

Mindaugas Gapševičius, Ursula Damm, Melissa Harrison (eds.)

NON-MACHINES

EXPERIENCING LIFE BEYOND MACHINES AND HUMANS



[transcript] Image

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Non-Machines

↔ Mindaugas Gapševičius is an artist and researcher working at the intersection of art, technology, and biology. He studied at the Vilnius Academy of Arts and later completed an M.Phil. at Goldsmiths, University of London, later followed by a PhD at Bauhaus-Universität Weimar in 2022. Since 2015, he has been affiliated with Bauhaus-Universität Weimar, where he works as a research fellow. His work investigates the relationships between human creativity, non-human entities, and technological systems. Gapševičius initiated and co-founded the media art platform Institutio Media and Berlin's first community biolab.

↔ Ursula Damm is a German artist and professor known for her work at the intersection of interactive digital art, urban space, and ecology. She holds the chair for Media Environments at the Bauhaus-Universität Weimar, where her projects explore both nature and technological systems. Using contemporary technologies, her installations serve as mediators between the habitats of humans, animals, and plants. Alongside her public art installations, her work has been exhibited internationally at major media art exhibitions and festivals, including Ars Electronica.

↔ Melissa Harrison is a Berlin-based researcher, architect, movement-artist, writer, editor, and facilitator working across critical spatial practices, commoning, and embodied experience. Her doctoral research at the NTUA explored spatial practices of commoning and pedagogies of (un)learning; she also holds an MA in Architecture from the University of Auckland. She is a member of the > top project space and association, where she co-initiated the project Common(s)Lab; a member of the Urban Commons Research Collective that co-edited the Urban Commons Handbook; and an editorial member of the publishing platform AoA.

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MACHINE AND IMAGINATION

KRISTUPAS SABOLIUS

CAN ARTIFICIAL INTELLIGENCE IMAGINE?

In recent years, there has been an ongoing discussion concerning versions of artificial intelligence (AI) that have been granted the capacity to *imagine*. Google's machine-learning research team, DeepMind, has developed techniques for enhancing deep reinforcement learning through what they term *imagination-based planning*. Their claim is that algorithms can "benefit from model-based imagination without the pitfalls of conventional model-based planning".¹

Ironically, this proposal resonates with a Kantian move: to situate the function of *Einbildungskraft* — productive imagination — at the heart of cognitive processes.² For DeepMind, the future of AI is tied to its ability to imagine, grounded in the premise that intellection is impossible without imagination. AI "thinks better" only when it acquires the freedom of variability: the capacity to learn by adjusting and recombining predetermined patterns of action.

The "imagination-based planning" feature allows AI agents to model multiple versions of scenarios for future events based on preset conditions. As Pascanu and colleagues explain:

Here we introduce the 'Imagination-based Planner,' the first model-based, sequential decision-making agent that can learn to construct, evaluate, and execute plans. Before any action, it can perform a variable number of imagination steps, which involve proposing an imagined action and evaluating it with its model-based imagination. All imagined actions and outcomes are aggregated, iteratively, into a 'plan context' which conditions future real and imagined actions. The agent can even decide how to imagine: testing out alternative imagined actions, chaining sequences of actions together, or building a more complex 'imagination tree' by navigating flexibly among the previously imagined states using a learned policy.³

In other words, the intellect is here enriched by a capacity to interpret future events through a range of possible outcomes. What is at stake is not simply prediction, but a field of *potentiality* — the ability to "construct, evaluate, and execute plans", with particular emphasis on construction. The agent is thus endowed with a technical architecture of futurity: a methodology for navigating its domain. In this sense, "an internal model to reason about the future — also referred to as imagining — enables the agent to seek positive outcomes while avoiding adverse consequences".⁴

For example, in game environments, the agent employs an imagination-driven neural network: it learns by retaining useful information for decision-making while eliminating erroneous paths. Imagination of the future is thus conceived primarily as the simulation of possible trajectories in given circumstances, with the goal of selecting the most favourable outcome. This approach

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Theophane Weber et al., "Imagination-Augmented Agents for Deep Reinforcement Learning", in *Proceedings of the 31st Conference on Neural Information Processing Systems (NIPS, 2017)*, 1.

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Immanuel Kant, *Critique of Pure Reason*, edited and translated by Paul Guyer and Allen W. Wood (Cambridge University Press, 1998), A115/B154.

3

Razvan Pascanu et al., "Imagination-Based Planner for Deep Reinforcement Learning", in *arXiv* (2017), 1, arXiv:1707.06203.

depends upon what DeepMind researchers call an *environment model*:

In order to augment model-free agents with imagination, we rely on environment models — models that, given information from the present, can be queried to make predictions about the future. We use these environment models to simulate imagined trajectories, which are interpreted by a neural network and provided as additional context to a policy network.⁵

In reinforcement learning (RL), the environment is the system with which the agent interacts. Formally, it is defined by three components: a state space, which represents all possible situations the agent can encounter; an action space, which specifies the set of actions the agent can take; and the transition dynamics, which describe the rules or probabilities governing how the environment changes when an action is performed. In addition, the environment includes a reward function, which provides evaluative feedback by indicating whether a given action was beneficial or detrimental to the agent's objective.⁶

Why, then, does the environmental model become so fundamental? One reason is the problem of *domain complexity*. In informatics, a *domain* may be conceived as a milieu structured by technical parameters. Algorithms are often trained in simplified or symbolic environments, such as low-dimensional systems. Yet these artificially generated milieus may not adequately capture the multidimensionality of real situations. For this reason, machine learning research increasingly turns toward methodologies that test the relation between AI and its milieu, aiming to navigate uncertainty while searching for domains that simulate reality as closely as possible.

In DeepMind's experiments, imagination-based planning was tested in two games: Sokoban and MiniPacman. Sokoban, a classic planning puzzle, requires the agent to push boxes to designated locations. Because moves are irreversible, errors can render puzzles unsolvable, forcing the agent to plan several steps in advance.⁷ In MiniPacman, the player must explore a maze while avoiding ghosts, gathering food, and using power pills strategically to reverse vulnerabilities.⁸

Although complex, these examples remain *coordinated environments*: closed environments governed by strict teleologies of action and measurable outcomes. This is precisely why algorithmic performance can be quantified through errors and successful decisions. The imagination attributed to such agents, then, is circumscribed by the constructed environment itself — a simulation of possibility spaces rather than an open horizon of creativity.

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Weber, "Imagination-Augmented Agents for Deep Reinforcement Learning", 1.

5

Ibid., 3.

6

Richard S. Sutton and Andrew G. Barto, *Reinforcement Learning: An Introduction*, 2nd ed. (MIT Press, 2018).

7

Weber, "Imagination-Augmented Agents for Deep Reinforcement Learning", 4.

8

Ibid., 7.

WHAT IS IMAGINATION?

The imagination has been described in numerous ways through its functions, features, and possible applications. The concept itself has become very capacious and inclusive of numerous aspects, sometimes even conflicting ones, and this resulted in a vast plurality of its meanings. For instance, Leslie Stevenson⁹ outlined 12 conceptions of imagination that unfold in a wide range of possibilities — from a capacity to perceive a non-present object to the appreciation of things that express the meaning of the human life, or even as a power to create art.

What is the meaning of such a multiplicity of opposite functions? When we claim that the functionality of imagination is relative, what we have in mind is that various relations and their character sanction the operations of the activity of the imagination, generate them, affirm them, and determine the limits of such operations. However, the totality of observable functions does not exhaust the whole field of activity of imagination. Located within a new milieu, imagination involves itself in new relations, which are followed by a remodeling of its functionality. Whatever the role we propose for imagination, whatever the identification of the tasks it performs in various contexts, a more attentive regard towards its field of activity suggests that within its potential, we will always find new kinds of possibilities of functioning.

Fichte¹⁰ identified the problem in a nutshell: imagination is resistant to any single function — that is, as a power of the mind that reveals the dynamic tension between determinacy and indeterminacy, as if hovering in a state of perpetual oscillation, it strives for determination but never fully attains it.

The imagination posits no sort of fixed boundary: for it has no fixed standpoint of its own; reason alone posits anything fixed, in that it first gives fixity to imagination itself. Imagination is a faculty that wavers in the middle between determination and nondetermination, between finite and infinite; and hence it does indeed determine A + B, both through the determinate A, and also through the indeterminate B, which is that very synthesis of imagination of which we were speaking just now. — This wavering is characteristic of imagination even in its product; in the course of its wavering, so to speak, and by means thereof it brings the latter to birth.¹¹

If anything, this approach to indeterminacy should be understood as an effort to venture into the unknown through provisional schematisations and to smuggle back semi-determined “artifacts” from an alien domain into the realm of the known, thereby seeking to interweave two contradictory orders. This corresponds to the cultivation of the earlier formula A + B, which precludes the possibility of attaining a fixed perspective grounded in harmonious synthesis. The establishment of a unified viewpoint that neutralises contradictions remains the prerogative of intellectual cognition. Imagination, by contrast, without any claim to finality, continuously amalgamates opposing fields within its own movement, marking “this oscillation precisely through its product”.¹²

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Leslie F. Stevenson, "Twelve Conceptions of Imagination", in *British Journal of Aesthetics* 43, no. 3 (2003): 238–259.

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Johann Gottlieb Fichte, *The Science of Knowledge*, edited and translated by Peter Heath and John Lachs (Cambridge University Press, 1982).

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Fichte, *The Science of Knowledge*, 194.

12

Ibid.

Nevertheless, the core of Fichte's problem of imagination must be understood today within the context of technical objects and their networks. If imagination is the site where determinacy and indeterminacy meet, then it can likewise be understood in parallel with what Yuk Hui reformulates as the interaction between recursivity and contingency¹³ — an approach that shifts attention away from the functioning of individual "imagining agents" toward imagination as part of the history of technical becoming. This problem had already been identified by Simondon,¹⁴ Stiegler,¹⁵ and Montani.¹⁶

IMAGINATION AND TECHNICS

In *Technics and Time*, Bernard Stiegler¹⁷ defines the "human" through the technical, identifying what he calls a fatal inversion of evolution. Our origin, he argues, is neither purely biological nor transcendental but fundamentally prosthetic. It is not the human being who invents tools; rather, it is *archi-technical* exteriority that constitutes the human. Evolution, therefore, is inscribed within humanity as the self-revelation of technicity. Just as the technological precedes the organic, imagination likewise precedes perception.¹⁸

In the third volume of *Technics and Time*, Stiegler extends this argument by reformulating Kant's notion of transcendental imagination in explicitly technical terms, introducing the concept of tertiary retentions.¹⁹ Unlike Husserl's primary and secondary retentions — which describe how consciousness retains immediate impressions of the past (primary) and more distant recollections (secondary)²⁰ — tertiary retentions are *material memory objects*. They are not merely syntheses of inner experience but externalised supports that actively structure both experience and imagination.

Devices such as computers, telephones, and televisions fulfill their role only insofar as they synchronise consciousnesses, ensuring the homogenisation of memory and imagination. Being material and spatial, they are nonetheless imbued with temporal significance. Tertiary retentions thus act as prosthetic mechanisms of memory, structuring consciousness itself. Imagination is central to this process: just as tertiary retentions precede secondary and primary retentions, imagination precedes both memory and perception.

Stiegler²¹ embeds transcendental schematism within technological exteriorisations. He recalls Kant's example of the number five in the *Critique of Pure Reason*: though the schema differs from the image, it remains dependent on visualisation — whether through a child counting on fingers, the Roman numeral V, or the binary string 101 in computer science.²² This demonstrates how technical supports are constitutive of conceptual possibility.

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Yuk Hui, *On the Existence of Digital Objects* (University of Minnesota Press, 2016).

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Gilbert Simondon, *On the Mode of Existence of Technical Objects*, translated by Cecile Malaspina and John Rogove (Univocal, 2017).

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Bernard Stiegler, *Technics and Time, 1: The Fault of Epimetheus*, translated by Richard Beardsworth and George Collins (Stanford University Press, 1998).

16

Pietro Montani, *Technological Destinies of the Imagination* (Mimesis International, 2022).

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Stiegler, *Technics and Time, 1: The Fault of Epimetheus*.

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Ibid.

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Bernard Stiegler, *Technics and Time, 3: Cinematic Time and the Question of Malaise*, translated by Stephen Barker (Stanford University Press, 2011).

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Edmund Husserl, *On the Phenomenology of the Consciousness of Internal Time (1893–1917)*, translated by John Barnett Brough (Kluwer Academic, 1991).

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Stiegler, *Technics and Time, 3: Cinematic Time and the Question of Malaise*.

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Kant, *Critique of Pure Reason*, A140/B179;

To claim that the Kantian schema presupposes tertiary retention is, more generally, to insist that the faculties of knowledge, desire, and judgment must be thought in terms of technical evolution, according to new *exosomatic functions* incessantly produced in the "sur-natural" and "sur-realist" history of humankind.²³ These functions, accumulating into a system, form a tertiary retentional milieu wherein potentialities gather as revenants and spirits, inhabiting objects invested with meaning — books, images, symbols, temples — echoing Simondon's account in *On the Mode of Existence of Technical Objects*.

Simondon²⁴ approaches the question of imagination precisely within the context of the functioning of technical objects. Presenting his position as an alternative to Gestalt psychology, Simondon introduces imagination not as a means of examining a particular cognitive faculty, but as a conceptual framework that exposes the parallels between ontogenetic and epistemological dimensions. What in Gestalt theory occupies the role of background is, in the case of living beings or technical objects, identified as the plane of the *associated milieu*. Understanding the milieu as background, however, requires taking into account its dynamic character — one that initiates processes of formation while never coinciding with the final determinations of forms. The Gestalt dynamics of perception become possible only because not everything in this process is given in a completed or finalised form. As Simondon observes:

What has escaped the attention of psychologists in their analysis of the inventive imagination aren't the schemas, forms, or operations that stand out as the spontaneously salient and striking elements, but rather the dynamic ground upon which these schemas confront each other and combine, and wherein they participate. Gestalt psychology, while recognizing the function of totalities, attributed force to form; a deeper analysis of the inventive process would no doubt show that what is determinant and plays an energetic role are not forms but that which carries the forms, which is to say their ground. The ground, while perpetually marginal with respect to attention, is what harbors the dynamisms; it is that through which the system of forms exists. Forms do not participate in forms, but in the ground, which is the system of all forms — or rather the common reservoir of the forms' tendencies, well before they exist separately and constitute themselves as an explicit system.²⁵

From Simondon's perspective, then, contrary to the claims of Gestalt theory, it is *forms* that are passive; they become active only through their organisational interaction with the background. In other words, an articulated and crystallised form is passive, since its dynamic force has already been actualised and fulfilled. Yet, in the Gestalt-oriented description of perception, attention is directed precisely toward forms — emergent schemas, figures, and operations — thus obscuring the "dynamic ground upon which these schemas confront each other, combine, and participate". Simondon expands this analysis by introducing another crucial dimension: the background or ground should be understood as a "system of virtualities, potentials, and forces",

Stiegler, *Technics and Time*, 3: *Cinematic Time and the Question of Malaise*, 50.

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Bernard Stiegler, "Hades as an Accumulation of Tertiary Retentions", in *Philosophy of Photography* 8, no. 1-2 (2017): 9-18, <https://doi.org/10.1386/pop.8.1-2.9.1>.

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Simondon, *On the Mode of Existence of Technical Objects*.

25

Ibid., 60-61.

while the forms themselves retain the status of the actual system.²⁶

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Ibid.

It is also important to emphasise that, in this framework, Simondon conceives the dimensions of background and milieu as parallel. It is within these dimensions that the dynamic charge resides, for it is here that potentiality is concentrated: possibilities reach us only through our relation to the milieu. It thus becomes evident that the milieu or ground accumulates the *tendencies* of forms rather than the forms themselves or, we might say, the directions of determinations rather than the determinations as such. This description of the system further elucidates the role of imagination, which is realised at the moment when invention brings together mentality and matter.

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Ibid., 61.

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Stiegler, *Technics and Time, 1: The Fault of Epimetheus*, 177.

29

Ibid., 47.

This, precisely, is the relational function of imagination — to activate dynamism, transforming passive forms into active ones through their relation to the ground (or milieu), which nourishes actualisation with primordial virtualities. As Simondon writes:

Invention is the taking charge of the system of actuality through the system of virtualities, the creation of a unique system on the basis of these two systems. Forms are passive in so far as they represent actuality; they become active when they organise in relation to this ground, thereby bringing prior virtualities into actuality.²⁷

Hence, invention can be understood as an increment of being, in which imagination operates as a cyclical movement between mentality and matter — that is, as a phase of conjunction between epistemology and ontogenesis.

In relation to this, Stiegler's concept of *epiphylogenesis* conceives the genesis of the human as fundamentally ambivalent, focusing on the circular relation between the living being and its milieu, as the further elaboration of Simondon's proposal. The "paradox of exteriorization" thus enables us to say "that the human and the tool invent each other, that there is something like a technical maieutics".²⁸ Epiphylogenesis, a recapitulating and morphogenetic accumulation of individual experience, designates a new relationship between organism and environment — a relationship mediated by inorganic, organised matter, the *organon*. In this sense, the *what* invents the *who*, just as much as the *who* invents the *what*. By elaborating Gilbert Simondon's idea of the *associated milieu*, Stiegler conceives of the milieu as the entanglement of the organic and the technical:

The difference between *phusis* and *tekhne* thus fades, as if the industrial technical object had engendered a third milieu in which it "becomes more and more like a natural object. At its beginning this object was in need of a regulative exterior milieu, the laboratory or the workshop, sometimes the factory. Little by little [...] it becomes capable of dispensing with the artificial milieu."²⁹

The concept of milieu becomes fundamental in identifying and scaling the circular relationship of mixed ontology. As Hui

explains, the being of digital objects unfolds through three interrelated processes: first, the construction of ontologies or metadata schemes by theorists and engineers; second, their materialisation in software and databases, which establish a milieu for these entities; and third, the formation of a broader technological system where humans, machines, and digital objects become integrated within interdependent technical ensembles.³⁰

However, it is impossible to grasp it apart from the opening toward indeterminacy that is captured through imaginative processes. This is also how Pietro Montani interprets the Kantian conception of imagination as fundamentally interactive. According to Montani, imagination involves both cognitive and perceptual-motor engagement with the environment: for Kant, to imagine is not merely to form internal representations but to interact dynamically with the world — combining dispersed data into coherent schemas while simultaneously exploring the material properties of things through embodied action.³¹ Montani develops this interpretation in dialogue with Lambros Malafouris's Material Engagement Theory (MET),³² which situates imagination within the reciprocal interplay between humans and materials. As Montani notes, in processes such as shaping clay on a potter's wheel, cognition and material affordances co-constitute one another — the design intention emerges through interaction rather than preceding it action.³³ Thus, imagination, as Montani emphasises, cannot be reduced to an internal mental faculty but must be understood as an extended, relational event in which, along the words of Malafouris and Ihde, "we make things which in turn make us".³⁴

ASSOCIATIONS THROUGH MILIEU

Hui, in *On the Existence of Digital Objects*, constructs a productive tension between Heidegger and Simondon to articulate two distinct poles for understanding the role of technology. In *The Age of the World Picture*, Heidegger argues that the modern world picture is not merely another image or representation of the world but that "the world itself, the world as such, what is, in its entirety, is now taken to be that which is normative and binding for us."³⁵ In this sense, the field of worldly possibilities acquires visual characteristics: the world's conception becomes adjusted to the logic of the image, which can be positioned before a spectator in a stable and controllable viewpoint. As Heidegger further explains, "'world picture', when understood essentially, does not mean a picture of the world but the world conceived and grasped as picture."³⁶

For Heidegger, modern technology emerges from this mode of thought that "conceives and grasps the world as a picture", whereby "the fundamental event of the modern age is the conquest of the world as picture".³⁷ In this view, technology is rooted in the metaphysical detachment of thought from

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Hui, *On the Existence of Digital Objects*, 75.

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Montani, *Technological Destinies of the Imagination*.

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Lambros Malafouris, *How Things Shape the Mind: A Theory of Material Engagement* (MIT Press, 2013).

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Montani, *Technological Destinies of the Imagination*, 19.

34

Don Ihde and Lambros Malafouris, "Homo Faber Revisited: Postphenomenology and Material Engagement Theory", in *Philosophy & Technology* 32 (2018): 195–214.

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Martin Heidegger, *The Question Concerning Technology and Other Essays*, translated by William Lovitt (Garland, 1977), 129.

36

Ibid.

37

Ibid.

38

Hui, *On the Existence of Digital Objects*, 103.

being — objects become representations to be mastered, calculated, and controlled. Simondon, by contrast, according Hui, “sees a detachment of thoughts from objects” (Hui 2016, 103).³⁸ In *Imagination et invention*, Simondon develops the concept of the image cycle — a dynamic process linking anticipation, perception, memory, and invention.³⁹ In this framework, imagination is not a static faculty of representation but a mode of individuation through which living beings negotiate their relation to the milieu.

The cycle begins with anticipation, a phase of pre-adaptive openness in which the image functions as a “proto-organ of experience”, expressing tendencies and motoric readiness prior to any fixed object or goal — “an embryonic structure” that gestures toward functions not yet realised.⁴⁰ In perception, the image becomes receptive to external information, organising itself into “structural and functional subsets of psychic activity”.⁴¹ Here, imagination mediates between the organism and its milieu, not as a withdrawal from the real but as a form of sensorimotor integration that anticipates and shapes experience within a fluctuating environment. Through recollection and symbolisation, images acquire affective and emotional density, forming an “analogical milieu” that both mirrors and transforms the external world.⁴² Memory-images condense experiences into symbolic structures, enabling the subject to navigate reality through a self-organising topology of meanings.

Finally, invention marks both rupture and renewal. It arises when the psychic system encounters discontinuity or incompatibility, prompting a reorganisation of its internal structures. As Simondon writes, “invention is the appearance of the extrinsic compatibility between the milieu and the organism and the intrinsic compatibility between the subsets of the action.”⁴³ Each invention represents a change of order, a new cycle that transcends the limitations of the previous one. For Simondon, image and invention belong to distinct yet continuous ontological domains: invention externalises the latent tendency toward invention already contained within every image. Thus, imagination can be described as a transductive process through which the psychic system maintains openness to transformation — a “world within the world” that continually reconfigures the relations between individual and milieu.⁴⁴

As Hui notes, “the concretization of technical objects brings to light some new functions that weren’t part of the design”, what Simondon calls *fonctions surabondantes*.⁴⁵ Once realised, these technical objects enter new milieus of use and meaning, generating further imaginative and social transformations. Hui thus places Heidegger and Simondon not as opposites but as two poles operating at “different orders of magnitude”, producing a kind of “quantum leap” between them.⁴⁶ Heidegger emphasises the totalising logic of modern thought that turns the world into a picture, whereas Simondon foregrounds the generative autonomy of technical objects that exceed human intention.

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Simondon, *Imagination et invention*.

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Ibid., 20-21.

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Ibid., 32.

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Ibid., 52-54.

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Ibid., 73.

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Ibid., 91.

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Hui, *On the Existence of Digital Objects*, 103.

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Ibid., 104.

This juxtaposition allows Hui to frame technology as both a site of metaphysical capture and of creative excess: "two types of amplification in two cycles, namely, the cycle of thoughts and the cycle of images as invention".⁴⁷ Consequently, this leads to a reformulation of the problem itself: to conceive the digital object not as an isolated entity but as part of a broader process of individuation within its milieu. As Hui observes,

The individuation of the digital object has to be situated not only in the structure of the object itself but also in its exterior surroundings, which constitute partly its associated milieu. The associated milieus are only possible when we take ontology into consideration and hence are able to understand individuation.⁴⁸

RELATIONAL ECOLOGY OF IMAGINATION

In response to Heidegger's and Dreyfus's criticism of cybernetics, Hui argues that their analyses have become less central in an era increasingly defined by digitalisation, by what Heidegger termed the *Gestell*. The power of artificial intelligence, he notes, lies in its capacity to reduce the world to computational models. Yet this is not simply a critique of reductionism per se; the problem arises only when reductionism is mistaken for the totality of reality, as in the legacy of Cartesian mechanism.⁴⁹

In this sense, we should not oppose machines to ecology,⁵⁰ as if technology merely violated nature's harmony — a view inherited from eighteenth-century thought. Instead, he proposes an *ecology of machines*, distinct from both technological determinism, nature and machine opposition, or the Gaia hypothesis of Lovelock and Margulis.⁵¹ Just as ecology depends on biodiversity, an ecology of machines requires technodiversity: a plurality of technical forms and ways of thinking. Without technodiversity, Hui warns, both cultural and biological diversity risk disappearance under the pressures of a homogenising rationality. In this sense, "Biodiversity is the correlate of technodiversity, since without technodiversity, we will only witness the disappearing of species by a homogenous rationality."⁵²

Although other life forms may exhibit forms of intelligence, humans distinguish themselves through symbolic invention, which constitutes both a stage in evolution and the foundation of a symbolic world structured by representation, operation, and process.⁵³ Human intelligence, as Hui notes, arises from the capacity to invent inorganic tools and symbols, the human as *animal symbolicum*⁵⁴ or as a technical being.⁵⁵ It is precisely here that the potential for ecological imagination emerges: by interrogating the symbolic forms of human imagination through the continual inclusion of nonhuman perspectives within hybrid or mixed milieus.

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Ibid., 104.

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Ibid., 105.

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Yuk Hui, "On the Limit of Artificial Intelligence", in *Philosophy Today* 65, no. 2 (Spring 2021): 339–357. <https://doi.org/10.5840/philtoday202149392>

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Yuk Hui, "Machine and Ecology", in *Angelaki* 25, no. 4 (2020): 54–66. <https://doi.org/10.1080/0969725X.2020.1790835>.

51

James Lovelock and Lynn Margulis, "Atmospheric homeostasis by and for the biosphere: the gaia hypothesis", in *Tellus* 26, no. 1–2 (1974).

52

Hui, "Machine and Ecology", 63.

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Hui, "On the Limit of Artificial Intelligence", 350.

Drawing on Kurt Goldstein's concept of *Auseinandersetzung* (or debate), Georges Canguilhem describes learning as the process "through which the living brings its own proper norms of appreciating situations, both dominating the milieu and accommodating itself to it".⁵⁶ Experience, in this sense, can be understood as an experimentation with functions: one learns through practice until these functions are formalised as part of one's experiential repertoire. It is precisely within this process that negotiation occurs, determining whether elements of interiority or exteriority prevail. Canguilhem characterises this as a *structural polarity of creation*.⁵⁷

The human being, as a technical entity, embodies a *heteropoietic* logic — a logic of external creation — in which exteriority imposes itself by offering instruments through which all action is mediated.⁵⁸ In this sense, humans internalise external creativity, continually incorporating tools and meta-tools into their modes of existence. Yet to understand the functioning of living beings more broadly, it becomes necessary to bracket this anthropocentric logic of action and attend instead to what Canguilhem — again following Goldstein — calls the "creative agency" of biological knowledge: a generative, at times seemingly paradoxical, form of biological intelligence.⁵⁹ Guided by this impulse, organisms exist autopoietically, through ongoing self-realisation in contact with their milieu, asserting their vitality through continuous adaptation and invention.

If negotiation is understood as the continuous interaction between an organism and its milieu, then the processes of imagining can also be interpreted through this lens. The answer to the question posed at the beginning: can AI imagine? — should thus be framed by emphasising two key points. The theme of imagination points toward trajectories of relation; hence, imaginative processes should be seen as cyclical phases of connection that ceaselessly recalibrate the trajectories of human and nonhuman imagination. The question, therefore, is not whether human intelligence can imagine, but how imagination becomes possible in technobiological togetherness. At the same time, this aspect indicates what could be called negotiative imagination in Canguilhem's sense.

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Ernst Cassirer, *An Essay on Man: An Introduction to a Philosophy of Human Culture* (Yale University Press, 1944).

55

André Leroi-Gourhan, *Gesture and Speech* (MIT Press, 1993); André Leroi-Gourhan, *On Technology*, edited and introduced by Nathan Schlanger, translated by Nils F. Schott (Bard Graduate Center, 2025).

56

Georges Canguilhem, "Experimentation in Animal Biology", in *Knowledge of Life*, Fordham University Press (2022), p113.

57

Ibid.

58

Georges Canguilhem, "The Living and Its Milieu", in *Knowledge of Life*, edited by Paola Marrati and Todd Meyers, translated by Stefanos Geroulanos and Daniela Ginsburg, 98–120 (Fordham University Press, 2008).

59

Ibid., 9.