Review by Mikhail Pogarsky
of the dissertation by D. F. FLÜCKIGER
"Contribution Towards a Unified Concept of Information"

The work by Daniel Federico Flückiger is surely the first time that the standardisation of two information concepts that previously appeared to be irreconcilable, has been so well-founded and consistently executed: Namely that of the statistical model of information technology, which was elaborated in the work of Norbert Wiener, Claude Shannon, Warren Weaver and their successors, as well as that of the semiotics information theory.

The basic approach is abstracted completely from the sense of the information to be transmitted, with special attention being focussed on the measurement of the information content. The smallest unit of information used was the bit, which characterises the choice of two alternatives ("yes" or "no"). This approach has been successfully used in the development of computers and has been widely used in cybernetics.

The semiotic concept of information technology, which is based on the "character" as the smallest unit of information, put the interpretation, recognition and meaning of the information transmitted by the characters in the foreground. These concepts allow processes such as learning, knowledge acquisition and thinking to be depicted. Until now, however, no one has succeeded in incorporating the semiotic concept in a conclusive formalisation, and that has made its application in the natural sciences difficult.

One of D. F. Flückiger's basic ideas – like all ingenious things – is extremely simple. After defining the individual "thing" as the basis for his information theory (the "thing" as a construct of the brain), D. F. Flückiger defines the relationships that refer to the "thing" as "d-syntactic" (i.e. relationships that are related to the determination of the "thing" as such, to the measurement of its character type and the interaction with other things), and the relations to which the "thing" refers as "d-semantic" (i.e. relations that reveal the character, the meaning of the individual "thing"). This extremely simple differentiation permits a mathematical formalisation of the basic semiotic idea to be carried out. And Flückiger then works out, using the mathematical apparatus upon which the work of Halmoz and Wechler is based, a conclusive mathematical system for his information theory.

Until now the philosophical nature of information has been disputed. And when followers of Norbet Wiener presuppose information as the third basic principle, upon which together with energy and material the world is based, then Hans Titze confirmed, for example, that information is not a new world principle but rather only a cause aspect of the principle of causality. As the result of his work, D. F. Flückiger comes to the conclusion that "It is rather the principle of causality in its entirety, and hence also its cause aspect, that are aspects of information." From a physical point of view, Flückiger assumes that information is to a certain extent identical with energy.

An undisputed contribution of Flückiger's work is the development of an information concept for open systems. And when Norbert Wiener views information as the antithesis of entropy, which proved itself to be a measure of disorder, then his findings are undoubtedly only correct for closed systems. Wiener considered Information as one of the instruments that are capable of reducing entropy, and

people as a link in the chain that stands in the way of the heat death of the universe. "We are swimming against the tide and have to fight against the enormous flood of disorganisation which, in agreement with the second law of thermodynamics, endeavours to bring everything to a heat death – the general equilibrium and the uniformity." – he wrote. "In this world our first duty lies therein that we establish small arbitrary islands of order and the system". Today, in work that deals with the problem of synergy, it has been convincingly explained that in open systems even in the inorganic world, specific spatial and temporal structures can appear as the result of self organisation. "As examples of such structures we can quote the laser, which produces coherent radiation, as well as fluids that form spatial or temporal structures, chemical reactions in which periodic fluctuations can be observed, spatial spirals or concentric waves. Even on this level we can talk about the creation of, or the conservation of, information." Both Wiener's approach as well as modern synergetic models fit completely into Flückiger's unified theory.

The discussion continues even today as to whether information is a characteristic of all material objects or only of living and self-determining systems. To illustrate this problem we cite the well-known Einstein-Podolsky-Rosen paradox. According to the ideas of quantum mechanics it is impossible to determine the direction of spin of an electron. However, as soon as one selects any arbitrary axis and carries out measurements, the electron spin orients itself to this axis. The Einstein-Podolsky-Rosen paradox relates to the fact that if one selects an electron pair whose total spin is equivalent to zero (singlet status) and the axes of rotation (Gerlach magnetic field direction) are unknown, and when one separates these electrons, no matter how far the distance, then as soon as we measure the spin of one electron and have assigned it to an axis of rotation, then indirectly we have also assigned the second electron to an axis of rotation, whereby the second electron instantaneously receives the information about the executed measurement. According to Bohr, a system that consists of two such electrons represents an indivisible whole, regardless of the huge distances that can separate the particles. To distract from the physical specialities of the paradox, let us concentrate our attention on the absolutely unique quality of concurrency of these electrons. Independent of whether they are a unified whole or part of a system, the speed of transmission of the information does not change when a change takes place in the distance between them – it is anyway not appropriate to speak of speed in this case as the electrons always behave synchronously. This particular example can be extended to cover all physical phenomena: Any physical system begins to behave in correspondence with the given law, this means that the information, which it obeys strictly, is originally present within it. And clearly the paraphrase of the biblical saying "And in the beginning there was information" is based on serious foundations. In this respect the Law of the Non-reduction of Information formulated by D. F. Flückiger can have a truly serious effect on today's scientific view of the world.

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