Natural Systems Design Science

An Empirical General Systems Approach

Usefully Coupling Physics, Language, and Nature

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An ISSS GST discussion candidate as a new general theory and practice.

Appendix References

A. Abstract

General Systems Theory started as a branch of science following the natural science practice of focusing on natural processes that were useful to represent as following mathematical rules. Partly because of that GST first emerged without any common way of referring to natural systems.

Natural Systems Design Science reverses that in order to make science a general study of the designs of nature, as systems observed in context. By referring to systems as defined by nature rather than by theory it offers a common foundation for sciences and experience. That also allows useful models and abstractions to point to and so illuminate their natural subjects in context, turning the direct subject of science into understanding nature, rather than theory.

B. Introduction:

The NSDS approach comes from connecting the energy laws of physics with the widely observed forms of natural systems beginning and ending with developmental processes. That evidence of energy continuity when implied or observable is typically seen as change following S-curves. That turns out to be a mathematical necessity for the conservation of energy, as energy transfer with discontinuous rates of energy transfer would imply instantaneous (i.e. infinite) derivative rates of change in energy flow without causation.

What it shows is that nature needs flexible organization to work, in the form of multi-scale non-mathematical processes that can begin and end with continuity. The most familiar kinds are the growth processes of systems we as S-curves in recorded data, that examined as systems seem to be actively opportunistic not deterministic.

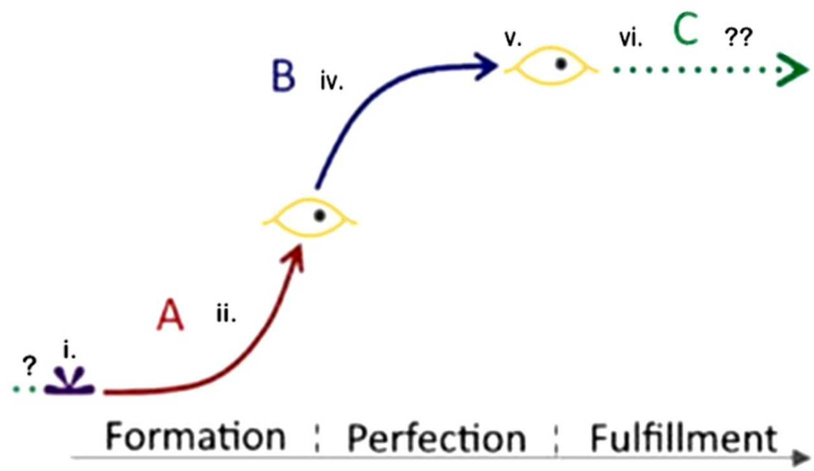
It is not a contradiction that the emergence and change in such organizational processes are often too small for us to see. It only means the limits of nature are outside the limits we can observe. So finding and verifying the continuities is part of the foundation too.

My papers, media links, and links to my research are on my research site:

https://Synapse9.com/signals - I live in New York

C. Appendix:

Nature's Integral of Emergence



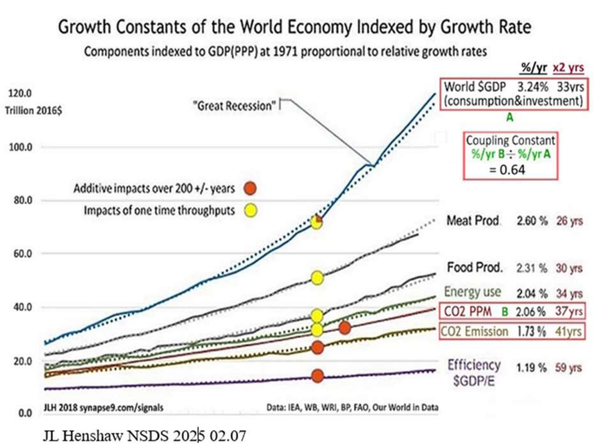
? Context i Germination, **ii** Unsustainable growth, **iii** Reorientation,

iv Meeting the World & Maturing, **v** Release, **vi** Free Engagement, **??** Future Contributions

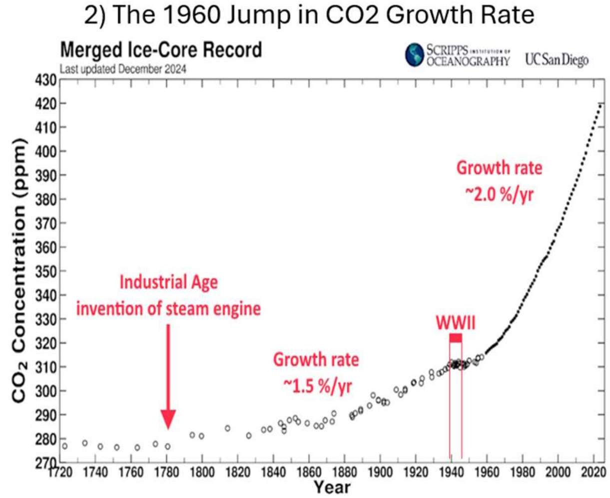
1. <u>The general chain of organizational states in beginning any energy</u> The color coded labeling of periods of change are to help make the intuitive connections between environmental processes going through each period of reorganization over time – Link

Below are two charts that settle the question of the real cause and needed response to climate change. The simple and unambiguous evidence is that CO2 warms the planet in nearly direct proportion to atmospheric PPM[1.] Since Watt invented an efficient rotary steam engine in 1780 CO2 has grown exponentially, directly coupled to the growth of the economy, at 1.5%/yr before WWII, and 2.0%/yr ever after[2]. That is the climate crisis, now doubling every 37 years!.

1) the linear coupling of GDP and CO2



2) The 1960 Jump in CO2 Growth Rate



2. **<u>The linear coupling of GDP and Atmospheric CO2, both regularly doubling</u>**
In 1) Note the close fit between the data curves for GDP and the *constant* growth rates of all its components indicating the system organized as a whole. In 2) note the 30% increase in the growth rate, from 1.5 to 2.0 %/yr. After the war there ways all the great new technology that won the war and it was then applied to accelerating the regular

1 Figure in the paper Fig 4 Ref 1-3
2 Cornel arXiv 2019 preprint. Paper Ref 1-3

doubling our the economy with no regard to the severe world crises from overshooting the manageable limits of the earth and world society impacts that would soon follow. (Ref 1-b below)

D. References:

Here are ten links you to help anyone fascinated or worried about the history of systemic failures we may be repeating, though still fluid and sorting things out I think, seeing dramatic turbulence of global societal system changes; I guess you could say: "looking for places to land." It was first prepared to help systems scientists and innovators in forming and guiding systems understand my technical work.

1. **ISSS bio and key links** **https://wiki.isss.org/index.php/Jessie_Henshaw**
   a) Research Site and links
   https://synapse9.com/signals
   b) List of Top 100 World Crises Growing With Growth
   categorized for prioritizing and responding to them
   https://synapse9.com/_r3ref/100CrisesTable.pdf
   c) The Scripps Inst. Data on the rate of global CO2
   https://scrippsco2.ucsd.edu/graphics_gallery/mauna_loa_and_south_pole/index.html
   d) **A World SDG** – and related research letters.
   Proposed to the UN and NGOs in the 2012-14 drafting of the SDGs
   https://synapse9.com/signals/?s=World+SDG
   e) 2019 (Henshaw). –Growth Constant Fingerprints of Economically Driven Climate Change: From 1780 origin to post-WWII great acceleration. 2nd submission, Cornel arXiv preprint.

2. **Publication list and sections:** **https://www.synapse9.com/jlhpub.htm**

a)	Major New Work	6 papers
b)	Pattern Language/Deep-Ecology	9
c)	Natural Systems Physics	7
d)	Reports to UN bodies	5
e)	Complete chronological listing	41

3. **YouTube Talks** **https://www.youtube.com/@JessieLydia**
   a) The talk on the Genome of Language
   https://www.youtube.com/watch?v=Ax2gPPrk4Zw
   b) Language as a Knowledge Tree for Systems "In Context"
   https://www.youtube.com/watch?v=Xd3aLWMztR0
   c) Exploring Words that Point to Systems, Anchoring Our Minds to Nature
   https://www.youtube.com/watch?v=F040Uv5mJTI
   d) Blindness to Systems That Matter
   https://www.youtube.com/watch?v=yG7YAFcE3So