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How to cite this publication

Please cite the final published version:

Wilson, A. (2017). Biosphere, Noosphere, Infosphere: Epistemo-Aesthetics and The Age Of Big Data. *Parallax*, 23(2), 202-219. doi:10.1080/13534645.2017.1299297

Publication metadata

| | |
|--------------------------|---|
| Title: | Biosphere, Noosphere, Infosphere: Epistemo-Aesthetics and The Age Of Big Data |
| Author(s): | Alexander Wilson |
| Journal: | Parallax |
| DOI/Link: | https://doi.org/10.1080/13534645.2017.1299297 |
| Document version: | Accepted manuscript (post-print) |

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BIOSPHERE, NOÖSPHERE, INFOSPHERE: EPISTEMO-AESTHETICS AND THE AGE OF BIG DATA

The evolution of human cognition has corresponded to the technological expansion of its state-space, increasing its degrees of freedom by tracking invariances and conjunctions in its relations with the world. This process has two aspects. First, the human has progressively broken up the unified whole that was the ‘magical unity’¹ (Simondon) of our pre-human ancestors into convenient and workable objects of knowledge that can be named, numbered, displaced, and exchanged. This is the abstract process of *discretization*, and it has gone step in step with hominization. Discretization is the essential mechanism of what Bernard Stiegler calls ‘grammatization,’ and corresponds to a process of dividing the world’s continuous fluxes and vague unities into ever smaller, countable parts and pieces. From the first flint tools to the computer, technics have always been a ‘grammatization of flows,’ for example, the discretization of ‘the flow of speech, or the flow of gestures of the worker’s body.’² But there is a second, complimentary process: that of synthesis, concrescence, or integration, which has also followed the course of hominization. Humans have extended their criticality not only by breaking the world up into smaller pieces, but by correlating these parts according to principles of symmetry and invariance, sequence and order. It is the organism’s capacity to encapsulate, to envelop an indefinite series, or to mark a horizon. This process can be thought of as complimentary to discretization: instead of a breaking-things-apart, it is process of enveloping, or of the constitution of a provisional whole (*holon*). It is also in this sense that physicists speak of a ‘grand unification’ of theory, but the integration of the life-world into a set of invariant causal relations can be said to occur in all living systems. More generally, all ‘extended critical’ systems may be said to produce such integrations as described by their stabilization upon a perpetual phase transition, a state of constant renormalization.³ The integration is a selective indication, simultaneously including and excluding relatively to that which is indicated. It is at the root of speculations about the eventual convergence of human knowledge upon an attractor, an *omega point*, or a *singularity*, as the ultimate end of a noölogical process. In his own speculative account of the place of the human thought within nature, Pierre Teilhard de Chardin posited such a convergence of the evolutionary process that in his view had seen successive layers of telluric organization rise from the crust of the earth, from inorganic geological matter, to the organic complexity of the biosphere, to the ‘hyper-personal’ transindividuality of reflective human thought.⁴ He called this the ‘*noösphere*’. Beyond the loftiness of his speculations, it is nevertheless possible to speak of a singularity of thought, of cognition and life. Experiences are integrated, irreducible to parts, and subjectively bounded, and there is an irreducible *complementarity between analysis and synthesis*.⁵

Today, the big data environment that tracks our interactions and displacements, that pulverizes the world as an abstract set of indexed variables, has been more appropriately described as an ‘infosphere’ (as we will see, this term is somewhat misleading, but let us use it for now). According to Luciano Floridi, the infosphere is a ‘fourth revolution’ in human thought, the most recent step in the Copernican displacement of the human from the world stage. ‘Turing displaced us from our privileged and unique position in the realm of logical reasoning, information processing, and smart behaviour. We are no longer the undisputed masters of the infosphere.’⁶ Turing is held to follow Freud, Darwin and Copernicus in the infliction of yet another wound to human narcissism. It is as though the prospect of a noösphere has been displaced by that of the infosphere, as though the organism’s process of cognitive synthesis had become obsolete, replaced by the lonely acts of sampling and

sequence matching, tireless iteration, measurement and calculation. If it is an effect of the human's outsourcing of intelligence to machines, is the infosphere the ultimate successor of the noösphere? Rising above thought like an algorithmic leviathan, has the infosphere made organism obsolete?

The present article argues that a better framework for thinking about the emergence of the infosphere is that human technoevolution has nefariously been overtaken by a *runaway process of discretization*. Culture now seems dominated by the rhetoric of discretization without bounds, without horizon, echoing Laplace's omniscient demon for whom, by perceiving all the micro causes of all the macro effects, 'nothing would be uncertain and the future, as the past, would be present to its eyes.'⁷ The big data society evokes the dream of absolute prediction and cybernetic control. I will problematize this line of thought from a noötechnical and 'epistemo-aesthetic' standpoint, by considering the shared aesthetic evolution of life, cognition and technè. We will see that the contemporary infosphere differs from the noösphere and biosphere in that it lacks essential features of organism, owing to the specific properties of the 'discrete-state machine,' which characterizes the computational paradigm. It will be argued that because it is the product of unbounded discretization, of analysis no longer complimented by synthesis, the infosphere is in effect severed from its roots in the extended criticality of life, and therefore does not maintain long-range correlations with the ecological milieus of the living. It will further be speculated that its elements therefore cannot directly participate in the production of *compossibility*.

DATA AND SENSATION

How is the infosphere any different from the horizon of sensation that has always *ipso facto* been the limit of knowledge? Cognition is at base rooted in some form of experience. In the words of William James, '[c]onceptual systems which neither began nor left off in sensations would be like bridges without piers. Systems about fact must plunge themselves into sensation as bridges plunge their piers into the rock.'⁸ Sensation is *identical to the vague boundary of knowledge*. Experience, *aesthesis*, is cognition's interface with the unknown. It is a surface of translation between doings and beings, events and memory, randomness and causality. Or as Deleuze put it, sense 'is never only one of the two terms of the duality which contrasts things and propositions, substantives and verbs, denotations and expressions; it is also the frontier, the cutting edge, or the articulation of the difference between the two terms...'⁹

Since the inception of hominization, the production of knowledge from sensations has been mediated by technics. In fact, know-how (technics) and knowledge are difficult to formally disentangle. Technics might be said to always supplement the courses sensation must follow on its way to becoming provisionally crystallized as knowledge. To gloss on Stiegler, the exteriorization of memory into hypomnemata is the very condition of the gap between reflective human consciousness and the sensations and reflexes that guide the animal within its semiotic environment. It should be noted, however, that supplementation already occurs on the level of the organism. The brain's interface with the world is already mediated by layers of neurological organization, nested feed-back systems, retentional contexts that selectively and sequentially transport sensations from the outside, in. These 'nerve currents' as William James called them, these layers of evolutionarily sedimented supplementation, constitute the organic prehistory of technical supplementation: the organism is always already prosthetic. As Brian Massumi rightly notes: 'What art and technology do is extend the body's existing regime of natural and acquired artifice, already long in active duty in producing the "virtual reality" of our everyday lives.'¹⁰

Nevertheless, specific aspects of the human experience originated with our ancestors' investment of the inorganic supplement. Leroi-Gourhan aptly linked the progressive dissociation of the human's sense of space and time from their speculated archaic unity with the cadences and rhythms of tool making and using. Our early ancestors transitioned from a world dominated by 'the natural rhythmicity of seasons, days, and walking distances to a rhythmicity regulated and packaged within a network of symbols—calendrical, horary, or metric—that turned humanized time and space into a theatrical stage upon which the play of nature was humanly controlled.'¹¹ One can imagine that the aesthetic environment of early humans was dramatically altered by the industrial explosion of flint tool production. A repetitive gesture mimetically infected the epigenetic evolution of *australopithecus aferensis*. No language or symbolic system yet existed, but younger individuals were raised into a rhythmic milieu metered by the repetitive knapping gestures that now occupied the species: reducing large blunt rocks to smaller and more incisive tools. The original Paleolithic industrial revolution resulted not only in the extension and supplementation of the body, but also to a renewed aesthetic context, dominated by a mechanical rhythmicity inseparable from the discretization of the world into smaller and more useful parts.

Our contemporary approach to knowledge still bears the mark of the first industrial revolution. The technogenesis that has modulated the historical modes of discretization, and which corresponds to the evolution of human cognition, has developed as the fallout of its initial conditions, the renormalization that occurred following the organism's irreversible transgression of an evolutionary threshold. Even the etymology of the word 'science' stems from the proto indo-european root **skei-* and the Greek *skhizein*, meaning to split, to cut, to cleave, as in 'schism' and 'schedule'. Indeed the evolution of human knowledge follows the history of human discernment, that is, of a process and capacity to tell one thing from another, distinguishing flesh from bone, food from poison, friend from foe, sacred from profane, alive from dead. And this history has marched in step with the evolution of technology. From the first flint tools—which were devices for cutting, chopping, and reducing larger things into smaller pieces—to the modern data centre, which now amasses metrics to an ever-higher degree of precision and resolution, or the particle accelerator, a machine that pulverizes the smallest known constituents of matter, the evolution of knowledge is rooted in an original event of analysis, an act of cutting the world apart into smaller pieces.

Technics and knowledge are thus joined at the hip. But the organism's production of milieu requires a second, complimentary process: the inclusive (and exclusive) synthesis or concrescence, the *becoming one of the many* as Whitehead called it.¹² The production of mereological inclusion, of horizon, of continuity, must be allied to discretization in order to produce the cognitive milieu. As Jacob von Uexkull so elegantly observed, each organism actively selects its Umwelt from its surroundings, and is indeed *inseparable* from this selection, this reduction of the world's complexity into a manageable model that includes the features it finds to be significant, while excluding irrelevant ones.¹³ The world does not appear to an organism in its complete objective reality. What an organism experiences is the part of the world that will have *meaning for it*, providing sustenance, shelter and reproductive affordances. The organism is selective, it includes and excludes, it is constituted in its production of a subset of the world around it. And so to the active process of *distinction* must be coupled an active process of *indication*. Distinguishing and indicating are reciprocally presupposed aspects of epistemo-aesthetic evolution. An organism *is* its particular way of skewing reality. A milieu is an indication of aspects of the actual environment that it

includes. Indication implies a masking out of the irrelevant, an occlusion of that which is insignificant for the organism's on-going activity of self-reproduction and maintenance. One might say that there is an essential organismic *amnesia*: the organism conveniently 'forgets' to consider certain aspects of the world. Or otherwise put, it 'gets bored' of counting its discernments, and jumps, through virtuality, beyond the limit of the series in order to envelop it in concept. This amnesia and boredom are aspects of the process of inclusion and exclusion that characterizes the organismic synthesis. Furthermore, this is precisely what computational systems fail to do, for they never get bored (they iterate indefinitely), and never forget (a digital copy is identical to the original).

NOÖSPHERE AS TOTAL SCIENCE

*...total science is like a field of force whose boundary conditions are experience.
A conflict with experience at the periphery occasions readjustments in the interior
of the field.
Quine.¹⁴*

The Umwelt requires a horizon, and this limit corresponds to sensation. As Locke put it: 'the simple ideas we receive from sensation and reflection are the boundaries of our thoughts...'¹⁵ If our technologically-expanded human Umwelt can be thought of as a *noösphere*, it should also be likened to Quine's concept of *total science*. It corresponds to a system of symmetries and synonymies, translational invariances and ordering principles, classes and categories that populate our fluctuating mediated relationship to the chaos that surrounds us. It is a gradient from confusion to distinction, rather than from obscurity to clarity: at the edges, the sphere decomposes, dissolves into vagueness, and is dominated by infinite speeds; near the centre it hardens and slows under extreme pressures. The core is thus inhabited by seemingly unquestionable or necessary truths, while the boundaries are contingent experiences in their purest and most radically unpredictable form. The field of integration spanning from the boundary to the core might be referred to as *aesthesia*. It is the fabric of the perpetually revisable sphere of thought. It corresponds, in one sense, to the Leibnizian concept of *compossibility*: this field of reciprocal constraints between contingent facts that expresses the self-consistency of the real. But instead of being grounded in necessity, as was knowledge in the Leibnizian system, here the noösphere's synthetic or integrative function is the precondition of necessity: what we call necessity is not that which grounds contingency, but rather that which is formed under the contingent pressures of compossibility. Indeed, if there is such a thing as a total science, it is but the provisional clearing of a region of relative causal stability and predictability; for human knowledge is a network of reciprocally-constraining references to relatively stable factors of the otherwise random and unpredictable world it interfaces with. Toward the centre, the pressures of compossibility are most intensely compelling and obliging. Yet even the apparently necessary truths found at the core are provisional to their eventual revision by *events*. With Deleuze, one can understand the surface as the origin of all events, which are essentially 'pure surface effect[s].'¹⁶ Novelty therefore enters the sedimented strictures of the total science from the periphery, and its aesthetic effects ripple and propagate across the matrix. All events are symmetry-breakings and catastrophes: they irreparably change the topology of the Umwelt, remapping its connections, functions, and capacities.

Now, contrary to Teilhard de Chardin's noösphere, which is categorically distinguished from the biosphere, the total science I'm referring to makes no strict distinction between biological sentience and reflective human intelligence or sapience. As we've seen, noötechnics cannot be formally distinguished from biotechnics, that is, from the natural organic supplementation of biology. It might be more accurate to speak of a *semiosphere*; both life and thought correspond to a manifold of biosemiotic milieus within the chaotic nonsense of the 'extra-semiotic space that surrounds it,' as Juri Lotman depicts it.¹⁷ Indeed, on a certain level of description, Deleuze and Guattari were right to say that '[t]here is no biosphere or noösphere, but everywhere the same Mecosphere.'¹⁸ That is to say, from the perspective of the greater 'chaosmos' that the authors sometimes refer to, which includes both the order of cosmos and the randomness of chaos, there is no definite direction to the process of life/cognition, no vitalist force guiding it to higher degrees of perfection, no promise of convergence, no hierarchy or priority. Yet from the point of view of the living organism and its long-range resonances—both horizontally, with its ecosystem, and vertically, with its path-dependent evolutionary trajectory—it is nevertheless possible to speak of a certain spatiotemporal asymmetry. The living is *oriented* within spacetime, it is subjective, agentic, and this fact is indissociable from the polarities of its nested levels and membranes. As Simondon notes,

on the level of the polarized membrane the interior past and the future exterior confront each other : this confrontation in the operation of selective assimilation is the present of the living, that is made of this polarity of passage and refusal, between substances past and substances that are to come, presents one to the other through the operation of individuation; the present is this metastability of the rapport between inside and outside, past and future...¹⁹

ORGANISM'S MERELOGICAL ENTANGLEMENTS

The origin of mathematics is directly linked to the organism's production of Umwelt. This follows from Henri Poincaré's influential insight that the fundamental axioms of Euclid's geometry—straight lines and dimensionless points, three-dimensional space and relative distances—emerge from our specific human physiology. They are less objective facts than *transductive* facts, so to speak, having to do with the human organism's afforded capacities to distinguish, indicate, and correlate features of its world. For instance, Poincaré defined the geometric point as the class of muscular sensations that accompany the gesture of physically *pointing* to it with one's body (as one does, typically, with one's finger). Two points differ only in the physiological sensation of the actual sequences of muscular sensations required for their 'construction' by a moving body in space. According to Bernard Teissier, 'what we perceive as signification is in fact a resonance produced by our physiology between our conscious thought and the structure of the world as integrated, in an unconscious manner, by our senses.'²⁰ There is 'a very strong relation between the *modes of integration* of the data from our different perceptual systems [...] that permit a unified perception of our environment and the *signification* of the mathematical objects that we use to describe this environment.'²¹ Euclid's concept of 'line without thickness' is linked to the pre-conceptual motions made possible by the human's bodily constitution and its interference with the particular affordances presented to it by the world in which it evolves. The formalization of Euclidean space thus mirrors Deleuze's notes about the emergence of language: 'It is a question of a dynamic genesis which leads directly from states of affairs to events, from mixtures to pure lines, *from depth to the production of surfaces*...'²²

The points, the lines, the surfaces and other *events* which must be teased out or abstracted from the concrete mixture, result from what Hume called ‘constant conjunction’. As he discovered, causality is constructed, the product of an empirical activity of abstraction. ‘Beyond the constant *conjunction* of similar objects, and the consequent *inference* from one to the other, we have no notion of necessity of connexion.’²³ The abstraction of causal regularity is inseparable from our physiological process of habituation to the world in the creation of our associated objectivity. Like Pavlov’s dog, we are *conditioned* to abstract a system of invariances from the chaos around us; ‘we believe in causality because we have been conditioned phylogenetically to do so by the regularity with which phenomena succeed one another in the physical world.’²⁴ An example of such a constant conjunction is the isomorphism Teissier finds between the visual geometric line and what he calls the ‘vestibular line’, proprioceptively drawn within perception by the inner ear’s registration of changes in the body’s acceleration (the Poincaré-Berthoz isomorphism). The organism finds a path of least resistance, or a *geodesic*, in the invariant transformation of both systems—visual and proprioceptive—and thereby registers the invariance in which the geometric ‘object’ of the line is founded. The commonplace notions of sequence and continuity, as well as the mathematical concepts of ordinality (set theory) and of boundary (topology), Teissier argues, descend directly from this simple organismic identification between the visually represented line and the proprioceptively felt or anticipated gesture for constructing it.²⁵

Before the hand-tool couple and the face-language couple,²⁶ there is perhaps the *hand-face* couple, that is to say, a constant correlation between what is seen and how one might reach for it. Poincaré argued that ‘[t]he third dimension is revealed to us in two different ways: by the effort of accommodation, and by the convergence of the eyes. No doubt these two indications are always in harmony; there is between them a constant relation...’²⁷ This is the deeper, prescientific sense of ‘what I cannot create, I do not know’,²⁸ for knowledge implies the construction of a provisional model of objectivity, an Umwelt, be it implicit or explicit, and this construction implies a specific series of gestures experienced physiologically by the organism. What is significant here is the implication that *it is impossible to formally distinguish knowledge from the sensation of its anticipated construction.*

Importantly, however, this does not mean that it is possible to *formally* reduce mathematical symmetries and physical invariances to the constant conjunction of series of muscular sensations and visual cues. Indeed, this impossibility has been confronted time and time again. As Teissier points out, Gödel’s incompleteness theorems imply that ‘all that is observable is not rationally deducible from elementary principles and facts.’²⁹ There is thus a necessary gap which cannot be formally bridged between semantics and syntax, that is, between sensation as the implicit condition of meaning and knowledge as explicit demonstrative expression. This gap is essentially an extension of Hume’s problem of induction, and follows the history of failures of empiricism and logical positivism to bridge the gap. Inductions cannot be reduced to logical formalism (Carnap) any more than to abstractions of empirical fact. Following Quine’s compelling argument against the dogma of reductionism, this is because ‘the total field [of knowledge] is so undetermined by its boundary conditions, experience, that there is much latitude of choice as to what statements to re-evaluate in the light of any single contrary experience. No particular experiences are linked with any particular statements in the interior of the field, except indirectly through considerations of equilibrium affecting the field as a whole.’³⁰ Though there is evidently a *factual* isomorphism between experience and demonstrative knowledge in the organism’s ongoing inference of causal regularity, it nevertheless cannot be completely explicitly expressed, because any explicit expression necessarily operates an occlusion of some share of

the whole. There is no way to recuperate all meaning from logical formalism because ‘semantics exceeds syntax.’³¹

This impossibility to reduce the semantic to the syntactic must be problematized alongside the apparent distinction between noösphere and biosphere, or between sapience and sentience. So much has been made of this apparently strict disparity between sensation as a ‘dull, confused, and stupid perception’ and the clarity of sapient perception or knowledge. This prejudice can be traced back at least to Anaxagoras: knowledge and reason (sapience) were aligned with a *conquering* of the complexities and confusions of the world, while conversely, sensation on its own was reduced to a domination of the soul by chaos and passions. Ralph Cudworth reported that in the philosophy of Plotinus

to suffer and to be conquered [are identified], as [are] to know and to conquer[.] Sense that suffers from external objects lies as it were prostrate under them, and is overcome by them... Sense is therefore a certain kind of drowsy and somnolent perception. [...] The perceptions of which compound, or of the soul as it were half asleep and half awake, are confused, indistinct, turbid, and encumbered cogitations very different from the energies of the noetical part, ... which are free, clear, serene, satisfactory, and awakened cogitations.³²

This mythical prejudice is part of our background of uncritically held assumptions. It codifies the relation between organism and world as a *conflict* deciding whether it will have been a case of sensation or a case of knowledge. In this tug of war between organism and world, it is sentience if the world dominates and sapience if the organism dominates. It should be noted that this prejudice also mirrors the deeply set philosophical assumption that there is an objective distinction between analytic and synthetic, or necessary and contingent truths. Analyticity is supposed to offer insights into the necessary, closely allying it to sapient knowledge. Synthetic, a posteriori knowledge, on the other hand, is held to reveal only contingent and ultimately trivial empirical facts, much as sentience is held to be uncritical reaction to world events. Necessary truths are supposed to say something meaningful about the world, and thus provide knowledge, while contingent truths are mere sensations, or stupid perceptions.

But in matters of organism this distinction is difficult to maintain. This can be elucidated through René Thom’s terminology of *salient* vs. *pregnant*. Thom critiqued Gestalt theory’s shortcomings in its failure to distinguish what he called ‘pregnant’ forms from merely ‘salient’ forms. Though salient forms are ‘registered in [...] short-term memory, [they] have no long-term effect on the behaviour of the subject (human or animal) or on its physiological state. The situation is different, [he maintained,] where forms that carry a biological significance for the animal are concerned.’³³ Pregnant forms carry semantic content. While a salient form might be any environmental discontinuity registered by the organism, such as a sharp noise piercing through the silence, or a flash of lightning cutting through the sky, such an event is not necessarily ‘pregnant’ in his view. A pregnant form or event will cause a real physiological change in the organism, changing its behaviour in some way. The distinction between salient and pregnant obviously echoes that between sentience and sapience. Both are a distinction between sensing on its own, and sensing with an added element of purposiveness. Pregnancy has a semantic content or import, it is a ‘cause’ to act, a reason, an ‘ought,’ while salience only conveys an ‘is,’ and does not motivate action.

These assumptions are challenged directly when one asks, how does data acquire meaning? How does salience become pregnancy? Thom's answer is that the difference is physiological in nature. The recognition of 'pregnant' forms, such as those 'of prey for the (hungry) predator, of the predator for its prey, of a sexual partner at the appropriate time, [...] gives rise to a very ample reaction in the subject: the freeing of hormones, emotive excitement, and behaviour designed to attract or repulse the inductive form.'³⁴ But if the difference between meaningless data and meaningful information is simply that meaningful information engages the physiology of the subject as to attract or repulse the object in question, while meaningless data does not activate the organism's behaviour, we are led into the abyss of regress. For is the sensory organ that provides discursive thought with the salience it is to evaluate (in terms having pregnancy or not) not already *smuggling in* its own implicit semantic assumption in its very distinction/indication of the data it is forwarding for evaluation? In other words, if your organism has forwarded this data to your consciousness for evaluation, has it then not already been physiologically mobilized by the data? If so, how is this not already pregnancy in the sense described above? When we try to formally distinguish salience and pregnancy in such a sense, we inevitably fall into a regress of retentional contexts, each always already selective, each always already mobilized by some implicit semantic valuation of that which is sensed. Indeed, the organism's mereological integration, and its correlative entanglement of sentience and sapience, salience and pregnancy, syntax and semantics, are the hallmarks of organismic incompleteness, making it formally impossible to reduce one to the other, as well as to completely distinguish one from the other of these pairs.

THE HORIZONLESSNESS OF THE DISCRETE-STATE MACHINE

Finitude fetishizes iteration: it naively clings to a manipulable unit and would thus become intoxicated with concreteness while forgetting that it surrenders itself bound hand and foot to the demands of the successive, which gives it no respite: it endlessly covets the next +1. It will see one, two, three ... n poplars, but will never manage a row of poplars.
Châtelet.³⁵

As I will now show, though the infosphere may appear to be an expansion of the Umwelt, or of total science, and thus tempt thinkers like Floridi to situate it as a 4th Copernican revolution, it lacks the essential organismic features just discussed. Big data is generated by algorithmic machines that can select for salience, but which do not participate in long-range mereological resonance with organism. They operate wholly within the realm of the finite, the discrete and the syntactical. Whereas within organism salience and pregnancy are necessarily entangled, with information technology saliences are perfectly disentangled from pregnancies. Artificial intelligence is currently founded on the hypothesized reducibility of natural, biological or cognitive functions to the 'discrete-state machine' originally generalized by Alan Turing.³⁶ The systems that now operate the selection of the saliences around us, are basically symbol sequence matching devices, sorting machines. Echoing James' *bridges without piers*, they run into logical problems of contextualization, of infinite regress, and are characterized by potentially endless iteration that never 'passes to the limit', each algorithm diverging forever, never plunging its piers into the vague rock of aesthesia.

The discrete state machine is horizonless. It iterates tirelessly, 'one operation per nanosecond without any weariness nor boredom,' while in organisms the story is wholly different, '[a]fter a couple of iterations, we get tired and we stop or say: "OK, I got it" and we look at the

horizon.³⁷ Another interesting result of Gödel's work was its demonstration that the *finite cannot be formally defined* without an axiomatic stipulation of infinity.³⁸ In other words, infinity, as a limit, as a horizon, is the condition of the finite. Without the horizon of actual infinity, there can be no tame finitude of distinctions. The indication of the infinite and the distinction of the finite are reciprocally presupposed, neither can be without the other. Within the discrete-state machine, on the other hand, no horizon exists, no holistic entanglement between infinite and finite, semantic and syntactic. The algorithm thus concedes to the *indefinite*. As Gilles Châtelet argues,

[a]ny timidity in deciding the horizon tips the infinite into an indefinite. Furthermore, this indefinite also contaminates the finitude, which, when it is simply placed beside the infinite, ignores the discipline of the oblique and breaks up, still nursing the hope of recapturing its foundation—the infinite—which always steals a little further away. This is why, in the indefinite, everything 'finishes' by being the same thing...³⁹

As an extended critical system, as a perpetual *phase transition*, the living being is in a constant state of renormalization between local and global scales of relevance.⁴⁰ In the organism there is a perpetual production of horizon corresponding to its constant renormalization; there is no base-state where the organism is merely passively identifying, sampling, discerning various discrepancies in its environment *prior to* coming to discern something that is of specific relevance to its on-going self-constitution. This further suggests that there is an identity between an organism's dynamic functional structure, and its sensation or cognition of the environment. This echoes Maturana and Varela's assertion that: '*[l]iving systems are cognitive systems, and living as a process is a process of cognition.*'⁴¹ It suggests that the discrete-state machine, which has no horizon, will always fail to cognize in the rigorous sense. For it knows no passage to the limit, no enveloping of the parts by the whole, no 'discipline of the oblique.' It never catches up with infinity. This issue is central to many of the major problems with symbolic approaches to artificial intelligence.

One such problem is the *symbol-grounding problem*. Imagine being transported to a planet where an alien language is spoken. You might want to buy a local dictionary to get started learning it. But of course this dictionary would not have any references to earthly languages. You would look up an alien word and its definition would be in the alien language, so you would then have to look up those words too, and then the words making up the definitions of those words, and so on. Going on like this, it is obvious that you would never learn the new language, for there is nothing in the dictionary that bridges the gap between your implicit knowledge of meanings and the self-referring network of meaningless symbols printed in the dictionary. How will you ever recuperate the meaning in the symbols? How will you ever find a match? Another, related, problem faced by discrete-state systems is that they have trouble establishing what is relevant to making adequate inferences about the world. In artificial intelligence, the *frame problem* is the problem of how to explicitly define our *common sense law of inertia*. 'If the computer is running a representation of the current state of the world and something changes, how does the program determine which of its represented facts can be assumed to have stayed the same, and which would have to be updated?'⁴² There are potentially infinite indirect effects of each occurrence or action carried out in the world, and we cannot possibly be surveying all of these every time we turn a doorknob or lift a glass of water to our lips. Some of these infinite effects will almost certainly affect our subsequent possibility for action. So if we are forced to make those explicit, such as when programming a robot to perform simple tasks, we have to figure out a way to identify and eliminate those potential effects that are irrelevant to the problem at hand.

But of course, this is very tricky, because the question of what is relevant is always *context dependent*: and so again we're faced with an infinite regress of contexts. The frame problem concerns the 'problematic nature of explaining the full task set of activities and *possible* functionalities and uses for operating in the world [...]. The problem is that there is no full account, or set of algorithms, that can be given about all possible actions, uses and functions.'⁴³ '[R]elevance is holistic open-ended and context sensitive'.⁴⁴

These difficulties echo the ancient paradox of *Meno*. 'How can you go around looking for something when you don't know what you are looking for? Even if it's right in front of your nose, how will you know that's the thing you didn't know?'⁴⁵ Aristotle too realized that this problem of contextual regress concerned all knowledge. He writes,

...assuming that there is no way of knowing other than by demonstration, [...] an infinite regress is involved, on the ground that if behind the prior stands no primary, we could not know the posterior through the prior ([...] for one cannot traverse an infinite series): if on the other hand [...] the series terminates and there are primary premises, [...] these are unknowable because incapable of demonstration...⁴⁶

It is a dilemma between an infinite regress of references to prior knowledge and some circular chain of justifications. Aristotle rejected both alternatives, and proposed that there was a kind of knowledge which was valid *a priori* without being demonstrable, and that '[d]emonstrative knowledge must rest on [such] necessary basic truths...'⁴⁷ Socrates' answer to Meno went much the same way: you *always already know* the knowledge that you seek, you merely have forgotten it (as the soul's memories are washed away in rebirth), but you just know it when you see it, *a priori*, through an act of *anamnesis*.

'[O]ne cannot traverse an infinite series,' argues the Aristotelian critic, and yet this is exactly what the organism's perpetual renormalization effectuates, thanks to its mastery of the horizon, its passage to the limit. What the ancients did not realise was that experience, as a boundary of knowledge, is equivalent to an instantaneous traversal of the infinite series. The fact that organisms in effect solve such relevance problems in every instant of their lives suggests that the organism's constitution is *semio-physical* through and through. The organism's on-going judgment of what is relevant is identical with its very selective constitution. Our boredom and amnesia have a functional role: infinite regress or iteration is only satisfied by a conditional act of passing to the limit, or of enveloping a series within an aesthetic horizon: we see the row of poplars, not just the individual poplars. It is this essential act that the discrete-state machine fails to perform. Unlike the discrete-state machine, the organismic machine's perceptive mechanism and its capacity to identify meaning are entangled, in the quantum mechanical sense of the word. They may be *complementary* with regards to specific interactions, but are not formally or objectively distinct. This is related to what George Spencer-Brown's calculus of indications demonstrated: *indication is formally identical to distinction*. A distinction is always already an indication and visa-versa. Though we all can intuitively grasp that there can be no indication without distinction, it is less obvious that, likewise, there can be no distinction without indication. 'There can be no distinction without motive, and there can be no motive unless contents are seen to differ in value.'⁴⁸ Simultaneously, the only way to specify any distinction at all, is to cross it in one direction or another, thereby indicating the value. '[T]he crossing of a boundary can be identified with the value of the content.'⁴⁹

In contrast to the discrete-state machine, there is therefore no zero-state in which the organism unilaterally *samples* the environment for changes without being simultaneously affected by the slightest fluctuation sensed. If a sensation is sensed, a difference is necessarily registered in the organism's degrees of freedom: it moves, it accommodates, it registers a difference. This mutual codetermination of the subjective selection and the meaningful objective occurrence was recognized by J. J. Gibson in his theory of *affordances*. Affordances belong neither to the 'outside' world nor to the 'inside' of the organism, but somehow consist of the very relations between them. 'An affordance is neither an objective property nor a subjective property; or it is both if you like. [...] It is equally a fact of the environment and a fact of behaviour. It is both physical and psychical, yet neither. An affordance points both ways, to the environment and to the observer.'⁵⁰ Affordances are thus involved in the mutual constitution of subject and object as a single process. They can be fruitfully thought of in terms of Simondon's concept of transduction, which also captures this procedure: the inside and outside are transductively produced, and neither is there before the other, for their relation logically precedes the terms. And so there is no point at which there is an un-meaningful or merely salient event of action/perception, for each event already presupposes the implicit reduction of the greater world to the environment as a logical condition for the transduction, and each production of environment in turn presupposes its own conditional transduction.

This is why the infosphere should be renamed the 'datasphere.' For information is 'difference which makes a difference.'⁵¹ Data on the other hand, don't make any difference. In order for a difference to make a difference, it must be accommodated by the organism, registered *as* pregnancy. Given that the organism is a resonant cascade of nested sensory contexts, it is not far fetched to speculate that what is sensed is always already *pregnant for the retentional context that senses* it, in that the accommodation happens in accordance with the affordances available to it, along paths of least resistance. The 'message' then forwarded to the subsequent 'level' will thus always already have been pre-selected and formed, and at no point, therefore, is it ever a purely unqualified *salience*. One cannot distinguish objectively whether the world or the organism has ever won the tug of war, whether mere sensation has occurred, or whether knowledge has been acquired. The inside and outside have changed irreversibly, whether our convention classifies the occasion as an active or passive one. All sensations are always already significant *ipso facto*, by means of the functional material constitution which permits the sensory context to discern events in the first place. If we must distinguish sapience from sentience in terms of 'normativity', then we are left with a regress of normative contexts, or something akin to what Johanna Seibt has called a 'normativity gradient.'⁵² But of course in this case the normative and the natural neither are reducible to each other, nor are they formally distinguishable. Meaning should therefore not be seen as arising *after the fact* of sensation. The normative does not arise after the empirical. The *ought* does not follow the *is*. Rather, the terms of these relations are entangled, and the reduction of one to the other always offers incomplete coverage.

CONCLUSION: WHAT TO DO WITH A DATASPHERE?

It is clear that discretization now runs amok. If this epistemo-aesthetic account of the differences between the biosphere/noösphere and the big data environment is correct, we are faced with a proliferation of distinctions that are not recuperated by indication. The age of big data is the fallout of discretization's progressive and arbitrary pulverization of the world around us. It signals the victory of discretization over concrecence, analysis over synthesis,

and the more it prevails, the more our capacity to create concepts and percepts is threatened. The dream of digital omniscience is founded on an implicit metaphysics of finitude and discretion, a Cartesian space of pixels and voxels, a *Laplacian world*, where everything can be predicted to perfection, where all macrophysical properties *supervene* inefficaciously on the microphysical. Novelty is impossible in the discrete-state machine; everything is written from the beginning, inscribed in the explicitly known initial conditions. Indeed, if the finite discrete-state machine cannot manage a ‘row of poplars’, to use Châtelet’s example, the problem we are faced with today is one of *not seeing the forest through the trees*.

Our contemporary culture seems so eager to submit to the *indefiniton* of data. Has undisciplined discretization always been the ultimate purview of enlightenment? There is a brand of contemporary prometheism that certainly seems to think so. But we should ask: why are we so committed to replacing the resonant entanglements of the organism with their digital approximations? We already know the limitations of syntax, and yet, like religious fanatics, we continue to pursue the impossible recovery of cognition in syntax alone. Our culture has embarked on an accelerated evacuation of infinities and of pregnancies, in the pursuit of an objectivity that we already know is unobtainable through iteration. There is, of course, a chance that we are submitting to algorithmic control because we are still blind to its effects, instinctively following the course of a malignant inertial thrust, an asymmetrical diffusion of *noötechnogenesis* toward untamed discretization and indefiniton. But if it is true that objectivity is produced through the contingent constraints of compossibility, which act reciprocally between events as they are *integrated* into the empistemo-aesthetic manifold, we may in this submission to discretization be mortgaging the very possibility of a world. Recall, for instance, of the transhumanist position that minds should eventually be uploaded to software, transcend embodiment and become pure intelligence; if my account is correct, an artificial intelligence devoid of incompleteness, entanglements and horizons, in effect precludes the possibility of aesthesia and cognition. The ‘great outdoors’ such a disembodied intelligence would step into would immediately dissolve, like a desert mirage.

Before the mereological resonances of cognition are extendable to autonomous artificial systems, we may have to wait for properly extended-critical technologies that incorporate the entanglements and incompleteness of the living. In the meantime, the discrete-state machine will likely continue to insert itself everywhere, between our thoughts, multiplying the steps between each concept, distracting us with bare saliences, making it more and more difficult to think. We must find ways to cope with this process, for example by multiplying the discrete-state machine’s confrontations with biological under-determination, with organic incompleteness, with intrinsic randomness, and by infecting, wherever possible, its algorithmic syntax with semantic anomalies and inconsistencies. To be contextualized as relevant and meaningful, digital saliences need to be routed back to the organismic machine of horizons, infinities and perpetual renormalizations. If we are ever to find a way beyond the age’s impasse, therefore, we must build conceptual and perceptual machines that compensate the discrete-state machine’s shortcomings with infinities and non-linearities, that is, with noötechnics that introduce drifts, bifurcations, and passages to the limit.

NOTES

¹ Simondon, *Du mode d’existence*.

² Stiegler, “Teleologics of the Snail,” 40.

³ Bailly and Longo, *Mathematics and the Natural Sciences*.

⁴ Teilhard de Chardin, *The Phenomenon of Man*.

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- ⁵ As is clear from quantum theory, the closer we look at reality, that is, the finer our analytical discernments, the more we find reality to be non-locally 'smeared out' into a synthesis of possible worlds in superposition.
- ⁶ Floridi, *The 4th Revolution: How the Infosphere Is Reshaping Human Reality*, 92.
- ⁷ Laplace, *A Philosophical Essay on Probabilities*, 4.
- ⁸ James, *The Principles of Psychology Vol. 2*, 9.
- ⁹ Deleuze, *The Logic of Sense*, 28.
- ¹⁰ Massumi, "Envisioning the Virtual," 64.
- ¹¹ Leroi-Gourhan, "Gesture and Speech," 315.
- ¹² Whitehead, *Process and Reality*.
- ¹³ Uexküll, *Mondes Animaux et Monde Humain*.
- ¹⁴ Quine, "Two Dogmas of Empiricism," 42.
- ¹⁵ Locke, *The Works of John Locke Vol. 1*, 308.
- ¹⁶ Deleuze, *The Logic of Sense*, 182.
- ¹⁷ Lotman, "On the Semiosphere," 208.
- ¹⁸ Deleuze and Guattari, *A Thousand Plateaus*, 69.
- ¹⁹ Simondon, *L'individuation*, 228 (my translation).
- ²⁰ Teissier, "Géométrie et Cognition," 5 (My translation).
- ²¹ Teissier, "Géométrie et Cognition", 11 (My translation).
- ²² Deleuze, *The Logic of Sense*, 186.
- ²³ Hume, *An Enquiry*, 85.
- ²⁴ Thom, *Semio Physics*, 7.
- ²⁵ Teissier, "Géométrie et Cognition"
- ²⁶ Deleuze and Guattari, *A Thousand Plateaus*
- ²⁷ Poincaré, *Science and Hypothesis*, 24.
- ²⁸ The phrase Richard Feynman famously left to posterity on his office blackboard.
- ²⁹ Teissier, "Géométrie et Cognition," 12.
- ³⁰ Quine, "Two Dogmas of Empiricism," 39-40.
- ³¹ Bailly and Longo, *Mathematics and the Natural Sciences*, 89.
- ³² Cudworth quoted in: James, *Principles of Psychology Vol. 2*, 11.
- ³³ Thom, *Semio Physics*, 6.
- ³⁴ Thom, *Semio Physics*, 6.
- ³⁵ Châtelet, *Figuring Space*, 50.
- ³⁶ Turing, "Computing Machinery and Intelligence."
- ³⁷ Bailly and Longo, *Mathematics and the Natural Sciences*, 77.
- ³⁸ Bailly and Longo, *Mathematics and the Natural Sciences*, 76.
- ³⁹ Châtelet, *Figuring Space*, 52.
- ⁴⁰ Bailly and Longo, *Mathematics and the Natural Sciences*, 230-231.
- ⁴¹ Maturana and Varela, *Autopoiesis and Cognition*. 13.
- ⁴² Dreyfus, "Why Heideggerian AI Failed," 1138.
- ⁴³ Felin, Kauffman, Koppl, Longo, "Economic Opportunity and Evolution," 11.
- ⁴⁴ Shanahan, "The Frame Problem."
- ⁴⁵ Plato, *Meno*, 12.
- ⁴⁶ Aristotle, *Posterior Analytics*, book 1, part 3.
- ⁴⁷ Aristotle, *Posterior Analytics*, book 1, part 6.
- ⁴⁸ Spencer-Brown, *Laws of Form*, 1.
- ⁴⁹ Spencer-Brown, *Laws of Form*, 2.
- ⁵⁰ Gibson, *The Ecological Approach*, 129.
- ⁵¹ Bateson, *Ecology of Mind*, 386.
- ⁵² Seibt, "Naturalize Sensory Consciousness"

BIBLIOGRAPHY

- Aristotle. *Posterior Analytics*. Translated by G. R. G. Mure. Adelaide: eBooks@Adelaide, 2015.
<https://ebooks.adelaide.edu.au/a/aristotle/a8poa/index.html>.
- Bailly, Francis, and Giuseppe Longo. *Mathematics and the Natural Sciences: The Physical Singularity of Life*. Advances in Computer Science and Engineering: Texts, v. 7. London : Hackensack, NJ: Imperial College Press ; Distributed by World Scientific Pub, 2011.
- Bateson, Gregory. *Steps to an Ecology of Mind: Collected Essays in Anthropology, Psychiatry, Evolution, and Epistemology*. Northvale, N.J.: Aronson, 1987.
- Châtelet, Gilles. *Figuring Space: Philosophy, Mathematics, and Physics*. Science and Philosophy, v. 8. Dordrecht ; Boston: Kluwer, 2000.
- Deleuze, Gilles, and Félix Guattari. *A Thousand Plateaus: Capitalism and Schizophrenia*. Minneapolis: University of Minnesota Press, 1987.
- Deleuze, Gilles, Constantin V. Boundas, and Mark Lester. *The Logic of Sense*. London: The Athlone Press, 1990.
- Dreyfus, Hubert L. "Why Heideggerian AI Failed and How Fixing It Would Require Making It More Heideggerian." *Artificial Intelligence* 171, no. 18 (December 2007): 1137–60. doi:10.1016/j.artint.2007.10.012.
- Felin, Teppo, Stuart Kauffman, Roger Koppl, and Giuseppe Longo. "Economic Opportunity and Evolution: Beyond Bounded Rationality and Phase Space." *SSRN Electronic Journal*, 2013. doi:10.2139/ssrn.2197512.
- Floridi, Luciano. *The 4th Revolution: How the Infosphere Is Reshaping Human Reality*. First edition. New York ; Oxford: Oxford University Press, 2014.
- Gibson, James Jerome. *The Ecological Approach to Visual Perception*. Hillsdale, NJ: Erlbaum, 1986.
- Hume, David. *An Enquiry Concerning Human Understanding*. Philosophical Essays Concerning Human Understanding. Chicago: Open Court Pub. Co., 1921. <http://catalog.hathitrust.org/Record/011204388>.
- James, William. *The Principles of Psychology*. [Place of publication not identified]: Digireads.com, 2010.
- Laplace, Pierre Simon. *A Philosophical Essay on Probabilities*. 1st ed. New York : London: J. Wiley ; Chapman & Hall, 1902.
- Leroi-Gourhan, André. *Gesture and Speech*. Cambridge, Mass: MIT Press, 1993.
- Leroi-Gourhan, André. *Gesture and Speech*. Cambridge, Mass: MIT Press, 1993.
- Locke, John. *The Works of John Locke in Nine Volumes*. 12th ed. Vol. 1. 9 vols. London: Rivington, 1824.
- Lotman, Juri, and Wilma Clark. "On the Semiosphere." *Sign Systems Studies* 33, no. 1 (2005): 205–26.
- Massumi, Brian. "Envisioning the Virtual." In *The Oxford Handbook of Virtuality*, Ed. Mark Grimshaw. New York: Oxford University Press, 2014.
- Maturana, Humberto R, and Francisco J Varela. *Autopoiesis and Cognition: The Realization of the Living*. Dordrecht, Holland; Boston: D. Reidel Pub. Co., 1980.
- Plato. *Meno*. Translated by J. Holbo and B. Waring, 2002.
https://www.ma.utexas.edu/users/rgrizzard/M316L_SP12/meno.pdf.
- Poincare, Henri. *Science and Hypothesis*. CreateSpace Independent Publishing Platform, 2012.
- Quine, W. V. "Main Trends in Recent Philosophy: Two Dogmas of Empiricism." *The Philosophical Review* 60, no. 1 (January 1951): 20. doi:10.2307/2181906.
- Seibt, Johanna. "How To Naturalize Sensory Consciousness and Intentionality Within A Process Monism With Normativity Gradient--A Reading of Sellars." In *Sellars and His Legacy*, edited by James O'Shea. Oxford University Press, 2015.
- Shanahan, Murray. "The Frame Problem." In *The Stanford Encyclopedia of Philosophy*, edited by Edward N. Zalta, Spring 2016., 2016. <http://plato.stanford.edu/archives/spr2016/entries/frame-problem/>.
- Simondon, Gilbert. *Du Mode D'existence Des Objets Techniques*. Philosophie / Institut Catholique de Paris, Faculté de Philosophie. Paris: Aubier, 2001.
- Simondon, Gilbert. *L'individuation à La Lumière Des Notions de Forme et D'information*. Paris: Editions Jérôme Millon, 2005.
- Spencer-Brown, G. *Laws of Form*. New York: Dutton, 1979.
- Stiegler, B. "Teleologies of the Snail: The Errant Self Wired to a WiMax Network." *Theory, Culture & Society* 26, no. 2–3 (March 1, 2009): 33–45. doi:10.1177/0263276409103105.
- Teilhard de Chardin, Pierre. *The Phenomenon of Man*. New York: Harper Perennial Modern Thought, 2008.
- Teissier, Bernard. "Géométrie et Cognition; L'exemple Du Continu." Cerisy, 2007. <https://webusers.imj-prg.fr/~bernard.teissier/documents/Cerisy06final5-1.pdf>.
- Thom, René. *Semio Physics: A Sketch*. The Advanced Book Program. Redwood City, Calif.: Addison-Wesley, 1990.

Turing, A. M. "Computing Machinery and Intelligence." *Mind* LIX, no. 236 (1950): 433–60.
doi:10.1093/mind/LIX.236.433.

Uexküll, Jacob von. *Mondes Animaux et Monde Humain Suivi de Théorie de La Signification*. Paris: Pocket, 2004.

Whitehead, Alfred North. *Process and Reality*. New York: The Free Press, 1982.