

Open Systems

Definition

Open System Theory (OST) dichotomizes the concept of the organization from that of the environment in which it is lodged, and then asserts the opposing forces of 1st and 2nd order cybernetics sustain adaptive order. 1st order cybernetics consists of deviation-counteraction ways to process information from an organism's environment, while 2nd order cybernetic refers to deviation-amplification means through which organisms process information from and about the environment. OST assumes that organizations that are more capable of processing information about their environment are more adaptive to shifts in environmental conditions.

Conceptual Overview

The genealogy of OST extends back to origins in WWII. 1st Order Cybernetics emerged with the 1940s war effort, developing into several traditions spearheaded by Norbert Wiener and Alan Turing. Wiener appropriated the term "cybernetics" from Plato in 1948; the Greek word *kuernetes* (pilot or rudder) was what Plato defined as "the art of steering." 1st order cybernetics can be defined as the art of steering through purposive behavior. Wiener, followed by Ashby, worked on cybernetic control machines that exhibited purposive behavior from deviation-counteracting feedback loops. Ashby's "law of requisite variety" holds that it takes more order (variety) in the system to process input-order from its environment. Turing's 1st order cybernetic work (Turing Machine) on machine intelligence was foundational to computer science, artificial intelligence, decoding German messages in WWII, and the "electronic battlefield" concept used in the

Vietnam War. 1st order cybernetics is rooted in Shannon and Weaver's information processing model, popularized in the General System Theory of von Bertalanffy.

2nd Order Cybernetics (or cybernetics of self-organization) also emerged in the early 1940s with work by McCulloch on human cognition and the nervous system; von Foerster and von Neumann continued to develop the area. 2nd order cybernetics is linked to Dewey's philosophy of constructivism (as opposed to realism); von Foerster's constructivism led to work on self-organization. Adaptation arises from reconstructing information into cognitive-constraint structures rather than responding directly to stimuli. Instead of cause-effect, cognition stands between cause and effect. Bruner and Piaget's work in cognitive constructivism, as well as Pepper's world hypothesis of constructivism are often cited exemplars.

Boulding inserted OST into one of nine distinct levels of system complexity in 1956: (1) frameworks, defined as typologies of structures and contingent environments; (2) mechanistic relations between organization structures and environments; (3) control, defined as first order cybernetic feedback comparison to an ideal; (4) OST, defined as cell type relations of organization and environment that introduces 2nd order cybernetics of deviation-amplification or requisite variety to oppose 1st order deviation-counteraction feedback loops; (5) organic, defined as plant type of complexity, such as in blueprint growth from seed to acorn; (6) image, defined as awareness of impression management role in organization relations to environment; (7) symbol, defined as archetypal, historical, and self-reflexive awareness; (8) social network, defined as relations between multiple organizations adapting and modifying environments; and (9) transcendental, defined as the relationship between what is knowable, and unknowable. Complexity

properties are cumulative, rather than succession. Boulding asserted that levels 1 to 5 are simple sign representations (frame, machine, thermostat, cell, & plant); whereas levels 6 to 9 involve languagedness: (6) images, (7) symbols and history, (8) societal discourses, and (9) more transcendental spheres.

OST principles have been incorporated into every field of organization studies.

Critical Commentary & Future Directions

Although OST has achieved acclaim since WWII, the construct is undergoing revision. First, OST is mono-languaged. Pondy continued Boulding's inquiry into ways to go beyond level (4) OS, arguing that language, symbol, and story were critical in social construction and enactment. Enactment is defined by Weick, using the notion of retrospective sensemaking to construct environments. Pondy's linguistic theory was routed in Chomsky's homogeneous, language grammatology. The problem is that Chomsky does not take Pondy's OST enactment-reformulation beyond Shannon and Weaver's sender-message-receiver-feedback (1st cybernetic) information processing model.

Second, OST dichotomizes the relation between the organization and environment by using the binary logic of cybernetics. Deleuze and Guattari criticized Chomsky's binary logic for its failure to appreciate and understand multiplicity in 1980. What constitutes a whole system, boundary, a purposive, and a learning system is not agreed upon by OST scholars. A future direction would be to theorize organization systems and environments without dichotomizing the relations between 'the organization' and 'the environment', seeing them instead as micro-politics in an interpenetrated social field, or

as rhizomatic assemblages of enunciation that are not unified in mono-languaged framework.

Third, OST offers what Astley critiqued in Katz and Kahn as an egocentric OST theory because it focused on how organizations interact with enacted or cognitively constructed environments.. Abstract terms that Katz and Khan use, such as equifinality and multifinality, are borrowed from biology; they do not apply OST beyond using it as a metaphor in their own work. Child posited a less contingent and deterministic relation between system and environment, emphasizing strategic choice behavior. To get beyond egocentricism, several OST approaches focus on populations or networks of organizations. Examples are Hannan and Freeman's population ecology and Pfeffer and Salancik's external resource control and dependence framework. Emery and Trist, on the other hand, developed a social ecology OST in which populations of organizations collaborate to manage more turbulent environments.

Fourth, there is concern with the application of OST to higher orders of system complexity. Image or impression management goes beyond strict deterministic responses by organizations to their environment, even where the concept of the environment is loosened and ideas of strategic choice, bounded rationality, or enactment are considered. Enactment denotes an order of complexity, beyond OST: a self-reflective awareness of symbols and history.

Fifth, assumptions and propositions put forth by early OST frameworks suggest universal mono-languaged, cognitive enactments (or constructions) across ethnic, cultural and gender borders. Thus, the question arises of whose terms dominate the underlying

differences? A future direction is to question the viability of universalizing OST claims about race, class, gender, and ethnicity.

Sixth, if organizations are human systems spread across many countries, and employing many specialties, a variety of national and technical languages are co-present. OST that assumes unitary, universal language, in unequivocal cybernetic feedback loops in both first and second order processes, is problematic. A future direction might be look at the multiplicity of languages by shedding OST's biological metaphors.

A future direction from the work of Pondy would be to develop third order cybernetics, moving beyond Shannon-Weaver and Chomsky, to a Bakhtinian OST. Bakhtin's answer to OST construed as just 1st and 2nd order cybernetics, is to offer the concept of heteroglossia, in which centripetal (deviation-counteracting or centering) forces of language are opposed by centrifugal (deviation-amplifying or decentering) forces of language. It is a matter of dialogism, of a multiplicity of language forces, not assuming a dialogue that is mono-linguaged. Dialogism is not the same as dialogue. Dialogue involves people conversing at the same time, often in the same place; cell phones make dialogue across mobile places possible, for instance. Dialogism seeks to reach beyond this idea of a place in time/space. Dialogism is concerned more with making a reply to some past speech act, or anticipating a speech act that is not yet uttered.

Thus far, reforms to OST have tried to introduce polyphonic dialogism. However, there are at least four types of dialogism: (1) polyphony dialogism, defined as many voices, languages, logics, and ideologies that are fully-embodied; (2) stylistic dialogism, defined as an interrelationship among various modes of language expression, such as everyday speech appropriated to organization use (e.g. slogans like 'Just do it'); official

speech, such as letters to shareholders; science-sounding speech, such as charts and graphs in annual reports; artistic speech such as décor or architecture, etc; (3) chronotopic dialogism, defined as differences in space/time concepts, such as focus on local versus global, or emphasis on past, present, or future in areas such as adventure narratives (romantic or chivalric), historical biographies, and several folkloric versions of chronotopes, and (4) architectonic dialogism, defined as the inter-animation of Kantian cognitive discourse, with more aesthetic and ethical societal discourses.

A future direction for OST is to formulate how multiple dialogisms interact. Such a move could fulfill Boulding and Pondy's dream of an OST beyond level 4-complexity. Just how that is to be theorized, researched, and how it affects practice has yet to be worked out. One direction would be to reformulate Boulding's orders of complexity using Bakhtin's dialogisms: polyphonic and stylistic dialogisms takes us beyond levels 4 (OTS) and beyond 5 (organic sign regimes) to level 6 (image complexity). Organizations no longer mimic cells (level 4 OST) or plants (level 5 organic), because humans manage images in multi-stylistic modes of expression.

Chronotopic dialogism is hypothesized to be consistent with Boulding's level 7 focuses on history, symbol, and self-reflection. One chronotope does not constitute dialogism. Even enactment or retrospective sensemaking, when it interacts with just one other chronotope, remains just a dichotomy. A dialogic example would be chronotopes of cyclic adventure, or reversal of focus on the present or past, to enact a more concrete version of the future.

Social networks (level 8) seem relevant to architectonics of societal discourses. However, perhaps Emery and Trist's social ecology is more than just OST, at least it is

more than Katz and Kahn's egocentric OST. Social ecology seems to relate to more ethical and aesthetic values that populations of organizations, as well as communities, can advocate in order change the turbulence.

Finally, it could be that transcendental (level 9) is a reentry of spiritual and religiosity into modernity. There is certainly increased interest in spirituality and religiosity (e.g. *Journal of Management, Spirituality & Religion*), represented in part by an interest group focusing on these themes in the American Academy of Management. Different cultures, with their own distinct religious and spiritual values, may change what properties are considered systemic.

In order for organization studies to move beyond OST it will require continued conceptualization and inquiry into the role of multiple-languages, stories, narratives, symbols. OST may be left behind, re-imagined with a less mono-languaged model, such as those of dialogism. It may be that Bakhtin's dialogisms can contribute to moving beyond mono-languaged, mono-logic formulations of OST.

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See also Storytelling, Language, Discourse

Further Readings and References

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