

The essence of modern technology and the essence of life:—same

To “Who is Nietzsche’s Zarathustra?” Heidegger appends a note in which he asks rhetorically, *Was ist das Wesen der modernen Kraftmaschine anderes als eine Ausformung der ewigen Wiederkehr des Gleichen?*¹ “What else is the essence of modern electrical machines than a form of the eternal recurrence of the same?”² (Krell opines that “Heidegger’s introduction of the Adamsian dynamo as an exemplar of eternal recurrence is nothing if not an embarrassment.”³) Heidegger says in the passage that rather than seeing eternal recurrence as *eine phantastische Mystik* “a look at the present age might well teach us a different lesson—presupposing of course that thinking is called upon to bring to light the essence of modern technology. . . . But the essence of such machines is neither something machine-like nor anything mechanical.”⁴ Whether *Kraftmaschine* is taken as ‘dynamo’ or as ‘power tool’ its *kinetic* essence is ‘rotor.’

‘Circling’ in Heidegger’s thought has positive or negative valence depending on how it’s getting done. ‘Circling,’ in his lecture ‘The Thing,’ is the worlding of world. Per his favored practice a clutch of down-home merisms conveys the positive, *heimlich*, valence of worlding:

“Whatever becomes a thing, it takes place from out of the circling of the mirror-play of the world [*aus dem Gering des Spiegel-Spiel der Welt*]. Only when, presumably suddenly, the world worlds as world does the ring shine forth [*erglänzt der Ring*] and ringingly releases the circling [*das Gering*] of earth and sky, divinities and mortals, into the nimbleness of its single fold [*in das Ringe seiner Einfalt entringt*]. In accordance with this circling, the thinging itself is slight and the thing that each time abides is nimble, inconspicuously pliant in its essence. The thing is nimble [*Ring ist das Ding*]: jug and bench, footbridge and plow. But a thing is also, after its manner, tree and pond, stream and mountain. Things are, each abiding thing-like in its way, heron and deer, horse and bull. Things are each abiding thing-like after their manner, mirror and clasp, book and picture, crown and cross.”⁵

¹ Martin Heidegger, *Wer ist Nietzsches Zarathustra?*, *Gesamtausgabe Band 7*: 124:

<https://www.beyng.com/gaselis/?vol=7&pg=124> .

² Joan Stambaugh’s translation in *The Finitude of Being* (1992) 86.

³ David Farrell Krell, “Analysis” in Martin Heidegger, *Nietzsche, Volume II: The Eternal Recurrence of the Same* (tr. David Farrell Krell 1984) 258. Krell translates, “What else is the essence of the modern power-driven machine than one offshoot of the eternal recurrence of the same?” 233.

⁴ *Nietzsche, Volume II* 233; GA 7:124.

⁵ Martin Heidegger, “The Thing” in *Bremen and Freiburg Lectures: Insight Into That Which Is and Basic Principles of Thinking* (tr. Andrew J. Mitchell 2012) 20; GA 79: 21: <https://www.beyng.com/gaselis/?vol=79&pg=21> .

In contrast to the Fourfold's mirror-playing ring-dance (*Reigen*) requisitioning, *Bestellen*, the effector organ of *das Ge-Stell*, has all the pastoral charm of a gas-powered hay-baler.

“The chain of requisitioning does not run out to anything; rather it only enters into its circuit [*Kreisgang*]. . . . The circuit of ordering takes place in positionality and as positionality [*Der Kreisgang des Bestellens ereignet sich im Ge-Stell und als das Ge-Stell*]. In positionality the presencing of all that presences becomes standing reserve [*Bestand*]. Positionality constantly draws what is orderable into the circuit of requisitioning [*Kreisgang des Bestellens*], establishes it therein, and thus assigns it as something constant in the standing reserve. The assignment does not place what is constant outside of the circuit of positioning [*Kreisgang des Stellens*]. It only assigns it, but off and away into a subsequent orderability, i.e., back and forth [*hinein und zurück*] into a requisitioning [*in das Bestellen*].”⁶

On one interpretation Heidegger is here describing a generic hypercycle.⁷ In Smith and Szathmáry's description of hypercycle,

“There are several kinds of replicator, A, B, C, and D. The rate of replication of each kind is an increasing function of the concentration of the replicator immediately preceding it in the cycle. Thus the rate of replication of B increases with the concentration of A, and so on round the cycle: the cycle is closed, because the rate of replication of A increases with the concentration of D. . . . the system may seem very abstract, but in fact ecosystems are full of hypercycles. . . . Algae, *Daphnia*, and sticklebacks are all replicators. The rate of replication of *Daphnia* increases with the concentration of algae, and of sticklebacks with the number of *Daphnia*. The cycle is closed because fish excrete into the water nitrogenous compounds which accelerate the growth of algae.”⁸

Heidegger's discussion of ‘the piece,’ *das Stück*, is a dig at ‘the American system of manufacturing,’ whose distinctive feature is the interchangeable part.⁹ Heidegger writes,

⁶ “Positionality” in *id.* 28, 31; GA 79: 29, 32.

⁷ For history of the concept see N. Szostak, S. Wasik, and J. Blazewicz, “Hypercycle,” *PLoS Computational Biology* April 7, 2016: <https://doi.org/10.1371/journal.pcbi.1004853> .

⁸ John Maynard Smith and Eörs Szathmáry, *The Origins of Life: From the birth of life to the origin of language* (1999) 48-49.

⁹ “We find that during the first half of the nineteenth century there emerged patterns of producing (and marketing) manufactured goods that by the 1850's had become widely known abroad as the ‘American system of manufacturing.’ Centering in southern New England and in the light metalworking industries, notably in firearms, clocks, watches, locks, and tools of various kinds, and then spreading into neighboring states and a broadening range of industries, there came into being the basic elements and patterns of modern mass manufacturing; that is, the principles and practice of quantity manufacture of standardized products characterized by interchangeable parts and the use of a growing array of machine tools and specialized jigs and fixtures, along with power, to substitute simplified and, as far as possible, mechanized operations for the craftsman's art.” John E. Sawyer, “The Social Basis of the American System of Manufacturing,” 14 *The Journal of Economic History* 361, 369 (1954).

“The pieces of the standing reserve are piece-for-piece equivalent. Their character as pieces demands this uniformity. As equivalent the pieces are isolated against one another in the extreme; just in this way they heighten and secure their character as pieces. The uniformity of the pieces provides that one piece can be exchanged for the other without further ado, i.e., is in place for this, and thus stands at the ready. One piece of standing reserve is replaceable by another. The piece as piece is already imposed upon for replaceability. Piece of standing reserve means: that which is isolated, as a piece, is interchangeably confined within a requisitioning.”¹⁰

Life’s capacity for ‘unlimited heredity,’ in the phrase of Szathmáry and Smith, depends upon just such modularity of the genetic structure.¹¹ In turn the “biotechnological revolution” initiated by development of the CRISPR technique springs from the exchangeability of pieces of that genetic structure.¹² CRISPR enables repair of ‘defects in the code’ by, e.g., removal of the defective part and replacement of it with a non-defective version;¹³ i.e., “one piece can be exchanged for another without further ado.”

As for standing reserve Heidegger claims that

“In the world era of technology [*Weltalter der Technik*], nature belongs in advance in the standing reserve of the orderable within positionality. . . . Due to the essence of technology, nature, which to all appearances stands over and against technology, is already inserted into the standing reserve of positionality as the fundamental standing reserve. . . . the essence of modern technology, positionality, in accordance with its essence, began with the fundamental act of requisitioning insofar as it first secured nature in advance as the fundamental standing reserve.”¹⁴

¹⁰ “Positionality” 35; GA 79: 36-37.

¹¹ “A second distinction between kinds of hereditary mechanisms is that between modular and holistic heredity. Heredity based on DNA is modular. A DNA molecule consists of many ‘modules’ (base pairs). If any one of these is changed, and the rest left unaltered, then the descendant molecules are changed just in that one module. In contrast, alternative autocatalytic cycles are an example of limited heredity, and they are holistic. There are no parts that can be changed without changing the whole replicating system. . . . We believe it to be true that all systems of unlimited heredity will turn out to be modular. The statement is true not only of the genetic system based on DNA but also of the only other natural system of unlimited heredity known to us, human language.” *The Origins of Life* 8, 9.

¹² Lukas Westermann, Björn Neubauer, and Michael Köttgen, “Nobel Prize 2020 in Chemistry honors CRISPR: a tool for rewriting the code of life,” 473 *Pflugers Archiv* 1, 2 (2021): <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC7782372/#:~:text=Emmanuelle%20Charpentier%20and%20Jennifer%20Doudna,a%20method%20to%20edit%20DNA>.

¹³ Katherine E. Uyhazi and Jean Bennett, “A CRISPR view of the 2020 Nobel Prize in Chemistry,” *The Journal of Clinical Investigation* (2020): <https://www.jci.org/articles/view/145214>.

¹⁴ “Positionality” 39, 40; GA 79: 42, 43.

This “fundamental act of requisitioning” was accomplished long ago by the first cell. Already in the earliest prokaryotes we find archaic requisitioning into standing reserve as the solution to biochemistry’s ‘horizon’ problem. Reactants have to be contiguous in order to react with each other; to take a eukaryotic example, yeast can’t make beer from sugar that’s in the next room.¹⁵ Sterling tells the origin story this way:

“the first cell needed a membrane to sequester [‘bring into the *Nähe*’] its chemical reactants. But construction of the membrane, a lipid-protein bilayer, required the products of its reactants. The cell needed to import small molecules, like sugars for fuel and amino acids to make proteins. However, importing those molecules required transporters in the membrane to move them from the outside into the cytoplasm, and those transporters are protein. The cell required a power plant to combust the sugars for energy to synthesize the proteins, but that process too required proteins. Nevertheless, after much trial and error over two billion years to accumulate and embody information from many improbable events, there were tiny cells, about 3 micrometers across. These *prokaryotes* were enclosed by a hydrophobic membrane, as thick as a single protein, that could sequester molecules and ions.”¹⁶

We might say sequestration by membrane formed the primordial *Da*. Anyway at this short distance, 3 micrometers,

“reactants mix rapidly by random molecular motion—*thermal noise*. . . . continual, no-cost agitation sends every loose molecule on a random walk, and the aggregate of random walks constitutes *diffusion*, a spreading out of molecules. Thermal diffusion thus accelerates the rate at which reactants

¹⁵ So apparent exceptions to the ‘no telekinesis’ rule are cherished anomalies until explained. E.g.: “Besides its exquisite sensitivity to touch—*Phycomyces* preferentially grows into wind at speeds as low as one centimeter per second, or 0.036 kilometers per hour—*Phycomyces* is able to detect the presence of nearby objects, a phenomenon known as the ‘avoidance response.’ Despite decades of painstaking investigation, the avoidance response remains an enigma. Objects within a few millimeters cause the fruiting bodies of *Phycomyces* to bend away without ever making contact. Regardless of the object—opaque or transparent, smooth or rough—*Phycomyces* starts to bend away after about two minutes. Electrostatic fields, humidity, mechanical cues, and temperature have all been ruled out. Some hypothesize that *Phycomyces* uses a volatile chemical signal that deflects around the obstacle with tiny air currents, but this is far from proven.” Merlin Sheldrake, *Entangled Life: How Fungi Make Our Worlds, Change Our Minds & Shape Our Futures* (2020) 58. On second thought maybe *Phycomyces* violates the ‘no telepathy’ rule.

¹⁶ Peter Sterling, *What is Health? Allostasis and the Evolution of Human Design* (2020) 1-2. And we do well to keep in mind that “The modal organism on earth was, and has always been, a prokaryotic cell. The number of *E. coli* in the gut of each human being exceeds the sum total of *Homo sapiens* now alive.” Stephen Jay Gould, “Trends as Changes in Variance: A New Slant on Progress and Directionality in Evolution,” 62 *Journal of Paleontology* 319, 321 (1988).

encounter their specific catalysts and coreactants and thereby accomplish their chemistry.”¹⁷

Furthermore,

“Thermal noise plays a second key role in cellular computation: it provides proteins with a major source [*Bestand*] of free power. . . . Thermal bombardment, beyond simple mixing, directly assists the chemistry because proteins are designed to work *with* the noise, rather than against it. A protein assumes various conformations determined by the amino acid sequence—with functional conformations separated from nonfunctional ones by significant energy barriers. These barriers are overcome as a protein molecule exchanges thermal power with the cytoplasm. . . . Thermal collisions occasionally drive the protein into its active conformation, and soon, thermal collisions kick it back again. To settle the impasse and briefly stabilize the protein in its active conformation requires some specific influence, such as the pulse of energy obtained when a protein hydrolyzes an energy-bearing molecule, like ATP [adenosine triphosphate].”¹⁸

With mention of ATP we arrive at the banks of the Rhine. *Das Ge-Stell*, Heidegger says, as the circulation in itself of requisitioning (*Zirkulation des Bestellens in sich selber*),

“composes the essence of the machine. Rotation belongs to this, though not necessarily in the form of a wheel, for the wheel is defined by rotation, not rotation by wheels. Rotation is that revolving which courses back into itself [*in sich zurücklaufende Drehung*], driving on the orderable (propulsion). The rotation of the machine is positioned, i.e., challenged forth, and made constant in the circulation that lies in the drive [*die im Getriebe beruht*], the essential character of positionality.”¹⁹

Heidegger’s oft cited example is the power plant on the Rhine. The river

“is there only as something ordered in the requisitioning just mentioned. The hydroelectric plant is not built in the Rhine river, but rather the river is built into the power plant and is what it is there due to the power plant’s essence.”²⁰

¹⁷ *What is Health?* 3.

¹⁸ *Id.* 4.

¹⁹ “Positionality,” 32; GA 79: 34.

²⁰ *Id.* 28; GA 79: 29.

Rotation belongs to that essence; the kinetic energy of the flowing river drives the blades of turbines which drive dynamos to generate electrical energy.²¹ In essence the power plant on the Rhine is a scaled-up version of ATP synthase, the *Wesen* of which is a rotor.²² Sterling describes ATP synthase as “a nanoscale turbine driven by a proton gradient that churns out molecules of ATP.”²³ He is not using ‘turbine’ metaphorically:

“This chemo-electrical proton gradient . . . represents potential energy—like water behind a dam. The pressure drives protons through the mitochondrion’s second nanomachine, the turbine inherited from prokaryotes comprising dozens of proteins. Protons entering a molecular chamber embedded in the membrane are driven across the membrane into the crevices of a thin, molecular stalk, causing it to rotate at 9,000 rpm. The rotor drives conformation changes within the terminal head, a complex of 20 to 30 proteins jutting into the central cavity (see figure 1.5). At each partial rotation (120°), the stationary head compresses two small molecules until they fuse to form ATP.”²⁴

These various correlations between modern technology, as described by Heidegger, and life’s devices conform to ‘Vermeij’s Law’:

“our species and the economic and social system we have created follow all the same fundamental rules that govern other forms of life and their economic structures. . . . all our unique characteristics are derived from precursors observable in nonhuman life forms. . . . our ability to modify and to anticipate has obvious, if less spectacular, precedents in the adaptations and the mechanisms of adaptation in other organisms.”²⁵

Again and again Heidegger insists that “The essence of technology is itself nothing technological.” Rather, “being itself essences in and as technology,” *in ihr und als sie das Sein selber west*.²⁶ I.e., the *Sein* of which Heidegger says:

²¹ *Das Wasserkraftwerk ist in den Rheinstrom gestellt. Es stellt ihn auf seinen Wasserdruck, der die Turbinen daraufhin stellt, sich zu drehen, welche Drehung diejenige Maschine umtreibt, deren Getriebe den elektrischen Strom herstellt, für den die Überlandzentrale und ihr Stromnetz zur Strombeförderung bestellt sind.* Martin Heidegger, *Die Frage nach der Technik*, GA7: 16: <https://www.beyng.com/gaselis/?vol=7&pg=16> . “The hydroelectric plant is set into the current of the Rhine. It sets the Rhine to supplying its hydraulic pressure, which then sets the turbines turning. This turning sets those machines in motion whose thrust sets going the electric current for which the long-distance power station and its network of cables are set up to dispatch electricity.” Trans. William Lovitt 1977.

²² See figures 8 and 9 here: <https://www.nobelprize.org/uploads/2018/06/walker-lecture.pdf> .

²³ *What is Health?* 2, caption to fig. 1.1.

²⁴ *Id.* 18. His figure 1.5 reproduces fig. 1 here: <https://www.pnas.org/doi/pdf/10.1073/pnas.1722086115> .

²⁵ Geerat J. Vermeij, *Nature: An Economic History* (2004) 4.

²⁶ “The Danger” in *Bremen and Freiburg Lectures* 56, 57; GA 79: 60.

“Of course only as long as Dasein *is* (that is, only as long as an understanding of Being is ontically possible), ‘is there’ Being. . . . only if the understanding of Being *is*, do entities as entities become accessible”²⁷

Being essences in and as τέχνη, which Heidegger describes as a kind of facultative access to beings:

“τέχνη is what pertains intimately to all bringing-forth in the sense of human setting-forth. If bringing-forth (τεκεῖν) is a setting into the unconcealed (i.e., the world), then τέχνη means the knowledge of the unconcealed and the ways of attaining, obtaining, and implementing it. The essential feature of bringing-forth is τέχνη, and the essential feature of τέχνη is *to be* the relation with unconcealment and to unfold [*entfalten*] that relatedness.”²⁸

Now “All we know is that today there is only a single lineage of life (that is, a single DNA-RNA-protein machine and a single metabolism).”²⁹ At the scale of individual organisms this lineage consists of ‘variation-generating mechanisms.’³⁰ At macro scale “Nature operates an entity making and breaking machine in the processes of speciation and extinction.”³¹ In the course of the churning of that macro-machine entities as entities have become accessible to one species of entity, the synthesizing-diaeresizing specialist, the *transcendens schlechthin*. In other words “the monstrosity that reigns here”³² is one more avatar of “that dark, driving, insatiably self-desiring power.”³³

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²⁷ Martin Heidegger, *Being and Time* (tr. John Macquarrie and Edward Robinson 1962) 255; *Sein und Zeit* (Niemeyer 2006) 212. *Allerdings nur solange Dasein ist, das heißt die ontische Möglichkeit von Seinsverständnis, »gibt es« Sein. . . . nur wenn Seinsverständnis ist, wird Seiendes als Seiendes zugänglich . . .*

²⁸ Martin Heidegger, *Heraclitus: The Inception of Occidental Thinking and Logic: Heraclitus’s Doctrine of the Logos* (tr. Julia Goesser Assaiante and S. Montgomery Ewegen 2018) 153-154; GA 55: 201, 202: <https://www.beyng.com/gaselis/?vol=55&pg=201> .

²⁹ Marc W. Kirschner and John C. Gerhart, *The Plausibility of Life: Resolving Darwin’s Dilemma* (2005) 256.

³⁰ *Id.* 248.

³¹ “Trends as Changes in Variance” 320.

³² *das Ungeheure, das hier waltet.* “Positionality” 28; GA 79: 29.

³³ *das Leben allein, jene dunkle, treibende, unersättlich sich selbst begehrende Macht.* Friedrich Nietzsche, *Vom Nutzen und Nachtheil der Historie für das Leben* (1874) § 3: <http://www.nietzschesource.org/#eKGWB/HL-3> .