

## BOOK REVIEWS

*Systems. New Paradigms for the Human Sciences.* Edited by Gabriel Altmann – Walter Koch. Berlin – New York, Walter de Gruyter 1998. 781 pp. ISBN 3–11–015619–9.

This bulky volume is a purposeful and well-premeditated attempt to support extensive application of the system theory to the social sciences and humanities. The editors suggest that the history of cognition should be divided into three periods. The first of them was introduced by the invention of writing. After some time a new era was inaugurated by the establishment of mathematics. And in the 19th century the third important innovation is the idea of system that has gradually achieved dominance in many disciplines. The universal usefulness of the concept of system makes interdisciplinary research possible because the latter thus acquired a common methodological foundation. According to the editors, the application of systems theory may take place in four different ways that are viewed as four consecutive stages where each successive stage is regarded as a more advanced and sophisticated utilization of mathematics than any of the preceding stages.

The papers included in the present volume are arranged in seven sections – general subjects (pp. 3–333), semiotics (pp. 337–382), knowledge and cognition (pp. 385–419), culture (pp. 423–475), music (pp. 479–546), language (pp. 547–620), and literature (pp. 621–667). The publication is concluded by an epilogue (pp. 669–755).

The thematic palette of the general section comprises the evolution of systems, applicability of synergetics to human sciences, fuzzy systems, the concept of organization, plurality of systems, systems theory as an ideology, and emerging systems.

P. M. Allen concentrates upon change in human systems, pointing out that there has been no science of change of human systems (p. 3). He distinguishes four kinds of systems: equilibrium models (tending rapidly to a stationary state), nonlinear dynamical systems, self-organizing systems, evolutionary complex systems (composed of a hierarchy of subsystems). A complex (social) system capable of evolution is unthinkable without imaginative freedom and creativity. The author is well aware that human beings cannot live outside society and that is why he stresses cooperation. Therefore he does not absolutize total individual liberty, and since change and development result from the interaction of (creative) individuals as members of a society, the future is in principle hardly predictable. Creativity guarantees our survival in the ever changing world for we can survive only provided we are ready to react to changes. And new solutions to new problems can only be found if we have at our disposal a sufficiently abundant storehouse of diversity, cultural richness and the courage to experiment. And therefore, if globalization is mistaken for homogenization, this might lead to consequences threatening the future of mankind. If evolution is to lead to a harmonious society, mutual interaction cannot be merely competitive but also cooperative. In other words, cognitive aspects should not be stripped of ethical principles governing the behaviour of the individuals in the society.

J. Gordesch has decided to use systems theory techniques as a cognitive tool instead of simply describing systems and their properties. He defines system with respect to its evolution as “any collection of interrelated elements (‘structured set’) where a change in one aspect would affect some or all aspects of the system” (p. 39), not forgetting that a system may be “organized for a definite purpose and in relation to an external system (environment)” (p. 39). Causal explanations are extremely exacting in history, in evolutionary processes, etc. (p. 44) and yet we know of instances when changes of civilizations or their complete breakdown can be ascribed to a sole and obvious external impact.

Gordesch’s definition of structuralism (p. 46) should be complemented by a more general remark, namely that structuralism is an analysis in which the ‘structures’ take priority over the substance involved in the system. The readers would appreciate his brief sketch of a theory of action (pp. 44–46) for its wide applicability.

H. Haken has posed the rhetoric question of whether synergetics can be applied to the human sciences. Synergetics concentrates upon the cooperation of the components within a system for new qualities may emerge in the course of the cooperation through self-organization (p. 58). A system is stable if its structure is maintained despite external changes but it is unstable if its structure changes due to the modification of control parameters. Changes may be initiated by small pushes of a random nature (p. 63). H. Haken applies his ideas to language (p. 66). A change upon one structural level (e.g. in phonetics) may – despite its random nature – exert a far-reaching impact upon a different structural level. Thus the changes in phonetics of French may have contributed to the loss of many of its grammatical inflections and to the large-scale typological change of the French language.

G. J. Klir pays attention to the radical changes in attitudes toward uncertainty in science for now we are aware that uncertainty is useful or even essential (p. 79). He distinguishes two broader frameworks – fuzzy set theory and fuzzy measure theory (p. 81). In the former instance uncertainty results from linguistic imprecision or vagueness while in the latter instance it is due to information deficiency (p. 86).

One of the cardinal contributions is E. Laszlo's study on the logic of sociocultural evolution. He points out that present-day science realistically appreciates factors of chance and instability (p. 105) and characterizes evolution as a step by step and level by level process of alternating phases of determinacy and indeterminacy (p. 106). Laszlo's ideas are not basically different from those expressed by G. J. Klir in the preceding article, cf. the following quotation from Laszlo: "Each system derives its structural and dynamic characteristics from the kind of interactions and interrelations that obtain among its parts, rather than from the aggregate presence of them" (p. 117). There is no doubt a good deal of realism in his statement: "The outcome of revolutions and other forms of historical discontinuity are always unpredictable and often surprising" (p. 124).

Another article dealing with the concept of organization has been written by V. Majerník. He admits that the configurational organization of speech is not sufficiently known because a great part of information is carried by the semantic content of speech which can be adequately described only when language is considered a goal-directed system (p. 135). Majerník concludes his paper with a question: "How can a system characterized by an elementary artificial intelligence be spontaneously developed from a purely physical system?" (p. 141).

S. Marcus is involved in the study of so-called conflictual sets. A conflictual pair is defined as a couple of requirements each of which is apriori independent of the other and able to be fulfilled, whose simultaneous satisfaction however proves, a posteriori, to be impossible. A typical example in this respect are the requirements, for a formal system, to be both consistent and complete; these two apparently independent and very natural requirements are shown by Goedel to be incompatible (p. 144). In practice, the conflict manifests itself in the fact that precision is often achieved at the expense of truth or vice versa (p. 147). This situation supports the plurality of approaches that may be complementary but not necessarily compatible. Not only science but also art can be rigorous, as Marcus puts it (p. 148).

In linguistics, for example, we are confronted with the conflictual pair syntactics – semantics (p. 150). Their mutual relation is determined by the function of language as the instrument of communication – to convey information processed by speech in the shape of semantic content. If a sentence is ambiguous, for example Slovak *Cement nahradil kameň* (where the nouns *cement* and *kameň* have zero markers for both nominative and accusative and the word order does not help because it is free), we rely on semantic (contextual or even pragmatic) criteria and translate it as "Cement has replaced stone" instead of "Stone has replaced cement". In this respect, however, art should be judged differently.

Helmut Schwegler asks the question of whether we can build a unified science which comprises all phenomena (p. 165). He argues for a non-reductionist way to this goal which he sees in the general systems theory (p. 167).

J. Seppänen discusses the systems approach as a new and stimulative paradigm that supports inter- and multidisciplinary in research (p. 181). His article may be described as a brief history of systems theory including the cardinal concepts such as system, model, classification, category, analogy, induction, information, genetic code, as well as basic ideas of cybernetics, psychology, neurology, linguistics (omitting, however, such an important precursor of structuralism as Baudouin de Courtenay undoubtedly was), sociology, and economics.

R. Stichweh has tried to define system and delimit it from its environment (operational closure, p. 303). Not surprisingly he touches upon marginality (p. 313) that may help to formulate a creative synthesis. In my paper on creativity in language (or rather speech) I discussed marginality in connection with vagueness and as a vanguard of change or evolution. The innovations arise upon the periphery that is neither conservative nor stable.

F. M. Wuketits (pp. 318-333) characterizes the main properties of living beings, their systemic nature relatively independent of their environment and draws a sketch of evolution within the framework of systems theory. Emergence is connected with the concept of novelty in evolution and is a property of the system as a whole (p. 324). His paper is concluded with a brief survey of human biological evolution. The old idea of evolution as progress is declared to be a myth (p. 330).

Part II comprises three contributions dealing with various aspects of semiotics. M. Bunge distinguishes the endostructure and exostructure of systems. Language is defined by him as including (a) vocabulary, (b) set of natural and social (in particular cultural) items referred to by expressions in the vocabulary, (c) grammar which is viewed as its structure (p. 345), including probably the so called inner form. While biological semiotic systems are due to evolutionary accidents, says U. L. Figge (p. 353), cultural semiotic systems are human inventions. H. Schweizer discusses linguistics, textual linguistics and hermeneutics from the perspective of systems theory (p. 357).

Part III is featuring two papers concerned with the issue of knowledge and cognition. B. Nicolescu contemplates the impact of the "quantum revolution" upon philosophy. He views abstraction (under the influence of quantum physics) as one of the constituents of nature (p. 385). He hopes to explain the "intellectual scandal of quantum mechanics" by means of introducing the notion of levels of Reality. His philosophical standpoint is succinctly expressed as follows: "... no one level of Reality constitutes a privileged place from which one is able to understand all the other levels of Reality. A level of Reality is what it is because all the other levels exist at the same time" (p. 394). The question of transdisciplinarity is solved by Nicolescu in this terminological framework. A cognitive systems theory is drawn by G. Rickheit and H. Strohner. They repeat the remark mentioned above by another author that systems theory makes the integration of several disciplines working on a common problem possible (p. 404). Cognitive systems are defined as a class of adaptive systems that process information by means of a central nervous system (p. 406). Subsequently he discusses metaphors of cognitive systems (computer, brain and ecosystem metaphors, p. 407).

In Part IV (Culture), M. Fleischer ponders the question of second reality as defined by Popper and turns to creating a terminological matrix for the phenomenon of culture (p. 433ff). A. Nobis deals with rise and evolution of culture and with culture as an open system (p. 463). This is intended to mean that it is never fully adapted to the needs of the society, which is true of language as well. In the evolution of culture the internal stimuli seem to play a key role although external factors may have an impact upon it too.

Two studies are devoted to music – M. Boroda analyses the European musical language (pp. 549-571) in his paper while R. Koehler and Z. Martináková-Rendeková apply a systems theoretical approach to both language and music pp. 514-546).

In Part VI, two studies deal with specific problems of language. H. Goebel applies exact methods to dialectology (pp. 549-571) and L. Hřebíček investigates lexeme frequency in texts which reflects the semantic strategy of the language user (pp. 572-588). On the other hand, H. Schnelle concentrates on linguistic models and theories as dynamic systems (p. 589ff). W. Wildgen deals with the fate of structuralism in linguistics and turns to the idea of chaotic dynamics and to the problem of insecurity or vagueness (pp. 596ff). And finally, he has made an attempt to view language as a fractal entity (p. 617).

The ideas of fractals and chaos are also discussed by F. Merrell in Part VII dedicated to literature (pp. 623ff). Upon a more abstract level, S. J. Schmidt writes about a systems-oriented approach to literary studies (pp. 646ff.).

Instead of an epilogue, W. A. Koch has contributed a remarkable study titled *Systems and the human sciences* (pp. 671-744). One might even regard it as an attempt at a unified or integrated theory of the universe upon the background of a fundamental unity of existence as such as well as of its structure and functioning. In accordance with his philosophical standpoint, Koch defines both consciousness and communication in a rather liberal manner and is inclined to consider the anthropic principle as a relatively plausible explanation of the universe.

This collective volume will no doubt be accepted favourably by scholars who are not content with their narrow specialization and feel the need to have an idea of human cognition as a whole. The ambition to grasp various domains as parts of a universe is obvious, especially the tendency to include humanities in the complex of sciences.

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