

Natural Growth as a Concept and a Process - of Individual Opportunistic System Development

Nature's apparent primary system-building method

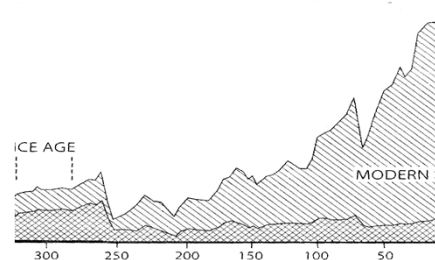
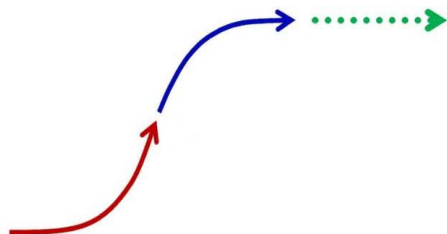
The first challenge is to ask:

- Why do so many natural systems seem to work independently?
- What makes them individual, as if having lives of their own?
- If it's that they grow individually, are they perhaps designed individually too?
- Is that independence also what gives many new systems relative freedom and independence as they mature?

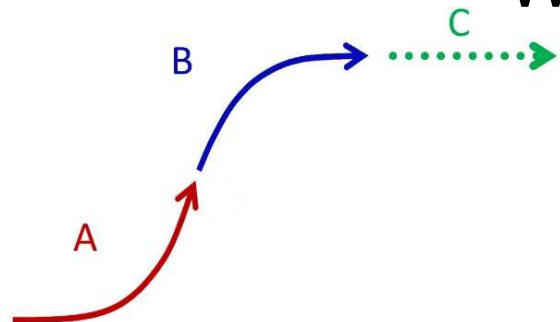
We learn to see Natural growth

With a key-indicator concept

As a natural creative process

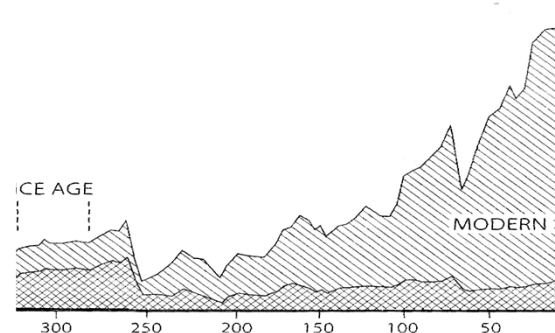


What to look for



As an indicator concept

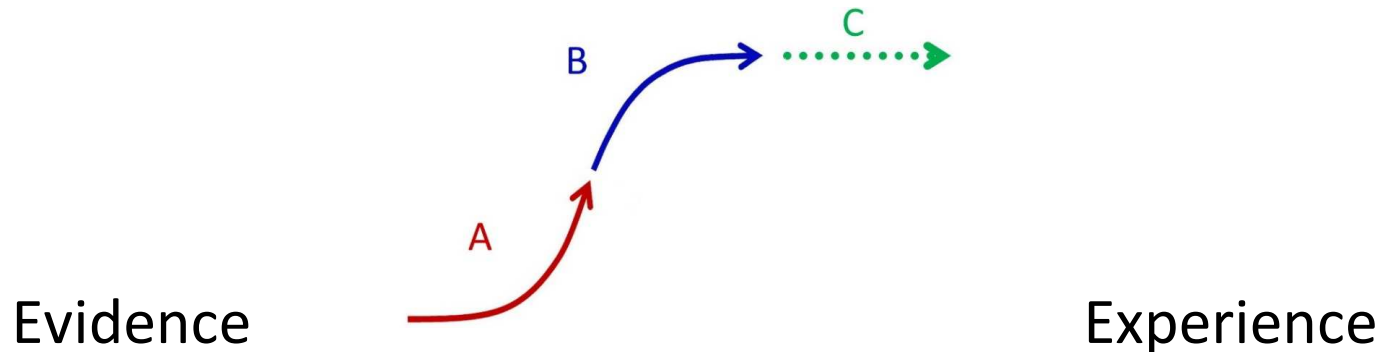
- We look for type A, B, & C stages for emerging system development
- Mathematical shapes of regular proportional change and their variations
- And associations with the emergence of individual “new lives”



As a natural building process

- We look for observable exploratory and opportunistic system-building processes
- Often not readily observable beginnings or mechanisms, like studying archeology
- We look for what animates exploratory resource capture and incorporation

Where the idea comes from



- The ubiquitous presence of 'S' curve development in nature
- The physics of energy conservation requiring continuity in energy flow
- The internal designs of growth systems that are self-sustaining after their growth

- Seeing it in many kinds of creative work, as 'S' curves from inception to completion
- The general narrative of all stories as having a flow from beginning, to middle, and end
- Seeing that growth systems are most often both individual and individually different

How it was first noticed



Evidence

- Growth seen as a **continuity** resulting in the evolution of free individual “new lives”
- Physics not studying emerging individual systems that concentrate energy
- Noticing that feedback loops invariably force change by upsetting their own

Experience

- Talking long into the night about the source of “individual differences”
- Watching self-organizing cultures as systems developing freedom to thrive
- Noticing that completing the last detail suddenly makes things useful.

conditions

A theorem showing Continuity of nature requires growth to start change
“The n^{th} Law of Thermodynamics”

Starting with a series of ‘n’
derivative energy conservation laws

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		$\sum_i m_j \frac{d^{n2} s_j}{dt^n} = 0$	$r_{j_n} < c_n$

Reintegrating the n^{th} derivative =>
an equation in exponential form

For some large n , the n^{th} 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 n^{th} 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.
$$f(t) = r_0 = \frac{r_n}{(n-1)!} \cdot t^{n-1} + \frac{c_{n-1}}{(n-2)!} \cdot t^{n-2} + \dots c_{n-i} \tag{3.3}$$

What continuity means for an energy building process

A. Building
a system

~ 0  +1

VS.

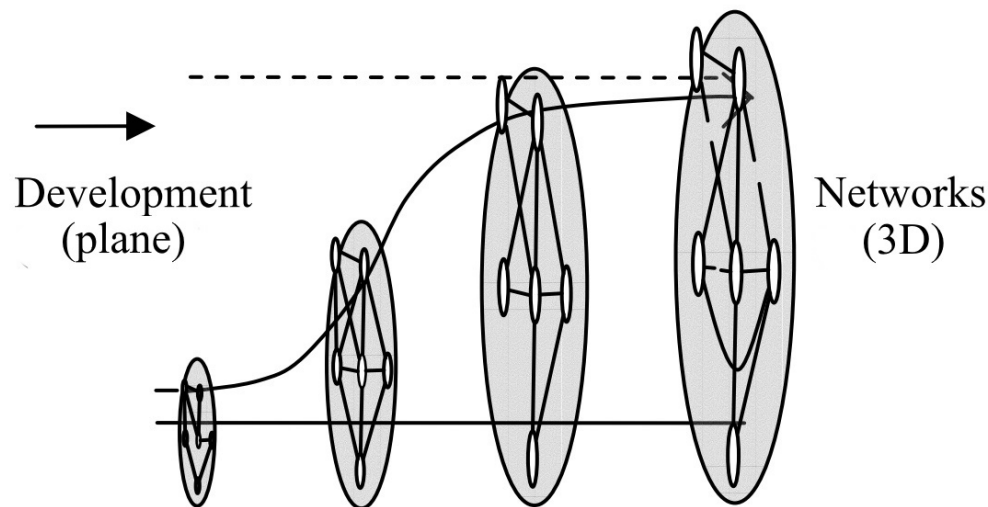
B. Leaping
w/ no
system

~ 0  +1

- A. • Every stage of building an energy system builds on a previous stage, like brick on brick
- To scale, steps must start small and build up, then build down again to reach a new level
- B. • Change without time, leap with no system
- Only possible for information, which is quite often discontinuous
 - Still... A lack of evidence does not change nature and need for continuity in change

How Growth Really Works, by Structural Innovation

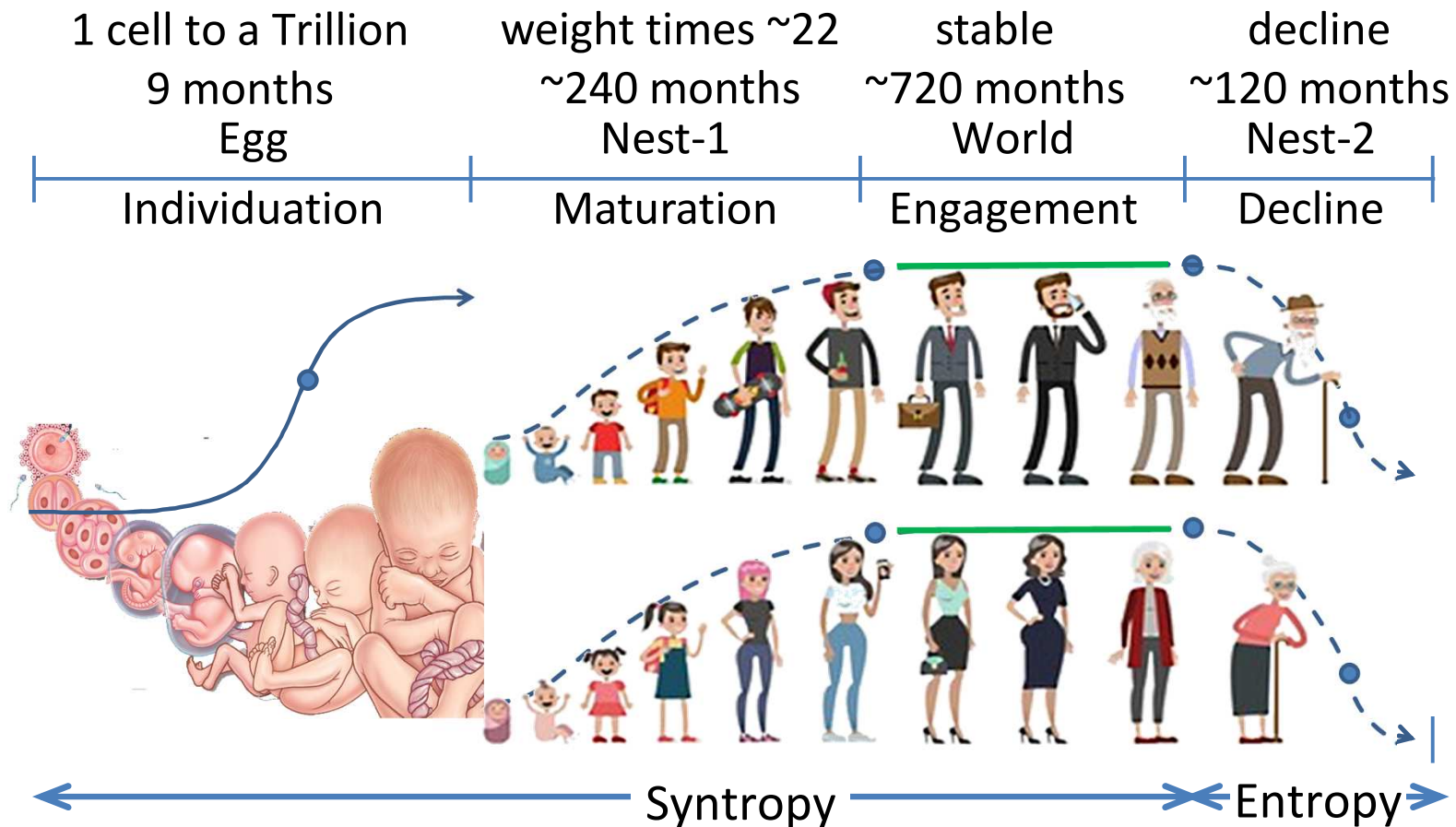
Orthogonal Development and Network Views



A Process of Developing Structure

- “Structural innovation” by joining complementary parts for the emergent properties, as seen in the connections of system parts once joined
- It’s an organ-ization process (organ-making) powering both system growth and maturation, joining complementary parts
- And it *may* follow an AIC (appreciative, influence, and control) fitting innovation to the system logic – as suggested in Gianni Di Marco in correspondence

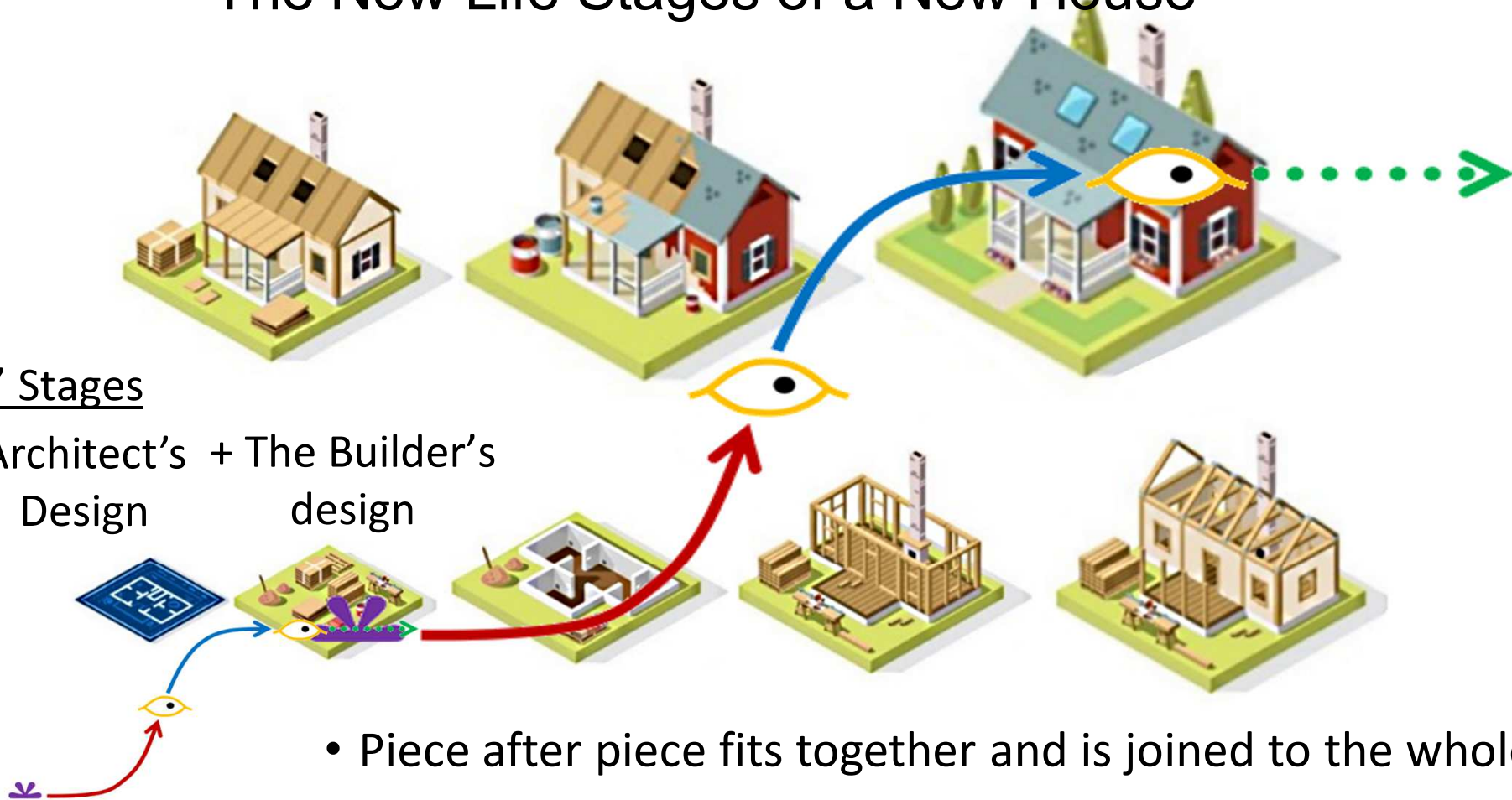
The Life Stages of people & body mass



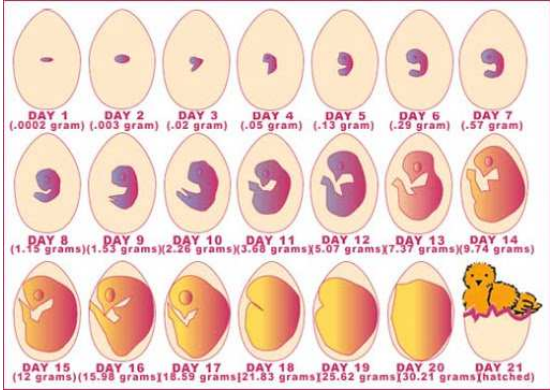
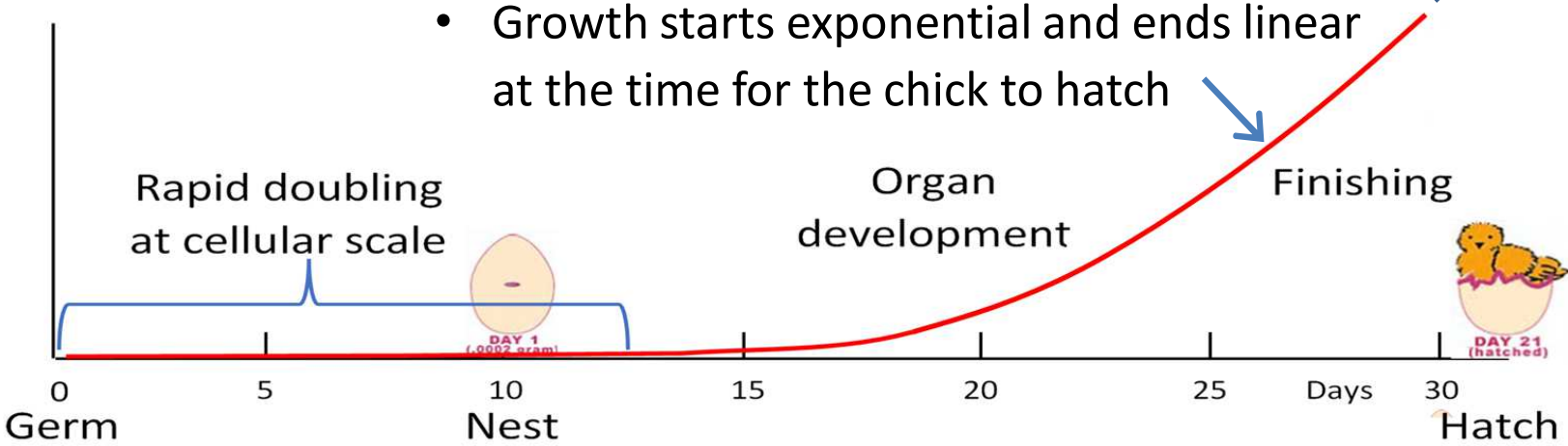
The New Life Stages of a New House

'Egg' Stages

Architect's + The Builder's
Design



The 31-day Growth Curve of a Farm Hen Chick ?

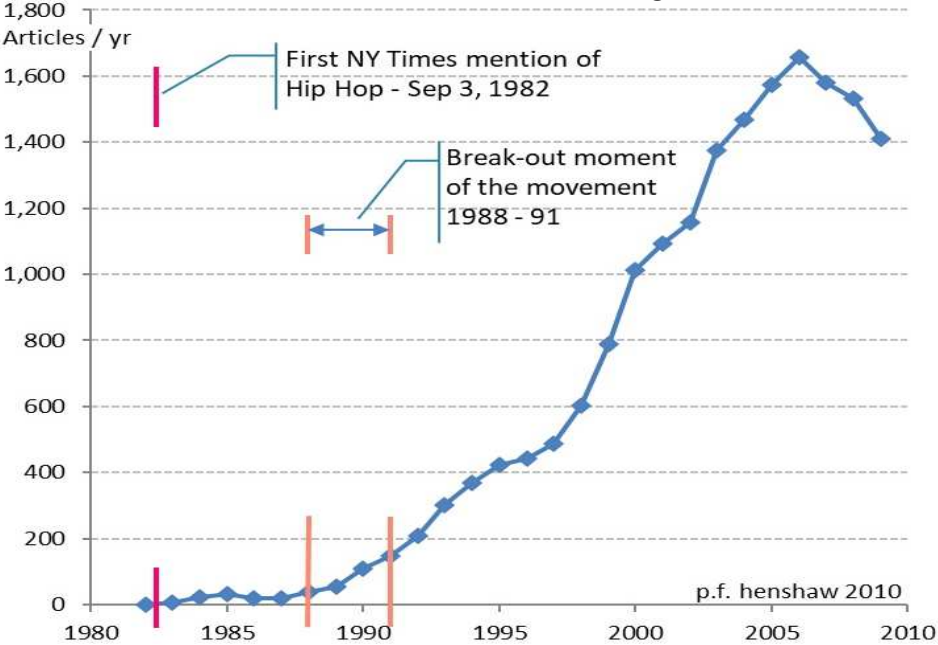


- Growth starts 10 DAYS before the egg is laid.
- And starts to slow at that time

The Break-Outs of Emergent Cultures

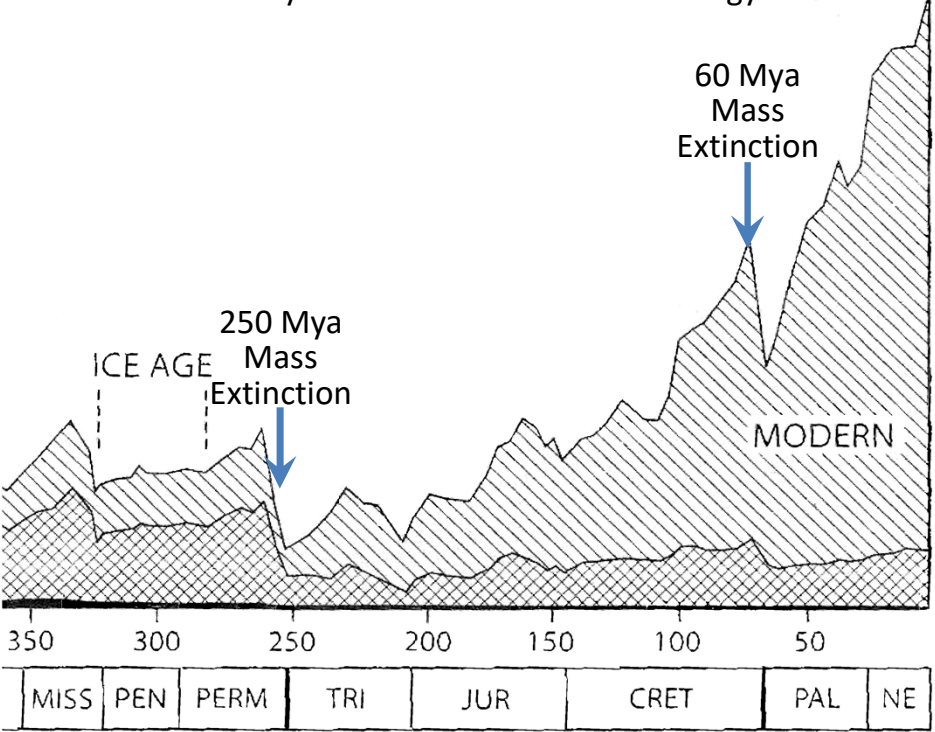
Hip Hop - Neighborhood to World Culture

The 1990s Break-Out of the 1970s neighborhood culture

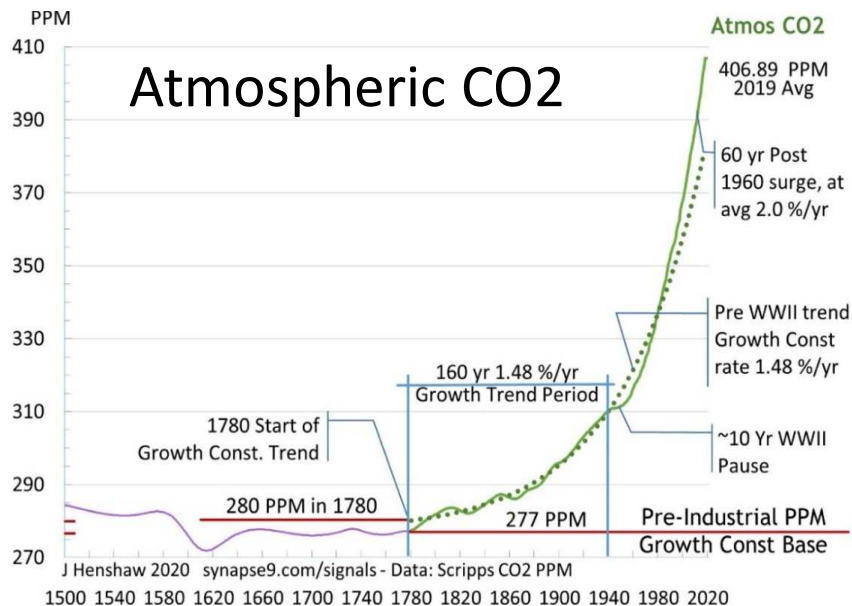
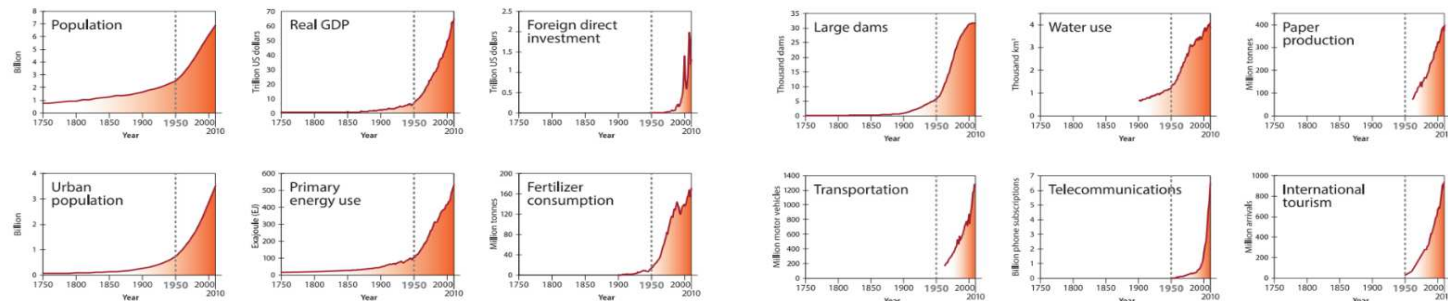


World Marine Life Fauna Diversity

from 250 Mya Mass Extinction - Paleobiology



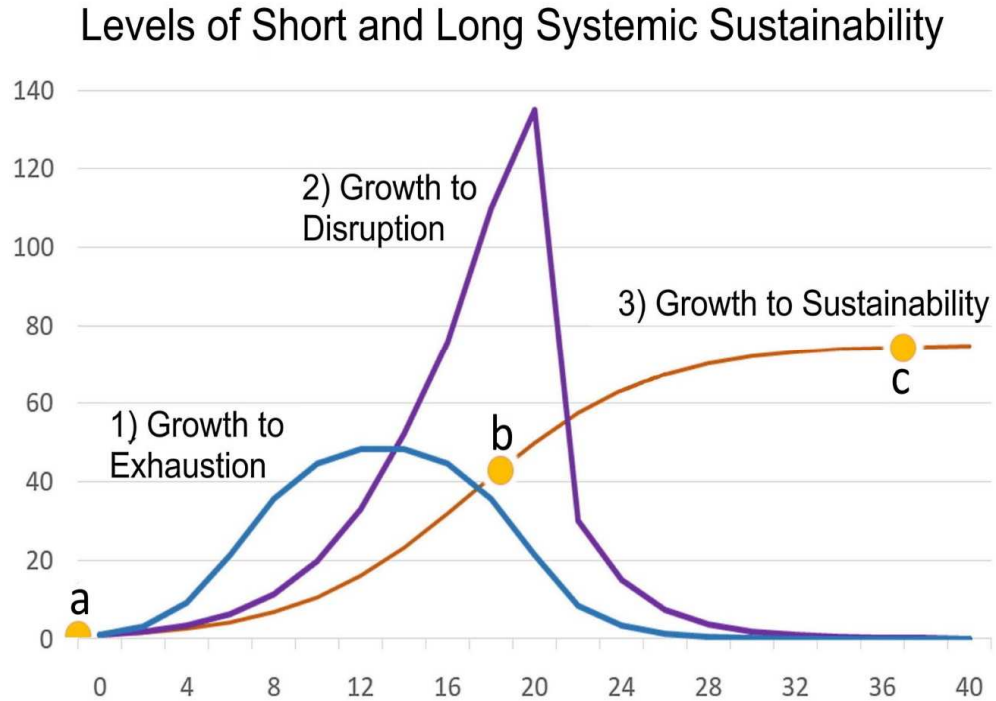
The great acceleration of the Anthropocene



- Our life of repeatedly doubling societal complexity and rearranging nature
- But where's our path to freedom in that?



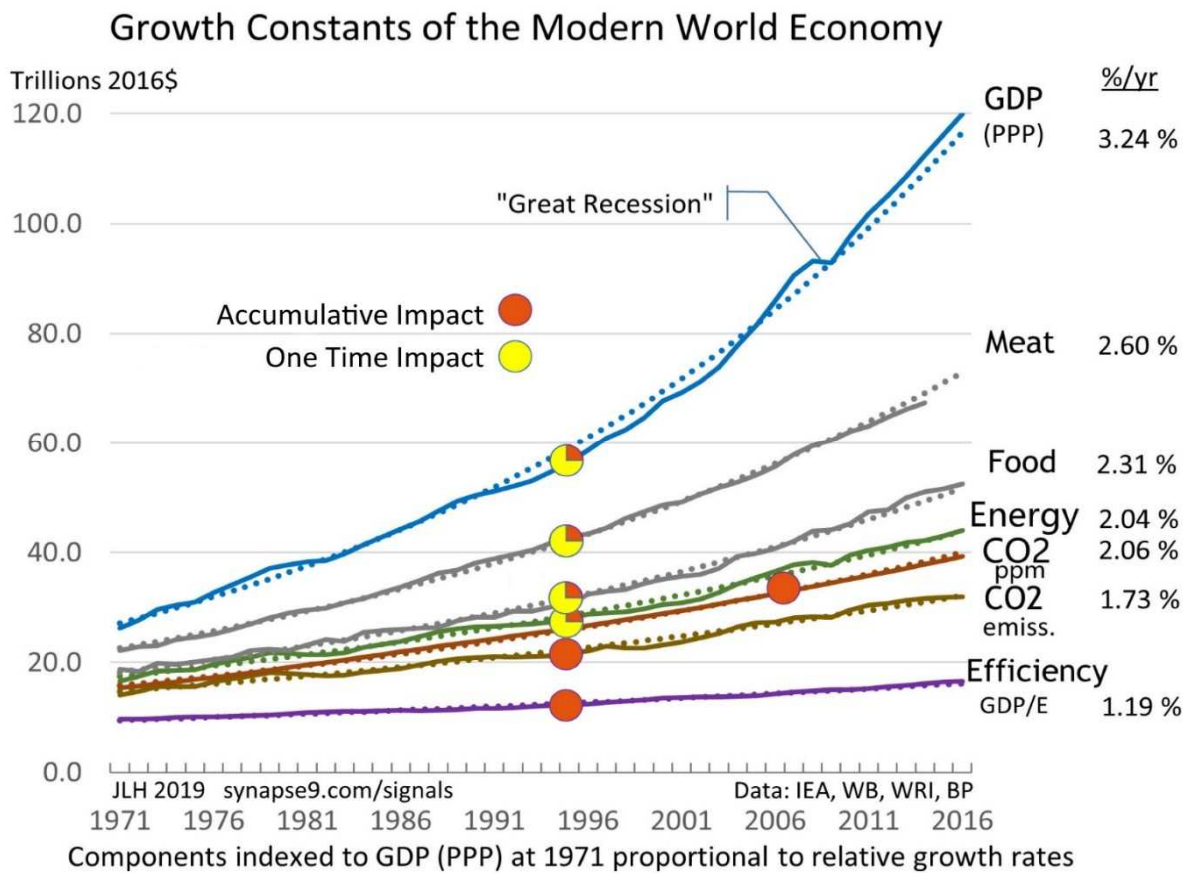
The three main development challenges for new lives



- 1) Growth to exhaustion – consuming the starting resource, failing to explore and innovate
- 2) Growth to Disruption – catastrophic internal failure of creative economy due to fatal internal disruption
- 3) Growth to Sustainability – creativity and restraint lead to achieving long term freedom

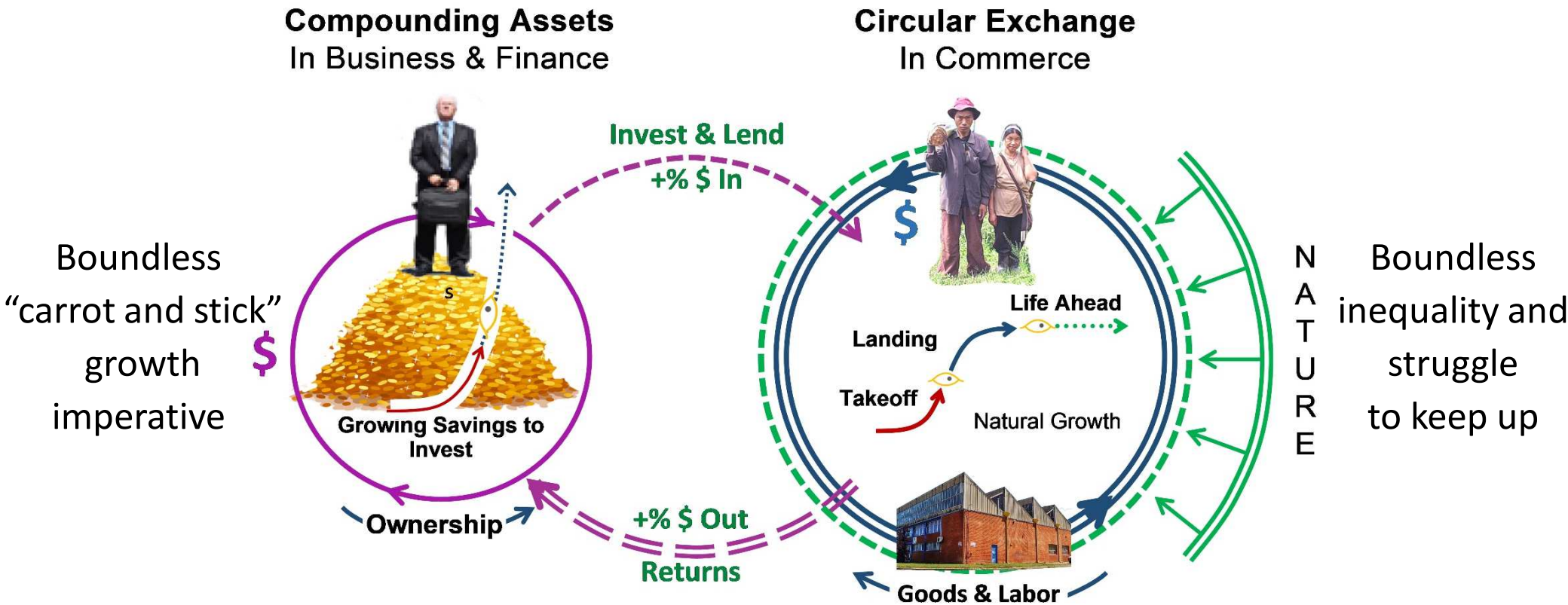
Can you think of personal examples of ‘failures’ of type 1) or 2) ?

Growth constants of a runaway world economy



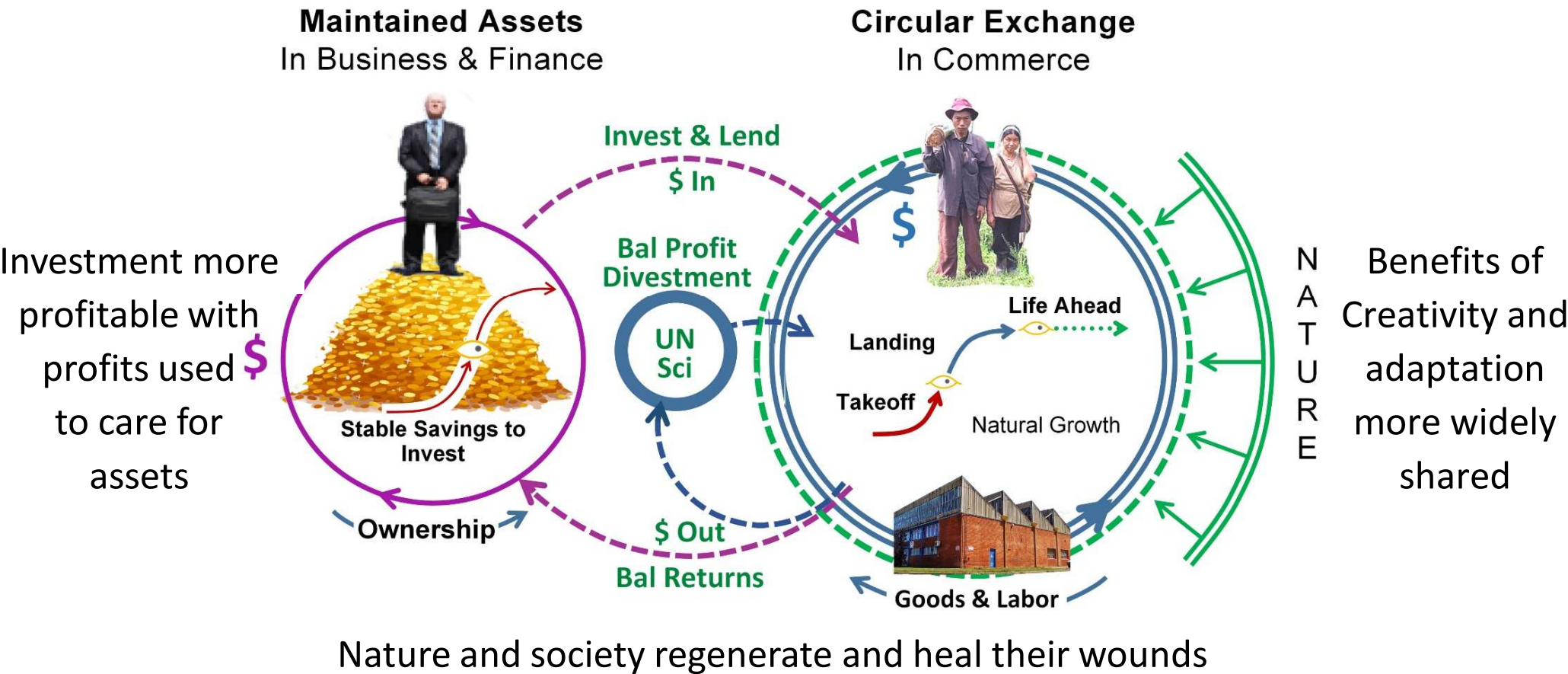
- Regular doubling of global impacts and rates of reorganizing both nature and human societies
- A system working as a whole, headed for disruption as a whole too
- The growing 3rd derivative jerk of change and drag of ever-growing complexity blindsides everyone with new emerging crises

A financial system driving the world existential crisis



Nature and society degraded and pushed past their limits

The economic system's own rudder steering it to safety



What the world might understand

- **The Earth *needs* a new life**

nature's plan for *new lives* might be a genuine alternative

- **Carrot & stick growth is unfair and exhausting**

and forcing people to push ever harder is too big a risk

- **Relying on ever more complex solutions is dangerous too**

famously cited by Joe Tainter as the cause of civilization collapse

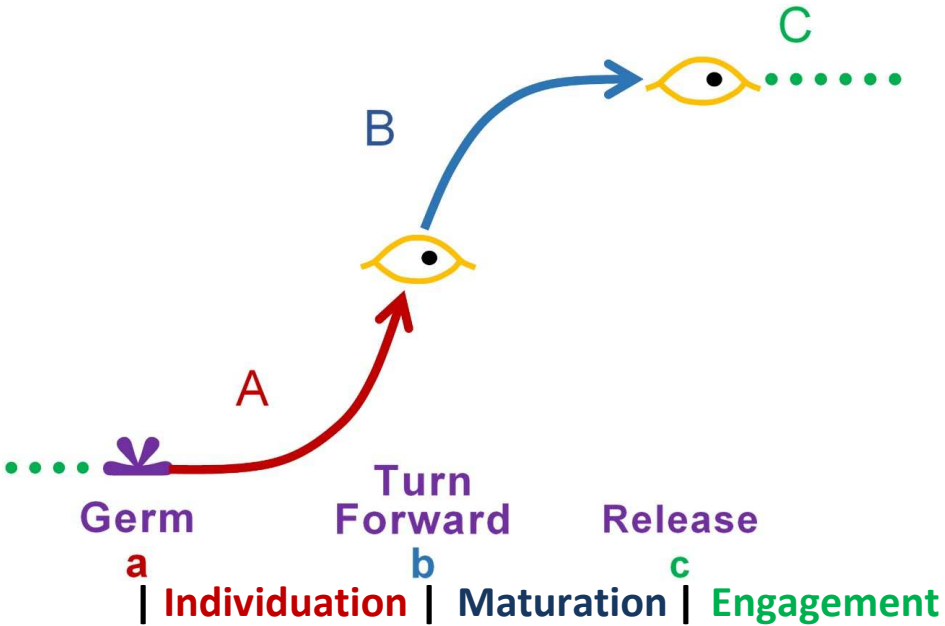
- **We need a well-informed planetary sense of community**

to be able to discuss how the world can make the turn toward freedom

Finding the powers that come with your purposes

Expanding on Bill Smith's: "purpose is power" suggestion

If A, B, or C transformation is your purpose, use the powers that come with it.



- A** – Purpose = **Individuation**
Power = Exploration & Multiplication
- B** – Purpose = **Maturation**
Power = Coordination
- C** – Purpose = **Engagement**
Power = Navigation

a) **Germ** – *the system stem cell*, b) **Turn Forward** – *to response-ability*, c) **Release** – *is freedom*

Tyler Volk's

John Stewart's

Metapattern of Combogenesis

- *Natural growth* is a process of assembling captured parts into higher order systems with emergent properties of New Organization
- The “big bang” of the universe began with an explosive growth of complexity
- Every growth system begins with its own “big bang” of growing complexity

Cooperation as Evolution's Arrow

- *System growth* is a process of making organized systems with cooperative parts to work as a whole
- It is also a process of fast expanding then then tapering internal system evolvability
- Ending in a system with high external evolvability in environmental relations

All kinds of system's use their rudders to steer growth to freedom

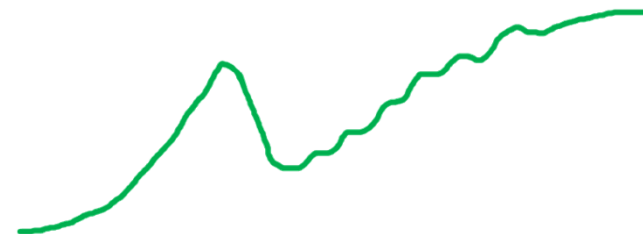
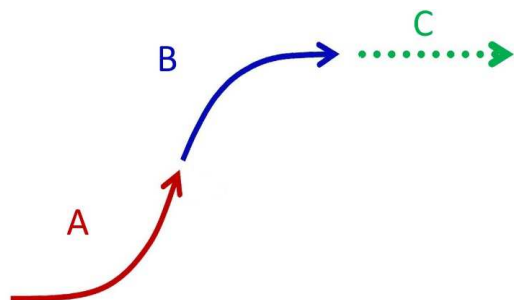
- *Each setting sail in a world they were designed for and adapted to as they grew*



- Gaia, ecosystems, civilizations,
 - cultures, societies,
 - economies, businesses,
 - plants, animals,
- communities, social groups,
- relationships, work habits,
- creative home & office work, etc.

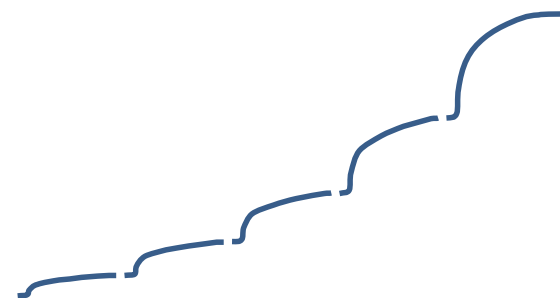
A symbol of freedom as working with nature

Rather than explain varied development paths – let's draw some!



Ex.1-The popularity of doing things right

1. Think of challenges faced, draw the curve
2. Always start and end with small steps
3. Adjust by adding new curves to record the thought process
4. Include blocks and recoveries
5. Think of the environment out of sight



Ex. 2 – Getting an education

Selected References from the paper

- Alexander, C (1965). A city is not a Tree
- Bateson, G (1972). Steps to an ecology of mind:
- Boulding, K . (1953). Toward a general theory of growth.
- Diamond, J. (2005). *Collapse: How societies choose to fail or succeed*
- Hardin, G. (1968). The tragedy of the commons
- Henshaw, P. (1979). An unhidden pattern of events
- Henshaw, P. (2007). Flowing processes in a punctuated species change
- Henshaw, P. (2010b). *The energy physics of continuity in change*
- Henshaw, J. (2015). Guiding patterns of naturally occurring design: Elements
- Henshaw, J. (2020). *Top 100 world crises growing with growth*
- Keynes, J. M. (1935). *The general theory of employment, interest, and money, Ch 16*
- Meadows, D. H. (1999). Leverage points: Places to intervene in a system.
- Meadows, D. H., Randers, J., & Meadows, D. L. (2004). Limits to growth: The 30-year update.
- Miller, J. G. (1973b). Living systems
- Ostrom, E. (1990). Governing the commons: The evolution of institutions for collective action
- Rees, W. E. (2020). Ecological economics for humanity's plague phase.
- Saulk, J., & Saulk, J. (2018). A new reality: Human evolution for a sustainable future.
- Sharpe, B., Hodgson, A., Leicester, G., Lyon, A., & Fazey, I. (2016). Three horizons: A pathways practice for transformation
- Smil, V. (2019). Growth: from microorganisms to megacities
- Steffen, W et al. The trajectory of the Anthropocene: The great acceleration.
- Tainter, J. (1988). The collapse of complex societies.

Part II

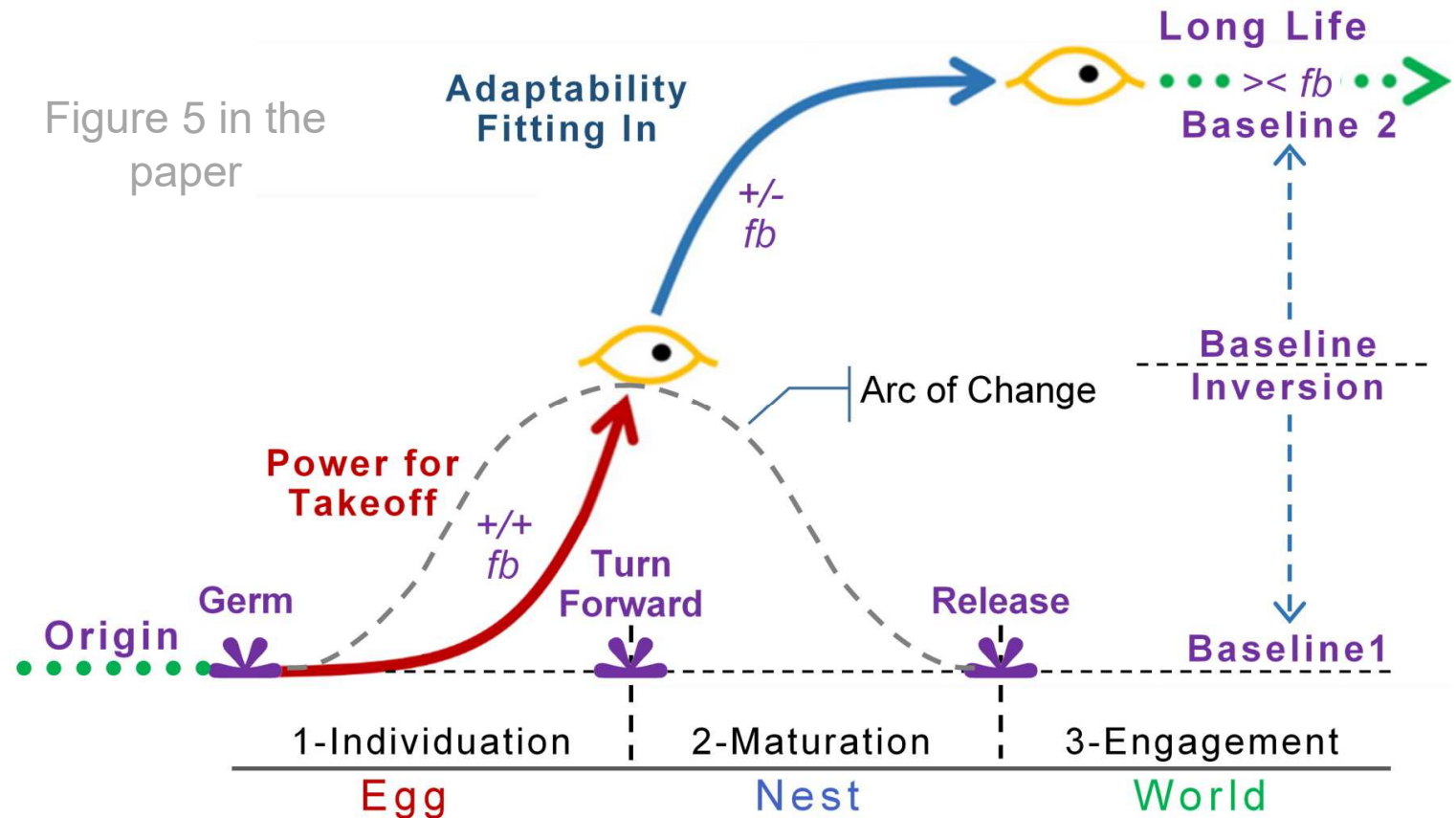
12 Key Discussion Topics to Fill Out the Details

(I'll pause after each to see if there are questions or comments)

Or we could just open it up for discussion?

Nature's Integral - The Growth Story of *New Lives in Detail*

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



Scientific terms for systems defined by nature are a problem

Apple



=>

What we can check in nature

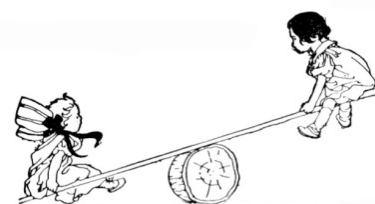
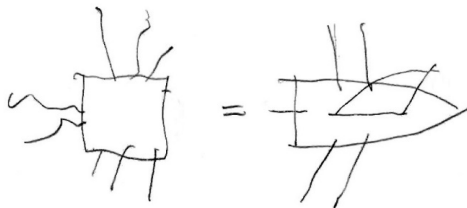
+

What we need to check in our thoughts

- **Natural language** is rooted in direct reference to natural phenomena
- And communicating our experiences, values, and feelings about them
- Our cultures in fact define shared member perceptions of reality

- **Scientific language** is rooted in being able to check your information
- So, we need to value and separate mental impressions by where we check them.
- Taking pains to retain raw impressions to allow new discoveries from them later.

Learning scientific story telling using direct references to nature



Life Story Arc's – Journeys of Growth and Change

coming of age arc

transformation arc

true discovery arc

taming the wild arc

missing players arc

quagmires arc

novice's arc

the hero's journey

the home builder

calm before the storm

plans interrupted

navigator's tale

guardian of the flame

tragedy in the commons

new life arc

partnership arc

deadly sins arc

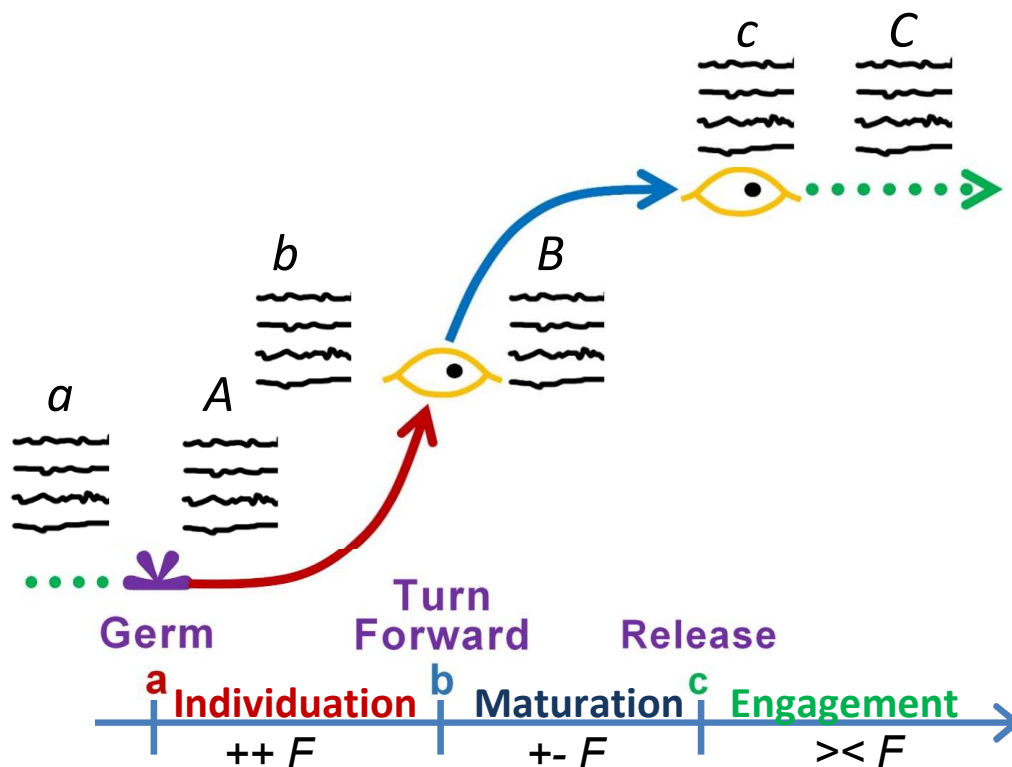
integrity arc

branching horizons arc

indomitable will arc

Tom Sawyer arc

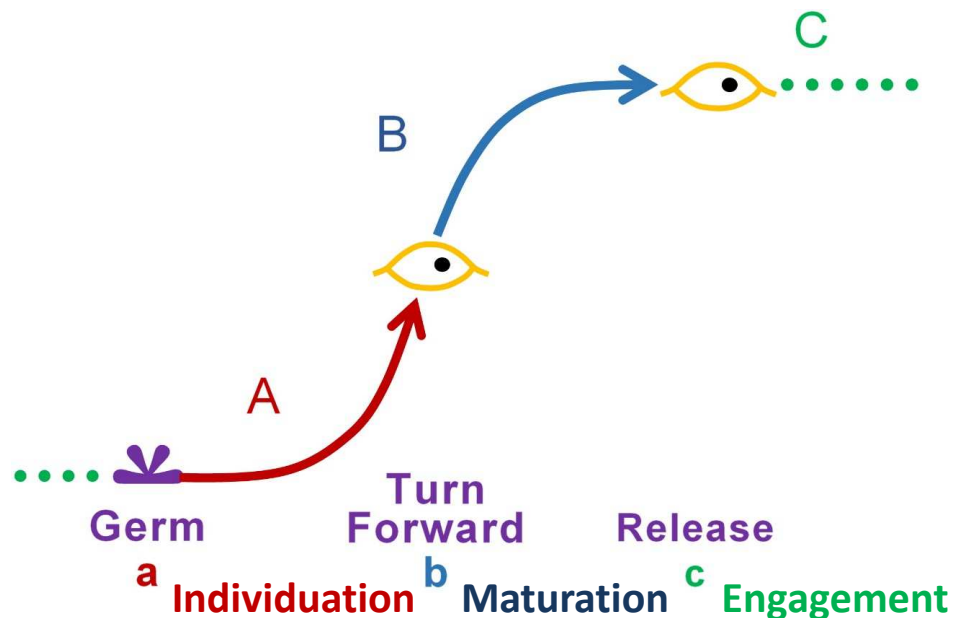
A hero's journey, with 6 suspense-filled life stories



A minimal program of

- 3 Transformative changes in direction
- 3 Challenging developmental periods
- 3 Scales of changing environments
- Starting with freedom to express individuality then increasing challenges to integrate it with complex worlds

The sources of the individuality of natural system growth

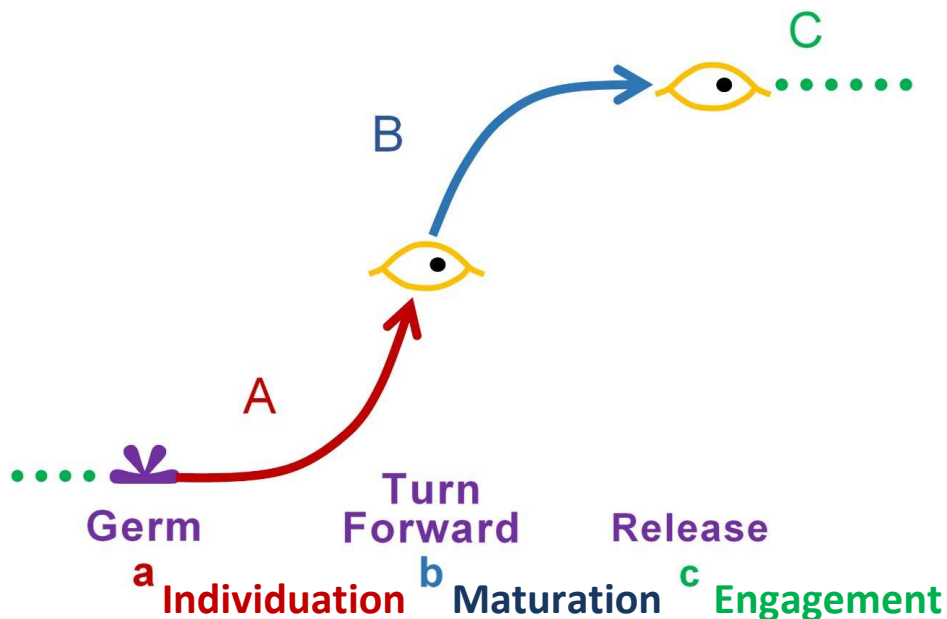


A minimal program of

- Developmental feedback loops growing from and expressing a complex seed
- Individually different opportunities to grow and build networks guided by character
- Early individuality strongly influences the turn forward and the choice of life to mature

From **a** – unformed, to **b** – fully formed but undeveloped, then **c** – fully developed

The accension pattern of natural system growth



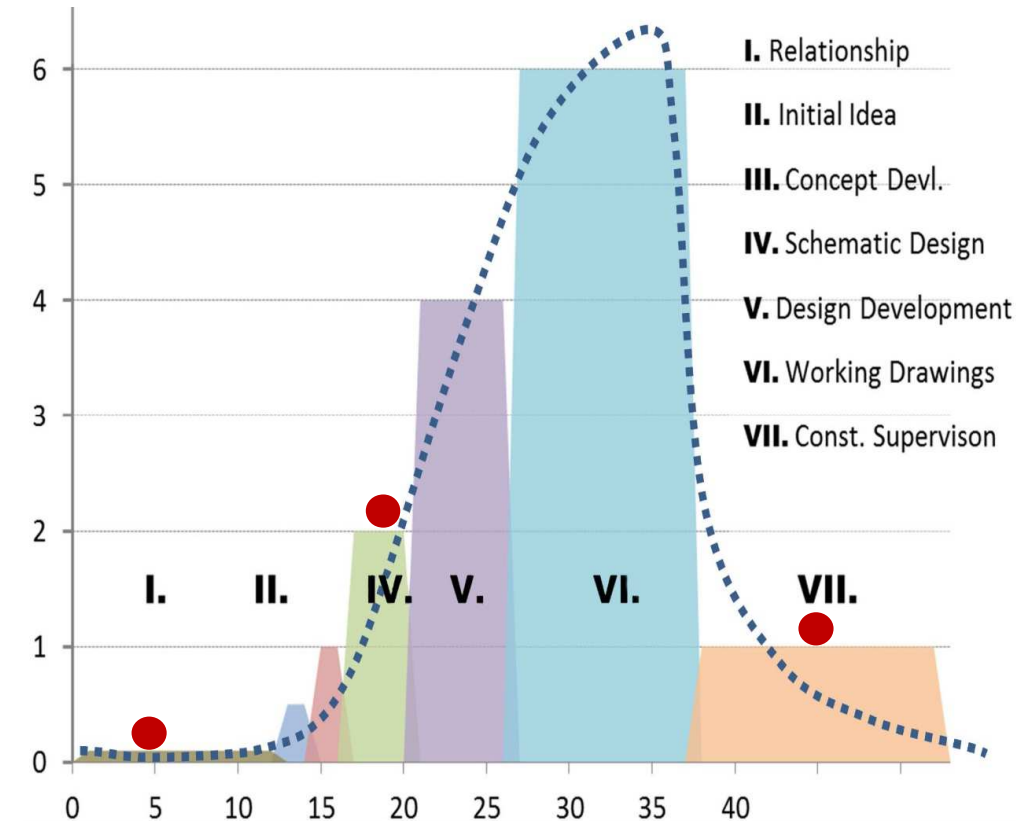
A – small steps to larger opportunity and faster, larger and more complex steps

B – Shifting in the middle to smaller scales of opportunity and steps to mature and train the whole for transition

C – Each new life the center of its own local universe, made ready for engagement

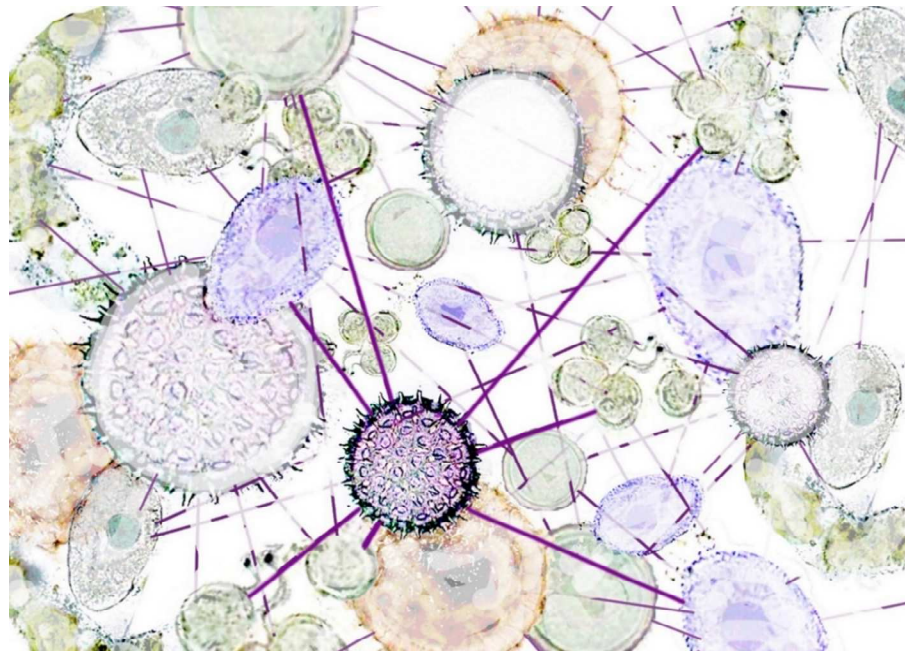
- Often a ladder of variable stages
- Or repeated falling back to cast about for a new path

Budget stages I. to VII. of design or office work projects



- **I. Relationship** – Settling on the right intent is the long-term key to success
- Initial schemes are easy to change as the work looks for where to go
- **IV. Schematics** – As the clock ticks a gut feeling tells you decisions must be made and work head for completion
- Un-cutting corners and dropping extras reveals the final form
- **VII. Observation** – to make sure the implementation goes well

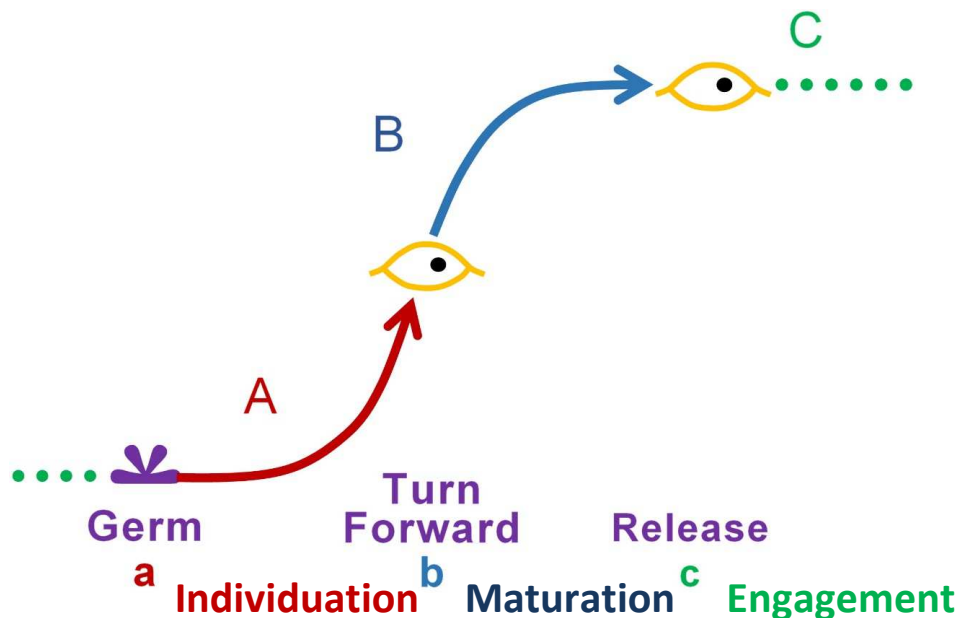
A world where most connections are very intermittent



- **Continuity** comes from centers building up reserves for resilience and retain memory of past connections
- **Environments** also build up reserves and retain higher-level memory of intermittent signals and pathways
- **Together** they make the “intercellular signalling pathways” self-organizing

Think of some examples of system memory in centers and environments

To develop a family Dinner, Vacation, or office Project



- A vision germinates - to start planning for assembling the parts
- Turn Forward commitment - to refine and put plan in motion add details and get help from others
- Release and launch – the product leaves the nest, released and delivered to independent life

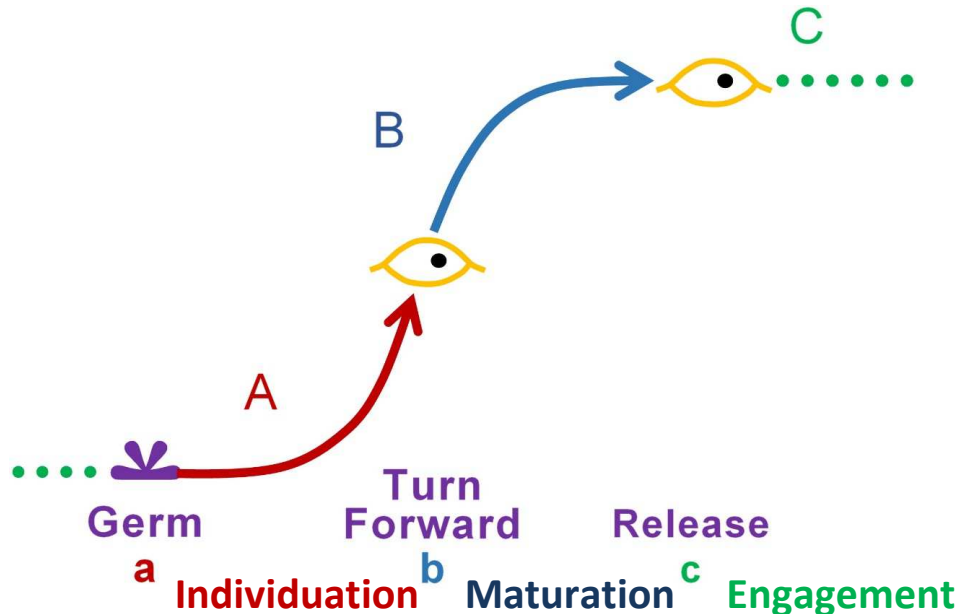
Steering by Self-Organizing “intercellular signalling pathways”

First Extractive Exploitation

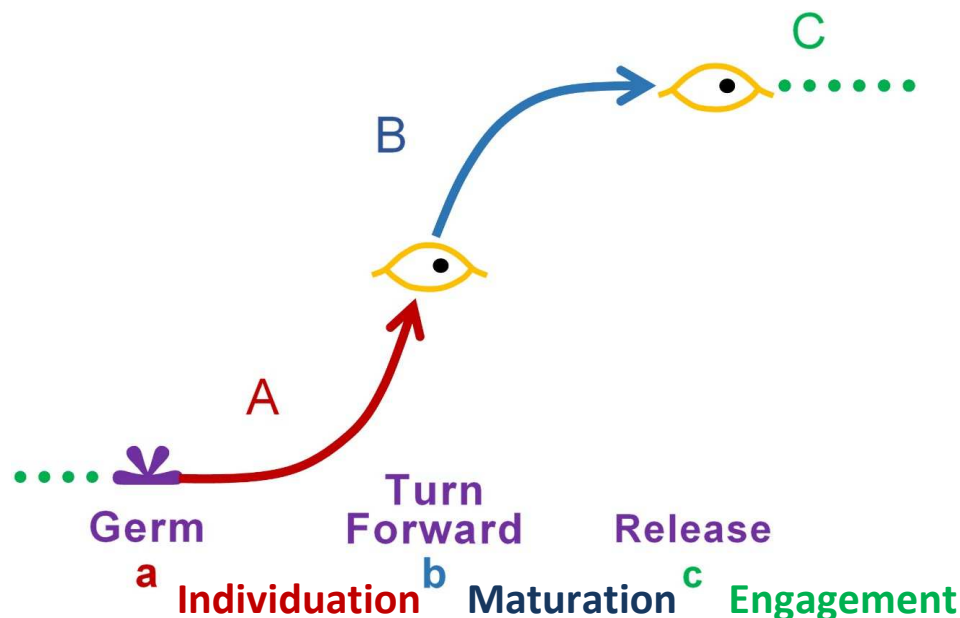
- extractive systems, expansion & diversification to the limit
- Self-investment in opportunity multiplies opportunities

Then Adaptive Maturation

- Self-investment in relieving pressure, preparing for the future
- every part balances pressures, supply lines and systems of communication



The positive and negative *complexity ratchets* of growth



A ++ F Growth is a complexity multiplier

- Self-investment multiplies invasive extraction, expansion & diversification
- Multiplying scale and complexity to the point of diminishing returns

B +- F Growth is a complexity stabilizer

- Equalizing pressures, coordinating supply lines and systems of communication

C >< F Growth is a complexity coordinator

How do we feed the seeds of a cultural sunrise



Let's put our tools together and make a difference!

ISSS 2021 - Paper & Slides

<https://synapse9.com/ISSS-21/NatGrowthConcept&Process.pdf>

www.synapse9.com/signals sv@synapse9.com

Part III

Supplemental Discussion Topics

- A supplemental set of 18 discussion slides



Current signs of ending the growth imperative

- 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

How else can this language for *new lives* be used?

Discussing leverage points for the Anthropocene 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 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.

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

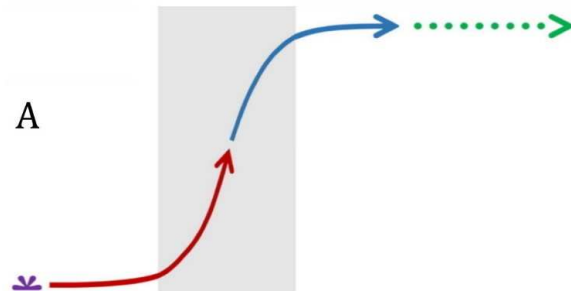
- New personal relationships that go too far and overstep each other's boundaries.
- Start up businesses that overshoot their expansion and become unable to coordinate the demands

The deep conflict between scientific language and nature

- Early science started to study nature as represented by abstract concepts, like Aristotle's "earth, air, fire and water"
- Direct references to natural subjects began to be treated as "undefined"
- That ignored the parts of nature that are indeed quite well defined by nature (using the dual meanings of "defined" here).
- Cultural learning still relies on direct references to the identifiable systems and features and meaningful human experience
- So the question is how to reattach scientific language with concrete subjects of nature on which cultural learning is based.
- That's the idea behind developing a scientific cultural language for the growth of new lives

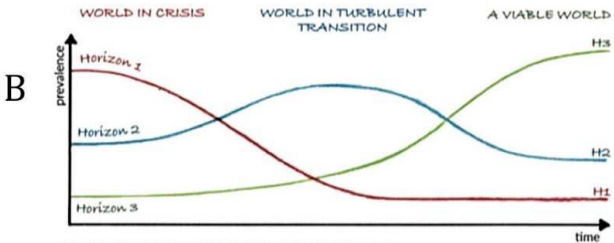
Related useful system transformation models

Familiar Long Struggle & Breakthrough



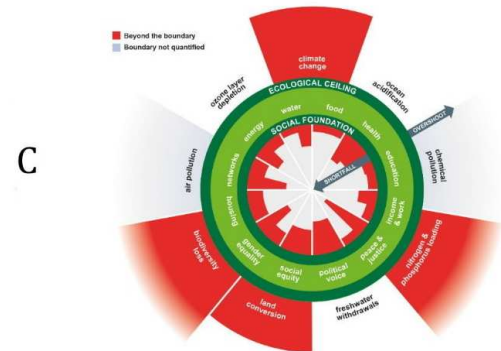
Sharpe, Three Horizons Framework

THREE HORIZONS FRAMEWORK APPLIED TO THE TRANSITION TOWARDS A REGENERATIVE CULTURE

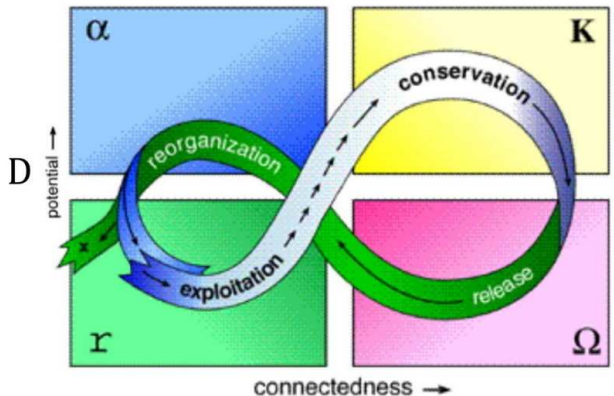


Sustaining innovation keeps 'the lights on' and maintains status quo.
Disruptive innovation identifies opportunities to change the scope of what is possible.
Transformative innovation facilitates the transition towards regenerative cultures.

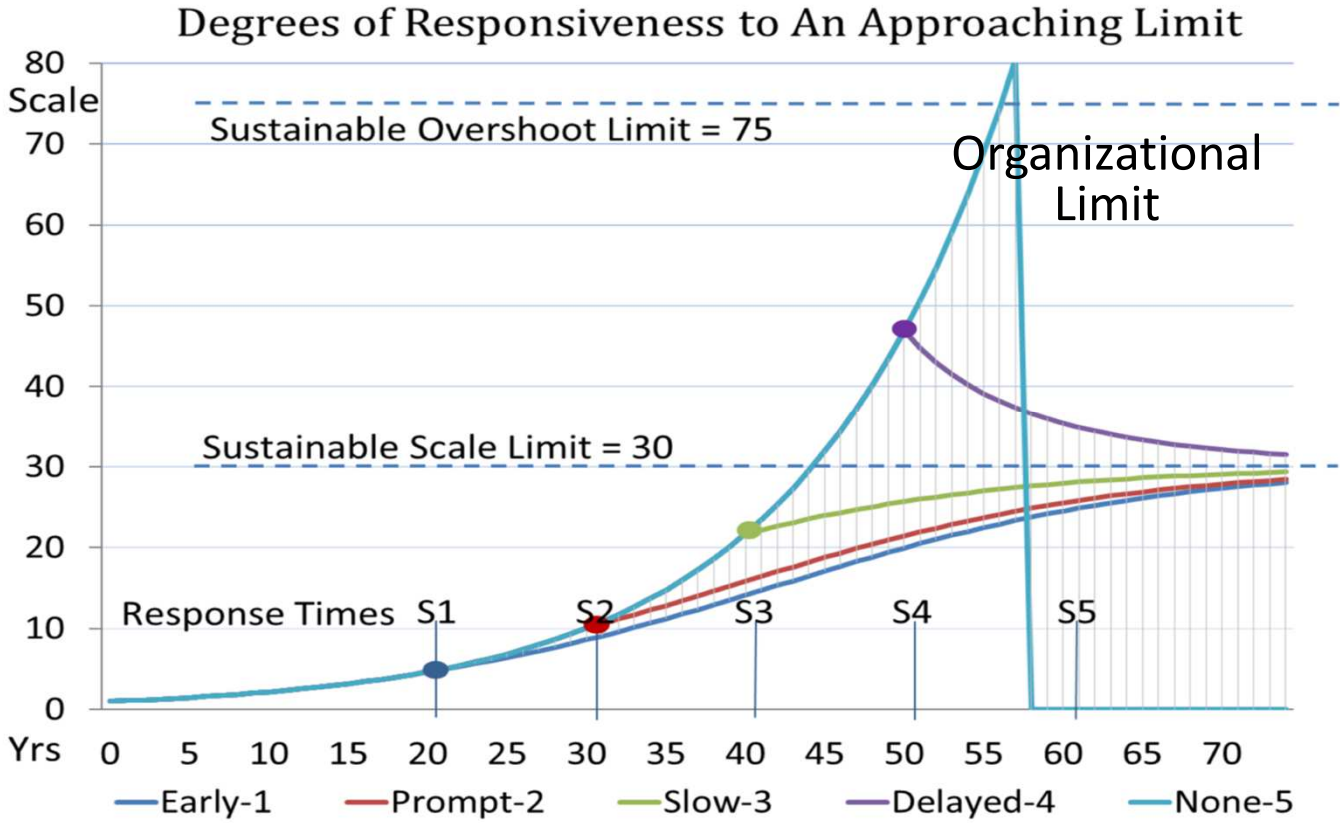
Reworth, Doughnut Economics



Holling, Panarchy Adaptive Cycle



The more delay the more disruptive the turn



You get lots of warnings... to which you should *always* respond

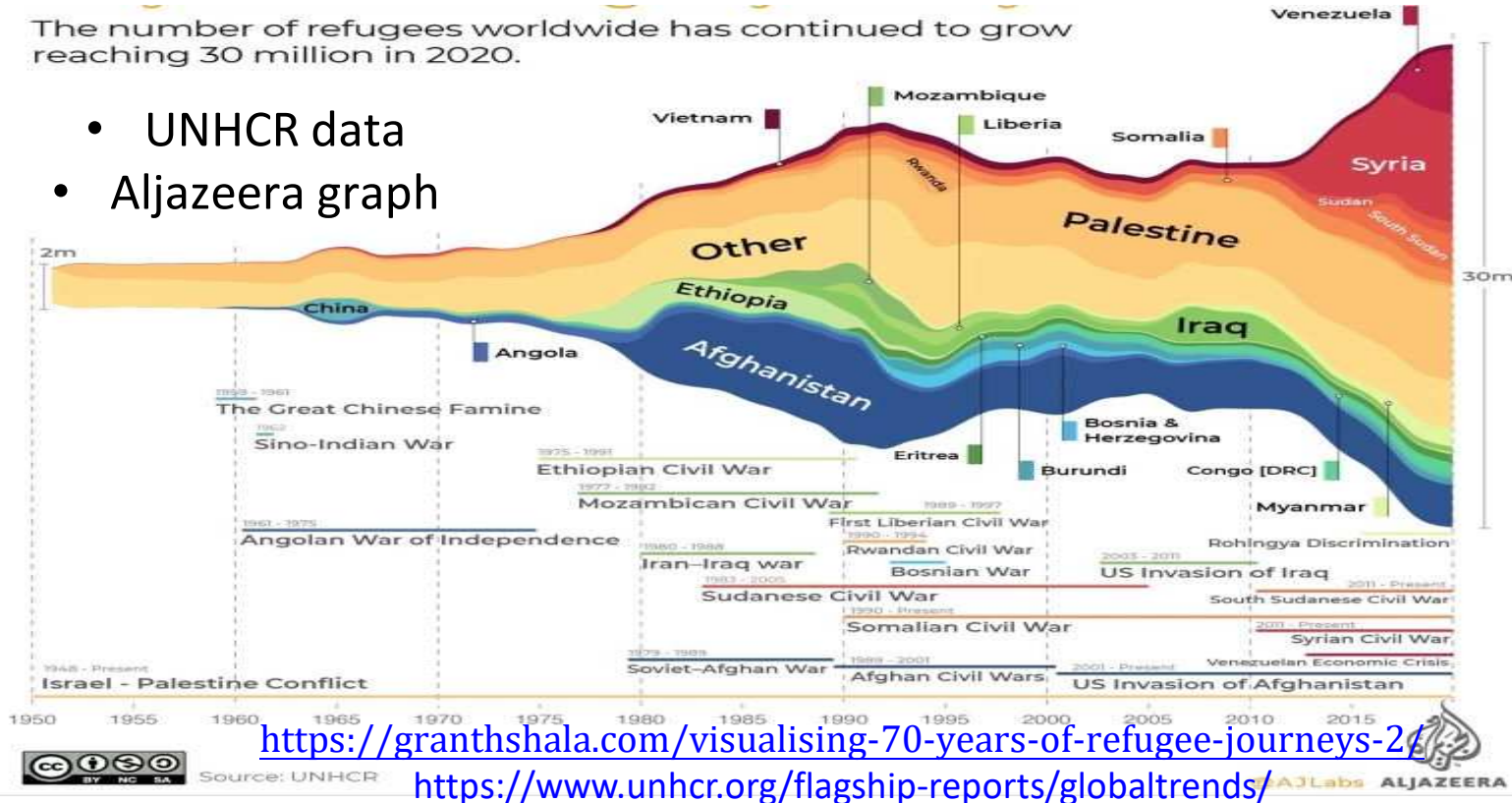
The 1950-2020 World Refugee Wave Trend

Tempers flaring from cultures pushed to interfere with each other?

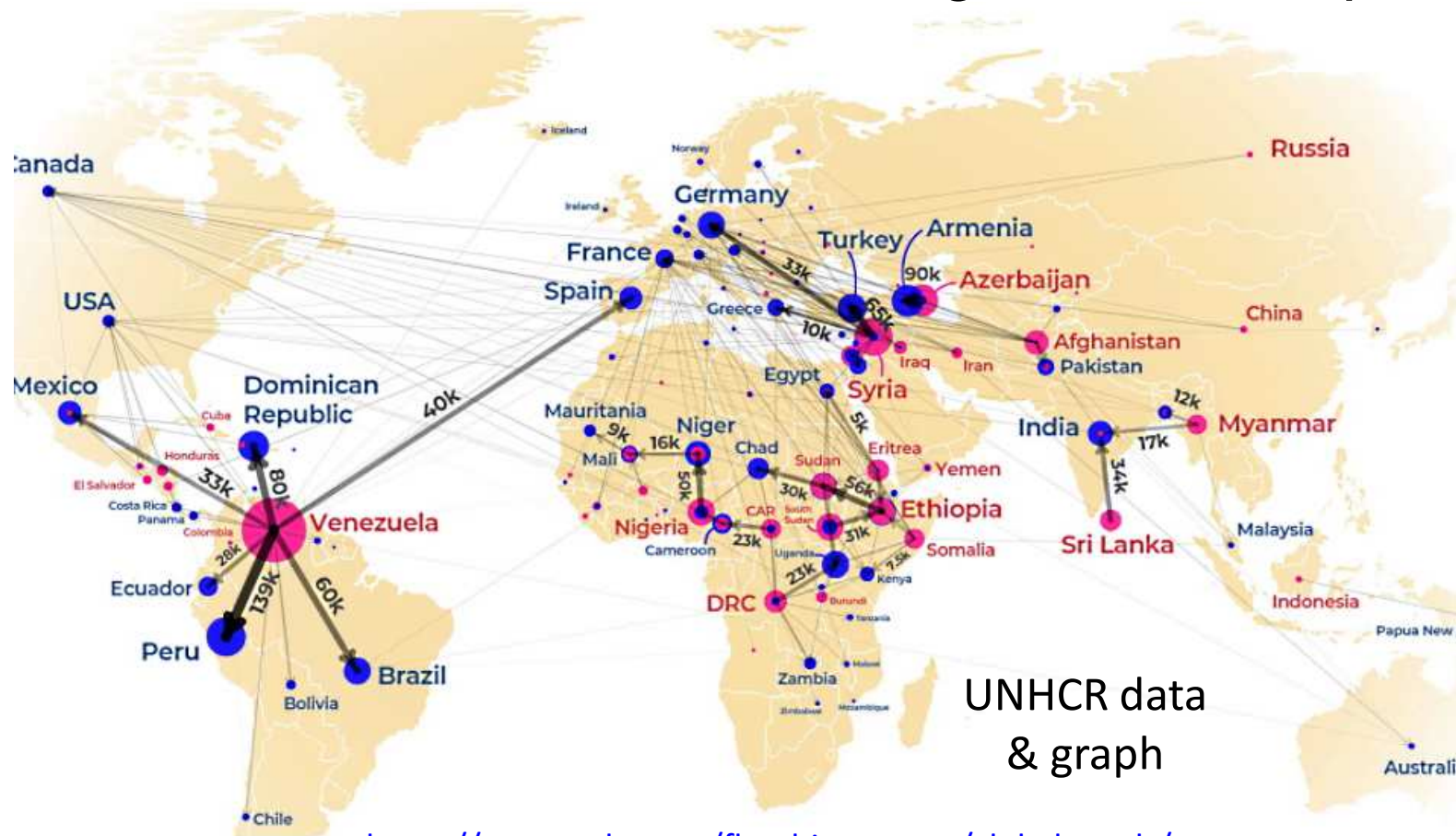
A “Cultural Climate Change?” Is this global or local?

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

- UNHCR data
- Aljazeera graph



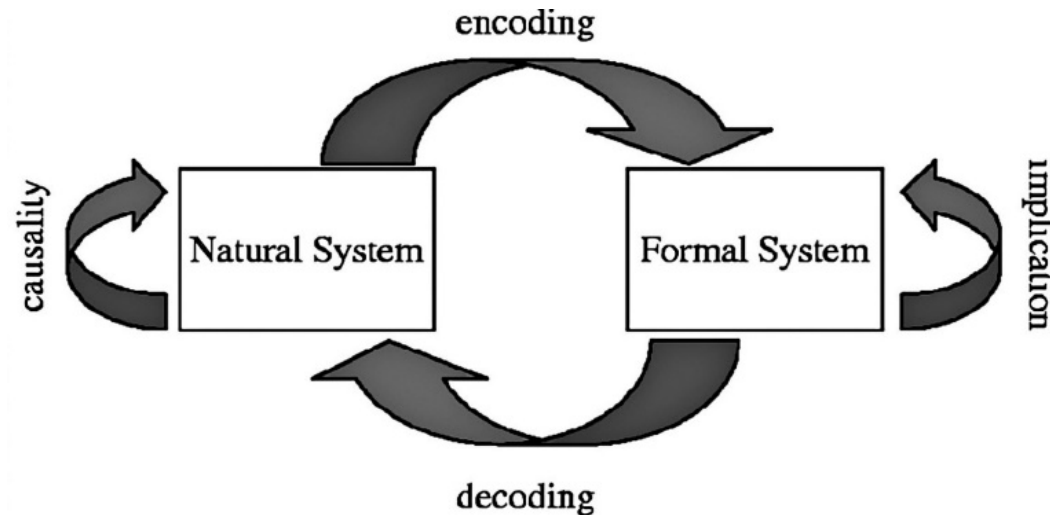
The 1950-2020 World Refugee Wave Map



UNHCR data & graph

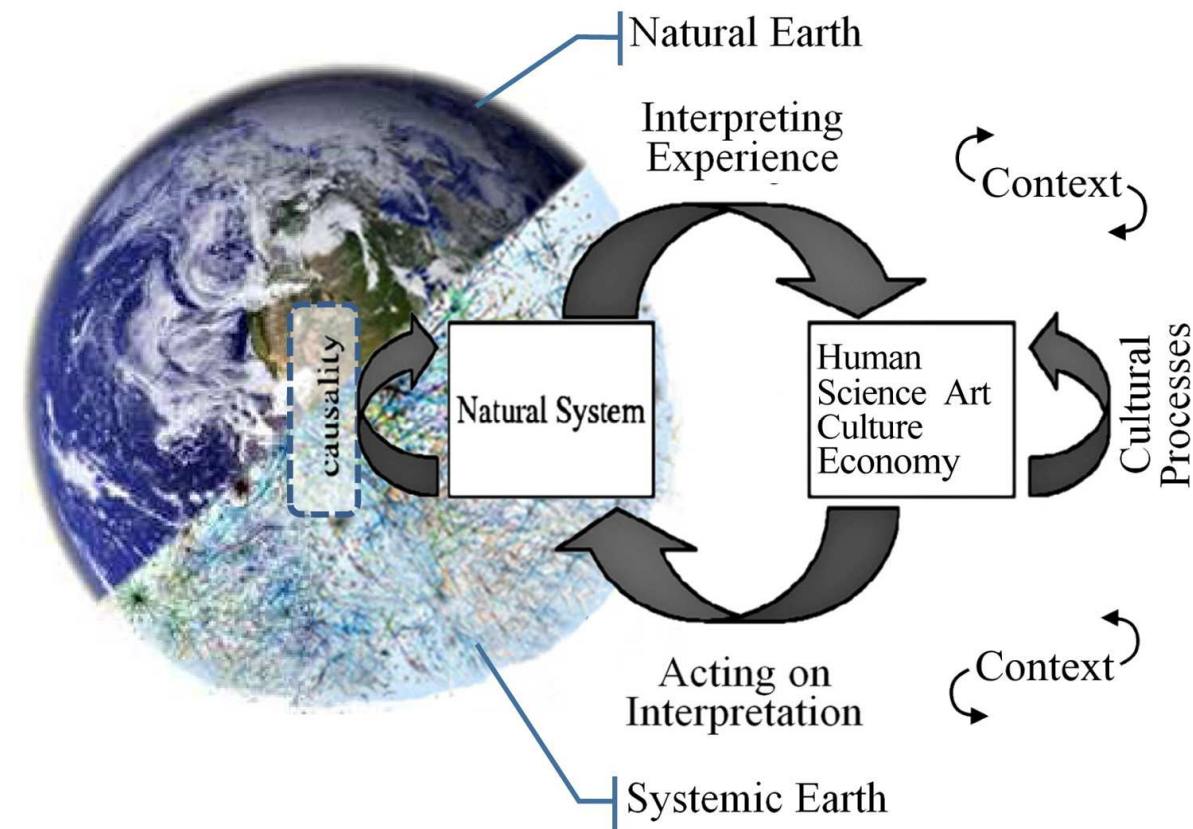
<https://www.unhcr.org/flagship-reports/globaltrends/>

Robert Rosen's model of the scientific learning method



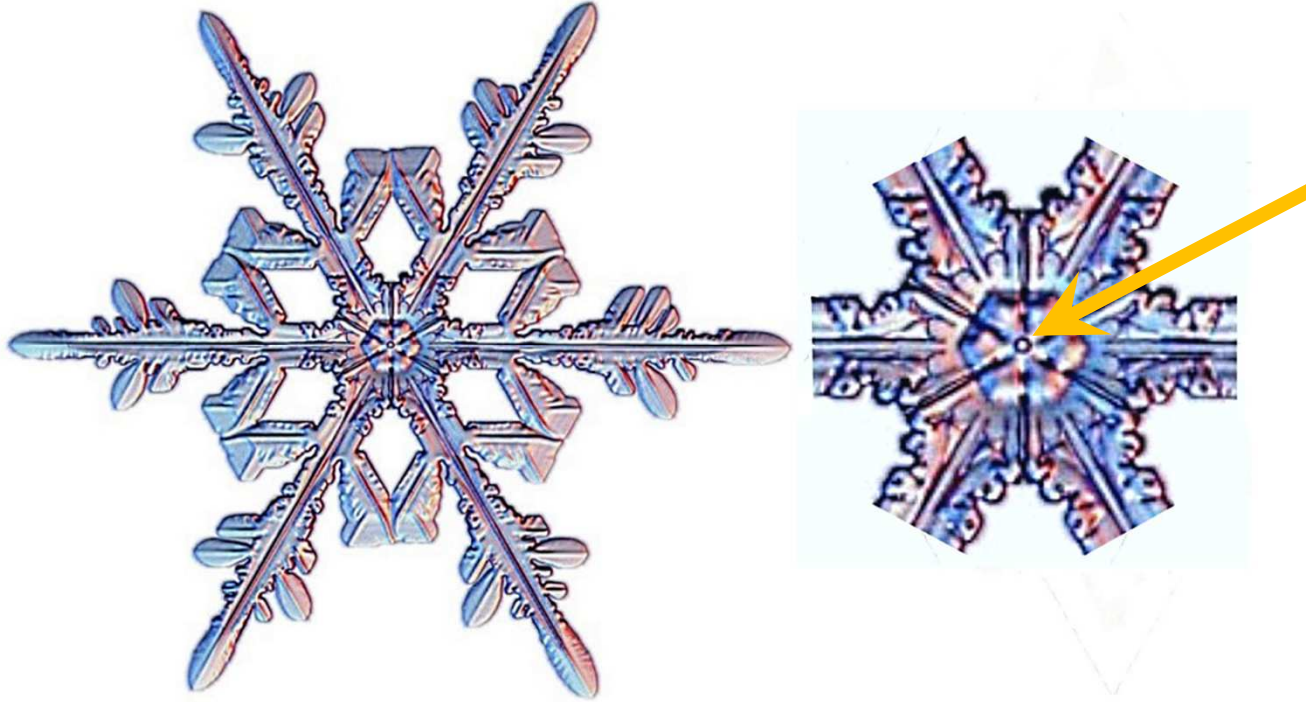
- Science as an iterative process, going back and forth between making observations of nature and encoding them in formal theory
- to then decode it to test the theory in nature with applications

Rosen's model of systems learning applied to human culture



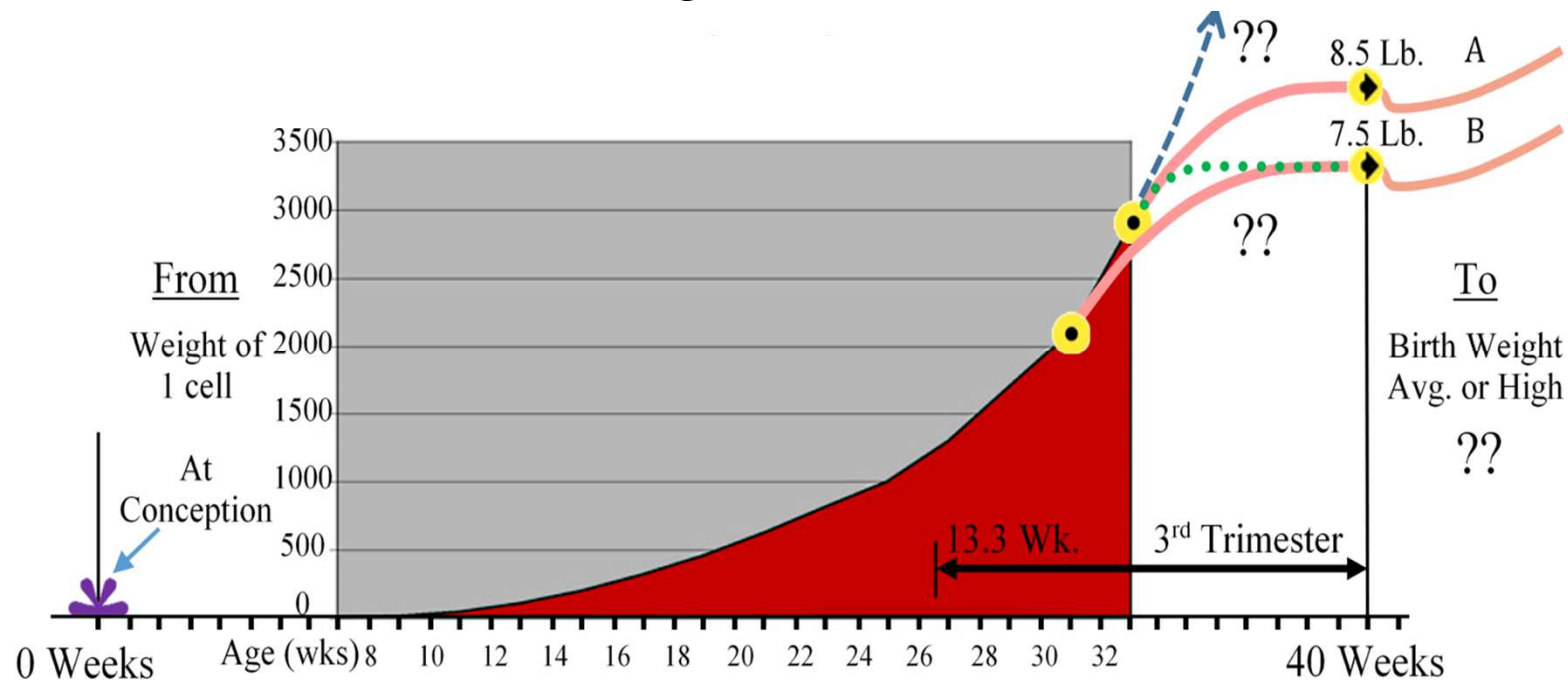
- As a general principle of learning systems, people engage and interpret their experiences with nature
- With language and arts people reference natural subjects and express the meaning of their experiences

A Snowflake and its central nucleus



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

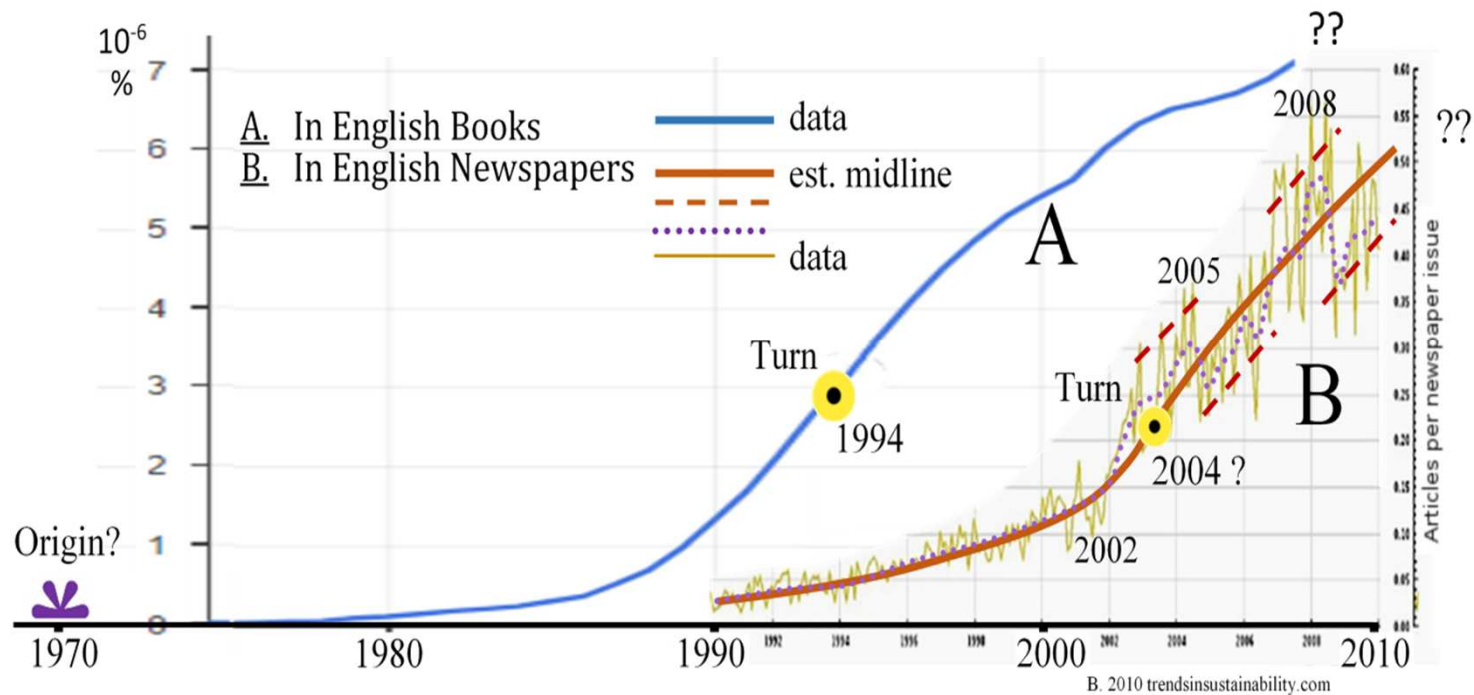
Fetal Weight: 8 to 32 weeks



Case Study I.

Human Gestation based on partial data for fetal weight.

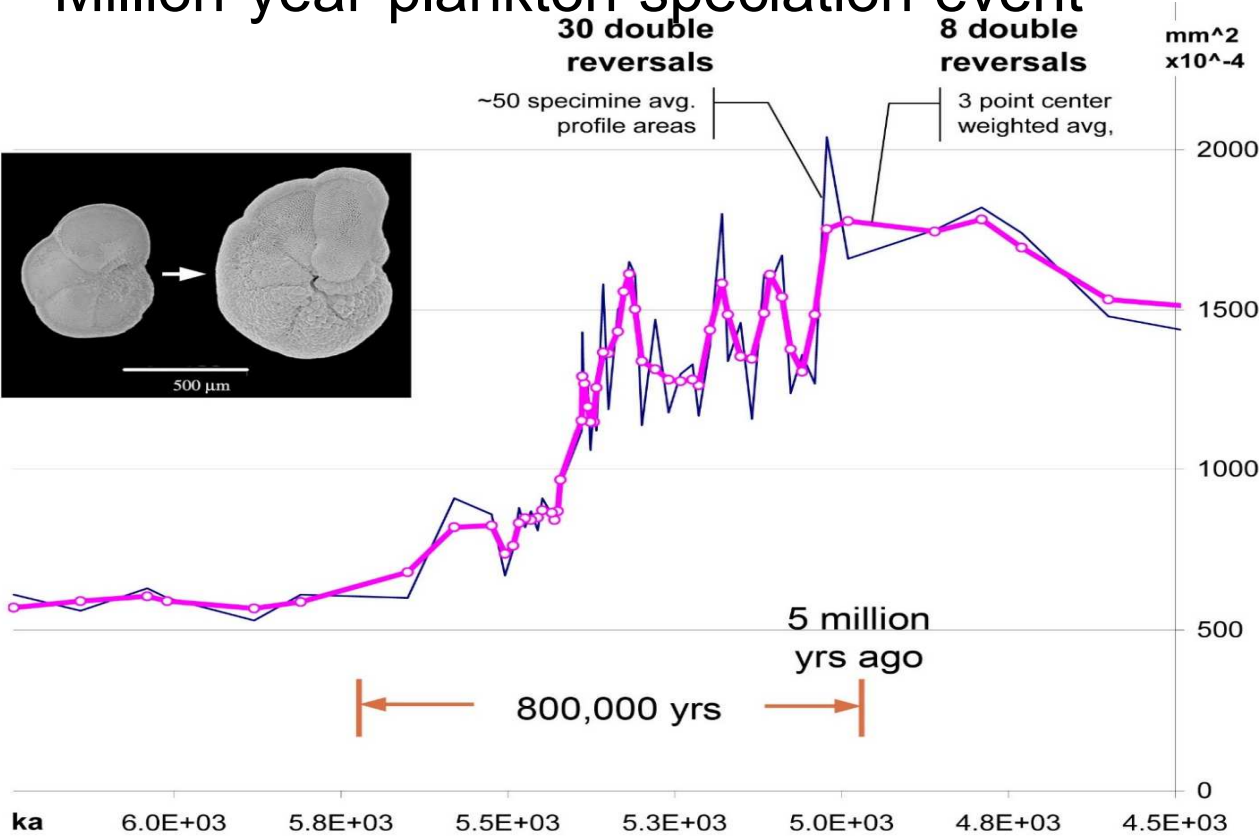
Growing publication on Sustainability



Case Study II

Data on English book and newspaper publishing

Million-year plankton speciation event



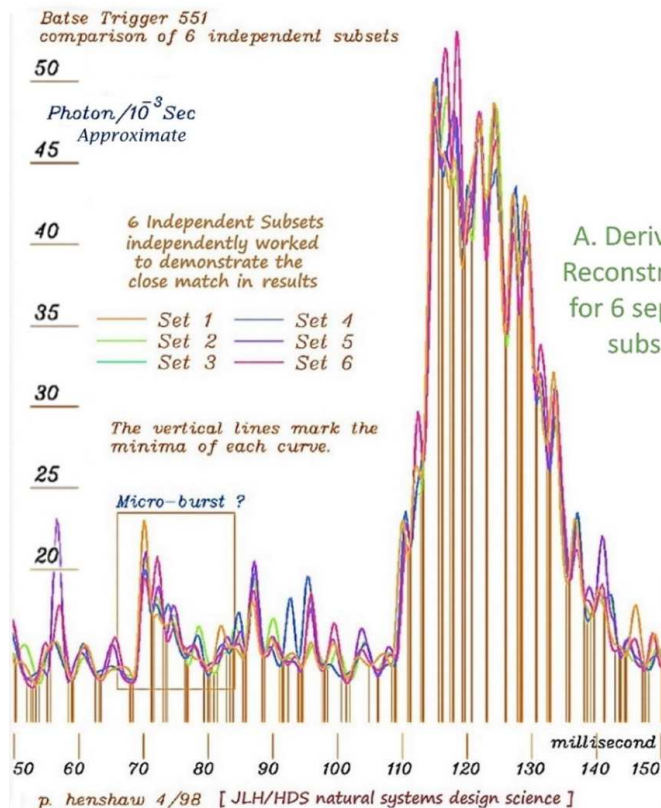
Case Study III

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

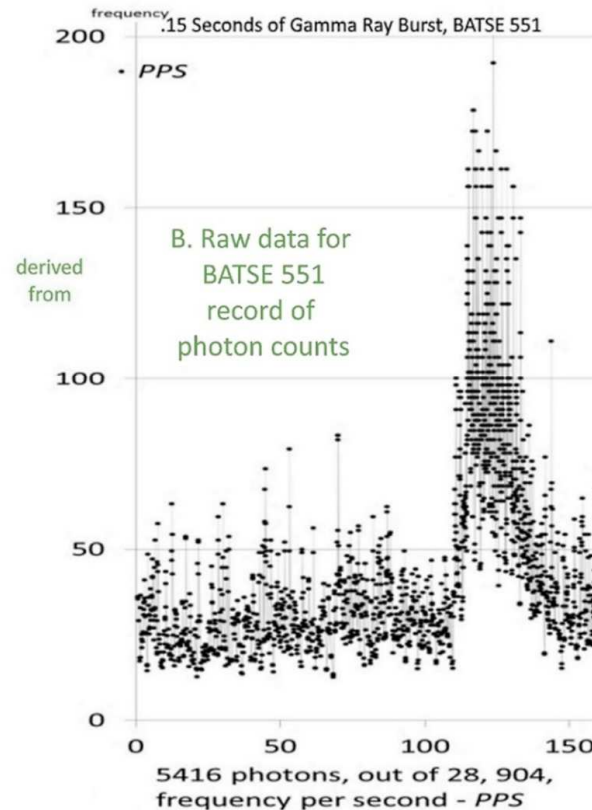
Connecting the dots - hidden continuities in Gamma Ray Burst

Derivative smoothing of six data partitions (lt) – Gamma-Ray Burst data (rt)

Intricate hidden continuities in Gamma Ray Bursts and the Gamma Ray Background.

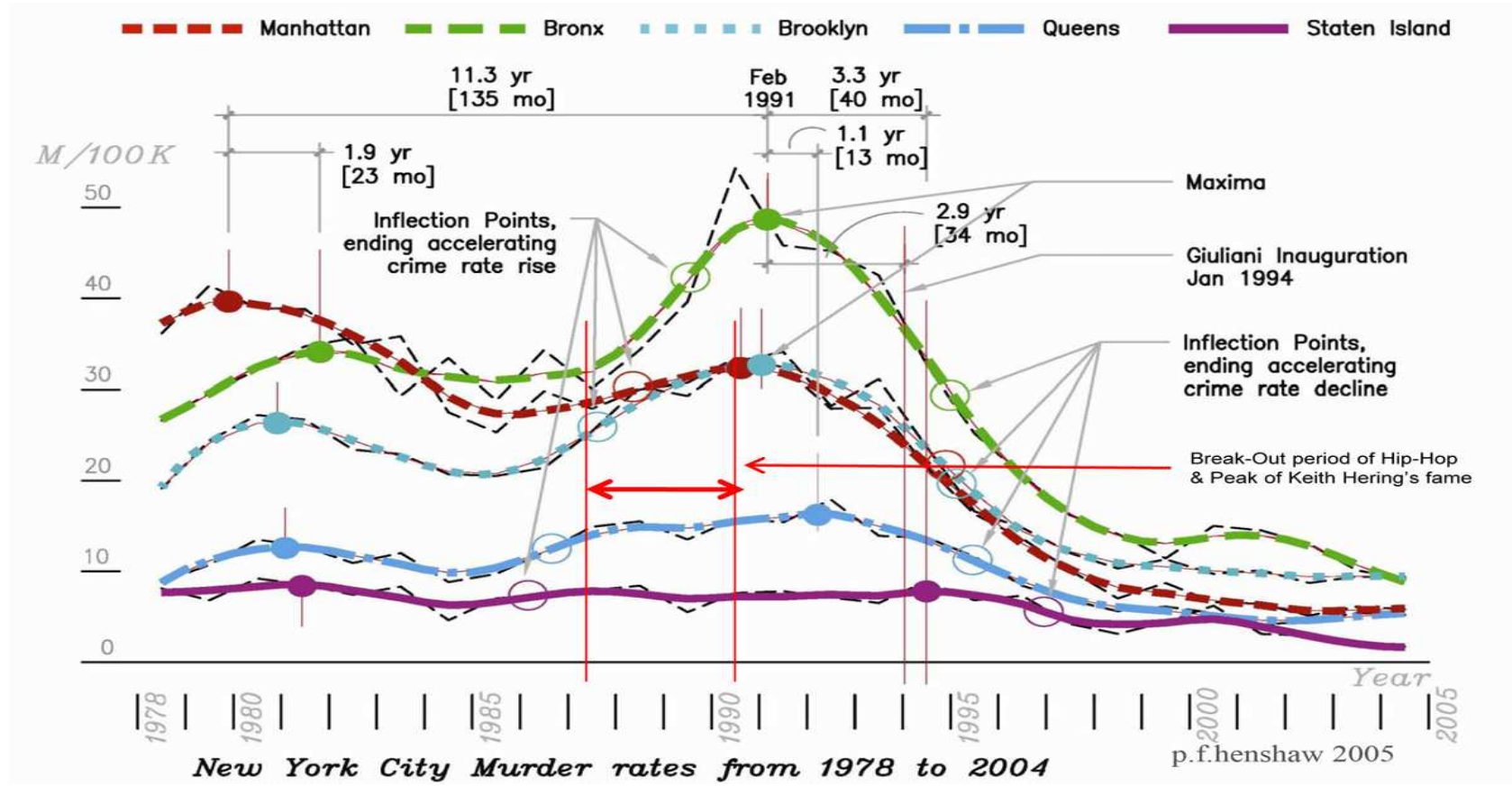


A. Derivative
Reconstruction
for 6 separate
subsets



Collapse of the Great NYC Crime Wave

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





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



ISSS 2021 - Paper & Slides

<https://synapse9.com/ISSS-21/NatGrowthConcept&Process.pdf>

www.synapse9.com/signals sy@synapse9.com

