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Dear Don,

I'm interested in exploring the issues of:
why individuals
why care about topological surface, closed or not
why toroids when they don't seem to connect
what you mean by 'set points'

I may well be speaking out of ignorance. I was recently asked a question in light of some of Ashby's definitions, only to find his introduction to cybernetics is still considered by some to be the only text on either systems theory or cybernetics, and I've never read it... Yes, I've gleaned enough to note it does seem to be missing what I consider the principal principle, ...(the simple rule for how to transition from growth to stability, and reason growth without limit otherwise risks loosing control). Still, I'm really out of the loop on lots of things I think.

a) There's a basic problem with 'individuals', though I can define them as 'loops that grow', because there aren't actually any loops in connections between things that occur as one time events (one hunger, one meal – no immediate connection to any other). It's like shopping, the flow may go back to the same source again and again, and then try something else unexpectedly. Maybe there are plays in game theory that are better exemplars for system connections, but I know nothing about that.

b) You focus on the different kinds topological surfaces, but why do systems need to occupy or describe a surface? Descriptors need to fit their viewers and common tools so 3D is more practical, but why focus on the 2D? I guess it offers a more easily understood model of linked things operating on hidden dimensions, the Flatland world as an example. Is that all?

c) Systems need to connect, and toroids don't seem to. In my early models the torus was a creature with a gut, and the internal circulation a somewhat illogical vortex cell, like a smoke ring, having no circles, just spirals. (remember I'm coming from a study of air currents) Still, with throughput such cells could take, combine and give, connecting with others through some near bye pools of 'stuff left lying around'. That's more or less what I observe in nature, that unordered resource pools are the main structure. One possibility is that each annulus is a plane (universe) of processes on a different family of dimensions or something, with some means of connecting. I guess the whole physical model thing is really the design for a kind of data filing scheme, something better than a simple folder in a folder design.

d) Set points are something I haven't dealt with much, except as whole system

states, considered from the point of view of the transitions between them.

Your toroidal model book is just amazing. Your other papers gave no indication how far you'd gone with it. I started with similar, if cruder, toroidal model drawings that looked more like little swimming organisms than trees, a torpedo shape with a gut, labeling the stages of through-put 'collect', 'transform', and 'distribute'. I represented hierarchy by connecting these independent actors to each other through free mediums of exchange (open pools) where useful bi-products from all kinds of things accumulate. One nice thing the free exchange model does is allow simultaneous autonomy, hierarchy and interpenetration of systems and system scales. I didn't ultimately find spatial structures satisfying though. The conceptual fit is helpful, but the physical match isn't so good, and they leave out the life-cycles of systems, their epic stories of specialization, the role of 'seeds', 'soils' and 'compost', etc. A variety of pictograms are needed I guess. Ones I don't think I've seen yet would convey the mirror relation between information in the system and the environment, and of course, how distributed organization works at all. My original sketch of the observer's role is a circle with a face profile turned to the inside, absorbed with an interior world of his own inventions... I don't know where those sketches are now, but enclose a quick freehand & my 1985 SGSR pictogram handouts which were out on a shelf for some reason, and a couple others.

In the end I shifted from focusing on getting the picture right to getting the discrepancies right. I went to a lot of effort to ground my systems thinking in readily collected faithful data on interesting subjects, linked with provable necessity to important things, using it to build good physical science explanations for unexplained characteristics of data and common events, and some of the persistent gaps in perception. I haven't had any measurable success in stimulating survival, profit or pleasure interest in it though. I guess at this point I know many reasons why, but it still feels odd how it continues to miss making the connection with people. Maybe it's all just overwhelming to people considering our position of amazing ignorance, or there really is some special reason. I think it fits so well to consider open systems as opportunistic, feeling their way along with a discovery process, maybe they really are living things and we actually do live in a very different world than modern thought would allow.

I recently revised and resubmitted a paper analyzing a fossil record of transition from one plankton species to another (draft at http://www.synapse9.com/GTRevisHB-2005fin.pdf) which leaves little doubt that systemization was the operating mechanism of the change. It includes a good argument why only systemization satisfies the requirements for what occurs during the punctuated equilibrium gaps of the fossil record generally. It's been in review since early Nov. Perhaps I'll hear something this month. It feels like a real shot in the dark, of course, not for the least because as a scientist I have no standing whatever and that's quite important to getting published in critical journals and then discussed.

Your graphics are super. I assume you've tried to publish it, a little flip book is what it looks like. I don't follow all your ideas and connections but it would make a nice object I think. I also liked your lists of systems thinking fictions and

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modes of application failures, and things like the hierarchy of toroidal structures stacked up on a center axies that become hoops, and ringing their annular axies. I built a wire model once with spirals wound on spirals on spirals. That a circular path (a dead end) implies a new polarity normal to its plane, and vis-à-vis, is sometimes handy.

What I've more or less shifted to might be called using the raw data itself as the system model, complemented with growth curve recognition and other aids. Such a non-model model can still be evocative, though of course not a concrete representation. It also has all the normal problems of data, but at least the images that develop are chock full of independent structural and behavioral discrepancies, making the 'real things' we come to imagine from them as unities of authentic connected and disconnected things, structurally similar to the originals.

Your series on system development patterns (p277- 282) is quite good. I emphasize the value of the underlying derivative rates of change too. They are very helpful in showing details of structural successions, with inflection points on any level providing useful landmarks. I might try to give derivative levels names as you have, but wouldn't always interpret them as having separate functions. There's probably an interesting list of exceptions, one being in economies where the rate of replacement corresponds to the level of investment. Another is when there are steady states between the growth phases, in which case each derivative hump is an complete systemization-to-decay event on its own. I mostly use derivatives for finding additional inflection point landmarks though. Assuming continuity, I look to how the sequence and staging of derivative reversals display the sequence of reorganization steps from all feedbacks positive at the beginning of a step change to all negative by the end. The attached sketches show two extremes of how that succession can be negotiated. Of course it all raises the question of what a measure is, what you have when you've arbitrarily connected the dots, and how systems sometimes seem to behave like models though they little in common with them.

You include the observer in the definition of a system (p19) by giving the observer sole responsibility for determining where to place system boundaries. I think real systems are full of tipping points, gaps, buffers, singular moments, separations between inside and out, etc., all of which provide testable boundaries. Most of the time you don't need to cross boundaries to notice changes in response as boundaries are approached I think. Sometimes to check if the boundaries I see are real or not I might look for the extra layers and grain of detail in the real thing I hadn't seen before (which doesn't exist in models), or more obvious things like checking my facts. No doubt the images that observers invent strongly influence how they will treat what they observe, but I think there are material levels of authenticity to our images and we can attend to them.

Perhaps the real contest with perception concerns what the song says, "life goes on within us and without us", that systems only work when they're 'out of control'. Human perception tends to lead us toward what we *can* control, not toward explaining how things work fine without us. To complicate the problem as I see it, perception provides us with something like an animated theatrical

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scrim through which we can attempt to observe the real world, providing a great show that persuasively paints our own vivid images over the feint shapes of the real but unreified world beyond. The fact that every human actually does seem to live in a different world should be clue enough it seems to me, but the leap out of our private theaters seems problematic. I'm not sure what's needed.

I see the unattainable quest as one of seeing inside other separate worlds. Given our starting position as that of observer, seeing things only from the outside, the first task is to learn how to recognize the outsides of things that have insides. One can build a catalog of things that originate from growth, for example. Still, there's a fundamental difficulty in getting humans interested in their 'neighbors' that are 'out of control', even if they're a source of trouble, or inviting you to a really great party.

Did you know that since the beginning of the Renaissance there has been an increase in individual economic productivity by a factor of about a billion? (1.035^600) That's hard to fathom, but a material fact, usually considered without any future. If people could see this great leap of ours in the universal pattern of organizational change they could apply their own experience with building a business, throwing a party or even just spinning a top. All complex building projects follow the same design principles of things coming together and falling apart. They also all teach similar rules about what sorts of excesses are dangerous, and that you really have the most fun if you don't try to get more than the most you artfully can out of them. The fact that the creative process on any scale applies similarly to any other scale uses the universal growth succession (the 4 phases I call Inflation, Integration, Disintegration & Decay; which you name the first 2: Investigation, Design, Installation) as a kind of universal corrective lens for our sliding scales of perception, bringing all change onto a comparable scale and letting us apply hard won knowledge of natural systems on one scale to others. That's one of the things I was referring to before when I said growth patterns had many excellent practical uses. If people learned that, the technical fix for the approaching climax crisis of capitalism is rather simple. We just copy from any other successful growth system in nature how to divert the feedback from inflationary growth, and then have a big party to celebrate the birth of a new species, Us!

All half in jest and half not, of course...

Best regards,

Philip F. Henshaw

02/20/2006

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