

Welcome to this week's presentation & conversation hosted by the **Canadian Association for the Club of Rome**, a Club dedicated to intelligent debate & action on global issues.



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Our Obsolescent Brains: Economics, Climate Change and Overshoot.

Description: *H. sapiens* evolved when our social & biophysical environments posed only modest challenges to our nervous systems. As a result, even modern techno-industrial (MTI) peoples are equipped with what are paleolithic brains with a repertoire of base emotions, behavioural predispositions, & simple survival strategies. These ancient qualities were once adaptive, enabling stone-age humans to survive millennia. Times have changed--cultural & technological evolution have outpaced evolution. Economic & population growth have made humanity the greatest geological force on Earth; the human enterprise is far into ecological overshoot; global heating is out of control. In effect, our enterprise has merged with the ecosphere to create a global socio-ecological 'environment' of such mind-boggling complexity that *we H. sapiens* are now maladapted to the world of our own making. Using economic logic & climate policy as examples, this presentation illuminates how paleolithic responses to our modern predicament puts humanity in danger of being 'selected out.'

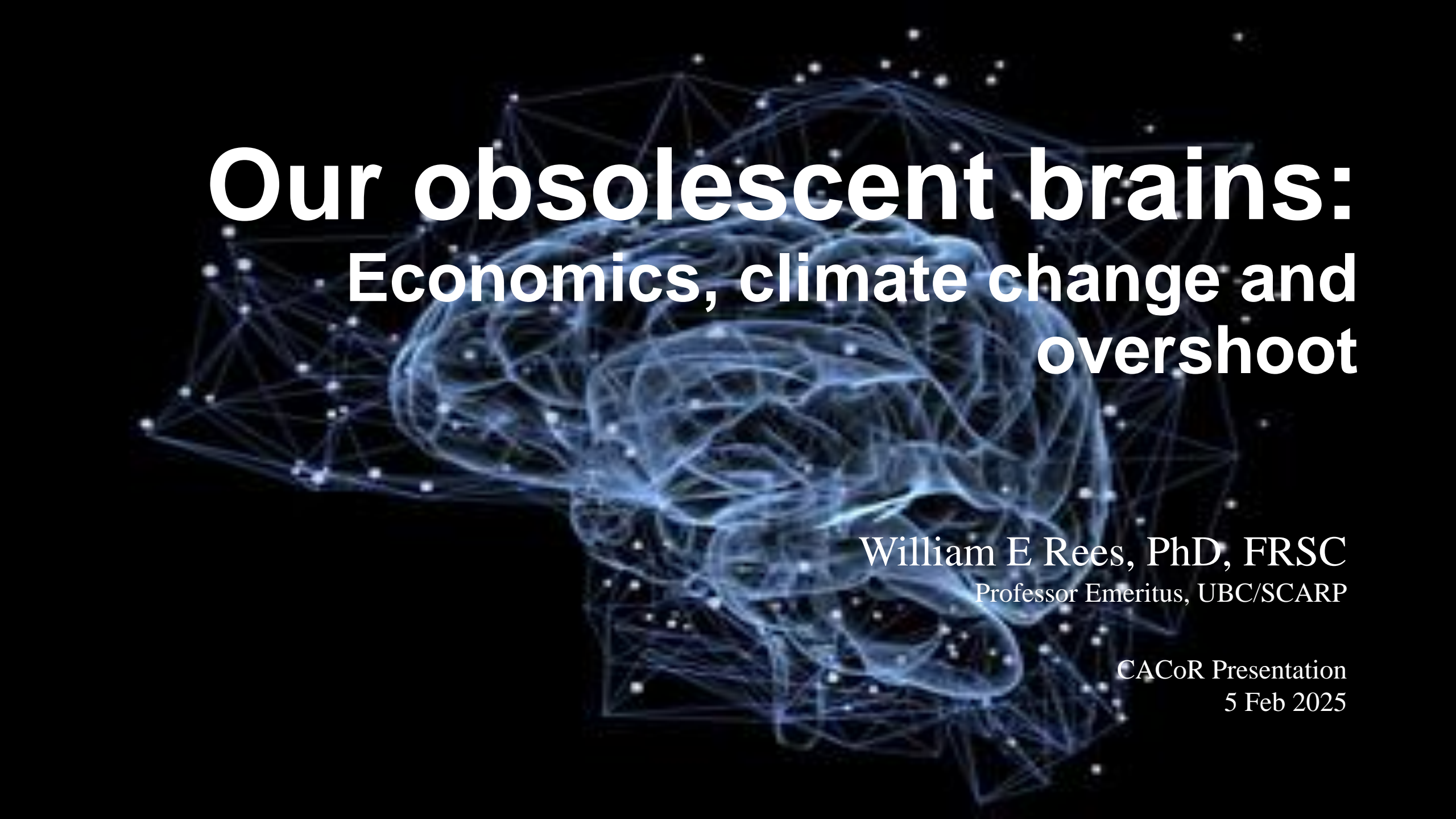
Biography: William E Rees is a human ecologist, ecological economist, former Director & Professor Emeritus of the U British Columbia's School of Planning in Vancouver. His research focuses on the ecological requirements for human survival & the behavioural & socio-cultural barriers to addressing our eco-predicament. He is best known as originator & co-developer of ecological footprint analysis, which reveals MTI 'civilization' to be far into potentially fatal ecological overshoot. Prof Rees has authored hundreds of peer-reviewed & popular articles on these & related dimensions of (un)sustainability. He is a Fellow of the Royal Society of Canada & his awards include the Herman Daly Award & Boulding Memorial Prize in Ecological Economics & a Blue Planet Prize (jointly with Dr Mathis Wackernagel).

The presentation will be followed by a conversation, questions, & observations from the participants.

CACOR acknowledges that we all benefit from sharing the traditional territories of local Indigenous peoples (First Nations, Métis, & Inuit in Canada) and their descendants.



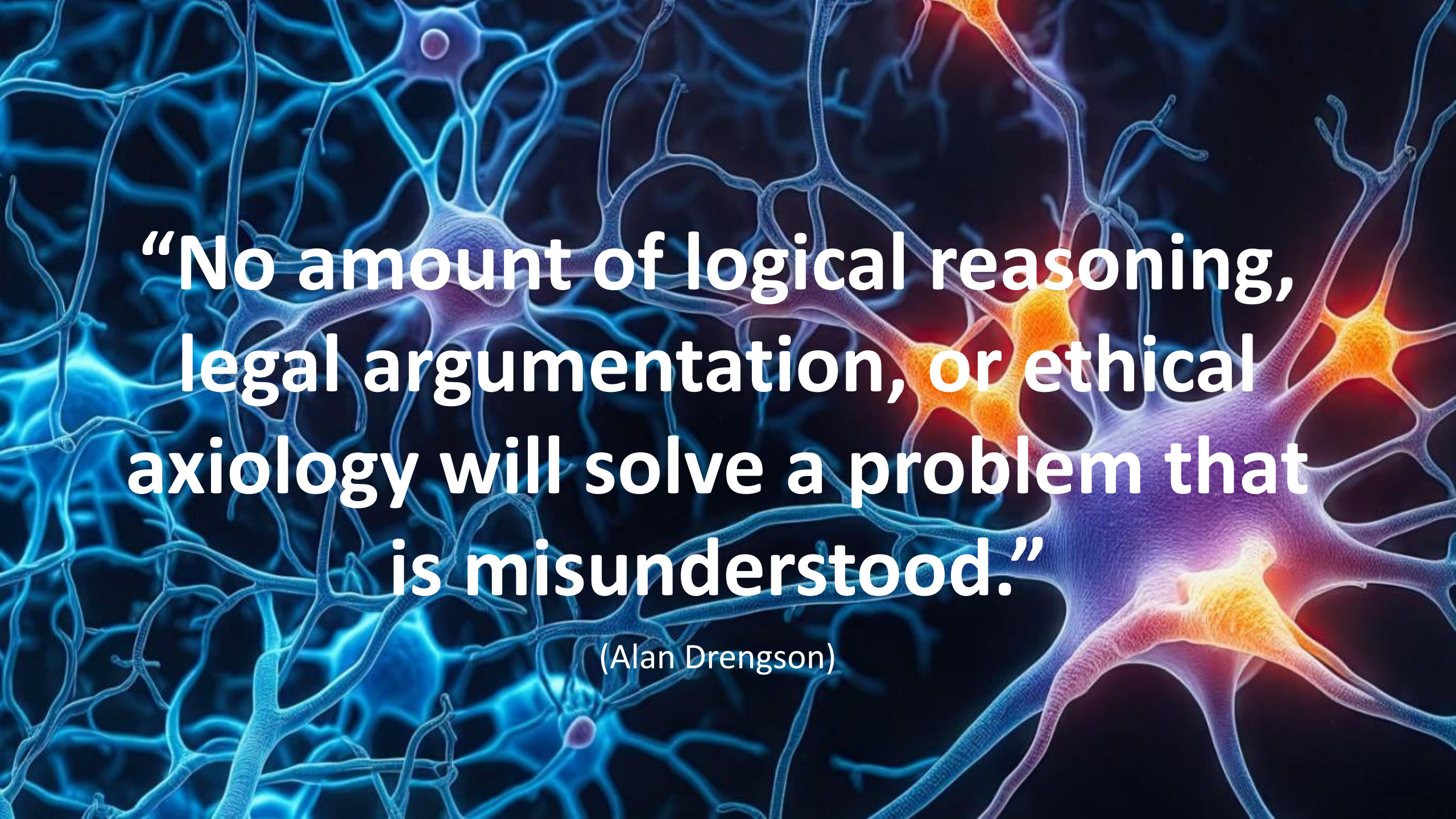
Website: canadiancor.com
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2025 Feb 05 Zoom #231



Our obsolescent brains: Economics, climate change and overshoot

William E Rees, PhD, FRSC
Professor Emeritus, UBC/SCARP

CACoR Presentation
5 Feb 2025



**“No amount of logical reasoning,
legal argumentation, or ethical
axiology will solve a problem that
is misunderstood.”**

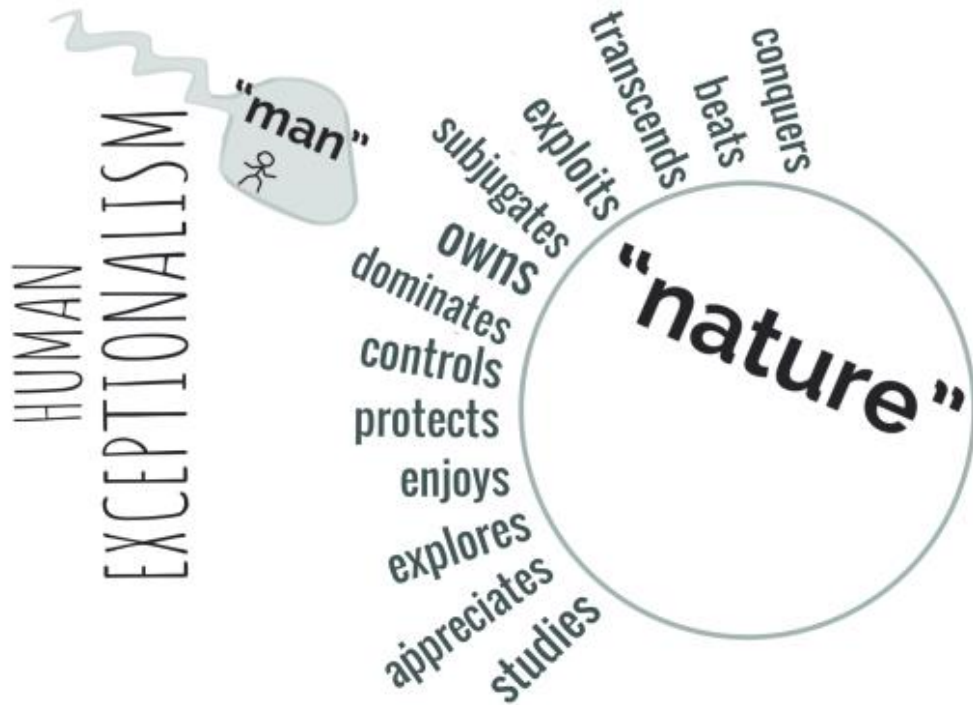
(Alan Drengson)

Consider this two-pronged 'problem'

- Modern techno-industrial society is gross ecological overshoot. *Left unattended overshoot is a terminal condition.*
- The world is simultaneously experiencing the erosion of civil society in many countries, expanding regional conflicts and escalating geopolitical instability.
- With the latter comes a withering capacity to respond effectively to either overshoot or possible civilizational collapse.

Lenses through which to view the problem

#1: Human “exceptionalism”



- Given *H. sapiens*' superior intelligence, moral superiority (and mortal soul), humans stand uniquely apart from the natural world.
- We are exempt from biophysical laws.
- **Evolutionary history and humanity's genetic endowment have virtually no bearing on how the future unfolds.**
- Human motivations and behaviours are wholly determined by social and cultural factors.

Lenses through which to view the problem

#2: Humans as part of nature



- Core concept:
“Nothing in Biology Makes Sense Except in the Light of Evolution” (Theodosius Dobzhansky).
- *H. sapiens*, like all known species, is a product of evolution by natural selection
- It follows that **nothing in human affairs makes sense except in light of evolution** (William Rees).

Premise

Modern techno-industrial society perceives our
eco-social crisis through the lens of
human exceptionalism.

This is an error.

*We misunderstand humanity's predicament;
we cannot solve 'the problem'.*

Humans are a product of natural selection

Natural selection requires

- A large population showing variation in the structure/function of key heritable features.
- Some of the variations will be better adapted to prevailing 'environmental' conditions.
- Individuals with superior variations will be 'selected' by the environment; i.e., they will survive and produce more offspring.
- The responsible genes will accumulate in subsequent generations.

Important Implications

- The brain (central nervous system) has evolved in the same manner as other organs and attributes.
- The capabilities of the brain reflect the environments in which it evolved.
- *H. sapiens* is always a ‘work in progress’, i.e., we are still evolving and subject to natural selection.

The 'modern' human brain

- The human brain evolved when *H. sapiens* lived in small tribal groups, in spatially limited, predictable environments that *posed only modest challenges to the evolving nervous system.*
- Modern techno-industrial peoples have inherited what are basically paleolithic brains with a corresponding repertoire of emotions, behavioural predispositions, and survival strategies.
- Like our ancestors, MTI persons tend to fixate on a single problem at a time the economy, emissions/climate change the pandemic, etc.
- We don't 'get' complexity; we don't connect the dots among various 'environmental' problems.
- We also exhibit a marked aversion to rapid change; we yearn for predictable stability.
- *Note that these qualities were once perfectly adequate for survival.*

Some heritable behaviours

Unless or until constrained by negative feedback, *H. sapiens* like all known species tend to:

- Expand into all accessible habitat;
- Consume available essential resources to the limit of prevailing technology;
- In the case, of humans, ‘accessible’ and ‘available’ are continuously being redefined or upgraded by technological advances;

Humans are like other species – all tend to over-exploit

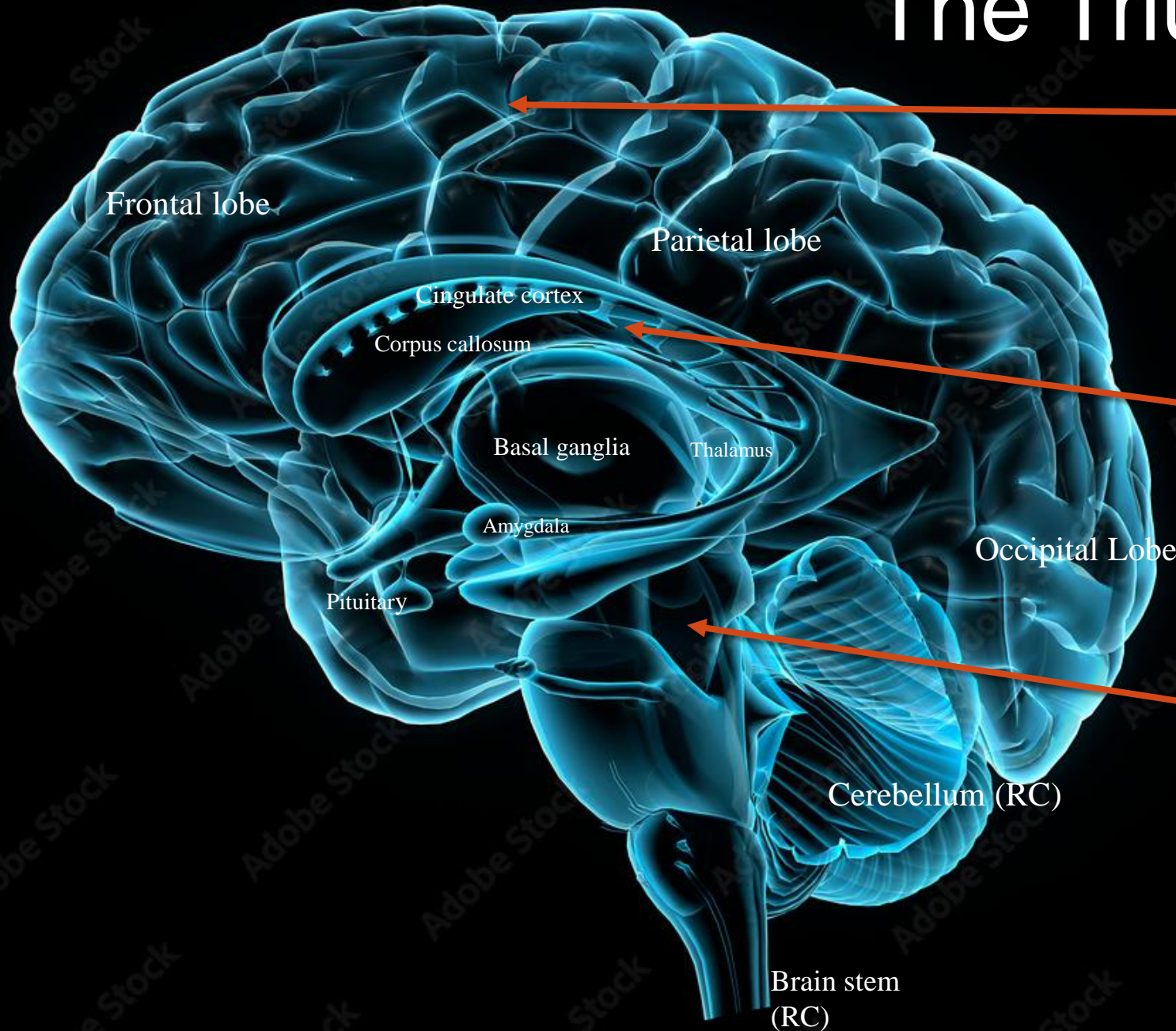
“Tool-wielding monkeys push local shellfish to edge of extinction”

New Scientist 19 Sept 2017



- But more advanced technology makes humans competitively superior to ecologically similar species in the acquisition of habitat and all other resources.

The Triune Brain Model



Cerebrum (Neo cortex or 'new brain')

- logic and reason; forward thinking and planning; technical manipulation, language and speech;

Limbic System: (paleo-mammalian or mid-brain)

- Emotions, feelings; responses to food and sex; bonding and attachment; memory

Reptilian Complex (Old brain)

- physical survival; reproduction; social stature; fight or flight; hard-wired ritual and instinct

Tension in the integrated mind

- Humans seem uniquely self-conscious and rational—we ‘live’ in cerebral consciousness. However:
- When anything from simple comfort to safety or ‘survival’ (including personal prestige, socio-economic status, political power—i.e., the ‘*status quo*’) are threatened, innate behavioural propensities that operate *beneath consciousness* (in the mid-brain and reptilian brain-stem) override rational responses. That is:
- **Passion and instinct often trump reason.**

Free will? We don't even know which sub-brain is calling the shots

- 95% of brain activity happens below conscious awareness. Even important decisions are made before we are aware we have made them.
- “A bevy of experiments in recent years suggest that the conscious mind is like a monkey riding a tiger of subconscious decisions and actions in progress, frantically making up stories about being in control” (Overbye 2007).

Humans: Not primarily rational

- A 'rational decision' is one arrived at through logical reasoning based on factual evidence
- Rational decision-making is influenced, but should not be unduly distorted by, emotion
- By these criteria, human groups are not remotely rational.

The sub-conscious 'ten-minute brain'

- For survival, the '*right here right now*' is much more important than 10 years or even 10 days from now.
- Evolution shaped our brains to focus mainly on the next few minutes; Why plan for the future if you cannot survive the next 10 minutes?
- 'Surviving for today' is the brain's main priority (finding food, shelter; avoiding predators and hostiles); "long-term planning takes the back seat." Those who can survive the next 10 minutes are much more likely to pass their genes on to the next generation.
- The 'fight or flight' response exists for a reason: powerful hormone injections enable us to take the quickest decisions, not the right decisions.

See: <https://tsakrklides.com/2025/01/30/the-longest-10-minutes-of-your-life-have-just-begun/>

Even economists recognize that

Humans ‘discount’ the future, naturally!

- Humans in general and politicians in particular, are temporal, spatial and social *discounters*.
- We *naturally* favour the familiar here and now, and close relatives and friends, over sketchy uncertain futures and unknown people in foreign lands.
- Decision-makers therefore much rather risk imposing possible future damage on the unborn and total strangers in distant countries than impose certain economic hardship on their own family, friends and constituents today (think: “climate change”).

On the slowness of human thought processing

- The information processing throughput of the human brain is about 10 bits/s.
- By contrast, our sensory systems gather data at $\sim 10 \times 10^9$ bits/s.
- This helps explain why we think in simplistic terms, first-order cause and effect, and why we can “*only think about one thing at a time*”
- “How can humans get away with just 10 bits/s?... Cognition at such a low rate [was] sufficient for survival.” “...most of the time our environment change[d] at a much more leisurely pace.”

(see Zheng and Meister 2025, *The unbearable slowness of being: Why do we live at 10 bits/s?*
[https://www.cell.com/neuron/abstract/S0896-6273\(24\)00808-0](https://www.cell.com/neuron/abstract/S0896-6273(24)00808-0)).

Something becomes obsolete when

- a) a newer version of the entity comes along that is more efficient, effective or otherwise functionally superior to the original.
- b) the entity's operating environment changes so much that it is no longer able to function effectively and may become self-destructive.

By definition 'b', the human brain is obsolete

- Modern techno-industrial humans have not evolved beyond cognitive limits set by their Paleolithic brains.
- We don't even realize we are trapped in this Darwinian sink hole.
- One consequence: People today are inherently maladapted to today's environment.

Unlike our Paleolithic ancestors

Modern techno-industrial (MTI) humans

- Live in a mind-numbingly complex, rapidly changing world-system of overlapping sub-systems that *we ourselves have created* and that *constantly challenge our limited cognitive capacities*.
- Are not cognitively equipped to fully understand, let alone control the workings of any major cultural sub-system – the global economy, the internet, AI, geopolitics – or their interactions with the climate system or any other biophysical sub-system of the ecosphere.
- Again, we don't – in fact we *cannot* – fully connect the dots.
- In effect, with our *functionally obsolete* brains humans are no longer adapted for survival in a mega-system of our own making.

Falling behind

- Memes = nuggets of cultural information (e.g., ideas, technologies) that can be instantly shared among members of the same generation. Significant change can happen in days or months.
- Genes = nuggets of biological information that can be passed only between sequential generations. Significant change takes many generations and thousands of years.
- Memetic evolution is much faster than genetic evolution; cultural evolution has vastly outpaced bio-evolution.
- **Again, modern humans are arguably cognitively impaired for life in today's world.**



Rapidly evolving memetic hardware



Slowly evolving (or regressing) genetic wetware

The bio-cultural factor

- ‘Reality’ is often not what we think it is. Humans ‘socially construct’ their lived realities (or better, we socially construct *shared delusions*).
 - Human groups create simplified interpretations of reality, e.g., political ideologies, religious doctrines, economic paradigms, scientific models, cultural narratives, etc.
 - Every culture/tribe generates somewhat unique perceptions which its citizens (often unconsciously) assume to be the one and true reality.

Why this matters:

- The socially constructed frames through which we view reality determine the kind of ‘reality’ we perceive.

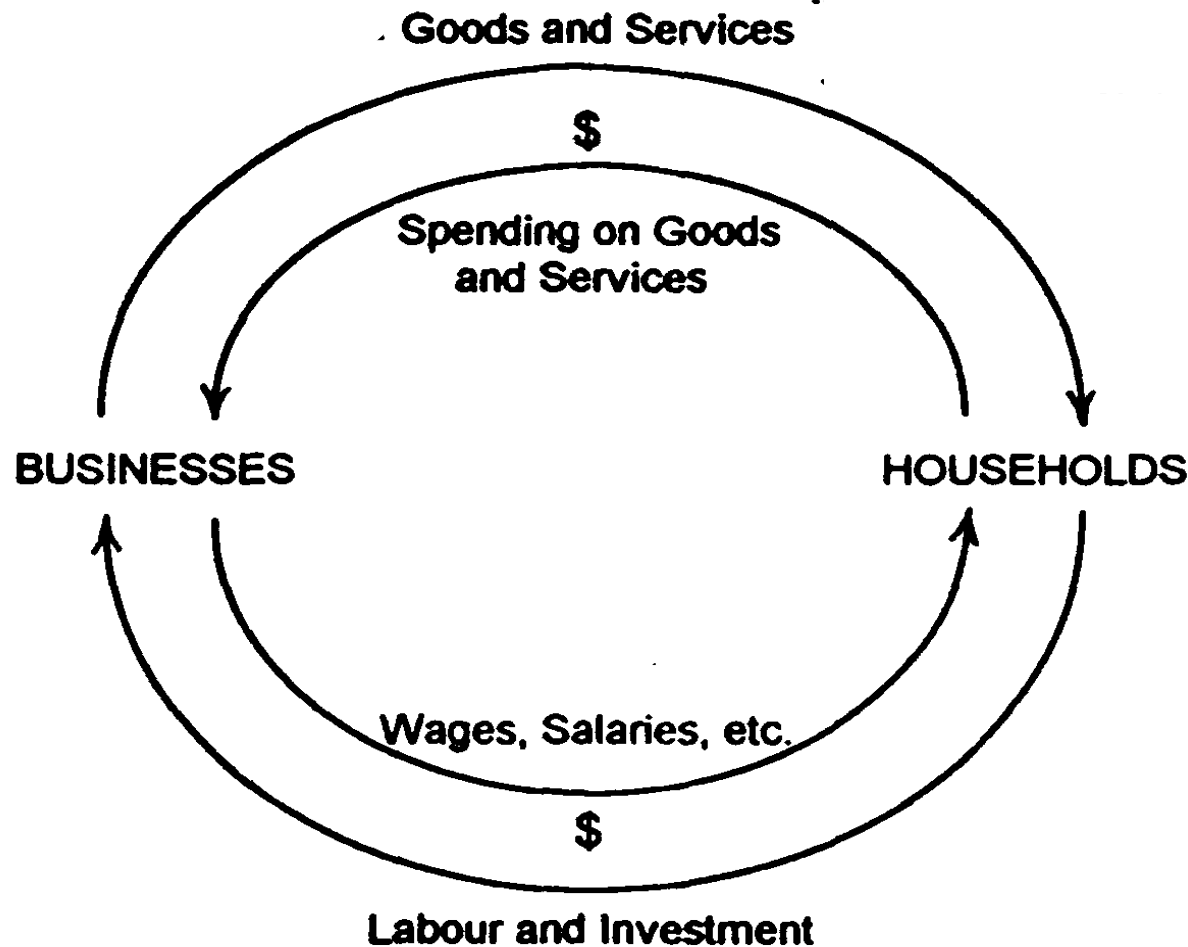
Potential problem

- People live out of their constructed realities (read ‘tribal myths,’ ‘political ideologies,’ ‘shared delusions’) *as if they were real*.
- Sometimes constructed beliefs are harmless – e.g., ‘the Earth is flat’, while inaccurate, was an adequate first approximation of reality for most of human evolutionary history.

But some constructed delusions are potentially catastrophic

- Modern techno-industrial (MTI) culture has been ‘living out of’ a nearly universal complex, yet overly-simplistic mythic construct called ‘neoliberal economics’.
- Neo-economics reflects post-enlightenment **human exceptionalism**; humans apart from nature
- *Its models are virtually untethered from biophysical reality.*

Starting point for economic analysis: The circular flows model



- Describes the economy as essentially self-generating.
- Omits the biophysical 'environment,' spatial and social communities, family, personal relationships, etc.
- Can neither predict nor prescribe for eco-social problems.
- **When glitches do occur, they are filed under the quaint concept of 'externalities.'**

It's a flight of fantasy

Economic activities are what humans do to exploit the biophysical 'environment' and allocate extracted resources essential for life. Yet neoliberal economics:

- Views the economy and the ecosphere as separate independent systems. (How stupid is that?)
- Assumes that any residual resource constraints or pollution will be overcome by human ingenuity (the greatest resource), i.e., through continuous efficiency gains and technological advances.
- **These two assumptions alone are enough to cement belief in unlimited economic growth.**

A related material fantasy

- The fallacy of ‘separate and independent’ is failing.
- Economists and other techno-optimists therefore fantasize that the economy is decoupling from ‘the environment’, i.e., the economy is ‘dematerializing’.
- This fantasy is based on limited (i.e., simplistic, faulty) accounting.
- Reality: There is some relative decoupling (when resource consumption and pollution increases slower than GDP growth) but absolute decoupling is rare and total decoupling is not even theoretically possible.

An Example: Pueyo's Dutch Delusion

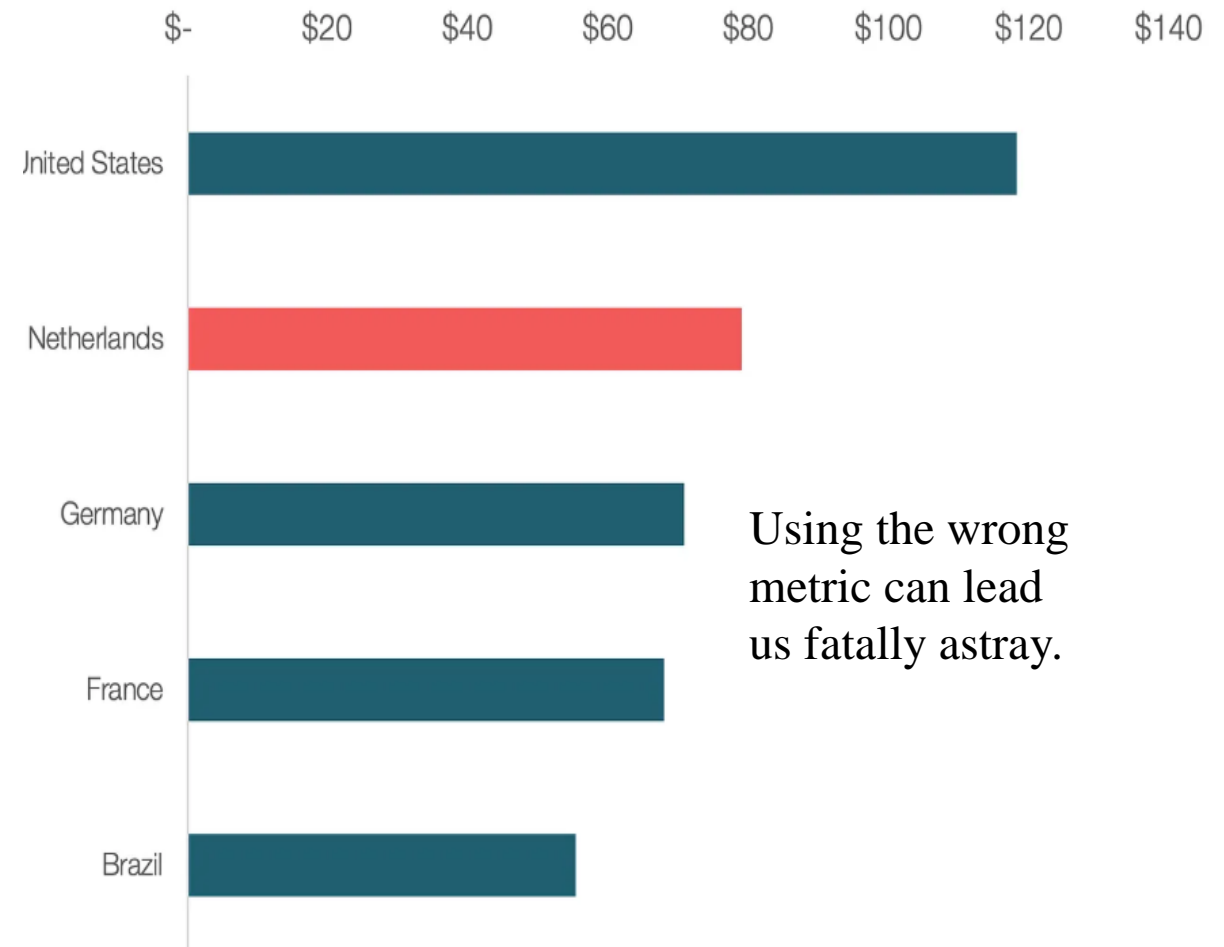
- Holland has a population of ~18M people living on ~33,500 km².
- Population density, ~545 people per km² “and the Netherlands is nice!”
- But “Netherlands is a top food exporter.”
- World pop at similar density = 70 billion.
- Add vertical farming, and Earth could support “many more than 100 billion and *would be a better place.*”

<https://unchartedterritories.tomaspuoyo.com/p/100-billion-humans>

Fact check: Holland is a net exporter in monetary terms only. Add material flows – e.g., fodder to feed domestic livestock and poultry – and the Netherlands could not support its own population on its domestic land base. The Dutch live on several times as much land ‘imported’ from elsewhere.

Top Agricultural Exporters

Food exports, billions of dollars, 2021



Using the wrong metric can lead us fatally astray.

Source: FAO (Food and Agriculture Organization of the United Nations)

Reality: There is no eco-decoupling – *H. sapiens* is the dominant consumer species in all major ecosystems

(C. Fowler and L. Hobbs. 2003. *Is humanity sustainable?* Proc. Royal Soc. London)

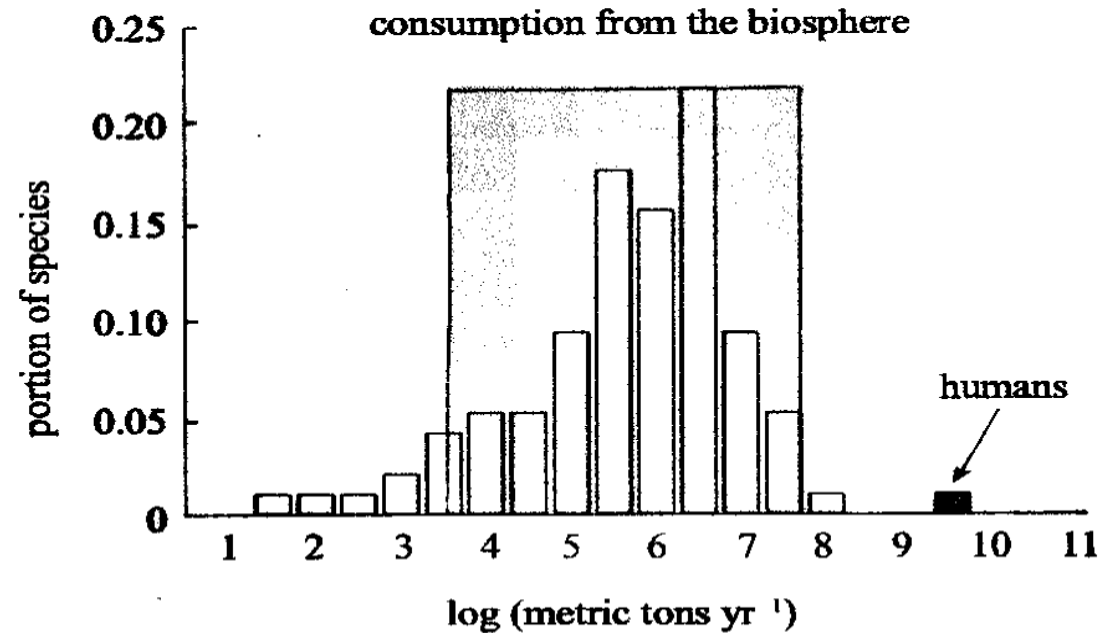


Figure 5. Human ingestion of biomass (dark grey bar) in the biosphere in comparison with that of 96 species of mammals. The 95% confidence limits among non-human species are indicated by the right and left edges of the pale grey shaded area.

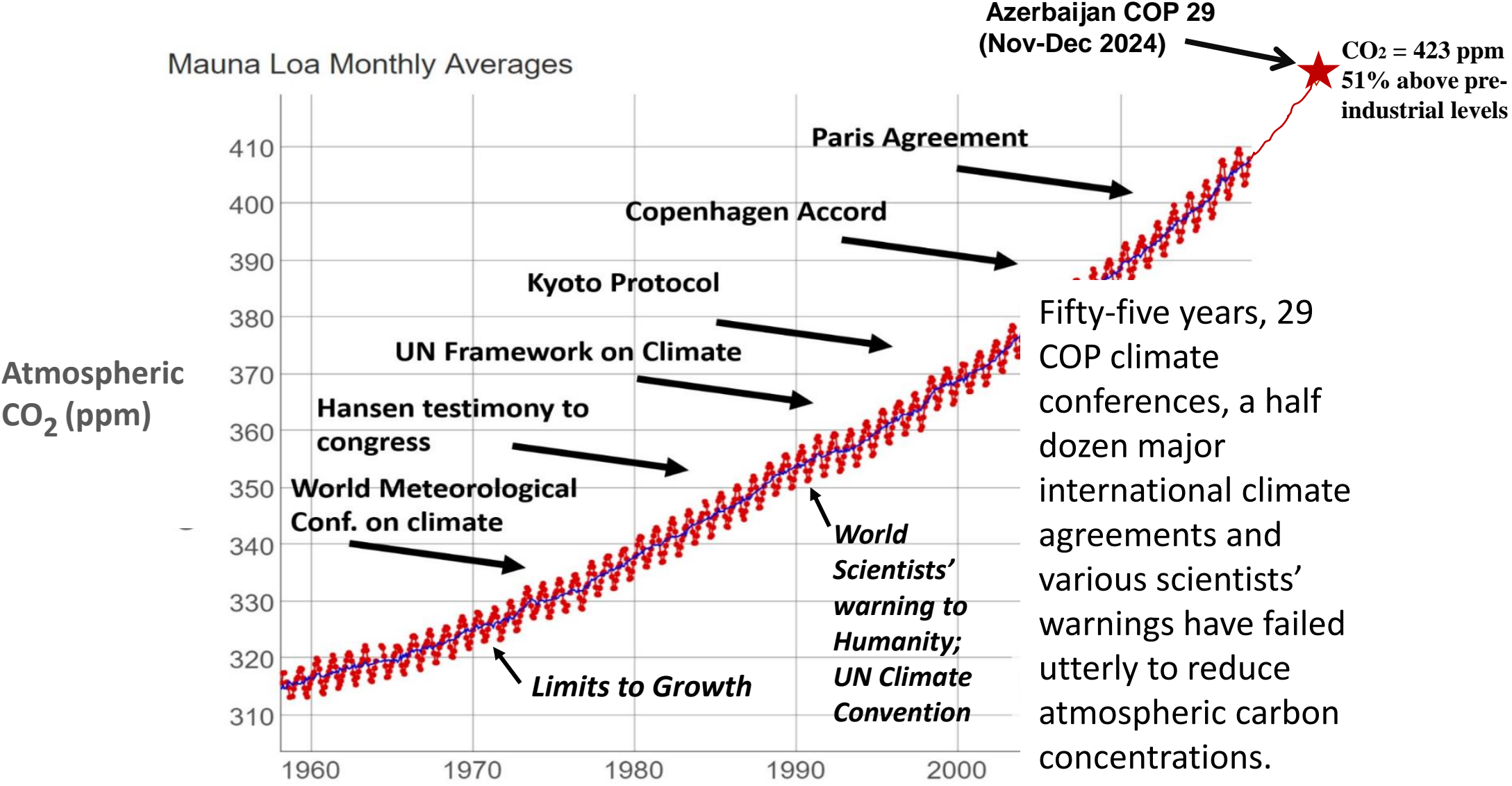
You can lead a
human to
knowledge but
you can't make
him think.



The challenge of global heating

- Temperatures in the early 2020s are unprecedented in the past 24,000 (possibly 100,000) years.
- Carbon dioxide levels are the highest they have been in 14 million years.
- 2024 recorded the highest annual levels of greenhouse gases ever.
- 2024's average land and ocean surface temperature was 1.29 C° (2.32 F°) warmer than the 20th century average. This was 0.10 C° (0.18 F°) warmer than 2023.
- The 1.5 C° warming limit is in the rearview mirror (probably 2.0 C° too).
- The global community is on track for 3.0 C° mean global warming and *climate chaos* in this century.

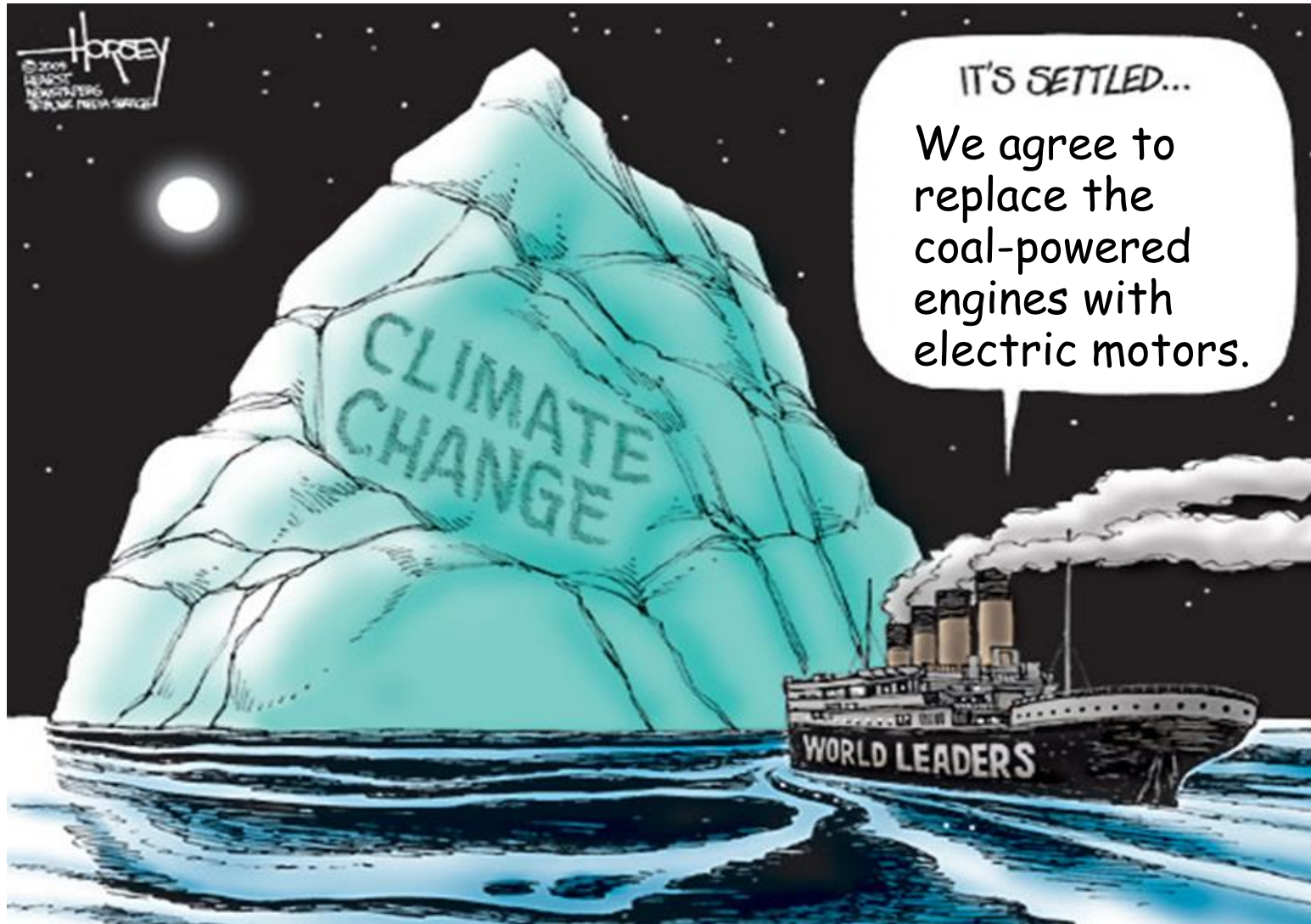
The path to atmospheric CO₂ reductions is paved with increasing FF use and strewn with failed climate agreements



Why? Politically acceptable (exceptionalist) ‘solutions’ to global heating are naively simplistic and short-term

- They reflect the ‘**ten-minute brain**’, i.e., the single-minded, growth-oriented short-term goals of capitalist economics. Approved ‘solutions’ include:
- Any capital-intensive investment (e.g., wind and solar power; EVs; non-existent carbon capture technologies; geo-engineering), e.g., **techno-fixes for the *status quo***. In short:
- Disaster policy is being designed to serve the capitalist growth-based economy “...so the latter becomes the solution to (not the cause of) the *[problem]*” (Spash 2016, p.931).
- **I.e., climate change is a *distraction* from acknowledging, and responding to, humanity’s real predicament, ECOLOGICAL OVERSHOOT.**

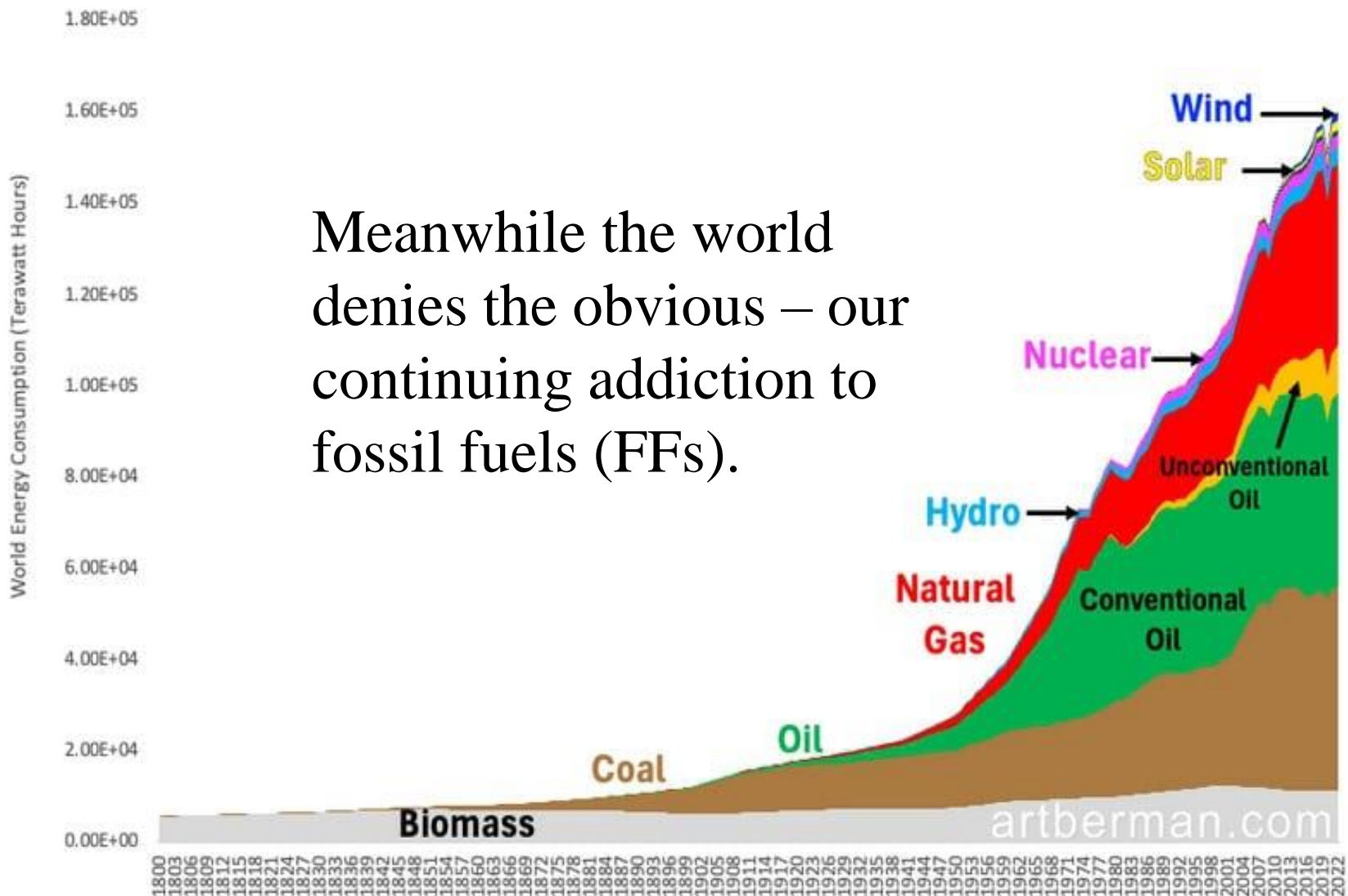
The prevailing approach is merely techno-political 'Business-as-usual-by-alternative-means'



- In effect, society is “Electrifying the Titanic” while ignoring the icebergs (Ophuls, 2021).
- BTW, quantitative replacement of fossil fuels would merely perpetuate overshoot and the continued degradation of the ecosphere.

**Unconventional oil is the world's largest new source of energy since natural gas
Its primary consumption is equal to wind + solar + nuclear + hydro combined**

Meanwhile the world denies the obvious – our continuing addiction to fossil fuels (FFs).



The renewable energy delusion

- Despite the RE hype, *there is no energy transition.*
- FFs remain dominant.
- New energy sources are additive.
- The modern world uses more conventional biomass (wood, peat, animal dung) today than in 1800.

There is so much momentum to the exceptionalist agenda that we are victims of

The quintessential 'rock and hard place'

Option One

If we rapidly 'stop fossil fuels' to avoid disastrous climate change in the absence of quantitatively adequate substitutes, we risk: inadequate energy supplies, broken supply lines, food and other resource shortages, local famines, reduced production, declining incomes, rising inequality, widespread unemployment, civil unrest, abandoned cities, and mass migrations, i.e., collapsed economies and geopolitical chaos (and would still suffer on-going climate change).

I.e., we risk the well-being and lives of billions.

Option Two

If we remain largely dependent on FF (society's default position) and maintain the growth paradigm while supplies last, we risk: more and longer heat waves (we're headed toward 3.0 C degrees warming), extended drought, desertification, melting permafrost, methane releases, water shortages, resource shortages, failing agriculture, famines, rising sea levels, the flooding (and eventual loss) of many coastal cities, uninhabitable regions, and mass migrations, i.e., collapsed economies and geopolitical chaos (and would still run short of energy).

I.e., we risk the well-being and lives of billions.

On Societal Collapse

(It wouldn't be the first time)

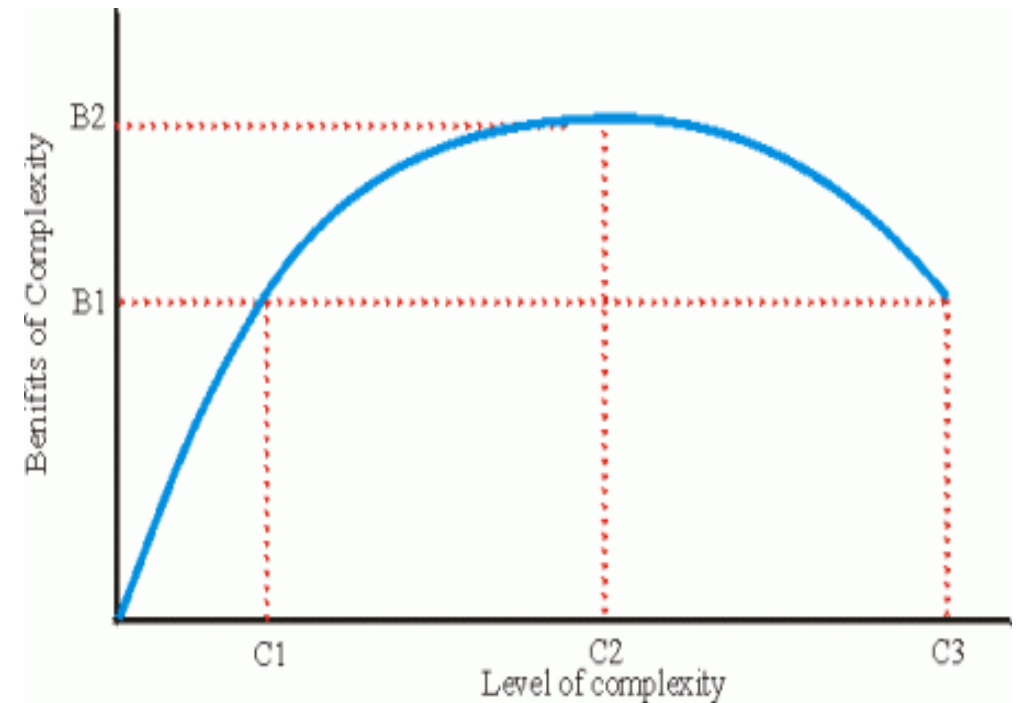


- “...what is perhaps most intriguing in the evolution of human societies is the regularity with which the pattern of increasing complexity is interrupted by collapse...” (Tainter 1995)

The Collapse of Complex Societies

(Tainter 1988)

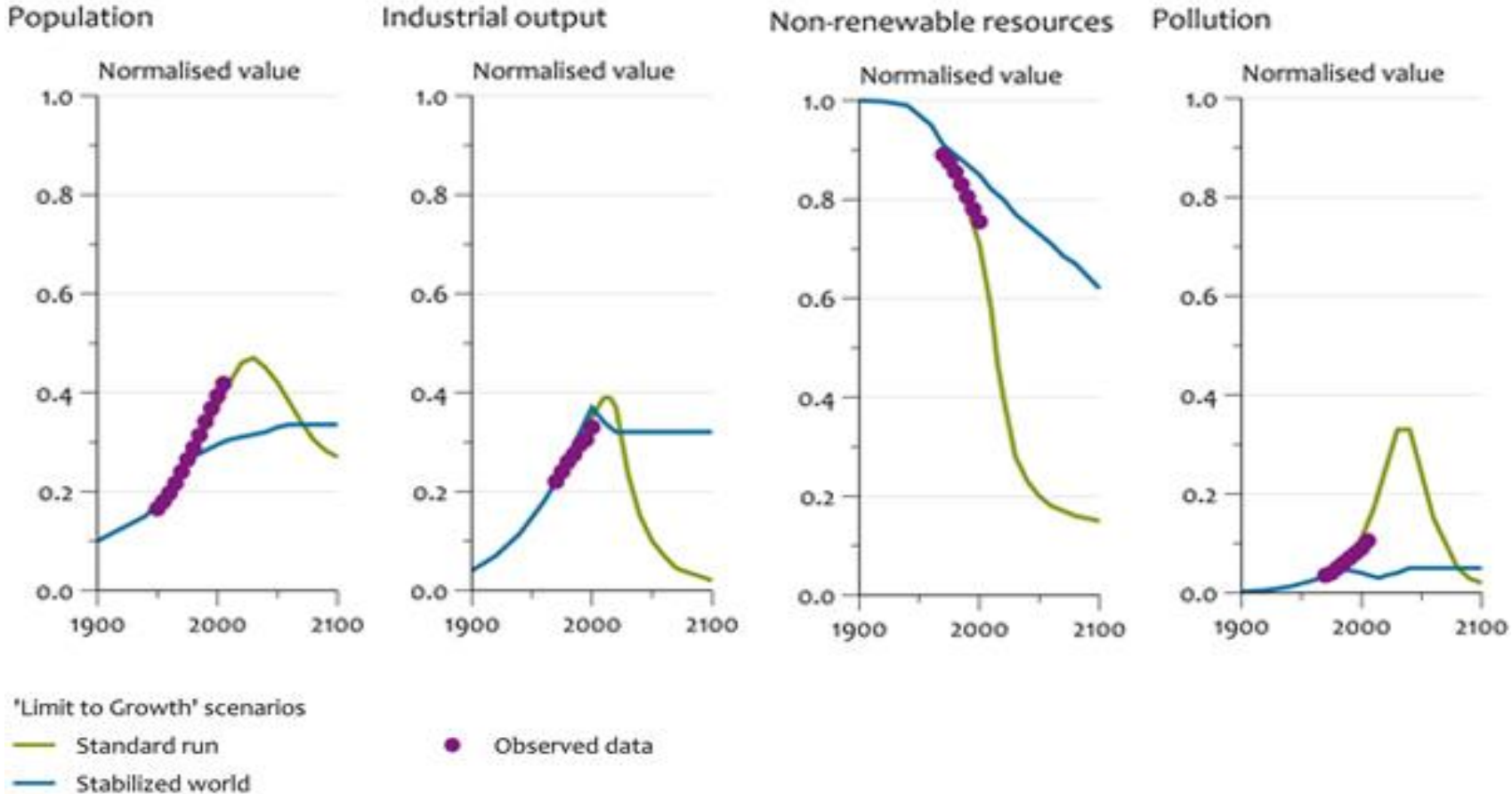
- Human societies are problem-solving systems. Each solution leads to greater societal complexity.
- Each such complexification increases the energy/material flows required to maintain the structural and functional integrity of the system.
- Eventually, “continued investment in complexity as a problem-solving strategy yields a declining marginal return” (e.g., incomes stop rising, EROEI declines, etc.) Corruption increases, social unrest prevails, support systems crumble....
- Increasingly radical attempts to save the system cannot permanently reverse the trend towards disequilibrium and collapse.



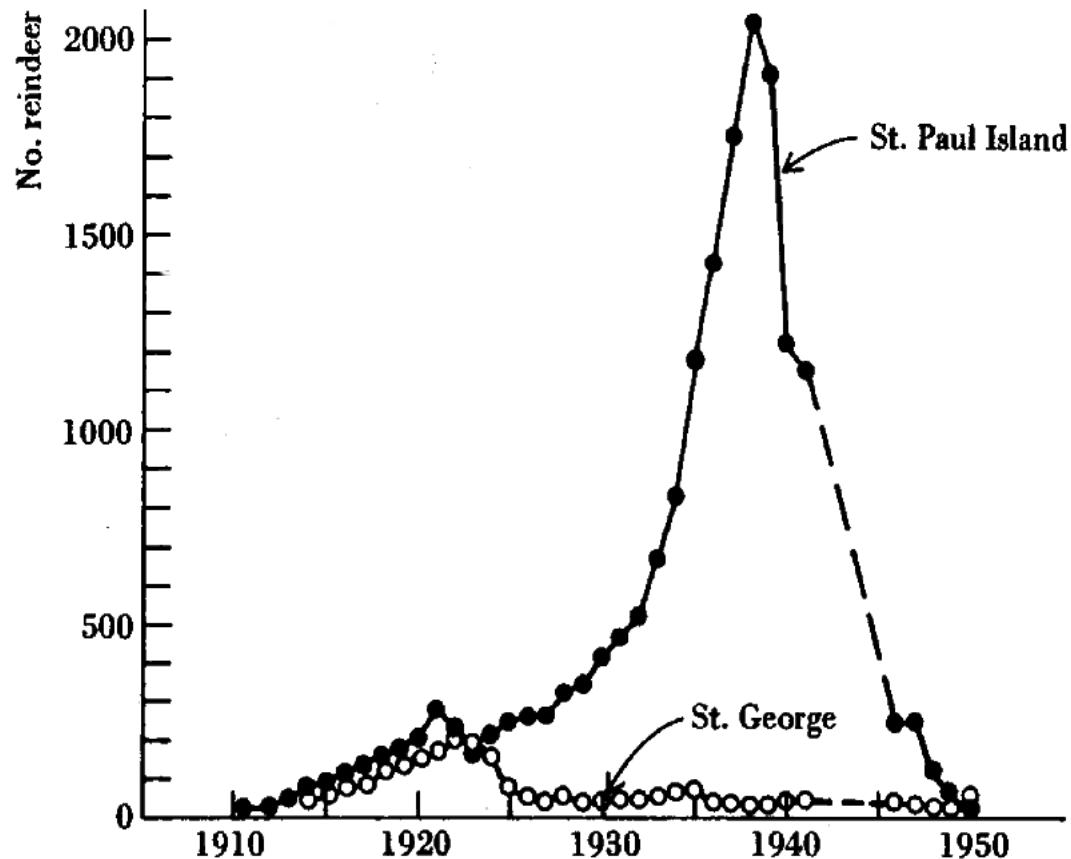
Think: accelerating climate change; ecosystem destabilization; impossible indebtedness; ballooning inequality, resource scarcity, growing energy demand; rising living costs, civil unrest; crisis in democracy; risky geo-engineering schemes, AI unleashed.

BAU: On course for collapse

Comparing 'Limit to Growth' scenarios to observed global data

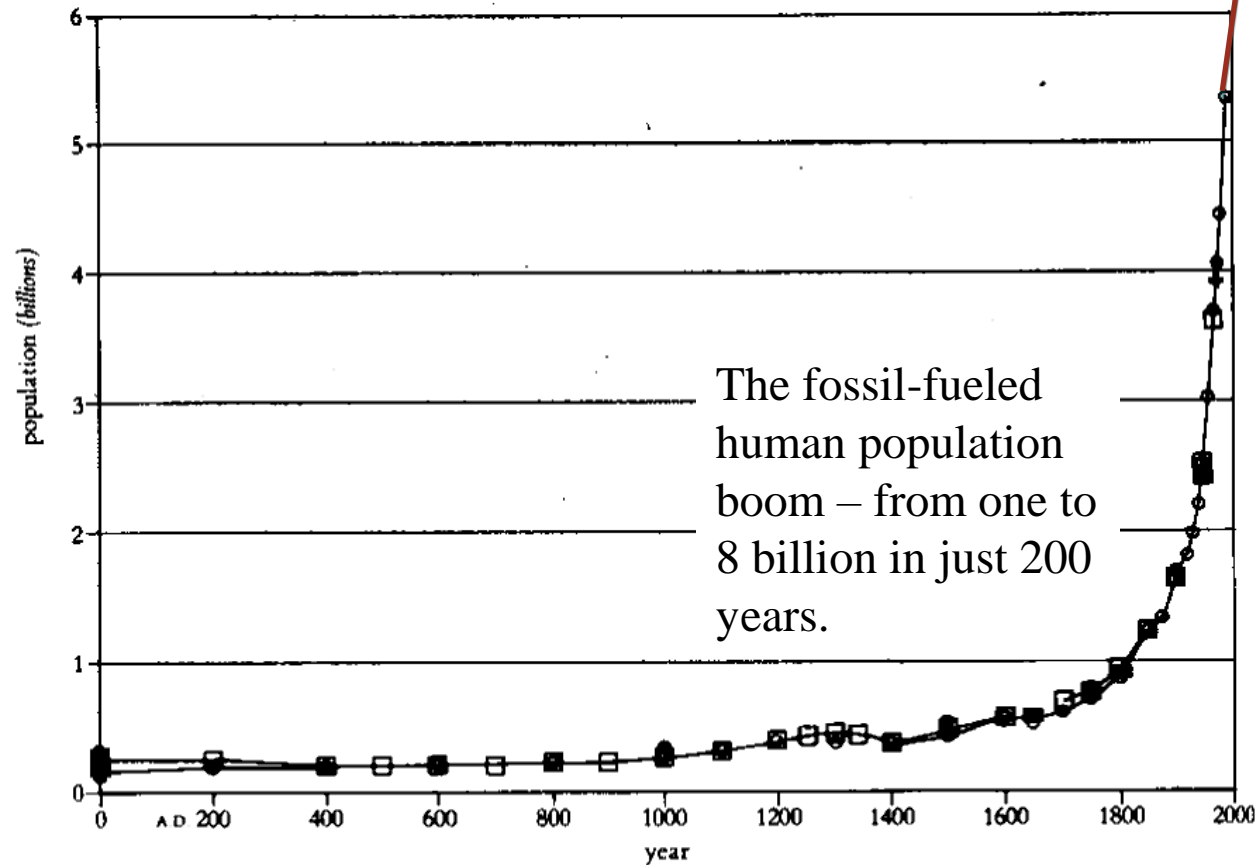


The boom-bust cycle ('plague' cycle) of any species introduced to a new, resource-rich habitat



- Here we see the rise and fall of reindeer Populations on the Pribilof Islands.
- In this case, the primary resource 'fuel' was lichens.

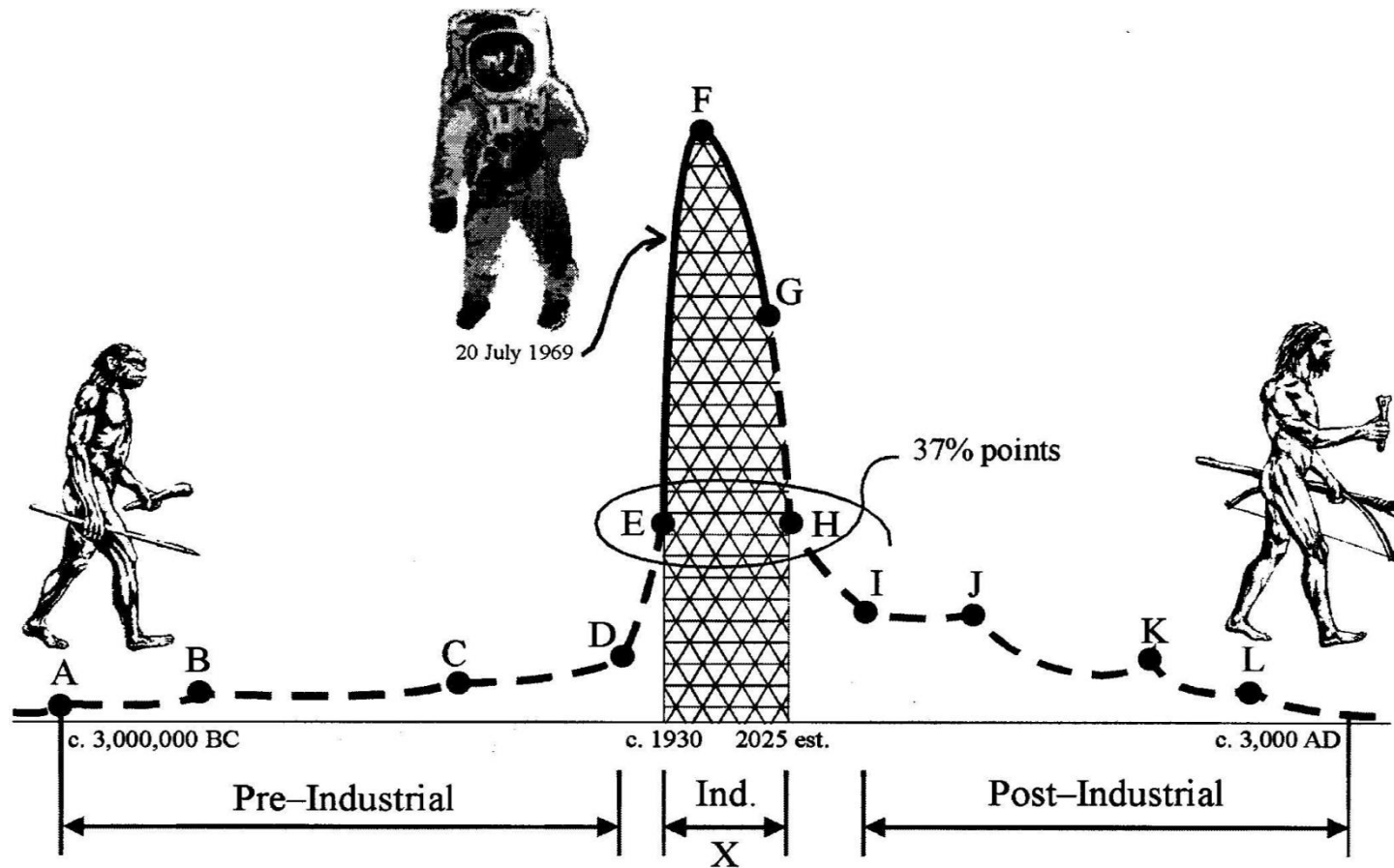
What goes up **will** come down!



Feb 2025 global population:
8.2 billion

- All species are capable of exponential growth under favourable conditions.
- Fossil-fuels are to humans as lichens were to reindeer.
- *H. sapiens* is nearing the peak of a one-off population boom-bust cycle.

'Peak oil' version of boom and bust: 'Olduvai Theory'

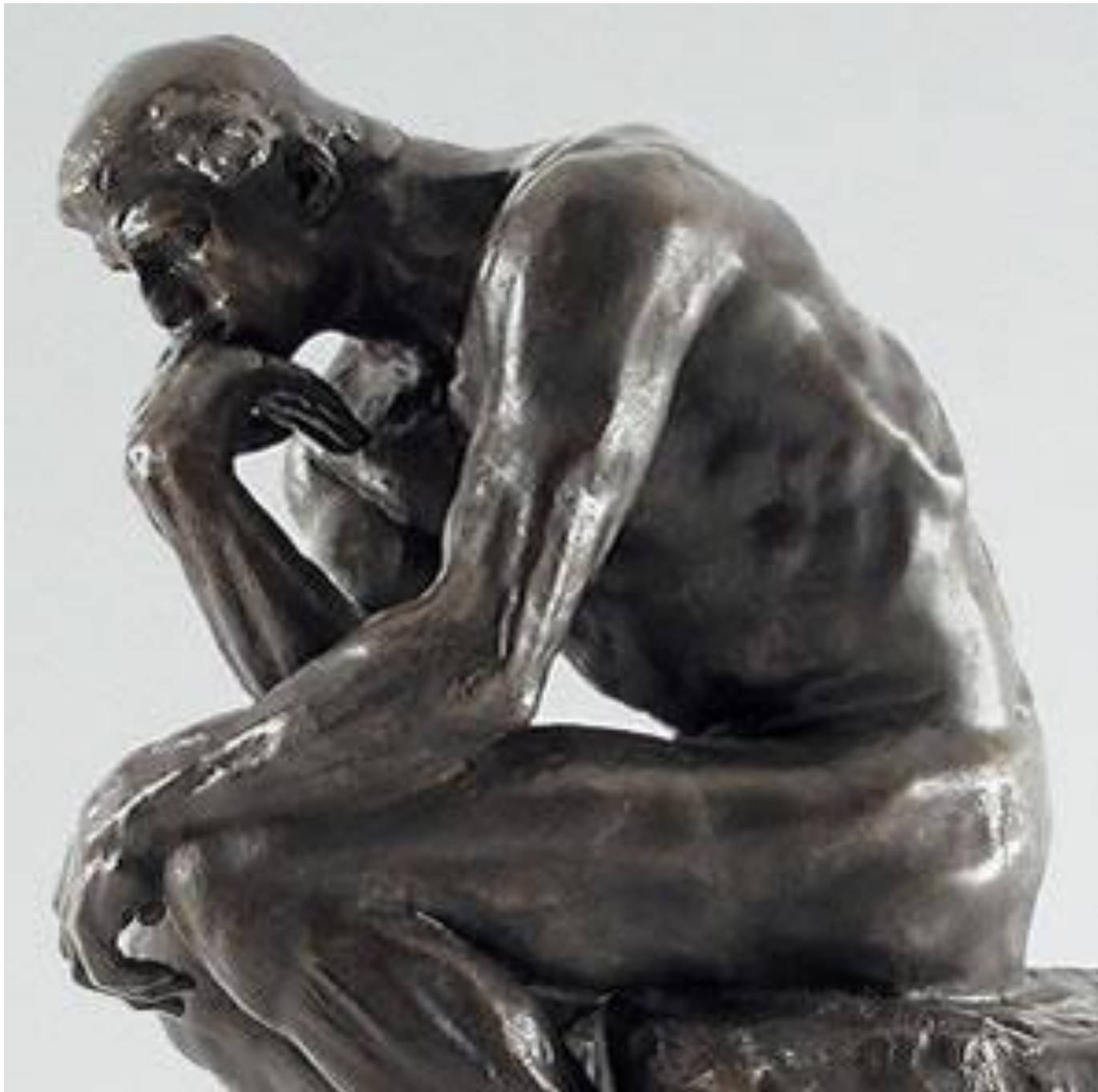


➤ Richard Duncan's outrageous proposition on the short life-expectancy of fossil-fueled society may have been a few decades premature

But wait, there's more...

Nate Hagen's *Frankly* #82 (31 Jan 25)

- “As we race towards artificial superintelligence, we face a species-level ‘Icarus moment’ - where our technological ambitions risk outstripping our collective wisdom as we fly too close to the sun.”
- “...AI could turbocharge the economic superorganism – accelerating its impact on resource extraction, ecosystem degradation, and human meaning – all while fragmenting our shared reality and concentrating power in dangerous ways.”
- How might society adapt? “Can we find ways to ‘use the devil’s tools in service of Gaia’s work’? Or are we opening a Pandora’s box that cannot be closed?”



Good question, yet we
plunge on largely
uncritical... Again:

It would seem
that “...man
today is *in flight*
from thinking.”

(Martin Heidegger, *Discourse on Thinking* [1955])

By which Heidegger meant
**philosophical, meditative,
contemplative thinking.**

Instead, we're bound up in
practical, mechanical,
manipulative thinking to
manage our day-to-day affairs..

So, why do I bother with all this?

- It's fascinating.
- At present, the socially constructed MTI cultural narrative and growth dynamic is **reinforcing** *H. sapiens* natural expansionist tendencies on a finite planet. (Not too bright!)
- I harbour a faint hope that raising to consciousness that much of our social behaviour is 'nudged' by the 'whisperings within' opens the possibility of self-awareness and asserting control.
- Recognizing the bio-origins of certain innate tendencies at least raises the (admittedly extremely remote at this stage) possibility of developing **socio-cultural overrides**.
- Keep in mind, much of so-called civilization is a set of laws, rules and social norms explicitly designed to 'override' such entirely natural behaviours as polygamy, theft, murder, etc.
- If enough people were to see the current MTI narrative 'debunked' then they might get to thinking serious about trying viable alternatives.
- **Accepting reality and knowing ourselves are the first steps toward a personal to civilizational transformation to a new way of being.**