

entropy

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The way I understand it, entropy is conceptualized as that process whereby any system will automatically and incessantly move from a condition of order to a condition of disorder. This can be paraphrased by the Second Law of Thermodynamics: Energy is always running down, moving to a state of thermodynamic equilibrium; natural processes always move in the direction of an increase of disorder (entropy). This can be experienced readily when one cleans and organizes a room. Once finished and in a maximum state of order, things soon fall apart. Within days the place could be a complete mess: entropy has prevailed. The physical scientists would have us believe that the universe is in the same predicament: it is running down, inevitably moving to a state of complete disorder (entropy), as if moving in a linear direction toward randomness and exhaustion. But I don't trust physical scientists too much; they fail to look at Life! By their definition, we could assume that *the most* ordered time would have been at the very beginning of the universe – yet their theories also claim that the universe began in a Big Bang, a giant explosion. What could be more chaotic?

The way I understand it, *negentropy* is conceptualized as that process moving contrary to entropy; it would seem to characterize Life itself. As Schroedinger says, "Life is the paradoxical contradiction to the Second Law." However, being obstinate, a life-centered scientist might claim, "Entropy is the paradoxical contradiction to the First Law: *Life exists!*" Life is always moving away from randomness and disorder, forever increasing ordered complexity and diversity. With Life, negentropy prevails.

Based on the heritage of a mechanistic mindset, we are coerced to believe that Life is an anomaly in an otherwise lifeless universe. Life is a random mutation, a highly improbable coincidence. That would seem to be a one-sided, self-effacing, life-denying position; for, *Life exists!* And it happens spontaneously when the properly ordered (negentropic) conditions are present. Aren't new stars being born from out of the firmament all the time?

Any discussion of Life on Earth must begin with the Sun. To promote semantic confusion, the process could be described as thus: The Sun, a highly negentropic condition of concentrated energy, is producing tremendous entropy in the form of radiated heat and light. Gaia consumes this entropic (degraded) energy and by

negentropic processes maintains a highly improbable biosphere of ordered chemical constituents. Within the biosphere, chloroplasts are absorbing this degraded (entropic) energy and by negentropy are ordering themselves so as to produce carbohydrates, expelling entropic oxygen. Human beings absorb this entropic byproduct and proceed to assimilate and order information, a highly negentropic activity. Human beings also absorb the highly ordered, living plant material and process it to produce entropic (more disorganized) waste material, feces, as well as entropic heat and CO₂. This highly entropic material is then consumed by bacteria to be broken down into essential constituents to be reintroduced into the negentropic cycle; and the process continues on and on with the absorption of still more solar radiation.

This discussion may offer a glimpse into how the system works; yet I'm not any fully closer to understanding exactly what entropy is, much less negentropy. It seems to be a relative affair: What is entropic material at one level of the cycle becomes usable energy (negentropic potential) at another level. We could say that the original concentrated energy produced by the Sun was eventually degraded into a scattering of a few material compounds – yet how many new stars burst into being while we were attempting to clarify this process? This is the fundamental question: What is the process whereby a few material compounds, compressed by gravity, spontaneously burst into being as a new star, thus initiating a whole new grand life-cycle? This process is obviously highly negentropic: the spontaneous appearance of concentrated order from out of an amorphous background. This must be an insight into the essence and miracle of Life. As Village Designers, we can attempt to recreate this process on a human scale by purposely organizing highly negentropic, ordered conditions in our environment, wherein fresh new life may have a chance to manifest *itself*, spontaneously, of its own accord.

In conclusion, it seems apparent that the entropy/negentropy dichotomy are relative conditions within an overall larger cycle – one momentum leads to Death; the other to Life. Entropy needs negentropy just as negentropy can only be defined in terms of entropy. What is one without the other? Would we recognize beauty if there was no ugliness?

Life is not an anomaly: *Life exists!* And it appears spontaneously when the proper ordered conditions are present. Ironically, Life needs negentropy *and* entropy. Life is necessarily limited and selected by entropy and Life grows and evolves through negentropy. Above all, *Life* is the reference point. The fundamental fact is, once again, *Life exists!* The fundamental question is, “What are the conditions whereby Life

spontaneously comes into being?” And how can we prepare to design for these conditions?

The entropy/negentropy debate is a dilemma for *Homo sapiens* simply because they are so effective at rapidly *increasing the rate* of entropy, ignorantly depleting all the stored, free, available energy in a system as fast as they can. Left to its own, the biosphere experiences both entropy and negentropy in a balanced state, using negentropy (order) to store free energy to sustain and enhance the system and entropy (disorder) to recycle components. With the interference of *Homo sapiens*, that store of free energy is rapidly depleted, upsetting the balance and thus accelerating entropy (death). It is ironic that, left to its own, the biosphere could continue almost indefinitely, until such time as a *surplus* of free energy radiated by an *expanding* Sun makes conditions inhospitable for carbon-based Life. At that time, inevitably, the proper conditions will appear somewhere else in the universe, and Life will spontaneously appear anew. Life is the reference point.

As with so many other issues, I take refuge in the simple and effective Taoist life-view: both phases of the cycle are necessary.