

How von Bertalanffy's critique of Marxist System Theory Self-Deconstructs!

David Boje, Ph.D.
September 14, 2004

Note: These are views of David Boje and not those of New Mexico State University; please address any feedback directly to Boje at peace@peaceaware.com

Instead of the “fertility of the interdisciplinary systems approach,” von Bertalanffy (1962: 11) takes organization studies down an approach I will call mechanistic bio-physics. Bio-physics system theory pretends to leave behind the mechanistic science of physics, but only succeeds in replacing it with yet another mechanistic epistemology, ontology, and methodology. The purpose of this article is to make these claims using von Bertalanffy's own rhetoric construction. In other words, I contend that von Bertalanffy's General System Theory (GST) self-deconstructs all on its own.

Summary of main argument -First, the open systems approach or what von Bertalanffy (1962: 12) also terms “living organism” is staunchly opposed to all forms of “teleology” reconstructing a history of physics which also turned away from social construction because it was ridden with teleology. Biology proposes to make the same move. Second, physics is accused of adopting 2-variable cause-effect models for its system theory, making it too mechanistic. The biology open systems model, adds a few variables to make it (self) multivariate, but is still a bio-mechanistic systems theory. Here is how the second point self-deconstructs in von Bertalanffy's (1962: 12) words: “every science is a model in the broad sense of the word, that is a conceptual structure intended to reflect certain aspects of reality. One such model is the system of physics.” And, we can add, another such model is the system of biology which selects and privileges certain aspects of reality in its ontology. Third, the result is that the sort of “social construction: of Berger and Luckmann (1967) or even the Marxist variety, is dismissed as a form of “vitalism” by the GST “Organismic viewpoint” or what is termed the “biophysics of the organism” (von Bertalanffy, 1962: 13). In short, biophysics open system theory is hegemonic. Fourth, GST has to replace vitalism (teleology) with something else, so it develops the concept of “goal seeking and self controlling behavior” (Bertalanffy, 1962: 13). In sum, biophysics is not different in genotype from mechanistic physics; it is another order of mechanistic closed system theory, which calls itself (rhetorically) an open system theory. Fifth, open system theory is beleaguered by the Shannon-Weaver (1949) model of communication which is itself highly mechanistic and closed looped (a point we shall see that Bertalanffy makes). Sixth, the very definition of system in the biophysics of GST is the “complex of interacting components, concepts characteristics of organized wholes such as interaction, sum, **mechanization, centralization, competition, finality**, etc., and to apply this to **concrete phenomena**” (Bertalanffy, 1962: 13, boldness is mine). Finally, these theoretic moves are acknowledged by Bertalanffy, 1962: 13) as the basis of “systems engineering: and “operations research,” which are about “scientific planning, design, evaluation, and construction of man-machine systems” and “scientific control of existing systems of men, machines, materials, money, etc.” respectively. This ends up being an open system theory of biophysics; in short it is isomorphic with Taylorism and “human engineering: which Bertalanffy (1962: 13) defines as “scientific

adaptation of systems and especially machines in order to obtain maximum efficiency with minimum cost in money and other expenses.”

With these seven main points, I would like to argue that biophysics systems theory masquerades as open, as beyond physics, but is closed essentialist and reductionist view of man-machine system, that selectively marginalizes Marx’s theory of political economy and the spiritual (and other ethical) perspectives of transcendence, myth, and spirit.

The story opens with a rejection of physics’ second law of thermodynamics as inappropriate to living systems. The story continues with an advocacy for the First Cybernetics of “information theory” using conceptions of the nervous system of the biological organism conflated with the bio-science of self-correcting feedback loops (self-regulation”). This becomes embraced as the story of complex adaptive open systems that evolve from lower to higher states of complexity (Bertalanffy, 1962: 16). The legitimating narrative for the biophysics Organismic Story (itself a grand narrative) is Ashby’s contention that “no machine can be self-organizing” (Bertalanffy, 1962: 16). Biophysics theory calls for an “open systems, i.e., systems importing matter containing free energy to an amount over-compensating the increase in entropy due to irreversible processes within the system (‘import of negative entropy’).”

Then, the fatal error: Ashby, followed by Bertalanffy, then the field of sociotechnical and most other open system theory in organization studies, adopt without critique the Shannon communication model (see Figure 1 p. 16 Bertalanffy) and it is called “Shannon’s Tenth Theorem, stating that if a communication channel has capacity H , equivocation of the amount H can be removed, but no more” (Bertalanffy, 1962: 16, italics his). The *Tenth Theorem* is the Achilles’ Heel of not only Ashby and Bertalanffy, but can be traced into Weick’s theories of sensemaking, equivocality, and enactment (fodder for another paper, at another time).

Here is how the fatal error of the Tenth Theorem, self-deconstructs in Bertalanffy’s text, as it is said to “illustrate the working of closed system” and in the very next sentence is a deconstruction of a book uncited (March & Simon, 1957 Organizations); “the ‘evolution’ of the computer is one toward disappearance of differentiation and establishment of maximum homogeneity (analog to the Second Principle in closed systems; Shannon’s Theorem similarly concerns closed systems where no negative entropy is fed in” (Bertalanffy, 1962: 16). What is ironic is that the Shannon model is boldly displayed in Fig 1 on page 16 as an underpinning for the so-called ‘living system’ of the biophysics model of the “transformation of matter.”

The result of the theory moves is that open system theory is a first order cybernetics based on the *Tenth Theorem* and spliced with Ashby’s man-machine “servomechanisms and automation” using the “simplest feedback scheme” amended from figure (p. 16) to figure 2 (p. 17).

Buckley (1967) is among the few sociologists to notice the inconsistency in GST. About Bertalanffy, Buckley (1967: 36) says that the homeostasis model of open systems takes

social science down the wrong path, then tells the story of the centuries of “long struggle [of GST] to bridge the theoretical gap between organic and inorganic matter” (additions mine, p. 37). He includes in his story how the “vitalistic” was exorcised from open systems theory, only to enshrine a “new vitalism” that is a “cruder mechanistic biology culminating in the current fusion of both organicism and mechanism in cybernetics and general systems theory” (Buckley, 1967: 37). In Buckley’s story of GST, the organicism of open systems theory is a way to distance themselves from “older biological methods of teleology and taxonomy” that were “made respectable by cybernetics” and in more “closed-loop ‘feedbacks’” and in the “goal seeking” “topological causal relations” of “direct graph” cycle models (p. 38).

What does Buckley do? Buckley (1967: 39) reintroduces “cognitive processes, consciousness and self-awareness, and sociocultural emergence and dynamics” back into open system theory, and then picks up on Maruyama’s (1963) “morphostasis and morphogenesis” (see Buckley, p. 58). Instead of limiting open systems to “self-regulation” loops this opens it to “self-directing” and “self-organizing.” (p. 58). In short, the human symbolic level returns, as does the area of socialization, and Marx.

What is problematic with a biophysics Open System Theory? When managers, leaders, and system engineers “tighten further the top official emphasis on reliability, thus closing the positive feedback loop leading back to a more rigid adherence to rules and a more vigorous defense of states” (Buckley, 1967: 60). In short, it becomes deviation-counteracting loop, with the deviation-counteracting loop all but shut down. The irony is that the open system is supposedly importing feedback on deviations from customer goals, but ends up reinforcing the very things the customer usually complains about. Self-regulation leads to more bureaucratic scripting of performance in ways that Merton defined long ago as bureaucratic dysfunction. As Maruyama and Buckley move beyond first cybernetics and into second cybernetics, the idea of a “variety pool”(Buckley, 1967: 63) replaces the “negative entropy” pool.

The Hierarchy Problematic – Returning to Bertalanffy (1962: 18) hierarchy becomes equated with steady state. First closed system theory is accused of embracing equifinality and the second law of thermodynamics which leads to “states of maximum disorder” or disintegration of the system. Hierarchy enters the “living system” so that it can maintain itself and avoid entropy. The thesis self-deconstructs in Bertalanffy’s (1962: 18) own words: “homeostasis model transcends older mechanistic models by acknowledging directiveness in self-regulating circular processes;” this as Bertalanffy adds is a case of “it still adheres to the machine theory of the organism.” In short, a closed system is hierarchically ordering; that is its legitimacy narrative.

The Free Competition Problematic - Bertalanffy ends up embracing a Social Darwinism model in order to not take the Marxist critical theory turn. He is not alone in this regard; the business college embraces Darwinism as a basis for Free Market capitalism. As Bertalanffy (1962: 18) puts it, “the economic outlook of the 19th and early 20th century” which is [Social] “Darwin’ struggle for existence and survival of the fittest” which is “a biological version of the economic model of free competition.” And then he

reasserts on the same page his thesis “the organism is essentially envisaged as an aggregate mechanism for maintenance of minimum costs.”

TO BE CONTINUED