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Dear Phil,

Thanks for your letter and for the suggestion that your website could tolerate samples of our correspondence. I am not afraid of the consequences if you aren't; perhaps we will be assigned to adjacent cells (and I don't mean in a cellular automaton). You can scan pages for a PDF or I can send you digital originals if you prefer so that search engines can pick up on details, e.g., synonyms such as "heterarchy" and "subversion." Getting indexed can lead to strange happenings, however. Back in the (g)olden days of 2000 when the early Genealogy was first posted on the IIGSS site, any Google search for people and concepts in the history of science or philosophy ranked the Genealogy web page in the top ten qualified sources. Until that aberration was remedied, I couldn't do web searches without getting my own work back as a preferred reference ... talk about a vicious circle. Anyhow, if you think that correspondence postings will help you, please do it, and thanks for asking.

Every time I see another of your trend diagrams I have to hope that you took a trip along The Evolutionary Trajectory by Richard Coren for a different perspective on the subject. Although it is no longer newly minted, it belongs on the table beside recent contributions from Lovelock and Meadows and Fey and Gore and probably some others so as to inform (or confuse) the discourse about what is going on, what to do, and who's to blame. There is also a relatively new book by Ray Kurzweil called The Singularity Is Near with a related message. If we see in references like these some desirable changes to the global *intellectual* climate, then that is the kind of global climate change I could encourage, but only as a provocative preliminary, since I still consider my old "Re-framing ..." paper to be the guide to how minds will have to change deeply before better behavior can be learned. A paradigmatic revolution is needed, not merely a new sensitivity to old worries or a fear of apocalypse. In my reckoning helpful reformation will have to make sense topologically, cybernetically, and systemically in ways that few appreciate yet.

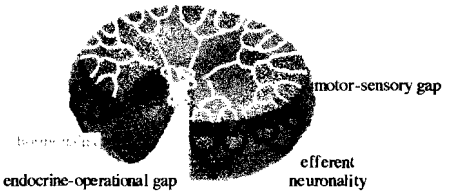
I don't know where you would like your own work to lead, so I can't imagine what responses you have received actually count as the good ones, but I'm glad to hear that you are getting some. My "What's Going On with the Topology of Recursion?" paper posted by SEED received exactly one interested response in three years' time, and that for marginally obtuse reasons. At least *I* still like the paper. In retrospect it did not sufficiently emphasize ubiquitous recursive cybernation as it should have done, but I was more concerned in 2003 with topology than with dynamics, so that was my excuse. Powers' magnum opus made a big difference in perspective for me, at least after a second reading. Even though his model leaves out more than half of what goes on in the human physio-psyche, he still contributes more toward a science thereof than all the hit-and-giggle psychological pundits put together ever have. Unfortunately, his "Making Sense ..." book doesn't (make sense), and even contains some glaring mis-statements, e.g., that cybernation only occurs in living systems and their artifacts. Nonetheless, his observation that we cannot control our behavior but rather only our perceptions is worth the price of admission all by itself. His original book (2nd edition) remains a hard slog but worthwhile, if only for attitude adjustment. After years of taking for granted the applied cybernetics of Stafford Beer, Peter Senge ("The Fifth Discipline"), Jay Forrester, etc., as merely interesting parochial exercises, I was moved at last by Powers' modeling and down-to-earth engineering attitude to appreciate cybernation as *the* ubiquitous science and to be reminded that all systemicity entails cybernation. If Powers had only pushed farther so as to explicitly acknowledge heterarchy (or second order cybernetics) in the von Foerster sense, he might have done the definitive work. By stopping far short with only a hierarchy of servomechanisms he leaves ample room for people to be dismissive who have thought about thinking and given up on servomechanistic approaches.

There will always be discomfort with the ouroboros, so none of us will live long enough to see "circular causality" triumph against the Western Rational Tradition, but of course this is itself a cybernetic effect, for there is nothing which self-regulates and persists so stubbornly as a *tradition*, especially where it is patched together out of counterfactual certainties. It is easy to see how things got into such a pickle. The instrumental croppings which humans have always used to insert themselves into control loops and engineer their environments became metaphors for linear piecemeal "cause-and-effect" in "open loop" philosophies, and the resulting zero[th] order cybernetics still prevails. If we need a lever, we hack off a tree branch, thus making an instrumental cropping which is taken apart from the topology and the cybernation of the living tree. As seen on TV, "even a cave man can do it," and most human traditions have done it in such a way as to focus upon tool-concepts (rather than recursive process-concepts) as the highest ideals of philosophies, religions, and sciences. Until people can hear the ghost of von Foerster rave on that "all processes are recursive," and then reckon with the cybernation this implies, I doubt that the essentiality of negative feedback and the consequences of unrestrained positive feedback will ever register. As for the consequences of ignorance, Al Gore gives us ten years (nine by now), while in The Revenge of Gaia, James Lovelock says that we have already overshot; Meadows et al are too chicken to admit that their models suggest that it is all over but the whining, and Willard Fey's ecocosm dynamics dramatizes with tough imagery a foul future if we don't do what nobody is about to do. Despite his own facts, Lovelock's overly-optimistic supposition nowadays is that there is still the possibility of a "way down" to a "soft landing," which echoes (without acknowledging it) H.T. Odum's considerations along the same lines back in 1992, but absent Odum's careful modeling to show what the real challenges are. Still no one seems to get it that it is in the nature of metastable systemic cybernation that it cannot change its ways until too late and therefore must crash in order to send a clear message posthumously at the funeral brunch, if not earlier so as to rouse those who passed out at the wake. Even (especially) if everyone on the planet became ecologically virtuous overnight, the consumer *chrematistic* could not survive the shock of its vital juices (money flows, resource usages, commerce, etc.) being radically and suddenly reduced. Had the First World ever been truly *economic*, things might have been different. When all is said and done, however, the modern gym with its stationary bicycles and treadmills and meaningless lifting of worthless weights will seem an especially apt metaphor for life in the over-developed fast lane. Perhaps if we could just attach electrical generators to all those spinners we could at least keep the lights on a little longer.

It is not clear to me what aspects and usages of "control" you find objectionable. Certainly, those of us who were indoctrinated with phrases such as "command and control" or "prediction and control" and told that "control" meant "control over" retain some bitter distaste, but after James Watt's governor and Norbert Wiener's servomechanisms it became possible to treat *controlling* in matter-of-fact ways. My definition of "control" is "the ordering of activities with reference to ends," this being but a slight generalization of the notion of cybernetic action and counteraction. After Arthur M. Young, I consider controlling to be a third derivative phenomenon, e.g., rate of change of acceleration (or "jerk" in physics), and it certainly is a relative phenomenon, i.e., relative to reference conditions, constraints, compellors, purposes or ends generally. In a topological paradigm, control is always dynamic, though the more conventional spherical paradigms are satisfied with control imposed as coercive stasis which encloses, isolates, confines, and eventually stifles its subjects unto an entropic death. I believe that control theory and control system engineers have used the word "control" well and consistently during the last half century (unlike the careless ways in which they and others continue to use the word "system"). I have come to believe that the notion that cybernetic approaches are merely engineering artifices, techniques or reductive analyses are wrong. For many years I was one of those people who dismissed cybernetics as artificial, not natural; applicable only in special cases, not ubiquitous; a matter of technique, not a matter of principle; and too paradoxical with its circular causality to be meaningful in the great "open loop" world informed by the Western Rational Tradition. Eventually I began to see that it was no accident that the "imaginary" component of every "complex" number represents rotation, that currents and cross-currents interact to form heterarchical eddies, that where there is a relative invariant there

must be cybernation maintaining it, and that — in general — things which go on can't not cybernate. The unit of *organization* per se — if there is such — is surely dynamic and cybernetic, perhaps a simple negative feedback loop as Powers suggests. "Under control" has real meaning in a dynamic milieu where "the eddy is the entity" (or the vortex is the veracity?) and "it rests by changing" [Heraclitus]. Following from this, toroidal topology is the natural metaphor for cybernetic circuits. Those who take cybernation for granted or dismiss it out of hand or find it too reductive or treat it as incomprehensible only cheat themselves, their paradigms, and their vocations. While a lot of the non-engineering scholars whose names we drop in our correspondence appreciated and advocated cybernetics, only a very few — such as Peter Senge — were ever able to raise the subject matter to the status of a "Fifth Discipline" and to teach it in seminars to real people, only after all that to have it dismissed as merely another technique for manipulating folks. (Last I heard, Senge had put aside cybernetic subject matter in favor of feel-good speculations about transcendent consciousness reminiscent of the barefooters of 1960s California, e.g., in a 2004 book called Presence – Exploring Profound Change in People, Organizations, and Society.) Even the hot young systemists who sponsored the "Principia Cybernetica" project have been so committed to a "hierarchy of meta-system transitions" posited by their mentor Turchin that they miss the point also. Meanwhile, searchers for a theoretical biology such as Stuart Kauffman and Robert Rosen wrote bold conjectural books about systemic biology in which cybernetics was never mentioned, while our Stanley Salthe mentions it only to dismiss it. Lovelock has a better idea when he speaks of the co-evolution of all aspects of the world together, rather than of biological evolution as separable, but even he stops short of seeing it all cybernating in unison. He does come close to admitting that "the eddy is the entity," but then backs off, claiming in effect that feedback cybernation is too mysterious to fathom, even though it happens to be the whole engine for Gaia as he describes her. Properly understood, controlling is a ubiquitous recursing activity, and the most effective controls are self-controls, whether in people, automata, or systems generally. An open attitude toward "control" is, I think, a prerequisite for getting on with any competent systemology.

Another prerequisite is surely to abandon the conventional (Aristotelian) wisdom that stasis is normal and change has to be explained; we must instead favor the converse where change is ubiquitous and invariances have to be explained. This lets us see how fashionable murmurings about "randomness" and "chaos" (and its edges) and "complexity" are fishy, coming as they do from a school of red herrings. In former times I got thrown out of conference discussions about "the evolution of complexity" because I wanted to talk about the evolution of *simplicity*. Just how can it be that there are any apparent constancies, recognizable steady states, invariant formulations, persistent standards, repeatable goings on, and — in the immortal words of von Bertalanffy — "et cetera"? And how is it that our limited minds can make sense of a blooming, buzzing turbulence? You can guess what my answer would be. Any answer framed in terms of "objects and relationships" couldn't help. It is no wonder that conventional mechanistic and morphological systemists have not figured out how to "integrate" disparate stuff so as to make things whole. When you speak of eddies in the swim of things, you have the better metaphor, and can partake fully of the poly-toroidal notion suggested at right (from p. 140 of my "Construing ..." pages) in which vorticulate entities may persist and move about, at once separate individuals but inherently connected to all else in their medium. Extended beyond fluidic metaphors to include circuits of structured entities, tori can interact in coordinations, couplings, embeddings, hierarchies, and meta-heterarchies (as sketched on p.132 of my "Construing ..." pages enclosed), so I am satisfied that the torus — itself a metaphor-by-inspection for the heterarchy of annular and meridial complements — generalizes naturally and provides a helpful, principled way to visualize all manner of cybernetic interrelations. I have found that whether anything is left out or not depends upon how much one is prepared to generalize, but I would be interested in what you think goes missing in topological iconography. Even in a metaphor for such a complex as the neuronal-hormonal system at right (von Foerster) in which every synapse is a connective gap where the reticulated nerves and the suffusive biochemistry interact



variably and heterarchically can be represented whole as a first approximation. Where it is important to build detailed models, e.g., for calculation and simulation, a discipline such as H.T. Odum's circuit language is required; and although visualization becomes impossible where complications are great, one need never give up on the topological approach. All I ask is that there be a breakaway of conceptualization and iconography that departs radically from the spherical metaphors and Cartesian partitionings which have so limited the WRT for so long. And perhaps "et cetera" is an essential systemological concept after all, since systems cannot be fully captured by any closed-form equations, graphical representation, or limited lists of properties.

One test of whether one's metaphors and methods are competent for the work at hand is whether they allow not only for a principled visualization of the subject matter as a whole but also for understanding at arbitrary levels of detail. Whether Odum-esque or otherwise, an appraisal of the reorganization of the American chrematistic across the 1970s watershed which you have studied would be a good challenge. Were there a very few important factors or very many? Was there a single triggering event that mattered more than anything else or was it just the whole situation that evolved en mess? To what extend were the changes deliberate, e.g., to feed the "military-industrial complex" or to defer "economic" collapse? Was it just the inevitable result of automobiles and suburbia as some have suggested? In my estimation, the retrogression of middle classiness since the 1970s emerges from at least the following, which can be seen as coupled events and also of deeply cybernetic changes in what has been going on:

+ whether they provide a [illegible] ladder for others.

1. Removal of the confiscatory federal taxes on high incomes;
2. Operation of the Viet Nam war as if guns and butter were not mutually exclusive;
3. Dispersal of middle class people, values, and politics away from city centers;
4. Escalation of executive salaries;
5. Widespread legalization of gambling;
6. Privatizations of public services, e.g., hospitals;
7. Shift from corporate regulation to corporate patronage, welfare, and subsidy;
8. Escalations in energy prices;
9. Periods of hyperinflation with an order of magnitude average increase over 50 years;
10. Radical increase in consumer debt leading to a negative rate of savings;
11. Obsolescence of low- and mid-range jobs due to automation;
12. Looting of pension funds and of the banking system;
13. Importation of workers and exportation of jobs at many levels.

Whether using a Stafford Beer approach or an H.T. Odum approach or a Jay Forester approach or something else, it would be interesting to model this and to untangle the interactions among purposeful manipulations (i.e., with reference to virtual attractors) and regulation (i.e., cybernetic reactions which maintain the status quo). The irony is, of course, that one could learn as much or more from hearing some key stories from behind the scenes during the period in question as from any retrospective model built on a mass of public information. What really happened, as always, defies technological analysis because it was inherently non-analytical. Unlike physical sciences where Ockham's Razor applies, social situations do not tend toward simple explications and are always more complex than one supposes and much more personal ... usually different than what is reported or conjectured from outside the inner circles. Conspiracy theories may be justified but they seldom identify the real culprits who have already taken the money and run. Somewhere between conscious knavery and unconscious cybernating counter-activity, the truth lies, all puns intended.

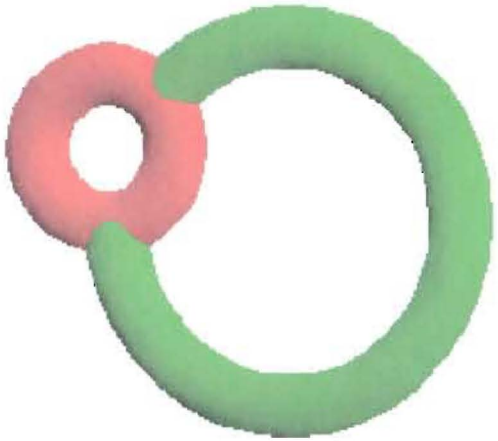
If you travel out to the Binghamton area, I hope you take the opportunity to visit with Stan Salthe. I am not far away from there and could join in. Some of us are no longer young and would do well to refresh friendly relations while we still can.

Best regards,

Don

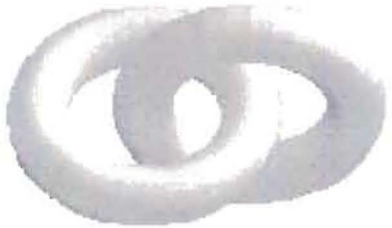
In idealized settings,
simple toroids may inter-relate with one another
in four kinds of ways:
as couples, as nested entities, as coaxial rings,
and as connected composites.

Of course, toroids may be separate and disjoint
or may intersect in any other way whatsoever.

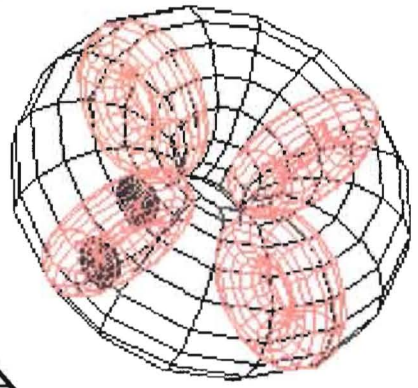


Toroidal Relations

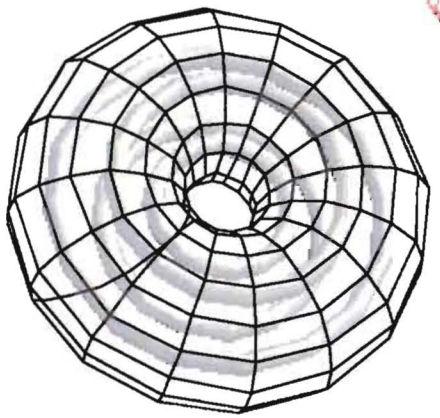
coupled



nested



coaxial



connected

Construing Systemicity
September 1995