

Evolution

The theory of evolution describes how a structurally determined system can change its structures through its operations [\rightarrow *System/Environment*]. Explanations of structural evolutionary changes are founded on the distinction of three mechanisms: (1) variation, (2) selection of variations and (3) retention or stabilization of the system.

We can speak of evolution when these three mechanisms can be distinguished, though the relationship between them is circular: the potential for variation demands selections that are already stabilized, just as stabilizing changes is only possible through mechanisms that secure a selection of the changes that are taking place.

In the classic theory of evolution applied to organisms, variation is attributed to endogenous causes (mutations) and selection is conceived as environmental pressure to make selections in order to adapt. In systems theory, however, it is claimed that self-referential autopoietic [\rightarrow *Self-Reference, Autopoiesis*] systems can be irritated by disruptions in the environment, but cannot be forced to adapt to it. More precisely, every system is already adapted to its environment, at least for as long as it can continue to exist; hence, we cannot speak of better or worse adaptation. A fundamental property of the system is that it cannot be connected with the environment item by item: environmental \rightarrow *complexity* can be understood by a system only in a reduced and limited form. This separation (and not adaptation) of system and environment must be viewed as the decisive element in explaining, for instance, the stability of life and the fact that organisms exist which remain entirely unchanged throughout evolution. Autopoietic systems are equipped with structures that allow their reproduction, but this reproduction only takes place on the basis of the system elements and not in relation to the environment. The environment is a condition of the system's persistent existence; it can become incompatible with the autopoiesis of the system, in which case the system disappears.

Under these premises, the drive towards structural variation in social systems may not be traced back to their instability (as in the case of genetic mutations), but to disturbances from the environment, to which the system can only react in a way that is compatible with the continuation of its own autopoiesis. Which disturbances irritate the system and which can trigger structural change depends on the system structures. The system can be indifferent or sensitive, and this characteristic conditions its degree of irritability, and thus also its ability to change its structures. Variation always appears as deviation from existing structures, i.e., as a failure of communication that, to the observer, can seem an internal error, or a problem in the relationship between system and environment. The system reacts to this problem because communication is disrupted. In this sense, systems cannot evolve on their own: they evolve when the environment is unstable and this instability is not synchronized with that of the system. The discontinuity between system and environment guarantees that irritations are produced, and the system can react to them by increasing its indifference or by varying its structures.

Selection processes take place only within a system. Selections are based on the connectivity that the variation gains in autopoietic reproduction. In the scientific system, for instance, a new distinction is selected when sufficient connections are found in scientific communication, whereby it stimulates the production of research, experiments, tests, publications. In the case of social systems, we can therefore speak of the self-selection of communication.

Regarding the third evolutionary mechanism, the system stabilizes the selected variations when it can integrate the new elements into its internal structural features.

In the case of society, the mechanism of variation is *→language*, which sets no limits on the variation of communication. By using language, themes can be introduced in communication without any limitations. In addition, language offers the possibility to form both positive and negative statements: it is possible to trigger structural variation because *→negation* allows diversions from existing structures of expectations. The code of language allows communication variations to be generated, which can be selected in the functionally differentiated society by *→symbolically generalized media*. These communication media, such as money, power or truth, create conditions under which the probability to incorporate the suggested variation is relatively high, and determine the societal usefulness of communicative selections. Scientific communication represents, for instance, a kind of improbable and divergent communication, which in modern society requires a particular communica-

tion medium—scientific truth—in order to guarantee a certain degree of success: without this medium, scientific statements would be barely acceptable. In order for the selected variations to obtain stability at the structural level, society must also trigger the internal differentiation of subsystems. These secure the reproducibility of the selected variations even under changeable environmental conditions.

The difference in relative degree of *→complexity* between system and environment is decisive for the continuation of evolution. The evolution of social systems can be ascribed to the interpenetration [*→Interpenetration and Structural Coupling*] of psychic and social systems. Conscious systems can only contribute to the variation of social structures because they are structurally coupled with the communication. They can therefore irritate social structures through intentional communicative contributions. It is impossible to predict the content of these contributions and they can induce unexpected deviations from the social structures of expectations. The “contingency” (i.e., the unpredictability) introduced in communication through interpenetration is itself observed and judged, and either incorporated and stabilized or rejected.

The mechanisms of variation, selection and stabilization are not coordinated with one another, since the positive selection of variations or the stabilization of selections do not proceed automatically: the positive selection of a variation is a coincidence. This lack of coordination does not hinder the evolution and it even accelerates it, while the results of evolution contribute to differentiating the three mechanisms. [*G.C.*]

Theory of Society (2012: Ch. 3); The Direction of Evolution (1992); Einführung in die Theorie der Gesellschaft (2005: Ch. 3).

