

General System Theory

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This article will review the role General System Theory (GST) plays in the development of science and philosophy. In particular, it will deal with (1) the historical importance of the advent of GST in the tradition of systems thinking, (2) basic principles of the framework of the GST, and (3) the relation between the latter and recent developments in systems science.

(1) Historically, GST was the first attempt to reconcile philosophical ideas with the practice of science as refers systems thinking.

Precursors of the modern system concept draw through from Aristotle's cosmology (introducing the word "system"), to diverse philosophically founded modern enlightened ideas of order based on the impact of Newtonian physics and generalized classifications schemes of knowledge, to the system doctrines of the diverse end 19th century natural philosophies.

The founding fathers of GST, Alexander A. Bogdanov, Ludwig von Bertalanffy, Anatol Rapoport, Kenneth Boulding, tried to fertilise philosophical ideas related to systems for a variety of scientific disciplines. The best-known attempt is Bertalanffy's theoretical biology deliberations in the 1920ies and 1930ies by which he turned the dispute between mechanism and vitalism obsolete. Later on, he tried to generalise these insights and to apply them to different disciplines. Hence his "Allgemeine Systemlehre" which was translated into "GST".

(2) GST was from the outset opposed to standard scientific thinking in terms of the programmatic and methodological categories of logical positivism and analytical philosophy of science. This can be shown along the three dimensions of (a) ethical, (b) ontological, and (c) epistemological-methodological implications of the GST framework.

(a) Each of the founding fathers took in his life a political stance or was at least engaged in social affairs. Thus it does not come as a surprise that they viewed the theory they developed not as value-free but laden with values aimed at guiding science towards the humane betterment of society. To be overall normative instead of exclusively descriptive proves to be a characteristic feature of GST.

(b) The domain of GST is the integration of systems science, conducted by applying an abstract level of theoretical deliberation that is able to elaborate on the principles which are valid for systems in general (derived from insights of all fields of scientific research) in the sense of organised wholes. By this, GST has been setting its interest upon some kind of

synthetically operating mathematics for analogy building, introducing entities of an essentially new sort also on the formal scientific field. These are centered around the main idea of organised complexity (e.g. structural isomorphism, hierarchical order, information, nonlinearity, differentiation, equifinality, flow and openness, regulation and feedback, teleology etc.), leading to what is usually called a systems ontology. This ontology, though often highly abstract, can be seen as overall reconstructive (real-world orientated) instead of exclusively constructive.

(c) Instead of an isolation of ever smaller problems accompanied by ever more specialisation guided by the regulative idea of reductionism, a tackling of system problems needed the ability of highly integrative thinking, by this, blurring established boundaries – between single disciplines as well as the Two Cultures. By stressing this functional change of science, GST claimed to develop a new notion of unity of science beyond the reductionist programme, relying on the new general and unifying categories related to organised wholes in all fields and on all levels of scientific consideration. Hence, GST seen from the epistemological point of view is overall synthetical instead of exclusively analytical.

(3) Systems thinking has deployed a variety of systems sciences let alone system theories since the heyday of GST. Some of the basic methods, principles, concepts of GST have diffused into recent system approaches, some of them have been disregarded. Evolutionary systems theory might be looked upon as one strand that has continued and elaborated upon GST positions. It will be discussed whether or not a revisitation of GST would have a potential impact on the further development of systems sciences.