FutureCrafting: the Nonhumanity of Planetary Computation or, how To Live with Digital Uncertainty

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The age of planetary computation

Planetary computation. An epochal shift rewires humanity by impacting on our capacity to feel, to perceive, to sense and to think. Far from being a mere matter of speed of communication, this change has to do with the creation of new interlocking ecologies where information is sensed and the cognitive, perceptual and affective spheres mutate. Sensation prevails on signification. Data becomes us. Mediation shifts to immediation. This is the 4th Revolution when the digital-online world spills into and merges with the analogue-offline world. In this *onlife experience*, data is the new currency, code is synchronized to the human and the infosphere becomes synonymous with reality.[1] The proliferation of smart algorithmic environments evolving in real time, the colonization of daily life by social networks, the tsunami of data, the unstoppable googlification of knowledge together create new ecologies of cohabitation and coevolution of the human with the nonhumanity of planetary computation. Given this scenario, two questions emerge as urgent. What is the impact of the ongoing informatization of bodies, artefacts and environments on the whole of human cognition, affectivity and perceptual faculties? What kind of narratives, images and fictions are needed to make sense of the ecologies we now inhabit, populated by agents on a continuum between the human and the nonhuman, a mix of the human with machines,

dataflows, codes, algorithms; strange entanglements of silicon and carbon?

The indeterminacy of open machines

In the 1980s Félix Guattari was one of the first thinkers to write about the coming "age of planetary computerization".[2] Already in 1979 he had written: "the computer is effectively on the point of being integrated into a complex of enunciation in which it will become impossible to 'separate out' human intervention and machinic creativity"[3] – effectively foreseeing the current ecological landscape where human and nonhuman cohabit in unprecedented ways. Moreover, in *The Three Ecologies* Guattari discusses how the "acceleration of the technological and data-processing revolutions, as prefigured in the phenomenal growth of a computer-aided subjectivity"[4] would lead to a series of human and nonhuman opening, unfoldings, and becoming. Focusing on how the computer would become the vehicle of a crucial machinic semiotisation, Guattari heralds the coming "post-media era"[5] as remapping subjectivities on the basis of newly formed computerization-driven assemblages. The emergence of computer-based practices of subjectification is, crucially, charged with potentialities: "one may assume, in this respect, that it is the extension into a network of databanks that will have the biggest surprise in store for us".[6] Guattari emphasizes the creative and liberating potential of these new subjectivities that, perhaps for the first time in history, would be able "to lead to something more enduring than mad and ephemeral spontaneous outpourings – in other words, to lead to a fundamental repositioning of human beings in relation to both their machinic and natural environments (which, at any rate, now tend to coincide)".[7] If subjectivity is produced through large-scale machines including languages, media, and technological innovation, then computer technology becomes a nonhuman component feeding into the pre-personal part of subjectivity.[8] "Just as social machines can be grouped under the general title of Collective Equipment, technological machines of information and communication operate at the heart of human subjectivity, not

only within its memory and intelligence, but within its sensibility, affects and unconscious fantasms".[9] Put differently, our current eco-technological lives are no longer simply *mediated* by information and computation, but are fully constituted by them. This is how Guattari furnishes us with ways of thinking about new human-nonhuman ecologies, staying clear of both technodeterminism and technodystopia, while also refuting the naïve notion of machines and technologies as neutral tools. What is emphasized instead is the extent to which planetary computation undermines the structural distinction between machine and cognition, and forces us to reimagine the boundary between the human and the nonhuman.

> The object is no longer to compare humans and the machine in order to evaluate the correspondences, the extensions, the possible or impossible substitutions of the ones for the other, but to bring them in communication in order to show how humans are a component part of the machine, or combines with something else to constitute a machine. The other thing can be a tool, or even an animal, or other humans. We are not using a metaphor, however, when we speak of machines: humans constitute a machine.[10]

The cyberneticization of the world, that is, the introduction of information on a planetary scale, is the key to new modes of sense-making that are contextual, relational and not fully predictable, which emerge in our contemporary technological condition.[11] New practices of subjectivity stem from the increasing miniaturization and personalisation of apparatuses; an age of digital ensembles unfolds, characterized by *open* machines and by instability, uncertainty and indeterminacy. In his discussion of the history of technological objects, media theorist Erich Hörl articulates the shift from sense-making as the outcome of subjective acts, to sense "emerging from the non-signifying collaborative practices of humans, objects, and machines".[12] The technical object ceases to be instrumental accessory to the establishment of meaning and becomes instead the hinge of open, collaborative and

relational – even "post-meaning" – production of sense. This shift to openness and indeterminacy is what in cybernetics underpins the distinction between trivial and non-trivial machines. While a trivial machine is characterized by a one-to-one relationship between its input (stimulus, cause) and its output (response, effect), and is therefore entirely predictable, non-trivial machines "are quite different creatures"[13] as cyberneticist Heinz von Foerster wrote:

> Their input-output relationship is not invariant, but is determined by the machine's previous output. In other words, its previous steps determine its present reactions. While these machine are again deterministic systems, for all practical reasons they are unpredictable: an output once observed for a given input will most likely be not the same for the same input given later.[14]

The role of indeterminacy in the evolution of machines is remarked by French mechanologist Gilbert Simondon who, in the short text *Technical Mentality* discovered after his death and written probably around 1970, discusses the openness of technical objects as the condition of their perfectibility.[15] This condition of openness whereby the object is worked upon, expanded, amplified and upgraded suggests however also the irruption of the unexpected, the off-grid, the unplanned, the emergent, even the accidental, in the constitution of machines.[16] In *On the Mode of Existence of Technical Objects*, Simondon reminds us of the crucial role of indeterminacy in this process:

> The true progressive perfecting of machines, whereby we could say a machine's degree of technicity is raised, corresponds not to an increase of automatism, but on the contrary to the fact that the operation of a machine harbors a certain margin of *indeterminacy* (emphasis added). It is this margin that allows the machine to be sensitive to outside information. Much more than any increase in automatism, it is sensitivity to information on the part of machines that makes a technical ensemble possible.[17]

The technological unconscious

The milieu of pervasive computing, ambient intelligence and immersive, instantaneous connectivity producing new techno-aesthetic sensibilities and human-nonhuman entanglements can also be described as *technological unconscious*. Italian artist Franco Vaccari first coined this expression in the late 1960s to signal the autonomous capacities of the machine to produce a memory independent from human awareness.[18] The technological unconscious evokes humans increasingly constituted by computation, software and codes; electronic objects recursively and continuously reshaping the world. It evokes digital uncertainty, defined here as the potential for unprogrammed, unknown, and contingent outcomes in computation. For sociologist Nigel Thrift the technological unconscious is an immersive milieu where humans and computation feed into, and adapt, to each other. As computing flows in the environment filling every interstice, the technological unconscious becomes the operation of powerful and unknowable information technologies that generate "a pre-personal substrate of guaranteed correlations, assured encounters and therefore unconsidered anticipation"[19] and, in doing so, keep on producing everyday life. Today's general ecological reality, then, is made of extensively cyberneticized, heterogenic subjectivities distributed in the environment, plugged into oscillating networks of digital uncertainty and signaling a radical ontological reorganization of the human. It is clear, then, why Guattari has been described as the "first general ecologist and theoretician of a technological unconscious".[20]

The nonhumanity of Artificial Intelligence

Whether we call it 4th Revolution, technological unconscious, or planetary computation what matters is the potential this scenario has to produce new concepts, new images and new

narratives, and to call for new models of knowledge creation, enquiry and future building. One of the key questions prompted by planetary computation concerns how to envision the encounter with the nonhumanity of Artificial Intelligence. After all, this encounter has no previous road-mapping and should be embraced as an entirely novel experience, moving away from the anthropocentrism that permeates most of the current attitude towards AI. Rather than expecting AI to be like human intelligence this opportunity should be used to experiment with notions of intelligence inclusive of what is other-than-human: distributed, extended, relational, emergent and, crucially, not necessarily carbon-based modes of thinking. After all, the most common element on earth after oxygen is silicon, a crystal found mainly in beach sand. The world of computation, the allegedly 'immaterial' world of data and hyperconnectivity, hinges on crystals of sand.[21] In a 1980 interview with Catherine Clément Deleuze said: "You know, it's curious, today we are witnessing the revenge of silicon. Biologists have often asked themselves why life was "channelled" through carbon rather than silicon. But the life of modern machines, a genuine non-organic life, totally distinct from the organic life of carbon, is channelled through silicon. This is the sense in which we speak of a silicon-assemblage".[22] Undeniably, the silicon assemblage has now become a reality. In his book on Foucault, Deleuze makes further reference to the 'potential of silicon' in third-generation machines, and to the impact of cybernetics and information technologies on processes of formation of subjectivity.[23] The era of silicon gives tangible form to the vision of a new individual in charge of rocks and inorganic matter, gathering within him/herself both human and nonhuman forces (the enigmatic Superfold). Deleuze's prescient analysis helps us in reframing human-machine interaction as an encounter with the nonhuman. This is the only way out of the anthropocentrism of the Turing test, and its assumption of human intelligence as *the* benchmark. What if, instead, we recognize the multiplicity of existing intelligences, resist the urge to make them like us, and

choose to experiment with the unknown potential they may be heralding? Design theorist Benjamin Bratton argues eloquently against the anthropocentric fallacy that permeates the encounter with AI.[24] Rather than asking AI to pass the Turing's test, this encounter should be used to pose different questions, so to redefine, expand and reimagine what counts as intelligence. Rather than fixating on something that is not there (the similarity human-machine), the focus should be on grasping the alien intelligences that are not even recognized because they do not match human expectations. What if we paid attention to nonhuman forms of intelligence already existing among us? Enter the Octopus.

The nonhumanity of the Octopus

The octopus is an extraordinary creature. Unique among invertebrates it has been listed as a kind of "honorary vertebrate" because of its intelligence, adaptability and capacity to feel and express pain.[25] Octopuses are renowned for being smart, curious, resourceful and adventurous; they can handle tools, solve mazes, open jars and escape from impossible tight spaces.[26] With two thirds of its neurons located in the arms rather than in the brain, the octopus neural system is exceptionally decentralized. Its arms are effectively autonomous agents. Thus, the octopus is a paradigmatic example of embodied and distributed cognition, and has become a remarkable model for soft robotics and AI research. [27] This has led to the first entirely soft *octobot* recently developed by Harvard scientists.[28] As the closest form of alien intelligence that we can study, the octopus is the blueprint for the development of an autonomous AI whose neural networks can adapt to and learn from the environment.[29]

It is appropriate at this point to draw on design theorist and polymath Vilém Flusser's wonderful work of philosophical fiction *Vampyroteuthis infernalis*[30] which looks at the human ontology and human communicative capacities from the inhuman perspective of the giant deep-sea squid. Scathing about the anthropomorphic and hollow criteria by which

humans understand life, Flusser deploys the nonhumanity of the Vampyroteuthis to raise thought-provoking points on information technology and its powers of control and capture.

> We are vertebrates of such complexity that we have managed to appropriate, by developing an immaterial art, an evolutionary strategy of mollusks. As our interest in objects began to wane, we created media that have enabled us to rape human brains, forcing them to store immaterial information. We have built chromatophores of our own-televisions, videos, and computer monitors that display synthetic images- with whose help broadcasters of information can mendaciously seduce their audiences.[31]

The nonhumanity of algorithms

Let's start by saying that the specific technological object "algorithm" informs a radical revision of the order of things, of human rationality and of thinking itself.[32] As the epitome of the post-industrial technical object, the algorithm embodies a technicity potentially *open* to infinite recombinations and endlessly perfectible. Andrew Goffey's formula "Algorithm = Logic + Control" emphasizes the algorithm's programme of action: its pragmatic functioning.[33] As a statement of intent, the algorithm make things happen; it both utters and generates. However, the conventional definition of the algorithm as recipe or "a series of steps undertaken in order to solve a particular problem or accomplish a defined outcome"[34] is not sufficient. For media philosopher Yuk Hui the comparison algorithm=recipe fails to distinguish between automatization of instructions (pure repetition) and automatization through recursion, where functions are (partially) self-defined. Instead, he argues that the algorithm is modulated by a horizon of contingency: what is neither known, nor present, yet.[35] For digital media theorist Luciana Parisi the current computational paradigm is based on the capacity of algorithm to respond and adapt to external inputs; to learn rapidly and to recursively base new outputs upon this learning.[36] A new dynamism intrinsic to computation emerges, a space in "between input data and algorithmic instructions, involving a non-linear elaboration of data"[37] where "algorithmic automation heralds the realization of a second nature, in which a purposeless and impersonal mode of thought tends to supplant the teleological finality of reason".[38] Parisi contends that algorithmic automation, in its radical

indifference to human qualities, signals the emergence of an alien, nonhuman mode of thinking. An instance of this is the 'machine-phase' of financial markets (high-frequency stock trading) where algorithms make decisions in the order of the millisecond, faster than any human. Not only does the sub-millisecond speed at which algorithmic trading operate and the massive quantity of algorithm-to-algorithm interaction exceed human comprehension; what is more, it cannot be fully controlled nor its outcomes fully anticipated. In Parisi's words: "the increasing volume of incomputable data (or randomness) within online, distributive, and interactive computation is now revealing that infinite, patternless data are rather central to computational processing".[39] Drawing on mathematician Gregory Chaitin's *algorithmic randomness* – the notion that in every computational process the output is always greater than than the input – Parisi argues that the entropic transformation of data that takes place in computation is what gives rise to the incomputable: "increasing yet unknown quantities of data that characterize rule-based processing".[40] Thus, the *incomputable* is now at the heart of computation. A key implication is that algorithmic automation can no longer be understood through the framework of Turing's discrete computational machine - a mechanism of first order cybernetics, a closed system of feedback based on a priori instructions based on step-by-step procedures endlessly repeatable. This is what automation means: initial conditions can be reproduced *ad infinitum*. Contemporary algorithmic automation, on the contrary:

> It is designed to analyze and compare options, to run possible scenarios or outcomes, and to perform basic reasoning through problem-solving steps that were not contained within the machine's programmed memory. For instance, expert systems draw conclusions through search techniques, pattern matching, and web data extraction, and those complex automated systems have come to dominate our everyday culture, from global networks of mobile telephony to smart banking and air traffic control.[41]

This is the essential difference between Turing's position – where computation stops when the incomputable begins – and Parisi's, who asserts that computation is defined by its internal margin of incomputability. It is this incomputability that, far from being a break *from* reason, signals the expansion *of* reason "beyond its limits to involve the processing of maximally unknown parts that have no teleological finality".[42] What is remarkable is that "this challenges the view that computational processing corresponds to calculations leading to pre-programmed and already known outputs. Instead, the limits of automation – that is, the incomputable – have become the starting point of a dynamism internal to computation, which exceeds the plan for technocapital's instrumentalization of reason".[43] Far from demonstrating the shortcoming of a mechanical view of computation, which equates randomness to error, the incomputable has become the absolute condition of computation, thus provoking irreversible change in algorithmic rules.

If we accept Parisi's argument, then computation becomes an incomplete affair constantly open to revision, which signals the irruption of nonhuman thought and, consequently, demands with urgency that we develop modes of understanding, interacting and relating with it. How can the human build affinity with the nonhuman logic of the machine? How do we develop the necessary strategies to adapt to the contingent; the inventive methods to imagine new relations; the stratagems to fine-tune to the unknown? If openness, uncertainty and indeterminacy characterize the new ecologies we inhabit, then we have to do it with astute intelligence. We must design ways of thinking from within the human-nonhuman ecosystems; we must develop a speculation pliable enough to be unhinged from teleology and top-down directives; we must be able to navigate ever-shifting territories and negotiate flexible boundaries. Then, if this is the challenge we face, what is needed are ways of creating new figures of thought: what I call FutureCrafting.

FutureCrafting

FutureCrafting is about reconceptualizing contingency and rethinking uncertainty.[44] It is about treating them both as a material to work with, rather than as a risk or a threat to avoid, which is symptomatic of a need to impose patterns of control and predictability. By FutureCrafting I mean the activity of giving shape to the future - here and now. *Future* is about speculating, but avoiding the trap of escaping into a fantasy of what the future could or should be. Instead, FutureCrafting concerns ways of capturing the future, grabbing it and bringing it back to the here and now so to inform the present. Which is the *Crafting* part: crafting pertains exquisitely to the now. In this sense FutureCrafting is speculation by design, a performative rather than descriptive strategy, whose interventions are designed to prompt, probe, and problematize, to inject ambiguity and even the non-rational and the non-sensical.[45] To borrow philosopher Isabelle Stengers' expression when she writes about "speculative methodologies", FutureCrafting is a practice that "affirms the possible, that actively resists the plausible and the probable targeted by approaches that claim to be neutral".[46] However, I would push this argument even further and argue that, more than affirming the possible, FutureCrafting has the propensity to actualize the virtual. There are three crucial points to remember about the actualization of the virtual:

- Actualization is always *problematic* and *problematizing*. Actualization is nothing but the creation of problems, and this is the reason why it is creative: because it breaks with the principle of identity, questions the existent, and introduces the unforeseen.[47]
- The actual does not resemble the virtual from which it emerges. Thus, the outcome of the process cannot be predicted: *unpredictability* is part and parcel of actualization.

- Actualisation needs imagination. The creation of difference and divergence needs *imagination*: something that has not been seen before. Imagination, Deleuze reminds us, "crosses domains, orders and levels, knocking down the partitions coextensive with the world, guiding our bodies and inspiring our souls, grasping the unity of mind and nature; a larval consciousness which moves endlessly from science to dream and back again".[48]

Framed in this way FutureCrafting becomes a strategy and a stratagem to conjure new figures of thought. The purpose of this exercise in imagination is multiple. FutureCrafting aims to make visible the invisible, to expose the unsaid, to trigger unexpected reactions, to illuminate the existent and bring into relief what is already happening, to provoke thought in venturing into unknown fields, to bring forth potential. This is why FutureCrafting is a set of tools that is simultaneously forensic, diagnostic, and divinatory. It is *forensic* because it concerns things taken as witnesses in order to articulate the existent.[49] It is *diagnostic* because it invents explanatory hypotheses in an interrogative fashion, by borrowing from abduction - a method of investigation unconstrained by a priori theory or a posteriori verification, but attuned instead to unpredictability, speculation and imagination. Finally, FutureCrafting is *divinatory*, as, like dowsing, attracts images around which new thoughts can coalesce. In this sense, FutureCrafting gives priority to imagination over direct observation, searches for the least familiar hypotheses, those with no verifiable answer, and leans toward the production of what is not there yet. It is driven by the question *what if?* It is speculative, in the same way in which sorcery is. If FutureCrafting is about looking into uncertain territories and working with contingency to imagine different futures, then there are many fields that already operate in this way: some philosophy, some artistic practice, some design, some experimental science, some finance. What all these practices have in common is that they operate in the gap between the "could" and the "is". This *otherwise* is the space where FutureCrafting

encounters planetary computation and its urgent demands. This is where where FutureCrafting gives us tools to live with digital uncertainty.

Crucially, digital uncertainty draws attention to the tension between machines that are increasingly autonomous and unpredictable, and the systemic control and pre-empting of expectations performed by digital apparatuses of capture. Much has been written about this: from Google's ambitious project of telling its users what they 'should be typing',[50] to the filter bubble argument according to which personalized search reinforces users' views and perspectives,[51] to the uber-connected dystopian scenario envisioned by American writer Dave Eggers in *The Circle*.[52] Planetary computation largely operates through dispositives of affective capture that, by narrowing down open-ended choices, effectively tame potential. Potential– which is always potential to actualize unknown relations and express the unexpected – is thus turned into prediction. Media theorist Anna Munster writes lucidly about this process whereby what *might* happen next, becomes what *will* happen next.[53]

This is why uncertainty becomes such a precious resource.[54] It alters established perceptions, disrupts linear predictability and shows the potential of operating in a state of indeterminacy, where the construction of what is possible depends on random, contingent and not fully known components. This, it can be argued, is the essence of creativity. Philosopher Elizabeth Grosz has written extensively on how the production of art is tied up with the unpredictable chaotic emergence of the future. She describes creativity as "the capacity to elaborate an innovative and unpredictable response to stimuli, to react or, rather, simply to act, to enfold matter into itself, to transform matter and life in unpredictable ways".[55] A similar argument is found in the science of nonlinear systems where indeterminacy is essential to the emergence and evolution of life. Physicist David Bohm sums this up neatly when he writes: "if we were to remove all ambiguity and uncertainty, creativity would no longer be possible".[56] So, if contingency and uncertainty are a resource to

capitalize upon, then FutureCrafting strategies that embrace uncertainty rather than shun it or trying to flatten it, should be taken into account to experiment with scenarios of cohabitation and entanglements of the human and the nonhuman, and to test the spectrum of the creative responses emerging in the space between them. What is fostered in this space is potential, the same potential constantly eroded by the systemic capture of planetary computation. And it is on this potential that we must focus if we want to craft possible futures.

Metis

To do so we need new myths, new stories, new fictions, and even new dreams that can counteract the capture of the imaginary. This is where FutureCrafting steps in as a way to produce interventions that can *trouble* us, to produce a fiction that creates *friction***.** To live with digital uncertainty, we must develop affinity for nonhuman intelligence. What is needed, let's repeat it, is astute intelligence, craftiness, cunning science, the capacity to act quickly and effectively within ever-changing contexts, an intelligence that can produce localised, contingent, adaptable, opportunistic knowledges. We have it already and it is called *metis.* In Greek mythology Metis was the goddess of cunning intelligence, and Zeus's first wife. Zeus swallows her as soon as she conceives Athena, and in doing so he makes Metis part of his own body of sovereignty and control, eliminating any element of unpredictability and disorder from the establishment of logos. Metis is

> a type of intelligence and thought, a way of knowing; it implies a complex but very coherent body of mental attitudes and intellectual behaviour which combine flair, wisdom, forethought, subtlety of mind, deception, resourcefulness, vigilance, opportunism, various skills and experience acquired over the years. It applies to situations which are shifting, disconcerting and ambiguous, which do not lend themselves to precise measurement, exact calculation or rigorous logic.[57]

If the classical human embodiment of metis is Odysseus, the Trickster, the wily and cunning agent of craftiness, multiskills, and technical intelligence, I would like to end my reflection by evoking, again, the tentacular intelligence of the octopus, acknowledged by the Greeks as the most refined example of nonhuman embodiment of metis. In advocating the octopus as a possible image to think with, I am following the words of mid-sixth century BCE Greek lyrical poet Theognis of Megara:

> Adopt the disposition of the octopus, crafty in its convolutions, which takes on
> The appearance of whatever rock it has dealings with.
> At one moment follow along this way, but at the next change the colour of your skin:
> You can be sure that cleverness proves better than inflexibility.[58]

Endnotes

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[5] Guattari Félix, *Soft Subversions* (New York: Semiotext[e], 1996) p. 106.
[6] Guattari Félix, *Schizoanalytic Cartographies* (London: Bloomsbury, 2013) p. 42.
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