

Complexity, organization, and managers

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The term complexity suggests several discourses with varying degrees of insight. One is that complexity is the inverse measure of our ability to simplify and grasp phenomena of interest. It entails the positivistic *a priori* assumption that, in their essences, things are simple and the universe is ordered. Complexity becomes the residual term; things are complex when uncertainties interfere with our analyses.

Systems might be defined as complex when they exhibit 'emergent' properties. The 'romantic' tradition presumed emergent holism in social and natural systems, positing a complex two-level ontology in which parts and wholes are inter-dependent (Kwa, 2002). The part must be comprehended as a synthesis of notions lying at two distinct levels. This leads to a third level of analysis, of the 'environment' within which the system's properties emerge, and are constrained and regenerated. The living system struggles to create and sustain its identity, auto-poietically, and so doing reconstructs its environment. Environment becomes an emergent concept, not given *a priori*, and such complexity places us within not without the system being analyzed.

Chaos theory, arguing order emerges from interactions among the system's parts, seeks their fundamental properties or the 'physical laws connecting them' so a simple description explains the orderliness. Drawn from biology, it shares population-ecology's presumption that managers are irrelevant to creating or explaining organizational behavior.

Hence the possibility that 'complex' might best be applied to social and economic systems that are inherently under-determined and chaotic. But - and here we sketch a subset of chaos theory - while these systems lack the 'fundamental

properties' which chaos theorists seek, they have 'managers' a sources of neg-entropy. This broadens the idea of the managerial contribution from the scanning and decision-making automata of conventional BSchool theory. It also goes beyond the meaning-making notions of the cognitivists or strategy theorists. But where might this contribution come from if derived neither from managers' insights into a positivist *apriori* order, nor of the system-parts' 'fundamental properties'?

Theorists exploring the growth of knowledge focus increasingly on the complex of practices emerging from collisions between the constraints and opportunities of the environment, and the strategic choices that produce order (Pickering, 1995). Penetrating this complex demands a fresh typology of practices, particularly to identify those that lie outside production. I propose a four-fold typology of practices as (a) purposive production, the normal sense of practice, (b) habitual, beyond explanation as purposive, (c) identity constructing, for those engaged in the practices, and (d) system constructing, supporting the practices. The latter practices yield consequences that are self-referential and infrastructural in the sense that Luhmann examines (Luhmann, 1995). Thus to speak of an organization as a knowledge system is both to suggest that there are managers for whom this knowledge is crucial to their strategic choices, but also that an infrastructure of language appropriate to the environment is available. In this formulation knowledge, and managers, would be unnecessary were the systems not complex.

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