

On dopamine

“After all, reward coding must accommodate the rewarding properties of both solving a math problem and having an orgasm.”¹

“If the reward-prediction error is positive, certain neurons fire to deliver a pulse of good feeling, . . . the urbilaterian adopted dopamine as the transmitter to signal a positive error, and that has been conserved.”²

*“That which endures primally out of the earliest beginning is what grants.”*³

Lamenting the sorrows of old age Mimnermus begins with loss of libido: “What life, what joy without golden Aphrodite?”⁴ ‘Aphrodite’ can be taken here as metonymy for *toutes les promesses de bonheur*;⁵ so that, in the words of Bernard Williams, “unless I am propelled forward by the conatus of desire, project and interest, it is unclear why I should go on at all.” In general “there is a nexus of projects, related to [one’s] conditions of life, and it would be the loss of all or most of them that would remove meaning.” And in the face of such loss a person may feel that she “might as well have died.”⁶ Just so Mimnermus: “When these things are no longer sweet to me may I die.”⁷

By Sterling’s account ‘Desire and Satisfaction’ got their start about a half-billion years ago with the last common ancestor of vertebrates and arthropods, the ‘urbilaterian’:

“A system was needed,” Sterling writes, “to prod an animal to search for all its key resources *before* they ran out and consume them in the right quantities. Our urbilaterian ancestors (worms) solved this challenge with a reward circuit. Hypothalamic neurons, monitoring an animal’s internal state, plus external opportunities and dangers, initiate a search well

¹ Robert M. Sapolsky, *Behave: The Biology of Humans at Our Best and Worst* (2017) 67.

² Peter Sterling, *What is Health? Allostasis and the Evolution of Human Design* (2020) 70-71.

³ *Das anfänglich aus der Frühe Währende ist das Gewährende*. Martin Heidegger, *The Question Concerning Technology and Other Essays* (tr. William Lovitt 1977) 31.

⁴ τίς δὲ βίος, τί δὲ τερπνὸν ἄτερ χρυσῆς Ἀφροδίτης;

⁵ “one cannot understand human life at all without taking account of the fact that it is irrevocably oriented toward the pursuit of this promise.” Raymond Geuss, “Suffering and Knowledge in Adorno,” repr. in *Outside Ethics* (2005) 121.

⁶ Bernard Williams, “Persons, character and morality” in *Moral Luck: Philosophical Papers 1973-1980* (1981) 12-13.

⁷ τεθναίην ὅτε μοι μηκέτι ταῦτα μέλοι. For contemporary documentation of death from loss of meaning – one’s ‘what I’m doing here’ – Sterling draws on Case and Deaton’s original paper of 2015; see now Anne Case and Angus Deaton, *Deaths of Despair and the Future of Capitalism* (2020).

before internal stores are depleted. Any behavior that delivers something better than predicted elicits a pulse of dopamine that makes the animal ‘feel good,’ that is, satisfied. Of course we can’t know how a worm feels, but its behavior certainly gives this impression. This circuit, using the same chemical [dopamine], operates in our brain and in the fruit fly’s. Thus, the reward circuit has been conserved for more than half a billion years.”⁸

Aristotle’s sense of how things work – nurtured by Plato – led him to build *orexis* – *appetitus*, ‘desire’ – into the very foundation of his natural philosophy. Book I of the *Physics* is all about the *archai*, the ‘starting points,’ ‘governing sources,’ ‘original beings’ of nature. All thinkers worth mention say that the *archai* are in some sense ‘contraries,’ *enantia*;⁹ that *phusis* comes from contraries. Aristotle reviews the contentions for various contraries as candidate *archai* and agrees that Yes, the *archai* must be contraries.¹⁰

Aristotle then argues for his novel version adapted from Plato: the two ur-contraries are *sterēsis*, ‘deprivation,’ ‘lack;’ and *eidos*, ‘form.’¹¹ Yet there must always be a third, underlying (*hupokeimenon*) thing instancing lack and capable of taking form; and that third thing is *hulē*, ‘material.’ He summarizes the doctrine by distinguishing his innovation from the thinking of other Platonists:

“For from its deprivation . . . something comes into being. . . . [Yet] we say that material and deprivation are different things . . . For the nature that persists [*sc. hupokeimenon, hulē*] is a co-cause with the form of the things that come into being, like a mother, while the other portion of the opposition [*sc. the deprivation in the material*] might often be slandered as not being at all . . . But since there is something divine and good and sovereign [which no true Platonist denies], we say that there is something opposite to it [lack of divinity, goodness, and sovereignty], and something else [the material that lacks] which inherently yearns for and stretches out toward it by its own nature [τὸ δὲ ὁπέφυκεν ἐφίεσθαι καὶ ὀρέγεσθαι αὐτοῦ κατὰ τὴν αὐτοῦ φύσιν]. For [other Platonists], it follows that the contrary yearns for [ὀρέγεσθαι] its own destruction. However, it is not possible either for the form to long for itself, since it is

⁸ *What is Health?* 169.

⁹ Πάντες δὴ τάναντία ἀρχὰς ποιοῦσιν. *Physics* I.5, 188a. “Everyone makes contraries the original beings.” Joe Sachs, *Aristotle’s Physics: A Guided Study* (1995) 36.

¹⁰ ὅτι μὲν οὖν ἐναντίας δεῖ τὰς ἀρχὰς εἶναι, φανερόν. *Id.* I.6, 189b. “That, then, the starting points must be contraries, is clear.” Sachs 38.

¹¹ *Cf.* Diotima’s tale of Erōs son of Poros, ‘Competence,’ and Penia, ‘Indigence’ in *Symposium*.

not defective [διὰ τὸ μὴ εἶναι ἐνδεής¹²], or for its contrary [lack] to long for it (since contraries are destructive of one another), but it is the material that does this [longing] . . . That, then, there are starting points [*archai*], and what they are [the contraries *sterēsis-in-hulē* and *eidōs*], and how many in number [three-in-two¹³], let it have been marked out in this way for us . . .”¹⁴

With all this longing we’ve almost got a country song. Anyway we’ve got a folktale. Alan Dundes shows that “*Folktales can consist simply of relating how abundance was lost or how a lack was liquidated.*” (his italics) Dundes notes that

“One structural type of American Indian folktale then consists of just two motifemes: Lack (L) and Lack Liquidated (LL). In the Malecite version of ‘The Release of Impounded Water,’ a monster keeps back all the water in the world (L). A culture hero slays the monster, which act releases water (LL). A Wishram tale based upon the same motifeme pattern is as follows: ‘A people on the Columbia had no eyes or mouths (L). They ate by smelling the sturgeon. Coyote opened their eyes and mouths (LL).’ . . . There are not a great many tales which consist of only two motifemes, but there are some. The two motifeme sequence may be said to constitute a minimum definition of an American Indian folktale.”¹⁵

And as we just saw, Aristotle takes the same two-motifeme sequence of Lack/Lack Liquidated to constitute the structure of nature: deprivation-in-matter taking form. No big surprise that Heidegger echoes the Master with a structurally identical ‘Tale of human being.’ In Heidegger’s story *hulē* is *Geworfenheit*, *sterēsis* *Sorge*, and *eidōs* is *vorlaufende Entschlossenheit*.

¹² Cf. “The man who does not feel himself defective has no desire for that whereof he feels no defect.” οὔκου ἐπιθυμεῖ ὁ μὴ οἰόμενος ἐνδεής εἶναι οὐδ’ ἂν μὴ οἴηται ἐπιδεισθαι. *Symposium* 204a; trans. Harold N. Fowler (Loeb ed.1925).

¹³ ἀλλ’ ὅτι αἱ ἀρχαὶ τρεῖς καὶ πῶς τρεῖς, καὶ τίς ὁ τρόπος αὐτῶν, δῆλον. *Physics* I.7, 191a. “But that the starting points are three, and in what way three, and what their character is, is clear.” Sachs 43.

¹⁴ *Id.* 1.8-9; Sachs 44-46. Sachs lucidly paraphrases: “Deprivation of a form in some underlying thing capable of possessing that form is a special kind of non-being. . . . The deprivation of form in some underlying material to which that form is suited is a potent kind of non-being that yearns for what it lacks. . . . Aristotle understands material as potency, stretching out toward form.” 48.

¹⁵ Alan Dundes, “Structural Typology in North American Indian Folktales;” repr. in Alan Dundes, *The Study of Folklore* (1965) 208. As Dundes tells us he is here drawing on Vladimir Propp, *Morphology of the Folktale* ([1927] tr. Laurence Scott 1958; 2nd rev. ed. Louis A. Wagner 1968). Specifically Propp’s functions “VIIIa. ONE MEMBER OF A FAMILY EITHER LACKS SOMETHING OR DESIRES TO HAVE SOMETHING. (Definition: *lack*. Designation: *a.*)” (p. 35) and “XIX. THE INITIAL MISFORTUNE OR LACK IS LIQUIDATED. (Designation: *K.*) This function, together with villainy (*A*), constitutes a pair. The narrative reaches a peak in this function.” (p. 53).

Thomas Sheehan glosses *Geworfenheit*, ‘thrownness,’ in these words: “our projects are not entirely free, unconditioned, and at our will. We are already pulled into our aheadness in and through what we may call *de-facto-ness* [*Faktizität*]. We are already thrown into a family, a language, a social structure, the whole panoply of things and situations which we did not choose and which condition our actions and choices. From the first instant of our lives we are already confronted by a history as long as our gene-structure.”¹⁶ *Geworfenheit* = ‘panoply of things and situations’ + genome + phenotype; ‘phenotype’ being “all traits of an organism other than its genome. . . . the enzyme products of genes are part of the phenotype, as are behaviors, metabolic pathways, morphologies, nervous tics, remembered phone numbers, and spots on the lung following the flu.”¹⁷ This amalgam is the human *hulē*.¹⁸

The *sterēsis in Geworfenheit* Heidegger designates as ‘being an issue for itself,’ *um selbst gehen*; in a word *Sorge*, ‘care.’ “Care is the term for the being of *Dasein* pure and simple. It has the formal structure, an entity for which, intimately involved in its being-in-the-world, this very being is at issue [*Seiendes, dem es bei seinem In-der-Welt-sein um dieses Sein selbst geht*].” He then describes ‘being at issue’ as a variety of *sterēsis*:

“ ‘Its own being is the issue for *Dasein*’: this first presupposes that in this *Dasein* there is something like a *being out for something* [*Aussein auf etwas*]. *Dasein* is out for its own being: it is out for its very being in order ‘to be’ its being. As such a being-about care is this being out for the being which this very being-out is [*Sorge ist als solches Sein-um dieses Aussein auf das Sein, das dieses Aussein selbst ist*]. . . . The structure of ‘being out for something’ . . . brings with it the phenomenon of not yet having something which I am out for. This phenomenon of not yet having something which I am out for is called *being in want* [*das Darben oder die Darbung*]. It is not merely a pure and simple objective not-having of something that I am out for. It is what first constitutes being-in-want, lack, need [*die Darbung, das Entbehren, das Bedürfen*].”¹⁹

The basic structure of care is ‘lack-in-being’ in the term from *Being and Time*, *Schuldigsein*. *Sorge* is the *sterēsis in Geworfenheit*.

¹⁶ Thomas Sheehan, *Karl Rahner: The Philosophical Foundations* (1987) 295-296.

¹⁷ Mary Jane West-Eberhard, *Developmental Plasticity and Evolution* (2003) 31.

¹⁸ Sapolsky traces the antecedents of behavior from ‘one second before’ through ‘centuries to millennia before’ to ‘the evolution of behavior.’ He characterizes the neurophysiology of *Geworfenheit* with the remark “ ‘It’s complicated.’ Nothing seems to cause anything; instead everything just modulates something else.” *Behave* 674.

¹⁹ Martin Heidegger, *History of the Concept of Time: Prolegomena* (tr. Theodore Kisiel 1985) 294, 295. Cf. “*Sapiens*’ design included a profound, restless curiosity—a sort of species-level ADHD.” *What is Health?* 170.

Lack of what? Section 62 of *Being and Time* is captioned, “*The Existentially Authentic Potentiality-for-Being-a-Whole of Da-sein as Anticipatory Resoluteness*,”²⁰ a mouthful which avers the Liquidated Lack to be *vorlaufende Entschlossenheit*, ‘anticipatory resoluteness,’ ‘cataphoric opened-upness,’ the human *eidos*. Heidegger claims that “authentic potentiality-of-being-a-whole of Da-sein” is “a mode of being of Da-sein . . . in which it brings itself to and before itself.” Anticipatory resoluteness, “basically dispersing every fugitive self-covering-over . . . arises from the sober understanding of the basic factual possibilities of Da-sein.” In our “individualized potentiality-for-being . . . Da-sein becomes free of the entertaining ‘incidentals’ that busy curiosity provides for itself, primarily in terms of the events of the world.”²¹ Primordial *Angst* “strives to expect resoluteness of itself.”²²

“Philosophy,” says Williams, “in particular moral philosophy, is still deeply attached to giving good news”²³ and Heidegger is no exception here, for he holds out the prospect that “Together with the sober *Angst* that brings us before our individualized potentiality-of-being, goes the unshakable joy [*gerüstete Freude*] in this possibility.”²⁴ I.e., the phenomenon reflected in story-telling imagery – with unsubtle physiological overtones – as ‘release of impounded waters,’ ‘freeing of the dawn-cows.’²⁵

‘Unshakable joy’ is the Peruna talking; i.e. “dopamine, which all animals since the urbilaterian have relied on to feel okay.”²⁶ As Sapolsky implies with his reference to solving a math problem the mesolimbic/mesocortical dopaminergic system²⁷ undergirds insight. And the phenomena of *vorlaufende Entschlossenheit*, *moksa*, *bodhi*, *satori*, *basirah*, the apophany of psychosis²⁸ and the peace that passeth understanding are nothing if not relief-granting *Grundeinsichten* into ‘that which is.’²⁹

²⁰ *Das existenziell eigentliche Ganzseinkönnen des Daseins als vorlaufende Entschlossenheit*.

²¹ Martin Heidegger, *Being and Time* (tr. Joan Stambaugh 1996) 286.

²² *Id.* 285. *Diese ursprüngliche Angst aber trachtet die Entschlossenheit zuzumuten*.

²³ Bernard Williams, “*The Women of Trachis: Fictions, Pessimism, Ethics*” in *The Sense of the Past: Essays in the History of Philosophy* (ed. Myles Burnyeat 2006) 49.

²⁴ *Being and Time* 286.

²⁵ E.g., “[Indra] smashed the serpent. He bored out the waters. He split the bellies of the mountains./ He smashed the serpent resting on the mountain . . ./ Like bellowing milk-cows, streaming out, the waters went straight down to the sea.” *The Rigveda: The Earliest Religious Poetry of India*, trans. Stephanie W. Jamison and Joel P. Brereton (2017); Hymn 1.32.1-2; Vol. I 134-135.

²⁶ *What is Health?* 116.

²⁷ Sketched in *Behave* 64-77.

²⁸ “The delusions appear suddenly as an ‘aha experience’ (‘Aha-Erlebnis’ or ‘revelation’) concerning what had been perplexing during delusional mood and often bring relief. . . . The delusions are not primarily a psychoanalytic defensive reaction meant to protect the self but involve a fundamental ‘reorganization’ of the patient’s experience . . .” Aaron L. Mishara, “Klaus Conrad (1905-1961):

But unless the particular case is a saint, “Dasein is always and already maybe again in irresoluteness.”³⁰ Although “dopamine pulses are as essential to human health as vitamins” nevertheless “*satisfaction cannot be stored but must be continually renewed;*”

“the pulses of satisfaction that move us from one activity to the next and sustain mood cannot be stored. To serve diverse behaviors and learning, the pulse of dopamine that delivers a pulse of satisfaction must necessarily be brief. Consequently, dopamine is promptly removed from the synaptic spaces by transporter proteins so as to prepare neurons to sense the next reward. No matter how wonderful a meal or a sexual encounter, the glow soon fades—by design. . . . we are never more than minutes or hours from dissatisfaction.”³¹

The two scientists offer their version of pastoral – in days of yore a spare and simple life of lacks and their liquidation: “Once, we had lives that, amid considerable privation, also offered numerous subtle, hard-won pleasures.”³² “From our species’ origin we lived by hunting and gathering. During the course of a day, these activities provided diverse small rewards and thus frequent pulses of satisfaction,” “the life-sustaining fountain of small rewards.”³³

Delusional Mood, Psychosis, and Beginning Schizophrenia,” 36 *Schizophrenia Bulletin* 9 (2010); <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC2800156/>. “For many patients [endogenous psychosis] evolves through a series of stages: a stage of heightened awareness and emotionality combined with a sense of anxiety and impasse, a drive to ‘make sense’ of the situation, and then usually relief and a ‘new awareness’ as the delusion crystallizes and hallucinations emerge . . .” Shitij Kapur, “Psychosis as a State of Aberrant Salience: A Framework Linking Biology, Phenomenology, and Pharmacology in Schizophrenia,” 160 *Am. J. Psychiatry* 13 (2003); <https://ajp.psychiatryonline.org/doi/10.1176/appi.ajp.160.1.13>. So don’t miss Oliver D. Howes and Matthew M. Nour, “Dopamine and the aberrant salience hypothesis of schizophrenia,” 15 *World Psychiatry* 3 (2016); <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4780291/>.

²⁹ Cf. “When a man has been thus far tutored in the lore of love, passing from view to view of beautiful things, in the right and regular ascent, suddenly he will have revealed to him [ἐξαίφνης κατόψεταί], as he draws to the close of his dealings in love, a wondrous vision, beautiful in its nature [τι θαυμαστόν τὴν φύσιν καλόν]; and this, Socrates, is the final object of all those previous toils [πόνου].” *Symposium* 210e.

³⁰ *Das Dasein ist je schon und demnächst vielleicht wieder in der Unentschlossenheit. Sein und Zeit* 299.

³¹ *What is Health?* 172, 127 (Sterling’s italics), 171, 127. Cf. “By birth neither immortal nor mortal, in the selfsame day [Erōs] is flourishing and alive at the hour when he is abounding in resource; at another he is dying, and then reviving again by force of his father’s nature: yet the resources that he gets will ever be ebbing away; so that Love is at no time either resourceless or wealthy, and furthermore, he stands midway betwixt wisdom and ignorance.” *Symposium* 203e.

³² *Behave* 69.

³³ *What is Health?* 171, 132.

Now, by contrast, “we have drugs that cause spasms of pleasure and dopamine release a thousandfold higher than anything stimulated in our old drug-free world.” Here ‘drug’ is Sapolsky’s metonymy for every modality of TechsiCola we have at hand, from day-trading to jet-skis. “An emptiness comes from this combination of over-the-top nonnatural sources of reward and the inevitability of habituation; this is because unnaturally strong [i.e., technologically boosted] explosions of synthetic experience and sensation and pleasure evoke unnaturally strong degrees of habituation. . . . our frequent human tragedy is that the more we consume, the hungrier we get.”³⁴

So how did this synthetic *Unwelt* come about? Is it, as Sterling contends, “the predictable consequence of pushing various highly optimized systems beyond the limits of their designs”?³⁵ Provisionally accepting that contention we want to know who, or what, is the pusher. And immediately we jump to the conclusion: the dopaminergic-insight-system driving technological change. (Or were we pushed?)

The role of insight in problem-solving and task-accomplishment has been noted at least since Aristotle. “The ἀγχίνοια,” he says, “is a good shot at the middle term in the blink of an eye.”³⁶ C. S. Peirce was the first, t.m.k., to insist on the centrality of insight to scientific advance;³⁷ and T. S. Kuhn to insist on its centrality to scientific revolution.³⁸ Schumpeter pointed out its centrality to “the fundamental phenomenon of economic

³⁴ *Behave* 69.

³⁵ *What is Health?* 133.

³⁶ Ἡ δ' ἀγχίνοιά ἐστιν εὐστοχία τις ἐν ἀσκέπτῳ χρόνῳ τοῦ μέσου. *Post. Analytics* 89b.

³⁷ He called it ‘abduction.’ “[Induction] never can originate any idea whatever. No more can deduction. All the ideas of science come to it by way of abduction. . . . The abductive suggestion comes to us like a flash. It is an act of *insight*, although of extremely fallible insight. It is true that the different elements of the hypothesis were in our minds before; but it is the idea of putting together what we had never before dreamed of putting together which flashes the new suggestion before our contemplation.” *Collected Papers of Charles Sanders Peirce; Volume V, Pragmatism and Pragmaticism* (ed. Charles Hartshorne and Paul Weiss 1934-1935) 5.145, p. 90; 5.181, p. 113. Of particular relevance to the history of neurophysiology is Walter Bradford Cannon, *The Way of an Investigator: A Scientist's Experiences in Medical Research* (1945); Ch. V, ‘The Role of Hunches.’

³⁸ “I was sitting at my desk [in the summer of 1947] with the text of Aristotle’s *Physics* open in front of me and with a four-colored pencil in my hand. Looking up, I gazed abstractedly out the window of my room—the visual image is one I still retain. Suddenly the fragments in my head sorted themselves out in a new way, and fell into place together. My jaw dropped, for all at once Aristotle seemed a very good physicist indeed, but of a sort I’d never dreamed possible.” That kind of experience, he continues, is the principal characteristic of revolutionary scientific change: “it involves some relatively sudden and unstructured transformation in which some part of the flux of experience sorts itself out differently and displays patterns that were not visible before.” Thomas S. Kuhn, “What are Scientific Revolutions?” in *The Probabilistic Revolution, Volume I: Ideas in History* (ed. Lorenz Krüger, Lorraine J. Daston, and Michael Heidelberger 1987) 9.

development.”³⁹ Köhler described captive chimpanzees as solving task-problems by insight.⁴⁰ Hadamard wrote a brief treatment confined to one field;⁴¹ Lonergan wrote a long, universalizing treatise;⁴² and it is Lonergan who makes vivid the key fact – *en passant* in a work on method – that in human being “insights are a dime a dozen;” *viz.*:

“But, as the many elementary objects are constructed into larger wholes, as the many operations are conjoined in a single compound knowing, so too the many levels of consciousness are just successive stages in the unfolding of a single thrust, **the eros of the human spirit**. To know the good, it must know the real; to know the real, it must know the true; to know the true, it must know the intelligible; to know the intelligible, it must attend to the data.⁴³ So from slumber, we awake to attend. Observing lets intelligence be puzzled, and we inquire. Inquiry leads to **the delight of insight**, but **insights are a dime a dozen**, so critical reasonableness doubts, checks, makes sure.”⁴⁴

The eros of the human spirit – desire, lack – has its lowly origin in the urbilaterian, as does ‘delight,’ satisfaction, lack liquidated. First desire was merely for the chemophysical *sine qua non* and only much later exaptatively, redirectedly, arose desire of ‘the intelligible,’ the sense-makeable-of through insight, innovative taking-as.⁴⁵

³⁹ “Here the success of everything depends upon intuition [*Hier kommt für den Erfolg alles auf „Blick“ an*], the capacity of seeing things in a way which afterwards proves to be true, even though it cannot be established at the moment, and of grasping the essential fact, discarding the unessential [*und das Wesentliche fest und das Unwesentliche gar nicht auffaßt*], even though one can give no account of the principles by which this is done.” Joseph Schumpeter, *The Theory of Economic Development: An Inquiry into Profits, Capital, Credit, Interest, and the Business Cycle* (2nd ed. 1926 tr. Redvers Opie 1934; repr. 1983) 85.

⁴⁰ Wolfgang Köhler, *The Mentality of Apes* (tr. Ella Winter 1925).

⁴¹ Jacques Hadamard, *An Essay on the Psychology of Invention in the Mathematical Field* (1945).

⁴² Bernard Lonergan, *Insight: A Study of Human Understanding* (ed. Frederick E. Crowe and Robert M. Doran, 5th ed. 1992).

⁴³ Cf. “So when a man by the right method of boy-loving [*διὰ τὸ ὀρθῶς παιδεραστεῖν*] ascends from these particulars and begins to descry that beauty, he is almost able to lay hold of the final secret [*τοῦ τέλους*]. Such is the right approach or induction to love-matters. Beginning from obvious beauties he must for the sake of that highest beauty be ever climbing aloft, as on the rungs of a ladder, from one to two, and from two to all beautiful bodies; from personal beauty he proceeds to beautiful observances [*ἐπιτηδεύματα*], from observance to beautiful learning [*μαθήματα*], and from learning at last to that particular study which is concerned with the beautiful itself and that alone; so that in the end he comes to know the very essence of beauty. In that state of life above all others, my dear Socrates,’ said the Mantinean woman, ‘a man finds it truly worth while to live [*βιωτὸν*], as he contemplates essential beauty [*αὐτὸ τὸ καλόν*].” *Symposium* 211b-d.

⁴⁴ Bernard J. F. Lonergan, *Method in Theology* (1971) 13; all emphasis mine.

⁴⁵ In his “exercise in fictional science” Braitenberg puts the capacity for “getting ideas” in Vehicle 10: “One day, after enough excursions, the vehicle will **suddenly realize** that all these paired associations . . . **make sense** if the whole situation is **seen as** a closed chain.” My emphasis. Yet not until Vehicle 14, the last, does the creator endow the critter with “a touch of the pleasure principle.” See Valentino Braitenberg, *Vehicles: Experiments in Synthetic Psychology* (1984). By Sapolsky and

Else why when puzzled do we inquire? “Dopamine,” Sapolsky writes, “is not just about reward anticipation; it fuels the *goal-directed behavior* needed to gain that reward; dopamine ‘binds’ the value of a reward to the resulting work. . . . In other words, dopamine is not about the happiness of reward. It’s about the happiness of pursuit of reward that has a decent chance of occurring.”⁴⁶ This point is acutely relevant for the process of learning: “learning in the right context,” Sterling writes, “is *intrinsically* rewarding. Neural circuits recognize when learning has occurred and trigger the reward circuit to deliver a pulse of dopamine that simultaneously provides satisfaction and boosts both learning and long-term memory. In other words, the learning mechanism *fuels itself* via intrinsic reward signals.”⁴⁷ Hence the more we learn the needier we get.⁴⁸

Insights are kicks. The fertile, productive ones come when we are working at a problem, a puzzle, an obstacle. Polya asks,

“What is progress toward the solution? Advancing mobilization and organization of our knowledge, evolution of our conception of the problem, increasing prevision of the steps which will constitute the final argument. We may advance steadily, by small imperceptible steps, but now and then we advance abruptly, by leaps and bounds. A sudden advance toward the solution is called a BRIGHT IDEA, a good idea, a happy thought, a brain-wave (in German there is a more technical term, *Einfall*). What is a bright idea? An abrupt and momentous change of our outlook, a sudden reorganization of our mode of conceiving a problem, a just emerging confident prevision of the steps we have to take in order to attain the solution.”⁴⁹

Clear enough then why selection would favor any system that generates bright ideas a dime a dozen: “Many a guess has turned out to be wrong but nevertheless useful in leading to a better one. No idea is really bad, unless we are uncritical. What is really

Sterling’s account the motivating pleasure principle must come in near the start, its lust channeling into ideation only afterward.

⁴⁶ *Behave* 74.

⁴⁷ *What is Health?* 126.

⁴⁸ So Nietzsche depicts us as ever-jonesing addicts: “our *drive to knowledge* [*Trieb zur Erkenntniss*] has become too strong for us to be able to want happiness without knowledge or the happiness of a strong, firmly rooted delusion. . . . Knowledge has in us been transformed into a passion [*Leidenschaft*] which shrinks at no sacrifice and at bottom fears nothing but its own extinction . . . Perhaps mankind will even perish of this passion for knowledge! – even this thought has no power over us!” *Daybreak: Thoughts on the prejudices of morality* (tr. R. J. Hollingdale [1982] 1997) § 429.

⁴⁹ G. Polya, *How to Solve It: A New Aspect of Mathematical Method* (2nd ed. 1957) 159.

bad is to have no idea at all.”⁵⁰ To be clueless is to lack **any** way forward, to be utterly *aporos*; having an insight liquidates that lack by showing **some** path; the capacity for insight is pathbreaking, *porimos*.⁵¹

Sterling notes “Evolution’s core tendency to increase embodied information.”⁵² The human mode of **increasing** embodied information – as distinct from passing it around – is, in Heideggerese, *das Entbergen*, ‘laying bare.’ Now “What has the essence of technology to do with revealing [*Entbergen*]? . . . Everything. For every bringing-forth [*Her-vor-bringen*] is grounded in revealing. . . . Technology is therefore no mere means. Technology is a way of revealing. . . . what is decisive in *technē* does not lie at all in making and manipulating nor in the using of means, but rather in the aforementioned revealing. It is as revealing, and not as manufacturing, that *technē* is a bringing-forth.”⁵³ But *what about it* makes *technē* a bringing-forth as revealing? Insight is decisive in *technē*; insight is the essence of technology and down in the engine-room is the impulse drive, the dopaminergic reward circuit.

If we take technology as a *mode* of revealing then, Heidegger claims, “another whole realm for the essence of technology will open itself up to us. It is the realm of revealing, i.e., of truth [*der Bereich der Entbergung, d.h. der Wahr-heit*].” For “*Technē* is a mode of *alēthuein*. It reveals whatever does not bring itself forth and does not yet lie before us, whatever can look and turn out now one way and now another.”⁵⁴ The essence of technology is *one kind* of insight, yet still again Heidegger hunts the whale *Grundeinsicht*:

“*Insight into that which is* [*Einblick in das was ist*]—this title now names the event of the turn in *beyng* [*Seyn*] . . . At first and almost to the very end it appeared as though ‘insight into that which is’ signified only a glance that we humans cast forth from ourselves to that which is. ‘That which is’ one customarily takes as a particular being, for indeed the ‘is’ is said of beings. But now everything has turned. Insight does not name our inspection of the being [*Einblick nennt nicht unsere Einsicht, die wir in*

⁵⁰ *Id.* 99.

⁵¹ “Escape to a different milieu . . . even with imperfect adaptation, can be more advantageous than improved adaptation to a grossly hopeless or deteriorating situation.” Mary Jane West-Eberhard, “Alternative adaptations, speciation, and phylogeny (A Review),” 83 *Proc. Natl. Acad. Sci. USA* 1388, 1389 (1986). In Darwinian terms the insight system generates rapidly a high volume of variants, the raw material of change. *Cf.* *r*-selection.

⁵² *What is Health?* 92.

⁵³ *The Question Concerning Technology* 12.

⁵⁴ *Id.* 12-13.

*das Seiende nehmen*⁵⁵], insight as flashing entry is the appropriative event of the constellation of the turn in the essence of being itself in the epoch of positionality. . . . Everything merely technological never reaches into the essence of technology. . . . Rather, the constellation of being should speak to us.”⁵⁶

The ‘turn’ is away from “inspection of the being” as Heidegger had described that phenomenon in 1925:

“Language, speaking, and thinking: they coincide as the human way of being [*die Seinsart des Menschen*]. They are the way we reveal [*offenbar macht*] and illumine (both for ourselves and for others) the world and our own human existence, so that in this luminosity we gain sight: human insight into ourselves [*Einsicht in sich selbst*] and an outlook on [*Aussicht auf*], and a practical insight into [*Umsicht über*], the world. . . . The fact that existence has and understands and strives for [*angestrebt*] this basic form of revealing [*diese Grundart des Offenbarmachens*] implies that, for the most part, much of the world stands in need of [*bedarf*] ‘revelation’ [*Offenbarung*], of being un-covered and made known. . . . So beings can be drawn out of their not-un-covered-ness [*Unentdecktheit*], their hiddenness [*Verborgenheit*]. They can be un-covered or un-hidden. This uncoveredness or unhiddenness of beings is what we call truth [*Wahrheit*]. . . . Truth is the un-covering of beings [*Wahrheit ist Entdeckung des Seienden*].”⁵⁷

Yet our practical way-finding, problem-solving, uncovering of beings does not lay bare *das Entbergen* itself. So “The issue is no longer to be ‘about’ something, to present something objective, but to be appropriated over to the appropriating event.”⁵⁸ Technological thinking does not because it need not ask “the real question” which, Heidegger says, is ‘What is it that calls on us to think?’ ‘The turn’ means to direct ourselves away from scratching up and putting together yet more beings and to ask

“What makes a call upon us that we should think and, by thinking, be who we are? That which calls on us to think in this way presumably can do so insofar as the calling itself, on its own, needs thought [*als das*

⁵⁵ Lovitt translates: “Insight does not make any discerning examination into what is in being that we conduct for ourselves.” “The Turning” in *The Question Concerning Technology* 46.

⁵⁶ Martin Heidegger, “The Turn,” in *Bremen and Freiburg Lectures: Insight Into That Which Is and Basic Principles of Thinking* (tr. Andrew J. Mitchell 2012) 70-71, 72.

⁵⁷ Martin Heidegger, *Logic: The Question of Truth* (tr. Thomas Sheehan 2010) 6, 141.

⁵⁸ Martin Heidegger, *Contributions to Philosophy (Of the Event)* (tr. Richard Rojcewicz and Daniela Vallega-Neu 2012) 5.

Rufende selber und von sicht aus das Denken braucht]. What calls us to think, and thus commands, that is, brings our essential nature into the keeping of thought, needs thinking [*braucht das Denken*] because what calls to us wants itself to be thought about according to its nature [*seinem Wesen nach selbst bedacht sein möchte*]. What calls on us to think, demands for itself [*verlangt von sich*] that it be tended, cared for, husbanded in its own essential nature, by thought [*in seinem eigenen Wesen bedient, gepflegt, behütet sei*].”⁵⁹

The calling calls because it needs thinking. It lacks. It wants ‘more,’ another iteration of self-articulating self-understanding⁶⁰ seeking “the unique and therefore single goal of our history . . . *seeking* itself, the seeking after being.”⁶¹

The half-billion year career of the dopaminergic reward circuit from safety device to ‘the calling’ – *von Wurme zum Menschen*⁶² – thus illustrates the fundamental aspect of historical change which so deeply stirred Nietzsche. As Darwin puts it,

“When this or that part [‘physiological organ (or legal institution, social custom, political usage, art form or religious rite)’⁶³] has been spoken of as adapted for some special purpose, it must not be supposed that it was originally always formed for this sole purpose. The regular course of events seems to be, that a part which originally served for one purpose, becomes adapted by slow changes for widely different purposes.”⁶⁴

DCW 9/03/2020

⁵⁹ Martin Heidegger, *What is Called Thinking?* (tr. J. Glenn Gray and Fred Wieck 1969) 121.

⁶⁰ *das Dasein selbst ist sichauslegendes, sichaussprechendes Seiendes. Prolegomena zur Geschichte des Zeitbegriffs*; GA 20.418.

⁶¹ *Contributions to Philosophy* § 5, p. 16.

⁶² “You have made your way from worm to man, and much in you is still worm.” Friedrich Nietzsche, *Thus Spoke Zarathustra* (tr. R. J. Hollingdale 1961); Zarathustra’s Prologue § 3.

⁶³ Friedrich Nietzsche, *On the Genealogy of Morality* (tr. Carol Diethe 1994) Second Essay, § 12.

⁶⁴ Charles Darwin, *The Various Contrivances by Which Orchids Are Fertilised by Insects* (2nd ed. 1877) 282. On this, ‘the Nietzsche-Darwin principle,’ see Stephen Jay Gould, *The Structure of Evolutionary Theory* (2002) 1214 and following.