

Holistic Natural Systems – Design & Steering

Guiding New Science for Transformation

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Abstract (447 words)

Great societies and their cultures, like all natural systems (and as opposed to conceptual systems), emerge from their environments, organized and behaving as wholes with their internal designs coupled with their external worlds. So nature can be a great teacher of what complex holistic designs are and how they successfully work. Some notably become imperiled by challenges of their own making, as ours has; driven to endlessly maximize its growth naturally leading to ever-growing conflicts, internally and with nature. Now we can compare different kinds of growth systems in their natural contexts to expose their different ways of coupling with their contexts and steering. Some work out fine – the difference often how internal and external parts fit. It helps identify how some take paths leading to deep trouble while others work out fine – the difference is often with how internal and external parts do or do not fit together. Better steering (self-control) also comes from more exposure to internal and external contexts, allowing more prompt notice of new situations and sure response.

Recognizing emerging systems starts with noticing something new becoming a growing center of relationships, a nucleus of activity in a nourishing place, something sprouting. Storms, trees, people, businesses, organizations, cultures, etc., all start as emerging internal designs that build themselves using connections with nourishing contexts. That coupling between internal and external worlds continues to evolve as the new system makes its *home in the world*, lasting for a short or long time. Another coupling of internal and external worlds matters, too, between human thoughts and lives. Our mental worlds are only indirectly connected with our contexts and can blind us to the meanings of life, as in one of our earliest recorded experiences, not feeling at home in the world. Those feelings of alienation, doubt, and separation from nature, turn out to greatly affect how we design our living systems, even helping to make reality only seem conceptual.

So with this “kit of parts,” we explore emerging system steering using familiar examples. A simple diagram asks good leading questions to remind readers what emerging system designs and non-verbal cues for response to notice for successful steering. We also read the meaningful *progressions* as arcs of stories about relationships. We first get perspective from multiple views, like noticing smooth or rough takeoffs and landings as cues to look all around before guessing how they happen. Their likely validity comes from confirming their *nonlinear continuities* of *emerging design*, which are hard to fake, making the stories one reads into them *reasonable hypotheses* to check out. Finally, we use ordinary language to refer to natural systems in context, not abstractly, using careful language as our first systems science.

Electronic supplementary material

Manuscript http://synapse9.com/_ISSS-22/MS-HNS1-Design&Steering.pdf

Supplementary topics: http://synapse9.com/_ISSS-22/Supl-HNS1-Design&Steering.pdf (pend)

Talk slide set: http://synapse9.com/_ISSS-22/Talk-HNS1-Design&Steering.pdf (pend)

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7 1 Introduction

8 *“Nature is always more subtle, more intricate, more elegant than what we are*
9 *able to imagine.” – Carl Sagan¹*

10 *“If we knew what it was we were doing, it would not be called research, would*
11 *it?” – Albert Einstein¹*

In a scientific study of natural systems, the first question has to be, “What can one seem to know for sure when it is so clear we cannot know very much?” Nature is more than complex; it is everywhere, independently organized and *animated*². No wonder our world is so confused by what we ended up going into, a world led by brilliantly educated cultures unable to collaborate in managing an increasingly unmanageable world seemingly headed for near-term demise. The one place we seem to see hope is that near-term demise has seemed likely at nearly every turn of our 200+ history of rapid exponential growth, only with more reason now. The demise seemed to be pushed off in the past, only to return by creating and using some new form of social and economic organization. Can we do that again?

It does pay to look at the great array of dead ends we seem to be facing (Henshaw, 2020).³ One seemingly remote chance at present is for people to follow nature’s tried and true formula for resolving growth crises for long life. It would involve changing what the system invests its profits in (money or resources), from maximizing growth to supporting the emerging new life’s effort to learn how to cope with its challenging new world. That would mean our choosing to use profits to care for what profits built, the innovative systems we need to live, and make them sustainable within their

¹ Science Quotes – <http://www.planetofsuccess.com/blog/2019/science-quotes/>

² Italics is used for key terms that refer to natural physical circumstances structures and processes

³ An experimental list of World Crises Growing with Growth - https://synapse9.com/_r3ref/100CrisesTable.pdf

27 means. That is like what graduates and other hatchlings, new businesses, and organizations go
28 through when forced to end their implausible experiments and make things work.

29 **The natural systems approach**

30 That posture is what we take here, not only because natural systems are complex in so many ways
31 and engage with others. It is also because so many seem more controlled from inside than out, like
32 people and the weather. Each identifiable individual also seems to emerge from within the larger
33 whole too. So it is impractical and likely misleading to devise “controlled experiments.” So finding
34 what one *can* know requires extra clarity in observation and language. There is some precedent for
35 this as a scientific method (Boulding, 1953, Goethe, 1996). Here we focus on reading the evolution
36 of emerging system designs associated with their growth, as is what ultimately seems to power
37 natural systems.

38 One of the initial questions is whether natural systems *have* organization, or are they just
39 coincidences of uncertainty? The latter is what science has implied by representing how nature
40 works with the statistical implications of recorded data. Whether natural systems are forms of
41 organization or not can be looked at in many ways. It is also a great test of one’s perception to see
42 what makes the difference. One good start is to look up the etymology *organization*⁴ which roughly
43 means “made like an organ,” and from a systems view, “working as a system.”

44 I call it “new science” for natural systems due to the focus on studying how natural systems
45 develop their own rules, freely experimenting within the bounds of the fixed laws of physics. One
46 can follow how that happens by watching systems grow to become self-defined and self-governed,
47 coupled with an external environment; like us, developing by emergence of new design, not *cause-*
48 *and-effect*. In general, cause-and-effect implies the subjects are out of context, and *organization*
49 *principles* are not considered, such as the emergent properties of new relationships or of connecting
50 complementary parts that apply to things in context (Bateson, 2017; Henshaw, 2008).

51 Here we also start by recognizing that long ago, humans developed language as their first systems
52 science. It was our way of recording important patterns, relationships, situations, experiences,
53 identities, etc., and attaching our feelings and other meanings to share. A pair of the earliest now
54 common words from the dawn of language are mother⁵ and father.⁶ They name roles in a family
55 and society and identify the radical (at the time) new social unit and organization of the nuclear
56 family. When that occurred is unclear, as it may have been before there were words for it. That
57 two-syllable pair, *mo-ther*, and *fa-ther*, seem present in nearly every ancient language, though,

⁴ Etymology Online - <https://www.etymonline.com/search?q=organization>

⁵ Mother <https://www.etymonline.com/search?q=mother>

⁶ <https://www.etymonline.com/search?q=father>

58 along with the related *ma-ma* and *pa-pa*. There is a dispute about whether these nearly universal
59 terms are shared from one language to another or come from the earliest sounds infants naturally
60 make, which they do seem to.

61 They also correspond to the nuclear design of family life, an invention that may have spread like
62 the words from culture to culture.⁷ So, we can use common terms both to refer to some of our most
63 ancient and durable knowledge of life and the *self-defining* things, arrangements, and features of
64 life with which we live and work. That way of defining terms is very attractive as a source of terms
65 for natural systems for scientific study, as the whole systems they define and other methods of
66 scientific definition are unable to do. It turns out that the natural systems of life are far better
67 defined by themselves than any observer will ever be able to, with the possible exception of the
68 fundamental laws of physics, amazingly useful generalizations of things too small to observe, with
69 one exception. That is the implication that the laws of physics are universally deterministic,
70 disputed by the organizations of the parts that seem to develop on every scale of the known
71 universe, and the bounty of emergent properties of new kinds of natural systems also display (Volk,
72 2017, 2020).

73

Observation

74 We see natural systems behaving as a whole, as “things holding together” such as water drops to
75 the solar system, various organisms, and other forms of organization. How they work and what
76 holds them together are mysterious for many reasons. We generally cannot either see inside them
77 from the outside or see the whole from any place inside. So we often build an image that combines
78 what we see, often not with uncertainties and questions about what to follow. Another problem is
79 that a whole system does not work by “cause and effect” so much as by stimulus and response,
80 engaging networks of relationships. So, all parts tend to be responsive to every other. Like a family,
81 a system’s internal designs develop individually to be self-sufficient except for access to its
82 coupled networks of outside sensors and connections for information and resources. How they
83 work is a little more exposed as their designs and connections develop during their growth, so that
84 is one of the focuses of study.

85 Exactly why systems form by growth is a little mysterious, starting imperceptibly small generally,
86 in some enabling context, from some initial *germ* or *seed*. So, to an observer, they always begin
87 when first noticed. Also complicating the identification is that growth starts so slowly, but
88 regularly, adding new parts and building up activity, going from less to more systematic by taking

⁷ Question of ancient aboriginal Australian use of the terms, for example
https://www.westernsydney.edu.au/dhrg/digital_humanities/featured/past_projects/mama_and_papa_in_indigenous_australia

89 faster-and bigger steps, a nonlinear and *compound growth* pattern. As a result, novices may not
90 have preconceptions and notice them well before experts who constantly compare what they see
91 with what they think they know. That is why experts, poets, and others learn how to return to being
92 naïve observers at will. It is to have perceptions that are more open and truthful.

93 Why nature starts all systems with compound growth was the subject of the previous paper on the
94 nature of natural systems (Henshaw, 2021). How growth starts is a kind of explosion, which makes
95 it quite visible as a sign of emerging systems of system change once one gets accustomed to seeing
96 at a cue to notice what is happening. However, we can never have more than limited information
97 on what is happening. We can often only see when systems noticeably change, but awareness of
98 contexts and periodically paying close attention help. So it is getting to know them and watching
99 for cues to respond, as much as we do habitually in raising children or doing projects at work, that
100 expands our vision of what is happening in the world that matters to us. Natural systems science
101 is about watching for cues in familiar and unfamiliar contexts and learning to convert perceptions
102 into information for others using familiar language.

103 Reflection – *What it comes down to is that we do not define reality.*

104 That is what nature does! We just observe and take simple notes on things that
105 are quite complex we call “concepts.” That, unfortunately, detaches our notes
106 from the contexts that would have given them meaning. So to build rather than
107 lose meaning, we need to use concepts to help see how much they leave out as
108 an ongoing learning process. It works best when making observations to pause
109 at the end to get a broad sense of the contexts, as well as taking away the facts.
110 That makes it much easier to discover new things when you go back for what
111 else there is.

112 One successful way to study the organization of systems is to look for patterns from one place that
113 also occur in others, say patterns of individual character, delayed reaction, overreaction, etc. That
114 validates some questions while raising more, forming a tree of branching learning. For example,
115 it can help to compare kinds of boundaries and look at what relationships do and do not cross the
116 boundary. With that open approach to revisiting the same question finding new information both
117 enriches and validates that the inquiry is of natural rather than conceptual designs. When checking
118 theories, one must look for exceptions whenever the theory seems repeatedly confirmed. Nature
119 will always give only similar answers.

120 The usefulness of theories and concepts varies considerably. A more advanced but quite practical
121 method is to first develop a theoretical model and then use it, by contrast, to aid in searching for
122 how nature departs from it. Theories are always abstractions (Back, 2006) that simplify and detach
123 a natural pattern from its context but can also refer to the natural phenomena and contexts of
124 interest. For example, when increasing pressure on a system, the result may be unexpected, such

125 as causing it to *jitter* before it fails. That exposes another level of organization and raises a broader
126 question about how systems under pressure will unexpectedly behave. Disturbing pressures can
127 have horrible effects on people, such as causing many strange kinds of panic, while in other
128 circumstances causing beautiful overtones from musical instruments. However, that pressure can
129 cause unpredictable disturbance also tells us that all systems have internal designs that can be
130 disturbed. That offers a very useful cue to respond to systems behaving unexpectedly, to see what
131 may be pushing the limits of their resilience. How to use these techniques will be one of our focuses
132 here.

133 As we study signs of development and change, we see more evidence that systems are not
134 numerical in design but organizational, built by forming networks of relationships that create
135 bonds by working together. However, numerical variables of interest are still useful for prompting
136 us to look to nature for answers, asking the main question: “What are we seeing, and can we
137 check?” For that, we generally need to accumulate contextual information as evidence and search
138 and digest our perceptions using a combination of *reasoning* and *feeling*. That makes full use of
139 our wonderfully and essential but underrated holistic senses. Our feelings help to enrich and
140 balance our reasoning, and reasoning to enrich and balance our feelings. It does depend on being
141 open one what one finds, but that process of enriching and validating one’s perceptions can ground
142 one’s thinking deeper and deeper in reality.

143 For example, the question “is the bolt tight” seems like a simple question. However, it turns
144 attention to both the bolt and its contexts and what might have prompted the question, like concern
145 about the cause or dangers of a loose bolt. Asking why the question came up is where the variables
146 are, prompting a search of the context. So, in general, expecting to learn something new every time
147 you ask a question about a natural system is a great sign that one is learning from nature rather
148 than looking for abstract answers. If not, one might be asking the question wrong or perhaps asking
149 it of a model or theory that always gives the same answer. What does that mean? It means that any
150 meaningful information from nature will reflect *all* the relationships in at least the immediate
151 context.

152 **1.1 The fascination**

153 The fascination with how nature works by itself, what this study came from, did not come from
154 trying to imitate nature but from noticing all the little transients that seem to begin and end all
155 events. They turned out to be the *takeoffs* and *landings* of systems emerging with compound
156 growth. It came up in freshman physics during a demonstration of using a strobe light to trace a
157 digital path of a ball in gravity, producing a simple parabola one can then calculate. So, to make a
158 small joke, I asked, what about the tossing and catching? I thought it funny that we only discussed
159 the part of the behavior that closely followed a fixed rule. The brief dynamic beginnings and ends
160 of things generally do not.

161 Later I found that split attention between animated and deterministic subjects was rather global,
162 with most of the sciences looking only for fixed rules. Perhaps it was just having not found useful
163 ways of studying emergent systems with individual designs and behaviors everywhere in nature.
164 It might also have been that science has been unusually effective in making things profitable from
165 its beginning. Hence, as a culture and often also doing work funded by profits, for methods of
166 control, it would have grown faster than other forms of inquiry and tend to dominate. Also,
167 naturally funded from profits, it would be natural for funding sources to ask it to study how to
168 control and be certain of profits, steering the culture of science toward assuring the most profitable
169 methods of control. In any case, I left physics and went on to study architecture, where how
170 complex designs emerged and came to completion, the beginning and ending transients of lasting
171 services, is always very important.

172 Reflection – *The cost of our simply tremendous history of success*

173 For centuries science and business mined profitable rules of cause and effect.
174 That seemed to come with a solitary focus for developed societies on growing
175 our control of nature and growing money, now quite visibly having distorted all
176 of human consciousness. Perhaps that is what blinds everyone to the nature of
177 emerging systems and the other amazing secrets of nature's success while
178 neglecting our tremendous emerging mortal threats of its overshoot!

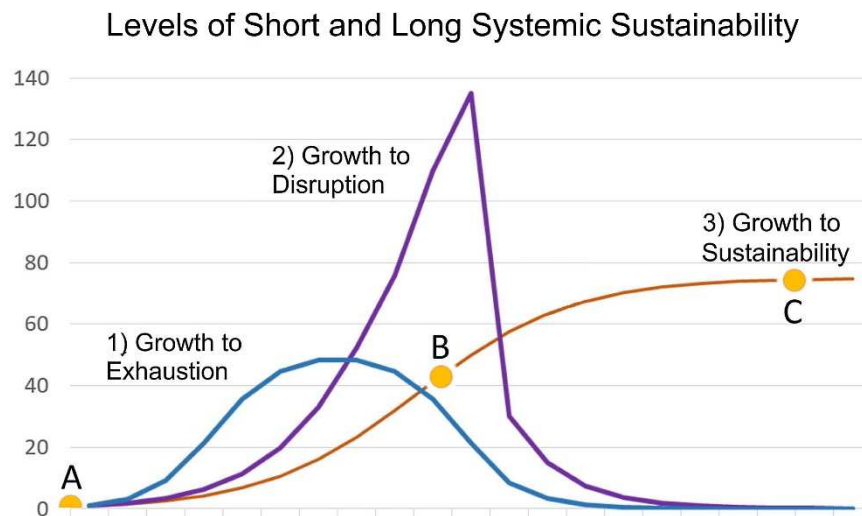
179 **Comparing growth systems**

180 The method introduced here for comparing different kinds of natural systems in context is a new
181 kind of natural systems science. There are limitless variations in how systems grow, most having
182 identifiable unique individually. That comes from growth being an *individual, internal, animated,*
183 and *exploratory* process that occurs in an also individually unique context. To study them, we start
184 by comparing three generic internal models and three internal design strategies for growth (Figure
185 1). Then, we study and compare the shapes of their development curves as records of *system*
186 *learning*, looking for patterns of internal and contextual design and development and potential cues
187 for responding to them. That is also how we compare natural systems with those developed by
188 people, generally finding that they have different structures but similar growth processes.

189 We look for how an emerging system's interior and exterior worlds are coupled, how each
190 navigates its challenges and otherwise behaves. We study natural self-organizing systems as self-
191 animated since what allows them to develop is a design for capturing energy, but still not having
192 human characteristics. So “half alive” and often taking off in unexpected directions, like
193 whirlpools, air currents, and fire, exhibiting behaviors we also see in people and social networks.

194 Systems displaying them include astronomical nebulae (Wiki-a, 2022)⁸. Even single-cell
 195 organisms display elaborate forms of such behaviors, like slime mold. Naturally occurring systems
 196 that include people and human-made systems that include people will display human
 197 characteristics but still not be human. So, it is important to use clear language.

198 What can you say about the systems that develop along the growth paths seen in Figure 1. They
 199 could be either human social systems or biological or chemical systems. Those kinds all produce
 200 different growth curves like those seen here. Are the shapes associated with different animated
 201 processes? Are the ways the curves change characteristics of any familiar internal or external
 202 conditions likely to affect a system's behavior?



203
 204 Figure 1. Degrees of endurance for emerging growth systems: Failing for
 205 being uncreative, Failing for being too creative, and Having it just right.

206 All systems appear to require successful germination by some new combination of things that can
 207 concentrate energy and resources for building up their animating structures, creating a *viral* or
 208 *contagious* process. For systems that show Type 1) Growth to Exhaustion, resources run out,
 209 starting with growth as the system forms by using resources to build itself, but then declines
 210 following some kind of bell curve. For Type 2) Growth to Disruption systems, the resource is
 211 relatively infinite, or the system's creativity lets find other resources. Without any constraint,
 212 growth might continue to accelerate until it disrupts its internal processes. That case lets us
 213 compare a match that pops and blows itself out without consuming all the phosphorous with
 214 creative human relationships, businesses, and societies with boom-to-bust system designs. That
 215 opens up many examples to study with much the same problem. How many familiar examples can

⁸ Astronomical nebulae <https://en.wikipedia.org/wiki/Nebula>

216 you think of for Type 1) and 2) growth? The one uses a resource till it runs out. The other expands
217 faster and faster till it upsets its internal workings.

218 Then some systems grow and avoid those growth hazards, Type 3), accomplishing all three
219 transitions, A, B, and C, to have a relatively long period of sustained climax before meeting some
220 later decline or hazard. That kind of system must be internally creatively adaptive enough to
221 change with its circumstances. It needs to expand beyond the limits of its initial resource and then
222 shift to using a sustainable resource, no longer using its internal building capability to expand
223 exponentially but to maintain the health of its internal design and environment. That means having
224 the capacity to sense cues to avoid hazards, i.e., developing an instinct for self-preservation and
225 survival. There are various examples of simple energy or chemical systems that are resilient and
226 self-regulating as if having a survival instinct. However, that is not what we mean to focus on here.
227 A simple case of a near-living system adapting to its environment to become sustained for a while
228 was that of a warm air current. It was temporarily blocked by another and then, as if “waiting its
229 turn,” resumed its travel on its original path. It is not important but a reminder that non-living
230 systems also sometimes creatively adapt.

231 So to apply the comparison of those three growth system types, we can ask:

- 232 • Which of the three paths seems most like the world’s we live in?
- 233 • How are we doing at reading the cues for changing our strategies?
- 234 • Civilizations can live quite long, and ecologies and species much longer. If we are so
235 inventive and perceptive, what are we missing in the world are we missing.
- 236 • The people running the planet tend to be the best educated and most communicative
237 types of people from good families; where is their mistake?

238 **Basics of systems steering**

239 Passive environmental influences such as resources, pathways, and constraints, to which natural
240 systems make an animated response, show systems navigating their terrain using *internal system*
241 *steering*. That would apply to all organisms, of course. It would perhaps also apply, if differently,
242 to weather systems, which are internally animated and respond to external change. But, on the
243 other hand, one would not call it system steering; if a physician, gardener, or other knowledgeable
244 caregiver gives *support* or *assistance* to other things. That is *system guidance* instead, not *steering*
245 unless you consider the guiding person a part of it; then, it is a system of mutual steering of the
246 guide and the subject. Externally *forced steering* of a system not as care would be *interference*.

247 The self-steering of natural systems is the subject here, how animals, communities, or other *self-*
248 *preserving* systems are alerted and respond to threats and opportunities in their paths. We mostly
249 aim here to broaden the context of thinking around the similarities and differences between the

250 strategies for steering ourselves and steering our planet. Both have challenges to overcome and
 251 opportunities to grasp.

Caring for a home and garden	Taking a trip with others
Continuous self-correction, such as like homeostasis	Following a practiced script or method
Responding to threats and opportunities	Hunting for things matching or complementing a given pattern
Responding to external cues to take action	Responding to internal cues to take action

252 Table 1. Different kinds of system-steering for people or other systems with
 253 internal guidance help them navigate. Think about the varied purposes,
 254 conditions, and cues for response required for each.

Ostrom – Guides to common interests. (1990, 2009)

Exposing regional stakeholders to their contexts helps them understand what is happening and make better choices.

Midgley – Community Involvement. (2007, 2011)

Exposing community stakeholders to their contexts to help them understand what is happening and make better choices.

Cabrera – DSRP systems thinking. (2008, 2022)

Deepening perception of reality by looking for how four dimensions of reality connect: Distinctions, Systems, Relationships, and Perspectives,

Smith – AIC systems management. (2009, 2013)

Expanding the powers of Appreciation, Influence, and Control from and on internal, transactional, and contextual domains.

Henshaw – Growth as natural system design. (2018, 2021)

Connecting how we and nature both make new systems by expanding on expanding germinal forms that start and change scale as wholes.

255 Table 2. System thinking methods for enhancing the learning experience

256 Figures 2 & 3 below show pictures of the *defensible domains* of a family home and a car on a road
 257 trip as examples and symbols of the more general relation between a natural system's *internal*
 258 organizational center and its *transactional* and wider *environmental* contexts.

259 The practical steps of steering such systems in all variations follow the same general pattern. There
260 are four separate or blended steps: *sensing*, *responding*, *preparing*, and *acting*. For these two
261 examples of the home and a traveler, the specifics of any sensing and response for one of either
262 kind could be quite different. We know that intuitively, but it is also because *steering* is an
263 extended series of *emergent designs*.

264 Examples of merging the four steps into a single flowing process are important. They often include
265 steering cars, coordinated body movement, dance, flocking and conversation, and of course, the
266 self-governance of economies. Hesitant response; pausing to recalibrate with each response is also
267 common. For example, birds often move that way, as do artists and designers who move one
268 careful step at a time. Then there are people pressed to respond but unable to, who freeze instead,
269 their “animal spirits” kept from moving them into action at all until they recover. Another
270 interesting pattern is strategic hesitation, such as birds waiting before taking flight or people
271 waiting to initiate a plan, waiting for the right conditions.



Figure 2. Defensible domains #1



Figure 3. Defensible domains #2

Suggesting the nesting of the *Internal*, *Transactional*, and *Contextual* domains of living systems for engaging its powers of (or corresponding to) *Reasoning* and *Feeling* for navigating environments, responding to a contexts *Distinctions*, *Systems*, *Relationships*, and *Perspectives*

272 Steering, then, seems to rely on feeling as a primary guide. You would not think that, given how
273 people say they are reasoning their choices of what to do. How many kinds of feelings we have is
274 not clear, but very many, and they are essential for our survival instincts and help us feel our way
275 along the steering demands listed in Table 1. For feeling and action to be in sync and steering
276 choices to flow smoothly, sensing and response coordination mechanisms must be on the levels of
277 both autonomic nerves and whole system behavior. We certainly react and feel that when
278 responding to an unexpected threat and also while cruising along expertly steering a car while
279 talking or thinking about other things. You might say feeling one’s reasoning and reasoning one’s
280 feelings is a mind-body collaboration central to steering.

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Unchangeable whole systems

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The evidence that many kinds of natural systems begin, develop, work, live, and only change as wholes includes how our bodies grew from single cells. Our growth in the womb changed our form a few times, and after we were born, our bodies and lives also changed form repeatedly while retaining the distributed individuality of our characters and behaviors. Part of what makes enduring individual wholes possible is the coupling of the self-contained internal system and its connections with stable external systems – a coupling of a separate world with connections. That is also what makes every enduring family in its home so unique and enduring; little can interfere with its defensible internal world or its connections. It is similar for cultures and languages developed by a growth process as wholes, but without a physical skin or enclosure, as “open systems.”. Their organizational structures make them unique and able to be flexible and adaptable as whole systems, but only able to change as wholes. The primary “force” holding them together is the emergence of versatile properties from making complementary connections. Simple examples are having internally controlled openings between *interior and exterior spaces* or having *cars on streets*. Even simpler examples include *knife and fork* and *pen and paper*. It genuinely seems that everything *made* is made of these.

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Cultures and languages can only change the structures that make them whole, their *tensegrity*, by internal processes *of the whole* to change what holds them together. The key to their combined durability and flexibility is that they have something like a “blockchain design,” with “authentic copies” of the design for the whole system like a genome, distributed to every part for active use or reference. The specific means of whole system coordination are often more visible than how a genome unifies an organism. Even in that case, we can’t follow how the whole system coordination works. We do see there must be a coordination mechanism, though, and see direct evidence. That validates looking for more.

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For each cell to check if what other cells make fits the master plan is also something a body would likely need to survive. So together, that gives one a puzzle for helping connect related observations. For familiar cultures and languages, the puzzle is how they remain so self-consistent over such long periods and are also so flexible and innovative. We seem to see the coordination mechanism in every cultural or language engagement, relying on two things. One is distributing authentic copies of the master design by acculturating people to that way of living or speaking, in youth or by immersion later. That gives them “the authenticated copy” to check against others for consistency, “the distributed ledger.” For languages and cultures, the authentic copies contain a large part of their history, much like every family conversation relies on having access to much of the history of family conversations.

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If one watches closely, each connection with someone starts with checking to see if there’s enough recognition as being part of the same culture or having enough shared roots of meaning to understand one another. Computers don’t understand, but we design them to repeatedly

318 authenticate all transmissions. How else could you have confidence about what is being
319 “transmitted.” So in cultural or language relationships, we rely on connecting with the roots to
320 share meanings, which maintains the root meanings forever since the root meanings originally
321 come from root experiences with others and nature. That’s the real foundation. The one way the
322 root meanings change, which does happen, is by innovation in meaning that extends the culture or
323 language as a whole.

324 So it seems that the most successful of humanity’s inspired, proud and ancient cultures found their
325 way into such a troubled world as we find today, perhaps by having taken a wrong turn some time
326 ago, while all along evolving to work and stick together as a whole. So like all of us individually,
327 our cultures can only repair our path by changing as a whole. Of course, we’d still need to keep
328 checking the new and old root meanings as we go, but to relieve our troubled steering of the planet
329 travel to safety, it seems necessary for it to result from inspirations of the whole.

330

331 **Physics and the science of natural systems**

332 Both physics and natural systems science aim to offer reliably useful abstract models of how nature
333 works. However, their use is quite different. The use of the one is predictive and of the other
334 exploratory. Natural systems science is about what we can discover about the organization of
335 nature, something that numbers cannot represent. There is also a disagreement in some quarters
336 about whether nature works the same as our most useful abstract models. Physicists seem mostly
337 non-committal, simply relying on the equations that fit the data for predicting controlled or
338 uncontrolled outcomes and represent the universe with grids of numbers.

339 In contrast, natural systems science uses models to assist with discovering forms of organization
340 in nature, prompting targeted questions about continuities that depart from the simpler paths of
341 models. For example, a car will never follow the exact shape of a road, but that shape is a good
342 place to start when looking for the true path that a car did or would likely take. For example, that
343 might help identify which skid marks were associated with a particular car's path of travel.

344 For another difference, physics assumes “cause and effect,” implying that there will be no effect
345 lacking an external force and that models of external forces determine events. The models based
346 on it have proven exceptionally powerful but do not raise questions about the contexts in which
347 they are used. So our social systems have gotten into serious trouble, unaware of the consequences
348 of using them.

349 The premise of natural systems science is different. It is to look for and study *emerging individual*
350 *systems*, their causations, internal designs and relationships, evolution, life cycles, self-steering,
351 and their external connections and relationships (Henshaw, 2015, 2018, 2020, 2021). The real
352 beginning of this approach to systems science was discovering a new way to use the central law

353 of physics, the conservation of energy. It was to ask: How can physical systems begin and end
354 while maintaining continuity of their energy needs and uses? The answer that turned up was
355 “emergent organization” achieved by the deeply nested internal physical processes of what we see
356 from the outside as flowing numerical “growth” (Henshaw, 1995, 2010).

357 Not all kinds of natural systems are like those that develop as wholes through an organizational
358 building process we call *growth*. However, they are the most useful kinds of natural systems that
359 people are part of, work with, work on, or work through. They are also special because they are
360 designs of nature powered by developing complex organization more than by quantities of energy.
361 So, they can regularly break some of the “laws of nature” for a while, like some of the laws of
362 thermodynamics. So, one might ask if this stuff called “natural system organization” is something
363 real or imaginary, a new kind of proposed “dark matter,” maybe?? How else might it have slipped
364 by the attention of our many highly advanced fields of modern science?

365 The terminology comes from what the words of natural language refer to in nature, so by definition
366 to what is real (not theory), and what the inventors of language saw and asked about as natural
367 phenomena. Western languages all get the term *organ* more or less intact from the ancient root
368 Indo-European terms ‘*werg*’ and ‘*ano*’ that mean respectively ‘work’ and ‘do’⁹ Combined, they
369 mean “thing that works.” So in the word ‘*org-an*’ the prefix ‘*org-*’ refers to *the thing*, and the suffix
370 ‘*-an*’ to the *doing*, and “*org-an-iz-ations*” can be read as “*creations made of working*
371 *relationships.*” So natural systems, as the “*working relationships created for the work of nature,*”
372 seem to be both organizations and organs in the traditional sense. So, no dark matter, just a better
373 understanding of the meanings of the common language.

374 It is such an important subject that one would expect it to be well studied. It seems that the lack of
375 study may be due to the reality that natural processes define having a form that cannot be
376 represented in numbers or theories, such as people define. However, better questions about natural
377 forms can be raised using numbers and theories to illuminate natural designs if used well for that
378 purpose. That poses a problem for physics, which can only approximate nature with random
379 variables in any case. A further barrier to representing natural systems with physics is that they
380 emerge from their environments by internal causation, composed of complex systems of
381 relationships complexly coupled with environmental context. So though this approach to studying
382 the working relationships that let nature’s systems work by themselves has only begun to develop,
383 the progress relies on standards related to physics and has come up with some useful new
384 questions.

⁹ Organ – Etymonline: <https://www.etymonline.com/search?q=organ>

385 **1.2 Ancient Cultural Roots**

386 “The concept of alienation identifies a distinct kind of psychological or social ill; namely,
387 one involving a problematic separation between a self and other that properly belong
388 together.” – David Leopold

389 **Conceptual blinders**

390 There are two fundamentally different ways of learning. One is to absorb direct impressions from
391 senses, observations, and experiences without interpretation, as we all do at times, especially at
392 unguarded moments. Artists and skillful observers do it for their work and others for connecting
393 deeply with reality. But, of course, that would have been the only way humans learned at first and
394 what began to change as we developed language. It is unclear when humans started to rework our
395 impressions of life to replace them with more powerful abstract concepts for life. It was probably
396 in stages before or after our brain’s neocortex developed, so a range between 90,000 and 50,000
397 years ago seems plausible (Wayman, 2012).

398 Concepts are powerful because we can arrange and change them quickly, giving thought an
399 ultimate modeling tool and toy for rearranging ideas of reality. They can work wonderfully in
400 combination with our accumulated direct observations, feelings, and impressions, each informing
401 the other. However, because concepts are inventions and easy to manipulate when we first learned
402 to build entire realities from them, it makes individuals and communities vulnerable to becoming
403 quite confused. The problem arises when making decisions based only on concepts when they
404 either blind you to or you simply lack any accumulation of direct observations, feelings, and
405 impressions of the reality your decisions will impact. This potentially systemic loss of connection
406 with reality does seem to be the source of, perhaps not all, of course, but certainly many of
407 humanity’s major mistakes, like humanity’s current accelerating destruction of our home on Earth.
408 The evidence that a blind fixation on a concept is the cause of that disaster is that we have long
409 had a rule for endless compound growth. All of nature uses compound growth only as a brief
410 kickstart for building systems.

411 There is extensive evidence that humans have become confused about our relationship with reality.
412 First, there is the very long history and innumerable kinds of alienation we experience. Alienation¹⁰
413 is fear of or despair over losing attachment with the world, other people, or other communities. It
414 is both a common modern and ancient experience. The story of Adam and Eve seems to record it
415 as Adam eating from the “forbidden fruit of knowledge” and as the “fall of man” (i.e., alienated

¹⁰ (Leopold 2018). *The Stanford Encyclopedia of Philosophy* <https://plato.stanford.edu/entries/alienation/>

416 from God). What more perfect poetic description of humankind becoming lost in its own false
417 realities could be? There are also the wars, all the wars, which rely on soldiers alienating the people
418 they face in battle — another seemingly near-perfect match with concepts resulting in a loss of
419 context.

420 There is also the strange matter of worldwide cooperation on maximizing the compound growth
421 rate of our consuming and disrupting the natural world. Perhaps the oddest part of it is how the
422 people managing the world catastrophe are the elite of the educated class. They are the leaders in
423 high-paying positions in the world's governments and education, research, business, and
424 institutional communities. They are simply the best of us, well liked, well mannered, and
425 responsive to others in every way at home and in their communities.

426 The problem seems to be with the stark black and white difference between the manipulation of
427 concepts we are driven by at work and the enjoyment contexts at home. Even sustainability was
428 redefined as “business as usual” by a little manipulation of concepts to make business work. See
429 footnote below for links to further context.¹¹

430 Ah, to feel at home in the world. It happens now and then; some people sustain it for long periods,
431 of course, then also usually have to rejoin society again to “get along.” Many people have a natural
432 ability to easily form, attach, and detach from their conceptual worlds. A home is virtually always
433 a place for being real. The battle between home life and global power run amuck will not be won
434 by finding a way to be happy oneself. We need more from us to make the world happy it seems.

435 **A Long-Lived Hestian Culture**

436 Great societies and their cultures grow from small beginnings, usually beginning somewhere a
437 local culture of competence developed. Greece and Rome are familiar, and many other strong
438 societies have developed too. Some lasted far longer than we expect societies to last today, like
439 long-lived bronze age societies.

440 Conceptual thinking for systematically using technology to build cities began about 10,000 years
441 ago (Whelan, 2020). When that combined with law, finance, accounting, and central government,

¹¹ Further author research context in Reading Nature's Signals: <https://synapse9.com/signals>
Institutional malfeasance - How Sustainability became BAU
<https://synapse9.com/signals/2022/02/18/how-sustainability-became-bau/>
Why we see life as conceptual - Betrayed by the power of our minds
<https://synapse9.com/signals/2022/03/13/betrayed-by-the-power-of-our-minds/>
List of ever-expanding crises - The Top 100+ World Crises Growing with Growth
https://synapse9.com/_r3ref/100CrisesTable.pdf

442 allowing leaders to collect profits to use in increasing their power, creating a boom of boom and
443 bust civilizations, seems marked by the many short-lived Bronze age Mesopotamian city-states
444 (Grossman & Paulette, 2020; Wyse & Winkleman Eds., 1999; Van de Mieroop, 1997)). However,
445 the slightly older Egyptian, Minoan, and Aegean island civilizations were different, more
446 interested in the arts of living than power. These seem to be the source of our modern world's
447 mixed heritage of art for art's sake and power for power's sake (Burkert, 1985; Dinsmoor &
448 Anderson, 1973; Henshaw, 2015).

449 The bronze age is dated roughly from 3000 BCE to the beginning of the Greek Dark Age, 400 year
450 period between the collapse of the Mycenaean civilization, around 1200 BCE. That was followed
451 by the emergence of the Greek Archaic Period, around c. 800 BCE, coinciding with when Homer's
452 work appears to be the first use of writing to record vivid stories. The best-known of the long
453 enduring civilizations of the Bronze age are those of England (Pearson, 2009), the Aegean
454 (Burkert, 1985) (Dinsmoor & Anderson, 1973), Minoan Crete (Willetts, 1977), Egypt (Wilson,
455 2013), and China (Loewe & Shaughnessy Eds., 1999).

456 According to Burkert as well as Dinsmoor & Anderson, a long-lived proto-Greek Aegean culture
457 lasted about 2000 years, traceable by its unusual ritual home design, centered on a low hearth
458 called the *Hestia*. The Hestia was at the center of a large gathering space wide enough to need
459 internal columns. The Hestia was where the home kept its perpetual flame but was usable for
460 warming food too, so with surrounding space for gathering, the home was well designed for long
461 large meetings. The archeological evidence places examples of that design from the beginning to
462 the end of the Bronze age. It is found at the bottom layer of Troy in 3000 BCE and in the Minoan
463 and Mycenae palaces just before the Greek dark age.

464 Its design even became the model for the revolutionary innovations of Greek architecture, with
465 classical Greek temples copying the form. The design is also still associated with Hestia, called
466 and perhaps literally the "*the first of the gods*" in the role of "*guardian of the sacred flame of*
467 *hearth and home,*" the low hearth for the perpetual flame of the home still called "the Hestia," too.
468 That remarkably long enduring central institution of an advanced pre-Greek home culture also led
469 to classical Greek architecture, democracy, arts, and sciences. Modern western traditions of hearth
470 & home are also directly inherited from its devotion to the sacred life of the home (Dinsmoor &
471 Anderson, 1973). Curiously that very long-lived and historically important culture seems to have
472 no name, so we can call it *the Hestian culture*.¹²

¹² One of the more fascinating features of the well documented ancient archeological and cultural heritage closely associated with what may be the actual first of the Greek gods, with a 2000 year tradition, having great influence even today on Greek culture, is the near total absence of reference to it in mainstream histories. It is as if mainstream histories were restricted to stories of city, wealth and army builders, which the Hestian culture, as advanced as it was in many ways, was not.

473

Then Growth for Its Own Sake

474 *“The warlike states of antiquity, Greece, Macedonia, and Rome, educated a race of soldiers;*
475 *exercised their bodies, disciplined their courage, multiplied their forces by regular*
476 *evolutions...” – Gibbon*

477 *– The Rise and Fall of the Roman Empire –*

478 We also inherited from ancient Greece its later classical traditions of the public sphere (Polis¹³),
479 the name for the city states of classical Greece as administrative and religious urban population
480 centers that later became centers of wealth and power (Egen, 2004). So, it represented “new
481 culture” in historical terms, for the building of Greece’s city cultures and a counter force to the
482 much older Greek home sphere (Oikos) that inherited Hestian culture.¹⁴ Part of that change was
483 due to the 350-year interceding dark age between the long establishment of Bronze age Hestian
484 culture and the emergence of classical Greek culture, some 150 years later. With the latter also
485 came the emergence of Greek science and the quick discovery it could be extremely profitable
486 (Engen, 2004; Farrington, 2016). Thales¹⁵ was the first scientist, a gregarious Ionian trader who
487 sailed the Mediterranean on business, also collecting mathematical principles from every ancient
488 culture. Though the records are scarce, he first gained fame using his maths to make a fortune in
489 the olive market, as if by inventing futures trading. That seed of how to design systems for making
490 piles of money would not have disappeared, of course, though there seems much less about it in
491 the records.

492 After discovering how to use math to turn a small sum into a large one, with little effort, the people
493 who learned to use it to grow their power also left many more records of what their power did than
494 how they did it. They built much bigger and more successful societies with advanced technology
495 than the boom and bust societies of the past. Their great success was partly due to rewarding their
496 populations rather than exploiting them. It would have tempted everyone to join in on the limitless
497 boom headed for its natural bust – for using power to multiply power – ending in internal, external,
498 and environmental crises and conflicts. It is the same formula now followed by modern society
499 and its world economic culture. A much more complete story of cultures that built economies
500 designed to fail is the book by Joe Tainter (1988), the Collapse of Complex Societies. His general
501 assessment may well be the most insightful. He concluded that they all seemed forced to create
502 solutions for their problems that were too complicated, seeing increasing “complexity” as the killer
503 it certainly is. So, for example, depleting resources requires more complex efforts to obtain them,

¹³ *Polis* the Greek city-state, or “public sphere” as opposed to the private Oikos, <https://en.wikipedia.org/wiki/Polis>

¹⁴ *Oikos* is Greek for the unity of the family, its property, and its home, <https://en.wikipedia.org/wiki/Oikos>

¹⁵ References to Thales’ Science and Philosophy <https://www.google.com/search?q=thales+science+philosophy>

504 resulting in declining resource availability and a society requiring increased resources to operate.
505 It is called EROI, energy return on energy invested (Hall, Balogh, & Murphy, 2009; Henshaw,
506 2011; Lambert et al., 2014).

507 The clear evidence is that in the shift from home-centered to national cultures, as ancient cultures
508 transitioned into modern ones to grow profits using technology, some of the most basic principles
509 of life were left behind. The cultural knowledge of how to live developed by the relatively
510 advanced Bronze Age home cultures held on for centuries. It is also still with us in our own home
511 cultures, now about 3-5,000 years from when it developed. That is partly because societal and
512 home cultures have never mixed well, preserving the ancient ways. Our senses of individuality
513 and alienation (Leopold, 2018).

514 The initial germ of urban design seems to have been 10,000 years ago with the technology of
515 organized farming to sustain settlements of traders and artists as non-farmers. Our recent and still
516 accelerating explosion of urban life began quietly with the Renaissance when the world economy
517 began doubling in scale every ~350 years (Maddison, 2008). That continued until “great
518 acceleration” (Steffen et al., 2015), which began upon Watt’s perfection of his rotary steam engine
519 in 1780. That abrupt start of our now threatening global explosion is most visible in the data on
520 global atmospheric CO₂¹⁶ (Henshaw, 2019), also showing our long history of multiplying CO₂ as
521 fast as we could be continuing. Since 1780, the world economy has been doubling at nominally
522 every 25 years, almost ten times, so increasing in scale by about 1024 times.

523 2 The Form of Natural Systems

524 **Rigidity and flexibility**

525 One of the most important and fascinating general features of natural systems is their common
526 combination of very stable structures that can only evolve as a whole, with highly adaptive parts
527 simultaneously. Take our bodies, a rigid structural design with very adaptive parts. Our structural
528 designs capable of evolving are mostly our ways of life and thinking, often with groups of people
529 adopting new ways of thinking in new situations. For example, when faced with an emergency,
530 people tend to shift to thinking only about the new common threat very quickly. There are also the
531 many counterexamples of human thinking becoming notoriously rigid. There are so many ways.
532 We get stuck on habits, rules, theories, cultural and social customs, and strategies that work in
533 some places, but we seem stuck with them everywhere. It is what Gestalt psychology called

¹⁶ The Scripps record of combined icecore and atmospheric CO₂ (scroll down to the figure).
https://scrippsco2.ucsd.edu/data/atmospheric_co2/icecore_merged_products.html

534 “functional fixedness”(Wiki-b, 2022)¹⁷ A natural systems view and its power to ground us to
535 reality can help fight these sometimes quite dangerous possessions.

536 We are also aware of personal feelings of alienation produced by mental or sometimes physical
537 barriers we and others erect, preventing personal, professional, or cultural connections. It is a
538 common feeling that these unwanted separations seem to oddly throw everything we want to be
539 secure into doubt. Overcoming barriers of self-isolation to keep others out also often wonderfully
540 enhance community engagement. But unfortunately, self-constructed barriers now keep our world
541 from focusing on its many current common existential threats. It is not just the existential threats
542 of climate change but the vanishing of the natural species and environment, the congestion and
543 confusion and other increasing pressures on human societies, and many more (Henshaw, 2020).
544 Given this pattern of highly abnormal widespread misbehaviors, our *polycrisis*, some call it. We
545 should comb our experiences for similarly converging multitudes of differing crises, “plagues of
546 plagues,” on any scale or at any time to learn from it. It is rather common once you understand
547 what you look for, such as things *going haywire* in multiple ways due to too disturbing internal
548 pressures. We should even consider the ancient oral traditions telling of similar systemic distress,
549 such as the ancient stories of the Bible.

550 The above outline of a new exploratory way of learning from repeatedly consulting natural
551 examples of related kinds is a scientific method, unlike the traditional one in some ways but quite
552 compatible as an addition to it once understood. Like traditional science, it searches for meaningful
553 patterns of relationships to then validate and build on. What’s different is focusing on complex
554 natural systems of relationships, not abstract representations. Focusing on watching for cues to
555 respond to from systems and their contexts becomes both a method of deeper investigation and
556 one of system *steering* instead of *control*.

557 **The lifecycle of natural systems**

558 Science is about finding what one can seem to know for sure when it is also clear we cannot know
559 very much. For example, the conclusion that natural systems develop from tiny starting designs
560 comes partly from recognizing the many common terms we have for what initiates larger scales of
561 organization, such as *nucleus, egg, seed, spark, eye, kernel, spirit, germ, stem, urge, inspiration,*
562 *notion, or idea.*¹⁸ We call what those initiate: *growth, sprouting, development, propagation,*
563 *crystalization, germination, animation, or the emergence of systems, relationships, roles, work,*

¹⁷ Functional Fixedness - Wikipedia https://en.wikipedia.org/wiki/Functional_fixedness

¹⁸ There are also a very wide variety of names for *ideas* that begin things, like *animus* and *amity*

564 *play, etc.*¹⁹ We are also unable to find exceptions to systems developing from discrete but tiny
 565 beginnings. We do find development processes and generally find a burst of non-linear self-
 566 organization associated with their beginnings, and then either good evidence of some minute seed
 567 to start them or do not find anything.

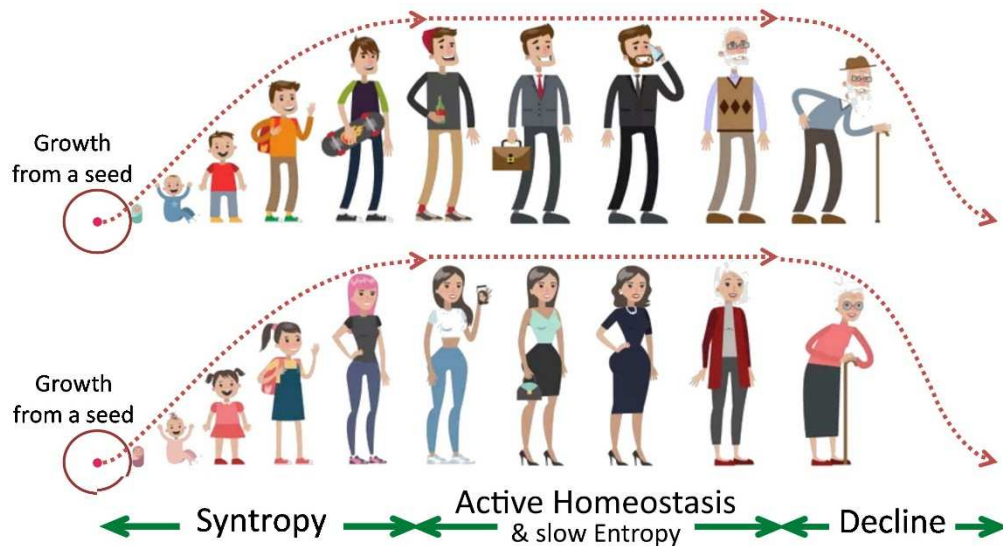
568 That also seems implied by general physics as an implication of energy conservation. The
 569 implication is that new energy uses need to develop by a continuous succession of increasing scales
 570 of energy using processes, which we do generally observe, to maintain the continuity of energy
 571 use required by energy conservation (Henshaw, 2010). Science relies so heavily on nature,
 572 exposing her work for us to study; it may be hard to accept that the sources of new forms of natural
 573 organization are generally impossible to observe. An easily understood case is the formation of
 574 snowflakes. We see that an ice crystal forms at the beginning, but not how its complex design
 575 blossoms from it. It does indeed suggest some kind of order is present at the particle/quantum level
 576 of matter, but we may also never have a way to observe it due to the uncertainty principle.

577 The start of a new system's organizational development is generally also in a quiet place with
 578 available energy and other resources. The germination first captures energy to invest in building
 579 up ways to capture more, forming a driver of positive feedback for multiplying organization that
 580 begins the system's growth. At the same time, the system's connections with its environment grow
 581 developmentally, too. That gives the system as a whole the form of a coupling of its emergent
 582 internal design with its external networks of contextual relationships, a new "*life*" emerging from
 583 its environment. That starts the period of *syntropy* for the system, creating *new organization* and
 584 *concentrating energy* coupled with *entropy* for the environment. The result is like a tree with roots,
 585 which in the tree's case has *environmental roots* both in the ground and the air.

586 The tree also has an unusual extended syntropic life, continuing to build its biomass and
 587 concentrate energy until it is old and stops growing. Human lives are something like that, too,
 588 continuing to expand and concentrate resources and influence until near the end of their lives.
 589 These patterns may vary quite a bit, of course. What is constant is the usefulness of asking the
 590 questions raised by the normative life cycle of living systems (Miller, 1973), Figure 4, which shows
 591 the normal case for systems that endure beyond their initial burst of formative growth. They grow
 592 syntropically until reaching a peak of vitality and resilience as they mature, then maintain syntropic
 593 processes as they entropically age while enjoying a long period of environmental engagement
 594 before declining. That typical cycle for new system lives seems to fit them all; if series of stepwise
 595 emergence, engagement, and decline stages are included.

¹⁹ The etymology of *inspiration* as: *in-spir-ation*, gives it its original meaning as things receiving the breath or spirit of life, [Genesis ii.7].

596 All the stages would be accumulative and have nested scales and stages of development at one
 597 scale that create environments for the next. Most often, the observable transitions from one state
 598 to another follow fairly smooth S curves, as if the development stages and the whole and the parts
 599 are all composed of processes of regular proportional change. Why small scale progressions create,
 600 large smooth shapes may fall to the conservation of energy, that every scale of change needs to
 601 develop without discontinuity. It might also come from other benefits of regularity.



602
 603 Figure 4. The normative physical life cycle for living systems: Following
 604 their initial A) explosive growth from a seed and then a longer period of B)
 605 maturing and learning from their new world, then C) long period of
 606 environmental engagement sufficient for reproduction – the stages of
 607 sustainable life. The scales and stages of development vary for individuals,
 608 species, and cultures: drawings – Guzaliia Filimonova/Getty images.

609 In nature, every system begins with compound growth (Henshaw, 2021). It is a process of using
 610 small amounts of emergent power to multiply power. That is quite essential for systems to develop
 611 from their tiny initial scales. However, that process could also destroy the originally sustainable
 612 design if continued until it pushed the system beyond its organizational upper bounds. The signs
 613 of pushing systems beyond their limits are something we are all experienced in responding to if
 614 noticed early enough, and it is quite common in caring for normal personal and workplace projects
 615 and relationships. Those are some things that “make life what happens when we were planning
 616 something else.” The ability to respond to exceptions is what makes systems naturally tolerant and
 617 responsive to variation. By their nature, systems work as wholes and *stand together*,²⁰ having
 618 reserve capacities and organizational resilience as basic properties of their organization.

²⁰ The original root meaning of *sys-tem*. <https://www.etymonline.com/search?q=system>

619 For healthy emerging systems, like the growth of human lives in the womb, *birth* occurs as a
620 response to the growth limits of the womb and the need for experience to make it in the world. The
621 mature fetus is fully formed as a human but highly undeveloped and faces the major environmental
622 change shock of being thrust into a strange new environment. That seems to be nature's optimal
623 solution, starting things up and hoping a shocking new challenge will prompt them to take hold.
624 In some ways, that seems to fit our current world situation, too. Our world culture is both fully
625 formed and shockingly undeveloped, stuck with having pushed the earth's limits to cause the
626 organization of our systems to begin breaking down while severely limiting our ability to respond.
627 It will no doubt be inconvenient. It looks like it is time to find some other version of nature's plan
628 for shepherding new lives to enduring success.

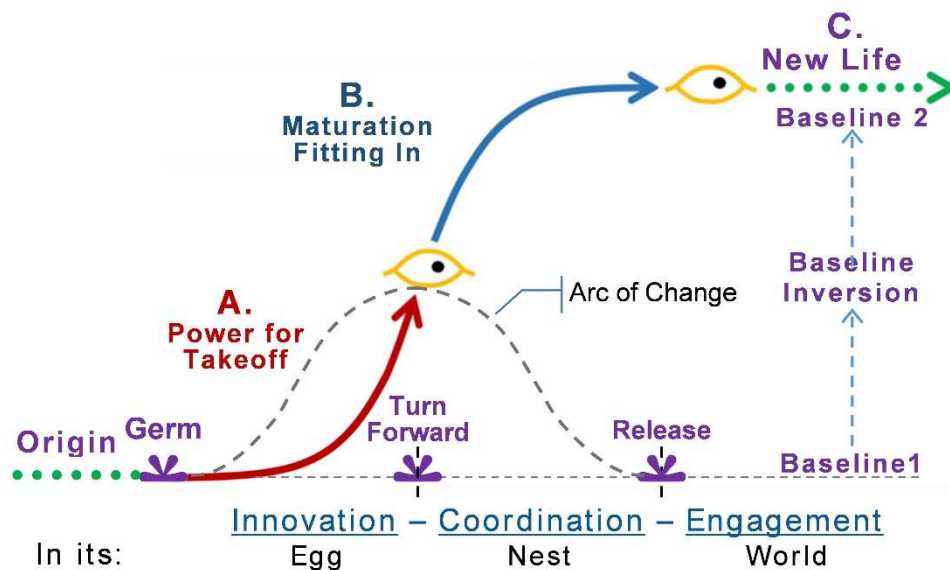
629 A simple model for raising the detailed questions we would need to ask about what kind of change
630 of life might offer us a bridge to the future is Figure 5. It represents a smooth continuity of
631 organizational processes, not mathematical shapes, and is called *nature's integral*, the classic
632 shape of how nature adds things up. There are similar mathematical shapes, but they do not say
633 much about what is happening to produce them. Asking questions about what produced it is the
634 object here. The depicted organizational growth process is initiated by some *germ* of system
635 design,

636 Not immediately obvious is that needing *Power for Takeoff* and then the longer period of
637 *Maturation & Fitting-in* shifts the power source from one process to the other. The power first
638 made available by *Innovation* is then used for *Coordination* culminating in readiness for
639 *Engagement* in the *New Life* ahead. So here we have another case of seeing what happens and
640 finding it hard to quite understand how it happens. However, we still urgently need to know how
641 to save our world from our long-held blindness to the limits of our inventions! So we need to find
642 how to be practical, find a new way to innovate, and tap into any kinds of work not yet widely
643 recognized, offering plausible strategies for how to do it. Perhaps most importantly, we need to
644 study all related natural or human designs to find cases that might show us better ways to do it.

645 Perhaps the main pattern to focus on, the one getting us in trouble, is why it is that some growth
646 systems smoothly turn from growing their power to exploit their worlds (growth stage - A) to
647 instead harmonizing their systems with their worlds (growth stage - B). That "change of purpose"
648 seems to sometimes come from a system having more "growth-pains" at the same time it
649 recognizes a new kind of "growth-opening," from making things big to making things work. As
650 systems grow, they have more maintenance needs; things get more complicated, and new
651 relationship needs are further away. These contextual triggers might guide a system's animation
652 to "turn forward" toward perfecting what growth built. In effect, that would naturally divert
653 resources formerly used to grow the system to caring for its needs instead. People do that at various
654 stages of life, such as when we come to an end of growth, ready for adult life (moving on to
655 engagement - C). One of those needs for any system that responds to its internally felt needs to

656 stop growing to invest in maturing to survive is to have resources to continue to be creative, take
 657 on new roles, and change with its world.

Normal Periods of Syntropy in Long Lives



658 In its: Egg Nest World
 659 Figure 5. Nature's Integral – Pointers to developing long lives. Each main
 660 period of development, A, B & C, would be made of various stages building
 661 on the ones before that produce growth and transformation, just not shown
 662 here for generality. They are what to look for as the actual pathways of
 663 system change in any particular case. One sees these successive stages in
 664 work on any project, new relationship, or education, combining to form the
 665 integral whole.

666 The learning challenges to achieving a smooth transition to a better and more sustainable way of
 667 life, mentioned in §1.2, are large. They will surely not be all those confronted. Crises inspire
 668 innovation of new kinds, though. In this case, learning how to do it is even in the very direct interest
 669 of the major economic sectors, led by the best educated and successful people on Earth. That they
 670 seem blind to the threat to themselves and everyone else, of continuing to maximize the system's
 671 growth till it breaks down, is another of the fascinating ironic puzzles. That blindness seems to be
 672 the specific reason the system is not responding to the increasing needs of the system to care for
 673 itself and its world.

674 Part of what we will most need to steer business choices is a way to calculate profits and losses
 675 holistically, not selectively as at present. There are ways to begin doing that, estimating the full
 676 spectrum of ecological and societal losses if overwhelming the Earth (Henshaw, 2011, 2020) and
 677 then qualify responses and distribute the optimal level of funds. That could distribute costs and
 678 benefits globally and in everyone's interest. The math to do that kind of distribution seems feasible,
 679 at least. But, for the moment, the extraordinary pushback from nature to our relentless expansion
 680 and interference with nearly all of life is a clear signal of harsh limits ahead if we do not collectively
 681 act.

682

The three beginnings of transformation

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alpha, beta, gamma – α , β , γ

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The three system development periods – A, B, & C: *embryonic* and *maturing* growth followed by

685

mature *engagement* – are often very noticeable and consequently easier to study. The deeper

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moments of transformation that begin the three longer periods are here being called *germ*, *turn* and

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release, and in Figure 6 below, given symbols alpha (α), beta (β), and gamma (γ). They initiate

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the main stages of development, and though sometimes very noticeable as events, they are much

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harder to study. When observable, they involve deeper complexities and generally happen too fast

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to follow or record. While those transformational changes in direction are generally faster, simpler,

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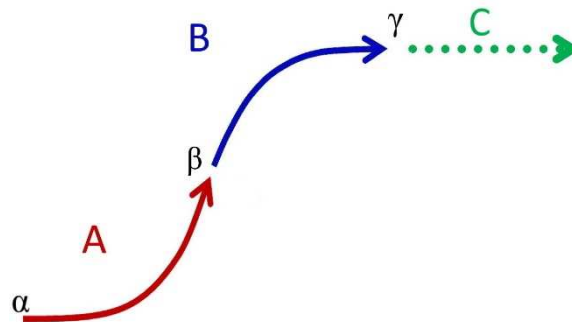
and more transformative moments of system change, they may well not be simple at their scale.

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At their scales, they may have development shapes like Figure 5, consisting of processes with as

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much complexity and variation.



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Figure 6. A, B, C – α , β , γ The labeling of syntropic development stages.

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The puzzles of *alpha* shifts come from asking how they work, like what allows a *single sperm* to

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fertilize an egg? It seems to involve mysterious smaller molecular scale beginning, middle, and

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end organizational processes. The hint that an organizational rather than statistical process is

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involved is that somehow only one sperm seems able to do it. Perhaps the sperm is *selected* by the

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egg removing the block to an individual suitor entering. It may also result from *attrition* due to

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eggs that allow more than one sperm to enter failing to successfully develop, or both?

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A similarly curious *beta* shift is the variety of ways people decide whether to mature or let go of

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new personal relationships. They all start with an experience of growing out the first pleasing

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connections; however, as all growth does, that first phase is outgrown. That happens in many

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different ways and then follows many different paths. The ones that come to matter most to us

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seem discussed and experienced as making the *turn* to deep, lasting relationships at a particular

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moment, somewhat by surprise, erasing all doubts like a miracle. It changes to protecting and

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maturing the new roles rather than just riding high on them. But how in the world does something

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suddenly do all that at once? External approval of family and friends often matters; sometimes,

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both mutually reinforce the deepening of shared life experience, attachment, and feelings! These

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life paths vary widely, such as being passed up and rediscovered long after.

712 The variety of *gamma* shifts is at least as varied, also seen in how people start their adult lives in
713 so many ways, take so many different kinds of lives, then change and shift between them. It makes
714 the description of maturity as *homeostasis*, meaning ever-returning to center, seem to be a great
715 oversimplification. These critical organizational changes may be tiny and instantaneous to trigger
716 the whole system shifts in the development direction they cause. They may also be glacially slow
717 changes in larger scale balances triggering deep organizational change somehow. They may even
718 be simultaneous, with the whole system momentarily coordinating large and small scales; who
719 knows? It is a little like speculating on other universes.

720 2.1 Reading the Signals

721 *“The Lyf so Short, The Craft so Long To Lerne”*

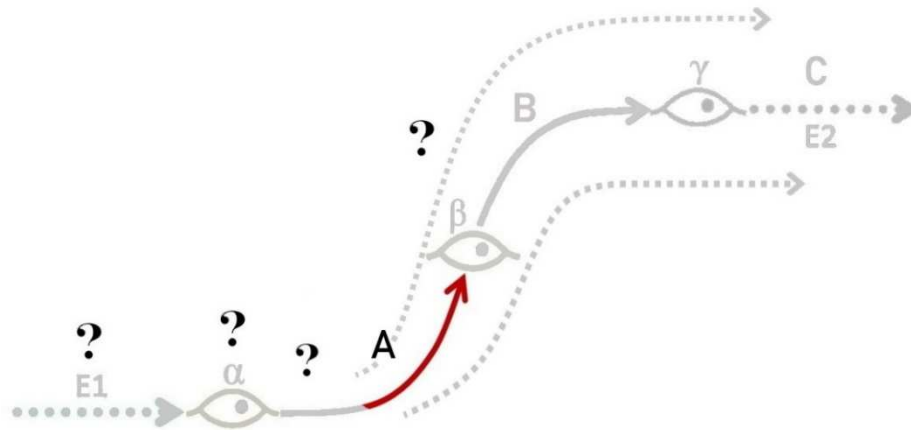
722 – *Chaucer*

723 Here we explore what growth system steering (self-control) is in practice by learning more about
724 reading the already fairly familiar signs that nature posts along the way. Another version of the
725 same simple S curve diagram, to use as a map of what to look for, shows why we don’t see what
726 is happening at first (Figure 7), will prompt leading questions, and help identify more non-verbal
727 cues. Very small signs can signal big things, and very big things can imply little or nothing.
728 Learning to see these meanings is an ancient language for reading the sources and behaviors of
729 emerging change. Unfortunately, our modern world’s focus on finding rules of control rather than
730 on how to notice how natural systems work by themselves causes that knowledge not to develop.

731 We all read signals of things changing we might need to respond to all the time, sometimes it is
732 easy and clear, sometimes not clear what it means, and sometimes we are much too slow in seeing
733 or responding. So to learn more about it, we could look more closely at where the signals come
734 from and share our experiences of learning what is more important. The best place to start a
735 discussion is to ask a group an opening question. That might be: “What have you noticed?” or the
736 more detailed “Tell us about your fruitful, satisfying, disappointing, or funny experiences with
737 reading signals of change and how you responded.” Noticing *changes of life* that need to be left
738 alone are at least as important as changes that need support or might be a threat.

739 We might read a signal of a change of heart and instantly forgiving a person for a great wrong,
740 which turned out to be a mistake. I also recall asking a banker about managing an ever faster,
741 changing, and more complex world, who said, “Oh, WE can handle it!.” It clearly suggested that
742 bankers had no idea what was coming, a surprise only confirmed by the wider systemic failure to
743 respond. I also continually learn and relearn social and physical skills, watching the flow
744 engagements for signals and ways to respond.

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Figure 7. Questions raised by our narrow view of emerging systems: We are likely to only first notice the intrusive growth period represented by the red line and not notice it as nature being very “pregnant,” with ALL the associated interests, questions, and concerns about the internal animation and expanding enabling context that comes with that. – α then A, β then B, γ then C -

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As we search for signs and cues for response while watching things happen, we notice what gets our attention and how to better time and measure our responses. We also notice the opposite, seeing what are only distractions and need no response, and the opposite, what we very often miss. As with many kinds of observation, a higher level of perception comes from being able to later recall the contexts of events not initially noticed. It seems odd to think of remembering later what you didn’t notice before. It seems to be a matter of retaining *raw impressions* and *holistic feelings* that allow one to reconstruct some of what one did not first notice. However, that kind of recall is like a hypothesis and needs checking. The verifiable connections that kind of recall helps one trace make both validation and falsification easier, and it also raises many often unbiased new questions.

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If one can recall contextual impressions of events, sounds, and smells, we can think about the prior context (E1), the germinal event (A), the startup period (the grey part of 1), and the later stages of what may have or might happen (B, 2, C, & E2, end context). Those would all be part of the natural provenance of the causal connections. To think about it holistically, first, think of all those connecting parts as an eventful flowing progression, like a story, and adjust the *arcs* as one would the shape of a story as you learn more. Then look at different parts, reviewing what you can recall, find out, feel, or imagine what has or might be still happening and the effect of or on its context. You would expect that odd interruptions or departures from the general flow could be important or not. That is, of course, because life cycles and information both tend to be eventful in surprising but different and the general symbolic model is only for helping you look into the reality.

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Many people know about a heightened perception of the details of things, from life-threatening or world-changing experiences, suddenly seeming to see in slow motion. That comes from the mind shifting to a higher speed of recording our natural senses of what is happening. Artists and

775 performers may have more of a natural talent for it needed in their work. Still, anyone seems able
776 to learn to watch it as it happens occasionally and then extend that ability.

777 Slow motion perception is particularly valuable in quickly noticing things, such as the earliest
778 signs of beginnings and endings. What catches one's attention is often seeing something
779 surprisingly out of place. It might be an unusual calm in a usually noisy and busy place or signs of
780 unexpected changes emerging, as suggested in Figure 7. As we notice new things emerging, the
781 information always seems late because it signals something having an unseen history and likely
782 expanding future. So to catch up with the past, it would be nice to know how to quickly replay the
783 recent past in slow motion, retrieved from your recorded contextual awareness. That would help
784 identify any urgent information about where the emerging change came from and is going.

785 That frequent perception of emergent change is an autonomic semi-cognitive response to the
786 dynamic features of emergence, recognized as a non-linear progression, even if still small. It could
787 be a pencil rolling off the table or a puzzling look from someone as a sign of rapid change. That
788 natural ability to quickly become alert to change is something we can improve on, too, by watching
789 for the signs and being more ready for the interruption. A good example is working in the kitchen
790 and ready to jump if a knife falls off the counter or while driving, ready for a person to suddenly
791 appear where not expected. One wants to instantly act but also have a speeded-up presence of mind
792 to not panic.

793 We also notice emerging action and inaction as cues to act or leave things alone. It is another
794 reason to have a speeded-up presence of mind when noticing significant changes (or lack thereof).
795 The most meaningful things to notice may be about things to be left alone and allowed to develop
796 naturally, without interference. Similarly, it is often good to mull it over for a while when one has
797 a bright idea. Letting it jell and slowly sort out connections in the context to make or avoid before
798 giving it structure and purpose.

799 **The midpoint of growth**

800 The classic example of a pivotal change to focus attention on is the midpoint in the S curve of
801 growth, its "inflection" or "turn forward" point, ' β .' The curve reverses curvature, going from the
802 **A** period of *takeoff* to the **B** period of *landing*. Often missed is the profound internal system change,
803 as its driving purpose from multiplying its power to adapting to and exploring its new world. It
804 can be a simple or a quite dramatic event depending on the change of environment that goes with
805 it, *and not seen at all in the growth curve*. The new chick and new child run out of space to then
806 emerge from their egg or womb as the protected places for their periods of boundless explosive
807 growth, to find a bigger world to adapt to and make their own.

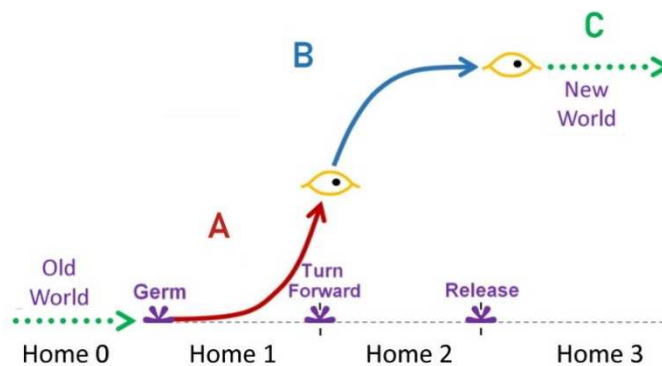
808 For the farmyard chic or new child, the transition is quite dramatic and cues rapid responses from
809 their environments, as if left in the lurch, nearly exhausted and cut off from their food sources and

810 unable to fend for themselves. That change is also a dramatic shift from focusing on *internal* to
 811 focusing on *external* relationships. It not only occurs at the limits of physical growth for new
 812 systems but also for the growth of personal relationships when they shift from focusing on
 813 themselves to focusing on relations with family and friends. There is a shift from focusing on
 814 oneself to finding one's center in groups of friends, work and businesses, or community and
 815 organizations.

816 The important takeaway is that this change in new lives, wherever they came from, is to make their
 817 own turn to where they are going. These are critical formative stages for the new life of any
 818 emerging system, a business, society, individual, or other emerging life. So for people and their
 819 organizations, it is critical to be able to observe, for example, what is growing right and wrong
 820 around them, and have some idea of what to do. These pivotal changes in direction have large,
 821 lasting effects, and every new system or life is steered from the inside and can only have learned
 822 how on its own, nature's test.

823 **Noticing S Curve Transformations?**

824 Did you take notes on the main events that occur at different points on the S curves of emerging
 825 new lives and transformations? Did you think about what they mean for what is developing and
 826 the world it is developing in? And, Why are they important to notice? Below is a simplified version
 827 to refer to as you read the notes on what things to notice and talk about with others.



828
 829 Figure 8. Small S curve figure Key

Before and After ? – The Context

1. What were things like **Before** ? Fully describe one example?
2. What will they be like **After** ? Think of several you could describe ?

830 Hints: Do what is important before and after form different patterns?

When Growth Starts ? – First Hints

3. How do we notice what is brand new ? What are several examples ?

4. Do they change their world ? How can you tell ?

831 Hints: Things out of place ? Things happening again ? New faces ? New questions ?

From beginning toward ending ? – Mid-Point Turn

5. Buildup coming to an end? What are examples ?

6. and perfecting things starting What are examples ?

7. Does that change their world ? How can you tell ?

832 Hints: New patterns of change ? Looking to the future ? Changing environments?

Coming to an End and Moving On? – New Roles and World

8. Approaching perfection? What are several examples ?

9. Getting ready for new places What are examples ?

10. How does it change its **old world** ? How can you tell ?

11. How does it change its **new world** ? How can you tell ?

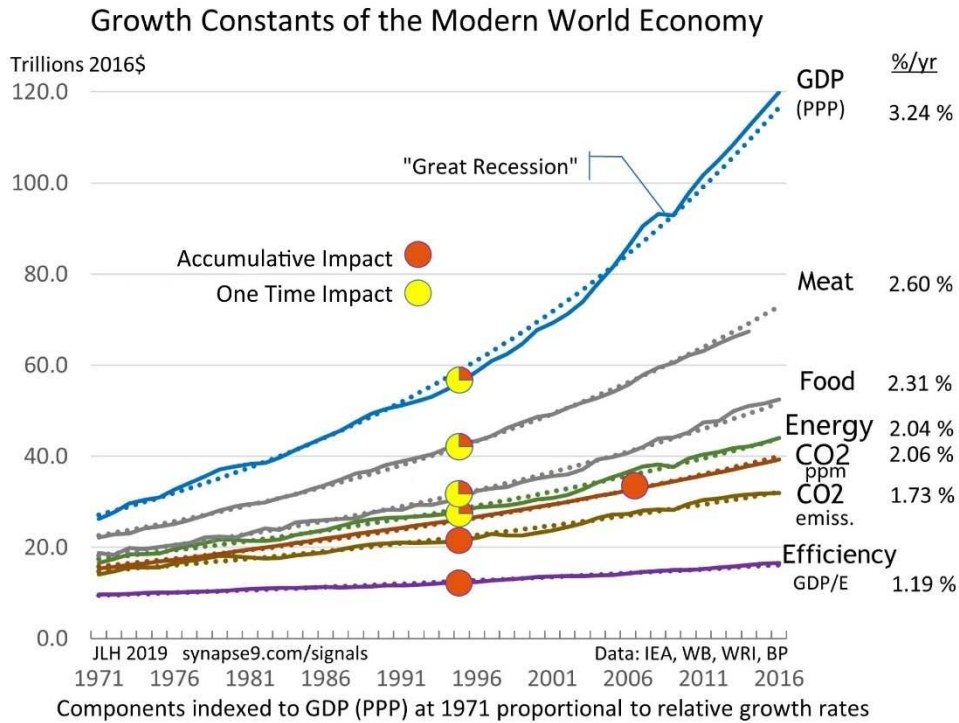
833 Hints: New patterns of change ? Looking to the future ? Changing environments?

834 **Parts moving altogether.**

835 One of the important properties of systems working as wholes is that measures of their parts tend
836 to move together, Figures 9 & 10. For example, figure 9 shows major indicators of the world
837 economy: GDP, consumption, pollution emissions and accumulation, energy use, and GDP energy
838 efficiency. Remarkably they are all moving in closely constant proportion to one another! That
839 exhibits their *proportional coupling*, a clear indicator of the world economy's organization,
840 causing it to work as a whole. At first, one might think that cannot be, as the research papers all
841 show that the various parts behave very differently. But, that is what globalization overcomes.
842 Market forces steer every part to find the most useful way for it to fit, driven to maximize returns.
843 So, rivers of innovators, workers, businesses, and investors vie to provide the services the world
844 wants and get the highest price for them to have growing investment resources. So the national
845 GDP curves jump all over until you put them together.

846 How the curves move together also shows that the system's organization is unusually stable, with
847 measures of the whole having near-constant growth rates (i.e., rates of doubling) that are in

848 constant proportion to each other. The close fit between the data and average growth-constant
 849 curves indicates that it is real. It shows the economy to have fixed rather than responsive steering,
 850 too, a fatal flaw in a world of rapidly changing conditions and threats, almost sure to be steering
 851 into ever worse trouble and inescapable traps, like having no achievable goal but ever faster
 852 change.



853
 854 Figure 9. Global economic steering curve, showing the close to constant
 855 proportional coupling of exponential resource and consumption impact
 856 curves.

857 That fixed steering, of course, is for maximizing the growth rate of GDP, investment, profits,
 858 consumption, and failure to slow the steady exponential growth rates of lasting impacts. Nearly
 859 the whole world focuses intensely on climate change, but we appear not to have yet considered
 860 changing the economy's steering. As a result, the latest atmospheric CO2 data (the direct
 861 proportional cause of the rate of warming) still shows it rising at its highest ever exponential rate
 862 (Henshaw, 2019).²¹ So what would it mean to steer the economy in some other direction?

863 Since investment builds the future directions of the economy, i.e., steering how the economy will
 864 turn and where it will go, new directions for investment will change where it is going. That would
 865 involve having more than a single variable objective. For example, it would make sense to steer

²¹ Scripps Global average Atmospheric CO2 ppm data, updated in May 2022.
http://scrippsco2.ucsd.edu/data/atmospheric_co2/icecore_merged_products

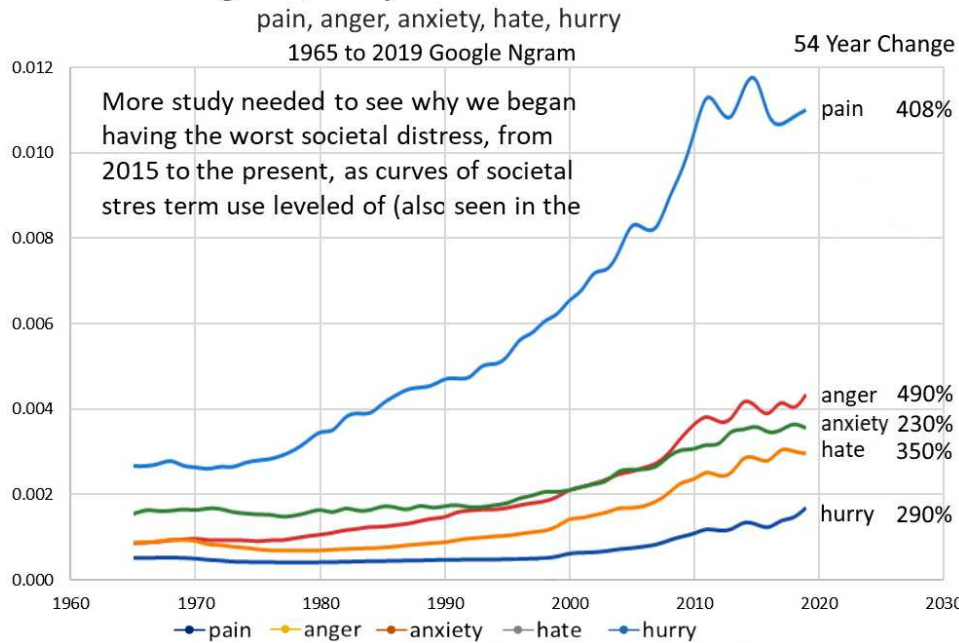
866 the economy for some safe harbor to protect it as it transforms. The current plan is to keep it
867 multiplying the impacts that threaten itself and the earth. To do that, investors need to a) understand
868 the difference, b) develop a plan, and c) have the plan give them the social, cultural, career,
869 political, and financial motivation to act in the common interest.

870 That not only seems necessary; it also seems possible. The people with high educational,
871 professional, and social status are in charge of steering the economy on its fatal course today. If
872 they saw the chance to correct the error of steering the economy to maximize the growth of its
873 already overwhelming impacts, they would respond out of wounded pride, if nothing else. That
874 would then motivate the technical teams to expand sustainability to investments using reliable
875 measures of accumulative costs and benefits (Henshaw, King & Zarnikau, 2011; Henshaw, 2014).
876 Something needs to relieve the system's ever-growing distress, and it would be better to be doing
877 something right than wrong.

878 Figure 10 shows word use frequencies for some terms of distress in English books by Google.²²
879 Selected are common terms for personal distress that have been rising together as probable
880 evidence of systemically increasing societal distress since the mid-1960s. Their roughly parallel
881 compound growth period is from about 1975 to 2011. The fluctuation after that suggests something
882 hit a limit, but feelings of distress remained high and unstable. There is enough detail in the shapes
883 to make them look possibly associated with specific cultural changes. That the curves and their
884 fluctuations move together, suggesting the curves reflect whole system behavior, might make it
885 hard to find what is involved. The pattern seems extraordinarily regular and systematic.
886 Interpreting a long period of exponential indicators moving together, indicating they reflect a
887 whole system behavior. That the pattern begins in the mid-70s is quite significant, suggesting some
888 lasting change started then. It could be lots of things but interestingly was not in the mid-50s or
889 60s when there was also emerging awareness of dangerous crossings of environmental thresholds.
890 From personal experience, the long rise of modern anxiety did seem to start in the 50s and 60s.
891 Evidence suggests that something more contagious or disastrous may have emerged in the 70s.
892 Short lists of recalled sources of general distress for each period are in Tables 3 and 4.

²² Google Ngram of societal distress terms moving together- see curve back to 1920 to more stable period
https://books.google.com/ngrams/graph?content=pain,anger,anxiety,hate,hurry&year_start=1920&year_end=2019&corpus=26&smoothing=3

Growing Frequency of Distress Terms in Books



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Figure 10. In books, a 350% rise in terms of distress – moving together: Word frequency in English books scanned by Goggle for the distress terms: pain, anger, anxiety, hate, and hurry, shows steady growth then fluctuation.

- Nuclear bomb threats and Silent spring
- Kenedy assassination and Viet Nam war
- Race riots, social revolution, & anti-communism
- Shareholder value took over the stock market??²³

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Table 3. Emerging societal distress in the 50s & 60s

- Severe recession and inflation
- The energy crisis
- Beginnings of political hate movements.
- Big rises in urban crime and violence

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Table 4. Emerging societal distress in the 70s

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Other features of the Figure 10 curves are a semi-regular fluctuation, long regular escalation on four of the five, and an abrupt shift to matching large fluctuation in about 2011. Obama’s first election was in 2008 and second in 2012, followed respectively by the biggest rise in societal

900

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²³ Did it start with “stakeholder value?” - Graph at: <https://synapse9.com/issues/GDP-WageHistSMb-fig.jpg>
- The 2016 research notes: <https://synapse9.com/signals/was-shareholder-value-what-did-it/>

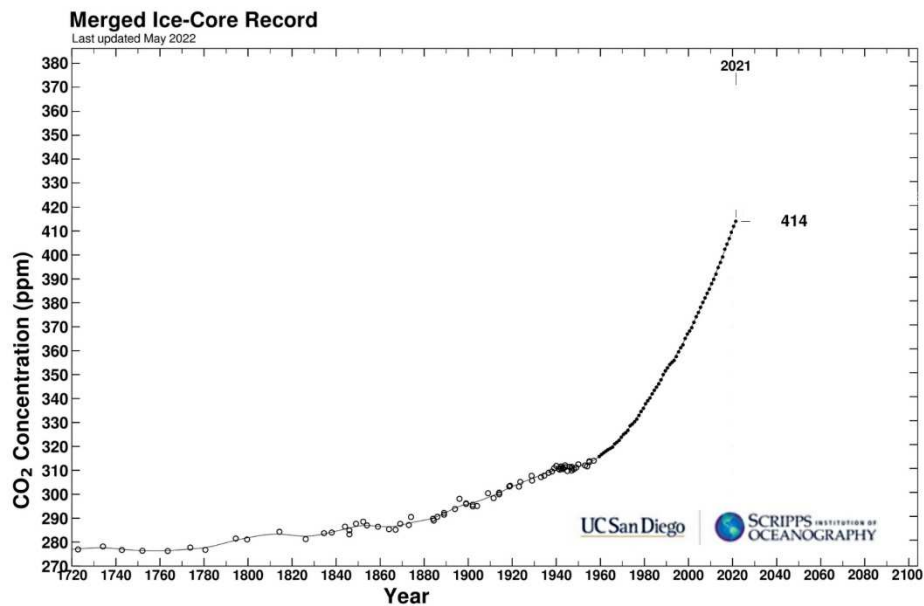
902 distress and the first big drop. So that does not seem to make sense, as Obama was awarded the
903 Nobel prize for restoring a sense of world peace. At this point, when running out of guesses, it is
904 time to question assumptions, look around the context for anything neglected, and find some
905 authoritative studies. The evidence so far is that something has been ratcheting up the levels of
906 distress throughout the English book writing world, about as regularly as the ratcheting up of the
907 economy. That the pattern had a specific beginning, coincident with the stock market change from
908 reflecting business value to shareholder value, makes it seem plausible that is one of the drivers.

909 A hint also comes from the sharpest rise in distress coming in Obama's first term – when he was
910 celebrated for fostering world peace. Ironies like this are often excellent evidence of looking in the
911 wrong place. Perhaps those feeling most distressed by the rapid deindustrialization and re-
912 socialization of America happening at this time and also by the election of the first Black president
913 are the people feeling the pain. That might not be who the readers of this work would think of first,
914 as it is not an intellectual community. So it is a wild guess, but this data may capture America's
915 vast writhing political polarization and perhaps in the UK and elsewhere. The longest and most
916 rapid accelerating polarization of the US economy²² would be guaranteed to disenfranchise many
917 real people. It might disenfranchise whole sectors of society, which would certainly deserve to feel
918 its pain.

919 That is not what was first assumed at all. It does, however, fit both 1) a social blindspot and 2) a
920 hypothesis based on *reading stories into the non-linear continuities of the data*, prompting the
921 recall of additional relevant data. Is it plausible that the ever more distressed English book writing
922 community located by the Google data is the political far right? They most vociferously voice
923 their pain and have done so for quite a long time. Still, it is a surprise. We have learned a lot from
924 the study and come up with unclear indications to help keep us looking for more and from jumping
925 to conclusions! We would assert that this very constructive conclusion comes from the method.

926 **Spiraling global forces**

927 What is happening is always the question. For example, say you are a senior director of the world
928 climate response team, and you see the following graph of atmospheric CO₂ (Figure 11). Say you
929 have seen the graph repeatedly, year by year as the dots on the curve proceed in a direction quite
930 different from the plan. What are your choices? What is top on your list? Might you ask, “What
931 plan are they following?”



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Figure 11. The Scripps 300 yr global atmospheric CO₂ raw data: How do you read it? Does this help indicate the true root cause of our problem? Where does it look like the next dot will be?

936 2.2 Transformations

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How brilliant business innovations emerge is often from following a passion, not knowing where it goes. Modern science came from Alchemy, in something of that kind of way. The transformation of our out-of-control world economy may well get ahead of us and so involve a lot of catchup. So, now seems a good time to study the available options and not fail to ask, “What If We Get This Right?”²⁴ Nature *does* often guide emerging systems to get it right. The main message of this paper is that there are ways to study that, learn how to read the signals and make the right responses. Circumstances will differ, of course, but studying the basics, considering their neglect, is perhaps the most important place to start. That is, learning to be observant, then using it to see how the systems you know do and don’t work.

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Finding words to use is part of that. Watching the flows and making them into stories helps. Mining the inherited meanings of the common language to tell us about the things we notice and wonder about is perhaps the best way to connect our language with its deep roots. That might also get the closest to finding and responding to the root purposes and visions of the coupled human-natural system as a whole.

951

952

People naturally learn nature’s creative processes and form the foundations of their understandings in life, immersed in the environments they come to know. These include people immersed in

²⁴ Dr. Ayana Elizabeth Johnson - <https://www.ayanaelizabeth.com/>

953 everyday work, community, or organization relationships. More generally, every community and
954 local ecosystem is also a systemic *hive* having *low degrees of separation*, so the responses of most
955 parts are to the whole, making the whole tend to be cohesive. But, of course, the big problem we
956 face of blindness to our impacts, using rules for remote control of systems we little understand,
957 also calls for a deep moral and historical search. It would be good to know why and where we
958 began tolerating the self-deceptions.

959 Advanced learning about natural systems seems to take a different observation method, imprinting
960 the mind with immediate impressions of patterns, relationships, and change, expanding on that
961 natural ability to observe and directly study our realities. We can also improve that ability, too.
962 We do that by learning to see the fine nuances of differences in any subject as we do with the hour-
963 to-hour changes in our children sometimes. Almost any subject of fascination will do. That seems
964 to be what Goethe's observation technique did for him (Goethe, 1996). One can even do it with
965 one's feelings and reasoning about them, using each to freely and openly respond to the other,
966 perhaps discussing discoveries with others. Many good observers, like scientists, entrepreneurs,
967 and artists, rely on honest and self-critical perception. Unfortunately, it is still hard to fend off
968 some of our cultures' biases, myths, crazy politics, and obsessions. That our economic culture
969 focused its attention on how to control each other's minds and the natural world set back our ability
970 to appreciate how nature works by itself.

971 At the atomic level, we cannot observe what happens nor see if atomic forms have internal
972 organization. There seems to be no useful information yet, but if energy conservation still applies
973 at that scale, some behaviors may not be statistical but developmental. What is most important to
974 people is not the theory but that these patterns apply to our lives and activities, all our large and
975 small activities beginning and ending with accumulative organizational steps coupled with an
976 environment. We will always struggle with the resulting perspectives of systems as seen from
977 inside and out, always being quite different. Given that a system's internal organization is a self-
978 referential whole, it will generally not be visible from the outside.

979 We live in a world where perhaps the most important causes and effects, those that develop from
980 whole emerging systems and animate change in our world, are generally found to have hidden
981 interiors and be out of our control. So, to appropriately respond to those emergent causes or the
982 struggles systems that need help, we need experience reading the cues and signs of what they are
983 becoming or how they are struggling. We become somewhat successful in noticing the smallest
984 signs of change, watching our children, friends, partners, etc. It is also the core talent for having
985 "social skills." It seems to be what indigenous cultures teach and how animals get along in a
986 complex world, born to be curious about the hints of change in the world around them. Earlier
987 research (Henshaw, 1985, 1995, 2000, 2008) pointed to a subtle sign of important change that
988 could be seen in time-series data or noticed by a sensitive listener or observer. That is reading the

989 non-linear dynamics in the background as changing derivative rates of change. Sometimes it
990 prompts one to notice things hardly noticeable before.

991 Modern cultures teach awareness of that non-verbal language of change for personal matters, like
992 home cooking or personal relationships. Still, in developed societies, education long focused on
993 teaching rules, names, and concepts, though that is changing. Learning about whole emerging
994 systems from abstractions still seems to be the general rule in business, finance, and most sciences,
995 where a precise “bottom line” is important. The problem is that it teaches about systems detached
996 from their natural contexts, starving the learner of questions and intuitions about what is happening
997 in nature. It is another reason people might feel uncertain about natural change and feel a need for
998 control, not taught to be observant.

999 **Breakthrough Transformation**

1000 There is a major risk in even posing a search for “breakthrough strategies” of simply falling into
1001 our dominant world habit of solving problems by finding things to control. That very organized
1002 way of life has given people considerable power, influence, and control over each other and nature.
1003 Unfortunately, it has left us as a species totally out of control. We created societies organized to
1004 rigidly continue to multiply their control.

1005 That system of life is destroying life, an entire planet, and causing us to avoid responding to the
1006 natural urges to use our wealth more wisely. So the first urge is to look for how to use wealth to
1007 heal the wounds we feel and see all around us. It is indeed possible and not altogether wrong, but
1008 it is also a step back into using our power to exert control again. So the question also needs to
1009 include how to get out of those runarounds?

1010 So to start over from basics, nothing appears meaningful except in context. *Runarounds* seem to
1011 be questions about systems caught in loops of *cause-and-effect*. They might well be headed
1012 somewhere on a spiral path or not at all.

1013 From the widest view, we have built an amazing new kind of life on earth, do not want it to fail,
1014 and need a healthy world that is much more naturally self-controlled. What that looks like is *the*
1015 *start of a plan*. Our current major threats are self-inflicted, seemingly caused by our fixation on
1016 using controls to concentrate power and profits, and for the longest time not noticing it was and
1017 would destroy the earth!

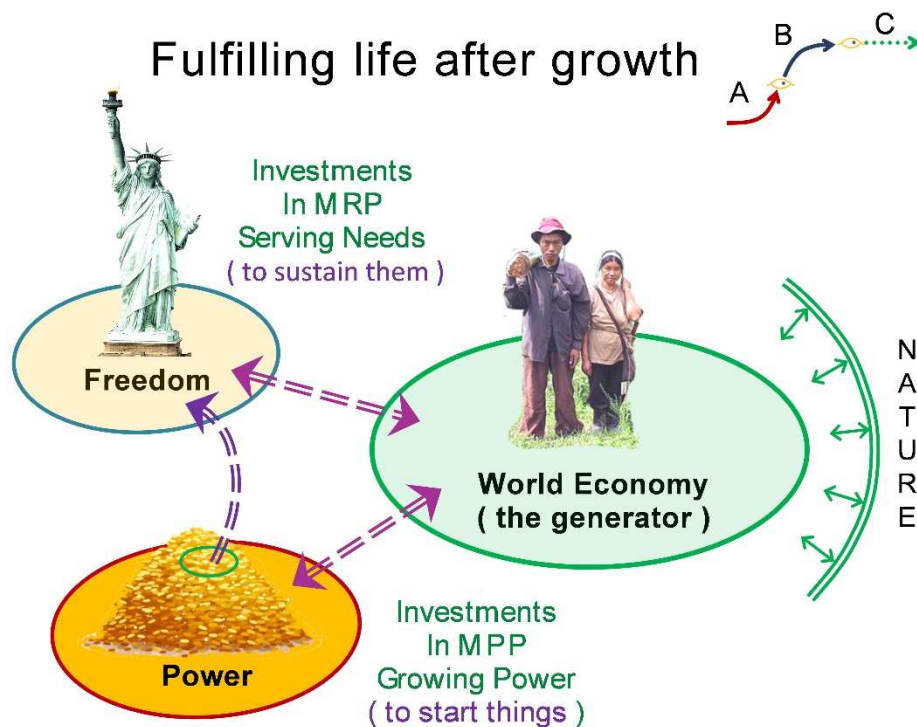
1018 We developed those habits over the last 60,000 years since widely shared conceptual thinking
1019 began, and around 12,000 years since that powerful way of thinking created urban centers. Then
1020 2500 years ago, that simplified way of thinking about power to gain more power turned into
1021 technology and science. After a dark age, it reemerged in the Renaissance, then 240 years ago
1022 helped us begin multiplying CO₂ and then find more and more efficient ways to do it (Figure 11).
1023 Every growth system starts somewhat that way, of course, but can we learn nature’s trick for taking

1024 care of things on a global scale instead of taking power over them, the fascination we let reemerge
 1025 in a bigger and bigger way after every failure of it before?

1026 It seems to always be inspiration that somehow takes over whole systems that produce
 1027 transformations, though. So, we do need to not shy away from having inspiration. But, this time it
 1028 would need to help free us from an exceptionally old runaround, so we can continue our original
 1029 journey, keeping the skills for creating and organizing things that work.

1030 Like our bodies and minds, all systems need fixed and moveable parts so that they can go places,
 1031 is one way to say it. So system designs need tension and release to maintain balance, stimulus &
 1032 response to remain creative and distributed, and so the wholes build on foundations and evolve.
 1033 Those are structures of system self-governance, relying on various forms of internal balance,
 1034 sometimes called *polycentric governance* or *tensegrity* (Ostrum, 2010; Turnbull, 2022).

1035 The following citations only scratch the surface but offer some insight into the imminent risks of
 1036 pushing systems to points of fragility, collapse or internal decay (Bell, 1971; Tainter, 1988; Chew,
 1037 2007). Many times before, cultural decay has led to dark ages, seemingly driven to unsustainable
 1038 complexity and collapse, as Tainter observed. So it should be a serious concern. The complexity
 1039 of systems generally cannot go backward and becomes unproductive too. So it's quite problematic
 1040 that modern economies have been relying on it for some time.



1041
 1042 Figure 12. Systems that outlive their growth: start with a maximum power
 1043 principle (MPP) to rapidly build their forms and places, then a maximum
 1044 resilience principle (MRP) to care for what they built, their lives, and world

1045 So, hopefully, these sobering truths about the kind of threat we face, and the opportunity to “start
1046 a new life” offered by learning from familiar examples of how to perfect complex system designs
1047 that develop by growth, will both help bring about the inspiration and clear enough minds to let us
1048 creatively shape our best response to our impasse (Figure 12).

1049 Figure 12 above is another simple concept intended to help think through the creative steps to take
1050 for releasing it from the trap it is presently in and transform the economy in nature’s favorite way
1051 to creatively prosper for a long time. The economy could continue to work smoothly as the
1052 generator of wealth. Well-informed people with vision could also help the community of well-
1053 educated, successful, and communicative people who manage the world’s businesses,
1054 governments, and finance to understand their new job. That is to take care of the natural world we
1055 are part of and the homes and societies we built, rather than continuing to manage our multiply
1056 exploitation of them.

1057 **2.3 Healthy systems**

1058 There is a useful shortcut for understanding natural systems once one has a grip on the basics. Of
1059 course, one will always need to go back to the basics again and again. That shortcut is to read
1060 systems and the events and changes of their life cycles as the great stories they are (Henshaw,
1061 2018). One can read the progression of the flows as *the arcs of their stories* about the flowing
1062 developments in their experiences and relationships, paying close attention to smooth *takeoffs* and
1063 *landings* and what inspires them. Those are *nonlinear* features of emerging natural design that are
1064 hard to fake and important to explore. It also helps make the intuitive guesswork that goes into the
1065 stories one reads into them *reasonable hypotheses to check out*. How much one does of that or not,
1066 the storylines remain as markers of where you might want to check. To bring out the natural
1067 systems that anchor their meanings in their contexts, use terms and language that help direct
1068 attention to the natural processes, relationships, situations, and experiences that our languages
1069 developed to convey. Of course, that includes shared social and intellectual experiences, too, as
1070 they are part of the natural systems world as much as physical experiences. Part of telling real
1071 stories is keeping them real by noticing and weeding out confusing terms of social and racial
1072 prejudice, misinformation, false authority, etc. Those do sometimes creep into our language if they
1073 are circulating around us.

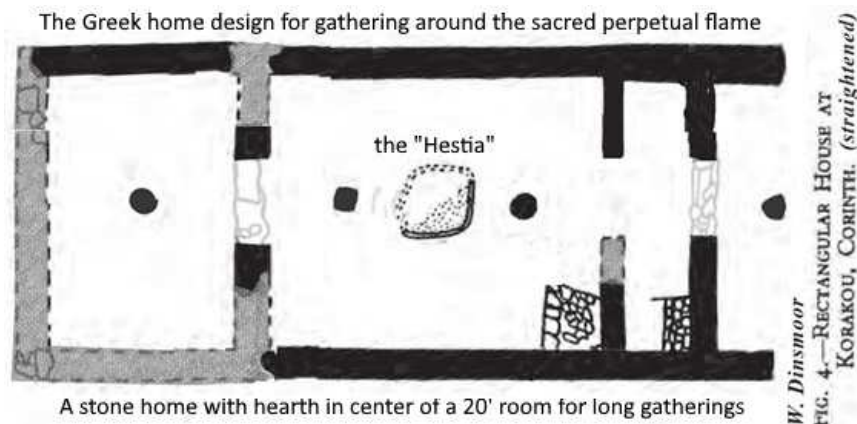
1074 **Designs of homes**

1075 How families make decisions in the collective interests of every member and the whole appears to
1076 have been the major change from human tribal to home + community cultures, becoming
1077 foundations of human culture and societies seems to have developed toward the end of the Stone
1078 in the Bronze age. It seems exemplified by the design of the proto-Greek Aegean Hestian home

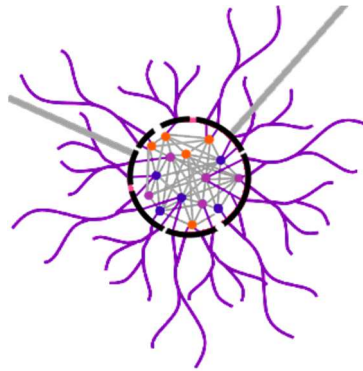
1079 (Figure 13) and its apparent worship of home life central to their culture (Henshaw, 2022) from
 1080 which our homelife cultures descended (Dinsmoor & Anderson, 1973).

1081 Much the same strong allegiance to the unity of the whole if seen in groups of good friends. It also
 1082 sometimes characterizes mature organizations and businesses that, as they perfect their designs
 1083 and mature, turn to using their profits for engaging with their worlds. That is the ideal natural S
 1084 curve culmination of long-lived natural systems that, as an ideal design, seems to have allowed the
 1085 emergence of complex life and reproduction long ago.

1086 Life is hazardous in any case; things happen to prematurely break relationships, and the lives of
 1087 individual systems never last forever, though large collective systems often continue to evolve and
 1088 long outlast their parts. Human communities exhibit some of the “all as one” features of homes
 1089 and close friends. At larger scales, more organizational diversity and complexity develop. More
 1090 people follow interests separate from others, with the community still working as a whole as the
 1091 parts fit together, having a common culture of connecting differences (Figure 14). That is quite
 1092 visible in most small and large communities and even big cities like New York. On those scales,
 1093 the common organic cultures also host compatible and antithetical subcultures, cooperating by
 1094 staying within bounds of tolerance, except when they do not, but rarely ever breaking up. After
 1095 years of global travel, neighborhoods are more like a *salad bowl* of different cultures.



1096
 1097 Figure 13. Natural system centers have physical or organizational
 1098 enclosures with openings that provide easy access to filtered inputs and
 1099 outputs, serving as homes for their hives of internal relationships that
 1100 organize and energize their lives.



1101

1102

1103

1104

Figure 14. The organization closely connected human centers, Homes, Gatherings, Neighborhoods, Communities, and Cities: the Hives of culture that become Nodes of connection in larger networks

1105

The interiors of homes, businesses, communities, organizations, and economies all contain and energize thriving *hives* of relationships. The term *hive* refers to the connectivity of a domain, usually the interior of an organized system, but used to refer to the small worlds of close association that serve as *nodes* in *networks*. So within a hive, all members would have direct connections and zero degrees of separation. So, for example, the hives within a network node might consist of the people in a family home and from their close association collectively responsible for messages sent and received on the network. It is just one of the interesting dynamics connected with *centers*.

1112

Centers are the basic unit organization in the design of life, as *centers of control* – *with* – *open connections*. In architectural design, they are visible at every busy street corner or local hangout, spontaneously forming and dissolving as the “attractors” that puzzle complexity theory we all naturally know very much about. Of course, there are hives of connection of many other kinds, such as those with and without networks connecting them and composing the complex textures of environments. There is much more to be said about the role of centers in our lives, how we build and care for them, and how we experience the freedom, security, and connections they give us.

1119

3 Discussion

1120

Reflection – *Will people will have the inspiration to survive?*

1121

This study has led to the conclusion that for whole complex systems to change as wholes and set out upon a transformation journey following an S curve to a change state, they would need to be inspired as a whole by an innovation that extends their origin story, soul vision, and original purpose, taking it forward.

1125

The views on what will become of the present confusing state of the civilized world, to both those who closely watch it and not, varies widely, despite the broad agreement we are in a very threatening whole system crisis. What is necessary is going to happen, whatever that is. Whether people can or will do with it what is possible is considerably more in doubt. In a rising crisis,

1129 reaching a general state of heightened suspense and nervous anticipation before doing the right or
1130 the wrong thing seems both the most and least promising sign of resolution.

1131 What Putin did is one example, feeling he had to act against the forces of history, working up the
1132 suspense and his courage to violate every principle of goodwill, then launching a major military
1133 incursion bent on erasing the homeland of Slavic culture he seemed to think had betrayed him.
1134 How Trump lost his sense of reality seems to exemplify the madness that comes from opposing
1135 inevitable forces as well, becoming desperate and spreading false stories to attract others, also
1136 fearing for the future. We should not follow those examples. Maybe we are lucky to have them to
1137 warn us.

1138 Conceptual blinders can be terrible, making it very hard to act against current interests to achieve
1139 even greater future interests. So people will need help with that, both those who need to change
1140 and those who help them. The crux of the problem seems to be how powerful concepts,
1141 disconnected from their contexts, so simplify what they show how to do they become inescapable,
1142 neatly hiding all the side effects too. What will most help people out of those traps is probably
1143 different in every case, but shared experience, humor, and irony seem higher on the list than
1144 promises and explanations. It is a matter of motivating internal change, often not responsive to
1145 external pressures unless everyone feels them at once.

1146 4 Acknowledgments

1147 During the pandemic, I have enjoyed a great deal of uninterrupted time to do the work, good health,
1148 a secure home, a good roommate, and adequate income, which together have been a godsend.
1149 What most contributed and made the work possible in the first place was having some parts of this
1150 fresh question to listen for answers to, constantly refreshed, and inspired by insights and reactions
1151 from many others over the years. So, I dedicate the work to all the many people who have shared
1152 their visions.

1153 5 Data Sources

1154 5.1 Climate

- 1155 1. Scripps Global average Atmospheric CO2 ppm, combining splined ice core data before
1156 1958, and yearly average mountain top measurements from of Mauna Loa and Antarctica

1157 including 1958 thereafter.
1158 http://scrippsco2.ucsd.edu/data/atmospheric_co2/icecore_merged_products

1159 5.2 Economy

- 1160 2. GDP (PPP) 1971 – 2016* Fig 8
1161 Archived IEA PPP data extended with recent World Bank data, see Fig 13 for illustration
1162 WB:
1163 <https://data.worldbank.org/indicator/NY.GDP.MKTP.PP.CD?end=2016&start=1990>
- 1164 3. World economic energy use 1965-2017 – Fig 8
1165 BP: <https://www.bp.com/en/global/corporate/energy-economics/statistical-review-of-world-energy/downloads.html>
1166
- 1167 4. Modern CO2 Emissions – 1971-2016, Fig 8
1168 Archived IEA CO2 data extended with WRI CO2
1169 emissions: <https://www.wri.org/resources/data-sets/cait-historical-emissions-data-countries-us-states-unfccc>
1170
- 1171 5. Historical Co2 Emissions 1751-2013 Fig 8
1172 US DOE DOE CDIAC data: https://cdiac.ess-dive.lbl.gov/ftp/ndp030/global.1751_2014
- 1173 6. World Meat Production – 1961-2016 Fig 8
1174 Rosner - OurWorldInData: <https://ourworldindata.org/meat-and-seafood-production-consumption>
1175
- 1176 7. World Food Production – 1961-2016 Fig 8
1177 FAO: <http://www.fao.org/faostat/en/#data/QI>

1178 6 References

1179 6.1 Image References

1180 Fig 5 ref – Figures of all ages of the normal lifecycle.

1181 Guzaliia Filimonova / Getty Images fair use exception request. Also used by **Richard Nordquist**
1182 Updated on July 17, 2019 in his [Semantic Field Definition](#). [Getty agreement](#) Thank you for your
1183 inquiry, we are tracking it under the reference number 03062829 for you.
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