

Understanding Nature's Purpose in Starting
all *New Lives* with Compound Growth, (Like the big bang!)

-

New natural science for individual systems
& choices for Future Society

The Milestones of New Lives **As useful guides and leverage points**

ISSS 2021 – Bio, Paper, Slides, & Extras

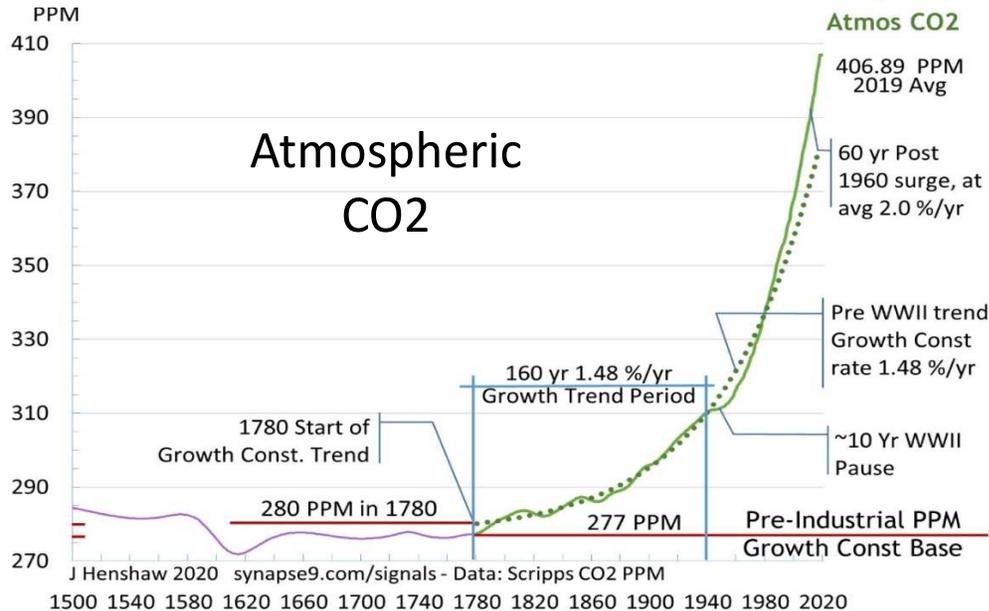
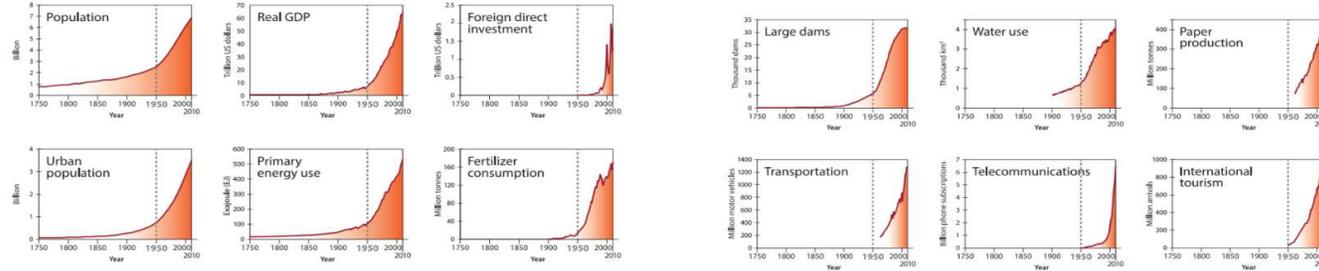
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- The general issue
 - Humanity is still in its long “big bang” explosion of new technologies, services, complexity and disruptions that started with the perfection of the steam engine in 1780.
 - How are we handling it? What is compound growth for anyway?
 - Might we learn from nature’s other kinds of big bang development processes, and what becomes of them?
 - Where would we look for examples? Or are they hidden in plain sight?

- Some basic natural systems issues
 - You might not know growth is nature's main system-building process with its feedback loops all internalized, hidden from view.
 - It's a capture and incorporation process, like learning, that continually changes the whole, so is not reversible.
 - The non-linear dynamics are what correspond to internal stages of development and to what comes next, like an assembly line.
 - The start and end of accelerating and then decelerating development are the main milestones.

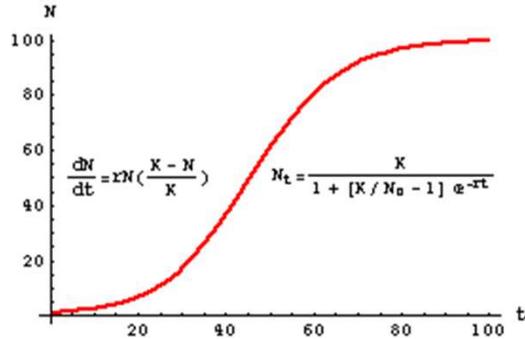
Complex systems created by growth are called "*New Lives*," a very general term, for new forms that have a life of their own.

- A prime example, is the great acceleration of the Anthropocene – our growth as a new life on earth.



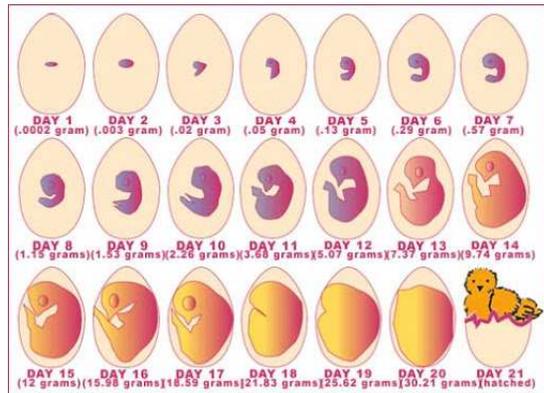
Life built around rearranging nature and our lives at ever faster accelerating rates!
 But what for?
 Could it be for Life?

- Does an equation that fits a system growth process describe it?



No, Hardly at all.

- The Great Acceleration of a Farm Hen Chick

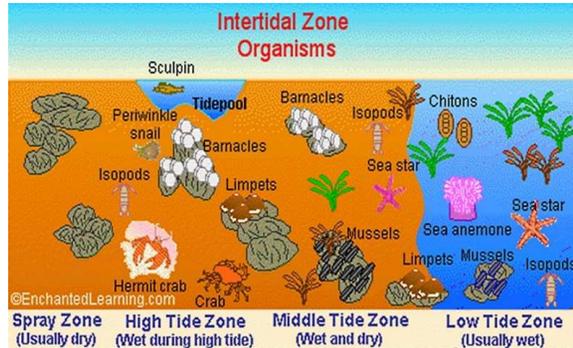


A 21-day growth sequence plus 10 days in the hen after the egg is fertilized.

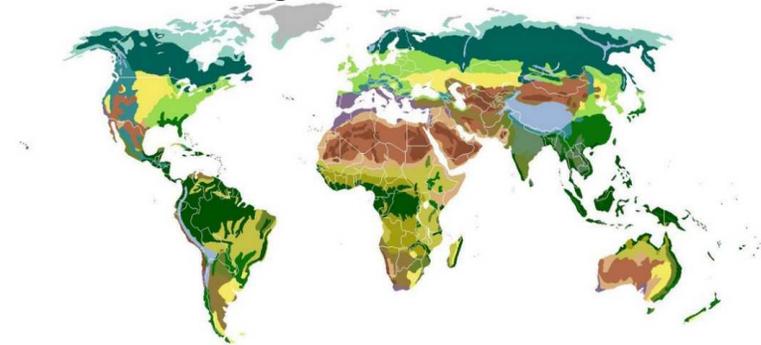
A very purposeful great acceleration

<https://www.cacklehatchery.com/how-long-after-mating-does-a-hen-lay-fertile-eggs/>

- *Growth is also what creates the shapes of life and fits them together*



Tidal zone ecology



World ecosystem zones



Manhattan

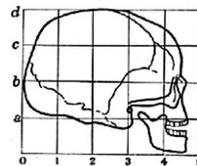


Fig. 177. Human skull.



Fig. 179. Skull of chimpanzee.



Fig. 180. Skull of baboon.

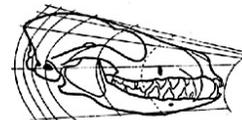


Fig. 181. Skull of dog, compared with the human skull.

- *D'Arcy Thompson* -



Hurricane

controlled by “intracellular signalling pathways”

• *Why starting change requires growth*

Energy Conservation requires gradual beginnings and ends to avoid infinite rates of change => "S" curves

An infinite series of derivative conservation laws

Integration of the nth law is exponential

Table 1	a) Conventional Form	b) Unified Form	c) Limiting Rates
1. Conservation of Energy • sum of energies is constant • 0 derivative level	$\sum_i \frac{1}{2} m_j \cdot v_j^2 = k$	$\sum_i m_j \int v_j \cdot dv = k$	$s_j < c \cdot t + k_1$
2. Conservation of Momentum • sum of momentums is zero • 1st derivative level ³	$\sum_i m_j \cdot v_j = 0$	$\sum_i m_j \frac{ds_j}{dt} = 0$	$v_j < c$
3. Conservation of Reactions • sum of forces is zero • 2nd derivative level	$\sum_i m_j \cdot a_j = 0$	$\sum_i m_j \frac{d^2 s_j}{dt^2} = 0$	$a_j < c_2$
4. Unnamed • Sum of 2nd accelerations zero • 3rd derivative level		$\sum_i m_j \frac{d^3 s_j}{dt^3} = 0$	$r_j < c_2$
5. Principle of Continuity • Sum of higher accelerations zero • n'th derivative level		$\sum_i m_j \frac{d^{n^2} s_j}{dt^{n^2}} = 0$	$r_{j_n} < c_n$

For some large n, the nth derivative rate r_n is taken as finite and between some lower and upper bound pair of constants representing the limiting propagation rates for the process of energy transfer:

$$u_n > r_n > l_n \tag{3.1}$$

Integrating the nth derivative rate with integration constant c_{n-1} also chosen between some upper and lower bound limits of propagation rates for the process at that level of acceleration:

$$r_{n-1} = \int r_n = r_n \cdot t + c_{n-1} \tag{3.2}$$

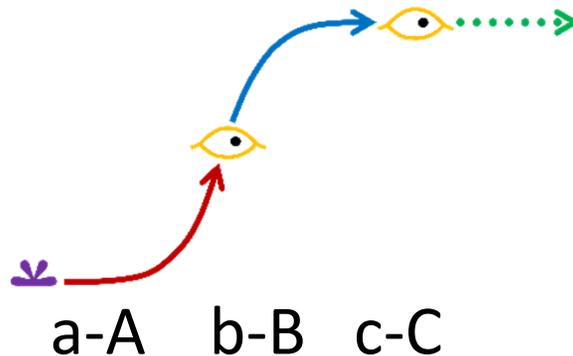
In general, as the number of derivative levels n increases and the number of times r_n is integrated i equals n the form of polynomial expansion approaches that of an exponential.

$$f(t) = r_0 = \frac{r_n}{(n-1)!} \cdot t^{n-1} + \frac{c_{n-1}}{(n-2)!} \cdot t^{n-2} + \dots c_{n-i} \tag{3.3}$$

Affirmed by the ubiquity of growth curves for beginnings and ends

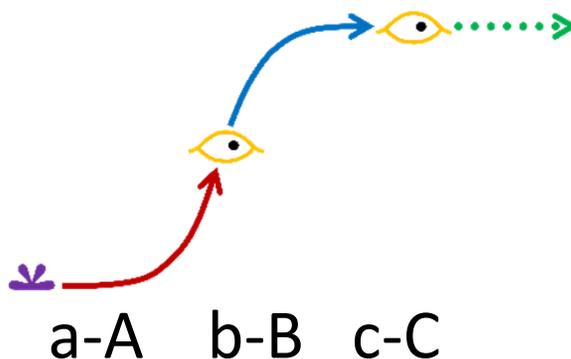
- To make it *new science* it needs a new general story
 - Based on data and observation and open to elaboration
 - A symbolic “S” curve with milestones: a-A, b-B, c-C
 - 3 organizational processes, 3 events to start each

Beginning	Middle	End
Individuation	Maturation	Engagement
Divergence	Convergence	Homeostasis



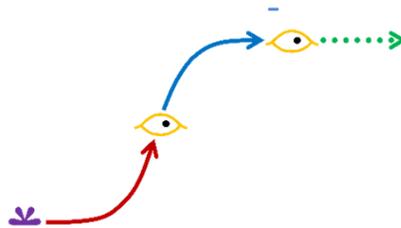
- It is one general story for all *individual new lives*
 - A natural science story of continuity
 - Each life the center of its own universe

plants, animals, ecosystems, weather systems,
civilizations, economies, communities,
businesses, cultures, societies, social groups,
personal relationships, work habits,
home, office, and artistic projects, etc.





- ? OK, but wait, why mix human designs with natural designs?
 - We copied our method of system design from nature's "innovation, maturation, and release" method, using the same milestones.



a A - b B - c C

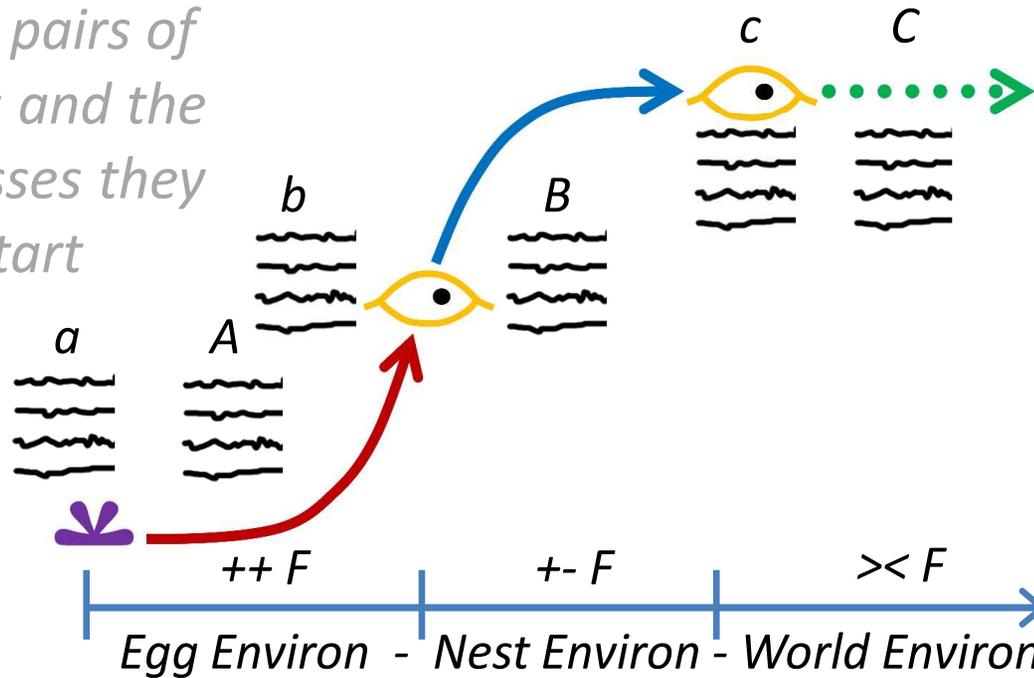


- Human systems also use it to develop communities, businesses, cultures, societies, social groups, personal relationships, work habits, home, office, and artistic projects, etc.

<https://www.freepik.com/photos/people> Photo by wayhomestudio - www.freepik.com

- *Growth is also a hero's journey, a thread of 6 suspense-filled complex stories*

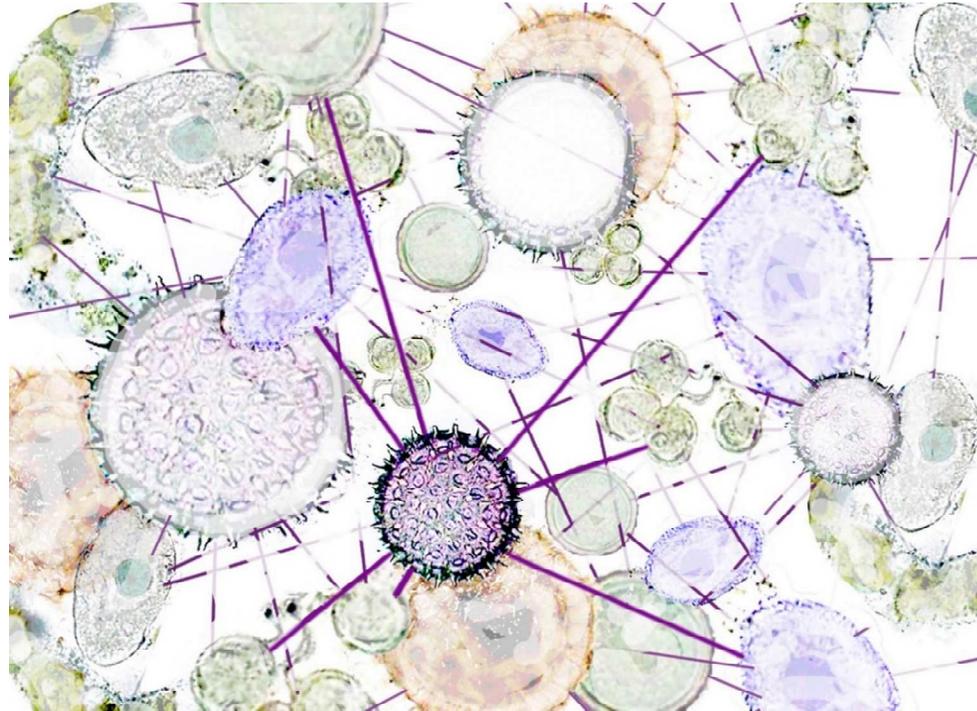
Three pairs of events and the processes they start



Self-organizing “intercellular signalling pathway” formation.

- Perhaps more familiar

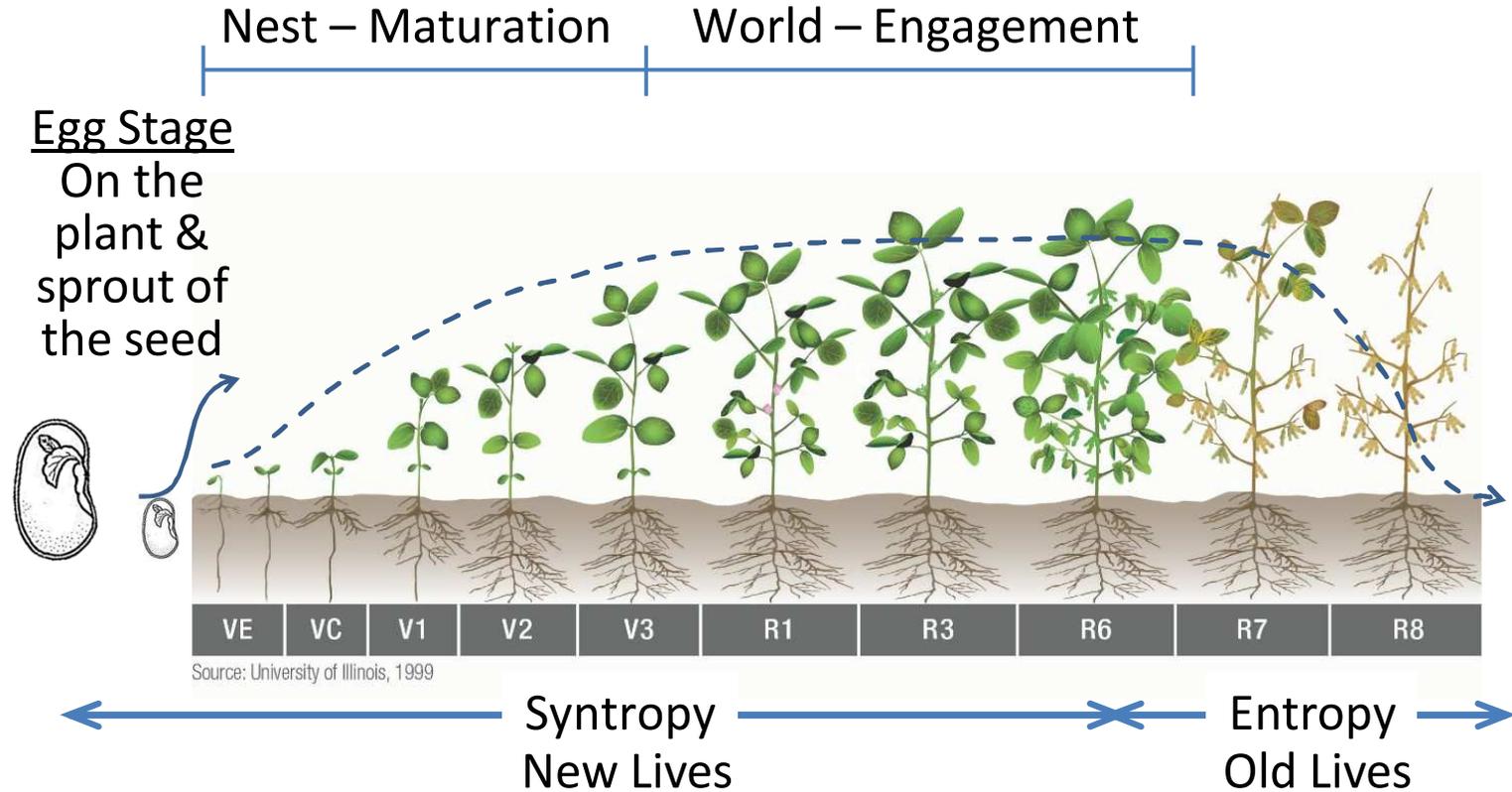
... is how at the climax stage of growth a new life emerges into a complex natural world – of mostly intermittent relationships



What
we
call
home

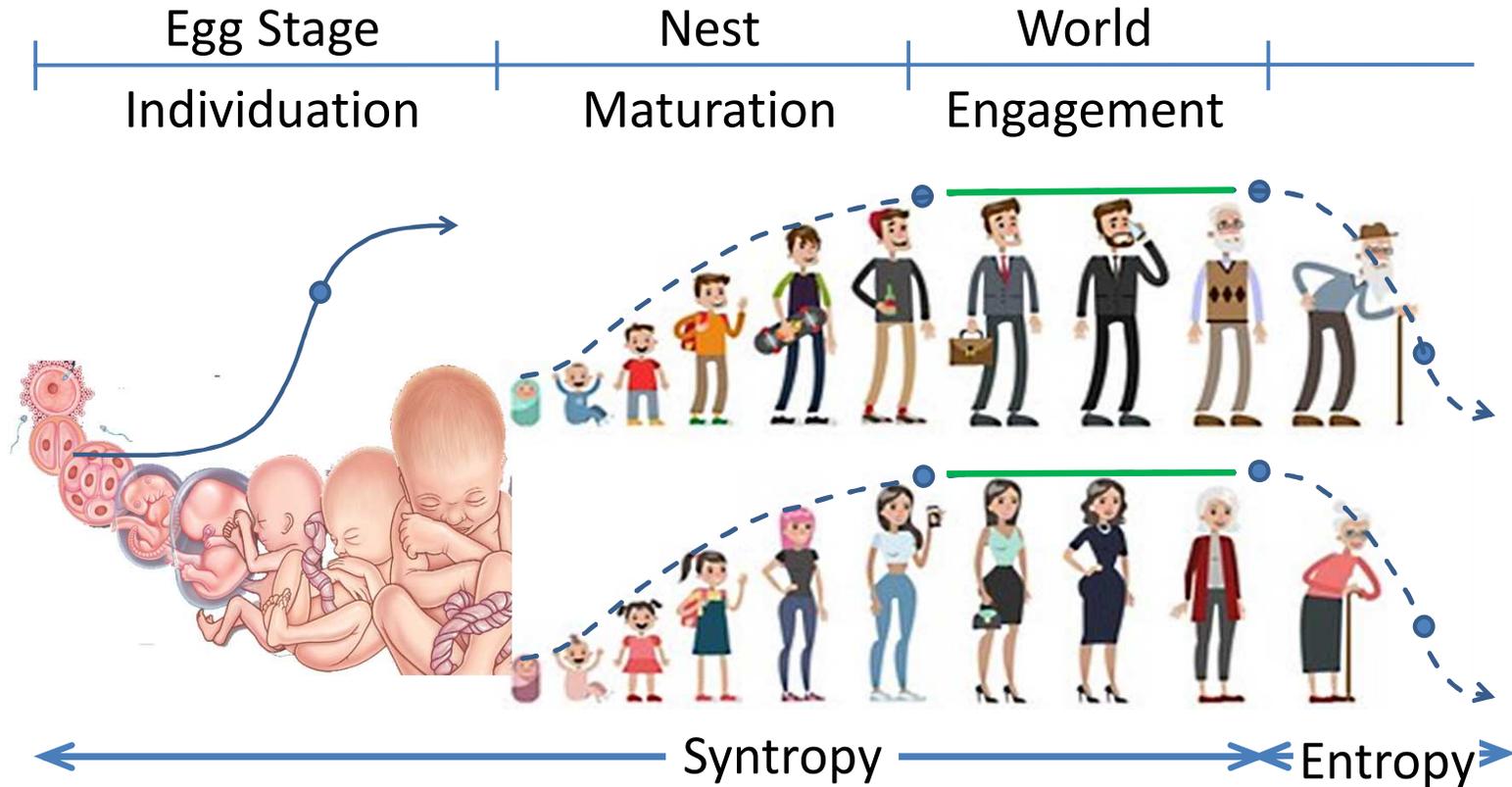
... of self-organizing *“intercellular signalling pathways”*

- The Life Stages of Plants

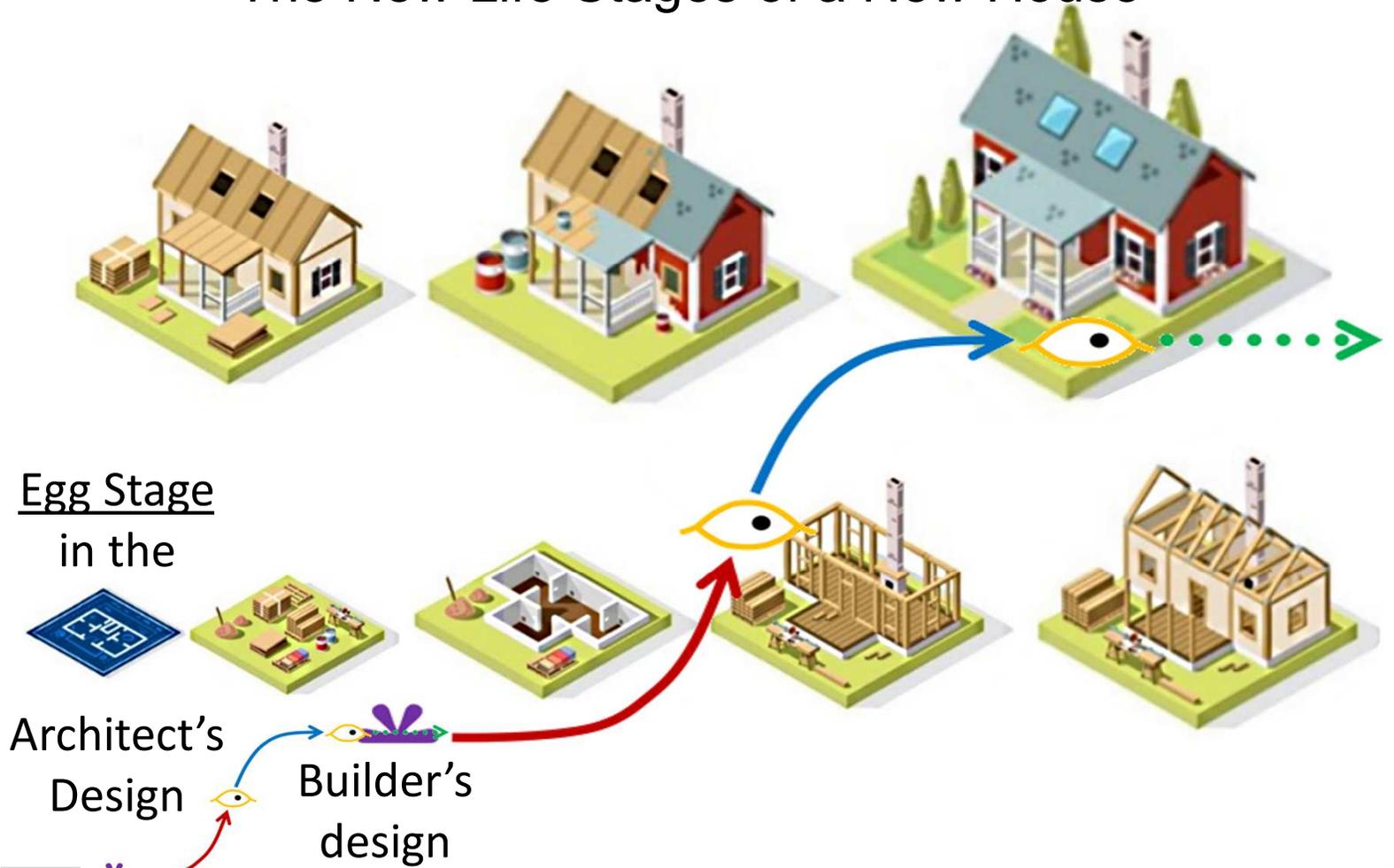


- The Life Stages of People

- One cell to a Trillion • Then times 22 in 1,100 months



- The New Life Stages of a New House

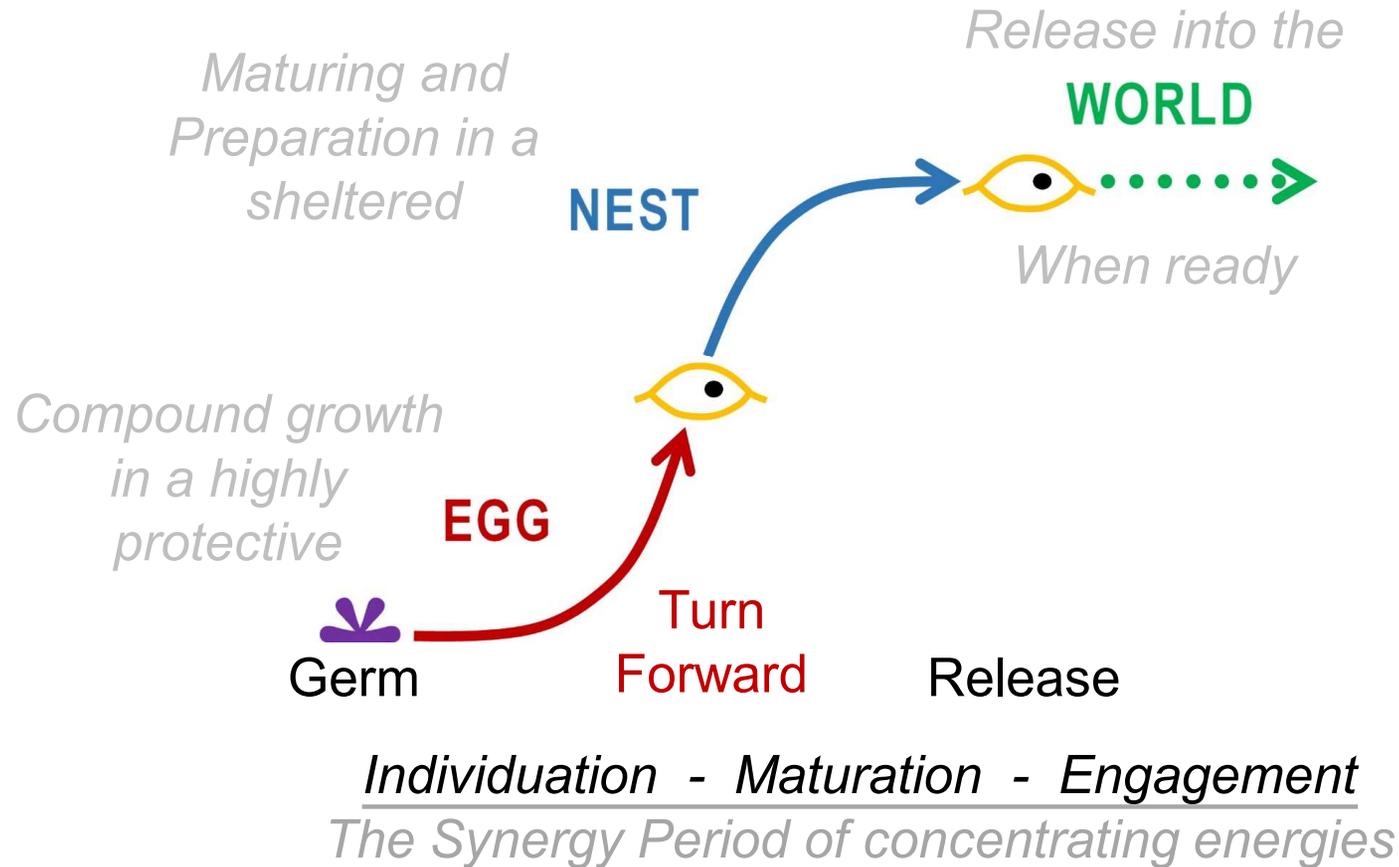


Egg Stage
in the

Architect's
Design

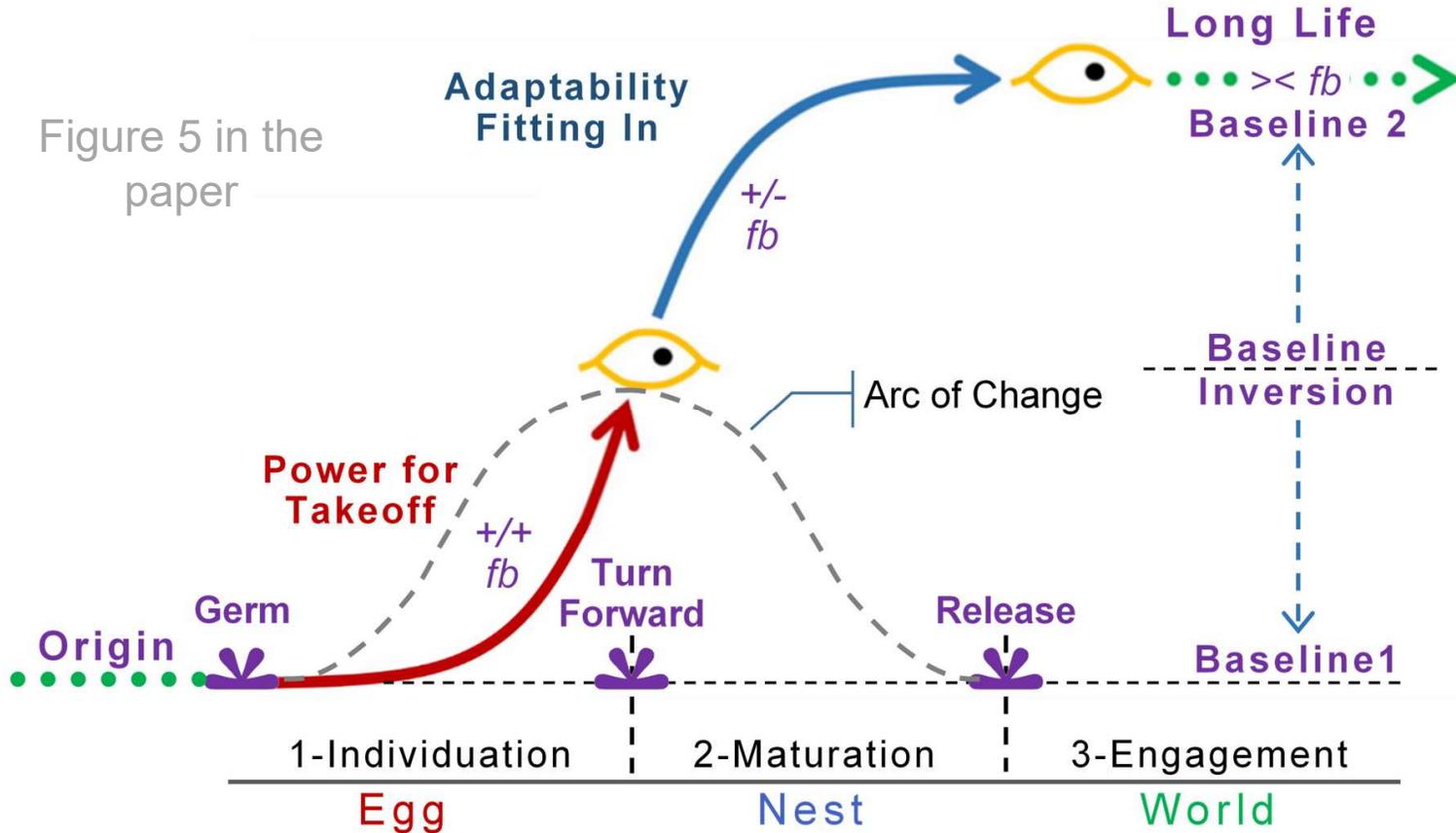
Builder's
design

- A language framework for the story of new lives



- The Growth Story of *New Lives in detail*

3 Pivotal events, 3 Feedback periods, 3 Organizational phases, 3 Environments



Egg, Nest, World

- For a family Dinner, Vacation, or office Project
 - a) Germ for
A) Individuation
 - b) Turn Forward
B) To Maturation
 - c) Release to
C) Engagement
in the World
- A. A vision for what to do germinates with no commitments, planning for assembling the parts
- B. Turn Forward – refining and putting the plan in motion, then details, start cleanup and get help from others
- C. Release – the product leaves the nest, released and delivered to independent life

unformed – to fully formed but undeveloped – to fully developed

- So, How might a language for *new lives* be used?

Discussing leverage points for the Anthropocene growth crisis.

- Exposing the responsibility of wealth for the increasing disruption of the earth and harm to our economic capital.
- Unifying the worldwide change of heart already under way.

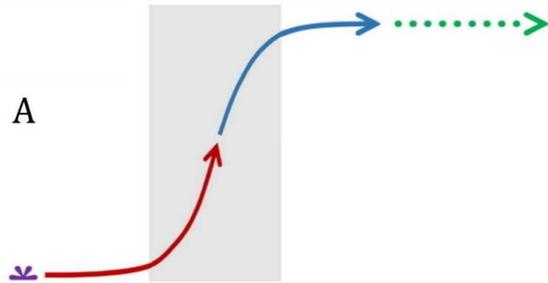
Helping people see and anticipate the milestones of their lives

- Learning to read growth changes at home or the office.
- Helping to enable the global transformation communities.
- Giving disparate cultures a common language and reality.

All are also good thought exercises and discussion topics

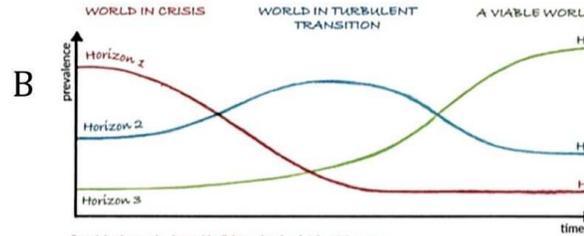
• Related useful system transformation models

Familiar Long Struggle & Breakthrough



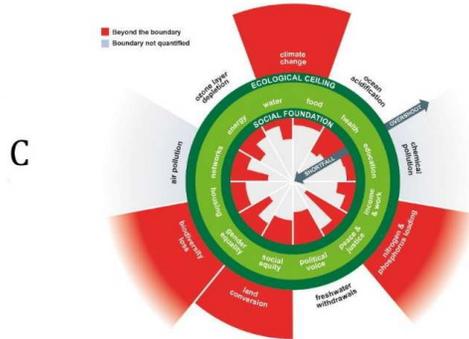
Sharpe, Three Horizons Framework

THREE HORIZONS FRAMEWORK APPLIED TO THE TRANSITION TOWARDS A REGENERATIVE CULTURE

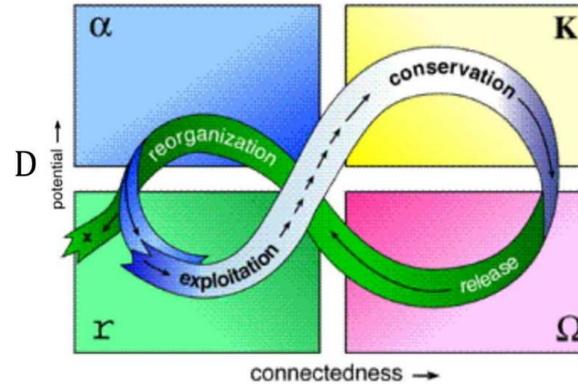


Sustaining innovation keeps 'the lights on' and maintains status quo.
 Disruptive innovation identifies opportunities to change the scope of what is possible.
 Transformative innovation facilitates the transition towards regenerative cultures.

Reworth, Doughnut Economics

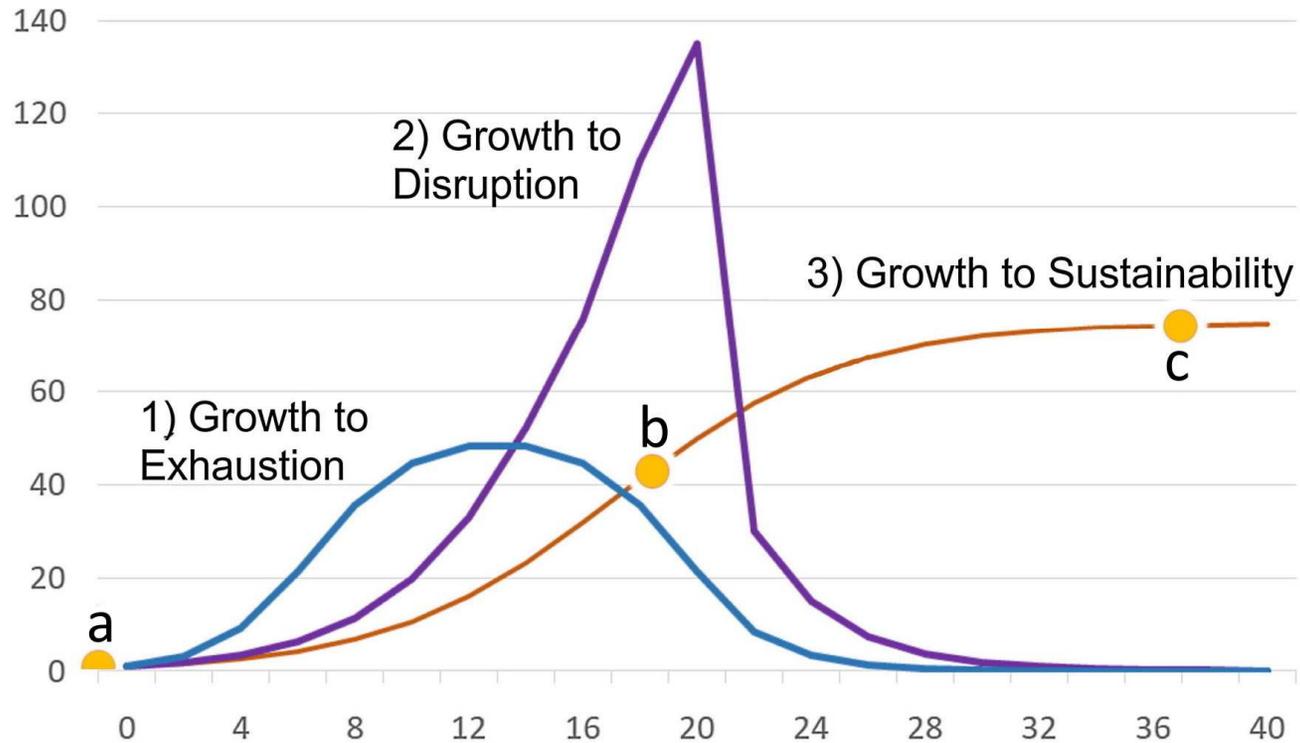


Holling, Panarchy Adaptive Cycle



All are also good thought exercises and discussion topics

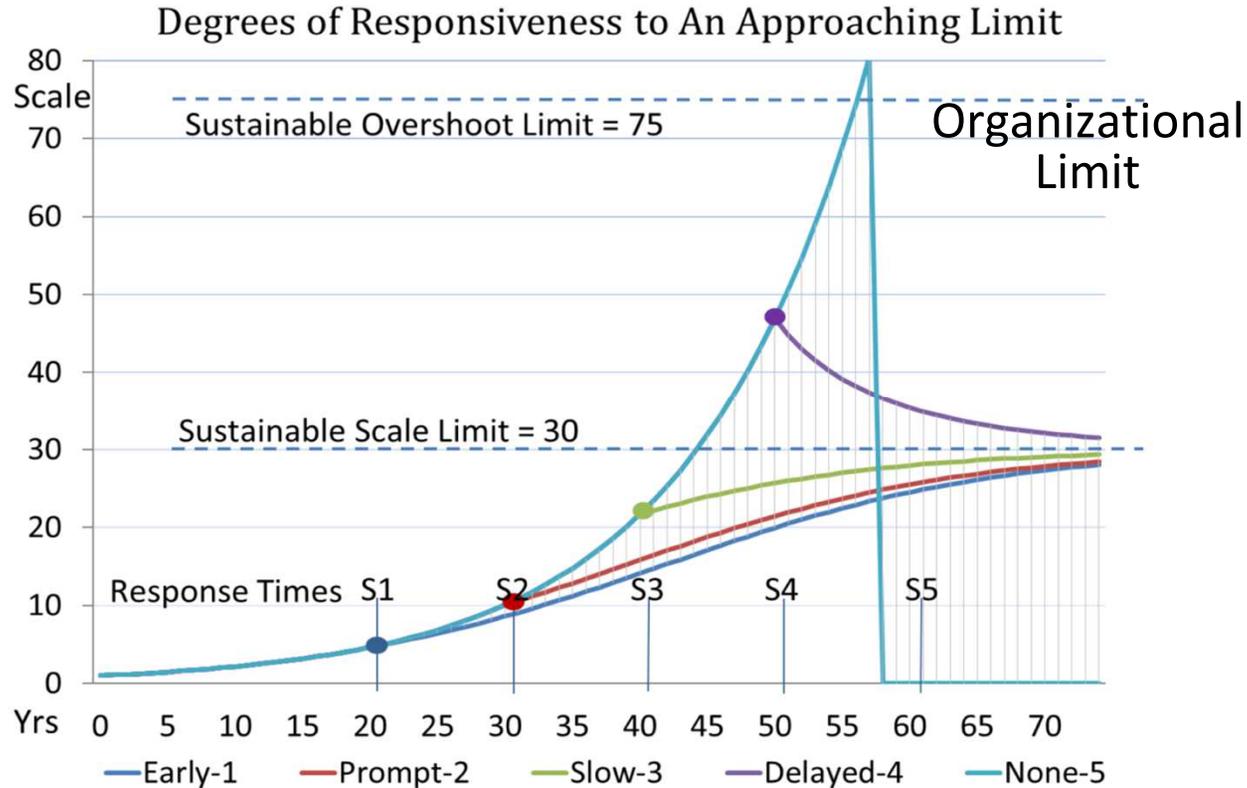
- The three main challenges of *New Lives*, A, B, & C



A New Lives Need: 1. Innovation, 2. Restraint, and 3. to Make a life

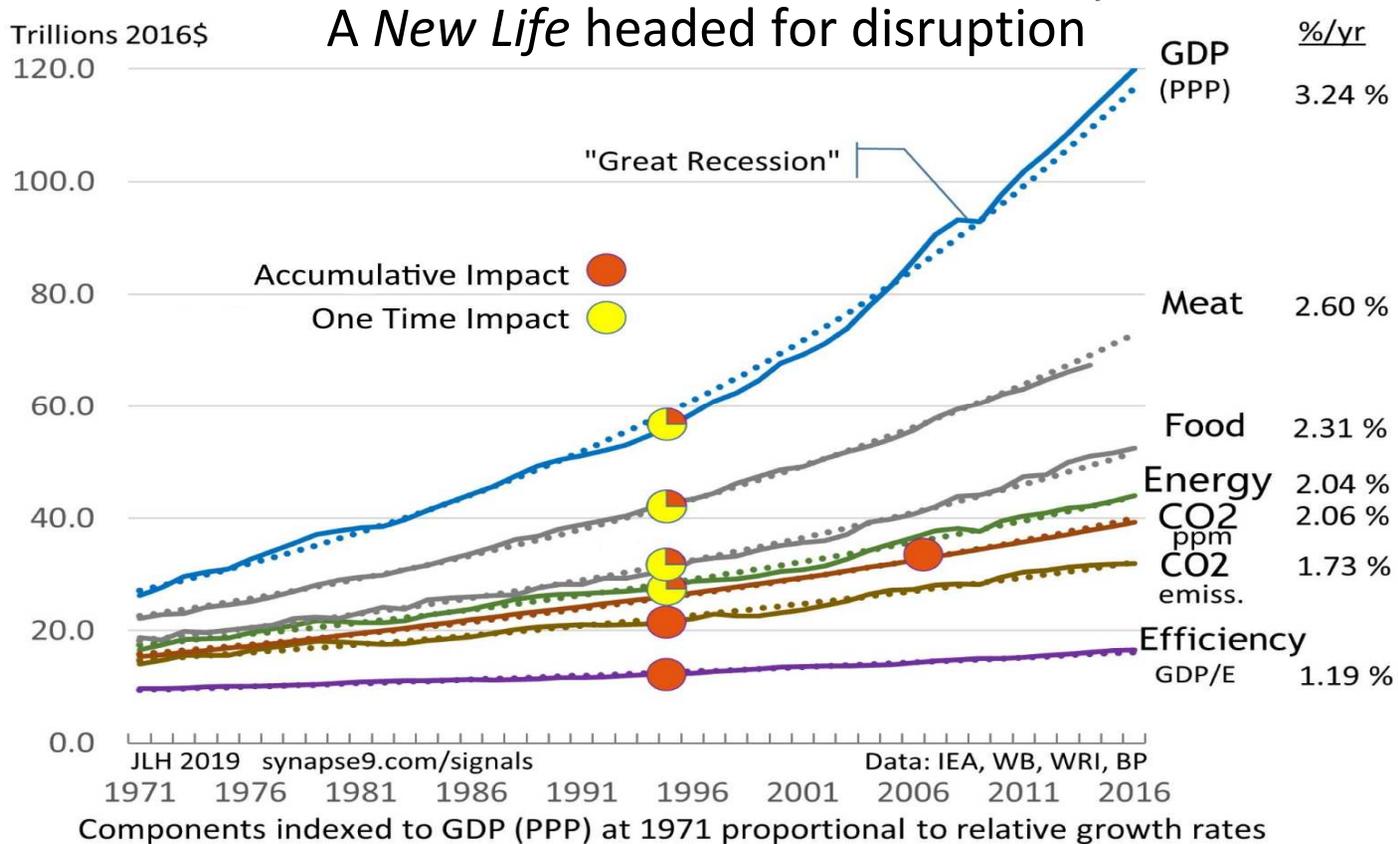
What are Examples of the two kinds of failure?

- What if a nature changes and a seemingly good life becomes risky?



You get warnings... The more delay the more disruptive the turn.

• Growth constants of the world economy



The physicality of growth: push comes to shove with the jerk of change.

- Scoping a system survival plan using systemic levers
 - Money circulation is out of balance, spiral for finance & circular in commerce.
 - A “carrot and stick” driver of finance is relieved by divesting profits to fund long term sustainability.

Compounding Profits
In Business & Finance

Circular Exchange
In Commerce



- Other ways to rebalance Finance and Commerce
 - Diverting investments to non-profits: a growing strategy for wealthy donors.
 - Feeding people hungry for new information & choices: helping them steer their lives in the right direction
 - Offer relief of the rising sense of global panic: by reducing the rising global struggle for survival
- Some basic cultural barriers
 - The “carrot and stick” that drives disruptive growth is taboo to discuss and requires new language
 - Our divided cultures are not well informed seem unaware of all speaking “foreign” languages

- What the world might understand:
 - **The Earth *needs* a new life** and following nature's plan for *new lives* might be a genuine alternative.
 - **A carrot & stick growth is exhausting and dangerous,** forcing people to push ever harder and take bigger risks with their own and everyone else's lives.
 - **We need a well-informed planetary sense of community** to be able to discuss how the world can make the turn forward.

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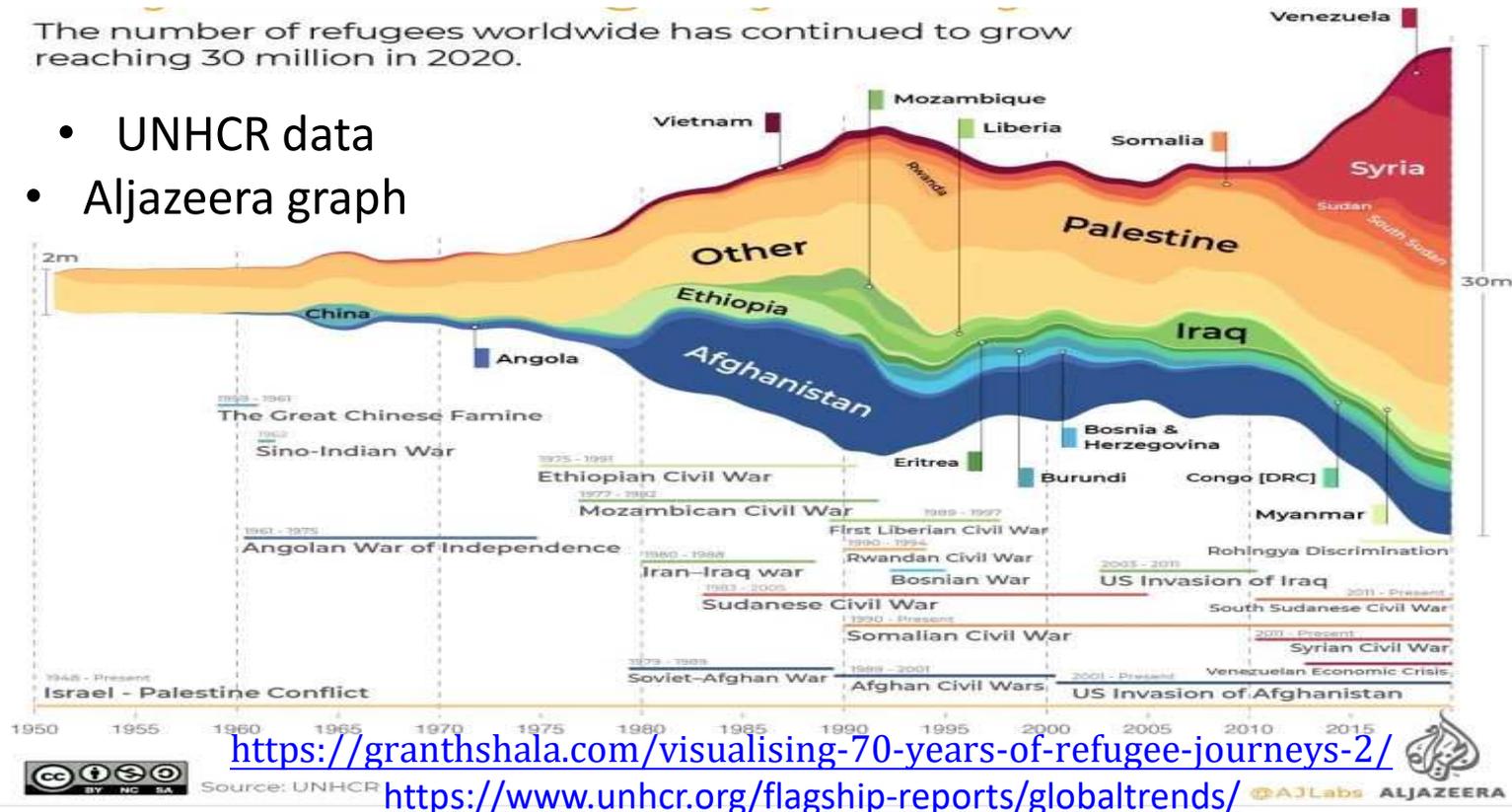
- The 1950-2020 World Refugee Wave

Tempers flaring from cultures pushed to interfere with each other?

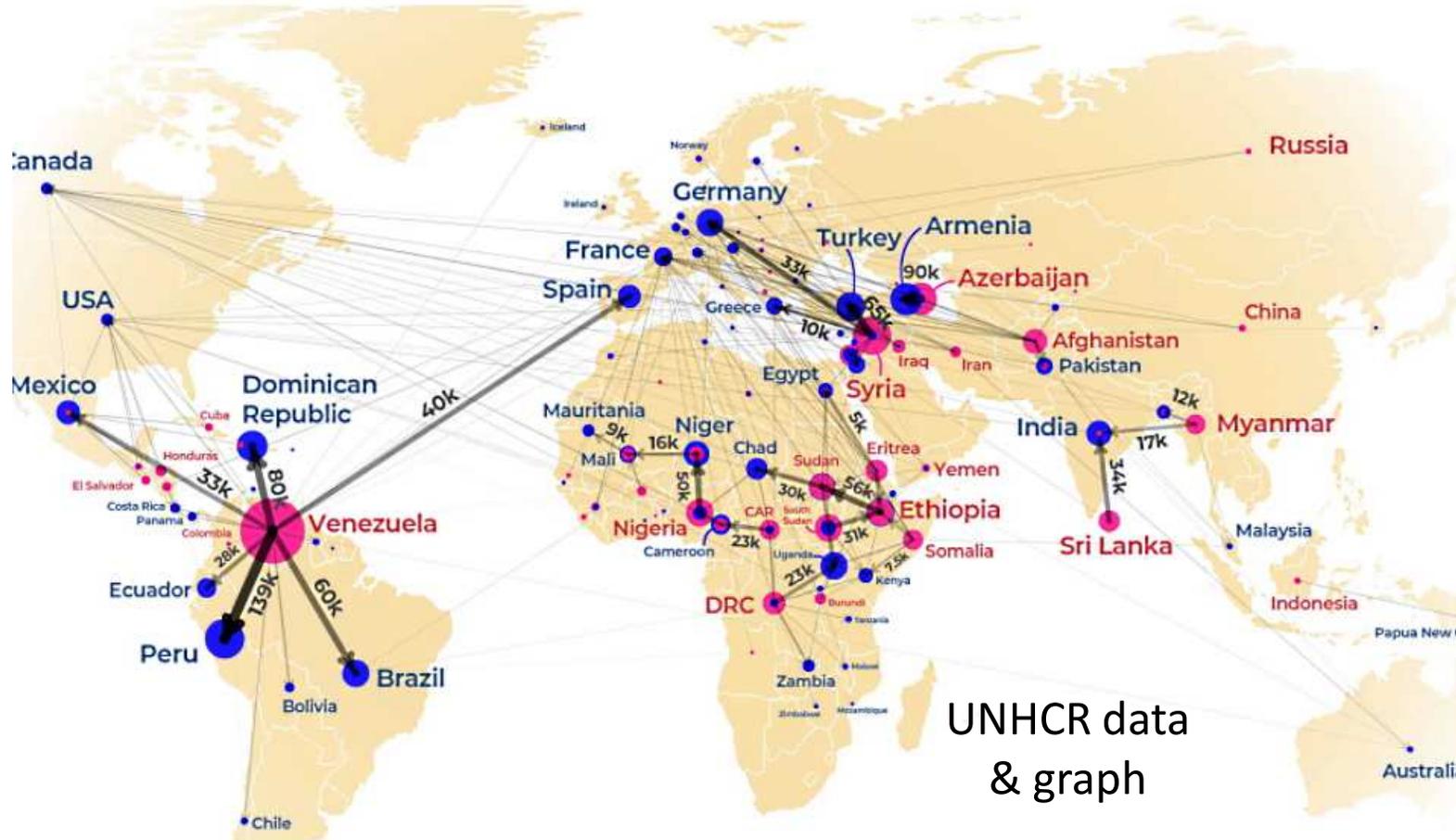
A “Cultural Climate Change?” Is this it global or local?

The number of refugees worldwide has continued to grow reaching 30 million in 2020.

- UNHCR data
- Aljazeera graph



- The 1950-2020 World Refugee Wave



<https://www.unhcr.org/flagship-reports/globaltrends/>

- We do not need business as usual.



- Culturally we need a sunrise



Let's talk about it!

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- A supplemental set of 11 discussion slides



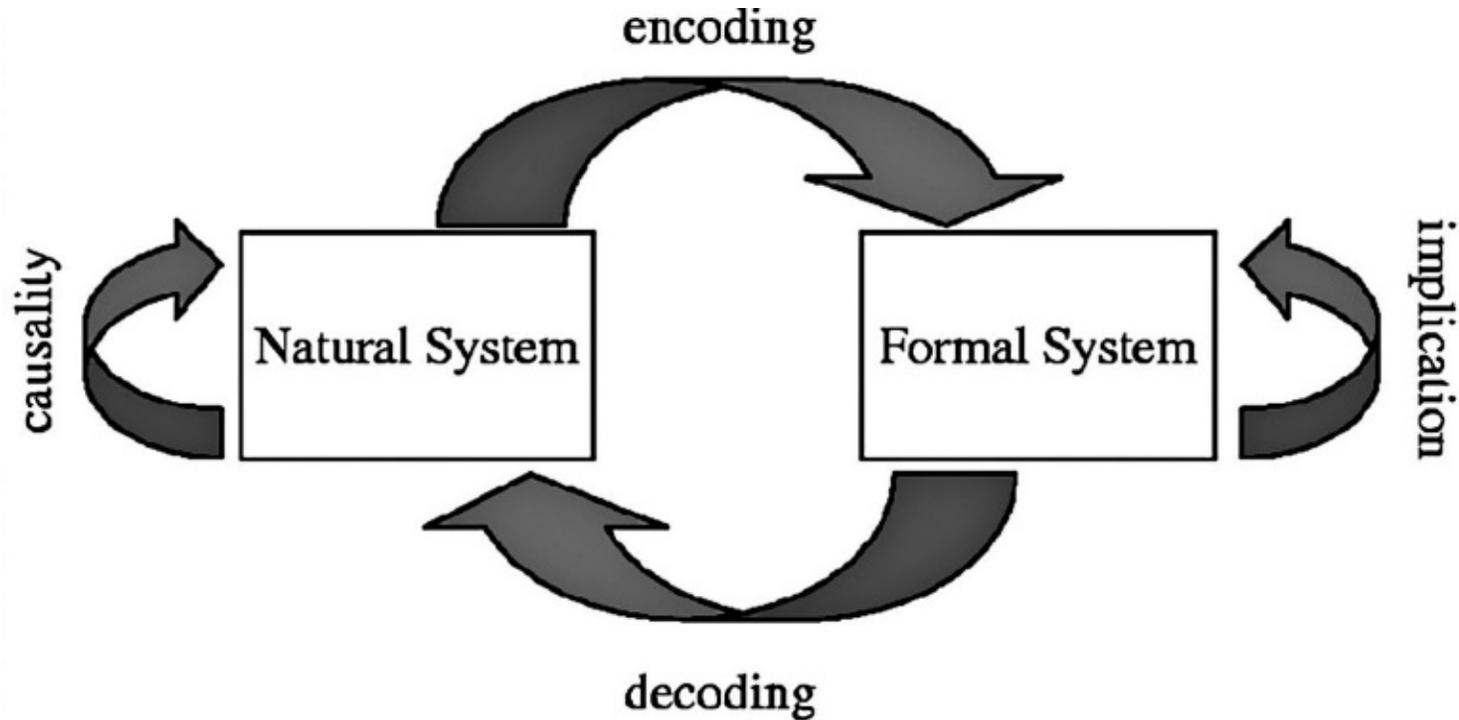
- Some of the challenges

- Because growth is organizational it does not work by cause and effect, but more by internally driven exploration.
- So, though growth transformations are very much part of our experience, they remain largely hidden while in plain sight.
- A primary role of human cultures is to share common knowledge and language, each defining its own reality.
- People worldwide care deeply about the *new lives* close to them, but recognizing patterns hidden in sight might be slow.

- **How new lives make the turn forward**
 - Human embryos shift from multiplying its parts to developing their usefulness at birth.
 - A family business invests its profits for compound growth till it has enough secure income to use its profits for family and community needs
- **How new lives fail to make the turn**
 - New personal relationships that go too far and overstep each other's boundaries.
 - Start up businesses that overshoot their expansion and become unable to coordinate the demands

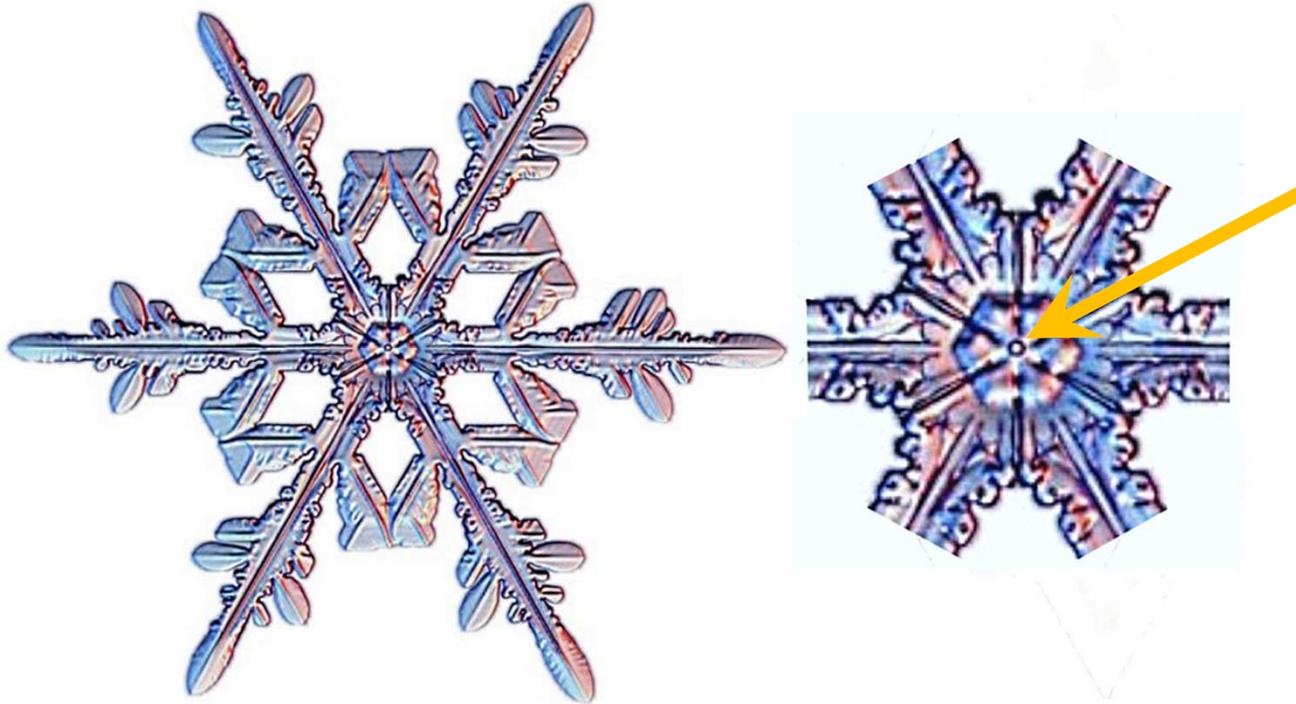
Switching from concentrating profits to distributing them (or not).

- Robert Rosen's model of science



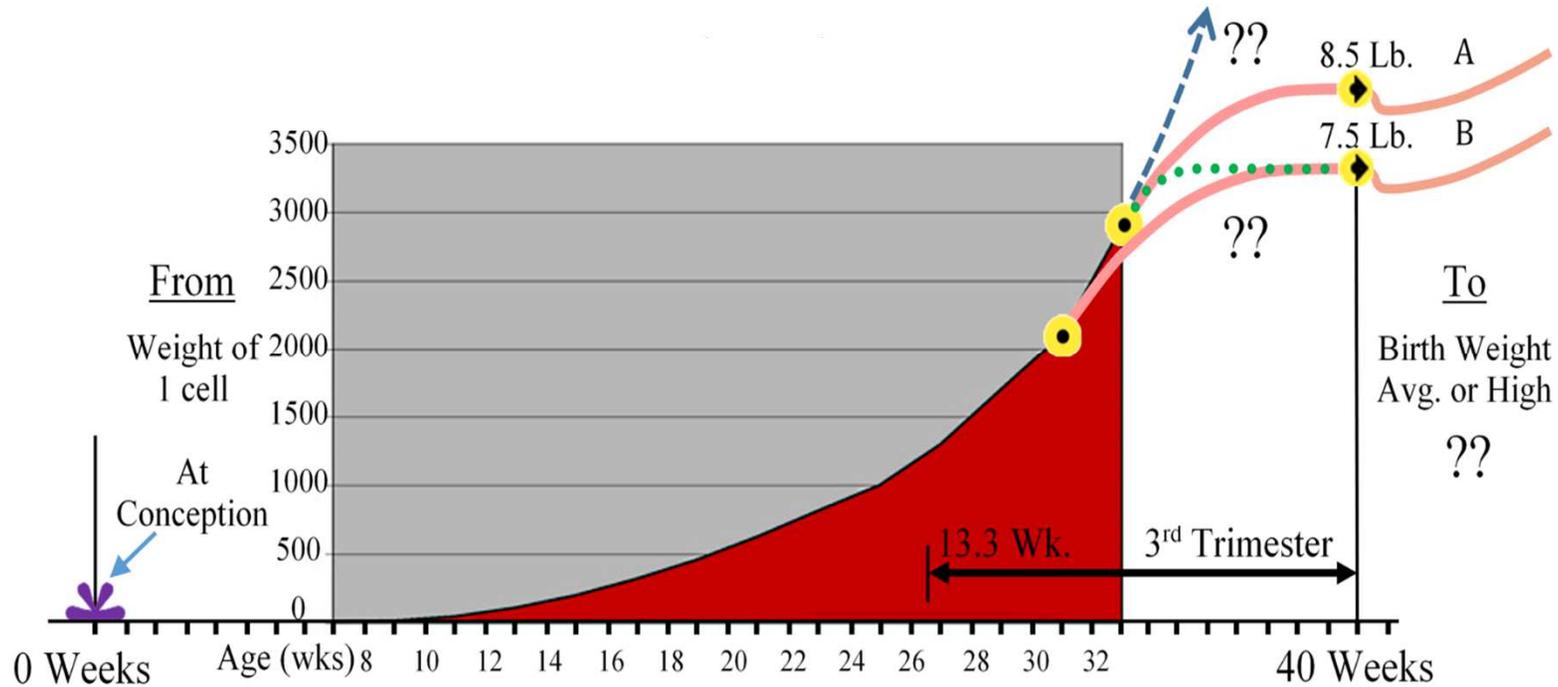
Finding, Encoding and Decoding natural patterns to test our theories of nature

- A Snowflake and its central nucleus



The crystal builds up from a tiny central dot. The filigree “entangled” within the first crystal.

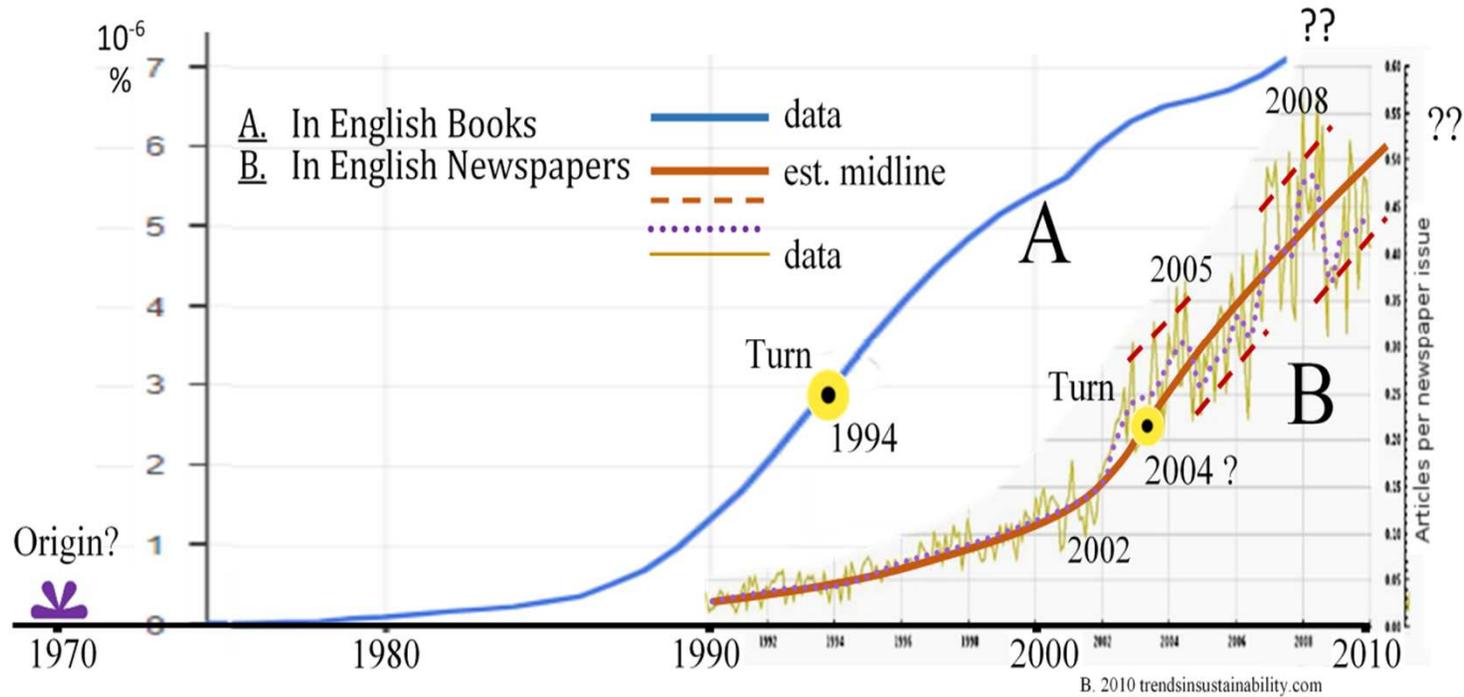
- Fetal Weight data: 8 to 32 weeks



Case Study I.

Human Gestation based on partial data for fetal weight.

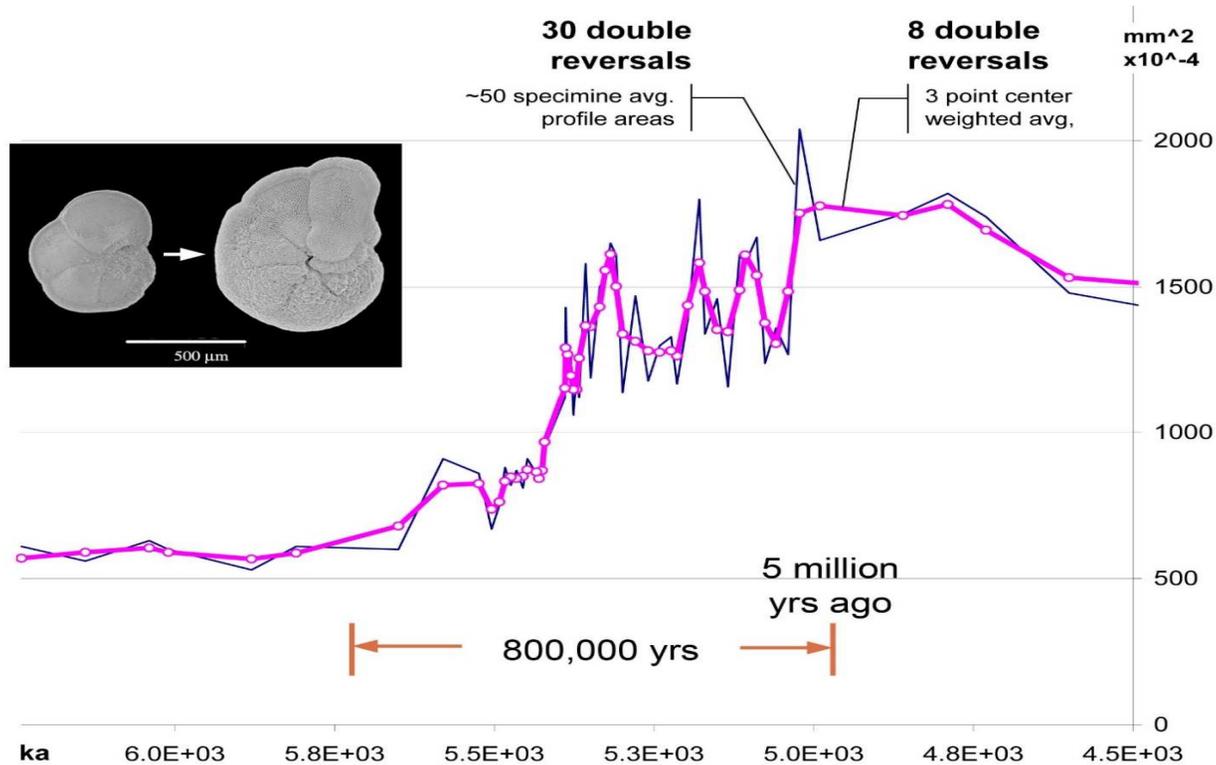
- Growing publication on Sustainability



Case Study II

Data on English book and newspaper publishing

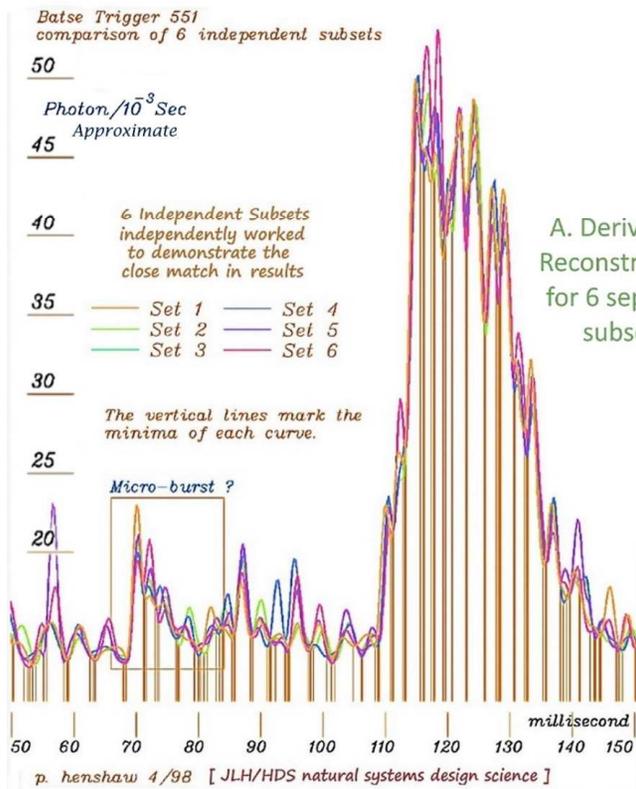
- Million-year plankton speciation event



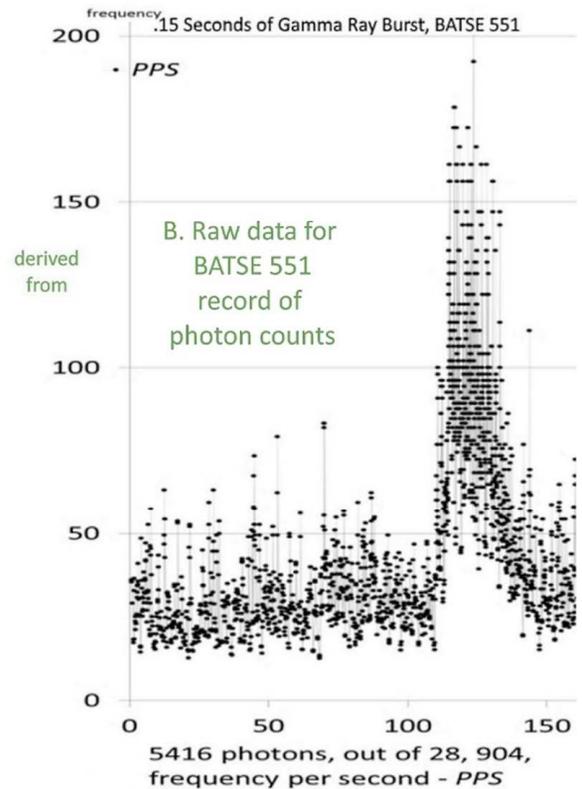
Case Study III

G. tumida plankton speciation – great spurts in size, differ from stability before and after.

- Intricate hidden continuities in Gamma Ray Burst

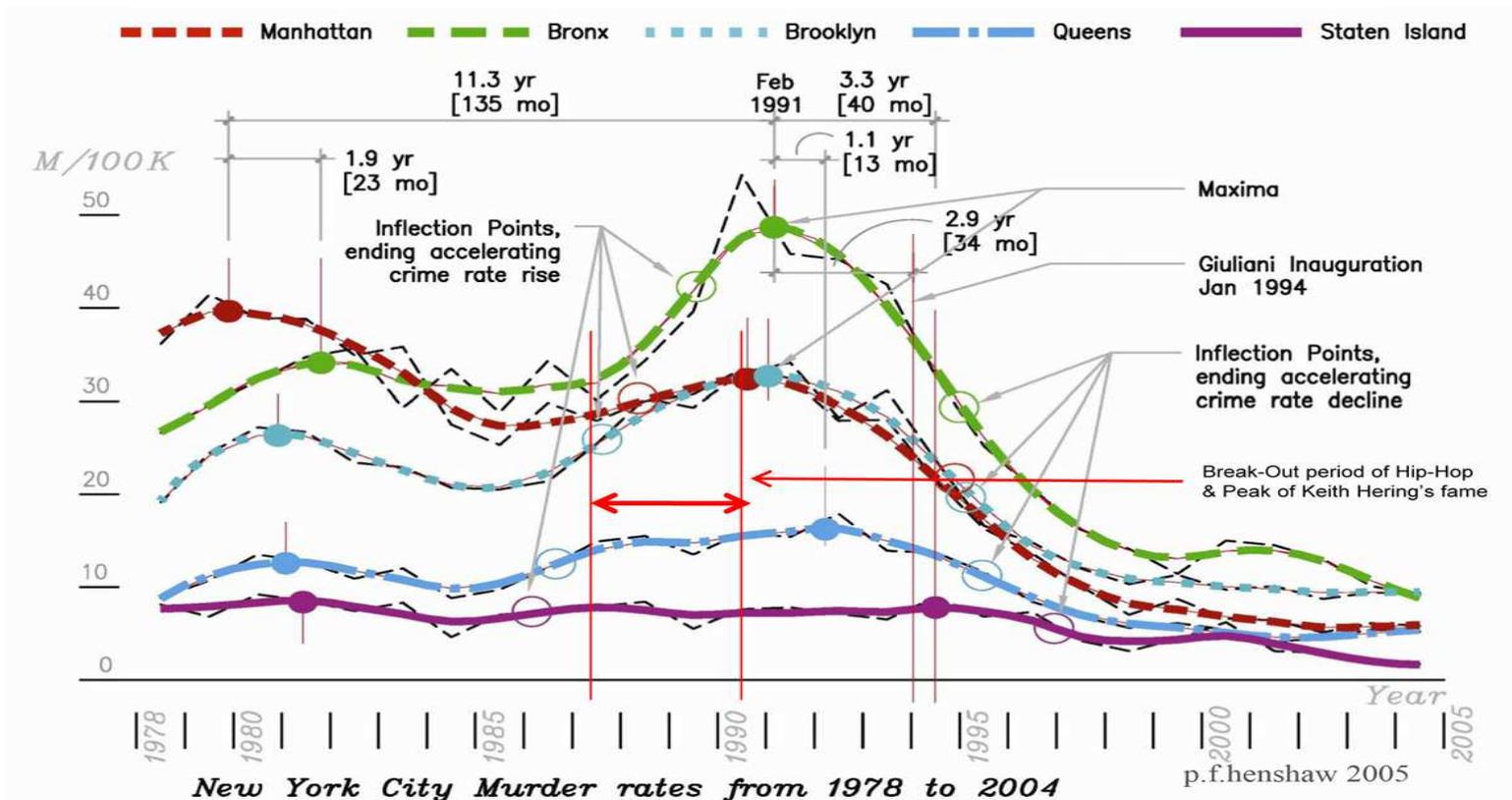


A. Derivative Reconstruction for 6 separate subsets



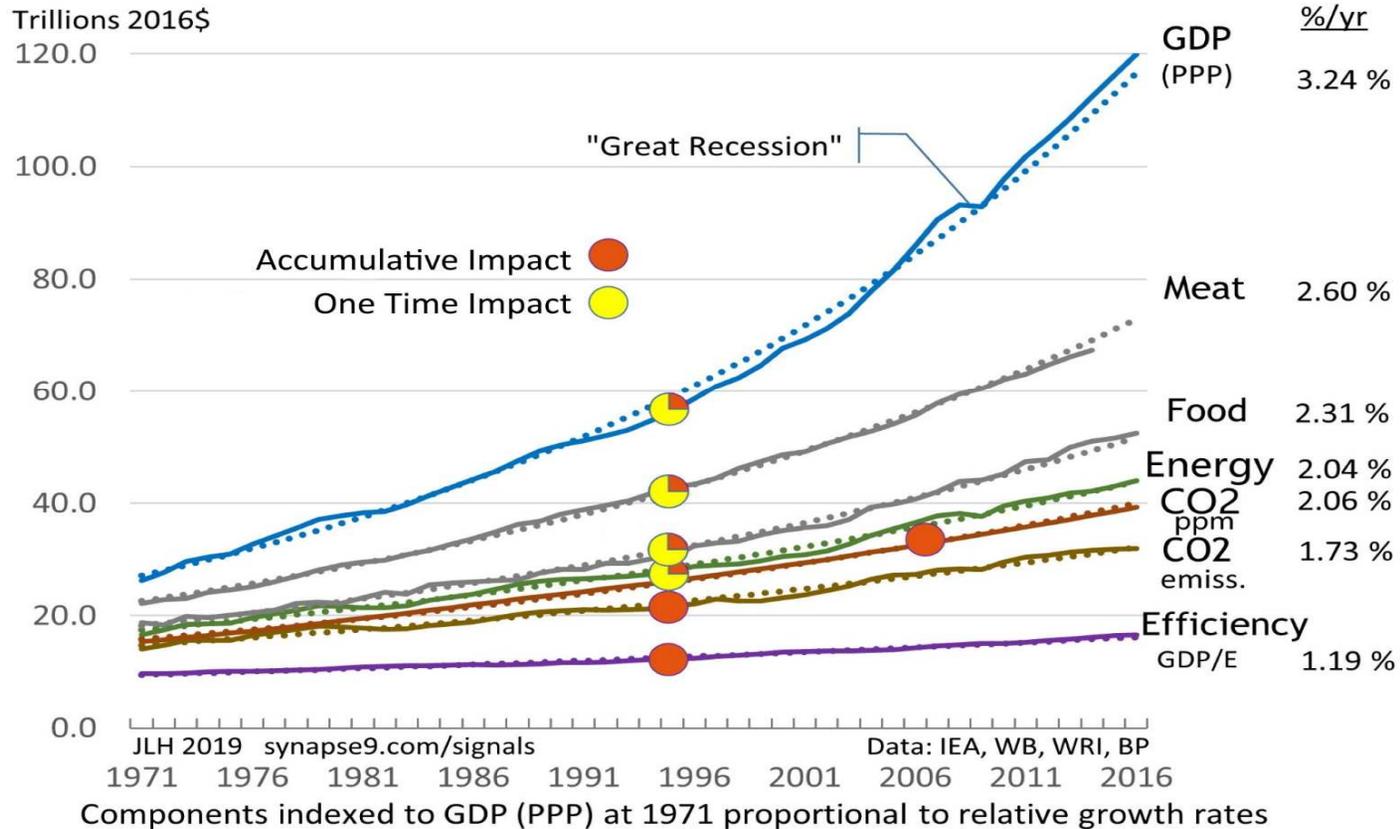
Derivative continuity of six data partitions (lt) of Gamma-Ray Burst data (rt)., connecting the dots.

• Collapse of the Great NYC Crime Wave



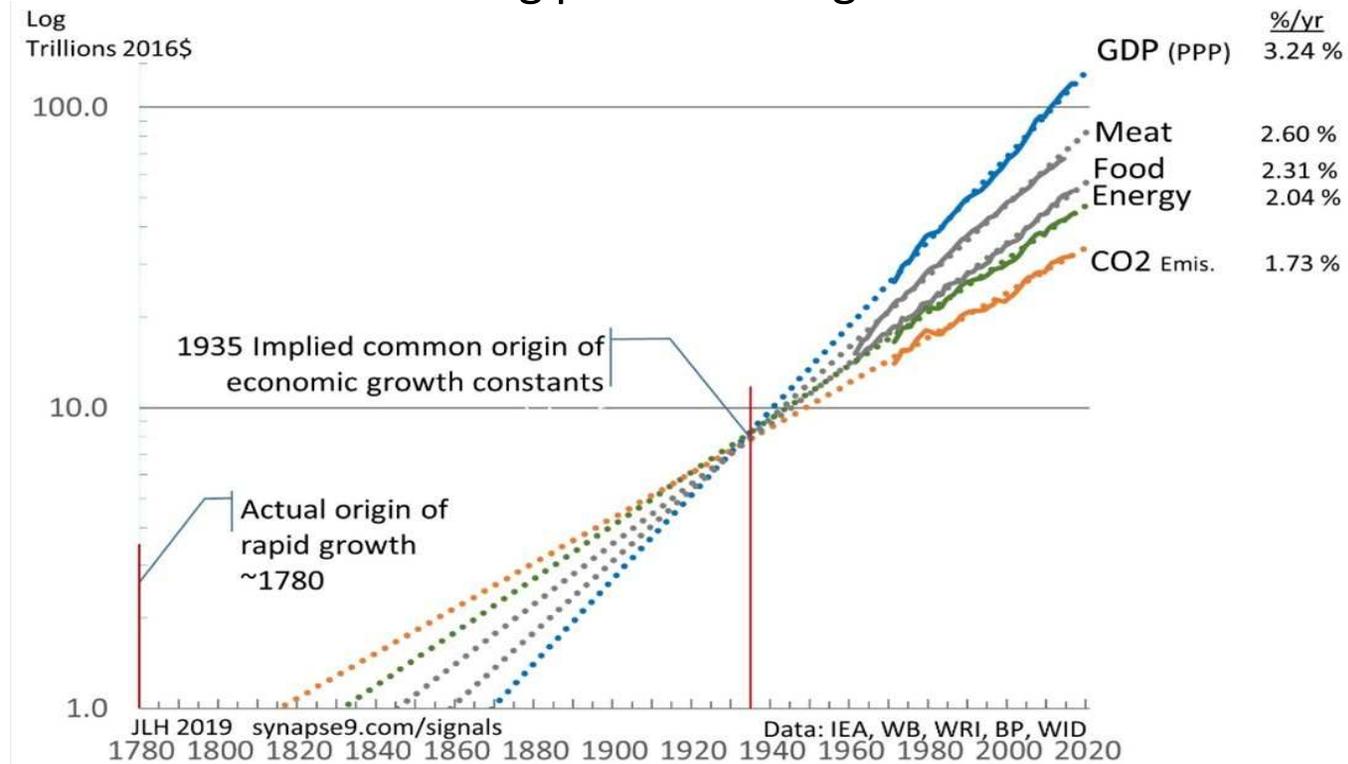
NYC Murder Rates by County showing waves of drug culture violence, collapse starts in 1990.

- Growth constants of the world economy



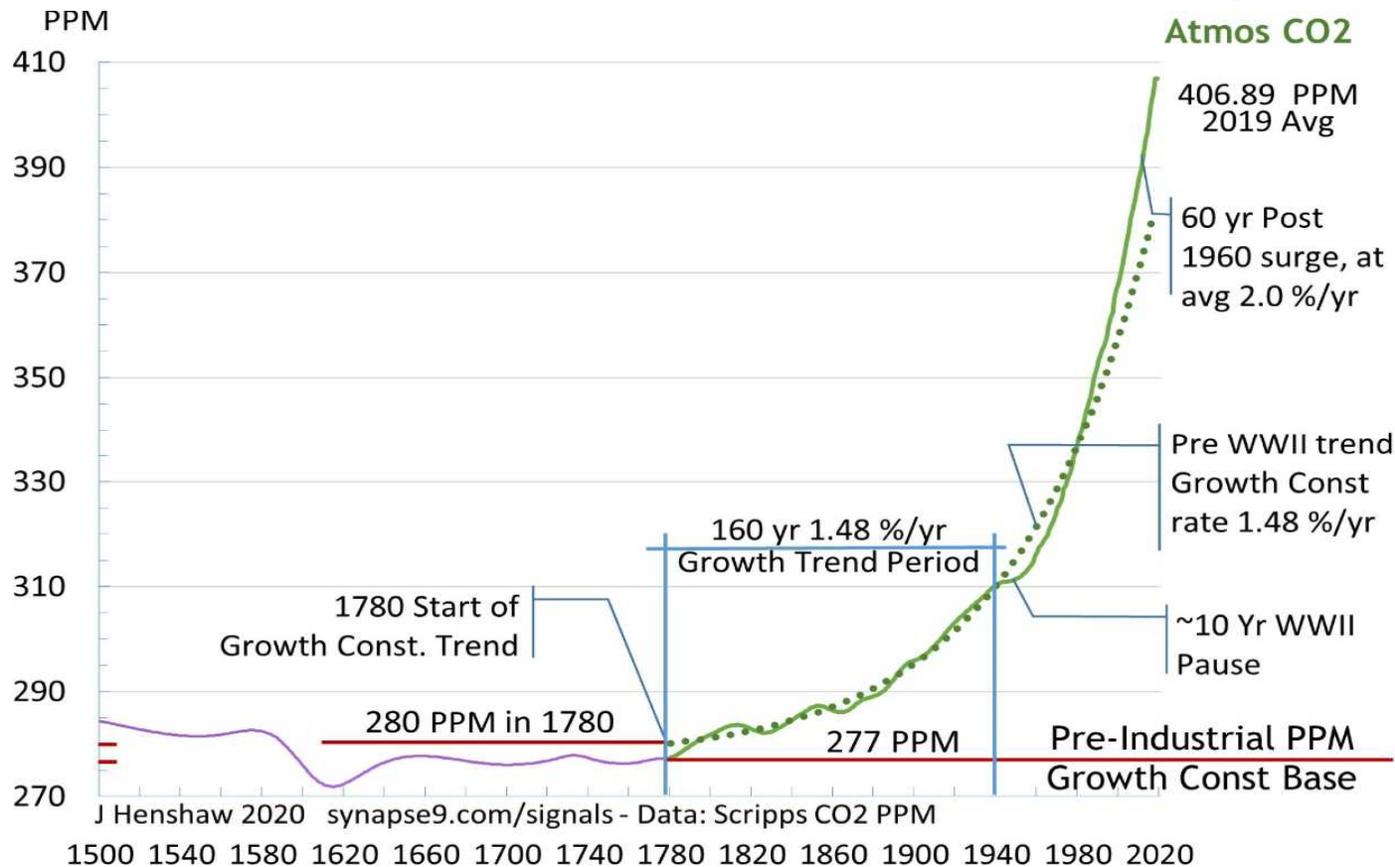
And constant coupling of World GDP and impacts

- GDP linked growth constants, shown homeostatic



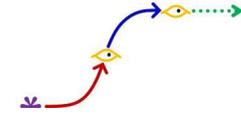
Projected 1971 to 2016 growth constants intersect in ~1935 as evidence the raw data was homeostatic about the trend.

• The Growth Constants of Climate Change



Post WWII Globalization vastly sped up Climate Change

Germ – Turn Forward – *Release*
Individuation – *Maturation* – *Engagement*



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