

## AFFECT, COGNITION AND THE NEUROSCIENCES

AFECTO, COGNICIÓN Y NEUROCIENCIAS

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## Abstract

Like many academic disciplines in the twenty first century the humanities have been deeply affected by developments in the brain sciences. Conceptually this has meant that some of the major preoccupations of the previous century, like those adhering to a Cartesian division between mind and body or the psychoanalytical conscious/unconscious duality, have been supplanted by a new kind of neurological relation; that is to say, the relation established between a diminished mental faculty and the imperceptible governing power of the *nonconscious*. What is presented here is focused on a theoretically contested notion of the neurological nonconscious that has produced two differently orientated strands in the posthumanities. The discussion focuses on attempts to assimilate a contested understanding of the nonconscious in a remodelled cognitive theoretical framework, on one hand, and a new materialist rendering of affect theory, on the other.

## Resumen

Al igual que muchas disciplinas académicas en el siglo XXI, las humanidades se han visto profundamente afectadas por los avances en las ciencias del cerebro. Conceptualmente esto ha significado que algunas de las principales inquietudes del pasado siglo, como las que se adhieren a una división cartesiana entre mente y cuerpo, o la dualidad psicoanalítica del consciente/inconsciente, han sido suplantadas por un nuevo tipo de relación neurológica; esto es, la relación establecida entre una facultad mental disminuida y el imperceptible poder gobernante de lo no-consciente. Lo que se presenta aquí se centra en una noción teóricamente impugnada del no-consciente neurológico que ha producido dos posicionamientos orientados de manera diferente en las posthumanidades. La discusión se centra en los intentos de asimilar una comprensión impugnada del no-consciente en un marco teórico cognitivo remodelado, por un lado, y una nueva interpretación materialista de la teoría del afecto, por el otro.

## Palabras clave

Lorem ipsum

dolor sit amet

consectetur adipiscing elit

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## Introduction

Like many academic disciplines in the twenty first century the humanities have been deeply affected by developments in the brain sciences. Conceptually this has meant that some of the major preoccupations of the previous century, like those adhering to a Cartesian division between mind and body or the psychoanalytical conscious/unconscious duality, have been supplanted by a new kind of neurological relation; that is to say, the relation established between a diminished mental faculty and the imperceptible governing power of the *nonconscious*. It is not the case, of course, that every humanities scholar has blindly followed this trend, but the inclination toward posthumanism, for example, has certainly been shored up by a prevailing notion of con-

consciousness grasped as just the tip of an iceberg of underlying, insensible neurological processes. The once radical idea that consciousness, formerly modelled via cognitive processes like attention, perception and memory, was just a thin slice of the action has now become a mainstream concept that infiltrates major debates. The nonconscious poses many questions for decades of cognitive work in the humanities and dramatically shifts the research focus away from an anthropocentric *weltanschauung* toward nonhuman worlds. Indeed, the concept now figures writ large in wide ranging debates on, for example, visual communication (Williams and Newton, 2009), digital technologies (Grusin, 2010) and the Anthropocene (e.g. Hayles, 2017, p. 34).

Significantly, the nonconscious also maps on to a more general and influential turn to affect, emotions and feelings that initially became prominent in the brain sciences in the early 1990s (e.g. Damasio, 1995). This turn has, as such, challenged scholars who are critical of the ways in which neuroscience has been seized upon in the humanities (and social theory), prompting them to re-evaluate the role of the nonconscious in the study of, for example, discourse and ideology; (Leys, 2011, Wetherell, 2012); concepts which have traditionally had a distinctive cognitive slant. Others have taken a more balanced viewpoint seeing little difference between a neurobiological materialism and critique (Pitts-Taylor, 2016, Sampson, 2016). The nonconscious has indeed become a deep seated component of the politics within the humanities amid wider concerns about the precariousness of human cognition in technical systems (Thrift, 2004; Hayles, 2017, pp. 173-75). To be sure, techno-capitalism itself cannot be considered today without a contemplation of the cognitive *and* affective politics it suggests (Karpi, Kahkonen and Mannevu, 2016).

Due to the complexity of this disciplinary drama, the aims of this condensed article remain fairly modest. What is presented here is focused on a theoretically contested notion of the neurological nonconscious that has produced two differently orientated strands in the posthumanities. Indeed, before addressing this theoretical division of the neuro-inspired nonconscious, it is significant to note that there is more instability than consensus in the neurosciences. The popular error of labelling the multiplicity of brain sciences a singular “neuroscience” has been acknowledged, as such, in the plurality of *neuroculture* (Rolls, 2012; Sampson, 2016). Nonetheless, this discussion focuses on attempts to assimilate a contested understanding of the nonconscious in a remodelled cognitive theoretical framework, on one hand, and a new materialist rendering of affect theory, on the other. In the case of new materialism, it is perhaps sensible to also concede that there is, from the outset, “no stable definition of affect” (Thrift, 2007, p. 175). In Melissa Gregg and Greg Seigworth’s (2010) key text, *The Affect Theory Reader*, there is a purposefully incomplete list of eight different theoretical

angles to affect theory (pp. 6-8). Here I will simply refer to new materialism as just one way to capture a particular kind of affect theory that embraces the nonconscious to challenge certain assumptions in cognitive science.<sup>1</sup> Although similarly influenced by the neurological nonconscious, through its broadening out the cognitive theoretical frame, the former strand provides a number of challenges to the ontological (and ideological) commitments of new materialism (Hayles, 2017, pp. 65-85).

What follows is structured around three brief explorations of each strand. First, the article explores the differing ways in which the neuroscientific nonconscious has stirred up the posthumanities. As said, the enquiry is restricted in scope, but aims to expose some level of generality by placing a small range of new materialist work alongside Katherine N. Hayles's recent concept of the cognitive nonconscious expressed in her 2017 book, *Unthought: The Power of the Cognitive Nonconscious*. Second, the article asks if new materialism, as Hayles claims, conspicuously ignores conscious cognition or does it offer a more nuanced concept, which, as I will argue here, moves beyond the cognitive framework to grasp a different kind of thought. Third, and relatedly, the article assesses the value of using a remodelled cognitive framework to understand the materiality of relations suggested by the nonconscious. Herein, contrasting conceptual understandings of matter, information, affect, levels, forces and assemblage become the focus. Finally, the piece concludes by cursorily assessing some of the key differences between each strand and making a few observations intended for future debate.

## The Rise of Neuroscientific Nonconscious and the Humanities

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In order to trace the widespread influence of the neuroscientific nonconscious we need look no further than the impact of Antonio Damasio's (1995) somatic marker thesis. To be sure, along with Benjamin Libet (1985) and Joseph LeDoux (2003), Damasio's Spinoza-inspired notion of the enhanced and enmeshed role somatically derived affects play in the processes behind reasoning and decision making figures writ large in these two diverging strands of interpretation.

To begin with, Damasio's work is often cited as support for a principal idea in new materialism; that is, despite the humanities' orthodox fixation with an anthropocentric worldview, humans actually arrive "late to consciousness" (Thrift, 2007, p. 186). In other words, the human brain is understood to take its time to build consciousness

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<sup>1</sup> I have to declare at this point that most of my work to date has focused on a broadly understood new materialist approach and affect theory (e.g. Sampson, 2012, 2016, 2020).

as just one of many responses to the dynamics of external environmental stimuli. Drawing on Spinoza, Wilhelm Wundt, as well as Libet, Damasio thus enables new materialism to frame the immediate experience of consciousness as a radical “backdated illusion” (p. 131). Indeed, *thinking* is not at all limited to the *thought* inside the brain, but as Thrift argues, Damasio provides an understanding of how somatic markers act as a kind of “corporeal thinking” in affect theory (p. 187). Through Damasio’s work we further see how the *forces* of affect traverse and remap emotions (Bertelsen and Murphie, 2010, p. 140). Emotion, in this context, is a kind of *capture of affect* in consciousness, but the focus is distinctly less on how these maps relate to conventional cognitive processes than it is on the significance of a feely, bodily *precognition*. As Thrift (2007) contends:

We should [...] pay more attention to the precognitive. This roiling mass of nerve volleys prepare the body for action in such a way that intentions or decisions are made before the conscious self is even aware of them. (p. 7)

There is a distinctive nonhuman concept applied to technology in the new materialist’s rendering of the affective nonconscious. For example, similarly drawing on Damasio and LeDoux, Richard Grusin (2010) offers a theory of affect in relation to the premediated human encounters with digital media, following, in part, a neuropsychology approach that insists upon: “The inseparability of cognition from affect or emotion, often on the priority of affect and emotion to cognition and rational judgment” (p. 78).

Grusin borrows from Hayles’ (2006) modification of Thrift’s (2004) “technological unconscious” transforming it into the neurologically fine-tuned concept of the “technological nonconscious” (Grusin, 2010, p. 72).

The nonconscious relation between human and nonhuman worlds of inorganic matter also becomes key to the Deleuze-Spinozan vitalisms of new materialism, by way of “linking the movements of matter with a processual incorporeality” (Gregg and Seigworth, 2010, p. 6). Affect thus becomes the “hinge where mutable matter and wonder... perpetually tumble into each other” (Gregg and Seigworth, 2010, p. 8). In other words, affect does not just pass from human body to human body, but becomes a non-conscious *force of encounter* with a dynamic materiality that possesses an autonomous nonhuman capacity to act and be acted on.

It is important to initially note that Hayles’ (2017) concept of the “cognitive non-conscious” is also influenced by Libet’s notion of a belated consciousness (p. 44). However, it is Damasio’s protoself that provides the core model of how the nonconscious feeds forward to consciousness; that is to say, how it “operates at a level of neuronal

processing inaccessible to the modes of awareness, but nevertheless perform[s] functions essential to consciousness” (p. 10). Indeed, in this model neuronal processes *level up* from Damasio’s primary protoself to higher levels of a core consciousness (pp. 9-10). At the lower level there is a “kind of sensory or nonverbal narrative,” which integrates Damasio’s somatic markers into coherent representations of the body, before becoming “melded with verbal content in higher consciousness” endowed with “abundant memory, language, and reasoning, narratives” (p. 10). So, at the top of the stack of cognitive levels is a distinctly human sense of higher consciousness “enriched” by the production of a “well-defined protagonist, the autobiographical self” and “reinforced through the verbal monologue that plays in our heads as we go about our daily business” (pp. 9-10). It is these verbal narratives, *represented* in the mental faculty of the brain that helps humans make sense of who they are.

Significantly though, Hayles reminds the reader that this levelling up process from proto to autobiographical self is not restricted to humans, but can be shared by some nonhumans including “many mammals, and some aquatic species such as octopi” (p. 9). To be sure, the novelty of Hayles’ concept is found in the expansion it offers of this cognitive levelling up process to other broadly defined *cognizers* who possess analogous interpretational and decision-making capacities. Although the starting point is strictly a neurological model, these capacities are not restricted to animals with brains, but include other biological cognizers, “including those lacking central nervous systems, such as plants and microorganisms” (p. 15). Moreover, the nonconscious is further extended to the cognitive capabilities of specific technical systems, some of which are inclusive of *cognitive assemblages* that bring together humans and technologies via interactions with neuron networks in the brain. This use of the term assemblage is important to Hayles given that it enables the humanities to break out of the “anthropocentric view of cognition” enabling “bridges” that span “across different phyla to construct a comparative view of cognition” (p. 15).

In spite of these efforts at bridge building, Hayles assemblage theory purposely opens up a stark categorical divide between cognitive and noncognitive worlds (pp. 30-33). On one hand, there are the *cognizers*; human and nonhuman *actors*, including some biological forms and computer algorithms, with the cognitive capacity to choose, decide and interpret. On the other, there are *noncognizers*, including inanimate and inorganic materials, such as stones and hurricanes, which may well be agents “harnessed to perform cognitive tasks” (p. 32), but are nonetheless noncognitive since they lack cognitive capacities. This categorical divide has a distinct intention. Significantly, the point is not to...

Ignore the achievements of conscious thought, often seen as the defining characteristic of humans, [but to] overcome the (mis)perception that humans are the only important or relevant cognizers on the planet. (pp. 10-11)

As Hayles contends, once this “misperception” is overcome then the humanities can turn to new important questions and ethical considerations (pp. 10-11). Indeed, whereas the technical cognitions found in AI algorithms, for example, have been commonly, and perhaps misleadingly, compared with higher level human cognition, Hayles contends that their traits are more analogous to a cognitive unconscious. As she puts it:

Like human nonconscious cognition, technical cognition processes information faster than consciousness, discerns patterns and draws inferences and, for state-aware systems, processes inputs from subsystems that give information on the system’s condition and functioning. Moreover, technical cognitions are designed specifically to keep human consciousness from being overwhelmed by massive informational streams so large, complex, and multifaceted that they could never be processed by human brains. (p. 11)

A major concern of Hayles’ work in the humanities is therefore centred on the increasing disappearance of human cognitive consciousness from technical processes.

This article will persist in probing these two alternative kinds of approaches to the nonconscious. But for now, some cursory comparisons and contrasts need to be made. Notably, both approaches readily align themselves to neuroscientific notions of the nonconscious and expand this notion to nonhuman worlds. However, whereas new materialism expands the capacity of affect to an inclusive human and nonhuman world of agential organic and inorganic matter, the cognitive nonconscious makes a categorical distinction between selected cognizant actors and noncognizant agents dependent on their capacity to choose, decide and interpret.

## Where is Consciousness?

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Hayles’ (2017) formulation of the cognitive unconscious is based, in part, on a critique of new materialism (chapter three). It is worth noting that this critique begins with some affirmative observations. For example, the new materialist’s effort to decentre the human subject is noted as a welcome move against “human exceptionalism” in the humanities, which, she contends, has overly focused on a “privileged special category” imbued with language, rationality, and higher consciousness, to the detriment of the human’s “continuum with nonhuman life and material processes” (p. 65). Furthermore, Hayles seems to particularly admire the strong ontological commitment new

materialism has to a conceptual foregrounding of a materiality that is vibrant rather than passive, and exists in metastable, dynamic processes, and assemblages with transformative potentials. Hayles continues:

After the baroque intricacies of the linguistic turn, [new materialist] approaches arrive like bursts of oxygen to a fatigued brain. Focusing on the grittiness of actual material processes, they introduce materiality, along with its complex interactions, into humanities discourses that for too long and too often have been oblivious to the fact that all higher consciousness and linguistic acts, no matter how sophisticated and abstract, must in the first instance emerge from underlying material processes. (p. 65)

This initial enthusiasm is, however, a brief concealment of a hefty ontological disagreement concerning the ways in which new materialism frames the nonconscious. The main thrust of Hayles' criticism is what she sees as the conspicuous absence of "consciousness and cognition" (pp. 65-66). Perhaps this is because of a reluctance, she suggests, on behalf of new materialists to "slip [back] into received ideas and lose the radical edge that the focus on materiality provides" (p. 66). Nonetheless, Hayles contends that by separating materiality from cognition new materialism weakens the case for a new materiality since it "erases the critical role played by materiality in creating the structures and organizations from which consciousness and cognition emerge" (p. 66). This is indeed a gritty provocation and one that new materialism should respond to in full. However, for now this discussion will simply ask if consciousness is erroneously or purposely missing from new materialism, or is there a more nuanced understanding of how nonconscious affect relates to consciousness.

At the outset, if we again peruse Gregg and Seigworth's (2010) *Affect Theory Reader* we can see how Hayles' suspicions have most probably been fuelled by what appears to be the celebratory zeal of some authors who see the role of the nonconscious in one of affects theory's main achievements; that is to say, "affect's displacement of the centrality of cognition" (p. 5). To be sure, affect theorists have enthusiastically drawn on various neurological conditions like synaesthesia to destabilize the study of discrete "cognitive modes" in preference for "sensual interconnection" (Highmore, 2010, pp. 119-20). Moreover, Brian Massumi's influential focus on affective intensities are posited in such a way as to "transform", "translate" or even go "beyond" cognition (Bertelsen and Murphie, 2010, p. 147). Similarly, Anna Gibbs (2010) argues that affect "prompts a rethinking of just what is meant by cognition at all" (p. 200). After affect theory, Gibbs argues, there can be no "pure cognition... uncontaminated by the richness of sensate experience, including affective experience" (p. 200).

However, these attempts to weaken cognition do not entirely ignore emergent consciousness. Hayles' observation of its conspicuous absence from new materialism has been, it would appear, somewhat selective. Indeed, through its embracing of the nonconscious, new materialism has arguably developed a far more nuanced understanding of cognition. As Megan Watkins (2010) points out, although nonconscious affects operate "independently, accumulating as bodily memory," and "may evade consciousness altogether," they also *aid* cognition and *induce* behaviour (p. 279). Indeed, this bodily memory—related in so many ways to Damasio's somatic marker hypothesis—does not become separated from cognition, but purposefully weakens the grip of the cognitive frame on what it means to think. As Gregg and Seigworth (2010) argue:

In practice, then, affect and cognition are never fully separable—if for no other reason than that thought is itself a body, embodied. (pp. 2-3)

Other affect theorists do not entirely disregard cognition either, but see it as the "end product;" that is to say, the point at which the intensity of nonconscious affect arrives as a "conscious emotion in the mind" (Probyn, 2010, p. 77). Along similar lines, Massumi (cited in Thrift, 2007) grasps cognition in the sense that it completes the "capture and closure of affect" (p. 180). The key difference here is that rather than seeing higher order cognitive processes, like perception, attention and memory, as the end product of a levelling up process, affect theory favours a kind of emotional cognition as the most intensive expression of this capture. Others, like Lara (2018), explore both the "restrictive capacities of consciousness" and the "influence" consciousness has on environmental conditions assumed to affect a person (p. 39).

This repositioning of cognition also presents contrasting alternatives to the important ethical considerations Hayles draws attention to. For example, her concerns over the potential disappearance of human consciousness from intelligent technical systems draws on Thrift's (2004) technological unconscious as the basis of a model of *automated cognition* that bends "bodies with environments to a specific set of addresses without the benefit of any cognitive inputs" (p. 177). On one hand then, Hayles (2017) uses Thrift's idea to argue for an expanded cognitive framework focused on "meaning and interpretations," which would operate like a *bridge* between the "traditional humanities and the kinds of nonconscious cognitions" performed by AI algorithms (p. 176). Such a bridge would bring together the technical cognitive nonconscious of the algorithm and "those humans who design and implement them" (p. 176). Clearly, there is much to be commended in Hayles' desire to make the humanities position on technology more immediate and less aloof. But arguably, on the other hand, Thrift's technological unconscious presents a more complex account of the role con-



consciousness plays in technological systems. It is not simply the case that human cognition has been cut of the operations of these technical cognizers. On the contrary, it is more a case of a wider *capture of thinking* that feeds on the precarious weaknesses of a human consciousness subjected to techno-capitalism. As Thrift (2007) argues:

Consciousness can be depicted as though it hardly existed, as an emergent derivative of an unconscious. Yet it is clearly dangerous to make too little of cognition, as I perhaps did in some of my early papers. Because it is so weak (though hardly as weak as some commentators have depicted it), it has enrolled powerful allies which can focus and extend conscious awareness – various configurations of bodies and things which, knitted together as routinized environments, enable a range of different technologies for more thinking to be constructed. (pp. 6-7)

It is as a consequence of this *capture of thinking* that Thrift argues that we need to “pay more attention to the precognitive” (p. 7). This is not, then, a technological non-conscious that merely usurps the human cognizer. Indeed, it has been argued recently that human emotion can, for example, become deeply interwoven with automated financial algorithms (Borch and Lange, 2017). On the contrary, the technological non-conscious is a system that taps into precognitive affects in order to steer intentions before the autobiographical self has a chance to even become aware that decisions have been made.

## On Matter: Information, Assemblages and Contagion

Hayles (2017) begins her thesis by relocating cognition outside of the cybernetic model of consciousness and rejecting the legacy of cybernetics in “the computation of the cognitivists” (p. 12). Here again we can grasp the influence of the neurosciences on the cognitive frame as it too moves away from the overly exhausted computer/brain metaphor towards a new paradigm that encompasses the non-conscious. Following this logic Hayles remarks that there is a growing recognition in the neurosciences that neuronal processes are not “fundamentally computational” (p. 13). Indeed, there is increasing support for an embodied and biologically constituted kind of cognition that is not simply restricted to an image of cognizant human thought (i.e. aware, attentive etc.). This leads to an acknowledgement of the differing contexts in which cognitive processes are assumed to emerge. The cognitive frame therefore expands to include distributed non-conscious neuronal communications between humans, like those established via circuits of so-called mirror neurons (p. 48). More profoundly perhaps, Hayles notes how these embodied contexts can be extended to include some nonhumans; plants, for example (pp. 16-20). Indeed, it is this concept of cognition as “a broad

compass” that leads her to further incorporate technical contexts into the category of cognizers (pp. 20-25).

Evidently, this neurologically-inspired appeal to broader contexts of cognition points to some fundamental collisions with new materialism. Particular attention is drawn here, as such, to Hayles provocative use of the term assemblage to explain how these broader contexts of the cognitive nonconscious are distributed exclusively through networks of cognizers (chapter five). To begin with, although Hayles claims to manoeuvre away from computational metaphors towards an embodied model of cognition, her concept of cognitive assemblages retains many of the conventional metaphorical references to engineering terms to support the categorical division between cognizers and noncognizers. Most notably, the cognizer/noncognizer categorization is dependent on the role of *flows of information* and *information processing* (pp. 115-16). As follows, the cognizer actor is made distinct from the material agency of the noncognizer since the former can *act on* information received while the latter can only be *harnessed* as an agent of information flow (pp. 28-29).

Moreover, albeit recognizing that information is context-dependent (p. 22), Hayles remodelled cognitive framework is, on one hand, determined by fairly conventional computational operations, such as the levelling up from “layers of interactions from low-level choices, and consequently very simple cognitions, to higher cognitions and interpretations” (p. 13), and on the other, a noncognitive material world defined by a lack of such operations; that is to say, the noncognizer is an agent that cannot process information in order to, for example, decide. For example, a “tsunami,” Hayles notes, “cannot choose to crash against a cliff rather than a crowded beach” (p. 3). In other words, although human decisions, climate change, the self-organising forces of matter that constitute a storm and human death are interconnected, the middle two are only regarded as a passive part of an informational loop, defined, in effect, by a lack of information processing power.

Ultimately, Hayles presents a differently orientated materialism, claiming that the cognitive nonconscious is all about “matter, energy, and *information*, [and] not only matter in the narrow sense” (p. 218 italics added). Therefore, the categorical border line between cognizers and noncognizers only includes plants and technical systems since they “share certain structural and functional similarities” with a model of human cognition defined by a capacity to act on the “flow[s] of information through a system and the choices and decisions that create, modify, and interpret the flow” (p. 116). This ensures that material agents and forces outside of these structures must take a back-seat to the “cognizers within the assemblage that enlist these affordances and direct their powers to act in complex situations” (p. 116).

There are a few frothy comparisons that can be made between certain aspects of Hayles' cognitive assemblages and new materialist affect theory. For example, the focus on mirror neurons in Hayles' account is fairly reminiscent of Gibbs (2010) work on the processes of affective mimicry in which she argues that the "sharing of form comprises information in the pre-cybernetic sense" (pp. 193-94). Affective mimicry or contagion, like, to some extent, the mirroring neuron circuitry of embodied cognition, becomes an "action on bodies" that in some way goes on to not only affect body chemistry, but also affects attitudes and ideas (p. 194). As Thrift (2007) similarly argues, affective contagion reveals that there is "only a delicate separation between one's own mental life and that of another" (p. 237). Nonetheless, the information flows that pass through Hayles' (2017) imitative cognitive assemblages are in sharp contrast to the assemblages of affective contagion. On one hand, cognitive assemblages are connected by a series of metaphorical "channels" through which information is interpreted. These channels begin with a lower level "signal-response" system like those assumed to function in mirror neurons, for example, but have since evolved into a higher level linguistic channel (p. 128). In other words, these channels form information loops or "network hardware" through which mimicry travels on its way from lower level social signals to higher level verbal codes (p. 128). As follows, we find a "trajectory analogous to nonconscious cognition developing first, with consciousness emerging later and being built on top" (p. 128). On the other hand, according to Thrift (2007), affective contagion is considered as a mixture of occurrences produced in an encounter between bodies and events outside the cognitive frame, including "hormonal flux, body language, shared rhythms, and other forms of entrainment" (p. 236).

Affective contagions are experienced as semiconscious flows of sensation "moving through the bodies of human and other beings" rather than information flows in the "thin band of consciousness we now call cognition" (p. 236). Indeed, these broadly understood bodies are like "receivers and transmitters" in the sense that they perpetually move messages on, but bodies not restricted to information flows; they are also receivers and transmitters of feelings and affects as well as attentive energy (p. 236). Indeed, a child who mimics an aeroplane, for example, does more than simply make a cognitive *choice* to imitate. The child is exposed to an affective *force* of encounter, which not only affects the child's desire to imitate, but *passes on* a transformative feeling to other parts of the assemblage. Unlike the context dependent nature of cognitive assemblages then, connected by embedded informational channels, affect is independent of context. The force of affective encounter is transposed, as such, *across* contexts.

Probably the most marked differences between cognitive and new materialist assemblages is in effect noted by Hayles (2017). Indeed, whereas she sees Deleuze and

Guattari's assemblage theory leaning on "connotations of connection, event, transformation, and becoming" and favouring "desire, affect, and transversal energies over cognition," the cognitive assemblage aims to offer a broader definition that includes a "provisional collection of parts" that are in a...

Constant flux as some are added and others lost. The parts are not so tightly bound that transformations are inhibited and not so loosely connected that information cannot flow between parts. (pp. 117-18)

As Hayles puts it, the most "important connotation" of cognitive assemblages is the...

Implication that arrangements can scale up, progressing from very low-level choices into higher levels of cognition and consequently decisions affecting larger areas of concern. (p. 118)

There is, then, an important distinction that needs to be made between the *leveling up* of cognitive assemblages and the *force* of encounter in new materialism. In the case of the latter, Hayles points to examples of what she regards as careless new materialist accounts of forces that are supposed to work *transversally* across micro and macrolevels. The issue is, she argues, that forces operate differently at certain levels, and therefore need to be approached with more careful consideration of mechanism specifics. The microlevels of bacterial life or quantum physics, for example, have very different kinds of forces in operation, she claims, to those that might occur on a macro socio-political or cultural level.

Hayles criticism of the forces of new materialism hinges on what she calls the restrictive ideological leanings toward "Deleuzian deterritorializations" (p. 73). However, this line of argument, focused as it is entirely on deterritorializations, perhaps misses the complex relations expressed in assemblage theory. Indeed, with every potential deterritorializing line of flight there is the possibility of a territorial refrain or new territorialization or reterritorialization (Deleuze and Guattari, 1987, pp. 310-50). This is not to be misunderstood as a material relation in the narrow sense: The force of one object exerting a force on another object. Neither is it complete chaos, but rather it concerns complex compositional planes in which different kinds of forces are expressed, including those found in far-from-equilibrium systems and systems at equilibrium, as well as chaotic and closed deterministic systems.

Further limitations become apparent in cognitive assemblage theory's initial commitment to Damasio's levelling up process from proto to core self. This is because the theory presents a neurocentric model of emergence that ultimately informs the subsequent ways in which cognition is distributed to a select group of biological and non-

biological contexts (the nonhuman cognizers). To be sure, what is lost in Damasio's model is an understanding of how these exterior, distributed relationalities operate beyond the closed interiority of neuronal interactions. As follows, Damasio (2000), like LeDoux (2003), contends that the coherent sense of self individual humans experience at the higher level of cognition is an emergent outcome of nonconscious interactions located *inside* the microlevel of synaptic functionality. This is not to say that the emergence of the self that says "I" is produced by a brain that is entirely immune to implicit affective somatic experiences. Nor is it a self wholly composed of purely explicit cognitive functions (perceptions, attention, memory, etc.). On the contrary, the core self emerges from nonconscious experiences of the material world in the wider sense. However, unlike new materialism, which focuses on nonrepresentational and precognitive tendencies of affect, the guiding principal of the protoself takes the form of a series of hardwired representations of the organism itself located *inside* the brain at various levels. It is these bodily representations that are supposed to maintain the coherence of self. This is what Damasio (2000) considers to be the most likely "biological forerunner" of the sense of a "preconscious biological precedent" (p. 21). It is the various neuronal interactions between the levels of protoself and autobiographical self that produce more elaborate representations experienced at a higher level of consciousness as identity and personhood. The sense of self therefore emerges matryoshka-like through a levelling up of representations that are interpreted at the higher level of consciousness.

Similar to Hayles, then, Damasio's model also seemingly breaks away from the old cybernetic models of consciousness, but there is a familiar and problematic retention of the metaphorical concepts of information processing and representational storage inherited from cybernetics (Sampson, 2016, pp. 126-29). Nonetheless, Hayles (2017) argues that the process of levelling up is crucial to the framework of nonconscious cognition. She concludes:

The specific dynamics operating at different levels provide a way to distinguish between material processes and nonconscious cognition as an emergent result, as well as elucidating the modes of organization characteristic of consciousness/unconsciousness. (p. 69)

## Conclusion

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The focus of this short article has been on a theoretically contested neurological notion of the nonconscious that has influenced two differently orientated strands in the posthumanities. On one hand, the new materialists and their brand of affect theory

have, for most part, welcomed a neurologically defined nonconscious as support for the principal idea that the cognitive conscious is a late arriver, and as a result, much weaker than the anthropocentric humanities had assumed. Indeed, the focus is less on the emergence of consciousness than it is on alternative concepts of bodily *thought*, mind controlling precognition and vulnerabilities to affective contagion. More importantly perhaps, and despite drawing on the neuroscientific nonconscious, new materialism remains committed to inclusive assemblages of sense making that bring together, for example, neurons and the self-organising matter of a storm, without a brain. This is a flat ontology that does not preconceive of the ascendancy of bifurcated human consciousness, but rather looks to transformations that arise through the human and nonhuman meso-levels of material relations. As follows, new materialist theoretical understandings of nonconscious assemblages foreground the importance of *relations of exteriority*.

On the other hand, Hayles neurologically-inspired expansion of the cognitive frame beyond the human brain claims to get a little closer to the new materialist's assemblage theory (p. 117). However, as well as criticising its lack of attention to emergent consciousness, Hayles also decries new materialisms overreliance on encounters with ill-defined physical forces and for overlooking the detail of specific level processes through which cognition is assumed to emerge. Perhaps these are legitimate criticisms, particularly if one agrees with Hayles' assessment that the excesses of Deleuzian terminology can obfuscate the detail of concrete examples of force and shroud them in ideological assumptions rather than empirical knowledge (p. 79). In many ways though, Hayles has simply replaced the anthropocentric structures of the humanities with a neurocentric posthumanities. The ontology of Hayles' cognitive frame thus begins in the microscales of the material brain before it emerges as a distributed macroscale consciousness. This neurocentric model of emergence is consequently analogically related to broader contexts of neuron-like tendencies in plants and some technical systems. This is a levelling up of a metaphorical brain understood as mostly determined by *relations of interiority*; that is to say, these level-interaction neurocorrelates established between micro-neuronal transmissions and their subsequent journey to macro mental faculties come to define the entire cognitive assemblage.

Arguably, the entire basis of Hayles' tripartite diagram of the (human) cognitive frame (p. 40) begins from the starting point of the neurological cognitive nonconsciousness and works backwards to explain everything that comes before and after. To be sure, this diagram positions modes of awareness and material processes on either side of the cognitive nonconscious, but the emergent relations that might connect

matter and consciousness are limited by way of a commitment to flows of information and information processing. Finally, the levelling up of cognitive processes between micro and macroscales is perhaps as nebulous as the forces of new materialism, but it also discriminates between those things with cognitive powers and those things without. Given Hayles' own concern for the Anthropocene and the new "reality that human actions are unleashing forces far beyond our ability to control them" (p. 83), then it would seem that an alternative ethical response might be to embrace the forces of this noncognitive world and see them as part of more inclusive sense making assemblage.

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