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The Syntropocene

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Abstract. This text gives an overview of the theoretical and historical developments of the theory of syntropy, in the context of an increasingly modernising 'Anthropocene'. This approach follows what the French philosopher Bernard Stiegler called "neganthropology" – a variant of anthropology concerned with the study of syntropy (Stiegler, 2018). Syntropy is here understood as a converging tendency that opposes entropy. Stiegler argued that the Anthropocene should more adequately be called the *Entropocene* (Stiegler, 2017). In one of his last books, *The Neganthropocene*, Stiegler imagines an Anthropocene permeated by syntropy, in which the flow of entropy is reversed.

Introduction

Towards the end of *Tristes Tropiques*, the French anthropologist Claude Lévi-Strauss famously argued that the system of civilization was becoming increasingly permeated by entropy. For Levi-Strauss, it was no longer sufficient to study civilization through anthropology, the study of human beings. "*Entropology,* not anthropology", was to be the term for a new discipline that woud concern itself with the implications of entropy, which he understood as a "process of disintegration in its most highly evolved forms" (Levi-Strauss, 1955).

Entropy is a diverging tendency, from the Greek words *en-* 'apart' and *tropos*, 'tendency' (di Corpo, 2014). As a process of disintegration, it dissolves structure, and goes toward disorder, chaos, and death. In information theory, a system with increasing entropy goes toward higher information: its 'noise' increases and is expressed as heat. According to the second law of thermodynamics, entropy tends to increase in a given system; this accumulation of entropy leads to the theorized "heat death of the universe". Although the theory of entropy originates in the natural sciences to describe abstract, rather than social systems, the processes of climate warming and biological degradation that are emerging in the Anthropocene are closely related to entropy. In *Tristes Tropiques,* Lévi-Strauss writes:

> "Taken as a whole, therefore, civilization can be described as a prodigiously complicated mechanism: tempting as it would be to regard it as our universe's best hope of survival, its true function is to produce what physicists call entropy: inertia, that is to say." (Lévi-Strauss, 1955)

If Levi-Strauss established the term *Entropology* to replace anthropology, the term 'Anthopocene' itself was reconsidered by the French philosopher Bernard Stiegler. In *Escaping the Anthropocene*, Stiegler (2017) coined the 'Entropocene' to describe an age of increasing entropy. Similar to Lévi-Strauss, he imagined the age of entropy, the Entropocene, as an age characterized by ever-accelerating geo-social issues: "The Anthropocene is an 'Entropocene', that is, a period in which entropy is produced on a massive scale".

In one of his last works, titled *The Neganthropocene*, Stiegler imagines a hypothetical age of *syntropy* in which entropy is reversed. The role of *neganthropology*, for Stiegler, is to develop syntropic techniques of resistance, which for Stiegler represent techniques to reverse the destructive entropy of our current age. For Stiegler, the Anthropocene is unsustainable in an environmental sense, "the question and the challenge of the Anthropocene is therefore the 'Neganthropocene'" (Stiegler, 2017). Syntropy, then, taken as a concept representing the flourishing of biological life through a constant struggle against entropy, is of key importance in the fields of ecology and sustainability.

1. History of Entropy & Syntropy

The theory of *entropy* originated in the field of thermodynamics in 1850, when the German physicist Rudolf Clausius proposed the second law of thermodynamics (Wu et al., 2020), which he later defined as "the principle of entropy increase". Lynes (2019) defines entropy as "the tendency of all closed systems toward greater disorder". Entropy, as a measure of disorder, gives an observer information on how close a system is to thermodynamic equilibrium, which on a cosmological scale is imagined as "heat death".

The German physicist Erwin Schrödinger, best known for his contributions to quantum physics, was the first to propose the concept of *syntropy* in relation to entropy. In his 1944 "What is Life?", Schrödinger defined the "negative entropy" of living organisms, "whose survival depends on temporarily and locally drawing order from their environment through metabolic processes" (Lynes, 2019). If entropy is the measure of disorder, "entropy with negative sign is a measure of *order.*" (Schrödinger, 1944). As Irwin and White (2021) put it: "Negentropy captures stray energy and reconverts it into order. The best example is photosynthesis, which captures the entropic sun's energy and converts it into plant material. Indigenous culture is renowned for its negentropic orientation". The term "negative entropy" underwent linguistic transformations, first to "negentropy" by the physicist Léon Brillouin, then to "syntropy" by the Italian mathematician Luigi Fantappiè.

Syntropy establishes itself as life-drive, in opposition to entropic death-drive. However, there exists an intellectual canon that understands syntropy as an ephemeral phenomenon, arising out of entropic chaos and going back to it. This idea begins with Lévi-Strauss, who wrote that the world would both begin and end without the human. He conceived of human history as a "transient efflorescence". (Lévi-Strauss, *Tristes Tropiques*)."Life in general, as 'negative entropy,' that is, as negentropy, is always produced *from* entropy, and invariably leads back there: it is a detour – as was said by Freud in *Beyond the Pleasure Principle* and by Blanchot in *The Infinite Conversation*" (Lynes, 2019).

Although the debate surrounding entropy and syntropy originated in thermodynamics, it was translated to various other disciplines such as information theory and philosophy. Bernard Stiegler applied the entropy/syntropy model to the Anthropocene. In this context, entropy and syntropy seize to be confined to the natural sciences and come to represent struggles and possible solutions to the Anthropocene, which by virtue of capitalist industrialization, big data, accelerationism, extractivism, and climate change increasingly appears as an entropic storm.

Lévi-Strauss imagined humans as "the most effective means of accelerating entropic disintegration toward its final inertia and general chaos". Stiegler, in the Neganthropocene, decidedly opposed this notion. For him, Lévi-Strauss had been overly pessimistic in his analysis, having overgone the regenerative potential of negentropy. Stiegler proposed *neganthropology* in opposition to Lévi-Strauss' entropology. If entropology studied the "process of disintegration in its most highly evolved forms", neganthropology may be conceptualized as the study of the process of *integration* in its most highly evolved forms – the process of syntropy.

2. Entropy and Death-Drive

> "F*or what is it to die but to stand naked in the wind and to melt into the sun?"* (Kahlil Gibran, *The Prophet*)

The second law of thermodynamics states that entropy, as measure of disorder or chaos, increases over time, eventually leading to heat-death. *Syntropy*, then, is the struggle of life against heat death:

> "Entropy is always associated with an increasing level of disorder. Nevertheless, Life defies entropy. Life becomes more complex over time, through growth and reproduction, turning more of the physical universe from disordered atoms into very highly ordered molecules. Living systems evolve towards order, towards higher forms of organization, diversification and complexity, and can keep away from heat death." (di Corpo, 2014, p. 3)

For the German-Korean philosopher Byung-Chul Han, the capitalist modus operandi is in its essence positivist, and rids itself of any associations with death or finality (Han, 2020). In its blindness toward the Freudian death-drive, capital counts, evaluates, and quantifies. Felwine Sarr calls this the *Quantophrenic bias* of the West (Sarr, 2020).

In the process of quantification, information is produced, and a system with higher information goes toward higher entropy. For Baudrillard, the act of 'discovering' something always implies violence towards it. When an object is discovered, it dies: "In order for ethnology to live, its object must die; by dying, the object takes its revenge for being "discovered" and with its death defies the science that wants to grasp it" (Baudrillard, 1994).

3. Syntropy and Life-drive

> "*You would know the secret of death. But how shall you find it unless you seek it in the heart of life?*" (Kahlil Gibran, *The Prophet*)

In the 1950s, the Belgian thermodynamicist Ilya Prigogine developed the idea that there could be perturbations of physical systems that are unpredictable, and that could move the system to a more ordered state: this would indicate a direct violation of the second law of thermodynamics. While entropy signifies the tendency toward chaos and death, *syntropy* signifies a converging tendency towards order, structure, and complexity. For Schrödinger, syntropy was closely related to the phenomenon of life; similarly, for Stiegler, "the relation entropy/negentropy is really the question of life par excellence" (Stiegler, 2018).

A fundamental question remains whether or not entropy can be reversed. Following Irwin & White (2021), "returning the mixed complex state to its original is statistically unlikely". However, a "mixed complex state" may behave differently in a closed system without external input, and in a complex open system such as the Anthropocene, in which there exists a constant influx and outflux of energy. Stiegler points out that negative entropy ought more precisely be referred to as antientropy: "There can be no negative entropy: entropy irreversibly increases, whereas negative entropy would imply a reversibility that Carnot, Clausius and Boltzmann all rejected" (Stiegler, 2018, p. 305).

Since its advent in physics, syntropy has remaind a contested hypothesis, mainly because it implies a 'backward-solution in time', in which the future retroacts on the past. The backward-solution in time goes against the conventional view of time as an entropic arrow moving forward (di Corpo, 2014). In the foreword to the I Ching, C.G. Jung writes: "Entropy is closely related to causality: Our science, however, is based upon the principle of causality (...) The axioms of causality are being shaken to their foundations by modern physics" (Jung, 2011). Despite these significant developments, 'science', for Jung, limits itself to the principles of causality and may remain incompatible with the idea of time flowing backwards. If entropy is closely related to causality, syntropy is closely related to retrocausality. Retrocausality, in turn, breaks the linearity of time, which is not compatible with a sociopolitical system founded on linear, capitalist development.

In reaction to the 'incompleteness' of causal and entropic theorems, Ulisse di Corpo (2014) adds to the laws of thermodynamics the law of syntropy: "In a converging universe, energy is constantly absorbed from the environment. Syntropy is the magnitude by which we measure the concentration of energy." (di Corpo, 2014, p. 7). However, this law may not be bound to thermodynamics, as it contradicts its main theorems. The study of syntropy may more accurately be identified within the new and vastly unexplored field of "cryodynamics" (Rössler, 2011).

4. Stiegler's Neganthropocene

In one of his last works, titled *The Neganthropocene*, Bernard Stiegler imagines an age of syntropy that could replace the Entropocene:

> "The question and challenge of the Anthropocene is therefore the 'Neganthropocene', that is, to find a pathway that will enable us to escape from this impasse of cosmic dimensions – which requires the elaboration of a new speculative cosmology in the wake of Whitehead." (Stiegler, 2018).

When the anthropologist Chagnon visited the Yanomami tribe, they added a new word to their vocabulary: "*Anthro*". But rather than signifying "human", as it does in 'Anthropocene', it meant the following: "A powerful, non-human being, a God become wild". After his visit, Chagnon was banned from ever again entering Yanomami land" (Bregman, 2020, my translation). The perspective of the Yanomami demonstrates how the Anthropocene, the age of humans, is only intrinsically 'human' within its own linguistic system. Once considered from an outside perspective, the human, *Anthro*, is non-human. In his entropic conquest for the domination of nature, the human behaves like a 'God become wild', lashing out against its own environment. If the Anthropocene can be called the Entropocene, a coherent term to replace *Anthropos* could be *Entropos* – a model of a human fully immersed in destructive entropy.

In the foreword to *The Neganthropocene*, Daniel Ross contextualizes Stiegler's work within the "eschatological questions that arise when a system reaches its limits". Citing from Spengler's *Decline of the West*: "What the myth of Götterdämmerung signified of old, the irreligious form of it, the theory of Entropy, signifies today – world's end as completion of an inwardly necessary evolution." (Spengler, 1918). The theory of entropy appears to be surrounded with fin de siècle sentiment. In *Tristes Tropiques,* Claude Levi-Strauss writes: "The world will begin without the human race and it will end without it" (Lévi-Strauss, 1955, p. 397). Entropy becomes an apocalyptic prophecy – this time, it is not the twilight of the Gods, but the twilight of the human race in the face of certain heat death.

Against this, it could be argued that entropy, not syntropy, is a detour. In this scenario, a syntropic phase would be interrupted by an entropic phase, a passing afflorescence, that would lead back to a syntropic phase. The result is the same: Within each system, there is a stage of "recovery" between two periods, which allow the system to live on. Is it the winter that allows the summer to return, or is it the summer that allows the winter to return? It depends the perspective we take.

5. Unity of Entropy and Syntropy

It becomes clear, then, that the relationship between entropy and syntropy is dialectical, that one cannot exist without the other. As Wu et al. (2020) write, "Entropy and negative entropy are two concepts that correspond to each other with opposite meanings. However, if we study them further, then we will see that the two concepts have the same meaning and mutually formulated properties".

In G.W.F. Hegel's philosophy, "life is substantial unity, undivided totality. All lines separating spheres or zones of living unity are artificial, mechanical, coercive. They tear asunder what belongs together and rend the unity of life." (Kroner, 2011). For Hegel, history develops toward the full development of spirit, or *Geist*. It unfolds in dialectical process towards greater freedom of spirit. If history resembles a plant, the end of history is its highest expression, its fruit: "Das höchste Außersichkommen, das vorherbestimmte Ende ist die Frucht." (Hegel, 1971).

For the Romantic poet and philosopher F. W. J. Schelling, Hegel's contemporary, "nature was not a mechanical process in which dead atoms are pushing and pushed by creative and divine power, but a stream of life, organizing itself and enlivening all things." (Kroner, 2011). Schellings idea of a stream of organized life against a mechanical and atomized universe calls into mind the theory of syntropy.

Conclusion

For Lévi-Strauss, the syntropic emergence of life is but a temporary efflorescence that will eventually return to entropic chaos. Others, including Stiegler, have emphasized the need for syntropy in spite of its statistical improbability. The question at the core of this debate concerns sustainability: will we be able to implement syntropic systems in an age of accelerating entropy? Will we be able to protect the syntropic systems already in place? It is becoming increasingly clear that the only sustainable future is a syntropic future. For this reason, the study of cryodynamics must be pursued in greater depth.

Kawase Hasui, 1931

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