western societies; on the contrary, rules of interactions are nearly permanently changed, and attractors are left by rule changing in an equally permanent manner. Whether the evolutionary *logic* that characterises the emergence of the Western societies is an ultimate stage of sociocultural evolution is quite another question, and I shall deal with this problem below.

My concentration on European evolutionary development has, of course, its reasons in the conviction that the emergence of European societies is founded on the unfolding of the particular dynamics that was the subject of the last two subchapters. To be sure, earlier societies were also evolutionarily regulated by "weak" kinds of these dynamics, where

sometimes, and only locally, self-reinforcing processes of cultural evolution occurred. Only in the European case were the initial evolutionary conditions, the values of the evolutionary parameter EP, such that the third type of dynamics could become effective and generate the European evolution, which could only lead to modern societies because it functions as the described feedback mechanism *which, among the effects described above, also accelerates its own velocity*. In this sense the Western societies are the most advanced of all societies that human history has produced, and in this sense other societies have to adapt to this kind of dynamics, not necessarily to all features of the Western societies, or become mere peripheral secondary regions, as World Systems Theory would call it. As any theory of evolutionary processes has to demonstrate what kind of logic generated the most advanced levels, i.e., to reconstruct the evolutionary processes from their preliminary end, it is rather unavoidable to concentrate on the European case, when trying to develop the foundations of a theory of sociocultural evolution.

The question if there are laws in history is, to be sure, mainly the question if there are principles of sociocultural evolution that explain the historical processes that we know empirically. In 4.2. and 4.3. I dealt with such principles, which were also analysed for the case of cognitive ontogenesis. Before I try to give an answer about the relations of these principles and some theoretical explanations of the processes we know empirically from history, it is necessary to have a more general look at these principles.

In 1.3. I gave a general definition of evolution and described it as a particular type of dynamics, i.e., a *meta dynamics* in the words of Farmer (1990) or *adaptive dynamics*. A dynamic system regulates its own development by adaptive dynamics if the system is able to vary its rules of interaction *according to the demands of its particular environment*. A "simple" dynamics, which is characteristic for most of the systems physics and chemistry are dealing, is characterised by the fact that the system changes its own states by applying its rules of interaction recursively on the preceding states and holding these rules fixed. To be sure, this kind of dynamics is "simple" only in the logical sense that the rules of interaction are not changed; physics and chemistry have shown many times that neither empirically nor mathematically is this dynamics

simple in the case of systems that are interesting for research. Let us call this kind of dynamics *first order dynamics*.

In Subchapter 3.1. it was demonstrated that it is possible to classify first order dynamics by the ordering parameters, i.e., mathematical properties of the rules of interaction. Generally the different types of first order dynamics can be classified and explained by the theorem of inequality: the more degrees of inequality a system contains the simpler its first order dynamics will be, that is, its trajectories are characterised by simple attractors and therefore by a stable order.

Adaptive dynamics can be described as *second order dynamics*. Adaptive systems not only change their states according to their rules of interactions, but also their rules themselves if and when environmental conditions are such that the system's states generated by the rules of interaction are not favourable in regard to these conditions. In particular adaptive systems can vary the ordering parameters that characterise the rules of interaction and thus generate new kinds of first order dynamics. Therefore systems that are capable of second order dynamics always have some kind of meta rules, which regulate the changing of the rules of interaction; Holland's genetic algorithm is an example of such meta rules. Yet second order dynamics is always dependent upon environmental conditions: although the varying of rules often happens without regard to any environmental conditions like, for example, mutations of the genome, the environmental selection decides whether these changes are successful, and will therefore remain or not. In the same sense adaptive variations of social structures will often occur as a reaction of a social system to environmental conditions that have, e.g., changed; if the variations of social rules are successful then the system returns to first order dynamics and with great probability to simple attractors, i.e., social order.

It is quite possible to describe and explain the greatest part of sociocultural evolution by an interplay of first and second order dynamics. Sociocultural systems have to maintain their existence in a particular environment, which demands certain achievements in both cultural and social dimensions. If an early society is not able to get along in a particular environment with first order dynamics, then second order dynamics will bring the system into other trajectories, i.e., the generation of new forms of social structure and of new cultural concepts as the

competence of the system. If these new achievements are sufficient then, as in most known historical cases, evolution will stop, i.e., the system returns to first order dynamics and it will remain in the according attractors. This was obviously the case not only with early tribal societies but also with most of the agrarian state empires. In particular these systems were not differentiated enough to allow the processes described in 4.2. become effective.

The dynamics described in the preceding subchapters can be called *third order dynamics*. Systems that are principally capable of this type of dynamics, like cognitive and sociocultural systems, contain of course the capability of the "lower" forms of dynamics too, i.e., they generate stable order by producing trajectories with fixed rules and they are able to change their rules if environmental conditions change. However, under certain conditions they can do more, that is, they can generate their trajectories by a dynamics, which is a permanent feedback mechanism between the system's development and the evolutionary conditions that regulate just this evolutionary development. I named this dynamics with a mathematical term, a two-dimensional Markov chain; in a more colloquial way one may describe this kind of dynamics as "the Münchhausen Principle" because the system regulates its dynamical development by applying its own evolutionary logic to its initial states and the initial values of its evolutionary parameters, like the lying Baron did in his story of pulling himself and his horse out of a swamp by his hair. The effect of this Münchhausen Principle is a systemic evolution, which under favourable conditions accelerates its own development and finally, is able to change almost all cultural and social features; mathematically speaking sociocultural systems capable of third order dynamics change the very geometrical conditions with which they started by varying the relations between roles and generating new relations and roles.

Third order dynamics is not *directly* dependent upon environmental selection like second order dynamics, but in a certain sense defines its own criteria of success. The evolution of Western culture cannot be understood mainly as answers to some environmental problems, but only by the logic characteristic for particular problem solving algorithms, which were no longer inhibited by cultural thresholds. Therefore we may say that adaptive systems, i.e., systems of second order dynamics, are in

a relation of *coevolution* with their environment, that is a mutual interdependency; systems characterised by third order dynamics are, in contrast, not directly dependent upon their environment but they determine and change it. Third order dynamics depends mainly, as the equations in 4.2. and 4.3 have shown, on the recursive sequences of structural conditions, level of cultures (or cognition) and the feed-back relations between them. To be sure, systems with third order dynamics also have to maintain their existence in a particular environment and must therefore generate states that are favourable with regard to environmental demands. That holds in particular for cultural achievements and political decision structures. However, the development of such systems has an additional logic of its own, which operates not in regard to environmental constraints, as purely adaptive systems do, but takes its own course, *provided basic environmental demands are fulfilled*. The exponential evolutionary rise of Western culture can be explained only in terms of such a kind of logic: cultural, and social, progress fed, so to speak, themselves and changed the physical and social environment of Western societies in the way we all know.⁵⁵ In a certain sense, systems characterised by third order dynamics define their own criteria for evolutionary success.

Therefore we have a certain form of "dialectical" relation between the three types of dynamics: first order dynamics operates independently from its environment insofar as these systems are "blind" to environment and follow only their own logic. I presume that the famous term of "autopoiesis" by Maturana and Varela means just that, i.e. a certain blindness with respect to environment (cf. Luhmann 1986). Adaptive systems, on the contrary, take environment into regard and adjust their structure according to environmental conditions. We may understand first and second order dynamics as thesis and antithesis.

Third order dynamics then seems to be the synthesis, in the sense that it contains both characteristics of the first two kinds of dynamics. Like adaptive systems, the systems capable of third order dynamics can

⁵⁵ I am quite convinced that the development of the so called "axial cultures" (Jaspers) must also be understood at least partially by a certain kind of third order dynamics. Yet apparently the conditions of initial heterogeneity were not favorable enough so that these early cultures (compared to Europe) stagnated in the end in their particular attractors.

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