THINKING ABOUT SYSTEMS AND THINKING SYSTEMICALLY

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Note: this paper was written in 1998 and I have not had a chance to revise it. When I revise it, I will keep the distinction between "thinking about..." and "thinking systemically" but will certainly give attention to some books that are not included. These include:

Historical context:


The first half of this book contains excerpts from some of the classic works when systems thinkers thought that they could find universal "forms." A quick reading of von Bertalanffy, Boulding, etc. is a useful context for later work.

Thinking about systems:


Holland offers seven "basic elements." This is simultaneously very useful and ironic. Elements of what? Isn't the whole systemic approach based on a commitment to the proposition that the search for "basic elements" is not the best way to understand the complexity of the universe? Or are these "elements" of a different kind?


While I think the distinction between "thinking systemically" and "thinking about systems" is useful, real people (and real books) don't always or even usually fall neatly in one category or the other. For example, Greg's book crosses the boundary that I've drawn, particularly in chapter 6, "The Nexus of the New Praxis" and chapter 7, "A range of Practical Management Applications."

Thinking systemically:


I think this book is a deliberate attempt to move from "thinking about..." to "thinking systemically." One of the challenges is to do this in a way that is not simply wrong-headed. There is a fundamental decision to be made here: when one moves from physics to politics and argues that both are, e.g., chaotic, is this 1) a wrong-headed, simplistic application of
ideas that have meaning and currency in one domain to another in which they don't mean the same thing; 2) a rich and illuminating argument by metaphor, requiring us to identify the limits of usefulness of the metaphor; or 3) a profound insight that things in one domain are like those in another?


Both of these books are applications of systemic thinking in specific contexts. You'll note that people who think systemically tend to focus on specific systems while those who think about systems tend to think about characteristics of all systems. Among other things, this is the residue of a profound clash of paradigms about what constitutes knowledge (and what constitutes the most USEFUL knowledge).


This is a valiant attempt to develop a way of thinking/talking about action that shifts from "individual responsibility" (which the authors would say is an atomistic rather than systemic framing) to one that focuses on "relational responsibility." In my humble judgment, this is an important agenda and one which needs additional work.

The essay elaborates two claims. The first asserts that “thinking about systems” is not quite the same thing as “thinking systemically” and the second asserts that the “thinking” involved in “thinking systemically” is not only or even primarily a cognitive process but inevitably involves acting into situations. The purpose of the essay is to work out some of these ideas for myself and to invite others to enter into conversation with them.

The distinction between thinking about systems and thinking systemically hinges on the perspective of the person doing the thinking. One can and usually does think “about” systems from outside the system. That is, whether we might describe the thinking as ontologically a part of the system or separate from it, in this instance the thinker takes the observer-perspective. When thinking systemically, on the other hand, the thinker is self-reflexively a part of the system and takes the perspective of a participant or component of the system.

This distinction can be explored by reference to examples. For example, if you read Gleick’s *Chaos* or Waldrop’s *Complexity: The Emerging Science at the Edge of Order and Chaos* with this distinction in view, I think you will see them as examples of thinking about systems as if the thinker were “outside” the system being described. One indication of this perspective is the form of knowledge that they strive to achieve: pictures and/or formula. As Ludwig Wittgenstein said, there are clouds of philosophy in drops of grammar, and the grammar that suggests these as the forms of a knowledge claim makes a host of assumptions that reward the effort required to explicate them. The beautiful photographs of fractals and computer
programs/computational formula that simulate the actions of complex adaptive systems are compelling and useful for many purposes, but they presume what Richard Rorty (Philosophy and the Mirror of Nature: Princeton University Press, 1979) called the “ocular” model of knowledge. That is, knowledge is something – over there -- that we – standing over here – “see.” We are outside the event being seen, recording or reproducing or representing it.


It is no accident that these books all emerge from a tradition of applied practice such as consulting or therapy rather than one of the “basic” sciences and that their knowledge claims are very different from those mentioned in the preceding paragraph. Instead of a representation “over here” of the structure and/or function of a system “over there,” the kind of knowledge claimed in these books consists of advice about how to think and act into situations. For example, Campbell, Coldicott, and Kinsella (see pp. 55-57) offer ten suggestions for “reframing” that are helpful to consultants working with an organization. Note the “genre” of these reframes: they consist of advise for action in a contingent setting not representations of a state of affairs. Rather than statements that purport to describe a part of the universe, they resemble what a coach might tell an athlete, or a counselor would advise a client. In more scholarly terms, they comprise what Aristotle (in the Nicomachean Ethics) called phronesis (practical wisdom or good judgment in uncertain situations) rather than episteme (knowledge of things that are what they are).

The role and function of the thinker changes depending on which of these forms of systems thinking one engages in. Exaggerating a bit to make the point, one who thinks about systems functions as a scholar or expert while one who thinks systemically functions as a coach. In a less exaggerated comparison, the knowledge produced by thinking about systems is useful in describing how a system works or designing a system to fulfill a specific function while the knowledge produced by thinking systemically is useful in knowing how to act in a specific moment as a part of the system.

**Some observations about these two ways of dealing with systems**

1. Both are useful.
I do not want to be understood as claiming that one of these is “better” than the other, because each do different things. There is a great deal of power in the “thinking about systems” perspective. One of my favorite books that uses this approach is William Cronon’s *Nature’s Metropolis: Chicago and the Great West* (NY: Norton, 1991). This book shows how the “city” and the “country” reciprocally define each other in a system whose structure and feedback loops are comprised of the means of transportation.

2. **Thinking about systems is more like the Enlightenment heritage than thinking systemically.**

   Among the distinguishing characteristics of the Enlightenment were:
   - reductionism in the unit of analysis,
   - the search for universality in scientific laws,
   - cognitivism (the idea that knowledge occurs in the heads of individuals),
   - possessive individualism (the notion that the person-as-bounded-by-the-skin is the smallest social unit, and
   - the assumption that the universe was organized mechanically.

   There was reason for people to hold onto this view. It worked to answer venerable questions and to do so elegantly, precisely (at least within their abilities to measure), and in ways that produced tangible human benefits, such as Pasteur’s inoculation against disease, Newton’s simplification of physics, and increased the ability to travel and communicate across distances. Such accomplishments should not have been, and were not, set aside quickly.

   However, the very precision of this way of thinking began to produce anomalies. Several things might be cited as the culmination and destruction of this worldview:
   - Einstein’s theory of relativity based on the “problems” growing out of the relation of energy to mass,
   - Russell and Whitehead’s failed attempt to combine mathematics and language (*Principia Mathematica*), and
   - Wittgenstein’s demonstrations of the limits of language (*Tractatus Philosophicus*) -- all in the first 20 years of the 20th century. A little later, Kurt Godel’s “proof” that no system could be both complete and consistent, and the dissemination of modal logics and non-Euclidean geometries were further nails in the casket of 19th century mechanistic materialism.

   One response to these challenges to the Enlightenment’s commitments was to develop systems theories. Perhaps the most radical of these in the early 20th century was Alfred North Whitehead’s (yes, he of the *Principia Mathematica*) “process philosophy.” In the most explicit embrace of “flux” since Heraclitus and before Heisenberg, his suggested emphasis on process entailed the willingness to abandon at least three of the characteristics of the Enlightenment cited above: reductionism, universality, and mechanism. Too radical by far for its times, Whitehead’s approach awaits rediscovery.

3. **The attempt to retain universality in knowledge of systems.**

   General Systems Theory may be seen as a way of keeping some of the distinctive characteristics of the Enlightenment. Von Bertallanffy and others were excited by the prospect of
finding systemic properties that were universal. One of the classic stories describes two presenters at a conference whose slides were mixed up. Although they were talking about systems of very different sizes and substances, they discovered that the systemic structures were identical. GST may be characterized as willing to abandon the virtues of reductionism and mechanism so long as they can preserve at least the ideal of universality in their truth claims.

The belief in the universality of systemic properties certainly comforted the proponents of General Systems Theory, and was a point that allowed them to feel a sense of continuity with their colleagues in more traditional sciences. However, subsequent developments have chipped away at this doctrine as well. With the clarity of hindsight, General Systems Theory may be described as having envisioned what might be called a “universal well-formed system.”

In a well-formed system:
- there are sufficiently dense feedback loops such that all components of the system are “in touch” with each other;
- these feedback loops function sufficiently well so that there are not system-destructive delays;
- there is a superordinate cybernetic monitor that regulates the function of all components of the system;
- the boundaries of the system are sufficiently well-defined so that it is possible to tell what is “in” and “out” of the system at any given moment; and,
- as a result of all of this, the sum of the whole is greater than the sum of the parts and the best explanation of a system is its own organization.

But the universe turns out to be a good bit more messy than this. Using this description of a well-formed system:
- not everything is a system,
- whether everything is “in” a universal system is at least in part a matter of the perspective of the observer,
- not all systems are “well-formed,” and
- even well-formed systems have much more fluid, varied, chaotic structures than the General Systems thinkers imagined, functioning “far from equilibrium” (to use Prigogine’s phrase: Ilya Prigogine and Isabelle Stengers, Order Out of Chaos: Man’s New Dialogue with Nature, NY: Bantam, 1984) and living at the edge of chaos and order (to use Waldrup’s).

Reinhold Neihbur (Moral Man and Immoral Society) and Thomas Schelling (Micromotives and Macrobehavior, NY: Norton: 1978) both showed that the sum of the whole is LESS than the sum of the parts (or even one of the parts) in the ethics of public life and in the orderliness and/or rationality of a wide variety of social settings. That is, Neihbur and Schelling argue that while an individual can be ethical, rational, and operate according to clear motives, a society cannot. The larger social system “lacks” (in comparison with the ideal of a well-formed system) sufficient feedback loops, well-defined boundaries, and, most of all, an adequately functioning superordinate cybernetic monitor. Clearly the structure of systems is variable, and their functions differ depending on the way they are structured – in ways that challenge those who seek
universality in the way they think about systems – and it may be that significant aspects of the universe are “aggregates” (as Schelling suggests) rather than systems.

If we take on board the argument in the above paragraphs, we are confronted with a challenge. How should we proceed? One idea is to develop ever more powerful or complex or shape-changing models of systems. This approach is the one taken by a prolific group of thinkers who show all the hallmarks of a major development in knowledge: energy, surprise, and a feeling of increased capability (see Waldrup; Klaus Mainzer, Thinking in Complexity: The Complex Dynamics of Matter, Mind and Mankind, NY: Springer, 1996, Second edition; Jack Cohen and Ian Stewart, The Collapse of Chaos: Discovering Simplicity in a Complex World. NY: Penguin, 1994; John L. Casti, Complexification: Explaining a Paradoxical World Through the Science of Surprise. NY: HarperCollins, 1994; and Stuart Kauffman, At Home in the Universe: The Search for the Laws of Self-Organization and Complexity. NY: Oxford, 1995).

And yet…. There was a group a few years ago who displayed all the same symptoms while using a very similar approach to the task of describing cognitive functions. A fascinating history of this project is found in Howard Gardner’s The Mind’s New Science: A History of the Cognitive Revolution (NY: Basic, 1985). In one sense, this makes the ability to simulate complex adaptive systems even more exciting. However, it also calls attention to the simplicity of the systems being modeled.

The state of the art seems a rather long way from being able to model human interpersonal communication, for example. An ordinary conversation between two people:

- Is interactive,
- Includes at least two cybernetic monitors, neither of which is linked directly to the whole system,
- Is multichanneled – the participants are never fully responsive to all of the information in the system and are selective according to variable criteria,
- Uses feedback that is symbolic, with meanings that are underdetermined within fluctuating patterns of nested contextualizations
- Involves a shifting set of motivations, some of which are emergent within the interaction; and,
- Involves memories and anticipations of conversations with people not physically present in the interaction.

A very important question is whether systems as complex as two persons in a normal conversation simply exceed our current state of sophistication (that is, we should devote as much resources as possible to increasing the power of simulations and developing nonlinear mathematical processes) or whether there are inherent limitations in kind to this approach (that is, we should not waste resources trying to do the impossible but should explore other ways of understanding such complex systems). I think that there is no way to know the answer to this question at this moment, but that each of us has to make a choice with insufficient information.

If we decide not to pursue the approach that leads to increasingly sophisticated mathematical modeling, what shall we do? One idea is to work in large social systems in ways that make them resemble and/or function (perhaps only temporarily) as if they were well-formed systems. This approach involves thinking systemically: making connections where there are not
ones, regulating the speed of feedback, improving the functioning of the cybernetic monitors, attending to the boundaries of the system, etc. The good news is that a large number of systemic practitioners exhibit all the signs of excitement and productivity in working this way as were mentioned above. Their work is regularly reported in the journals Human Systems: The Journal of Systemic Consultation and Management and Connessioni: Rivista di Consulenza e Ricerca Sui Sistemi Umani, as well as in the books cited in the fourth paragraph of this essay.

4. The discovery of reflexivity, or the positioning of the knower inside that which is known.

If we are part of a system, then our knowledge of the system affects (because it is itself a component) the system. But what is knowledge if the thing known is changed by the act of knowing itself? And who are we who know ourselves if we are part of a system? These questions emerge from the idea that our knowledge is not so much a reflection of reality (in the sense that Rorty would call the “Mirror of Nature”) but has a reflexive relationship to reality (in the sense of reflexive verbs in grammar – that which acts is simultaneously and inexorably acted on). Many people think that this is one of the BIG IDEAS in the 20th century.

Reflexivity in this grammatical sense lies beneath all three of the following approaches. (Note: the labels are imprecise. There is a lot of overlap here and the people referred to may well not like the category to which they are assigned – in fact, I believe that these folk will not like being assigned to a category at all!)

5. Constructivism


As you read these books, however, see if they do not retain a commitment to the Enlightenment’s notions of individualism and cognitivism. The site of the activity is in the mind; the challenge is to “know” when the “mirror of nature” is curved or cracked, and this leads to paradox.


6. Autopoiesis

A much more substantive (that is, “realist”) approach is focused on the ability of systems to organize themselves, or “autopoiesis.” This is the very serious suggestion that systems develop in ways that are prefigured by their own structure and experiences. The so-called Santiago (Chile) School is the origin of this idea. See: Humberto Maturana R. and Francisco Varela G. De

7. Social Constructionism

As I write the heading for this final section, I am very aware that I am talking about only some versions of social constructionism. See W. B. Pearce, “A Sailing Guide for Social Constructionisms” in Wendy Leeds-Hurwitz, ed. Social Approaches to Communication (NY: Guilford, 1995). The examples I would give here include those cited in the fourth paragraph of this essay. These practitioners use techniques such as circular questioning, reflecting teams, paradoxical interventions, positive connotations to the whole system, etc. as part of their tradition of practice. The form of knowledge that results from this way of thinking (described as phronesis above) has been elaborated by Vernon Cronen (“Practical Theory and the Tasks Ahead for Social Approaches to Communication,” in Wendy Leeds-Hurwitz, ed. Social Approaches to Communication, NY: Guilford, 1995).

A thought about where this takes us….

I have a sense that thinking systemically is practically invisible from the perspective of academia (in part because its notion of knowledge differs from that which is most valorized in academic institutions), and that many practitioners find thinking about systems simultaneously compelling and frustrating. My purpose in elaborating the differences between these two is in part to clarify and in part to argue for the legitimacy --- even in academic circles --- of what I am calling “thinking systemically.”

Thinking systemically entails abandoning many of the preoccupations of the Enlightenment. This is not a trivial matter. Richard Bernstein (Beyond Objectivism and Relativism: Science, Hermeneutics, and Praxis. Philadelphia: U of Pennsylvania Press, 1983) described what he called “the Cartesian anxiety” -- the fear that if we do not have absolute certainty, we have no knowledge at all. Historically, this anxiety has paralyzed us, Bernstein believes, and we need not to refute it so much as to be cured of it!

I find Bernstein’s argument clarifying. If the task is not so much to see how well our knowledge fits the Enlightenment criteria as to figure out what are the appropriate criteria for our knowledge, then we can move on with confidence, I think. And as we move on, the difference between practitioners and academics becomes less clearly marked. All of us find that we have less and less to do with epistemology and more to do with phronesis. We will find ourselves acting less often as sages or encyclopaedias and more as coaches, consultants, stakeholders, and citizens of the systems in which we live. That is, we should be less concerned about the hypotheses and propositions that we can assert than our abilities to enter into a wide variety of systems (or aggregates, or not-so-well-formed systems) and act effectively. The emphasis might well be on what we can do rather than on what we know -- that is, on our ability to think systemically in the contexts in which we find ourselves.