

Forest Semiosis: Plant Noesis as Negentropic Potential

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In a significant portion of his later writings, Bernard Stiegler pursues the expansion of thinking in an attempt to get beyond the Anthropocene. Operationalising concepts from Martin Heidegger's *What is Called Thinking* to bring together thinking (*penser*) and caring (*panser*) as *pænsée*, Stiegler argues that moving beyond the Anthropocene – towards a Neganthropocene – requires an expansion of what humans think and care about. In his earlier work, *Technics and Time 1: The Fault of Epimetheus*, Stiegler provides a consideration of memory as sedimentary or, to use his term, 'epiphylogenetic'. Roughly put, human thought develops through reflexive interaction with technology. Take writing as an example. Humans write something. This writing transforms what humans can think. In turn this transformation of the human makes it possible for new things to be written. Each transformation builds upon the previous: 'the technical inventing the human, the human inventing the technical'.¹ In positioning thinking as caring, Stiegler aims to expand what it is possible to care about by introducing new sedimentary layers in this reflexive system of thought.

Given his emphasis on care, it would seem useful to place Stiegler's later work alongside the scholarship of someone like María Puig De La Bellacasa. Bellacasa stresses an 'ethics and politics of care' that rests on a notion of interdependence and entanglement.² Alongside the work of people like Natasha Myers and Donna Haraway, Bellacasa stresses care and care thinking as central to transformative thinking in the contemporary condition.

She locates care as emerging from the intersections of lived embodiment. Despite its foundation in a reflexivity with non-human technologies, Stiegler's consideration of thinking as care remains foreclosed to the sort of engagements Bellacasa puts forward in thinking with(in) messy, ecological terrains. Epiphylogenesis maintains an anthropo-technocentrism unique to the relationship of humans and technology. Stiegler's anthropo-technocentrism limits his push towards novel forms of thought in at least two ways: 1) it limits what kinds of beings can produce the novel thought – or *noesis* – Stiegler aims at while 2) limiting the possibilities of *noesis* itself; only humans have *noesis* and humans cannot think *noesis* beyond the human. Stiegler's concept of writing persists in a semiotic framework that centres human signs. As such, there has been limited engagement in thinking Stiegler within critical animal or plant studies.

Nevertheless, there is a strength in Stiegler's consideration of external memory systems, via epiphylogenesis, that remains useful despite this limitation. The aim of this article is to take up his consideration of the Neganthropocene (as the promotion of novel thought, or *noesis*, through an expansion of care) that broadens the specific kind of knowing emergent in epiphylogenesis beyond human-technic interactions. I suggest that plants (and animals) also have epiphylogenetic, sedimentary memory. As such, this article aims to add to the growing field of literature dedicated to considerations of plant epistemologies. What is novel about my approach is its attempt to bring Stiegler's

epiphylogenesis into this conversation. Stiegler has been critiqued on the grounds of his anthropocentrism (which is likely rooted in his Heideggerian tendencies).³ My aim is less a critique than an attempt to infiltrate and co-opt the use of epiphylogenesis and the Neganthropocene, while leaving aside the anthropocentric commitments. This development of epiphylogenesis beyond human-technic relations remains aimed at the Neganthropocene, through an increase of not only what it is possible to think, but the conditions of the possibilities of thinking. Care moves beyond a unilateral commitment of the human, to a reflexive interaction.

This article consists of four sections. The first explores Stiegler's consideration of thinking through his promotion of *pænsée*. Here, the limits of Stiegler's epiphylogenesis are understood as grounded in a linguistic-centric semiosis. To provide an alternative, the second section offers a more expansive semiotics that is developed in the scholarship of C.S. Peirce and Gilles Deleuze and Félix Guattari. To introduce this semiotics, I focus on a study of semiotic chains in response to forest fires in coastal redwood (*Sequoia sempervirens*) forests. In the third section I argue that these semiotic chains operate as epiphylogenetic memory systems: that each stage of the chain, each sign, operates as sediment that builds upon previous sediment or signs. Finally, I focus on the way that this alternative notion of epiphylogenesis intersects with the more interdependent ethics of care provided in the work of Myers and Bellacasa: the expansion of *noesis* goes beyond expanding what thought is *about* in epiphylogenesis to an expanded concept of what thought *is* in epiphylogenesis. At the core of this position is the claim that plants (and animals) have complex epiphylogenetic, sedimentary memory systems that are not extensively different from the human-technology assemblages described by Stiegler.

Pænsée in the Neganthropocene

Near the end of his life, Bernard Stiegler published a number of texts focused on care. Among these

are a short series, *Qu'apelle-t-on panser?* (What is called caring?), and various elucidations focused on the potential of care to usher in a new epoch: the Neganthropocene.⁴ For Stiegler, the Anthropocene blocks thinking beyond itself through both technological and ideological means. Thinking, as *noesis*, is grounded in prosthetic memory systems. Humans use technologies, such as computers, to remember things. The computer is *exosomatic*: it stores memory outside the brain and the *soma*. Conditions in the Anthropocene produce what Stiegler terms *de-noetisation*: the structures of these memory systems frame what sort of thoughts can be produced, limiting the possibility of *noesis*.⁵ These technological conditions result in the ideological, negative protention where 'we do not believe that it is possible to change human behavior'.⁶ Aligning this *de-noetisation* with entropy, and naming the Anthropocene an 'Entropocene' that closes off knowledge in closed entropic, exosomatic systems, Stiegler locates the overcoming of these conditions in affirming the power of a *noesis* generated in the openness of negative entropy or negentropy in the Neganthropocene.⁷ Drawing upon Martin Heidegger, this *noesis* is aligned with care. For Heidegger, to be with is to care for.⁸ To think (*penser*) about something is to care (*panser*) about it.⁹ This care is bound up with the exosomatic: Stiegler's hope is that in expanding care one expands thought and that in expanding thought one expands care. But the notion of *panser* goes beyond the English connotation of care. While designating 'care', *panser* also can be translated as bandaging or treatment. Moving beyond the Anthropocene requires expanding *pænsée* (thinking+care) in the development of new *noesis* that is bound up with action.¹⁰

Despite this push to expand the limits of thinking, Stiegler's philosophical commitments limit the possibilities of *noesis*. This is particularly evident in his framing of semiotics and writing. In *Technics and Time 1*, Stiegler considers memory through genetic, epigenetic, and epiphylogenetic systems.¹¹ Genetic memory is present in long-term evolutionary history

and is seen in heritable genes. This is present in living forms: they pass down their genes to their offspring. Epigenetic memory constitutes heritable aspects, such as behavioural patterns, that aren't determined by genes. Epigenesis describes the way that a milieu or environment condition one's being. It is the third memory system, 'epi-*phylo*-genesis', that is unique to Stiegler. It is defined as 'the conservation, accumulation, and sedimentation of successive epigeneses, mutually articulated'.¹² Epiphylogenesis is envisioned as a sedimentary progression of technological epigenesis. Each level of sediment builds on the others. Stiegler understand this reflexivity as central to technology. The technical object emerges through the encounter of an interior and exterior milieu.¹³ Stiegler presents this consideration through the emergence of writing systems as described by Jacques Derrida and André Leroi-Gourhan. The *grammē* (a technical term for a 'writing' that structures human existence) is not reducible to writing, because it is both older than human writing and extends, for Stiegler, to 'electronic files and reading machines'.¹⁴ The sedimentation of *grammē* can nevertheless be explored through writing. Writing emerges as an external reference of internal memory. A reflexive chain develops in the relation of the human to the exosomatic system. Humans interact with technology, which shifts their behavioural patterns. These new behavioural patterns lead to new developments in the technology. Each epigenetic progression builds on the previous sediment. Stiegler aligns the history of the *grammē* with the history of technics.¹⁵

Francesco Vitale has argued that Stiegler's position is grounded in his disagreement with Derrida. Where Derridean semiotics open to a 'differential process of biological life', Stiegler remains bound to the human-*techne* duality as limit of *noesis*.¹⁶ Unlike genetic and epigenetic memory, Stiegler considers epiphylogenesis uniquely human.¹⁷ The chain of sedimentation in epiphylogenesis is entirely a relation of humans to their own writing. To be fair, Stiegler does not limit plants and animals from having certain

types of knowledge, as both have genetic and epigenetic memory. It is only epiphylogenesis, as a 'new type of *grammē* and/or program' that is foreclosed to the non-human.¹⁸ Stiegler announces 'the *epiphylogenesis* of man' as a break from life that produces a history.¹⁹ As such, there is no history for the plant, no history for the animal. Furthermore, this way of thinking suggests that non-humans do not build complex, sedimentary memory systems. There is no *noesis* beyond the human.

Forest memory: a collective response to fire

But what if *noesis* doesn't need to be limited in this manner? An alternative consideration of something like the *grammē* would open *noesis* beyond the human. Rather than framing this in terms of writing, I prefer to consider it as a semiotic system. To develop an understanding of semiotic memory inspired by Peirce and Deleuze and Guattari, the remainder of the article concentrates on a study of coastal redwood (*Sequoia sempervirens*) forest response to forest fire. This semiotics works to develop a collective *noesis* in forests that evolves both external to and alongside humans.

The distribution of signs in the *Sequoia sempervirens* ecosystem might be drawn out in how the forest responds to fire. Given their position along the west coast, with immense fog cover and relative lack of lightning, fire tends to be rare in old-growth redwood forests.²⁰ Past examples of fire, such as a 1945 fire in Humboldt County, suggest that the redwood trees are largely unaffected by fire when compared to other trees in the region.²¹ Historically, the Yurok people have used this to their advantage by engaging in low-intensity burning that is beneficial to the tanoak (*Lithocarpus deniflorus*) and helps suppress the spread of larger fires.²² Evidence does suggest that an increase in fire in the region due to climate change could be detrimental to the coastal redwood.²³ Increased fire and dryness would likely be detrimental to seedling success.²⁴ In August 2009, fire erupted in the Swanton area of Santa Cruz, CA for the first time since 1948. Because

it affected a number of landholders, including Lockheed Properties, the fire has been referred to as the Lockheed Fire. It burned 3 163 hectares.²⁵ The area had been logged around the turn of the twentieth century and clear-cut from 1907–1923.²⁶ The land currently houses even-aged redwood and Douglas fir (*Pseudotsuga menziesii*) due to these clear cut practices, though attempts are being made to produce an even aged forest through selective harvesting.²⁷ After the fire, roughly 48.5 per cent of trees in the Lockheed area are redwood with tanoak and Douglas fir also featuring prominently in the area.²⁸ Redwoods had the highest survival rate among the trees; significantly higher than Douglas fir and tanoak.²⁹ Among the trees, coastal redwoods were found to have the highest mean of crown survival, the highest percentage of residual canopy, and the highest percentage of post-fire regeneration.³⁰ Nevertheless, among trees surveyed in the Lockheed area, redwoods had more scorch patterns than other trees. As such, redwoods were found to be the species most resilient to fire. Among basal sprouts that rooted after the fire, redwoods were also found to have the most offspring.³¹

Against language-centric semiotic systems – among which the use of writing in Stiegler’s epiphylogenesis can be included – Peirce defines the sign as ‘something which stands for something in some respect or capacity’.³² Linguistics is only one form of semiotics among many. By distinguishing linguistics as only one form of semiotics among many, Peirce allows for non-human semiotic systems. He outlines three types of signs – indexes, icons, and symbols – which Deleuze and Guattari reinterpret.³³ For Peirce, an index ‘takes hold of our eyes, as it were, and forcibly directs them to a particular object’.³⁴ Deleuze and Guattari name territorial signs as indexes.³⁵ Just as an arrow with the word ‘food’ indexes a restaurant, a fire leaves scorch marks upon a redwood tree’s bark. In this latter example, the territory is marked through an index – the scorch marks index the fire. For Peirce, the second type of sign, icons, are direct representations: the word ‘tofu’ is an icon

of tofu. Where indexes abound in the more than human world, it can be more difficult to locate icons. Nevertheless, examples can still be seen. Coastal redwoods can reproduce both sexually and asexually. In asexual reproduction, they produce identical clones.³⁶ These clones are icons of the mother tree. For Deleuze and Guattari they are signs of reterritorialisation. Finally, a third concept, symbols, are identified as contextual signs. These are aligned with deterritorialisation. For Peirce, symbols are uniquely human, consisting in mathematical and grammatical symbols. Through their re-working, Deleuze and Guattari aim to move Peircian semiotics beyond signifier-signified relations by way of a principle of assignification, where the signifying chain can be breached at any point by pre-signified intensities.³⁷ Icons, indexes, and symbols, as instances of material semiotic chains, work on the levels of material strata (stratifying, de-stratifying, and re-stratifying).³⁸ These signs are not signifier-signified relations, but chains of interpretation.

The Lockheed fire can be grasped as an intersection of multiple actors within an ecosystem. It might be useful to start with the fire. Fire is an interesting ‘actor’ within an ecosystem. It doesn’t quite fit the typical criteria of interpretant (given by Peirce), but it does produce signs that are interpreted by the rest of the ecosystem. Redwoods respond to fire in several ways. I’ve already mentioned that scorch marks index the fire. Given that this fire was able to burn species other than *Sequoia sempervirens*, the response of this species has been to dominate the terrain in the aftermath. These material significations – in the emergence of redwoods throughout the understorey – are in turn read by other tree and animal species in the region, with the redwood’s remaining dense canopy cover producing the conditions that allow certain species to develop at the expense of others. The persistence of fire as a quasi-actor within a forest can alter the landscape. The conditions of fire are varied, with fire operating on different parts of the forest: fire can be surface fire, understorey fire, and canopy fire.³⁹ The result of the Lockheed Fire

has produced conditions that allow the redwoods to dominate the terrain; but a different sort of fire – such as a canopy fire – might have been more detrimental to the species.

These chains are what constitute thinking: selves emerge from these chains (rather than the inverse).⁴⁰ For Peirce, semiotic chains contain three levels of meaning making relating to the 'real'. The category of firstness is described as 'a flash'; it is a spontaneous, free sensation that is nearly imperceptible.⁴¹ Secondness moves this flash towards permanence as a form of sensation – a sensation perceived as 'dynamical connection' or 'mere resemblance'.⁴² Where firstness is a flash and secondness is a repetition, thirdness is habit and learning.⁴³ Thirdness is related to Deleuze's consideration of the past and memory. Deleuze outlines both an active and passive synthesis of the past. The passive synthesis, habit, recognises the past as a 'problematic source'.⁴⁴ Memory, the active synthesis of the past, determines itself through the indeterminacy of habit. Memory emerges in response to a sign: a 'violent' interpretation that 'mobilises the memory'.⁴⁵ The pure past is not productive. Nevertheless, memory attempts to awaken and interpret it. This interpretation is productive insofar as it produces a new sign in a semiotic chain. As such, the pure past insists upon the present in a way that determines the future. Memory is an interpretation in a semiotic chain.

Semiotic memory outlines a materialist epistemology that aims at something other than sentience as a criterium of memory. As such, the coastal redwoods and other plants are understood as having knowledge. This is by no means a novel idea. There has been a recent uptick in theoretical works on plant thinking.⁴⁶ Though it falls outside the scope of this article, it is important to note that this theoretical investigation pales in comparison to the rich scientific history of plant intelligence which precedes it.⁴⁷ Within the theoretical frameworks of plant theory, my examination comes closest to that of Natasha Myers, who has gone so far as

articulate the potential of a *Planthroposcene* defined as 'an aspirational episteme and way of doing life in which people come to recognise their profound interimplication with plants'.⁴⁸ Myers stresses the interdependence of what I term semiotic chains. More broadly, it would be easy to suggest that this semiotic framework could be placed alongside the new materialism of Bruno Latour's actor-network theory, Jane Bennett's vital materialism, and Isabelle Stengers's cosmopolitics.⁴⁹ There are further intersections with feminist posthumanists such as Stacey Alaimo and Donna Haraway by way of notions of trans-corporeality, embeddedness, and situatedness.⁵⁰ While new materialism and posthumanism hold positions similar to the one I've presented, my position is that these discourses articulate a causality of semiotic chains: positioning actors or actants ontologically prior to semiotic chains. Within a materialist semiosis, knowledge is indistinguishable from the semiotic chain. Rather than an internal intelligence, material semiosis, in plant life, is the production of signs by plant bodies. This places my notion at a distance from other thinkers of plant intelligence such as Michael Marder. Here, I follow Terrence Deacon in thinking about sign-systems through 'entention' rather than intention. Intention relies on purposiveness and representation that assumes a hierarchical dependence. For example, the mind desires some representation and so the body goes in search of that thing, prioritising the mind's act over the body. Deacon's concept of 'entention' provides an alternative wherein these phenomena can be considered non-hierarchically, without an assumed determination.⁵¹ As such, the consideration of knowledge is not one of internal consciousness nor prosthetic consciousness. Rather, knowledge emerges out of the development of semiotic-chains.

Semiosis and epiphylogenesis

Semiotic memory allows a return to Stiegler as long as we bracket his anthropo-techne-centrism. In the memory systems Stiegler develops both

genetic and epigenetic memory are present beyond the human. All living things contain both genetic and epigenetic heritability. Every plant indexes its ancestors in its physicality as it is passed down through these genetic and epigenetic chains. Beyond heritability, trees also provide criteria for more individual memory in a variety of registers. The most obvious might be through ring systems, which index the habitat and thirdness of tree groups (thirdness insofar as this explains one way that the redwoods learn to be with their habitat). Coastal redwoods are dependent on fog for much of their water.⁵² Given the complexities of a tree's water intake, the ring patterns will vary on the basis of root water, fog drip, and evaporative conditions.⁵³ Ring patterns are not only unique to species but are even specific to habitat. As interpretants, coastal redwoods interpret the environmental conditions of water fall through their ring systems. These rings index the history particular to the region. In examining rings, humans take part in a semiotic system that is oriented towards the future: reconstructing the pure past of habit through the interpretation of memory. Scientific interpretation introduces new signs within the semiotic chain.

How does this relate to epiphylogenesis? To repeat Stiegler's definition, epiphylogenesis is 'the conservation, accumulation, and sedimentation of successive epigenesis, mutually articulated'.⁵⁴ Within his work this can be seen prominently through the way technologies and humans build upon each other. Technical objects serve as an externalisation of cultural memory and are exosomatic. Central to this sedimentation is the externalisation of memory in writing. As such, technical objects may have a recourse to Peircian symbols – the only uniquely human sign. But it should be asked whether these objects are symbols, icons, or indexes. Writing uses symbols, but symbols are not inherent to the process of externalisation. Grammatical devices (such as periods and commas) are not essential to writing systems but serve as aids. The written word doesn't function as a symbol, but as an icon or an

index. While it would be outside my scope to claim that the redwood forest develops a linguistic technical object, it would not be off the mark to suggest that the forest produces a material semiotic chain that mediates internal and external milieus. This claim might appear ludicrous to a language-centric semiosis, but it is perfectly valid from the Peircian-Deleuzian-Guattarian position. Understood as semiotic chains, epiphylogenesis might be extended beyond the human to all forms of life that develop together through interaction.

It is possible to provide a consideration of something akin to Stiegler's epiphylogenesis in a forest ecosystem on the basis of semiotic chains consisting of multiple interpretants. Unlike genetic and epigenetic systems, the epiphylogenetic operates only on the basis of a collective memory. In Stiegler's work it is the collective involving both human and technical objects. For a plant equivalent to epiphylogenesis the collective would include the plant as species (genetic) and the distributed ecosystem (epigenetic) building on each other in a reflexive semiotic chain. For this reason, the collective evokes not only the redwood, but the entire ecosystem in which it plays a part. Even if this criterion does not align with the anthropo-techne-centrism of Stiegler's epiphylogenesis, the concept is still useful for considering this distributed memory within a collective individuation or collective enunciation of the forest. Here it is possible to arrive, with Deleuze and Guattari, at a position where 'no distinction between man and nature' is made.⁵⁵

To start from the most basic formulation: if genetic memory presumes that form is present in the germen of a species, and epigenetic memory presumes that the form is potential that is moulded by some external form, then epiphylogenesis can be taken as a mediation of these concepts.⁵⁶ Following Gilbert Simondon – a notable influence on both Deleuze and Stiegler – it is possible to recognise group-individual dynamics as co-determinate: 'the group is not formed by individuals joined together in a group due to certain bonds, but by grouped

individuals, *group individuals*. Individuals are group individuals'.⁵⁷ The relation of individual and group is not a synthesis, but it is synthetic. For Simondon, it is in the rapport between the two sides that signification emerges: 'signification is a rapport of beings, not a pure expression; signification is relational, collective, transindividual, and it cannot be provided by the encounter of expression and the subject'.⁵⁸ Signification is an act of collective enunciation. Thus, the forest dynamic envisioned here considers the production of sign-systems as emerging between the engagement of the individual plant and the diverse culture of interpretants within the ecosystem. This relation is not a synthesis of the individual and culture, but the synthetic rapport that results in signification. Following Simondon, this rapport is grasped as metastable, rather than composed of stable, distinct forms (genesis and epigenesis are not distinct forms but are metastable and interspersed). The emergence of new signs in this rapport can be read in terms of individuation: interpretation through the metastable rapport is an operation of individuation. This metastable formation of individuation, working through a reflexive and epiphylogenetic process, undoes the consideration of a single, unilateral designer. It follows that forest *poiesis* does not result from the prescriptive and unilateral design of a (divine or human) intelligence, but through the cultural investment of multiple group individuals whose emergence is discovered in the relation between their internal and external milieus. Through this rubric, design is not present in the germen, nor imposed on the soma from without. Design works through the dynamic significations emerging at the meeting of interior and exterior milieus.

This can be presented in the Lockheed area. Redwoods interpret these conditions of fire to their benefit; they 'read' the landscape left by the fire and reproduce on the sites that the fire has left bare in the understory. Within this structure, the potentials given in the memory system of the redwood's pure past – those genetic conditions which set the stage

for it to grow within specific conditions – are the habits that condition its emergence in the Lockheed landscape after the fire. The emergence of these potentials within the landscape result from the mediative and reflexive relations of the potentials present in the landscape (the soil, the distance from the coast, the forest canopy, the fog in the area, and so on) with the potentials present in the redwood's genetic memory. The meeting of these potentials results in mutual interpretation. The emergence of new signs – in the form of new saplings – is the result of this reflexive semiotic chain. The various dynamics emerge, together, in a collective enunciation to express a new sign as index of this history.

Furthermore, while the future of the Lockheed area is unknown, we may be able to predict aspects based on previous semiotic developments, such as those that have occurred in Humboldt County over the past century. In the early 1900s, forests were disturbed with the introduction of livestock. Some of these grasslands have been abandoned. While the redwood was able to dominate after the Lockheed area because of its resilience to fire where other trees falter, in the Humboldt prairies it has been the Douglas fir which has dominated. In the Lockheed area, the fact that the redwood's canopy was able to sustain itself in spite of the fire meant that the necessary shade conditions for reproduction and spread were available. In the Humboldt grasslands, on the other hand, a Douglas fir stand was able to be established due to the lack of redwood competition. Nevertheless, as the Douglas fir has established itself in that area, its own canopy has begun to provide the necessary shade conditions needed for other species to flourish, notably redwood and tanoak. Scientists hypothesise that, without significant change in the area, the redwood will eventually dominate the space that is currently held by the Douglas fir.⁵⁹ In this space a dynamic conversation is unfurling. The human settlers stripped the area, producing the prairie. This sign served as a sort of flat space where animals could graze. The abandonment of these lands set the conditions for a

new interpretant, the Douglas fir, to reproduce itself on the land. Yet, this very interpretation of the land provided the conditions for the redwoods and tanoak to integrate themselves back onto the land. Thus, in these three motions, a dynamic semiotic chain develops, with different interpretants interpreting the conditions and acting on the basis of those conditions: again, we see the emergence of different signs through the dynamic processes of collective enunciation. The potentials of the prairie are interpreted by the Douglas fir – an interpretant uniquely situated to read the potentials provided. The Douglas fir's interpretation of this sign is the production of a new sign that emerges in the resulting canopy. Through the dynamic process of interpretation, this allows other interpretants to emerge through the sign provided by the Douglas fir. Here the coastal redwood emerges in the landscape through the dynamic history of the past that is indexed by the Douglas fir.

The story I've told here is much too limited. For it has largely only given an account of the trees. These trees express themselves within a rich, unfolding dynamic with numerous interpretants who are integral to the development of the necessary conditions for new interpretations to emerge. The elements and variation in soil composition allow different species to flourish, but the compositions of the species on the soil will, furthermore, determine future compositions.⁶⁰ The elevation and distance from the coast play an integral role in where redwoods and other species develop.⁶¹ The different flora and fauna of any region allow different animals to survive, but those animals will also transport plants to different areas through their faeces. I raise these various examples to stress the intricate and dynamic metastability of these various interpretants working in a reflexive and mediated collective. The forest expresses itself through these various interpretants as a dynamic and intricate system of knowledge. The ability of the coastal redwood to interpret the conditions of the Lockheed area, post-fire, suggests a form of material intelligence that allows the species to be resilient. These movements index

an evolutionary dynamic that merges the genetic and epigenetic developments through the external interactions with other interpretants. Together these interpretants form a collective knowledge system that dynamically produces itself through interaction.

Care-full considerations

Stiegler suggests that thinking and care are intrinsically tied. As such, despite his anthropocentrism, there are similarities between his approach and that of María Puig De La Bellacasa, who has posed an 'ethics and politics of care'.⁶² Following Haraway, Bellacasa stresses a notion of interdependence and entanglement. Within this analysis, ethics and care cannot be disentangled from the world: one cannot be in the world without care.⁶³ Myers's Planthropocene attempts to situate such a relation between the plant and the human – recognising that humans and plants are persistently interconnected. Within these interconnections, Myers's neologism provides the capacity 'to change the terms of the encounter, to make allies with these green beings'.⁶⁴ Beyond Stiegler, whose *noesis* is focused merely on human intelligence, thinkers like Bellacasa and Myers stress an entanglement *with* that goes beyond the armchair to suggest that thinking and care require a relational and material entanglement.

Stiegler is perpetually announcing that thinking is care but given his positioning of thinking within a particular epiphylogenetic and human-technocentrism, the possibilities of care are only raised unilaterally: the human invokes a care for the world. If only humans are capable of thinking in this manner, then only humans are capable of caring in this manner. Ironically, this re-affirms the Anthropos of the Anthropocene. Stiegler instates epiphylogenesis as a way to overcome pure life for something like *Dasein*; something historical. But he institutes a separation that places limits on both thinking and care, insofar as they are intricately connected. His theoretical consideration separates the human from the entanglements expressed by Myers and Bellacasa. Thus, the philosophy of care is inherently

divided between an entangled care and a unilateral care. It is not all that surprising that the latter seems closer to paternalism than genuine care. Stiegler's Neganthropocene aims to expand the possibility of what it is possible to *care for*, but his presuppositions relating to care foreclose the possibilities of *caring with*. If thinking is caring, a notion of thinking built within material semiotic chains comes closer to the formulation of care as entanglement. Within the forest, each sign intersects with the plurality of signs designated prior to it. Signs are sedimentary, building upon each other over time within the space where they are present. Each interpretant exists in and through the entanglement, and signs are developed through that interaction. If thinking is care, then this system of entanglement is synonymous with caring. This is not a unilateral deployment of care for but care as emergent in the intersections of entanglement. Thinking as entanglement is caring with.

Expanding care beyond unilateral paternalism – in a sense infusing Stiegler's consideration of *noesis* through care with a healthy dose of entanglement – broadens the possibilities of care beyond the Anthropocene. As such, Stiegler's aim of producing the Neganthropocene by way of *noesis* as care remains available but with a more inclusive epiphylogenesis. Epiphylogenesis provides notable criteria for thinking about technological innovation: if technics invent the human, it is integral to consider this impact in the design process. In extending epiphylogenesis beyond human-technical relations the consideration of impact must be expanded even further. Innovation affects not only the human in a human-technic reflexivity but extends beyond these limits to affect a multiplicity of interpretants. This is most obvious in considering something like clear cutting. Clear cutting is, theoretically speaking, a human interpretation of the forest. It is a sign that interprets the conditions of the forest and expresses a new set of conditions. What is notable is that actors in the forest respond to this sign, producing their own signs. Trees developed through even-aged

tree growth. This has, in turn, had some serious ramifications on humans – on one level the trees are not as healthy, which can impact human plans for the forest, but on another level, unhealthy trees adversely affect oxygen levels, which has profound impacts on humans. As a result, humans have read the signs deployed by the forest and instituted selective harvesting rather than clear cut logging methods. The Yurok people have understood this entanglement throughout history. Their localised burnings worked through a 'care-full' semiotic entanglement that was beneficial to both the health of the forest and their people. Expanding epiphylogenesis in this way provides a recognition that design is not necessarily a unilateral process of the human acting on material, nor is it even a reciprocal operation of human and technology, but rather, that it is an entangled and collaborative process that affects multiple beings on multiple registers. A product or production is not separated from this entanglement but is deployed through and by the entanglement, affecting and affected by the entanglement. Care emerges from these interactions. The designer – while a misnomer, given that design is a collaborative unfolding within these sedimentary chains – can either recognise this entanglement or ignore it. If the aim is to think beyond enclosure, it may be better to affirm this collaboration.

Conclusion

Stiegler's pursuit of a Neganthropocene through his use of thinking and care (*pænsée*) in epiphylogenetic memory systems provides a notable goal: the expansion of care against the negative protention of the Anthropocene. Yet, despite the aim of expanding both what it is possible to think and care about, Stiegler limits the possibilities of this sort of thinking to human-technic relationships. In this article I have promoted a more than human, asignifying semiotic formulation of epiphylogenesis which enables an operationalisation of Stiegler's formulation beyond Stiegler's limit. Drawing upon the complex semiotic chains of the coastal redwood, I have provided an

overview of sedimentary memory that accounts for a history of the forest. This enables a more complex and entangled form of both thinking and care that bring Stiegler's consideration closer to feminist post-human theories outlined by Bellacasa and Myers. These more entangled formulations pursue the Neganthropocene with, but also beyond, the human. Together, these complex relations of care, entwined with the Neganthropocene, designate the potential of a care-ful semiotic entanglement that opens the door for a relational collaboration: a recognition that all production is collaborative, even if it is not recognised as such.

Notes

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1. Bernard Stiegler, *Technics and Time, 1: The Fault of Epimetheus*, trans. Richard Beardsworth and George Collins (Stanford: Stanford University Press, 1998), 137.
 2. María Puig de la Bellacasa, *Matters of Care: Speculative Ethics in More than Human Worlds* (Minneapolis: University Of Minnesota Press, 2017), 5.
 3. Francesco Vitale, 'Making the Différance: Between Derrida and Stiegler', *Derrida Today* 13, no. 1 (May 2020): 1–16, <https://doi.org/10.3366/drt.2020.0216>.
 4. Bernard Stiegler, *Qu'appelle-t-on Panser? 1. L'immense Régression* (Paris: LLL: Les Liens Libèrent, 2018); *Qu'appelle-t-on Panser? 2. La Leçon de Greta Thunberg* (Paris: LLL: Les Liens Libèrent, 2020); *The Neganthropocene*, ed. and trans. Daniel Ross (London: Open Humanities Press, 2018); 'What Is Called Caring?: Beyond the Anthropocene', trans. Daniel Ross, *Techné: Research in Philosophy and Technology* 21, no. 2 (2017): 386–404, <https://doi.org/10.5840/techne201712479>.
 5. This analysis is heavily indebted to Martin Heidegger, 'The Question Concerning Technology', in *Basic Writings*, ed. and trans. David Farrell Krell (San Francisco: HarperSanFrancisco, 1977), 307–42.
 6. Stiegler, *The Neganthropocene*, 35.
 7. *Ibid.*, 51.
 8. Martin Heidegger, *Being and Time*, trans. John MacQuarrie and Edward Robinson (New York: Harper Perennial Modern Classics, 2008 [1927]), 237.
 9. Stiegler, 'What is Called Caring?', 389.
 10. Stiegler develops this portmanteau in *L'immense Régression*, 120, and discusses it early in *La Leçon de Greta Thunberg*.
 11. Stiegler, *Technics and Time, 1*, 138–140.
 12. *Ibid.*, 140.
 13. *Ibid.*, 79.
 14. *Ibid.*, 137.
 15. *Ibid.*
 16. Francesco Vitale, 'Making the Différance', 12.
 17. Stiegler, *Technics and Time, 1*, 140.
 18. *Ibid.*, 138.
 19. *Ibid.*, 140.
 20. John O. Sawyer et al. 'Redwood Trees, Communities, and Ecosystems: A Closer Look', in *The Redwood Forest: History, Ecology and Conservation of the Coast Redwoods*, ed. R.F. Noss (Washington, DC: Island Press, 2000), 111.
 21. John O. Sawyer et al., 'History of Redwood and Redwood Forests', in *The Redwood Forest: History, Ecology and Conservation of the Coast Redwoods*, ed. R.F. Noss (Washington, DC: Island Press, 2000, 7–38.
 22. *Ibid.*, 26.
 23. Margaret R. Metz et al., 'Unexpected Redwood Mortality from Synergies between Wildfire and an Emerging Infectious Disease', *Ecology* 94, no. 10 (October 2013): 2152–59, <https://doi.org/10.1890/13-0915.1>.
 24. Sawyer et al., 'Redwood Trees, Communities, and Ecosystems', 112.
 25. Rachel Anne Lazzeri-Aerts, 'Post-Fire Analysis of Sequoia Sempervirens Forests on the Central Coast of California' (master's thesis, San Jose State University, 2011), 34, <http://search>.

- proquest.com/docview/878528238/abstract/E4DF5E04E3DE4752PQ/1.
26. Ibid.
 27. Ibid., 36.
 28. Ibid., 46–47.
 29. Ibid., 49.
 30. Ibid., 51–57.
 31. Ibid., 61.
 32. As cited in Eduardo Kohn, *How Forests Think: Toward an Anthropology Beyond the Human* (Berkeley: University of California Press, 2013), 29.
 33. Ibid., 531n41.
 34. C.S. Peirce. 'On the Algebra Logic: A Contribution to the Philosophy of Notation', in *The Essential Peirce, vol 1. 1867–1893*, ed. Nathan Houser and Christian Kloesel (Bloomington and Indianapolis: Indiana University Press, 1992), 226.
 35. Gilles Deleuze and Felix Guattari, *A Thousand Plateaus*, trans. Brian Massumi (Minneapolis: University of Minnesota Press, 1987), 55.
 36. Deborah L. Rogers, 'Genotypic Diversity and Clone Size in Old-Growth Populations of Coast Redwood (*Sequoia Sempervirens*)', *Canadian Journal of Botany*, 2 February 2011, <https://doi.org/10.1139/b00-114>.
 37. Deleuze and Guattari, *A Thousand Plateaus*, 142.
 38. "Behind" statements and semiotisations there are only machines, assemblages, and movements of deterritorialisation that cut across the stratification of the various systems and elude both the coordinates of language and existence. That is why pragmatics is not a complement to logic, syntax, or semantics; on the contrary, it is the fundamental element upon which all the rest depends'. Deleuze and Guattari, *A Thousand Plateaus*, 148.
 39. Ibid., 71.
 40. This is an argument made by Eduardo Kohn in *How Forests Think*, 33–34.
 41. C.S. Peirce, 'A Guess at the Riddle', in *The Essential Peirce, vol. 1*, 278.
 42. C.S. Peirce, 'Trichotomic', in *The Essential Peirce, vol. 1*, 280.
 43. Ibid., 284.
 44. Gilles Deleuze, *Difference and Repetition*, trans. Paul Patton (New York: Columbia University Press, 1994), 83. Elsewhere, Deleuze aligns it with the 'body-without-organs' and anti-production. See *Proust and Signs*, trans. Richard Howard (London: Continuum, 2000), 117–18.
 45. Deleuze, *Difference and Repetition*, 64.
 46. See, for example, Michael Marder, *Plant-Thinking: A Philosophy of Vegetal Life* (New York: Columbia University Press, 2013); Marder, *Grafts: Writings on Plants* (Minneapolis: University of Minnesota Press, 2016); Luce Irigaray and Michael Marder, *Through Vegetal Being: Two Philosophical Perspectives* (New York: Columbia University Press, 2016); Matthew Hall, *Plants as Persons: A Philosophical Botany* (New York: SUNY Press, 2011); Jeffrey T. Nealon, *Plant Theory: Biopower & Vegetable Life* (Stanford: Stanford University Press, 2016); Hanna Stark, 'Deleuze and Critical Plant Studies', in *Deleuze and the Nonhuman*, ed. Jon Roffe and Hannah Stark (Houndmills, Basingstoke, Hampshire: Palgrave Macmillan, 2015): 180–97.
 47. Tony Trewavas has presented a helpful overview of this history in Tony Trewavas, 'Plant Intelligence: An Overview', *BioScience* 66, no. 7 (1 July 2016): 542–51, <https://doi.org/10.1093/biosci/biw048>. Trewavas traces the consideration of plant intelligence to Karl Robert Eduard von Hartmann in 1875 and Charles Darwin in 1880. It might be possible to go back even further: for example to Johann Wolfgang von Goethe's 1790 *Metamorphosis of Plants*. Recent scholarship goes further in pushing the relationship between plant behavior and cognition. One might start with Barbara McClintock's 1984 Nobel Prize speech, in which she discusses plant intelligence on a cellular level, and the work of Suzanne Simard on plant communication through carbon transfer. Barbara McClintock, 'The Significance of the Responses of the Genome to Challenge', *Science* 226 (1984): 792–801, <https://doi.org/10.1126/science.15739260>; Suzanne W. Simard et al., 'Net Transfer of Carbon between Ectomycorrhizal Tree Species in the Field', *Nature* 388, no. 6642 (August 1997): 579–82, <https://doi.org/10.1038/41557>. See also the forthcoming Simard, *Finding Mother Tree*:

- Discovering the Wisdom of the Forest* (New York: Penguin Random House, 2021). These discourses have been popularised in the work of Peter Wohlleben. See Peter Wohlleben, *The Hidden Life of Trees: What They Feel, How They Communicate*, trans. Jane Billinghurst (Vancouver, Berkeley: Greystone Books, 2016). This work is not without controversy. See Jos Kramer and Joël Meunier, 'Kin and Multilevel Selection in Social Evolution: A Never-Ending Controversy?', *F1000Research* 5 (28 April 2016), <https://doi.org/10.12688/f1000research.8018.1>.
48. Natasha Myers, 'From the Anthropocene to the Planthropocene: Designing Gardens for Plant/People Involution', *History and Anthropology* (2017): 4, <http://dx.doi.org/10.1080/02757206.2017.1289934>.
 49. Bruno Latour, *Reassembling the Social: An Introduction to Actor-Network-Theory* (Oxford: Oxford University Press, 2005); Jane Bennett, *Vibrant Matter: A Political Ecology of Things* (Durham, NC: Duke University Press, 2010); Isabelle Stengers, *Cosmopolitics 1*, trans. Robert Bononno (Minneapolis: University of Minnesota Press, 2010). One might also consider this discourse alongside Object Oriented Ontology – particularly Timothy Morton, *Hyperobjects: Philosophy and Ecology after the End of the World* (Minneapolis: University of Minnesota Press, 2013) – though there are issues with any sort of reflexivity in OOO. See Peter Wolfendale, *Object-Oriented Philosophy: The Noumenon's New Clothes*, ed. Robin Mackay (Falmouth: Urbanomic, 2014).
 50. Stacey Alaimo, *Bodily Natures: Science, Embodiment, and the Material Self* (Indianapolis: University of Indiana Press, 2010); Donna Haraway, *Staying With The Trouble: Making Kin in the Chthulucene* (Durham, NC: Duke University Press, 2016); Haraway, 'A Cyborg Manifesto: Science, Technology, and Socialist-Feminism in the Late Twentieth Century', in *Simians, Cyborgs and Women: The Reinvention of Nature* (New York: Routledge, 1991): 149–81.
 51. See Terrence Deacon, *Incomplete Nature: How Mind Emerges from Matter* (New York: W.W. Norton & Company), 26-28.
 52. S. S. O. Burgess and T. E. Dawson, 'The Contribution of Fog to the Water Relations of Sequoia Sempervirens' (D. Don): Foliar Uptake and Prevention of Dehydration', *Plant, Cell and Environment* 27, no. 8 (August 2004): 1023–34, <https://doi.org/10.1111/j.1365-3040.2004.01207.x>; J. Azevedo and D. L. Morgan, 'Fog Precipitation in Coastal California Forests', *Ecology* 55, no. 5 (1974): 1135–41, <https://doi.org/10.2307/1940364>.
 53. John S. Roden, James A. Johnstone, and Todd E. Dawson, 'Intra-Annual Variation in the Stable Oxygen and Carbon Isotope Ratios of Cellulose in Tree Rings of Coast Redwood (*Sequoia Sempervirens*)', *The Holocene* 19, no. 2 (March 2009): 189–97, <https://doi.org/10.1177/0959683608098959>.
 54. Stiegler, *Technics and Time* 1, 140.
 55. Gilles Deleuze and Felix Guattari, *Anti-Oedipus*, trans. Robert Hurley, Mark Seem, and Helen R. Lane (Minneapolis: University of Minnesota Press, 1983), 4.
 56. Deacon, *Incomplete Nature*, 64–69
 57. Gilbert Simondon, *Individuation in Light of the Notions of Form and Information*, trans. Taylor Adkins (Minneapolis: University of Minnesota Press, 2020), 334.
 58. *Ibid.*, 345.
 59. Sawyer et al., 'Redwood Trees, Communities, Ecosystems', 113.
 60. Lazzeri-Aerts, 'Post-Fire Analysis', 73–74.
 61. Sawyer et al., 'Redwood Trees, Communities, Ecosystems', 113.
 62. Bellacasa, *Matters of Care*, 5.
 63. *Ibid.*, 6.
 64. Myers, 'From the Anthropocene to the Planthropocene', 4.

Biography

Jacob Vangeest is a PhD student at the University of Western Ontario's Centre for the Study of Theory and Criticism. Jacob is invested in a nebulous constellation of plant epistemology, the later Platonic dialogues, considerations of the 'non', technics, and the lineage of theories and philosophies of becoming. His current research engages in bridging discourses of technics, plants, and posthumanism. Jacob currently lives in Northern California and enjoys hiking among the redwoods.