

The Great Simplification

Nate Hagens (00:00):

Greetings. Hello everyone. I'm just back from a trip. Frank and other dogs, very happy to see me. I was at the Bioneers Conference. Found many new speakers for the podcast in the future. I wanted to quickly give my thoughts on the Geoffrey West podcast, which aired yesterday on Metabolism and the Hidden Laws of Nature. I hope everyone can watch that before they watch this, Frankly, because I would like to offer some brief summary of what Geoffrey said, and also outline seven key questions that emanate for me from thinking about humans and societal metabolism. So real briefly, Geoffrey outlined that Kleiber's law, which is that animals and ecosystems have their energy use or their metabolism scale to the three quarter power of their size, and that this also applies to humans as individual animals, and that this three quarters is called a sublinear scaling because we get more efficient as we get larger.

(01:22):

Like an elephant doesn't use 10,000 times the energy of something it's 10,000 times larger than, but something less, approximately three-quarters power or so. We also discussed that when humans meet each other and live in villages and towns and cities and countries, there is a supralinear scaling. The exponent is above one on the products and the innovation and the technology, and things like crime and patents and things like that. So the products of our social interaction, which is probably engendered by status and dopamine and drive and incentives, are something above one. But what ends up happening is if you look at the total human... Frank, you want to get down? If you look at the total human global economy, it also follows Kleiber's Law and the GDP... The energy use scales GDP to the three quarter power, which is freaking amazing that our global economy is growing, and the energy use is around the three quarter power, which actually is demonstrably true.

(02:49):

We've grown our economies at 3% a year, the last 40 years, and grown our energy at 2.1%. So for every 100 units of GDP, we need 70 new units of energy, so it tracks. Now what's even more interesting is if you look at the scaling laws of population versus energy, that exponent is around 1.4. So if population doubles, our energy use would be two times 1.4 is 2.8 times as much. So this is all a fascinating topic which underpins my work and what I think society should recognize more broadly and incorporate into our decisions. Here's seven questions I came up with based on Geoffrey West's podcast.

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(03:45):

First of all, is capitalism in service of this metabolism, this metabolic law of nature? I read this comment in the conversation with Geoffrey, and I'll reread it here because it's one of my favorite quotes. From Ronald Wright, *A Short History of Progress*, "What took place in the early 1500s was truly exceptional, something that had never happened before and never will again. Two cultural experiments running in isolation for 15,000 years or more at last came face to face. Amazingly, after all that time, each could recognize the other's institutions. When Cortés landed in Mexico, he found roads, canals, cities, palaces, schools, law courts, markets, irrigation works, kings, priests, temples, peasants, artisans, armies, astronomers, merchants, sports, theater, art, music and books. High civilization, differing in detail but alike in essentials, had evolved independently on both sides of the earth." Also, Geoffrey West had a graph that he sent me that showed over time, that unbounded growth, which means the pursuit and achievement of growth without any bounds or limits, requires an acceleration cycle of innovation to avoid collapse.

(05:29):

And one could argue that the agricultural trajectory from 12,000 years ago until 500 years ago had started to reach into those limits. And maybe capitalism and colonialism and how we organized in the face of energy surplus was what put us on one of these next curves. So my question is capitalism in service of the metabolic laws of nature? Second question, would these things happen without the presence of energy surplus? So we can't really know, tens and hundreds of thousands of years ago, the scaling laws of human settlements of the past, except that they were hunter gatherers for 99% of our history because there wasn't enough energy surplus to scale beyond nomadic tribes. So the question is, does the presence of energy surplus create the exosomatic economic social organization, or does the social organization create the incentives and the discovery and the methods to access more energy? I'm inclined to think that it's the energy surplus, the presence of energy surplus that is primary, and the other stuff flows downhill from that.

(07:04):

But I think it's an interesting question. Would a culture of educated, behaviorally stacked hominids who had a wider definition of self than our current dominant culture, would those humans construct a society of a lower metabolism? And maybe they did,

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and maybe that was the indigenous cultures, and they got outcompeted by the energy hungry amoeba. But I think it's an open question, what education and kind of a zen attitude towards life and our interconnectedness with nature, would these metabolic supralinear scalings apply to such a society? Open question. Next big question is right now, people are recognizing what carbon is doing to the atmosphere, the finiteness of fossil carbon, and so we're building a lot of renewable energy devices, solar panels, wind turbines, geothermal batteries, et cetera. So given the viewpoint of Geoffrey West and societal metabolism, are renewables part of an energy transition, or are they just kind of a protuberance on the massive amoeba that is growing. And they're not separate. They're just like a shark that grows an extra fin using that extra energy, but it doesn't change the entire goals, nor the metabolism of the entity.

(08:50):

Next question. Geoffrey and I discussed fact that cities become more efficient as they get larger. So if you extrapolate that forward, if we head towards a decentralized world, which many are advocating, doesn't this imply that... Let's say if New York City's population was evenly distributed over 5,000 smaller cities, that the environmental and resource impacts would be not only larger, but significantly larger. And so I think an open question is, given the metabolic scaling laws of nature and human systems, is decentralization from a population standpoint, is that a good thing? A sub-point there, a sub-question there would be if our economies grow globally at a sub-linear scale energy-wise, but our populations use energy at a super-linear scale, does it make sense to organize society in two different realms, like have all the production thing scaled in cities and have the population elsewhere? I don't know the answer to that. I need to think about that more.

(10:20):

Next key question, number five out of seven, recently, the Wegovy and some of these weight loss drugs are based on something called GLP1, which originally was thought to modulate gut hormones, but now it's been known that it actually is in the hindbrain and it reduces a person's craving and demand for food, for entertainment, for novelty, for gambling, for alcohol and other things. So this chemical that is being produced in the lab actually has the ability to change a human metabolism. Any of you that have tried to lose weight or live healthier lives, you can potentially change your metabolism on your own. But the key question is, what is the societal equivalent of Wegovy or

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GLP1? Is there some sort of thing, whether it's a policy or a drug or a cultural movement, that is able to do the cultural equivalent of what these weight loss drugs are doing? A speculation.

(11:41):

Question number six, in each of the transitions that humans have had so far to more innovation that put us on another curve in Geoffrey West's graph, the externalities or the impact on the biosphere was relatively small, except the next one. If we are able to jump to another curve with artificial intelligence or the like, will the waste products from our metabolism suddenly be a larger limiter on our prospects than our pool of energy availability? Because any... And I'm going to be talking more about this in the near future, that AI, if it manifests as some people are saying, it will improve in scale across all domains, which will function like a larger straw, and it will be a death now for many of the tipping points already nearly being reached or surpassed in the environment. Which brings me to the final question, which I asked Geoffrey on the podcast, is, can knowing that we have a social metabolism change our social metabolism?

(12:59):

And I think this is just an absolutely central question to the work of this podcast, to the work of the world. We are approaching... This is what I refer to as a species level conversation, is all the things that happened in the past are informing the moment we're alive now. And we are biological organisms. We're primates. We're predators. We're extremely social. Like other organisms, we have in metabolism. That metabolism has taken over and spread all over this blue-green earth. Can understanding that change our culture. So I talk about the Great Simplification. What about a great sophistication, where instead of just following simple organismic rules, we integrate our knowledge, kind of like in a Heisenberg sort of way, to alter our path forward, a species level conversation? And a subset of that is, what if a town board, or a city council, or a county commissioner truly understood the scaling trajectory of growth and what humans are doing? Would they make different decisions about their town? Would they say, "Oh my gosh, things are scaling at 1.15, superlinearly, and our energy use and environmental impact are also scaling."

(14:39):

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Maybe we should anticipate 10 or 20 years might that look like in Red Wing, Minnesota or Topeka, Kansas, or Johannesburg, South Africa, or whatever it is, and make decisions today using our cognitive mind that trump the emotional decisions of the future. So Geoffrey West is really interesting fellow, and I've learned a lot more from reading his PowerPoints in the last few days. I believe Lizzy posted one of them in the show notes of his episode. Metabolism scaling and humans is a very interesting question. I'm going to return to this and keep thinking about it. Thank you. I will talk to you next week.