Cosmic Anarchy and the Law of Increasing Complexity

Simoun Magsalin

30 July 2024

Contents

If the entire universe follows laws of natural selection, what could this mean for anarchy?

Last year, a curious paper was published in the *Proceedings of the National Academy of Sciences* by Wong et al. (2023) entitled "On the roles of function and selection in evolving systems." This team of scientists and philosophers theorized a 'law of increasing functional information' or the law of increasing complexity. The new natural law states: 'The functional information of a system will increase (i.e. the system will evolve) if many different configurations of the system undergo selection for one or more functions.' This law is proposed to be at parity with other natural laws like the laws of motion, thermodynamics, gravitational attraction, and electromagnetism.

The authors further argue that there seem to be common elements in evolving systems that constitute a natural law, to which evolution and natural selection belong. According to Wong and co-authors, evolving systems refer to a 'collective phenomenon of many interacting components that displays a temporal increase in diversity, distribution, and patterned behavior,' which includes not only life on Earth, but also abiotic ('nonliving') processes like how the atmosphere is created and maintained, how minerals form and diversify, and how stars emerge from hydrogen fusion, leading to heavier matter.

Evolving systems have three main characteristics: component diversity, configurational exploration, and selection. A system has multiple interacting units (component diversity) that spontaneously configure themselves through various processes (chemical, thermodynamic, gravitational, of course, biological) which results in multiple new configurations. These configurations are then selected based on stability, patterned behavior, or function. Through this lens, the law of increasing functional information is the law of evolution applied to all physical matter. According to this proposed law, matter in the universe can and will diversify and complexify in new configurations and these configurations will be naturally selected for depending on the viability and stability of the configuration or pattern. Of course, the paper also outlines ways by which this natural selection is interrupted through phenomena such as supernovae, planetary freezing, or mass extinction events.

Anarchists such as Peter Kropotkin and Murray Bookchin applied scientific inquiry to liberatory politics. In the same tradition, perhaps we can ask: what could the law of increasing complexity tell us about social and political life?

Cosmic Anarchy

Let us return to a story about the universe. At one point in time, there was a singularity — everything in the known universe compressed into a single point — and then it became everything we see today. A great Big Bang ordered the universe, an anarchy of energy and expansion, of space and time, of matter and antimatter. Then the stars were born, they lived, they died, and they reproduced (in that order). In the molten cores of the first suns fused the material needed for later suns, planets, and eventually, life. This whole cosmic dance is organized anarchically — if only because hierarchy and domination have no physical equivalent in the cosmos.

In reflecting on this cosmic anarchy, we can deduce a few things. First, we learn that the cosmic order of the universe tends toward greater and greater complexity. Second, we learn that this complexity is ordered spontaneously. Stars spontaneously fuse helium and heavier elements in their cores. Meanwhile, similar spontaneity constellates the stars into galaxies and forms and seeds worlds.

These two law-like generalizations — complexity and spontaneity — also order life as we know it. What is life but the self-reproduction of chemical reactions? At one point in the history of this great Earth, chemical reactions began self-reproducing spontaneously and into greater and greater complexity until it became life. This is abiogenesis.

Cosmic anarchy, then, is not merely a normative theory (i.e. what should be) but *descriptive* (i.e. what is). In its descriptive aspect, it suggests that the natural order of the cosmos is anarchic in nature, *precisely* because hierarchy and domination have no physical equivalent and that complexity and spontaneity is what prevails in the natural order of the universe.

Later on, life became sapient — humanity. For hundreds of thousands of years, humanity lived in the same cosmic anarchy where complexity and spontaneity reigned. As far as we can tell, precursor species to humanity were already social. There does not seem to have been a time that humans lived in a 'war of all against all,' like a Hobbesian 'state of nature.'

Humanity experimented widely by taking on and rejecting all kinds of social forms. They created everything from small tribes to confederations, free cities, anarchic and kingless societies. Some human societies would settle and create metropolises, only to be later abandoned when that organizational form became untenable — making it incorrect to assert that cities and urbanization somehow constitute 'more advanced' modes of organization over other (sometimes nomadic) forms. Whether as urban, pastoralist, or nomadic cultures, human societies bring with them past forms — functional information — and add it to the repertoire of current social forms in increasing complexity.

When it comes to the natural world, Murray Bookchin reminds us that humanity has the unique ability to nurture and cultivate our natural and social environments, to consciously direct the fecundity and diversity of life on the planet. In this sense, humanity is unique in the cosmic history in the universe in that we are the only known beings with the ability to consciously and actively *choose* to develop our ecological and social environs to be more fecund, diverse, and complex, to consciously direct the cosmic order towards more complex (or perhaps information-dense) forms of life and living.

Hierarchy

It was only quite recently in the some thirteen odd billion years of existence that the order of cosmic anarchy became punctuated by hierarchy, by the violent imposition of a rival order, by simplification under the command of a few. Yet it was not inevitable. Just as specific historical circumstances led to life on Earth (maybe something to do with the Moon and its tides, tectonic plates, solar energy, and raw power of lighting), specific historical circumstances led to the formation of hierarchy and its slow generalization towards the entire world.

Hierarchy may follow similar rules of complexification and diversification as it takes a variety of social forms. Some may be stateless societies with slavery, others large empires with various castes and gradients of power and privilege, still even others having a mix of egalitarian and hierarchical relations. But hierarchy and domination *remain* a rival order to the cosmic anarchic order in the universe.

Hierarchies may be able to diversify in their own way, but hierarchical and domineering forms of social organization still function to simplify rather than complexify the world. Spontaneous action might even bring about the creation of hierarchies — consider Murray Bookchin's postulation that reverence to elders might dialectically bring about gerontocracy and then later other forms of hierarchy — but once established, these hierarchies will inevitably act against spontaneity in favor of securing their own domination.

Indeed, both hierarchy and domination deprive us of the vast repertoire of social forms available to human society. Hierarchy and domination are also agents for erasure of memory, forced conversion of religion, and genocide that actively simplify the world in defiance of the natural tendency towards complexification. In this sense, hierarchy simplifies the world and destroys various functional information created in the vast diversity of human society and the natural world. We need only to remember how the Spanish conquistadors burned the vast libraries of Mesoamerica, their forced conversions of conquered peoples, and the mass death they brought to the colonized. Not merely content with genocide, hierarchy also actively destroys the functional information of the natural world through ecocide — mass death of another level.

Entropy

Despite the rival order of suffering and simplification brought about by hierarchy, there is another law-like generalization of the universe, of cosmic anarchy: entropy and decay. A star reaches its breaking point and goes supernova, thereby releasing its matter into the universe, birthing new stars, and ultimately birthing life as we know it — are we not stardust? Just in the same way a tree falls in the forest; it dies, it rots, it is consumed by fungi and bacteria, and then the decay gives birth to new life. Here we see entropy spontaneously giving way to complexity, and the cycle continues anew. This is not to say that entropy is a normative value — again, it is merely a description — it merely *is,* and forms part of, the anarchic order of the cosmos.

What entropy ultimately suggests is that hierarchy was not always here and will not always be here. Hierarchy is untenable in the long term. Great empires descended into ruin in the Bronze Age Collapse, the Roman Empire fell, and the great Chinese empires stagnated and dissipated. Even our current world order has an ending that everyone today is aware of: the threat of humanity-wide collapse due to the climate crisis. The question being is if we control and complement the entropy and survive it, or if it all comes crashing down around us.

In the historical experiences of imperial decay, humanity finds and creates new niches and ultimately creates new functional information, like how the death of empires can give birth to republics. Some forms of functional information, like the Roman industry of creating garum, was historically contingent on certain forms of human organization and would fall apart under different contingencies. Hierarchy makes possible certain technologies of power that would otherwise be impossible. Roman nobility would eat nightingale's tongues as a delicacy, a dish unthinkable to create today. Or perhaps, industrial society today makes possible nuclear energy or vast fossil fuel extraction, feats impossible under earlier forms of human organization.

But the decay of hierarchy would make possible other free social forms that would otherwise be impossible under hierarchy, like communism. We will lose some functional information from hierarchical modes of living, many of which will not be missed. After all, what possible nostalgia could emerge from the loss of the functional information of insurance and stock markets? Humanity only stands to gain new functional information from its decay, much like how death and decay can lead to new life in complement — rather than in conflict — with the cosmic order.

The ultimate destiny of the universe is where the complexity and spontaneity of all this develops and decays to a point where the universe dies in heat death, unable to further complexify and only decay. Such is also the ultimate fate of hierarchy: it will morph, transform (sometimes spontaneously), *but it will decay*. The natural order of cosmic anarchy *will resume*. Whether humanity will live to see it is another question altogether.

Sapience

So what now? Humanity is, as far as we know, unique in all of existence in having been endowed with sapience. We are creatures of the universe with the ability to be conscious of our existence in the universe. If, as Murray Bookchin reminds us, 'humanity is nature rendered self-conscious,' we can perhaps also say that *humanity is the universe rendered self-conscious*.

When colonizers reached the so-called Americas, they found a land of unparalleled bounty. They were unaware that the complexity and fecundity of the land's bounty did not exist just as it was, but was actively, spontaneously, and intentionally nurtured and cultivated by a keystone species: humanity. In many parts of the world today, Indigenous peoples continue to fill the keystone ecological niche vital to the continuing complexity of the ecosystems they belong to. This is the greatest blessing of humanity: that we are endowed with the ability to consciously enrich the complexity of the universe.

We, as humanity, have the ability to nurture and cultivate the spontaneity and complexity of the universe, to direct decay towards further spontaneity and complexity, to fully realize the order of cosmic anarchy. This is then the normative aspect of cosmic anarchy: that humanity can once again choose to act not only in a complimentary manner to the cosmic anarchic order of the universe, but also to *enhance* it and consciously complexify the universe by adding novel functional information into the overall system.

However, like how environmental circumstances can limit the generation of new configurations in the law of increasing complexity, humanity actively limits the generation of new configurations through mass violence on ecology and on humanity itself. Humanity is rapidly decaying the world, decomplexifying it into monotones, monocrops, monocultures, and monotheisms. Genocides simplify the world. Like how a monocrop decomplexifies an ecosystem, conquests and forced conversions have made the world more progressively uniform over the multiplicity of human culture and spirituality. It was the 'end of history,' as some have claimed, as we transitioned into one (homogenous) kind of social form of organization with 'liberal-democratic' capitalism.

Species-Choice

There is only one cosmic inevitability in this universe and it is decay.

We are now faced with a choice: either we use our sapience to enrich the natural world and restore the balance of cosmic and social anarchy, or it shall be imposed upon us by the order of the universe. As many have suggested within the degrowth movement, the end of growth (read: domination) is inevitable; it is merely our collective species-choice if it is controlled degrowth or full collapse. Indeed, it is a choice before us as a species if we can complement nature's tendency towards complexity or continue to act against it at our collective peril.

If the order of cosmic anarchy is imposed upon us through the unsustainability of hierarchy and domination, all that we recognize of this beautiful world will be gone in self-destruction, and life and the universe will continue on without us. Without us, the universe would lose its self-awareness.

The choice has always been, as Murray Bookchin presciently noted, anarchy or annihilation.

Author's Note

This essay was first drafted before "On the roles of function and selection in evolving systems" was published. It was first drafted with key insights and lessons learned from both anthropology and dialectical naturalism from thinkers like Peter Kropotkin, David Graeber, and Murray Bookchin. Peter Kropotkin, and Élisée Reclus, grounded their anarchism in a tradition of scientific inquiry, or the grounding of radical politics in the sciences. Kropotkin, for example, connected his observations of mutual aid among animals and humans to the theory of evolution. In this sense, we can think of the story of cosmic anarchy and the choices before us as being likewise informed by the new sciences of today, particularly by this proposed law of increasing complexity.

Special thanks as well to Samuel and Søren for reviewing and suggesting expansions to this text!

Simoun Magsalin
Cosmic Anarchy and the Law of Increasing Complexity
30 July 2024